

Recommendations to the Standing Committee on Environment and Sustainable Development

Please see below for recommendations related to an ongoing study being undertaken by the Standing Committee on Environment and Sustainable Development:

1. That, pursuant to Standing Order 108(2), the committee undertake a study of clean technologies being researched, manufactured, and utilized in Canada to reduce greenhouse gas emissions and reduce harms to the environment; that the study also include how Canadian clean technologies can be used to reduce global emissions; that the study consist of no fewer than six meetings; and that the committee report its findings to the House.

With respect to this study, the committee should consider the ways that polytechnics support businesses to develop and adopt clean technologies, products and processes. The proven success of institutions when it comes to delivering innovation supports to a diverse group of partners presents an opportunity to activate this capacity across the country.

Polytechnics and colleges occupy a unique space in the research and innovation ecosystem. They are experts at moving ideas into the economy and society, contributing to economic growth and improving social outcomes. Institutions serve as innovation intermediaries that help organizations of all sizes adopt, implement and commercialize new products and processes through applied research.

Applied research refers to a wide range of innovation activities delivered in partnership with private firms, not-for-profits and community organizations. Polytechnics receive support for this work through the College & Community Innovation Program (CCIP) administered by the Natural Sciences and Engineering Research Council of Canada (NSERC). CCIP is the only federal program specifically designed to activate polytechnic applied research capacity. Established in 2004 as a pilot with \$600,000 in funding, it now provides \$85 million annually to 119 eligible institutions.

Meeting Canada's climate ambitions will mean moving beyond the technology, systems 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 are critical complements to carbon taxes and other market-based levers.

Canada's polytechnics are both living laboratories for sustainability and hubs for environmentally focused research. Polytechnics are recruiting experts to drive a sustainability research agenda and mobilizing knowledge so that best practices can be shared and scaled. Environmental applied research also engages student talent, helping to train the green workforce Canada requires.

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.

The promise of applied research is clear. In 2020-21, the 13 members of Polytechnics Canada conducted more than 3,700 research projects, addressing the needs of 2,600 partners. These projects and partnerships resulted in 3,300 prototypes being developed for firms of all sizes and across all sectors, most notably cleantech.

Year-over-year, there is increasing evidence that the polytechnic and college sector’s capacity to deliver solutions has outpaced the funding envelope. Consider the current program realities:

- The number of eligible institutions continues to grow
- Demand for recent program competitions has far exceeded available funding
- Some grant types cannot be offered regularly due to budgetary constraint

Polytechnic and college applied research is lumped with academic science and research more broadly. Funding flows from the same Tri-Council investments but represents only about 3 per cent of the total. Meanwhile, government interventions designed to support business productivity, growth and cleantech adoption often leave innovation intermediaries like polytechnics on the sidelines, ineligible to apply even with identified business partners in tow.

We estimate our members have the capacity to more than double innovation outputs. At a minimum, this means providing close-to-market, climate conscious, innovation support for more than 5,200 small- and mid-sized business partners every year, in addition to the thousands of other partners served by the larger college sector. Because colleges are located in communities across Canada, they are positioned to serve the needs of businesses large and small, urban and rural.

Polytechnics Canada is recommending a five-year commitment that recognizes and secures the college sector’s capacity to facilitate the widespread adoption of clean technologies and deliver innovation, productivity and commercialization services across Canada.

	Annual Funding Floor	Incremental Investment/year	Total Funding/year
2022-23 (Current)	\$85M	-	\$85M
2023-24	\$85M	+ \$50M	\$135M
2024-25	\$135M	+ \$7M	\$142M
2025-26	\$142M	+ \$8M	\$150M
2026-27	\$150M	+ \$9M	\$159M
2027-28	\$159M	+ \$11M	\$170M
Ongoing	\$170M	-	\$170M

Environmental & Sustainability Capacity Examples

Algonquin: Carbon Emissions in Heritage Buildings

The 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.

British Columbia Institute of Technology: Virtual Clean Energy Training for First Nations Communities

The British Columbia Institute of Technology (BCIT), in partnership with Siemens Canada, Denesoline Corporation (Łutsël K'é Dene First Nation's wholly owned subsidiary) and the Digital Supercluster, is empowering Indigenous communities by providing an online vocational training program in Clean Energy Power Plants. Many rural northern communities, such as Łutsël K'é Dene First Nation are powered by diesel, which can be detrimental to both the environment and the health of residents. This project works directly with Łutsël K'é Dene First Nation in the Northwest Territories to create a virtual experiential training platform in Clean Energy Power Plants to create Indigenous capacity to operate and maintain clean energy microgrid systems.

Conestoga: Advanced Technologies for Electrical and Electronic Equipment Waste

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. Conestoga's NSERC Industrial Research Chair for Colleges in Advanced Recycling Technologies for Waste Electrical and Electronic Equipment, Dr. Hamid Karbasi, has been working 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

Fanshawe: Charging EVs at Home

A joint initiative between Western University's Faculty of Engineering, Fanshawe College's Centre for Research and Innovation and London Hydro is investigating household energy consumption for electric vehicles. EVs produce, on average, only three per cent of the emissions of a similar gas-fueled car. The focus of this research is to determine whether climate factors affect energy use when recharging EVs at home. Researchers are collecting data at different temperatures using smart meters and the Green Button Standard, an initiative that authorizes third parties to access household utility data.

George Brown: Design and Development of a Residential Wind Turbine Prototype

An Ontario Centres of Excellence (OCE) Connections student project is designing and developing a prototype for an urban environment wind turbine that can be used by homeowners to produce energy. The design consists of a standard-sized ventilator driven by wind, with harnessed energy converted into DC power by a generator. The electricity produced can be used to supplement power drawn from the grid. The wind turbine will be designed to be safe in urban environments - with birds, children and pets in mind.

Humber: Accessible Electric Vehicles

A team of Humber students won the inaugural Project Arrow National Annual Mobility Design Competition by designing a fully electric, autonomous vehicle for Canadians living with a disability. "Project Atlas" set out to rectify recurring issues those with disabilities encounter with vehicles on the market today. The winning team has been invited to participate in a co-op term at Autodesk, a software company responsible for developing AutoCAD design programs.

Kwantlen Polytechnic University: Green Business Management and Sustainability Graduate Diploma

Green business looks to reduce, or avoid by design, negative impacts on the local or global environment. Kwantlen Polytechnic University's Green Business Management and Sustainability graduate diploma in business administration is ideally suited to professionals venturing into management at companies that embody or are embracing sustainability. The program provides the knowledge, skills and tools to direct companies and organizations toward environmental and economic sustainability, as well as covering many elements of a traditional business management program.

Northern Alberta Institute of Technology: 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.

Red River College Polytechnic: Repurposed Battery DC Fast Charger

This project involves the second-life use of batteries from the previous Winnipeg Transit Electric Bus Demonstration. The Vehicle Technology & Energy Centre team designed, built and tested the system to utilize repurposed batteries as an energy storage system (ESS) to power a 25-kW direct current fast charger. The ESS is charged at off-peak times and stores energy for peak-time use. The charger is equipped with a combined charging system and dispensers to accommodate most electric vehicles.

Saskatchewan Polytechnic: Artificial Intelligence & Machine Learning for the Mining Sector

A research collaboration between Saskatchewan Polytechnic's Digital Integration Centre of Excellence and Cameco has improved their uranium mining processes. The project led to the successful development of a prototype artificial intelligence model for Cameco that shows potential to better predict process outcomes for mining uranium with about 90 per cent accuracy. By utilizing the new methodology, Cameco stands to remove the labour-intensive component of the mining planning process, reducing costs and saving time.

Seneca: Supporting Eco-Entrepreneurs

Seneca and Kingbridge Centre are creating an innovation hub to help entrepreneurs build and scale businesses in the agriculture, food production and processing, energy and environmental sectors. Sharing business development and applied research resources, Seneca and Kingbridge Centre help companies grow and solve challenges related to technology, infrastructure and sustainability. Seneca's contributions include applied research infrastructure and faculty expertise, as well as access to HELIX, Seneca's business incubator and accelerator.

Sheridan: The Integrated Energy and Climate Master Plan (IECMP)

Through its Energy and Climate Master Plan, Sheridan has invested in a comprehensive energy and greenhouse gas reduction solution that enables campus-wide control and metering, building efficiency retrofits, upgraded and expanded heating and cooling distribution, on-site heat and power generation and extensive solar photovoltaic applications. The IECMP provides a long-term platform for ongoing continuous improvement through world-class energy management, provides a robust foundation for deeper emissions reductions over time and enables faculty to develop world-class sustainability, energy and climate curricula. New buildings are built to at least LEED Gold standards with a separately specified energy performance requirement consistent with global best practice.

Southern Alberta Institute of Technology: Building Green Homes

The institution's Green Building Technologies facility recently worked with Woodpecker European Timber Framing to develop a "net-positive" home for a young family with a modest budget. The result is one of three homes worldwide to comply with Living Building Challenge standards, diverting more than 90 per cent of building waste from landfills, harvesting rainwater to meet water needs and ensuring energy requirements are met with roof-mounted solar panels. This demonstration project provides a template for residential green building in Canada.