



Advancing Learning Environments with Smart Buildings

Education's Practical Path to Net Zero

Canada's Net Zero¹ deadlines, stretching from 2040 to 2050, are shaping building strategies across the country, including for schools and higher education campuses. For many learning environments, Net Zero means moving away from fossil fuels and exploring options such as ice banks, solar, and wind-powered energy. But while Net Zero is a required directive, it is not the only pressure facing educational environments.

Schools and higher education campuses are also dealing with aging facilities and assets, deferred maintenance, cost pressures, and tight budgets that demand more be done with less. Labour shortages continue to affect day-to-day operations, especially when skilled staff are responsible for multiple buildings or campuses. Energy cost pressures are also becoming a significant factor across the sector. These realities make the path to Net Zero more complex, but also more urgent.

For education leaders, the challenge is to identify where digital services and artificial intelligence (AI) can help support the most important operational outcomes first: improving performance, reducing operating costs, increasing reliability, and strengthening resilience while building a practical path toward Net Zero.

¹ The Government of Canada defines achieving net zero emissions to mean that the Canadian building landscape "either emits no greenhouse gas emissions or offsets its emissions, for example, through actions such as tree planting or employing technologies that can capture carbon before it is released into the air."

How AI Works and Why it Can Help Achieve Net Zero

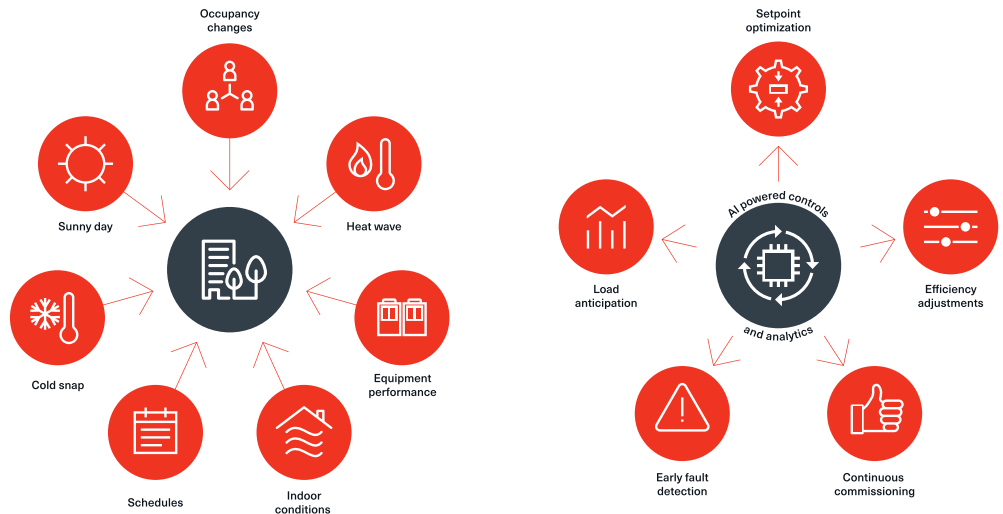
AI can play an important role in helping schools and higher education campuses achieve Net Zero goals while improving day-to-day building operations. At a high level, AI works by analyzing building data, identifying patterns, and adjusting based on real-life circumstances. Instead of relying only on static schedules or manual intervention, AI can continuously learn from how a building is actually performing.

Simulation modeling is the key idea here. AI looks at the components that impact performance, including occupancy, weather, equipment status, schedules, historical trends, and real-time conditions, and re-adjusts based on what is happening in the building. This continuous learning drives AI-enabled changes and makes the system more responsive over time.

For schools and higher education campuses, this matters because building use is constantly changing. Classrooms, labs, residences, gyms, and common areas all have different patterns of occupancy and demand. Academic schedules, after-hours events, weather shifts, and seasonal changes all influence performance. AI helps facilities teams respond with greater speed and accuracy.

This is where outcome-based transformation becomes important. Schools and higher education campuses can focus first on where AI and digital solutions deliver the greatest return: efficiency, reliability, reduced emissions, and more informed decision-making.

AI in Action Across Canadian Conditions - Operate Proactively



Three AI-Enabled Pathways to Resilience

1. Digital Services for Increased Uptime, Reduced Travel

Digital services give schools and higher education campuses a way to help reduce technician travel, improve uptime and respond to issues more quickly, including in remote communities. By leveraging connected equipment, remote diagnostics, and continuous monitoring, teams can identify issues early and use the data for maintenance with a focus on key parts and the most impactful assets.

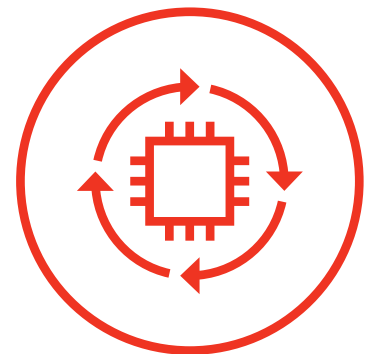
This supports quicker response through remote capabilities. In many cases, problems can be diagnosed, and sometimes resolved, without a technician visit. That matters because the traditional service response often depends on sending someone to the site, and that process can be inefficient. Technician visits may involve missing parts, the wrong people, labour shortages, fuel cost, travel time, wasted emissions, and scheduling delays.

Digital services are often more efficient resulting in quicker fixes that can be completed remotely, often in minutes. They also help improve decision-making accuracy because they are based on actual building data, not assumptions.

2. Modernizing BMS for Consistency and Scalability

Modernizing the building management system is another key pathway. Many schools and higher education campuses still operate with outdated systems that limit visibility and flexibility while some are too old to support modern updates at all.

An updated BMS helps ensure building controls are current, redundancy is assured, and AI capabilities can be turned on. It also increases reporting capabilities, giving operators more visibility into what is happening across their buildings. Upgrading BMS gives teams a kind of mirror image of the building. Without that visibility, there is often a lack of information, and operators may hit a wall without knowing it until performance or comfort is affected.



For school boards and post-secondary leaders managing multiple sites, scalability is especially important. A campus- or enterprise-level system provides a holistic macro perspective, so teams can see performance across multiple buildings while still accessing detailed information when needed. It also supports 24/7 remote access and, in some cases, third-party integration.

3. Embedding AI into Controls and Analytics

The third pathway is embedding AI into controls and analytics to improve decision-making and operational efficiency. A consultative approach, supported by building data, brings valuable insight that helps schools and higher education campuses make informed, outcome-based decisions.

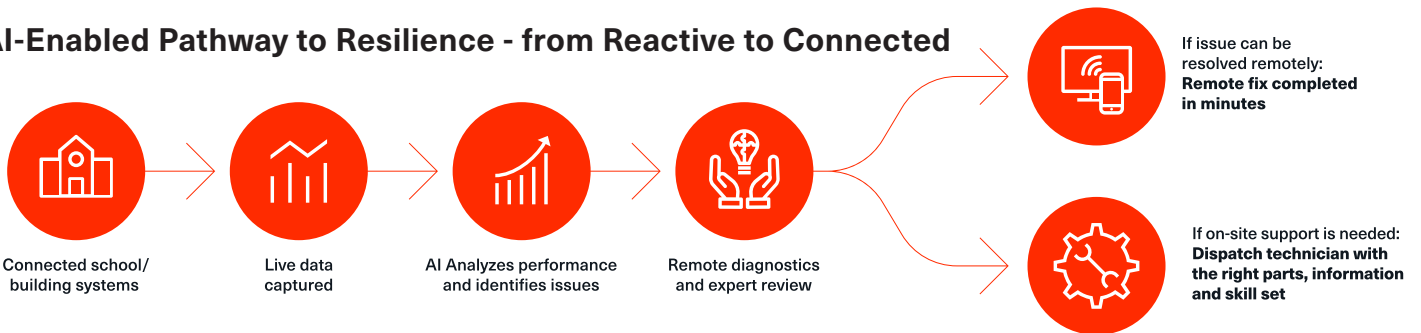
With AI embedded in controls and analytics, facilities teams can benefit from live, 24/7 commissioning to help efficient operation, help reduce operating costs, improve reliability, and increase equipment lifespan by identifying inefficiencies or emerging issues earlier.

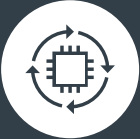
AI also can anticipate changes in building load based on occupancy or environmental conditions such as a sunny day, heat wave, or cold snap. Instead of relying on manual adjustments to setpoints, AI can make these changes automatically and continuously.

This is especially important in the context of labour shortages school and higher education facilities teams are facing. on repetitive adjustments. AI can automate some repetitive manual work and better inform facilities teams so technicians can focus on service backlogs, preventive maintenance, and interventions that help prevent failures.




AI-Enabled Pathway to Resilience - from Reactive to Connected





System Enhancements:

- Modernized BMS enables campus- or district-level visibility
- Outdated systems replaced with more secure, scalable platforms
- AI-enabled reporting improves insight and decision-making
- 24/7 remote access supports oversight across multiple schools
- Third-party systems can be integrated more easily



Benefits:

- Improved uptime
- Faster response
- Reduced travel
- Lower service cost
- Better support for remote and dispersed sites

Doing Nothing Costs Something

There is a cost to doing nothing. Even moderate connectivity can make a difference. Every day that a learning environment is not gathering data is a day when potential savings may be lost and progress toward Net Zero may be delayed.

Whether a school or higher education campus is early in its digital transformation journey or further along in its Net Zero journey, the path is relatively simple and rooted in outcome-based information:



Connect

Get buildings connected



Maintain

Leverage data for informed troubleshooting and preventive maintenance



Optimize

Leverage AI to make informed decisions directly tied to building objectives, including Net Zero

AI enables facilities teams and education leaders to align technology with operational reality and build a pathway toward stronger, smarter, more resilient buildings in Canada while helping to meet operational goals and ESG targets.

About the Author

Eric Groulx has more than 25 years of experience at Trane with deep expertise in controls, service, and operations. Since joining in 2001, he has held roles of increasing responsibility and now leads regional operations and Intelligent Services in Montreal.



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