ALBERTA EDUCATIONAL INSTITUTION RETROFIT MARKET ASSESSMENT

ABSTRACT

Alberta's educational institutions face mounting infrastructure and climate pressures. Deep energy retrofits offer transformative solutions but are hindered by financial, policy, and operational barriers. This market assessment analyzes trends, challenges, and opportunities across post-secondary and K–12 sectors, highlighting financing models, case studies, and policy recommendations to accelerate retrofit adoption and decarbonization

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Strategic Sustainability Consulting is a specialized advisory firm dedicated to advancing practical, high-impact sustainability solutions for organizations and communities. We combine expertise in sustainability reporting, climate strategy, decarbonization planning, and sustainability performance with a collaborative, evidence-based approach to help clients navigate complexity and achieve meaningful results. Through strategic guidance, analytical rigor, and strong cross-sector partnerships, we support the transition to resilient, low-carbon futures grounded in real-world action.

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ALBERTA ecotrust

Sustainable Campus Collaborative, located in Southern Alberta, acknowledges and honours to the traditional territories of the peoples of Treaty 7, which include the Blackfoot Confederacy (comprised of the Siksika, the Piikani, and the Kainai First Nations), the Tsuut'ina First Nation, and the Stoney Nakoda (including Chiniki, Bearspaw, and Goodstoney First Nations). The city of Calgary is also home to the Métis Nation within Alberta (including Nose Hill Métis District 5 and Elbow Métis District 6)

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Executive Summary

Overview

Alberta's post-secondary institutions and K–12 school boards face mounting pressure from a series of related challenges, including modernizing aging infrastructure, enhancing energy efficiency, reducing emissions, all while managing rising energy, operational costs and climate change risks affecting facilities infrastructure. Deep energy retrofits are a critical solution, but widespread adoption remains elusive. Most executive leaders outside of Facilities Management (FM) and Sustainability lack a clear understanding of what deep retrofits involve or the long-term value they deliver. Funding mechanisms are rigid, capital and operating budgets are siloed, and facilities leaders must be prudent about their approach to projects. The way budget cycles are structured means upfront planning costs can't be capitalized unless the project proceeds, which can result in significant upfront project costs being absorbed into already inadequate operating budgets.

Key Challenges

1. Understanding the Full Retrofit Lifecycle: Deep energy retrofits require an end-to-end transformation mindset. The process typically includes baseline assessments, feasibility modelling, capital planning, procurement, implementation, and long-term verification. To successfully shepherd retrofit projects institutional leaders must understand this full lifecycle and how it aligns with academic and financial planning cycles.

2. The education sector in Alberta faces an accumulation of rapidly aging infrastructure. A significant proportion of campus buildings were constructed in the post second war era period of rapid expansion when construction standards were lower. This means that a growing number of major systems and building envelopes have exceeded their end of life posing increasing operational and financial risk to institutions, communities and the province.

3. Budget Pressures, Capital Constraints & Deferred Maintenance: Retrofits often span operating and capital budgets, but these are rigidly separated in most institutions. If a project moves forward, planning costs may be capitalized. If it doesn't, those incurred costs must be absorbed operationally. Implementing a retrofit is often expected to reduce operating costs through energy efficiency, improved climate resilience and insurance costs, but require capital investment. This provincial government mandated accounting practice hinders early action and structural policy changes will be invaluable to helping institutions access solutions. Institutions are dependent on provincial government policies regarding capitalisation which determine institutional approaches to the issue, so working collaboratively to develop prudent approaches would be valuable.

4. Business Case Development and ROI Tensions: Retrofit Return On Investment (ROI) includes both operational (e.g. cost savings, efficiency) and strategic (e.g. emissions, ESG, resilience) benefits. Many institutions prioritize high-ROI, short-payback projects and ignore long-term systemic upgrades with transformative potential. Projects also need

to consider the financial implications of how they mitigate future risks such as utility rate increases, carbon tax increases/ changes, grid destabilisation, and climate risks. ROIs may be hard to achieve even with long term considerations and so the value of this risk reduction needs to be considered. This approach can also make it harder to construct favorable business cases in the future.

5. Funding Challenges and Models in Alberta: Current funding options—operating budgets, provincial Capital Maintenance & Renewal (CMR) funds, Infrastructure Maintenance Program (IMP) and special grants—are limited and competitive and don’t cover the complete cost of deep energy retrofits. As well, IMP/ CMR funding is allocated annually, while retrofit projects run over multiple years. Institutions must commit to projects without knowing they will receive IMP/ CMR funding in subsequent years – a significant financial risk. It would help institutions manage risk if IMP/ CMR funding could be guaranteed for multi-year deep retrofit projects on a sliding scale, for example Year 1: 100%, Year 2: 70% and Year 3: 50%. This approach would facilitate the implementation of valuable multi-year projects that deliver better value for taxpayer dollars. Institutions must provide the bulk of project costs from internal funding sources. Grant funding opportunities from the federally funded Low Carbon Economy Fund (LCEF) have limited funds and so are very competitive.

   Energy Performance Contracts (EPCs) and Energy as a Service (EaaS) models face barriers due to debt classification rules. Public post secondary institutions in Alberta do not have the ability to take-on debt without cabinet approval, as stipulated in Alberta’s Post Secondary Learning Act[1]. In the absence of clear provincial guidance about whether EPC and EaaS are classified as debt, or if so, what the process and requirements are to facilitate accessing debt, institutions are reluctant to pursue them. The province may decide that an EPC or EaaS is impermissible, without stipulating the issues determining that decision. This affects the ability for institutions to engage financial solutions offered by Energy as a Service Company’s (ESCO’s), SOFIAC, Efficiency Capital and the Canada Infrastructure Bank.

6. Systemic Change Requires Systemic Solutions: Alberta needs a coordinated policy framework that enables predictable cost capitalization, risk-sharing, and unique third party financing. Institutional leaders cannot resolve these issues alone—province-wide action based on a framework established by the provincial government is required.

Key Findings

None of these issues can be solved by individual institutions. Alberta needs a coordinated, province-wide approach to

- clarify how early-phase retrofit costs are treated under accounting rules,
- establish principles for distinguishing between capital and operating budgets,
- create clear policies to facilitate performance-based financing,

[1] Alberta. (2003). *Post-secondary Learning Act*, S.A. 2003, c. P-19.5 (current as of May 15, 2025). King’s Printer. Retrieved January 31, 2026, from https://kings-printer.alberta.ca/1266.cfm?page=p19p5.cfm&leg_type=Acts&isbncln=9780779853304&display=html

- develop case studies and playbooks that reduce ambiguity and build confidence.

Alberta is not unique. These same barriers exist in BC, Ontario and other jurisdictions. What's different is how institutions and legislatures have responded. Case studies from institutions in Ontario - Brock University, the University of Toronto, Humber Polytechnic, BC – Thompson Rivers University, and Quebec - Collège Notre-Dame-de-Foy (CNDF), Collège Jean de la Mennais, that have overcome challenges to implement ambitious and successful deep energy retrofits. These cases show how institutions can in phase retrofit delivery and build executive support which is vital to project success. Thompson Rivers University in Kamloops leveraged performance-based incentives and integrated project delivery. The University of British Columbia has pioneered carbon accounting frameworks that integrate with academic mandates. Institutions across the province are opportunistically and steadily investing in energy efficiency on a building by building basis.

These examples show that solutions exist and that Alberta can leverage learnings and approaches from other jurisdictions to create solutions, but these must be tailored to local priorities, funding, governance, and risk appetites.

Alberta Post Secondaries (PSIs) can also learn from K-12 schools, which face similar budget constraints but have successfully pooled procurement, integrated project delivery, and innovative financing models to achieve school board goals. While governance models differ between school boards and PSIs, the technical and project management lessons between the institutions are transferable. For example, 27+ rural school boards collaborated to collectively procure renewable energy from the Bull Creek Wind project. In successfully executing this ambitious collaboration they demonstrated the ability of even small public primary and secondary schools and boards to take ambitious steps to decarbonise while staying within tight budget constraints by working together closely.

To accelerate the widespread adoption of deep energy retrofits in the education sector, stakeholders such as the Alberta Ecotrust Retrofit Accelerator, ESCOs, aggregators, utilities, banks, financing agencies, industry groups, and provincial governments should consider collaborating on executive briefing packages for both post-secondary institutions and school boards. These packages would clearly outline the full retrofit lifecycle, address budget structures and cost treatment, and demonstrate the long-term value of retrofits—not just short-term ROI.

Institutions would also benefit from increased budgetary stability and predictability after the financial challenges resulting from years of budget reductions, reduced international student fee revenue and frozen tuition fees. These challenges have constrained institutional financial capacity to address growing deferred maintenance and the need for deep energy retrofits. Collaborating with stakeholders to develop long term solutions that are better aligned with long term planning will support management and reduction of risk and emissions.

Energy retrofit stakeholders should also consider collaborating to advocate for province-wide changes to financial policy and clarify rules debt, build a shared learning platform, and engage institutional CFOs and boards, not just facilities teams, in project funding conversations, because project financial structure, not technical complexity, is one of the most significant challenge facing energy retrofit projects.

Barriers, Opportunities & Operational Considerations

Background and Context

Any serious discussion about deep energy retrofits must begin with a hard truth: outside of facilities and sustainability teams, with significant competing priorities and challenges it is difficult for leaders in Alberta's education sector to fully understand the challenges and benefits that deep retrofits will deliver. The deep energy retrofit opportunity is an institutional issue and not limited to facilities management, so institutional academic and other operational leaders must also be engaged.

Retrofit solutions considered by institutions in Alberta must take into account the unique circumstances of the province, and factors outside of institutional control, such as geography, climate, grid intensity (mix, efficiency, operating conditions), energy costs and politics that circumscribe solutions institutions consider to meet institutional strategic goals.

Foundational Barrier

At best, there's a vague sense that these projects reduce emissions and save money. However, educational institution decision-makers often lack a clear understanding of the entire process, from assessment and planning through funding and financing to execution and long-term performance tracking. If we want to increase momentum, we need to reduce this gap in understanding. This means briefing executive teams, translating technical solutions into business value, and positioning deep retrofits as strategic investments that strengthen long-term institutional resilience and safeguard teaching and research capabilities—not as one-off sustainability projects.

Project Management Barriers

Education is just the starting line. The real complexity begins once interest turns into intent. Deep energy retrofits require an end-to-end transformation mindset. The process typically includes baseline assessments of energy consumption, system condition, and GHG emissions; feasibility and financial modelling; capital planning and engineering design; procurement, project management, and implementation; and measurement, verification, and long-term operational tuning. Considering the full lifespan of buildings crosses many departments, budgets, and funding cycles. The goal of retrofits is often lost in translation, and blame is passed when communication about these goals is not clear. This journey and process is rarely well understood across institutional leadership and stakeholders. To achieve the positive outcomes we're all working towards, the cycle needs to be better understood by being mapped, phased, and tied to key academic and budget cycles.

Even when support is available, the financial structure under which educational institutions function can become a barrier. They operate under a dual-budget system, with operating funds allocated for short-term service delivery and capital funds reserved for significant investments. Retrofits affect both areas, but they're seldom budgeted accordingly. Institutions are also grappling with the financial constraints stemming from consecutive years of reduced or frozen provincial funding, domestic student tuition, decreases in international student tuition revenue[2] even as inflation continues and costs rise.

For example, if a project proceeds, early-stage costs, such as feasibility studies and engineering, can be capitalized. But, if a project stalls, those costs must be absorbed as operating expenses, often with no budget allocated—this risk chills innovation and progress. Few institutions can afford to absorb six-figure feasibility study costs without a guarantee of project continuation. And feasibility studies are required in order to make informed decisions about the feasibility and prioritization of proposed projects. This makes capital commitment a prerequisite for being able to consider and move forward on projects initially, not just a final hurdle.

Assuming a project advances, funding for delivery must be justified through a business case that captures operational benefits (energy cost savings, catching up deferred maintenance, and operational efficiency) and strategic benefits (carbon reduction, strategic alignment, ESG performance, and risk mitigation). Different institutions and ministries weigh these benefits differently. ROI calculations tend to be conservative. Projects that don't pencil out on a strict payback basis, despite principled long-term value, often get sidelined.

Yet only considering strict payback terms without considering long-term value is an incomplete analysis. In many cases, deep retrofits replace end-of-life infrastructure, reduce growing maintenance costs, reduce system failures, and associated reputational risk, while improving occupant comfort which enhances physical capacity to learn. These are tangible operating benefits but tend to be hard to capture in a just not always captured in the financial analysis and budget approval process. This is an issue identified by NRCan[3] on its website"Why invest in energy retrofits? By investing in retrofits that make your building more energy efficient, you will lower your energy costs, reduce your maintenance requirements, create a more pleasant interior environment for your occupants, increase the value and productivity of your building, and reduce your environmental footprint."

The Cost of Doing Nothing

Without reinvestment in infrastructure, institutions cannot save money. They are accumulating risk, accelerating system failure, and pushing future costs even higher. This is not prudent financial management. Short-term thinking undermines long-term institutional sustainability.

While both K-12 and post-secondary sectors face infrastructure and emissions challenges, their governance, funding, and planning models differ. K-12 school boards typically have more

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[2] Cecil, B. (2025, March). *Sector research project: Issues, impacts & institutional responses within the Canadian higher education sector* (Updated June 2025). Academica Group.Benhttps://academica.ca/wp-content/uploads/2025/06/SRP-Final-Report-Mar-2025.pdf

[3] https://natural-resources.canada.ca/energy-efficiency/building-energy-efficiency/retrofitting

centralized capital controls and shorter planning cycles. Post-secondary institutions operate under board governance with greater autonomy, but they face different approval pathways and are often more impeded by borrowing constraints. Lessons can be shared, but approaches must be tailored.

Cross-Institute Collaboration

School boards have piloted pooled procurement, shared engineering teams, and delivery frameworks that could also benefit PSIs. In a webinar hosted by Alberta Energy Efficiency Alliance[4], Edmonton Public School Board leadership described their successful use of Integrated Project Delivery to implement energy retrofits at lower cost. While mandates and governance differ, shared playbooks can support the acceleration of retrofitting across both sectors. For example, 25 rural school boards pooled purchasing power to build and source 29.2MW of renewable energy from the Bull Creek Wind project[5].

Funding

When it comes to funding, the sector faces multiple limitations: its operating budgets have been under pressure for years. Redirecting them toward retrofit planning is difficult without impacting core services. In Alberta, provincial funding for Capital Maintenance Renewal (CMR) funds are earmarked for critical lifecycle replacements. Using them for deep retrofits may worsen the deferred maintenance backlog and increase financial and operational risk, because it is not always the case that deferred maintenance addressed during energy retrofits is the highest priority deferred maintenance. For example, a college may decide to delay replacement of a roof that is nearing end of life and instead direct its annual capital allocation into an energy retrofit, which will simultaneously address deferred maintenance issues related to an aging boiler, building envelope and lighting. The roof may subsequently experience unexpectedly heavy snow loading and damage, creating significant financial and operational risk as a result.

Special sustainability grants, periodically available from provincial and federal funding may offer matching funds, but are episodic, competitive, have short application timelines and often include difficult to fulfill requirements. This means you can’t rely on them for long-term planning. These grant therefore require institutions to have the resources, good fortune, timing to enable them to be opportunistic, with shovel ready projects ready to go when funding opportunities arise, a requirement that is increasingly infeasible given the many constraints on institutional financial capacity. Also impeding institutional capacity to take advantage of opportunities are controls and approvals implemented in 2024 in the Alberta Priorities Act[6], which increased the obstacles institutions face to access federal funding.

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[4] Alberta Energy Efficiency Alliance. (n.d.). *Collaborative project delivery for school energy retrofits*. Retrieved January 31, 2026, from https://www.aeea.ca/resources/learn-how-epsb-uses-integrated-project-delivery-to-bundle-school-retrofits-within-constrained-cmr-funding/

[5] https://www.pembina.org/blog/wind-farm-powers-500-alberta-schools, https://bluearthrenewables.com/projects/bull-creek-wind-facility-2/

[6] Alberta. (2024). *Provincial Priorities Act*, S.A. 2024, c. P-35.5 (current as of August 27, 2025). King’s Printer. Retrieved January 31, 2026, from https://kings-printer.alberta.ca/1266.cfm?page=P35p5.cfm&leg_type=Acts&isbncln=9780779857531&display=html

Private-sector financing through Energy Performance Contracts (EPC) or Energy-as-a-Service (EaaS) and funding available from Canada Infrastructure Bank aggregators are options, but they introduce governance, debt recognition, and repayment complexities (see Appendix D). Debt treatment is a key constraint. Alberta institutions have limited borrowing authority, because of the provincial legislation that governs their ability to borrow. Even models that utilize third-party capital may still be considered debt under provincial accounting rules, particularly if future cost savings are required to repay the investment. Without explicit provincial policy enabling these models, uptake will remain low.

Trends and Expectations

Several key trends are shaping the retrofit market in Alberta's educational sector:

- **Financial Challenges:** K-12 and post-secondary educational institutions across the province are facing significant financial pressures. They've been impacted by significant inflation of both goods and services. This cost pressure is exacerbated by constrained revenue, with caps on domestic student tuition and international students, as well as reduced funding from the provincial government.

  These pressures have resulted in increasing K-12 institutions student – teacher ratios, layoffs and program closures at post-secondaries across Alberta. Facilities management is viewed as a cost driver by decision makers, secondary to teaching and research, so these financial pressures are increased deferred maintenance and reducing resources available for deep energy retrofits.

- **Energy Efficiency and Sustainability Standard Expectations**: There's an increasing demand from students, staff and academics and community stakeholders to improve institutional performance on sustainability generally, including reducing energy consumption and minimizing carbon footprints, prompting institutions to invest in green technologies and sustainable building practices.

  In order to take advantage of technological advancement, capital renewal plans and design processes need to embed improvements in energy efficiency so that opportunities are taken to disrupt complacent "like-for-like" processes. Identifying and designating energy retrofit champions can play a role, as can educating institutional facilities staff about the opportunity.

  For post-secondaries this means that they increasingly need to consider participating in sustainability reporting standards, such as Association for the Advancement of Sustainability in Higher Education (AASHE) Sustainability Tracking, Assessment Rating System (STARS), and/ or University Times Higher Education (THE) Impact Ratings. Primary and secondary school boards frequently choose to participate in the EcoSchools Program to engage students, staff, parents and community members. Institutions also increasingly connect sustainability and energy retrofit initiatives to the United Nations Sustainable Development Goals.

- **Government Programs and Private Capital**: There are currently numerous programs and opportunities simulate interest in exploring the viability retrofits.
    - Leveraging Ancillary Service related infrastructure (residences, parkades, retail spaces, etc.) that do not receive any government or tuition fee related funding but rather are expected to be financially and operationally self-sufficient. It is easier to manage maintenance, energy retrofits and reinvestment through directly related reserves and/ or mortgage through the Alberta Capital Finance Authority (ACFA).
    - Leveraging provincial Capital Maintenance & Renewal (CMR) funds, Infrastructure Maintenance Program (IMP),
    - Accessing federal grant funding opportunities through programs like NRCan's Low Carbon Economy Fund (LCEF),
    - Accessing funding programs like the Canada Infrastructure Bank Building Retrofits Initiative, and aggregators provide lower cost funding to retrofit projects, partially by leveraging their access to low cost CIB funding.
    - Energy Service Companies and utilities provide capabilities to help institutions tackle technical, operational and financial challenges institutions face in undertaking energy retrofit initiatives and leverage their access to CIB funding (see Appendix G).
    - NRCan funded Alberta Ecotrust Retrofit Accelerator, which provides a free coaching service to guide building owners and managers through the process of making deep energy retrofits to their buildings, including in the educational sector.

- **Technological Advancements**: Increasing adoption of advanced technology, such as building automation systems, metering,electrification, renewables, battery storage, improvements in building envelopes, data management, desktop software together with Deep Retrofit Planning (DRP) leveraging artificial intelligence, etc. support the ability of institutions to understand complex building energy performance to improve energy efficiency and reduce emissions. Supporting the widespread use of the tools will help accelerate adoption and accelerate performance improvements.

Case Studies: Key Lessons from Canadian Post-Secondary Energy Retrofit Projects

Post-secondary institutions across Canada are transforming their campuses to meet ambitious decarbonization and energy efficiency goals. The six case studies examined here—University of Toronto (UofT), Thompson Rivers University (TRU), Humber Polytechnic, Brock University, Campus Notre Dame-de-Foy (CNDF), and Collège Jean de la Mennais—illustrate diverse approaches and innovations in financing, technical solutions, and implementation strategies. Despite differences in size, climate, and legacy infrastructure, all share a commitment to reducing greenhouse gas (GHG) emissions, modernizing aging systems, lowering operating costs, and enhancing resilience. For further details about UofT, TRU and Brock's accomplishments consider watching the recording of a panel discussing their learnings[7].

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[7] Sustainable Campus Collaborative. (2025, November 5). *AEF tackling financial barriers: Deep retrofits in educational institutions* [Video]. YouTube. https://www.youtube.com/watch?v=DQTC8jHx0Pc

The following section outlines the differences and similarities between the various case studies. For details on each of the campus projects, see Appendices A-C.

Funding

A central challenge for all institutions was financing major infrastructure projects without overburdening budgets. This challenge has been exacerbated by significant cumulative operational budget cuts by provincial governments together with significant decreases in international students and the much higher tuition revenue that they pay.

Funding Models:

1. Performance-Based / Turnkey Models: Institutions like CNDF and Jean de la Mennais accessed SOFIAC's services which guarantee cash flow positivity, depending on the sales split with the client as well as guaranteeing that the client will never pay more than their portion of the agreed-upon split over the duration of the contract.
2. Utility Partnership Model: TRU partnered with Creative Energy, a regulated district energy utility, shifting capital risk to the partner while paying a stable regulated rate.
3. Deferred Maintenance Integration to support financial case: Humber, Brock, U of T, Campus Notre Dame-de-Foy (CNDF), and Collège Jean de la Mennais integrated end-of-life system replacements into decarbonization projects, strengthening the financial case.
4. Blended Funding Models: All projects used a mix of federal, provincial, and utility incentives to de-risk capital investments. Funding sources include the Canada Infrastructure Bank (CIB) at U of T and the federal Low Carbon Economy Fund (LCEF) at Brock. CIB funding is difficult to access, with minimum project bundles of $55M+ which few institutions can meet and the LCEF application process is very competitive.

Differences:

a. Ownership & Risk: Ontario institutions (U of T, Humber, Brock) owned and managed their systems using public funding and internal capital. TRU outsourced operation and risk under a regulated utility framework, while CNDF and Jean de la Mennais relied on SOFIAC's program.
b. Strategic Alignment: Projects embedded in long-term campus energy plans, such as Humber's IEMP, University of Toronto's Leap, Thompson Rivers University's LCDES and Brock's Carbon Reduction Plan worked closely with boards to advance strategically mandated projects.

Deferred Maintenance

Aging energy infrastructure and deferred maintenance were both challenges and opportunities.

Commonalities:

a. Capital Renewal as Decarbonization: Projects replaced outdated boilers, steam networks, and distribution piping with low-temperature hot water systems, cutting emissions and renewing infrastructure. Facilities Leaders need to systematically consider options to improve energy efficiency and performance and not simply replace "like for like".

b. Asset Life Extension: TRU and Brock revitalized under-utilized electrical infrastructure during upgrades, improving campus resilience.

c. Optimized Sequencing: Institutions integrated building retrofits—envelope, lighting, automation—with central plant upgrades to reduce heating loads before investing in new systems.

Differences:

a. Scale of Backlog: Brock addressed a significant backlog in electrical distribution equipment dating to the 1960s, while Humber retired a 1970s-era steam network.

b. Strategic Timing: CNDF and Jean de la Mennais used turnkey solutions to tackle deferred maintenance in tandem with energy retrofits.

Technical Solutions – Evaluation & Choices

Technical strategies reflected both regional energy contexts and legacy infrastructure. Institutions often undertook comprehensive assessments of potential solutions before committing to a particular technological approach.

Commonalities:

a. District Energy Transformation: U of T, TRU, Humber, and Brock modernized district energy systems, shifting from fossil-fuel steam or hot water to low-temperature hot water loops powered by heat pumps, geo-exchange, and electric boilers.

b. Heat Recovery & Hybrid Systems: Humber's SWITCH project recovers waste heat from chilled water systems, supplying up to 40% of campus heating needs. Brock combined electric boilers and heat pumps with legacy equipment for resilience.

c. Building-Level Efficiency: All institutions paired central plant upgrades with building envelope improvements, advanced metering, and automation, lowering energy demand.

Differences:

a. Technology Pathways:

- U of T invested in urban geo-exchange paired with deep energy retrofit
- TRU adopted a two-stage ASHP/WSHP hybrid for cold climates
- Humber is phasing in geothermal baseload plus battery storage
- Brock emphasized data-driven SCADA/BAS integration capping off years of investment in energy retrofits.
- CNDF and Jean de la Mennais focused on retrofits—heat pumps, lighting, HVAC, and controls.

Impacts: Decarbonization, Costs, and Performance

The projects highlighted by these case studies were initiated to help institutions achieve strategically mandated goals, including GHG emissions reductions, energy efficiency improvements and supporting institutional academic missions.

Achievements:

- Deep GHG Reductions: TRU (95% by 2026), U of T (37% by 2030), Humber (net zero by 2029), Brock (67% post-electrification), CNDF (>40%), and Jean de la Mennais (significant reductions).
- Lower Operating Costs: Projects report annual savings reinvested in operations; U of T expects $9M/year in utility savings.
- Enhanced Resilience & Reliability: Centralized or hybrid systems with redundancy improved campus energy security.
- Educational & Engagement Value: All integrated real-time dashboards, living labs, and research opportunities.

Differences:
- Policy Leadership: Institutions leveraged projects to influence local and provincial decarbonization agendas, while smaller colleges emphasized demonstrating replicable models.
- Community & Campus Integration: TRU and Humber emphasized visible sustainability features; Brock is promoting behavioral engagement via mobile competitions.

Lessons for the Sector

From these diverse experiences, lessons emerge:
- Align with Policy and Long-Term Plans: Projects rooted in climate and energy plans secure stronger funding and stakeholder support.
- Integrate Maintenance & Decarbonization: Combining deferred maintenance renewal with decarbonization reduces net project costs.
- Leverage Partnerships & Incentives: ESCOs, utility partnerships, and grants de-risk financing, especially for smaller institutions.
- Phase & Sequence Projects: Early building retrofits reduce loads, improving efficiency and returns on later district energy upgrades.
- Invest in Data & Engagement: Robust BAS/SCADA systems and public dashboards support accountability, research, and behavior change.
- Embed Resilience & Flexibility: Hybrid systems with backup fuel sources and modular infrastructure future-proof investments.

1. **Case Study Summary**

These six case studies demonstrate that achieving deep decarbonization in campus energy systems is both technically and financially feasible. However, as outlined earlier in this report, both the technology and financial structures of retrofits face unique challenges in Alberta.While these examples demonstrate what is possible when strong governance, partnerships, and blended financing align, they also underscore why Alberta has not yet seen similar projects scaled broadly across its education sector. The gap is not primarily technical—it is structural, shaped by Alberta-specific constraints in funding predictability, accounting treatment, and uncertainty around debt classification and approval pathways for performance-based financing.

The “Conclusion and Future Considerations” section that follows distills these Alberta realities—financial capacity limits, policy constraints on borrowing, and the compounding pressure of deferred maintenance—so stakeholders can focus on the highest-leverage changes needed to enable deep retrofits at scale.Success depends on strategic planning, stakeholder alignment, innovative financing, and integration of technical upgrades with deferred maintenance renewal. Together, they offer compelling roadmaps for institutions seeking to reduce emissions, strengthen infrastructure, and embed sustainability as a core element of operations and education.

Conclusion and Future Considerations

Barriers to Deep Energy Retrofits

The challenges faced by educational institutions trying to move deep energy retrofit projects forward are shared by educational institutions across Alberta and Canada. The leading challenges limiting institutions include

- Financial: Institutions have experienced significant ongoing provincial government budget cuts and reduced tuition revenue from international students. This constrains institutional ability to fund energy retrofit projects.
- Policy: Provincial legislation, Post secondary Learning Act[8] restricts public educational institutions from taking on debt and the rules of what the province considers debt aren't clear. As a result, institutions have found it very difficult to borrow to fund retrofits. This has made it unclear whether they can use solutions offered by SOFIAC and ESCOs.
- Deferred maintenance: Growing deferred maintenance backlogs at post-secondary and K-12 institutions increase the pressure on financial and operational resources creating an obstacle for advancing energy retrofit projects.

Recommendations to Overcoming Barriers

To help institutions overcome these constraints the following actions by PSI energy retrofit advocates are as follows:

- Develop briefing packages for Educational Institution Executives that map the retrofit process and cost treatment under accounting rules followed by institutions in the province
- Advocate for province-wide accounting approach to retrofit solutions and policy clarity around the principles determining whether EPC and EaaS solutions will be classified as debt, or not, or make process and requirements to access debt transparent. Solutions to this challenge could include deconsolidation of largest institutions from provincial financial statements. This would allow these institutions to issue bonds and borrow without provincial government approval, giving them more flexible access to money markets, similar to financial market access available to institutions in Ontario.
- Build a shared platform of case studies, dashboards, and resources, while improving access to funding for design planning and develop business cases.
- Engage Educational Institution finance leaders directly to help them overcome structural barriers.

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[8] Alberta. (2003). *Post-secondary Learning Act*, S.A. 2003, c. P-19.5 (current as of May 15, 2025). King's Printer. Retrieved January 31, 2026, from https://kings-printer.alberta.ca/1266.cfm?page=p19p5.cfm&leg_type=Acts&isbncln=9780779853304&display=html

- Consider opportunities to collaborate with financial solution providers, to bridge the policy and information gap with policy makers and legislators.

Case Studies Overview

1. **Humber Polytechnic**
   Humber Polytechnic's Low Carbon District Energy System (LCDES) project was a decade-long campus energy transition anchored in the institutional net zero strategy and building on the successes of the ground breaking Institutional Energy Master Plan and SWITCH project. Humber's LCDES has been implemented through 30+ major efficiency and renewable projects (e.g., building retrofits, controls/metering upgrades, and 1.3 MW of solar PV) to implement a Low-Carbon District Energy System designed to electrify and decarbonize heating and cooling at the North Campus and support Humber's commitment to net-zero Scope 1 and 2 emissions by 2029.

   Humber's SWITCH project converted the legacy steam plant to hot water distribution, a critical project setting the foundation for decarbonisation efforts. It layered multiple low-carbon and resiliency components, including heat-recovery chillers (estimated to supply ~40% of heating needs), a 2 MW electric boiler for off-peak operation, gas-fired hot-water boilers for redundancy/load management, a 4 MWh battery for load shedding as well as being designed to integrate a future geothermal field, all within a broader strategy that emphasizes standardization, self-delivery, and minimizing disruption in occupied buildings.

   The LCDES project is on track to achieve an internal rate of return exceeding the IEMP IRR target rate of 7%. At a cost of approximately $65M the project is realising significant utility savings, $14M to date, savings which are expected to increase over time. Its implementation has been supported by grants/incentives covering nearly half the cost, as well as realising significant capital-renewal benefits, such as addressing $14M in deferred maintenance. Humber's LCDES project (and IEMP process and SWITCH project) provide a set of replicable lessons and insights on goal-setting, engagement, pilots, flexibility, and using deferred maintenance and funding to make decarbonization financially viable.

2. **Thompson Rivers University**
   Thompson Rivers University's Low-Carbon District Energy System (LCDES) project was a campus-wide transition from decentralized natural-gas heating to a renewable thermal energy backbone intended to cut fossil-fuel-based heating emissions by ~95% by 2026, building on TRU's sustainability planning (based on AASHE STARS performance) and electrification pilots that culminated in a full district energy strategy.

   A central feature is an innovative partnership with Creative Energy structured as a regulated thermal utility overseen by the BC Utilities Commission (via CPCN approval), shifting much of the utility-side capital and operational responsibility to the partner while TRU focuses its capital on in-building retrofits and campus priorities.

The selected technical solution is a two-stage heat-pump LCDES using air-source heat pumps for low-grade heat and water-source heat pumps to lift temperatures to approximately ~72°C (65–75°C range), with electric boilers for cold-weather backup and RNG-fueled boilers for redundancy, supported by a digital twin and data access to enable education, engagement, and research; the system is sized to serve 13 campus buildings with room for future integration and expansion.

The financing narrative highlights a blended model including a $50M Canada Infrastructure Bank loan to Creative Energy, approximately $24M invested by Creative Energy in utility assets, approximately $19M invested by TRU in the "Sustainability Powerhouse" and connection retrofits, plus ~$1.7M in Clean Economy Investment Tax Credits and a $1.7M BC Hydro Low-Carbon Electrification incentive, with repayment through regulated rates over a 30-year agreement and projected lower annual utility costs once fully online.

Implementation notes emphasize schedule risk management (heat pumps as a long-lead item), system integration through a campus "stress test" lowering heating-water setpoints to ~65°C, and careful phasing to reduce campus disruption; expected benefits include near-elimination of building-related emissions by 2026, capital renewal/deferred maintenance advantages, real-time energy data for learning, and resilient redundancy through multiple heat pumps/boilers—framed as a replicable pathway for other institutions seeking rapid building decarbonization.

3. **Brock University**
   Brock University's district energy "re-electrification" case study outlines a multi-phase modernization (2018–2025) that moved the campus from natural-gas-based district heating back toward electrification to leverage Ontario's low-carbon grid while improving resilience and learning value.

   The project began with an efficiency retrofit replacing legacy cogeneration engines (eight 820 kW units replaced with four 2 MW models), improving performance and cutting NOx and carbon emissions, then expanded into "big data" integration through a customized SCADA platform, a non-proprietary Niagara Tridium BAS backbone, and an energy management/engagement suite (blackPAC dashboards and EcoBoss competitions) to enable real-time operations, analytics, and behaviour change.

   The culminating DES Electrification phase (2022–2025) shifted the system's primary fuel from natural gas to electricity, adding assets such as electric boilers, VFDs, heat pumps, and valves, and is reported to deliver a 67% GHG reduction while revitalizing stranded electrical infrastructure and addressing deferred capital renewal. The project was financed through $3.6M internal capital plus $2.9M federal funding via Environment and Climate Change Canada's Low Carbon Economy Fund (Champion Stream) and is positioned as a replicable model that embeds the campus as a living laboratory to support Brock's Carbon Reduction Plan targets (75% reduction by 2030; net-zero by 2050).

4. **University of Toronto**

University of Toronto's Project LEAP case study describes a $138M, multi-phase modernization and decarbonization of the St. George campus district energy system—one of Canada's largest urban campus energy networks—aimed at cutting Scope 1 and 2 emissions by >50% by the end of 2027 while addressing end-of-life steam infrastructure and deferred maintenance pressures.

The initiative combines central plant electrification (replacing one natural-gas boiler with two 15 MW electric boilers for steam), six industrial heat pumps feeding a low-temperature hot-water network, and use of an existing 6 MW cogeneration asset, alongside a 368-borehole geoexchange field, deep energy retrofits, network conversion from steam to low-temperature hot water (improving efficiency by ~20–30%), and LED lighting upgrades in 37 buildings—all configured as an interconnected "nodal" network for phased delivery and redundancy.

Financing uses an outcome-based procurement and blended model including a $56M low-interest CIB loan, other incentives, and reinvestment from avoided costs, with proposals scored on performance (technical merit, delivery capacity, financial impact) and contracts tied to guaranteed energy/carbon outcomes.

Expected results by 2027 include ~46,000 tCO_2e annual reductions, 75% less campus fossil fuel use, sustained >99.99% service reliability, plus curriculum/research integration enabled by real-time monitoring and public displays; the case study emphasizes replicable lessons on aligning carbon goals with asset renewal, procuring for outcomes, designing for flexibility, and building cross-sector partnerships.

5. **Collège de la Mennais**
   Collège Jean de la Mennais' SOFIAC case study describes how the 506,000 ft^2 (47,000 m^2) private secondary school in La Prairie, Québec (~1,700 students) delivered a comprehensive decarbonization and energy-efficiency retrofit to modernize aging infrastructure, reduce operating costs, and demonstrate sustainability leadership.

   The project was implemented through SOFIAC's turnkey model (with technical partner C-Nergie), requiring no upfront institutional capital and relying on guaranteed energy cost savings to service a ~15-year, 9-month contract. The ~$3.0M retrofit was strengthened by ~$1.13M (≈38%) in blended incentives from Hydro-Québec, Énergir, and Québec's MELCCFP, and included measures such as lighting upgrades, motor controls, HVAC optimization, heat recovery, pumping/network optimization, and replacement of some gas heating with air-source heat pumps—delivering major energy reductions, significant GHG cuts aligned with provincial climate goals, and progress on deferred maintenance.

6. **Campus Notre Dame-de-Foy**
   CNDF's case study describes a $5.7M comprehensive energy retrofit delivered through SOFIAC's turnkey performance model (no upfront capital for the college), with Johnson Controls providing technical delivery and savings structured to service the SOFIAC contract. The project secured ~$3.054M in incentives (over half of total costs) and reports

outcomes of ~33% energy reduction and >40% GHG reduction (over 600 tCO_2e/year), plus improved comfort, resilience (including demand-response enablement), and strengthened institutional climate leadership.

BROCK UNIVERSITY RE-ELECTRIFICATION CASE STUDY

Deep Energy Retrofit to reduce emissions

ABSTRACT

Brock University's DES Electrification project demonstrates how a post-secondary institution can accelerate decarbonization while improving resilience and educational impact. Building on systematic efficiency upgrades, including engine replacements and advanced BAS/SCADA integration, Brock transitioned from natural gas to an electrified, low-carbon system powered by Ontario's clean grid. Accessing federal funding and internally reallocated capital, the project revitalized aging infrastructure, enhanced energy distribution, and achieved a 67% GHG reduction. By embedding real-time data systems and engaging the campus as a living laboratory, the project advances Brock's goal of a 75% emissions reduction by 2030 and net-zero by 2050, offering a replicable model for other institutions.

Donald Jantz

[Course title]

STRATEGIC SUSTAINABILITY

Brock's District Energy System Electrification – Case Study

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Introduction to Brock University

Brock University is a comprehensive post-secondary institution located on 500 acres within the UNESCO Niagara Escarpment Biosphere Reserve in St. Catharines, Ontario, Canada. It is about 2 hours from Toronto, 20 minutes from Niagara Falls and minutes from idyllic orchards and vineyards dotting the Niagara Peninsula.

Brock is a hub for education and research in the region. Founded in 1964 it has grown into a student body of approximately 19,000 undergraduate and 2,700 graduate students and almost 3 million SF. of teaching and support space. Brock offers a diverse array of programs, including Business, Education, Arts, Sciences, Humanities, Applied Health Sciences, etc. With approximately 5,000 employees Brock is one of the largest employers in St. Catharines, a city of roughly 140,000, and plays a vital role in the local economy serving as a cornerstone of the community's cultural and intellectual life.

At Brock's founding, the Niagara region lacked infrastructure for transporting natural gas, so the campus was fully electric. Only in 1984 did the institution begin to install gas boilers as natural gas became an accessible affordable option and electricity prices were increasing. In 1992 the institution moved fully to natural gas, installing a hot water district energy system, using eight 820kW Caterpillar 3516A engines. Incidentally, this Caterpillar engine model went on to become on of the best-selling reciprocating co-generation engines in the world.

Brock has a history of sustainability stewardship demonstrated through projects since the 1990's when the institution installed combined heat and power generators to improve energy efficiency and reduce energy costs and emissions of the district energy system. In 2018 and 2020 Brock implemented projects to modernize and improve the energy efficiency of its District Energy System. And, in 2021 it approved its first Sustainability policy and published its first Carbon Reduction Plan in 2023. The Plan committed the institution to reducing carbon emissions by 75% by 2030 relative to 2013 levels and achieve carbon neutrality by 2050. The institution updated its five year Energy Conservation & Demand Management Plan for 2024-2029 to guide decision making to achieve the institution's ambitious sustainability goals.

Brock's Carbon Reduction Plan and Energy Conservation & Demand Management Plan provided an important framework to support investments in advanced energy management systems, and electrification to take advantage of clean electricity available from Ontario's electrical grid. These projects demonstrate the institution's unwavering commitment to sustainable development while also requiring strategic financial planning and technical and project management skill to deliver on time and on budget.

This case study aims to provide valuable insights to help other institutions striving to implement deep energy retrofits to reduce emissions and fulfill ambitious sustainability goals while overcoming complex technical, financial and project management challenges. A key aspect in this case study is how previous initiatives were leveraged and integrated to enable this large-scale decarbonization project, providing a crucial perspective on the timeframe and synergies that need to be considered when designing an institution-specific approach to retrofits.

Brock University District Energy System Modernisation (2018-2025)

Brock University's District Energy (DES) Electrification project has been a significant undertaking to improve campus energy efficiency, resilience and reduce emissions. The initiative builds on the institution's legacy of electrification and technological innovation implemented in previous years. This initiative was completed in a multi-phased approach, and it has transformed the university's central heating and cooling plant, and energy management systems to improve its efficiency, reducing emissions, and bolstering resilience.

Phase 1: District Energy Efficiency Retrofit (2018-2019)

Upgrading the core of the district energy system by replacing outdated cogeneration engines with more efficient models. Specifically, eight 820kW 3516A Caterpillar engines were replaced with four more energy efficient 2MW 3516H models that produce 85% less NO_X. These new engines significantly improve performance, increasing electricity output from 6.4 megawatts to 8 megawatts of electricity and generating approximately 7,854 kW of heat. This engine upgrade led to a reduction in NOx emissions by over 85% and a 20% decrease in carbon emissions.

Building on the engine upgrade, this phase focused on optimizing the cooling infrastructure and enhancing the system's operational flexibility.

This phase involved the replacement of an existing absorption chiller unit with a new, more efficient model capable of reliably operating at variable loads, ranging from 50 to 1,000 tons. A new centrifugal chiller, capable of producing 1,600 tons of cooling and equipped with four high-efficiency compressors, replaced an older centrifugal chiller, further enhancing the system's overall efficiency and responsiveness.

Brock University has been working for many years to achieve institutional sustainability goals. The most recent project, District Energy System (DES) Electrification, builds on the established foundations and implements new processes and technology to achieve immediate goals, as well as facilitate progress towards ambitious future goals.

Phase 2: Using Big Data (2020 - 2023)

Brock University has strategically deployed a core set of technologies to achieve its energy goals. The systems and technology support energy management decision making and risk management through efficiency, predictive analytics, and improved control.

Smart System Integration

Supervisory Control and Data Acquisition Server (SCADA) System: Brock recognised that the lifeblood of a modern energy system is its data and that DES modernisation should include commissioning a reliable, industrial grade open-platform communication data systems facilitating access to meaningful timely data supporting real time decision making. As a result, the university installed a SCADA system which was customized to fit institutional needs.

Niagara Tridium Building Automation System (BAS): The old, legacy platform Brock was using in its existing systems was neither compatible nor adequate for the new equipment and operations. Therefore, Facilities Management upgraded its BAS to a non-proprietary system (i.e., Niagara N4 Tridium Platform) as the new backbone for building operations. The new BAS provides the campus with effective, real-time system controls that support effective decision making, enhancing campus environment and risk management.

Energy Management System: To leverage the capabilities of these systems Brock implemented a Distributed Energy Resource Management System, which includes public facing dynamic energy dashboards in high traffic student space, a utility bill management system with connectivity to RETScreen(R), a utilities consumption/tracking dashboard and interactive sustainability competitions. Brock worked with Blackstone Energy Services to create the blackPAC energy tracking suite which supports educational displays and real time metrics.

One of the most impactful elements of blackPAC is the competitions, which are conducted via a mobile app called Ecoboss. Ecoboss is a cutting-edge tool that supports the campus community engagement and behavioural change via gamification. These competitions have allowed Brock to maximize the impacts of the students, faculty and staff participating in campus energy conservation initiatives and adopting habits creating the Brock sustainable lifestyle while on campus.

Public Dashboards (blackPAC, Blackstone Energy and EcoBoss): Brock worked closely with Blackstone to leverage SCADA and Niagara Tridium BAS data to develop energy dashboards to engage and inform campus users about energy use and real-time operations. The dashboards display information on screens in high traffic areas across campus spotlighting the results and ongoing performance of Brock's assets.

Phase 3: District Energy System (DES) Electrification (2022 - 2025)

The project enabled Brock's District Energy System's to transition from using natural gas to electricity as its primary fuel source and take advantage of Ontario's reliable grid. This game-changing initiative, coupled with efficiency measures, reduced Brock's carbon emissions by 67%.

The project leveraged existing electrical infrastructure avoiding high equipment and installation costs. Brock was able to retrofit and enhance existing assets, which contained costs throughout the project while also revitalizing stranded assets. Through the project, some new assets were added, including electric boilers, variable frequency drives (VFDs), heat pumps and valves. All of the equipment was selected and installed with decarbonization and energy efficiency at top of mind.

The project's key stages and timeline are presented below:

Stage 1 (April 2021 – February 2023): Funding the project.

Stage 2 (February 2023 – March 2024): Detailed project design, with Equinox Engineering as the prime consultant.

Stage 3 (April 2024 – June 2024): Procurement of equipment and contractor services.

Stage 4 (June 2024 – March 2025): Construction / Implementation by Modern Niagara Southwestern Ontario.

DES Electrification Project Financing

Brock University's District Energy System (DES) Electrification project was funded internally by Brock, contributing $3.6M of capital. The Canadian federal government contributed the remaining $2.9M of capital. To secure the internal resources, Facilities Management developed a business case, outlining the multiple benefits of this project (i.e., addressing deferred capital renewal and maintenance, decarbonization, reducing compliance lability under carbon pricing programs and enhancing campus resilience), which was presented to the Executive Team. Once approved, Facilities Management was able to proceed with a formal proposal to the federal government. Capital was strategically reallocated from existing funds in the five-year Long-Term Capital Plan. This money was originally intended for improvements to the heating and cooling distribution system of the DES.

The funding granted by the Canadian government was obtained via a competitive application under Environment and Climate Change Canada's Low Carbon Economy Fund (LCEF) – Champion Stream. Brock University was one of the few institutions to be successful in obtaining funding under this program.

DES Electrification Project Challenges

Project advocates encountered and overcame big and small challenges every day of the project from inception to completion. Some of the challenges Brock overcame and must be anticipated by other institutions include:

i) **Project Timelines:**

The funding under LCEF has strict requirements to follow: Any equipment or services had to be procured after the funding agreement was fully executed to be eligible for funding. This meant that detailed engineering and equipment selection didn't start until April 2023. Brock is required to follow Broader Public Sector Guidelines to ensure best value and competitive procurement of public resources, which adds time to the procurement process. The deadline for project completion was non-negotiable, adding pressure to the timeline.

An additional challenge to the timeline was the long lead times on the delivery of major equipment (e.g., heat pumps and electrical equipment). To mitigate this risk, some equipment was purchased ahead of time directly by Brock, instead of waiting until the mechanical contractor was selected.

ii) **Integration with Existing Systems:** Another challenge managed by Brock's DES Electrification project team was ensuring that the new SCADA, BAS, solutions integrated seamlessly with both existing legacy systems and new equipment alike. The team chose vendors and systems that had a proven record of integration and included significant testing to ensure systems performed as required. Using open systems and taking a technology agnostic approach, facilitated the integration of the old and new systems and equipment. In order to enable this, some hardware updates were needed to allow the additional points and sequences to work properly.

iii) Employee Transition**:** Another challenge managed by Brock's DES Electrification project team was ensuring that staff were able to transition from a centralised fossil fuel based on a large central plant, to a distributed generation model, requiring different strategies and operating sequences to maintain. Facilities Management staff were engaged in the process to ensure any needs for training and new operational requirements were adopted early on the process. The process to build buy-in by staff continues to require resources, support and commitment.

iv) Supply Chain: One of the risks that became and continues to be significant was supply chain risk. All the new equipment, such as boilers, heat recovery chillers, battery, VFDs, pumps and heat pumps had long delivery times. Critical equipment was frequently delivered just in time to install. This left little margin for error. It's attributed to the skill of the team and the project management that all equipment arrived on time and there were no major project delays.

v) Disruption to Operations**:** Brock University's Facilities Management team and the mechanical contractor (Modern Niagara) had to carefully manage disruption to building occupants. As much work as possible was completed during summer months, Christmas break and reading weeks when there are fewer users on campus. This required careful management of operational staff holiday schedules during these times. Construction had to be scheduled when the campus and buildings were occupied Brock and its project partners managed the disruption to users to minimise impacts, such as noise, dust, and access restrictions.

Opportunities & Outcomes

i. Deferred Capital Renewal & Maintenance (DCRM)**:** Brock used the project and funding as an opportunity to address the backlog of DCRM by revitalizing and extending the lives of assets, as well as replacing assets that were operating beyond their useful life.

Specifically, electrical infrastructure, such as transformers, breakers, relays, busbars and other electrical infrastructure from the institution's founding, that had been stranded and underutilised. The project revitalised and reintegrated these systems using them to their full capacity. Other equipment, which was not in condition to be refurbished of reutilized (e.g. Student Centre's electrical boilers), were replaced with new units. Overall, this work has significantly improved the institutional facility condition index on the central plant and the overall utility of many university spaces.

ii. Increased System Resiliency: The DES Electrification project implemented an ability to use both electrical and natural gas feedstock to meet campus energy needs. This diversity increases campus resilience which helps manage risk, GHG emissions and other issues more effectively. The effectiveness of heating the district system's hot water loop has been proven already in the first half of 2025.

iii. Carbon Reduction Plan Goals Achieved and on Track: Brock University established ambitious carbon reduction goals in its 2023 Carbon Reduction Plan, in which it committed to reducing carbon emissions, relative to 2013, by75% by 2030 and achieve carbon neutrality by 2050. With the DES Electrification Project delivering a 67% reduction in GHG emissions after fully implemented, the institution is well positioned to achieve its 2030 reduction goal and has a clear path to achieve its ambitious 2050 goal.

iv. Enhance Campus and Community Education & Engagement: Brock's Institutional Strategic Plan: 2025-2030 identifies "Shape tomorrow through research, discovery and knowledge", as well as "Build sustainable futures". In alignment with these strategic mandates and Brock's Carbon Reduction Plan, the DES Electrification project creates opportunities to enhance learning and research activities of students and faculty and engaging the campus community.

Plans to do this include using the renewed facilities and technological structure as a Campus as a Living Lab to provide educational opportunities for engineering and other students to directly learn about actual applications of

i. Thermodynamics, district energy and create and carry out projects.
ii. Real time data analysis, data mining, machine learning and numerous other opportunities that this project has also opened for Brock teaching and research missions.
iii. Engagement of the campus community in energy management through the increased accessibility of information and data, etc.

Key Success Factors

Successful projects share similar factors that help ensure they succeed:

1. A successful project requires strong champion who brings awareness to the executive team and board. This enabled the project to be heard and then advance more quickly. A strong leader facilitates communication between institutional and project leadership which ensures alignment and support.
2. Project leaders have a clear understanding of how success is defined and have the tools and capacity to achieve those goals.
3. A project team who has the technical understanding to identify potential risks and develop and implement a plan to mitigate those risks and challenges.

This approach will also help ensure that when inevitably unanticipated challenges arise the team is well positioned to manage them effectively.

4. Develop a solid baseline of current performance to set clear goals for improvement. This helps secure buy-in from the executives, leadership and partners.
5. Being able to make difficult decisions based on the accurate information. The best preparation for this is to identify risks and implement a plan to mitigate them. In many cases this makes difficult decisions more streamline and most importantly, provides senior leadership with the information and understanding required to manage the key issues effectively.

Brock's Facilities Leadership knows that making impactful change does not come easy and involves hard decisions. Transparent communication ensures that all parties are clear with the task at hand, allowing an opportunity to ask questions and participate in the process. Furthermore, it's crucial for success to have a team that believes in the project and sees the value it provides for the institution. When you exercise these strategies throughout a project, we have found this is a key factor to your success as a project team.

Conclusion

Brock University's District Energy System Electrification Project demonstrates how a mid-sized post-secondary institution can lead in ambitious climate action by leveraging existing infrastructure, investing in smart technology, and embedding sustainability into operations, education, and culture. Through strategic phasing, campus-wide engagement, and innovative funding partnerships, Brock will achieve a 67% reduction in carbon emissions while improving resilience, efficiency, and educational value. The project not only exemplifies climate leadership in the post-secondary sector but also serves as a replicable model for institutions seeking impactful, cost-effective pathways to decarbonization.

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THOMPSON RIVERS UNIVERSITY DISTRICT ENERGY SYSTEM PROJECT CASE STUDY

GHG Emissions Reduction Strategy

SUMMARY

The TRU Low-Carbon District Energy System (DES) project will deliver a campus-wide renewable thermal energy solution, reducing fossil fuel-based heating emissions by 95% by 2026. This transformative infrastructure upgrade supports TRU's carbon neutrality goals, showcases sustainability leadership, and demonstrates scalable decarbonization for post-secondary institutions across Canada.

Donald Jantz

Strategic Sustainability Consulting

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1. Introduction to Thompson Rivers University

Founded in 1970, Thompson Rivers University (TRU) is a teaching and research institution located in Kamloops, British Columbia. Its main campus spans 250 acres with views of the confluence of the North and South Thompson Rivers. With approximately 35,700 students (including over 9,100 international students from 70+ countries), TRU is a leader in environmental stewardship and sustainability.

TRU’s desirable location puts in proximity to cultural and outdoor amenities, with an increasing selection of vineyards close by and major hiking, biking and ski resorts, such as Sun Peaks and Harper Mountain within an hour’s drive. As well, the campus is adjacent to the Tournament Capital Centre, Kamloops largest recreational facility and is connected by walking trails to parks, riverside pathways and urban amenities.

The university is situated in BC's semi-arid interior, with a 1% design day temperature of -25°C, posing serious heating and resiliency demands. TRU’s energy infrastructure originally comprised decentralized gas boilers and air handling units across multiple buildings, which posed a major obstacle to emissions reductions.

2. Sustainability Vision and Background

TRU's commitment to sustainability began in earnest in 2015 with the adoption of its first Campus Sustainability Plan, structured around the AASHE STARS framework. TRU became the first Canadian institution to earn a STARS Platinum rating in 2018 and successfully requalified in 2022.

The 2020 update of the Sustainability Plan followed extensive community consultation. 86% of the TRU community ranked sustainability as “very” or “extremely” important. The plan pledged carbon neutrality for Scope 2 emissions by 2030. TRU benefits from the fact that BC’s grid is one of the cleanest in the world, being delivered by hydro energy generated by dams operated by the provincially owned energy utility, BC Hydro. As a result, electrifying building heating is an effective way to eliminate the bulk of campus emissions. This made building decarbonization the top priority, as heating via natural gas accounted for nearly all TRU's campus GHG emissions.

3. The Carbon Challenge: From Decentralized Gas to Electrification

TRU faced a fundamental challenge: how to transition an aging, decentralized gas heating system to a low-carbon alternative. The campus was not originally designed with a district energy system in mind, and all buildings had individual mechanical rooms and gas boilers. Electrification would require a full-scale rethink of the campus energy system. It would also provide a valuable opportunity to deal with significant deferred maintenance.

The transition began with experimentation and learning. A biomass boiler was installed at TRU's Williams Lake campus in 2018, in partnership with School District 27. Biomass was also explored for a new Trades building on the main TRU campus. However, Kamloops' municipal bylaws prohibited outdoor wood boilers and there was also sensitivity in relation to air quality due to experience with wildfires, limiting broader application.

As a result, TRU pivoted toward electrification. It installed its first electric boiler at the Industrial Training and Technology Centre (ITTC) and cross-connected it with the School of Trades and Technology, creating a mini-district system. In 2020, TRU opened the Nursing and Population Health Building—its first fully electrified building with no natural gas connection, served by heat recovery chillers and backup electric boilers.

4. Project Overview

4.1 Innovative Partnership and Technology Evaluation Process

To navigate the scale and complexity of the campus-wide decarbonization challenge, Thompson Rivers University engaged in an innovative technical and operational partnership with Creative Energy, one of Canada's leading district energy providers. Creative Energy brought deep expertise in large-scale thermal energy solutions, financial structuring, and regulated utility operations, which allowed TRU to reimagine not just its energy infrastructure—but how it would be delivered, financed, and operated for decades to come.

A Utility Partnership Model

For this ground-breaking project, TRU and Creative Energy developed a regulated utility partnership governed by the BC Utilities Commission.

Regulatory approval Process

In British Columbia, the sales of thermal energy, including district energy systems, is regulated by the BC Utilities Commission (BCUC). Creative Energy had to submit a Certificate of Public Convenience and Necessity (CPCN) application to the BCUC for approval to build the TRU low carbon district energy system. The CPCN prepared by CE documented that the proposed district energy system was the most economical way of meeting TRUs objectives, was aligned with the objectives set out in the British Columbia Clean Energy Act, and that appropriate consultation had taken place with the local community and potentially affected First Nations. The BCUC determined that the project did meet those criteria and was in the public interest and should therefore proceed.

Under this model:

- Creative Energy is responsible for financing, constructing, and operating the centralized energy plant and distribution network.
- TRU retains ownership and control of the campus buildings and pays Creative Energy a regulated rate based on capacity and consumption.
- The partnership reduces TRU's capital risk while enabling long-term price stability, accountability, and high service standards through regulatory oversight.

This model allows TRU to focus internal capital on building retrofits and other strategic initiatives while securing a decarbonized, modern energy backbone without increasing institutional debt.

Comprehensive Technical Screening

To arrive at the optimal system design, TRU and Creative Energy undertook a full lifecycle comparative assessment of decarbonization pathways, including:

- **Biomass**: Initially attractive due to regional wood waste supply, but ruled out due to Kamloops' air quality bylaws and wildfire concerns.
- **Direct Electrification with Resistance Heating**: Technically viable but not energy efficient or cost-effective for large buildings.
- **Ground-Source Heat Pumps (GSHP)**: High energy efficiency but required extensive underground works and land area, which were costly and impractical on the constrained campus.

- **Air-Source Heat Pumps (ASHP)**: Improved dramatically in recent years but alone couldn't provide sufficient temperature lift during winter.

- **Water-Source Heat Pumps (WSHP)**: Optimal for campus integration, able to elevate low-grade heat from ASHPs to building system requirements.

- **Combined ASHP-WSHP + Electric Boilers**: Offered the best balance of cost, performance, resilience, and scalability.

Technology	Capital Cost	Fuel Costs	O&M Costs	Space & Complexity	Carbon Emissions	Screening Outcome
Back-Up Natural Gas Boilers	**low**	**low**	**low**	**low**	**high**	**In**
Electric Boilers	**low**	**high**	**low**	**low**	**low**	**In**
Biomass Boilers	high	low	high	high	low	Out
Geo-Exchange	high	low	low	medium	low	**In**
Air-Source Heat Pumps	**medium**	**low**	**low**	**medium**	**low**	**In**
Sewer Heat Recovery	high	low	high	high	low	Out

This led to the selection of a two-stage low-carbon district energy system (LCDES) using air-source heat pumps to produce low-grade heat from the ambient air and water-source heat pumps to elevate that low grade heat to to ~72°C for space and water heating. Electric boilers provide backup during the coldest weather, and renewable natural gas (RNG)-fueled boilers add redundancy.

The LCDES design is future-proofed to integrate, waste heat recovery from an adjacent building, and additional thermal users (e.g., off-campus facilities and on-campus housing).

This partnership and process underscore the value of rigorous planning, innovative procurement, and adaptive design in enabling institutions to meet bold climate goals.

5. Technical Innovation and Design Approach

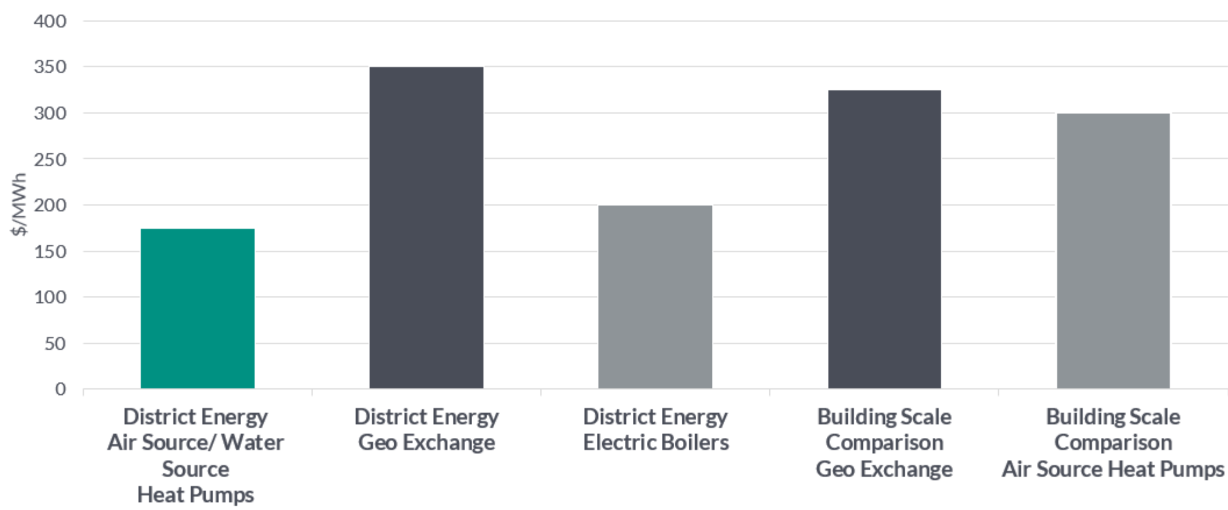
The LCDES features a two-stage heat pump system using both air-source (ASHP) and water-source heat pumps (WSHP):

- Air-source heat pumps generate low-grade heat (up to 40°C).

- Water-source heat pumps elevate the heat to between 65°C and 75°C, suitable for legacy systems.
- Electric boilers provide backup during cold weather below -15°C.
- Gas boilers (less than 5% use) serve as emergency backup and are fueled by renewable natural gas (RNG).
- Created digital twin to facilitate remote management of the system helping anticipate and manage challenges that arise.
- Providing access to data to support campus engagement, education and research.

This system ensures 95% of heating is powered by clean electricity from BC Hydro, with capacity to serve 13 campus buildings and future TRU Community Trust buildings.

As well, Creative Energy's analysis of comparative levelized cost of energy of each of these potential solutions identified this approach as the lowest cost solution.



6. First Nation & Community Engagement

TRU made the LCDES a centerpiece of campus sustainability:

Consultation and engagement with First Nations are very important to Creative Energy and Thompson Rivers University. Creative Energy provided information about the district energy project to Tk'emlúps te Secwepemc (TteS) chief and council and subsequently met with TteS. The meeting was conducted virtually over Microsoft Teams. An overview of the project was presented to the attendees followed by a question-and-answer period. TteS were fully supportive of the LCDES project noting that green and environmentally friendly initiatives are desired with First Nations. No concerns were raised during the meeting about the project. Installation for the distribution piping system will disturb the ground and so the TteS were asked to identify any areas of the campus where they wanted to have their archaeologist in attendance during excavation.

To maximise engagement the energy centre was constructed in a prominent, central location as a visual and educational symbol of the university's commitment. As well, the campus sustainability office was co-located in the building.

7. Financing Model and Economic Impacts

A key innovation was TRU's partnership with Creative Energy, which will develop, own, and operates the system as a utility. Funding for the project comes from a variety of sources, including:

The **Canada Infrastructure Bank** (CIB) provided Creative Energy a program loan of $50 million for deep-decarbonization retrofits, with TRU as the first project implemented under the partnership. This lowers the cost of capital deployed to complete the TRU project.

Creative Energy invested about $24 million in utility assets, including energy plant equipment, trenching and distribution piping. As a tax paying utility, Creative Energy's solution is able to access approximately $1.7 million in Clean Economy Investment Tax Credits for this solution, further reducing the cost to Thompson Rivers University.

Thompson Rivers University invested approximately $19 the "Sustainability Powerhouse" building and campus retrofits to connect buildings to the district energy system. TRU will recognise donor support on a poetry wall for the LCDES in the Powerhouse.

The project was also awarded a **BC Hydro Low-Carbon Electrification** (LCE) incentive of $1.7 million incentive.

How the financing works

Ownership & off-take: Creative Energy owns/operates the utility assets and sells thermal energy to TRU under a 30-year agreement; TRU owns the building and undertakes in-building retrofits. This structure keeps most utility capital off TRU's balance sheet, which is useful because B.C. public universities rarely receive authority to borrow directly.

Rates payback: TRU repays Creative Energy's capital through regulated thermal rates over time; the cheaper CIB financing helps TRU realize 15–20% lower annual utility costs once fully online.

Regulatory approvals: The system is a regulated thermal utility approved via BCUC CPCN proceedings (Phase 1 decision in 2023; Phase 2 application in 2024). This unique approach enables the project to be financed "off-book" through capacity and consumption rates that are governed by the BC Utilities Commission.

While overall operational costs may be higher than purchasing natural gas (the price of which can be volatile) to fuel its existing boilers, the model provides long-term economic benefits, avoids deferred maintenance costs, and keeps capital reserves available for other strategic priorities.

8. Implementation Challenges and Solutions

I. Timelines and Procurement: Construction contracts were competitively tendered by TRU and Creative Energy for their respective scopes. The heat pumps were identified as a long lead item which could affected project schedule if they were procured after the construction contracts were awarded and so Creative Energy purchased them directly from the manufacturer.
II. System Integration: The efficiency of the heat pumps is heavily dependent on the heating water temperature with lower temperatures resulting in higher efficiency. TRU undertook a ‘stress test’ on the existing building systems where the heating water temperature was lowered from its normal setpoint which was sometimes above 80°C to 65°C which is the minimum temperature the district energy system would operate at. Acceptable building temperatures were maintained even during cold winter weather indicating that systems could operate effectively at temperatures lower than the original design criteria. The district energy control system will be integrated with the building controls to raise the heating water temperature if needed during extreme cold weather.
III. Disruption to Campus Operations: Construction was concentrated during summer months, with careful coordination to minimize impacts to circulation routes through the campus and teaching and learning spaces in the buildings.

9. Outcomes and Key Benefits

i. GHG Emissions: Eliminates Campus building related emissions by 2026 ahead of the 2030 objective mandated in TRU’s 2020 Sustainability Plan.
ii. Capital Renewal: Provided opportunities to address deferred maintenance; legacy systems upgraded; life expectancy of key assets extended.
iii. Education and Engagement: Opportunity to implement real-time energy data reporting and provide which supports teaching, research, and campus awareness.
iv. Resilience and Redundancy: Integrated Decentralised Energy system design facilitates resiliency as the system includes multiple heat pumps and boilers, reducing the impact of individual equipment failures.
v. Community Catalyzation: The LCDES can be expanded to future residential and commercial developments adjacent to the campus.

vi. TRU Reduces Cost and Risk: Creative Energy can access low-cost financing from CIB and is also able to claim Clean Economy ITC's as, unlike TRU, they are a tax paying entity. These savings directly result in reduced rates for TRU. Creative Energy are also managing project and long-term operational risks.

10. Conclusion: Lessons Learned and Replicability

TRU's LCDES project showcases how an older, gas-reliant campus can leapfrog to low-carbon heating through a combination of innovation, partnership, and policy alignment. Key lessons include:

- Start with a clear carbon goal and community engagement.
- Leverage campus projects (e.g., new buildings) as pilot opportunities.
- Be flexible, for example be prepared to pivot as challenges require. For example, TRU shifted from biomass to electrification when needed.
- Pick vendors carefully and take time to establish relationships and negotiate agreements that will enable working together as partners solving issues together.
- Work closely with trusted vendors to evaluate all possible solutions to ensure the final solution is the most appropriate.
- Consider non-traditional financial and operational solutions to overcome financial constraints to achieve goals.
- Use public-private partnerships to de-risk capital requirements.
- Embed sustainability visibly and operationally across campus life.

This project offers a replicable roadmap for institutions across Canada seeking to meet decarbonization goals while strengthening financial and operational resilience.

References: Thompson Rivers University & Creative Energy slides and transcription from presentation to Sustainable Campus Collaborative meeting Wednesday,

PROJECT LEAP

A big step towards becoming Climate Positive

The following is a brief case study on a significant infrastructure project that will reduce the University of Toronto's St. George campus greenhouse gas emissions by over 50% by the end of 2027.

4 November 2025

UNIVERSITY OF TORONTO

DEFY GRAVITY

The University of Toronto's (U of T) downtown St. George campus, founded in 1827, is one of Canada's largest and most complex urban energy networks serving over 100,000 campus users each day. Its century-old district-energy system has quietly powered research labs, libraries and classrooms for generations and continues to do so today.

Launched in 2021, the university's Climate Positive Plan committed U of T to eliminate more greenhouse gases than it emits by 2050. This dual challenge — aging infrastructure and ambitious climate goals — set the stage for Project Leap, a $138 million transformation that reimagines how an academic institution can electrify, decarbonize and modernize the backbone of how it manages energy.

Driving the change

Originally commissioned in 1912 with coal as its energy source, the St. George campus district energy system transitioned to natural gas in 1952 and adopted cogeneration in 1994. Over time, it has faced increasing pressure to modernize. Deferred maintenance costs were increasing, while high-intensity research facilities require uninterrupted increased capacity and clean power. Simply replacing aging boilers would not align with U of T's long-term emissions targets and sustainability vision, so a system-level redesign became the most viable path.

Key drivers for this transformation include:

- Legacy steam infrastructure reaching end-of-life and limited efficiency potential.
- Electricity supply stability in Ontario, making large-scale electrification feasible.
- Escalating operational and carbon costs associated with natural gas combustion.
- Desire to demonstrate leadership and influence others on the world stage.
- Integration opportunity with deferred maintenance renewal projects.

Engineering the LEAP

Project Leap is a multi-phase, campus-wide initiative designed to reduce campus emissions (scope 1 and 2) by more than 50 % by the end of 2027. It combines electrification, efficiency and thermal-energy storage technologies into a cohesive, resilient system. Each component contributes to decarbonization while maintaining operational continuity on a live campus.

Major system components are:

- **Central Plant electrification**. Replacement of one of four natural gas boilers with two 15 MW electric boilers for steam production. Six new industrial heat pumps feeding the low-temperature hot-water (LTHW) network. Repurposing of the existing 6 MW Cogeneration plant.
- **Geoexchange** - Utilizing the full capacity of a 368-borehole field beneath front campus providing significant thermal capacity, capturing summer heat and storing it underground for reuse in the winter.

- **Deep Energy Retrofits** - Ventilation optimization, heat-recovery units and advanced humidity control in energy intensive buildings to reduce campus demand intensity.
- **Network Integration** - Conversion from high-pressure steam to low-temperature hot-water distribution improves efficiency by 20–30 % and enables heat-pump compatibility.
- **Lighting Retrofits** - Reducing energy use and emissions by upgrading to energy-efficient LED lighting in 37 buildings.

The project is structured as an interconnected nodal network — an approach common in advanced European district-energy systems — allowing phased integration and redundancy without interrupting academic operations.

Technical highlights:

- Peak heating capacity: 64 MW (mix of electric and recovered heat).
- Expected GHG reduction: 46,000 t CO_2e (> 50 % reduction).
- Service reliability: > 99.99 % uptime maintained through redundant loop configuration.

Financing and partnerships

Project Leap's scale and complexity required innovative financing and governance. U of T adopted an outcome-based procurement and blended-finance model that attracted both public and private capital while sharing risk across partners.

Funding structure:

- Total project value: ~$138 million.
- $56 million low-interest loan from the Canada Infrastructure Bank (CIB).
- Federal decarbonization incentive funding and provincial Save on Energy program contributions.
- University capital reinvestment from avoided-cost savings.

Procurement emphasized performance, not lowest cost. Proposals were scored on technical merit (50 %), delivery capacity (17 %), and financial impact (33 %). This outcomes-based model encouraged innovation and accountability among bidders. The selected consortium developed a solution that advanced the university's climate-positive timeline by a decade while reducing projected capital cost relative to the feasibility baseline.

Collaborative framework features:

- Multi-party contracts linking university, contractors, private lender, CIB.
- Guaranteed energy and carbon-performance metrics with shared incentives.
- Agile governance structure allowing iterative design and schedule adjustments on a living campus.
- Transparent data-sharing and coordinated commissioning to minimize operational risk.

Results and impact

By the end of 2027, Project Leap will deliver measurable performance gains across environmental, financial, operational, and educational dimensions.

Sustainability:

- 46,000 t CO_2e annual reduction (> 50 % of scope 1 and 2 emissions).
- Cut campus fossil fuel use by 75%
- Elimination of a natural gas boiler and transition to electric, low-temperature hot-water distribution.
- Significant drop in campus combustion emissions and local air pollution.

Financial and operational:

- Positive net present value
- Deferred maintenance addressed through equipment replacement and system standardization
- Improved infrastructure and energy supply resilience to climate extremes.
- High-efficiency equipment lifespan extended by 20 – 25 years.

Educational/Communications:

- Real-time monitoring and public display systems to showcase energy flows.
- Integration with academic curriculum and research in sustainability and thermal systems.
- Visible evidence of U of T’s leadership in urban decarbonization to influence others.
- Communicating “it can be done” to inspire the U of T community and beyond.

Lessons and takeaways

Project Leap demonstrates that campus decarbonization is as much about culture and governance as it is about technology. The initiative reframed energy transition as an institutional collaboration rather than a facilities project.

Key lessons:

- Set a clear north star. A bold target like ‘Climate Positive by 2050’ aligns technical and financial decisions.
- Link carbon goals with asset renewal. Tackle deferred maintenance while advancing emissions reduction.
- Design for flexibility. Iterative planning allows adaptation to new technologies and funding windows.
- Procure for outcomes vs. inputs. Reward verified performance rather than upfront cost.
- Build cross-sector partnerships. Collaboration with lenders, utilities and engineers reduces institutional risk.

- Keep sustainability visible. Making infrastructure part of the educational experience sustains engagement and accountability.

Ultimately, Project Leap shows that deep decarbonization can accelerate — not delay — operational renewal. By fusing electrification, innovation, collaboration and leadership, U of T is demonstrating how complex institutions can enable a climate-positive future.

For more information, please contact:

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Project Leap
https://www.fs.utoronto.ca/projects/project-leap/

Climate Positive
https://climatepositive.utoronto.ca/

Comparison of Options for Financing of Retrofit Projects

Feature	SOFIAC	ESCO (Energy as a Service/ EaaS)	ESCO (Energy Performance Contract/ EPC)	Bank
Source of Financing	CIB funding and private capital	Third-party capital (provider/SPV/investor); little/no upfront capex.	Customer capital or customer debt; ESCO may arrange lenders.	Bank loan (may or may not be CIB supported)
Balance Sheet Impact	May preserve debt carrying capacity.	Service/OPEX-like.	Balance Sheet Debt	Balance Sheet Debt
Risk Transfer	SOFIAC guarantees savings & assumes performance risk through IPMVP*	ESCO guarantees savings & assumes performance risk through IPMVP*	ESCO may guarantee savings & assumes performance risk through IPMVP*	Remains with Institution
Repayment Mechanism	Paid with IPMVP* verified energy savings	Fixed payments sized to savings; ESCO remedies shortfalls per IPMVP*	Service fee: fixed, availability-based, or indexed to outputs/savings.	Fixed interest loan repayment (10-20 yrs) regardless of savings
Project Delivery	Fully managed, turnkey project. Independent verification	Turnkey audit-design-build-commission + IPMVP*; O&M optional/defined.	Turnkey + ongoing monitoring/analytics; O&M commonly included to protect outcomes.	Institution manages project and 3rd party delivery agents
Potential for Aggregated Projects	Able to bundle multiple campuses and buildings for scale	Able to bundle multiple campuses and buildings for scale	Able to bundle multiple campuses and buildings for scale	Project by project.
Institutional Control	Institution retains project and operation control and decision making with retained full asset ownership	Institution typically retains ownership of assets, as well as project and operation control.	ESCO typically retains asset ownership and control for contract term or bought out through early buy-out/ termination purchase.	Institution retains control as well as debt and performance risk Assets are subject to recourse by the lender

*International Performance Measurement and Verification Protocol (IPMVP)

Overview of SOFIAC

Funding Deep Energy Retrofits in Alberta's Post-Secondary Sector through SOFIAC

Post-secondary institutions in Alberta are facing increasing pressure to reduce their greenhouse gas emissions, modernize aging infrastructure/ catchup on deferred maintenance, and demonstrate leadership in sustainability. However, one of the greatest barriers to implementing deep energy retrofits at the scale required—ranging from $5 million to $100 million or more—is access to capital. Traditional debt-financing models conflict with institutional borrowing limits or strategic priorities, making it difficult to pursue ambitious upgrades to building envelopes, HVAC systems, lighting, controls, renewable energy and electrification.

This is where SOFIAC offers a transformative solution. Originating in Quebec and now expanding across Canada, SOFIAC is an innovative public-private platform that enables institutions to undertake major energy efficiency and decarbonization projects without upfront capital investment, asset encumbrance, or borrowing against their own balance sheet. It is tailored to help public sector organizations—including universities, colleges, and polytechnics—accelerate climate action through infrastructure upgrades that pay for themselves over time.

SOFIAC Funding Program
SOFIAC is a Canadian wide retrofit initiative launched in 2021 as the largest and original aggregator under the Canada Infrastructure Bank with backing by Natural Resources Canada.. They are collaborating on SOFIAC to finance and support energy efficiency projects for public institutions and businesses.

SOFIAC's purpose is to accelerate energy efficiency and decarbonization in public, commercial, industrial, and multi-residential buildings by removing financial and technical barriers to retrofits. SOFIAC funds and manages projects directly, engaging energy service companies to do the work, while SOFIAC assumes all risks, while clients repay a portion of verified savings and benefit from lower costs from day one.

Initially capitalized with support from the Canada Infrastructure Bank, Fondaction, Fiera Private Debt, and the Québec government, SOFIAC later expanded across Canada with additional backing from Desjardins and international investors. Today, it manages more than $400 million in funding. By combining public and private capital with turnkey project delivery, SOFIAC offers a scalable model for accelerating building decarbonization nationwide.

sofiac
energy performance

SOFIAC's model is built on the principle that decarbonization must be accessible, affordable and practical. Clients retain a portion of energy savings from the very first day of a project, while repayment to SOFIAC is performance-based and guaranteed by verified reductions in consumption. With no upfront costs and no risk for building owners, SOFIAC helps accelerate the pace of energy efficiency projects while ensuring long-term accountability and measurable climate benefits. Its growing footprint across Canada positions it as a leading example of how innovative financing and turnkey delivery models can drive the transition to a low-carbon economy.

How the SOFIAC Model Works

SOFIAC's model combines third-party financing, project aggregation, risk reduction and performance contracting to deliver turnkey retrofit solutions. The key features include:

1. **Investment that doesn't negatively impact the Institution's debt service cover ratio (PSAS (**Public Service Accounting Standards) for public sector or IFRS **(**International Financial Reporting Standards) for private sector**)**

SOFIAC raises capital through institutional investors, commercial lenders and the Canadian Infrastructure Bank (CIB) to cover 100% of the upfront cost of energy retrofit projects. Since SOFIAC—not the educational institution—is the borrower, the investment into the assets preserves institutional borrowing capacity for other priorities such as academic expansion, student housing, and research facilities, etc.

2. **Performance-Based Repayment**

The Institution repays SOFIAC over a long-term contract (typically 15+ years) using only a portion of the actual energy savings in energy, calculated by an independent third party. Additional savings such as operations, maintenance, and carbon costs remain fully the benefit of the Institution. If the project underperforms, clients pay less - or nothing. If it overperforms, clients benefit from an accelerated cost recovery and improved savings split. SOFIAC takes full responsibility for the turnkey finance, design and delivery of the project and deploys expert technical partners to deliver the project from its pre-qualified list of approved technical delivery partners.

If the savings fall short, SOFIAC not the Institution absorbs the risk and acts as an intermediary with the ESCO to ensure performance meets contractually stipulated requirements. This structure eliminates financial uncertainty and aligns all parties toward maximizing energy performance and emissions reductions.

3. **Turnkey Project Delivery and Support**

SOFIAC provides a fully managed solution: from energy audits and project scoping to procurement, financing, implementation, and measurement & verification (M&V). This relieves facilities teams from managing complex multi-building projects and ensures consistency, quality, and scalability across campuses. However, the in-house client teams remain fully in control of all decision making and oversight of SOFIAC activities, nothing is executed without the knowledge and approval of the Institution.

4. **Ownership**

As soon as the project is commissioned and functioning as intended, whether that is in total or phased, full ownership of all assets is passed to the Institution without liability i.e. no lien, lease or hold over Title, the investment made by SOFIAC is fully non-recourse.

Financial Benefits for Alberta's Post-Secondaries

i. **No Upfront Capital**

SOFIAC enables deep retrofits to proceed without any initial capital outlay. This eliminates one of the biggest barriers to large-scale energy upgrades, particularly during times of budget constraint or capital spending freezes.

ii. **No Need to Access Debt Capacity**

Because the investment is structured as a non-fixed service payment unattached to the assets, institutions can preserve their credit rating and borrowing room for core academic or capital priorities—something especially important under Alberta's fiscal framework.

iii. **Risk Transfer**

SOFIAC's performance-based structure shifts technical and financial risks to SOFIAC, backed by the Canada Infrastructure Bank. Institutions are only responsible for paying back the portion of savings that are realized, with no risk of cost overruns or underperformance.

iv. **Budget Certainty**

Payments to SOFIAC are attributed to actual energy saved with a positive cashflow from day one back to the Institution. This provides long-term budget stability and contributes to portfolio overall resiliency

v. **Accelerated Climate Impact**

SOFIAC enables campuses to achieve 30–60% reductions in energy use and emissions within a very short timeframe. This aligns with Federal and Provincial climate goals, institutional sustainability commitments, and reporting requirements such as STARS, ESG, GHG inventories, and net-zero pledges. It is also a requirement of CIB funding.

vi. **Strategic development**

Deep retrofits generate non-energetic benefits for organizations, such as improved working conditions for teachers and students through better air quality, lighting, and upgraded heating systems. Beyond reducing GHG emissions, a decarbonization project can help post-secondary institutions provide a better environment for students. The institution may also choose to increase tuition fees to reflect these improvements, making deep retrofit projects even more profitable.

Scalable Applications in Alberta

Many Alberta post-secondaries manage large, energy-intensive campuses with buildings that are 30–60 years old and in urgent need of modernization. SOFIAC can help fund comprehensive upgrades across entire campuses—residence halls, labs, lecture halls, administrative buildings, and athletic facilities—at scales of $5 million to $100 million or more, without competing with other institutional priorities.

By leveraging SOFIAC, Alberta's post-secondaries can:

- Modernize infrastructure at no upfront cost
- Demonstrate sector leadership in sustainability
- Accelerate their path to net-zero operations
- Free up internal funds for student-focused priorities

Conclusion

SOFIAC represents a powerful, practical, and proven approach for Alberta's post-secondary institutions to accelerate building retrofits, reduce GHG emissions, and meet their long-term sustainability goals—all without relying on public capital budgets or increasing Institutional debt. With increasing pressure to act on climate and aging infrastructure demanding renewal, SOFIAC provides a strategic solution that works financially, operationally, and environmentally.

Links to Case Studies of SOFIAC projects for post secondaries. Requested more details.

- 2025 College Bourget, Quebec. K-12. 2,000 students, $4.8 million,87% reduction in GHG emissions, 40% reduction energy consumption, saving $180,000 in energy costs annually.
    - Project optimised main ventilation unit and heating water production using heat pumps and electric boiler. Recommissioning of mechanical systems, power demand management and upgrading the kitchen hood.
    - No details of financial solution
- 2025 Campus Notre Dame-de-Foy (CNDF), Quebec. pre-university, technical, vocational college, 1,200 students. $5.7 million, 40% reduction in GHG emissions. SOFIAC partner Johnston Controls (JCI) engaged by SOFIAC in RFP bidding process to design and implement.
    - No details of technical or financial solution
- 2021 Collège Jean de la Mennais, Québec. Details to follow

Overview of the Energy Service Company Model
Alberta Educational Institution Retrofit Market Assessment

Accelerating Campus Decarbonization through Performance-Based Retrofit Financing Models

Energy Service Companies (ESCOs) help post-secondary institutions modernize aging infrastructure, reduce utility costs, and cut greenhouse gas (GHG) emissions by delivering comprehensive retrofit projects—often in the $5–$100M range—using contractual structures that repay investments through verified energy savings and/or service payments.

How ESCO delivery model works
ESCOs usually act as a turnkey partner that can:

- Conduct an investment-grade assessment to identify energy, cost, and GHG-reduction opportunities and develop a multi-measure retrofit plan.
- Design, procure, and implement upgrades (e.g., building automation, HVAC optimization, lighting, district energy, and renewables where appropriate).
- Support grant and incentive applications to improve project economics.
- Provide (directly or through partners) project financing options where appropriate, including coordination with lenders and tools such as the Canada Infrastructure Bank (CIB).
- Guarantee performance for Energy Service Performance Contracts (ESPCs) through formal measurement and verification (M&V) protocols, with reporting that can be required monthly or annually for a defined post-implementation period.
- Provide operations and maintenance (O&M) services as defined in the contract (often included in Energy-as-a-Service and sometimes included or supported in ESPCs depending on the agreement).

Two common ESCO contract structures: Energy Service Performance Contract (ESPC) or Energy-as-a-Service (EaaS)
While both structures can enable deep retrofits with limited upfront capital, they differ in ownership and operating responsibilities:

Energy Service Performance Contract (ESPC or EPC))

- In an ESPC, the institution typically owns the equipment and ultimately benefits from the guaranteed utility savings.
- The ESCO provides a savings guarantee; if verified savings fall short of the guarantee, contract terms require the ESCO to address the shortfall (e.g., make a shortfall payment or implement corrective actions).
- Financing may be owner-arranged (e.g., on-balance-sheet) or structured through third-party financing/shared-savings approaches, depending on accounting treatment, governance, and procurement.

Energy-as-a-Service (EaaS)

- EaaS is distinct from ESPC. It is typically structured as a service agreement (subscription or pay-per-use) where the service provider owns, operates, and maintains the relevant assets during the contract term.
- Payments are tied to delivered service outcomes (e.g., availability, comfort, delivered energy services, or emissions performance), with O&M usually included.
- Some EaaS agreements include end-of-term buy-out options, depending on the project and negotiated terms.

Financial structure considerations for post-secondary institutions

For Alberta colleges, universities, and polytechnics, the main advantage of working with an ESCO is access to technical expertise and performance-based risk transfer, with repayment aligned to operational savings and/or service fees rather than upfront capital outlays. Whether an agreement is treated as on- or off-balance-sheet depends on the specific contract terms and the accounting rules followed by the institution.

- Repayment schedules are commonly structured to align with the savings or service-value timeline (often 10–20 years).
- In ESPCs, performance is validated through M&V consistent with ; if verified savings do not meet the guaranteed level, remedies are applied under the contract.
- Off-balance-sheet treatment can be more feasible for certain service-based agreements (including some EaaS structures), but classification varies by terms and institutional accounting policies.

- Centralized plant and energy system upgrades may be easier to track and verify than widely dispersed measures (e.g., lighting across many buildings), which can add complexity to savings attribution.

ESCOs may partner with or introduce financing providers (e.g., banks, private capital, or Canada Infrastructure Bank participation). In Alberta and Canada, options can include shared-savings contingent repayment models, capital leases within EaaS structures, or owner-financed ESPCs, depending on institutional constraints and market offerings.

Application of ESCO models in Canada: illustrative case examples

Examples of ESCO-delivered ESPCs in the Canadian post-secondary sector include:

- Memorial University (Newfoundland): phased ESPC activity across campus facilities (e.g., St. John's campus and later multi-campus phases).
- York University (Ontario): ESPC upgrades across many campus buildings, including lighting, HVAC optimization, and building automation improvements.
- Queen's University (Ontario): multi-phase retrofit programs with savings guarantees supporting infrastructure renewal and reduced maintenance costs.

Path forward for Alberta institutions

- Engage an ESCO (or a competitive ESCO procurement process) to scope an investment-grade assessment (IGA) and define a bundled project with measurable savings and GHG outcomes.
- Structure an ESPC or EaaS agreement that reflects institutional governance, accounting treatment, and risk tolerance, and that defines Measurement and Verification (M&V) based on the International Performance Measurement and Verification Protocol (IPMVP), O&M responsibilities, and remedies for under-performance.
- Blend incentives and grants with financing to improve affordability and expand project scope (e.g., deferred maintenance + decarbonization measures).
- Use verified savings and/or service payments to support repayment while progressing toward emissions-reduction targets (e.g., 40–60% GHG reductions for major retrofit programs, depending on baseline and measures).

Recommendations

- Develop briefing packages for post-secondary executives that map the retrofit process, procurement pathway, and accounting considerations under the rules followed by Alberta institutions.
- Advocate for province-wide policy clarity and consistent accounting guidance that confirms conditions under which ESPC and EaaS agreements may be treated as service arrangements and/or support favourable balance-sheet outcomes.
- Provide incentives and enabling tools that help institutions finance energy retrofits and address deferred maintenance at affordable, risk-appropriate rates.
- Build understanding and hands-on support to help institutions access available funding streams (provincial and federal) and to navigate ESCO procurement and contracting.

Acronyms and terms

- AHU – Air Handling Unit
- CCA – Capital Cost Allowance
- CIB – Canada Infrastructure Bank
- DSCR – Debt Service Coverage Ratio
- EaaS – Energy-as-a-Service
- ESPC – Energy Performance Contract
- ESCO – Energy Service Company
- GHG – Greenhouse Gas
- IGA – Investment-Grade Assessment
- ITC – Investment Tax Credit
- M&V – Measurement and Verification
- PSI – Post-Secondary Institution
- SOFIAC – (Québec) Société de financement et d'accompagnement en performance énergétique (often referenced as a shared-savings/contingent repayment financing partner)

References

Energy Services Association of Canada – materials on guaranteed energy savings and energy performance contracting.

Maiorano, J. (2012). Barriers to energy efficiency projects and the uptake of green revolving funds in Canadian universities (Background paper).

Overview of Canada Infrastructure Bank (CIB) Aggregator Retrofit Loan Programs Delivered Through Banks

Purpose and Scope

This appendix summarizes retrofit loan programs offered by Canadian banks in partnership with the Canada Infrastructure Bank (CIB) through an “aggregator” model. In this structure, banks originate and administer financing to building owners while leveraging CIB capital for eligible energy efficiency and decarbonization measures within a project.

Note: Many banks also offer other green financing products (e.g., green loans, green bonds, sustainability-linked loans, and commercial mortgage products) that can support retrofit activity. This appendix focuses specifically on CIB-backed aggregator programs delivered through banks.

Target Clients and Value Proposition

These programs are intended to accelerate decarbonization of Canada’s building stock by reducing upfront capital barriers and aligning debt structures with energy and emissions performance. Typical client segments include commercial real estate owners and operators, developers, public-sector institutions (e.g., schools, post-secondary institutions, hospitals), private post-secondary institutions, industrial facilities, and multi-unit residential owners.

Clients typically pursue these programs to reduce greenhouse gas (GHG) emissions, lower operating costs, future-proof assets against emerging carbon regulations, and improve competitiveness in attracting and retaining tenants and customers.

How CIB Aggregator Retrofit Loan Programs Work

Banks generally structure retrofit financing across three phases, often working alongside Energy Service Companies (ESCOs) and/or engineering and consulting firms engaged by the building owner.

1) Pre-Retrofit

- Coordinate with the owner’s ESCO and/or engineering partner to complete assessments and develop a retrofit scope, including energy modeling and a GHG baseline.
- Identify and document eligible measures for CIB-backed funding (eligibility is typically tied to the GHG performance of specific energy conservation measures within the project).
- Develop a measurement and verification (M&V) plan and supporting documentation required by the bank and the CIB-backed program.

2) Retrofit (Construction and Commissioning)

- Provide construction-period financing and, where applicable, a defined commissioning period to validate performance and stabilize operations.
- Blend funding sources: CIB-backed capital typically applies to eligible decarbonization and efficiency measures, while other project elements may be financed through conventional bank capital or other sources.

- In some program structures, pricing may include sustainability-linked features (e.g., better pricing for stronger verified performance); terms are program- and project-specific and are not typically published as a fixed rate schedule.

CIB participation is not inherently limited to 50% of a project. The share of costs eligible for CIB-backed funding depends on the measures included and the emissions-reduction performance attributed to those measures, as well as program rules and lender structuring.

3) Post-Retrofit (Stabilization and Long-Term Financing)

- Offer refinancing pathways once the asset is stabilized (i.e., retrofit work is complete, systems are performing as intended, and operating performance is sufficiently predictable).
- Provide longer-term financing options that may include extended amortization, refinancing of construction debt, and (where applicable) capital release to support reinvestment in additional upgrades.
- In some cases, borrowers may also explore complementary programs such as CMHC's MLI Select for eligible multi-unit residential projects.

Financial Structure and Eligibility (Program-Level Overview)

- Loan structure: commonly includes an interest-only construction (demand) loan, followed by term financing (e.g., a commercial mortgage).
- Sizing: may be linked to verified or forecast annual GHG reductions and program caps; limits vary by program and lender.
- Pricing: generally reflects competitive market terms and, for CIB-backed components, may be influenced by Government of Canada bond yields; actual all-in project pricing depends on the blended financing structure and project specifics.
- Eligibility and documentation commonly include: a minimum GHG-reduction threshold versus the baseline; an independent M&V plan; professional engineering sign-off; and alignment with recognized project development standards (e.g., Investor Ready Energy Efficiency (IREE), administered by Green Business Certification Inc. (GBCI) and the Canada Green Building Council (CAGBC)).
- Borrower requirements: typically includes an existing or new commercial banking relationship with the participating bank.

Benefits

- Financial: potential operating cost reductions, improved cash flow, and potential increases in asset value; debt structures that can align repayment with retrofit outcomes.
- Environmental: meaningful GHG reductions and improved indoor environments; supports compliance with evolving carbon regulations and building performance standards.
- Strategic: supports proactive risk management and asset competitiveness as carbon pricing and municipal emissions mandates expand.

Illustrative Case Examples (as commonly cited in market materials)

- Avenue Living (Edmonton, AB): retrofit of the SunRise building; revitalized 179 rental units; reported ~64% annual GHG emissions reduction.
- Sidewalk Real Estate Development (Halifax, NS): office-to-residential conversion of the Centennial Building; created 141 new rental units; reported ~67% annual emissions reduction; avoided 5,000+ tonnes of GHG emissions by retrofitting instead of building new.

Path Forward for Institutions

Post-secondary institutions and other public-sector owners can consider CIB-backed aggregator programs delivered through banks as a complement to, or alternative financing pathway alongside, ESCO delivery models. Potential pathways include:

- Engage early with participating banks and qualified ESCOs/engineering teams to align retrofit scopes with eligibility requirements and institutional decarbonization priorities.
- Use CIB-backed financing where eligible to reduce overall cost of capital for qualifying measures, recognizing that projects often involve blended funding sources.
- Prepare for emerging municipal carbon regulations and building performance standards by adopting a proactive retrofit planning approach and establishing robust baseline and M&V practices.

Recommendations

- Develop institutional briefing packages that clearly explain how CIB-backed bank programs integrate with existing capital planning, ESCO approaches, and sustainability strategies.
- Clarify terminology in communications (e.g., distinguish CIB-backed aggregator programs delivered through banks from other bank green financing offerings).
- Align retrofit financing strategies with compliance requirements in jurisdictions with carbon performance standards (e.g., Calgary, Vancouver, Toronto, Montreal).

Post-Secondary Deep Energy Retrofit Examples Using CIB Financing

The examples below illustrate how post-secondary institutions have accessed Canada Infrastructure Bank (CIB) financing either directly (CIB-to-owner) or through CIB Building Retrofits Initiative (BRI) aggregator partnerships (CIB-to-aggregator-to-owner). These examples clarify typical capital flows, counterparties, and the types of measures financed.

University of Toronto (St. George Campus) — Direct CIB Financing (Project LEAP)

- CIB participation: CIB committed up to $56 million to support deep energy retrofits at the St. George Campus (CIB project materials also reference a $50 million investment across projects).
- Capital flow: CIB provides financing directly to the University for eligible retrofit projects (public-sector retrofit pathway).
- Measures highlighted: replacing natural gas-fueled sources with electricity (e.g., gas-fired boiler replacement with electric boilers), industrial high-temperature heat pumps, building

automation upgrades, ventilation optimization, and measures to reduce thermal and electrical loads.
- Performance: CIB project materials cite emissions reductions of 62% (49,023 tCO_2e/year) associated with the retrofit program scope.

Thompson Rivers University — CIB Financing via Creative Energy Aggregator Partnership
- CIB participation: CIB reached financial close on a $50 million loan with Creative Energy to support deep decarbonization of buildings via district/community energy solutions, including projects at Thompson Rivers University.
- Capital flow: CIB financing is provided to the aggregator (Creative Energy), which then delivers/finances eligible retrofit projects with participating building owners/institutions.
- Delivery model: community/district energy approach (connection/conversion to lower-carbon district energy and related plant/network improvements as applicable).

Brock University — SPARK Program Using Enbridge Sustain–Blackstone Aggregator Model
- CIB participation: CIB has an Enbridge Sustain–Blackstone retrofit program intended for large buildings in Ontario, targeting at least 30% emissions reductions.
- Institution example: Brock's SPARK program is described as a $100+ million initiative delivered with Enbridge Sustain and the CIB, using an energy-as-a-service approach with no upfront capital cost to the University.
- Capital flow (as publicly described): Trade coverage reports that CIB provides 70% of the funding with the remainder funded by Enbridge Sustain; Blackstone Energy Services is reported as the developer/implementation partner supporting delivery.

Concordia University — Guy-De Maisonneuve (GM) Building Deep Energy Retrofit with Johnson Controls
- Project: deep energy retrofit of the 11-storey Guy-De Maisonneuve building under Concordia's PLAN/NET ZERØ initiative; public announcements cite a 50% reduction in energy consumption and improvements to HVAC, lighting, and related systems, plus a living-lab component.
- CIB access pathway: Johnson Controls Canada is a CIB Building Retrofits Initiative (BRI) partner/aggregator, which can provide a route to CIB financing for eligible retrofit projects.
- Note: Public announcements for the GM Building describe the Johnson Controls partnership and target outcomes; however, they do not publicly specify whether CIB financing has been executed for this specific building.

Complete List of CIB Building Retrofits Initiative (BRI) Aggregators and Partner Contacts
The list below reflects the CIB's published BRI partner contact list (service providers/aggregators and participating financial institutions). Organizations and contact details may change; users should refer to the CIB partner list for the most current information.

Service Providers / Aggregators
- Ainsworth

- Ameresco Canada
- Creative Energy
- Efficiency Capital
- Enbridge Sustain
- Johnson Controls Canada
- Noventa Energy Partners
- SOFIAC

Participating Financial Institutions

- BMO Financial Group
- Scotiabank