REPORT

# Decarbonizing Buildings: What is Holding Us Back



## Executive Summary

On May 2, 2025, Earth District and the Toronto and Region Conservation Authority's (TRCA) Partners in Project Green co-hosted *Decarbonizing Buildings: What is Holding Us Back?* It convened leaders from academia, industry, and government to address the persistent barriers to building decarbonization. This event marked the first formal collaboration following the signing of a Memorandum of Understanding (MOU) between Earth District and TRCA. This partnership aims to empower the next generation of sustainability leaders while advancing innovative, low-carbon solutions for thriving communities across the Greater Toronto Area and beyond.

The event featured a ceremonial MOU signing and opening remarks from Dr. Craig Stephenson, President & CEO of Centennial College; Andrew Dowie, Parliamentary Assistant to the Minister of the Environment, Conservation and Parks and MPP for the riding of Windsor-Tecumseh; John MacKenzie, Chief Executive Officer of TRCA; and Dr. Cathy Bruce, President and Vice-Chancellor of Trent University, on behalf of Earth District. This was followed by a keynote address from Leith Moore, Founder and Principal of Assembly Corp, who emphasized the opportunities and complexities in decarbonizing the built environment. The centrepiece of the event was a series of rotating discussion activities that facilitated discussions exploring systemic barriers and actionable strategies throughout the building lifecycle: design, construction, and operations. The day also included networking opportunities and fostered new cross-sector connections.

This report serves as a synthesis of the insights gathered during the event. Although discussions were structured around three main pillars (design, construction, and operations), participants surfaced numerous cross-cutting issues that transcended these categories. To reduce redundancy and better reflect these overlaps, the report reorganizes insights into seven thematic categories: **Financial Structures**, **Regulations and Standards**, **Technology, Supply, and Infrastructure**, **Post-Occupancy Practices and Data**, **Culture and Perception**, **Collaboration and Integration, and Education**

Each section highlights the key challenges and barriers identified by event participants. It also presents targeted recommendations alongside potential actionable items for each category.

The potential actions items identified as Areas of Future Focus (pg. 18) outline collaborative strategies stakeholders can adopt to accelerate the building decarbonization along a high-level timeline. It is intended to inform ongoing and future initiatives under the Earth District–TRCA partnership and beyond to guide collective efforts in programming, research, and experiential learning. By distilling insights into strategic pathways, the report aims to move stakeholders from dialogue to action, advancing the shared goal of building sustainable, resilient communities.

# Key Insights

## Financial Structure

### Identified Challenges/Barriers

**Short-Term Profit Focus Over Long-Term Sustainability**

Short-term profits are often prioritized over long-term sustainability, including low-carbon and high-performance outcomes. Sustainability measures tend to be overlooked unless driven by certifications or external requirements, such as LEED or Toronto Green Standard. The market focus on immediate returns frequently leads to the removal of sustainable options due to budget constraints. As a result, builders pursuing sustainability and decarbonization may lose contracts to lower-cost, conventional approaches.

**Limited Government Incentives and Financial Support**

It was reported that there is insufficient government support, characterized by limited funding and a deficient structure for incentives and grants. Additionally, uncertainty surrounding carbon tax regulations and an inconsistent incentive structure serve as barriers to investment in sustainable practices.

**Misaligned Industry Compensation and Financing Models**

Designers typically receive compensation based on project costs and materials rather than on sustainability outcomes, which undermines the value of eco-friendly initiatives that are typically more costly. Financial institutions and other lenders often require traditional feasibility studies that are challenging for green buildings to provide, making it even harder to secure funding. Thus, well-defined business cases and ROI metrics are essential for sobtaining financial support and driving sustainability efforts forward.

### Recommendations

**Adopt Lifecycle-oriented Funding Models with Aligned Incentives**

There is an opportunity to explore modular, life-cycle-based and performance-tied funding models, supported by government incentives and innovative contract structures that share risks and align partner incentives.

**Streamline Approvals and Prioritize Carbon Performance**

To enhance project outcomes, it is important to prioritize carbon performance and lifecycle value in all planning and execution stages. Approval process should be streamlined to facilitate faster and simpler approvals for projects that incorporate energy-efficient designs.

Furthermore, it is recommended that vendors be prequalified based on their technical skills and sustainability expertise, ensuring that only the most capable and knowledgeable partners are engaged in these projects.

### Continue Providing Financial Incentives and Targeted Funding

Government incentives and targeted funding are important for enabling advancement in building decarbonization across the GTA. Continued support of the building sector through the provision of incentives and targeted funding initiatives is recommended. Collecting incentive and funding information in a single information webpage will help identify gaps in available funding in support. All levels of government are encouraged to work together to share information on programs and align initiatives to avoid duplication.

### Enhance Building Financial Analysis to Include Resilience and Long-term Value with Standardized Metrics and Data

It is recommended that additional, long-term metrics that more accurately capture value over a building's lifecycle be incorporated into both public and private financial analysis as it relates to new building projects. The inclusion of these metrics will better encompass the benefits from climate change resilience, risk mitigation, and lower operational/maintenance costs. To facilitate this process, collaboration between government and private sector is recommended to standardize metrics and data transparency, as this can help normalize investments while clearly demonstrating their impact.

## Areas of Future Focus

### Lifecycle Funding Pilot Framework

**Mid Term**

**Key Stakeholders:** Earth District, TRCA, Municipalities, Government Funding Agencies, Legal/Procurement Advisors, Private Sector Partners

Design and pilot a funding framework for public building projects that ties funding to performance outcomes over time. The model will include lifecycle cost analysis, shared risk clauses, and incentive structures aligned with energy and maintenance performance. Begin with one or two municipal projects to test the model, supported by policy advisors and legal input.

### Carbon-First Procurement & Fast-Track Approval Pilot

**Mid Term**

**Key Stakeholders:** Municipal Planning Departments, Procurement Offices, Sustainability Consultants, Vendor Prequalification Bodies

Develop a pilot process that fast-tracks approvals for projects meeting high carbon performance and energy efficiency standards. Include a vendor prequalification system prioritizing technical and sustainability credentials. Collaborate with municipalities to test the streamlined process on select public infrastructure projects and refine based on performance outcomes and stakeholder feedback.

**Sustainable Construction Incentive Program**

**Short Term**

**Key Stakeholders:** Government Funding Agencies, Municipalities, Industry Associations, Building Owners

Establish and promote a dedicated funding stream that offers grants or tax incentives for sustainable construction expenses, such as emissions assessments, low-carbon materials, and staffing for decarbonization. Begin with a funding toolkit and targeted outreach to eligible partners. Pilot applications with 2–3 demonstration projects to build the case for broader adoption.

**Resilience ROI Metrics & Data Framework**

**Mid Term**

**Key Stakeholders:** TRCA, Earth District, Financial Analysts, Municipalities, Standards Organizations

Co-develop a standardized framework for evaluating ROI that includes resilience, climate risk, and long-term value. Collaborate with financial experts and municipal partners to define key metrics and data-reporting formats. Pilot the framework on select public projects to demonstrate its effectiveness and refine it for broader adoption.

# Regulations and Standards

## Identified Challenges/Barriers

### Fragmented and Inconsistent Policy Frameworks Create Compliance Burdens

Inconsistent policies and evolving standards were identified as barriers, creating uncertainty and compliance burdens. Additionally, the inconsistent enforcement of these codes and standards across jurisdictions adds to the challenges for designers and builders.

### Lack of Clear Decarbonization Pathways

Existing government net-zero strategies are typically high-level to maintain flexibility for reaching decarbonization targets. Limited information on net-zero pathways presents a barrier to representatives of the building sector as it makes it challenging to understand timelines, priorities, technology preferences, and accountability for investment decisions. This creates uncertainty for planning long-term projects, such as low-carbon buildings, which may discourage investments in innovative building designs or technologies.

### Land-Use Restrictions Limit Innovation

Outdated land-use regulations and restrictions such as zoning laws, building codes, density limits, etc., can limit flexible and innovative green building design.

## Recommendations

### Standardize Codes and Simplify Regulatory Pathways

To reduce confusion and accelerate adoption, consistency across building codes and policies is recommended. Simplified regulatory pathways are critical to facilitate building electrification and transitions in sustainable building technologies or practices. All levels of government should look for opportunities to collaborate across jurisdictions to provide greater clarity to the building construction sector.

### Establish Enforceable Building Performance Standards Beyond Construction

Federal and provincial building codes should continue to expand their focus on low-carbon construction. To be effective, these codes must be clear, enforceable, and supported by planning, permitting, and robust monitoring processes. In addition, building performance standards should go beyond the construction phase and apply throughout a building's operational life, ensuring long-term clarity and impact. While voluntary standards are valuable, enforceable government standards implemented through by-laws are more likely to drive widespread adoption of low-carbon designs and technologies.

## Areas of Future Focus

### Unified Code Alignment & Regulatory Access Project

**Mid Term**

**Key Stakeholders:** Provincial Code Authorities, Industry Regulators, Trade Certification Bodies, Municipal Governments

Collaborate with regulatory and code authorities to identify inconsistencies in municipal building codes and streamline pathways for cross-specialization transitions (e.g., gas to refrigeration). Develop a unified reference guide and propose simplified approval processes to reduce barriers. Pilot the changes with targeted sectors and gather feedback for provincial-level recommendations.

### Post-Construction Performance Standards & Monitoring Pilot

**Long Term**

**Key Stakeholders:** TRCA, Municipal Governments, BOMA, Code Authorities, Facilities Management Teams

Develop and pilot enforceable low-carbon operational standards that apply post-construction, distinct from design-phase requirements. Work with municipalities to embed these standards into permitting and inspection processes, supported by dedicated staff for ongoing performance monitoring. Begin with a small group of public or commercial buildings and align with BOMA or equivalent benchmarks.

# Technology, Supply and Infrastructure

## Identified Challenges/Barriers

### Fragile Supply Chains and Infrastructure Limit Retrofit Feasibility

Fragile supply chains were identified as a challenge in building retrofit projects, as the procurement of new technologies and materials for decarbonizing buildings becomes logistically difficult. In some cases, this can significantly delay project timelines and increase overall cost. Outdated electrical and utility infrastructure in some jurisdictions also limit capacity for electrification retrofits, preventing opportunities for some building to decarbonize.

### Limited Availability and Perceived High Costs of Sustainable Materials

The difficulty of sourcing sustainable products, such as low-carbon concrete, recycled steel, and responsibly harvested wood was identified as a barrier. Additionally, there is an overreliance on international suppliers, due to local production limitations and prioritizing cross border goods due to the North American trade systems. There are underlying issues related to infrastructure, production, transport, and supply chains. The municipal resistance to innovative materials like wood further complicates the issue.

### Lack of Standardized Guidance for Decarbonization Retrofits

The lack of a consistent standard or unified approach that outlines all considerations of a decarbonization retrofit, such as supply chains, procurement, costs, and alternative technologies presents a barrier for many organizations. Additionally, some buildings systems and equipment are inherently difficult to decarbonize as they were not designed with GHG emissions and embodied carbon in mind.

While redesigning existing systems can reduce costs, it's not always practical and may involve risks that some organizations cannot tolerate.

Opportunities to adopt more efficient or lower-carbon options comes when equipment reaches end-of-life, but these moments often come with time pressures that limit building operators' ability to consider unfamiliar alternatives.

### Lack of Vendor Knowledge and Experience in Sustainable Technologies

A lack of familiarity with sustainable building technologies and practices among vendors was identified as a barrier. Many suppliers and contractors lack the technical expertise or up-to-date knowledge required to implement low-carbon solutions effectively. This results in missed opportunities for innovation, inconsistent project outcomes, and hesitation in adopting advanced sustainable methods.

## Recommendations

### Use Pilot Programs and Embed AI to Accelerate Adoption

It is recommended to test new materials, smart systems, and low-emission equipment through pilot programs to collect data that helps verify performance in real-world, case-specific applications. This can help prove the viability of technologies, raise awareness, and increase adoption. Additionally, leveraging AI to optimize building operations and energy use by automating tasks is essential. Embedding AI in standards and KPIs while expanding pilots to evaluate risks and performance will provide further benefits. Furthermore, integrating smart building technology into retrofit projects as well as new builds is advised.

### Provide Tools and Strengthen Supply Chains for Seamless Tech Integration

To facilitate seamless technology adoption, creating tools such as user manuals, integrated ecosystem manuals, comprehensive building material libraries, and operational readiness packages were recommended.

Strengthening and diversifying the supply chain was identified to improve access to emerging technologies.

## Areas of Future Focus

### Tech Integration Toolkit & Supply Chain Support Initiative

**Mid Term**

**Key Stakeholders:** TRCA, Earth District, Tech Providers, Construction Firms, Supply Chain Experts, Building Operators

Develop and distribute a standardized toolkit, including user manuals, integration guides, and material libraries, for seamless adoption of smart building technologies. In parallel, collaborate with suppliers to identify gaps and diversify sources for emerging tech and sustainable materials. Pilot the toolkit in retrofit and new build projects and refine based on operator feedback.

### Smart Systems & AI Pilot Integration Program

**Mid Term**

**Key Stakeholders:** TRCA, Earth District, Technology Providers, Building Owners, AI Specialists, Municipal Retrofits Teams

Launch pilot projects to test smart materials, low-emission equipment, and AI-driven energy optimization systems in both retrofits and new builds. Partner with tech providers to embed AI into building management systems and develop KPIs that reflect real-time performance. Collect data to evaluate impact and scalability, and use findings to inform future standards and incentive programs.

**Vendor Education Initiative for Sustainable Building Practices**

**Short Term**

**Key Stakeholders:** Earth District, TRCA, Industry Associations, Procurement Officers, Vocational Training Bodies

Implement a targeted education program to enhance vendors' skills in sustainable construction, focusing on low-carbon materials, retrofitting, and energy efficiency. Offer flexible training options both in person and online, including case studies, demonstrations, and certifications. Encourage municipalities and developers to prefer vendors who complete the program in procurement decisions.

# Post-Occupancy Practices and Data

## Identified Challenges/Barriers

### Lack of Post-Construction Maintenance Plans and Performance Monitoring

The lack of clear plans for post-construction maintenance or performance monitoring, along with the often-overlooked costs of maintenance and monitoring during planning, has been identified as a significant challenge.

### Insufficient Data Collection, Sharing, and Real-Time Monitoring

It was reported that inconsistencies with how data is collected and shared, both within and across different organizations, undermines effective decision-making as it relates to low carbon buildings. The use of real-time building data monitoring and lifecycle tracking frameworks was perceived to be limited in the building sector. Without post-occupancy monitoring, discrepancies between modeled and actual energy use may be missed, resulting in buildings not performing to design specifications or expectations. Ensuring that buildings are properly commissioned after construction was also highlighted as an important process.

### Absence of Baseline Data, Pilot Studies, and Executive-Level Information

The absence of baseline data further complicates decision-making regarding energy type changes, and the lack of pilot studies fails to align interdepartmental goals and budgeting. Although performance data exists, it is not publicly available, and there is a notable deficiency of executive- level data to support green investments. Lastly, it is important to note that roadmaps need to be tailored by building type to effectively address these challenges.

## Recommendations

### Incorporate Post-occupancy Feedback and Real-time Tracking into Standard Practice

It is recommended that post-occupancy feedback be integrated into future design, training, and operational practices to drive continuous improvements and achieve more sustainable outcomes. Implementing real-time carbon performance tracking will measure success and guide decision-making. Organizations should require

post-occupancy verification instead of relying solely on pre-certification compliance.

**Mandate Reporting and Embed KPIs into Facility Operations**

Promoting mandatory reporting and evolving standards can help new building projects keep pace with technological advancements. To ensure consistent tracking, energy and sustainability KPIs need to be integrated into facility management standard operating procedures.

**Facilitate Access to Resources, Case Studies, and Phased Retrofit Frameworks**

There is a need to facilitate access to case studies and forums that increase awareness of international best practices and standards. The development of phased retrofit frameworks can support the gradual implementation of decarbonization retrofits, while governments can play a crucial role by providing building material libraries, procurement data, and centralized resource hubs to guide and facilitate sustainable construction practices.

## Areas of Future Focus

### Post-Occupancy Feedback & Real-Time Carbon Tracking Program

**Mid Term**

**Key Stakeholders:** TRCA, Earth District, Building Owners, Facilities Managers, Tenants, Tech Providers, Sustainability Consultants

Implement a post-occupancy review process that includes tenant feedback surveys and real-time carbon tracking using smart sensors. Require post-occupancy verification as part of project close-out, with findings used to inform future design and training.

### Retrofit Resource Hub & Phased Framework Pilot

**Mid Term**

**Key Stakeholders:** TRCA, Earth District, Government Agencies, Retrofit Experts, Knowledge-Sharing Platforms

Create a centralized online hub offering phased retrofit frameworks, international case studies, and procurement resources. Include material libraries and policy guidance to support gradual decarbonization planning. Launch with a pilot forum series to gather input and test the phased framework on 1–2 demonstration projects for refinement.

### Facility KPI Integration & Reporting Mandate Pilot

**Mid Term**

**Key Stakeholders:** TRCA, Facility Management Firms, Building Owners, Sustainability Consultants, Reporting Standard Bodies

Pilot the integration of energy and sustainability KPIs into daily facility management SOPs. Develop standardized reporting templates and require quarterly submissions tied to performance benchmarks. Partner with select buildings to test feasibility and use outcomes to support wider policy adoption and compliance frameworks.

# Culture and Perception

## Identified Challenges/Barriers

### Conventional Building Practices and Traditional Procurement Limit Innovation

Conventional building practices and traditional procurement have been identified as challenges that limit innovation within the building industry. There is a hesitance to change, which results in a reluctance to share risks or rewards associated with innovation and performance. Furthermore, the fear of being first movers deters the adoption of low-carbon strategies.

### Lack of Urgency and Trust Undermines Decarbonization Efforts

The industry was also perceived to exhibit a lack of seriousness and urgency regarding decarbonization efforts. This resistance to change is compounded by fear, misinformation, and a lack of trust among stakeholders, creating additional barriers to progress.

## Recommendations

### Empower Governments to Lead Cultural Change Through Funding and Policy Support

Municipal and regional governments are encouraged to lead cultural change and promote innovation. They can do this by providing funding and policy support for training and outreach that advances sustainable practices.

### Shift from Lowest-cost to Value-based, Performance-driven Investment Strategies

The building industry is encouraged to transition from a lowest- cost approach to a value-based, performance- driven investment strategy. Buildings should be acknowledged not merely as tools for emissions reduction but also as essential infrastructure for climate adaptation. This involves viewing them as integrated systems with measurable outcomes that embed sustainability throughout every phase of development. Tying sustainable practices with efficiency will help promote positive perception as efficiency translates to cost savings and optimization of resource use.

### Develop On-Site Leadership and Incentivize Decarbonization Culture

There is a pressing need to train leaders who can champion sustainable practices and empower on- site teams to adopt decarbonization-first mindsets across all roles. Establishing internal incentives for energy savings and sustainability is also recommended, including the use of certificates, awards, and competitions that engage both tenants and operators.

## Areas of Future Focus

### On-Site Leadership Development & Decarbonization Incentive Program

**Mid Term**

**Key Stakeholders:** Building Owners, Facility Managers, TRCA, Earth District, Industry Associations, Tenants

Create a leadership training program focused on empowering site managers and teams to prioritize decarbonization and sustainable practices. Complement this with an incentive scheme featuring certificates, awards, and competitions to recognize and motivate energy-saving achievements among tenants and operators. Pilot the program in select buildings to refine engagement strategies and measure impact.

### Sustainable Value-Driven Investment & Culture Shift Campaign

**Mid Term**

**Key Stakeholders:** Municipal & Regional Governments, TRCA, Earth District, Industry Associations, Investors, Developers, Training Providers, Policy Makers

Launch a government-led campaign that promotes a cultural and strategic shift in the building industry—from lowest-cost decision-making to value-based, performance-driven investments focused on climate resilience and sustainability. The campaign will combine funding incentives, policy reforms, and targeted training/outreach programs aimed at public agencies, investors, and developers. Activities include workshops to educate stakeholders on long-term value and resilience metrics, grant programs to support innovative projects, and recognition awards that celebrate leaders adopting these practices. The initiative will foster an innovation-friendly culture, backed by measurable outcomes, to embed sustainability across all development phases.

# Collaboration and Integration

## Identified Challenges/Barriers

### Lack of Stakeholder Alignment Undermines Project Coherence

One of the identified challenges is the lack of alignment among stakeholders within and across organizations, who often work with different, uncoordinated objectives. This lack of a shared vision or coordinated plan can fragment the project and lead to missed opportunities and hampers innovation.

### Limited Collaboration Frameworks and Fragmented Project Delivery Models

There is a lack of collaboration frameworks, while traditional design-bid-build models further create a siloed workflow. Poor communication and fragmented roles contribute to these issues, along with minimal sharing of industry cases. Moreover, Integrated Project Delivery (IPD) and other successful models remain rare and poorly understood, further complicating the landscape.

## Recommendations

### Foster Cross-Disciplinary Collaboration

It is recommended that collaboration occurs between the fields of civil and building engineering and computer science and IT to develop integrated solutions to building decarbonization. Additionally, supporting startups and manufacturers dedicated to producing decarbonized construction products is essential for advancing this initiative.

### Adopt Integrated Project Delivery (IPD) and Lifecycle Collaboration Models

It is recommended to adopt IPD models to align the design, construction, and client objectives fostering early-stage collaboration among contractors, designers, and sustainability consultants. Additionally, lifecycle collaboration among all stakeholders, including designers, builders, and owners, is essential, with shared responsibility extending from project inception through operation. This collaboration should also encourage knowledge-sharing among contractors, architects, and engineers throughout the project lifecycle.

### Partner with Educational Institutions and Invest in Sustainability Research and Development

It is recommended that building sector stakeholders partner with educational institutions to align research with the needs of the construction industry, providing students with opportunities for applied sustainability projects and practical experiences. Additionally, there is a need to invest in research and development to enhance the availability, affordability, and reliability of sustainable materials.

## Areas of Future Focus

### Cross-Disciplinary Symposium & Discussion Series

**Short Term**

**Key Stakeholders:** TRCA, Earth District, Industry Experts, Startups, Manufacturers, Policy Makers

Organize a recurring symposium and discussion series that brings together professionals and academics from civil/building engineering, computer science, IT, startups, and manufacturers. The series will focus on sharing knowledge, showcasing innovations, and fostering partnerships for decarbonized construction solutions. Incorporate networking sessions, panels, and collaborative workshops to stimulate cross-sector collaboration and project ideation.

### Industry-Academic Collaborative R&D Partnership Program

**Mid Term**

**Key Stakeholders:** TRCA, Earth District, Universities, Colleges, Construction Firms, Research Institutes, Funding Agencies

Establish a structured partnership program facilitated by TRCA and Earth District to connect academic institutions with industry stakeholders for joint sustainability research and development projects. The program will provide dedicated resources including funding support, project coordination, and networking opportunities to foster effective collaboration. This initiative aims to drive innovation in sustainable construction materials and practices while offering students valuable experiential learning and internship placements.

### Funded Pilot Program for IPD and Lifecycle Collaboration

**Mid Term**

**Key Stakeholders:** Municipal and Regional Governments, Developers, Contractors, Designers, Sustainability Consultants, Building Owners, TRCA, Earth District

Establish a funded pilot program that supports projects adopting IPD contracts to align stakeholder incentives from design through operation. Provide grants to participating teams to cover collaboration workshops and digital platform implementation for real-time knowledge-sharing. Monitor pilot outcomes to develop standardized best-practice guidelines and encourage broader adoption of lifecycle collaboration models industry-wide.

# Education

## Identified Challenges/Barriers

### Technical Knowledge Gaps Limit Decarbonization Capacity

There exists a notable lack of decarbonization expertise among consultants, construction and operations staff that is compounded by the need for training and upskilling in sustainable processes. These training gaps lead to restricted knowledge and a low capacity for long-term planning.

Education on new tools is often delayed or entirely absent, and a limited understanding of energy flow, sources, and costs persists even among professionals.

Moreover, there is a lack of training in hydronic and low-temperature Heating, Ventilation, and Air Conditioning (HVAC) systems, along with a shortage of refrigeration technicians despite growing demand.

### Disconnect Between Education and Practical Sustainability Applications

The disconnect between theoretical education and practical sustainability applications complicates matters, while cuts to college programs continue to reduce training capacity. Although 12– 18 month co-ops are recognized as more effective.

## Recommendations

### Promote Inclusive Workplace Cultures and Elevate Visibility of Emerging Career Paths

Fostering inclusive and innovative workplace cultures is highlighted to attract and retain diverse talent in the industry. It is equally important to promote trades as viable, respected, and secure career paths. Additionally, increasing the visibility of smart building opportunities among engineering, IT, and architecture students will ensure that the next generation is aware of and prepared for these emerging fields.

### Integrate Continuous, Cross-Field Training and Make Sustainability Education Standard Practice

It was suggested that continuous internal training opportunities, including workshops and reskilling initiatives, along with regular "lunch and learn" sessions focusing on sustainability and innovative practices, should be provided.

Cross-field training is necessary to keep pace with emerging technologies as well as emphasis on soft skills such as change management to help project managers implement successful projects. Government funding will play a crucial role in sustaining these education and training programs. Furthermore, there is a need for sustainability-focused courses and certifications, particularly in relation to emerging technologies and sustainable materials.

Providing both mandatory and voluntary training that explains technical jargon in straightforward language is suggested, ensuring all staff can engage with the content and address their concerns. Making training a part of procurement and contract terms will further integrate learning into organizational practices, while sharing benchmarking data and case studies within industry networks can enhance collaboration and promote continuous learning and improvement.

### Embed Building Innovation Education in K–12 and Post-Secondary Curricula Through Industry-Academic Collaboration

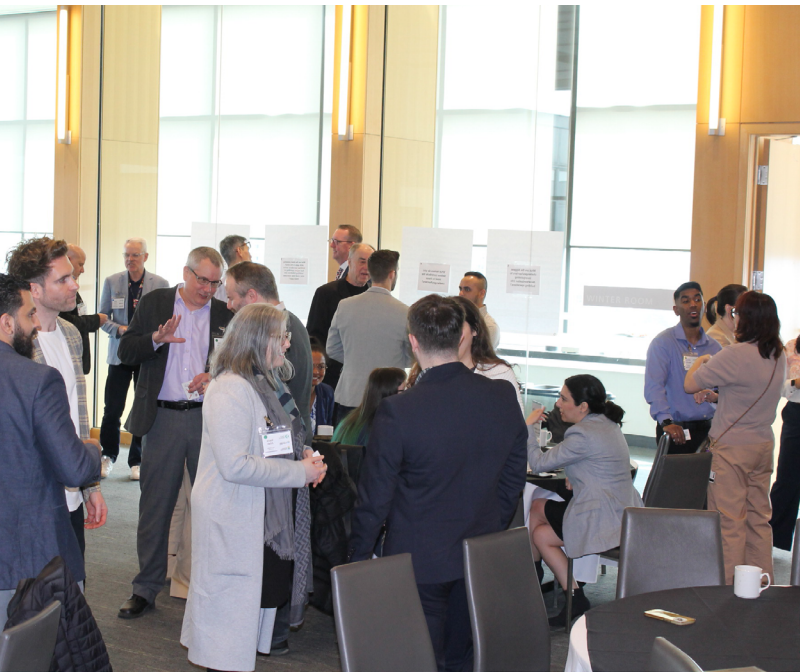
Incorporating environmental education and building innovation in K-12 and post-secondary education is recommended. Programs such as architecture, trades, and engineering need applied and interdisciplinary content that goes beyond theoretical learning. To achieve this, collaboration between academic institutions and industry is crucial to co-create a curriculum that aligns with real-world needs, including system integration and material analysis.

**Expand and Fund Long-Term Co-op Placements and Smart Building Education to Align with Industry Needs**

To better prepare students for industry needs, more extended co-op placements of ideally 12 to 18 months are recommended. Procurement policies, such as Request for Proposal (RFP) co-op mandates, can be leveraged to fund these placements, particularly for non-profits. Additionally, increased funding and awareness are necessary to expand access to students' placement opportunities. Furthermore, expanding smart building programs can effectively integrate energy, technology, and operations education.

**Use Storytelling, Public Projects, and Recognition to Shift Perceptions and Promote Smart, Sustainable Buildings**

To challenge outdated assumptions about buildings and trades, stronger narratives are needed to engage skeptical stakeholders while highlighting the benefits of smart buildings. We can leverage projects like the TRCA's new mass timber office building to showcase Integrated Project Delivery, renewable energy integration and promote renewable-ready design from the earliest stages of planning and development. Furthermore, using storytelling and recognition initiatives including awards, can inspire action.



## Areas of Future Focus

**Smart Building Certification Program for Students**

**Short Term**

**Key Stakeholders:** Earth District, TRCA, Industry Experts, Student Associations

Launch a semester-long extracurricular program where students attend weekly sessions led by industry experts in smart buildings. Each session includes a talk and a hands-on workshop aligned with real-world challenges. Students will collaborate on a capstone mini-project and receive a Smart Futures Certificate of Participation upon completion. Designed to complement academic studies and increase student exposure to industry needs within 4–6 months.

**Continuous Learning: Online Speaker Series for Professionals**

**Short Term**

**Key Stakeholders:** TRCA, Earth District, Partner Employers, Industry Experts, Professional Accreditation Bodies

Launch a virtual speaker series tailored to industry professionals, focusing on practical sustainability knowledge, emerging technologies, and cross-disciplinary learning. Hosted monthly by Earth and TRCA, the sessions can be counted toward PD hours and are designed to support continuous learning across roles. Pilot over 3–4 months with recordings and attendance certificates provided to participants.

### Industry and Career Awareness Campaigns for Students

**Mid Term**

**Key Stakeholders:** Earth District, TRCA, Student Associations, Universities/Colleges, Industry Associations, Employers

A social media and campus-based campaign to promote inclusive work cultures and increase awareness of trades and smart building careers among students. Partner with student groups and universities to host career spotlight events and highlight success stories from diverse professionals.

### Storytelling & Recognition Campaign for Smart Buildings

**Mid Term**

**Key Stakeholders:** Earth District, TRCA, Universities/Colleges, Municipalities, Industry, Students

Launch a cross-platform storytelling campaign highlighting real projects to showcase smart building features and renewable integration. Create videos, articles, and tours for industry, community, and student audiences. Introduce a "Smart Building Champions" program to recognize leaders in sustainable design. Co-develop campaign materials with students and industry partners to boost engagement and strengthen academia- industry connections.

### Co-op Expansion Initiative

**Long Term**

**Key Stakeholders:** Earth District, TRCA, Municipal Governments, Non-Profit Organizations, Industry Partners, Provincial Ministries

Establish a co-op funding and curriculum enhancement initiative to support 12–18 month placements in sustainability and smart building sectors. Collaborate with municipalities to include co-op mandates in RFP procurement, enabling funding streams for non-profit placements.

### Building Innovation Curriculum Working Group

**Long Term**

**Key Stakeholders:** School Boards, Earth District, TRCA, Industry Partners, Curriculum Developers, Ministries of Education and Colleges/Universities

Establish a cross-sector working group to co-develop applied curriculum modules on building innovation for K–12 and post-secondary levels. These modules will cover topics such as system integration, sustainable materials, and smart technologies. Pilot in select institutions, with a goal to scale over 2–4 years.

# Areas of Future Focus

The Areas of Future Focus (pg. 18) have been developed based on the challenges and recommendations identified through the event discussions. This section presents a foundational set of strategic actions aimed at overcoming persistent barriers to building decarbonization. While not exhaustive, it is intended to guide and support ongoing efforts, encourage cross-sector collaboration, and align stakeholders around shared priorities.

Each action item includes an indicative timeline categorized as short-term, mid-term, or long- term to help prioritize efforts. It also includes a list of key stakeholders to highlight the sectors that may need to engage and coordinate for effective implementation.


# Conclusion

This report highlighted various challenges identified during the discussion surrounding building decarbonization. Key barriers include misaligned financial incentives, inconsistent regulatory standards, insufficient data, cultural resistance, and gaps in education. However, there was a shared vision for transformation along with actionable strategies that can be applied across different areas. Thematic areas such as financial reform, technological integration, performance-based standards, and cross-sector collaboration provide a foundation for progress. As the conversation shifts towards action, stakeholders are invited to utilize this framework to promote resilient and fostering an environment of ongoing learning, innovation and responsibility.

# Areas of Future Focus

## Financial Structure

Mid Term

**Lifecycle Funding Pilot Framework**

**Key Stakeholders:** Earth District, TRCA, Municipalities, Government Funding Agencies, Legal/Procurement Advisors, Private Sector Partners

Design and pilot a funding framework for public building projects that ties funding to performance outcomes over time. The model will include lifecycle cost analysis, shared risk clauses, and incentive structures aligned with energy and maintenance performance. Begin with one or two municipal projects to test the model, supported by policy advisors and legal input.

Mid Term

**Carbon-First Procurement & Fast-Track Approval Pilot**

**Key Stakeholders:** Municipal Planning Departments, Procurement Offices, Sustainability Consultants, Vendor Prequalification Bodies

Develop a pilot process that fast-tracks approvals for projects meeting high carbon performance and energy efficiency standards. Include a vendor prequalification system prioritizing technical and sustainability credentials. Collaborate with municipalities to test the streamlined process on select public infrastructure projects and refine based on performance outcomes and stakeholder feedback.

Short Term

**Sustainable Construction Incentive Program**

**Key Stakeholders:** Government Funding Agencies, Municipalities, Industry Associations, Building Owners

Establish and promote a dedicated funding stream that offers grants or tax incentives for sustainable construction expenses, such as emissions assessments, low-carbon materials, and staffing for decarbonization. Begin with a funding toolkit and targeted outreach to eligible partners. Pilot applications with 2–3 demonstration projects to build the case for broader adoption.

Mid Term

**Resilience ROI Metrics & Data Framework**

**Key Stakeholders:** TRCA, Earth District, Financial Analysts, Municipalities, Standards Organizations

Co-develop a standardized framework for evaluating ROI that includes resilience, climate risk, and long-term value. Collaborate with financial experts and municipal partners to define key metrics and data-reporting formats. Pilot the framework on select public projects to demonstrate its effectiveness and refine it for broader adoption.

## Regulations and Standards

Mid Term

**Unified Code Alignment & Regulatory Access Project**

**Key Stakeholders:** Provincial Code Authorities, Industry Regulators, Trade Certification Bodies, Municipal Governments

Collaborate with regulatory and code authorities to identify inconsistencies in municipal building codes and streamline pathways for cross-specialization transitions (e.g., gas to refrigeration). Develop a unified reference guide and propose simplified approval processes to reduce barriers. Pilot the changes with targeted sectors and gather feedback for provincial-level recommendations.

Long Term

**Post-Construction Performance Standards & Monitoring Pilot**

**Key Stakeholders:** TRCA, Municipal Governments, BOMA, Code Authorities, Facilities Management Teams

Develop and pilot enforceable low-carbon operational standards that apply post-construction, distinct from design-phase requirements. Work with municipalities to embed these standards into permitting and inspection processes, supported by dedicated staff for ongoing performance monitoring. Begin with a small group of public or commercial buildings and align with BOMA or equivalent benchmarks.

## Technology, Supply and Infrastructure

Mid Term

**Tech Integration Toolkit & Supply Chain Support Initiative**

**Key Stakeholders:** TRCA, Earth District, Tech Providers, Construction Firms, Supply Chain Experts, Building Operators

Develop and distribute a standardized toolkit, including user manuals, integration guides, and material libraries, for seamless adoption of smart building technologies. In parallel, collaborate with suppliers to identify gaps and diversify sources for emerging tech and sustainable materials. Pilot the toolkit in retrofit and new build projects and refine based on operator feedback.

Mid Term

**Smart Systems & AI Pilot Integration Program**

**Key Stakeholders:** TRCA, Earth District, Technology Providers, Building Owners, AI Specialists, Municipal Retrofits Teams

Launch pilot projects to test smart materials, low-emission equipment, and AI-driven energy optimization systems in both retrofits and new builds. Partner with tech providers to embed AI into building management systems and develop KPIs that reflect real-time performance. Collect data to evaluate impact and scalability, and use findings to inform future standards and incentive programs.

Short Term

**Vendor Education Initiative for Sustainable Building Practices**

**Key Stakeholders:** Earth District, TRCA, Industry Associations, Procurement Officers, Vocational Training Bodies

Implement a targeted education program to enhance vendors' skills in sustainable construction, focusing on low-carbon materials, retrofitting, and energy efficiency. Offer flexible training options both in person and online, including case studies, demonstrations, and certifications. Encourage municipalities and developers to prefer vendors who complete the program in procurement decisions.

## Post-Occupancy Practices and Data

Mid Term

**Post-Occupancy Feedback & Real-Time Carbon Tracking Program**

**Key Stakeholders:** TRCA, Earth District, Building Owners, Facilities Managers, Tenants, Tech Providers, Sustainability Consultants

Implement a post-occupancy review process that includes tenant feedback surveys and real-time carbon tracking using smart sensors. Require post-occupancy verification as part of project close-out, with findings used to inform future design and training.

Mid Term

**Retrofit Resource Hub & Phased Framework Pilot**

**Key Stakeholders:** TRCA, Earth District, Government Agencies, Retrofit Experts, Knowledge-Sharing Platforms

Create a centralized online hub offering phased retrofit frameworks, international case studies, and procurement resources. Include material libraries and policy guidance to support gradual decarbonization planning. Launch with a pilot forum series to gather input and test the phased framework on 1–2 demonstration projects for refinement.

Mid Term

**Facility KPI Integration & Reporting Mandate Pilot**

**Key Stakeholders:** TRCA, Facility Management Firms, Building Owners, Sustainability Consultants, Reporting Standard Bodies

Pilot the integration of energy and sustainability KPIs into daily facility management SOPs. Develop standardized reporting templates and require quarterly submissions tied to performance benchmarks. Partner with select buildings to test feasibility and use outcomes to support wider policy adoption and compliance frameworks.

## Culture and Perception

Mid Term

**On-Site Leadership Development & Decarbonization Incentive Program**

**Key Stakeholders:** Building Owners, Facility Managers, TRCA, Earth District, Industry Associations, Tenants

Create a leadership training program focused on empowering site managers and teams to prioritize decarbonization and sustainable practices. Complement this with an incentive scheme featuring certificates, awards, and competitions to recognize and motivate energy-saving achievements among tenants and operators. Pilot the program in select buildings to refine engagement strategies and measure impact.

Mid Term

**Sustainable Value-Driven Investment & Culture Shift Campaign**

**Key Stakeholders:** Municipal & Regional Governments, TRCA, Earth District, Industry Associations, Investors, Developers, Training Providers, Policy Makers

Launch a government-led campaign that promotes a cultural and strategic shift in the building industry—from lowest-cost decision-making to value-based, performance-driven investments focused on climate resilience and sustainability. The campaign will combine funding incentives, policy reforms, and targeted training/outreach programs aimed at public agencies, investors, and developers. Activities include workshops to educate stakeholders on long-term value and resilience metrics, grant programs to support innovative projects, and recognition awards that celebrate leaders adopting these practices. The initiative will foster an innovation-friendly culture, backed by measurable outcomes, to embed sustainability across all development phases.

## Collaboration and Integration

Short Term

**Cross-Disciplinary Symposium & Discussion Series**

**Key Stakeholders:** TRCA, Earth District, Industry Experts, Startups, Manufacturers, Policy Makers

Organize a recurring symposium and discussion series that brings together professionals and academics from civil/building engineering, computer science, IT, startups, and manufacturers. The series will focus on sharing knowledge, showcasing innovations, and fostering partnerships for decarbonized construction solutions. Incorporate networking sessions, panels, and collaborative workshops to stimulate cross-sector collaboration and project ideation.

Mid Term

**Industry-Academic Collaborative R&D Partnership Program**

**Key Stakeholders:** TRCA, Earth District, Universities, Colleges, Construction Firms, Research Institutes, Funding Agencies

Establish a structured partnership program facilitated by TRCA and Earth District to connect academic institutions with industry stakeholders for joint sustainability research and development projects. The program will provide dedicated resources including funding support, project coordination, and networking opportunities to foster effective collaboration. This initiative aims to drive innovation in sustainable construction materials and practices while offering students valuable experiential learning and internship placements.

Mid Term

**Funded Pilot Program for IPD and Lifecycle Collaboration**

**Key Stakeholders:** Municipal and Regional Governments, Developers, Contractors, Designers, Sustainability Consultants, Building Owners, TRCA, Earth District

Establish a funded pilot program that supports projects adopting IPD contracts to align stakeholder incentives from design through operation. Provide grants to participating teams to cover collaboration workshops and digital platform implementation for real-time knowledge-sharing. Monitor pilot outcomes to develop standardized best-practice guidelines and encourage broader adoption of lifecycle collaboration models industry-wide.

## Education

Short Term

**Smart Building Certification Program for Students**

**Key Stakeholders:** Earth District, TRCA, Industry Experts, Student Associations

Launch a semester-long extracurricular program where students attend weekly sessions led by industry experts in smart buildings. Each session includes a talk and a hands-on workshop aligned with real-world challenges. Students will collaborate on a capstone mini-project and receive a Smart Futures Certificate of Participation upon completion. Designed to complement academic studies and increase student exposure to industry needs within 4–6 months.

Short Term

**Continuous Learning: Online Speaker Series for Professionals**

**Key Stakeholders:** TRCA, Earth District, Partner Employers, Industry Experts, Professional Accreditation Bodies

Launch a virtual speaker series tailored to industry professionals, focusing on practical sustainability knowledge, emerging technologies, and cross-disciplinary learning. Hosted monthly by Earth and TRCA, the sessions can be counted toward PD hours and are designed to support continuous learning across roles. Pilot over 3–4 months with recordings and attendance certificates provided to participants.

Mid Term

**Industry and Career Awareness Campaigns for Students**

**Key Stakeholders:** Earth District, TRCA, Student Associations, Universities/Colleges, Industry Associations, Employers

A social media and campus-based campaign to promote inclusive work cultures and increase awareness of trades and smart building careers among students. Partner with student groups and universities to host career spotlight events and highlight success stories from diverse professionals.

Mid Term

**Storytelling & Recognition Campaign for Smart Buildings**

**Key Stakeholders:** Earth District, TRCA, Universities/Colleges, Municipalities, Industry, Students

Launch a cross-platform storytelling campaign highlighting real projects to showcase smart building features and renewable integration. Create videos, articles, and tours for industry, community, and student audiences. Introduce a "Smart Building Champions" program to recognize leaders in sustainable design. Co-develop campaign materials with students and industry partners to boost engagement and strengthen academia- industry connections.

Long Term

**Co-op Expansion Initiative**

**Key Stakeholders:** Earth District, TRCA, Municipal Governments, Non-Profit Organizations, Industry Partners, Provincial Ministries

Establish a co-op funding and curriculum enhancement initiative to support 12–18 month placements in sustainability and smart building sectors. Collaborate with municipalities to include co-op mandates in RFP procurement, enabling funding streams for non-profit placements.

Long Term

**Building Innovation Curriculum Working Group**

**Key Stakeholders:** School Boards, Earth District, TRCA, Industry Partners, Curriculum Developers, Ministries of Education and Colleges/Universities

Establish a cross-sector working group to co-develop applied curriculum modules on building innovation for K–12 and post-secondary levels. These modules will cover topics such as system integration, sustainable materials, and smart technologies. Pilot in select institutions, with a goal to scale over 2–4 years.

# Participants

AtkinsRealis Canada Inc.
Austrian General Consulate - Commercial Section
BGO
Black & McDonald
Bullfrog
Canada Green Building Council
Canada Sri Lanka Business Convention
Centennial College
Circular Innovation Council
City of Pickering
City of Richmond Hill
City of Toronto
City of Vaughan
Demirov Fine Homes
Diamond Schmitt Architects
Durham Region
Ecosystem
Ecosystem Energy Services
Enercare
EQUANS Services
Fleming College
GTAA
Hariri Pontarini Architect
Mantle Developments
Nerva Energy
North 60
Ontario Tech University
PCL
Polaris Transportation
Pratus Group
RDH Building Science
Region of Durham
ROGERS
Schneider Electric
Toronto and Region Conservation Authority
Tree House Energy Services
Trent University
University of Toronto
University of Toronto Scarborough
Windfall Ecology Centre
York Region
York University

We encourage you to stay involved as we keep the conversation going about decarbonization in buildings. Be sure to check our website and follow us on social media for news about upcoming events and updates. If you have any questions, suggestions, or want to get involved, reach out to us at info@earthdistrict.ca and ppg@trca.ca.

Earth District

- earthdistrict.ca
- @earthdistrictca
- linkedin.com/company/earthdistrictca

Partners in Project Green
Brought to you by: Toronto and Region Conservation Authority and Toronto Pearson

- partnersinprojectgreen.ca
- linkedin.com/company/partners-in-project-green

Toronto and Region Conservation Authority

- trca.ca
- @trca_hq
- linkedin.com/company/trca

Keito Iuchi

Keito Iuchi contributed to the writing and design of this report. Keito is a multimedia designer with experience in visual communication, web design, and user experience, passionate about creating meaningful and impactful design solutions across diverse media. Keito is a recent graduate of the Joint New Media Program at UTSC and Centennial College, focused on digital media production and design through both academic and practical training.