AI Brings Predictable Energy Use to Smart Schools

How Schools Can Stay Ahead of Canada's Evolving Energy Landscape

Canada's abundant natural and renewable energy resources give it a uniquely complex electricity landscape, marked by a growing shift toward electrification and evolving grid structures. This evolution brings new opportunities for cost savings while introducing novel challenges that require proactive planning.

School districts across the country face mounting pressure to manage unpredictable energy costs with leaner budgets. They must do so while keeping students comfortable, maintaining reliable operations, and planning multi year budgets in an environment where budget tightening and even budget cuts have become the norm. As energy markets shift and operating expectations rise, schools increasingly need to understand the best way to achieve their objectives.

Grids in Transition: What Schools Need to Know Now

Understanding evolving grid behavior is essential for schools' electrification, HVAC, and budgeting choices. This includes knowing when energy is most expensive, which loads can shift, and how smart controls can protect against volatility. Electricity grids across Canada are transitioning toward time of day pricing structures, where peak periods, often aligned with the busiest school hours, carry significantly higher costs This shift makes the timing of energy use as important as the amount consumed.

Provinces such as Ontario, Quebec, British Columbia, and soon Alberta are already using or are moving toward structured peak/off peak rates Combined, these regions represent well over 80 percent of the Canadian population, meaning most schools will feel the effects of increasingly differentiated pricing .

Recovered energy , which is heat or energy that would otherwise be wasted but is captured for re-use, remains the cheapest available resource, followed by off peak electricity, a major but frequently overlooked cost saving opportunity for schools striving to stretch limited operating budgets.

Trend

Smarts that Scale

BC's District 23 uses advanced energy-modeling and real-time building data tools supported by CleanBC to improve HVAC, energy management, and maintenance, showing a growing trend toward smarter Canadian school building operations.

Source: Government of British Columbia – CleanBC Clean Buildings Program

Unlike natural gas, electricity prices fluctuate hourly. Schools that operate HVAC based on fixed schedules rather than real time grid conditions risk substantial and unnecessary exposure to cost spikes. Natural gas cannot be economically stored at the facility level, leaving schools vulnerable to volatility driven by global supply dynamics, weather patterns, or geopolitical disruptions.

Rising Demand is Reshaping the Grid

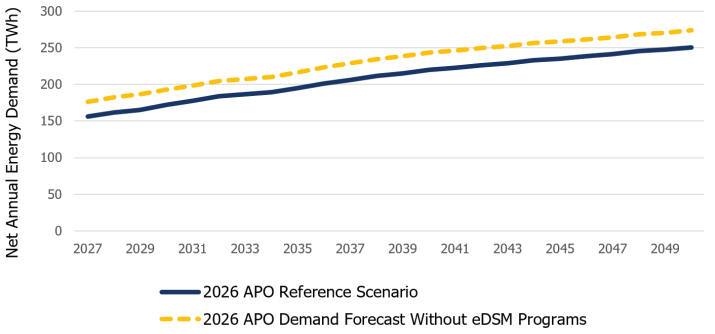
Artificial intelligence (AI) expansion and the rapid growth of data centres are accelerating electricity use, increasing stress on the grid and contributing to more volatile energy prices .

Canada is entering a period of unprecedented electricity growth fueled by AI adoption, electrification of transportation and heating, and a rapid expansion of data centres . These facilities create significant round the clock demand, reshaping traditional load curves for utilities and customers alike.

Daytime grid peaks will intensify as large scale computing and AI processing continue to expand. Even nighttime, historically the most affordable period for electricity use, will see rising demand as data operations run continuously to maximize throughput .Natural gas markets remain destabilized, challenging the long held assumption that gas will remain reliably inexpensive . Global supply chains, environmental regulation, and carbon pricing all contribute to higher volatility.

As a result, school districts must anticipate higher and less predictable operating costs unless they adopt technologies and strategies designed to reduce exposure, shift loads intelligently and improve efficiency without compromising learning environments.

Efficiency-Driven Demand Reduction



Expanded energy-efficiency programs are projected to lower Ontario's electricity demand by 8% by 2050—roughly the amount needed to power Toronto today. As one of the grid's most cost-effective resources, energy efficiency helps manage system load while reducing costs for consumers.

Source:
Independent Electricity System Operator (IESO), 2026 Annual Planning Outlook Summary (www.ieso.ca)

Smarter Buildings, Lower Risk: The AI Edge for Schools

AI enabled school buildings move beyond traditional reactive controls, using real time insights and predictive adjustments to optimize comfort, energy use, and indoor air quality across dynamic learning environments. By reducing manual workload and improving efficiency, AI helps schools create more comfortable and resilient spaces while lowering operational costs. A comparison illuminates the benefits that AI offers:

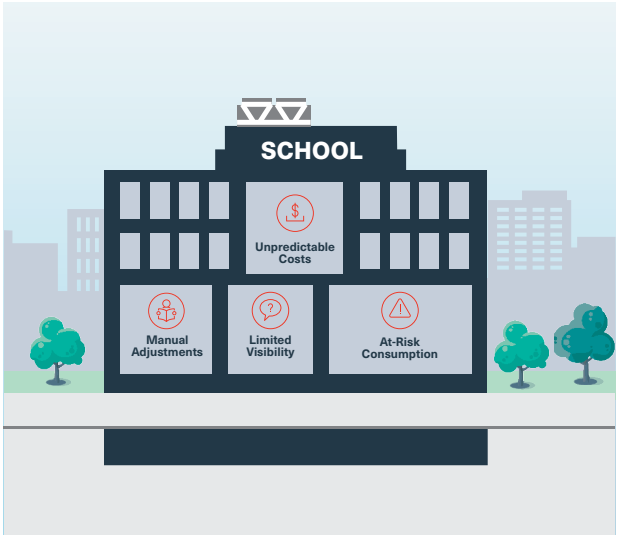
Traditional Energy Management

Unpredictable Costs - Traditional building management lacks the ability to dynamically adjust to peak pricing, sudden weather shifts, or grid level signals. When the grid becomes stressed or prices spike, the building continues consuming energy at the same rate, increasing exposure to volatile costs.

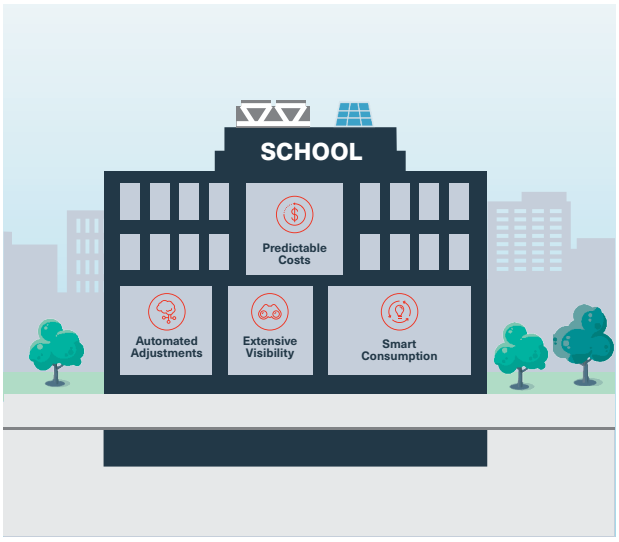
Manual Adjustments – For year, building comfort has relied heavily on manual intervention, which often occurs only after comfort complaints or operational issues arise.

This reactive approach increases downtime, reduces occupant comfort, and leads to unpredictable costs. It also results in conditioning empty classrooms, hallways, or gymnasiums—wasting energy and consuming funds that could otherwise support academic programs.

Limited Visibility – A building that relies on manual building management provides administrators with minimal real time insight, making it difficult to anticipate budget impacts, justify equipment upgrades, or validate the financial return of energy saving initiatives. As a result, decisions are often based on incomplete information rather than measurable performance.



At-Risk Consumption - Traditional building management ultimately leaves schools unable to mitigate risk in a grid that is becoming increasingly volatile due to electrification, AI-driven demand, and climate related peaks. Without the ability to adapt, buildings face rising operational risk and higher, less predictable energy costs.



AI-Enabled Energy Management

Predictable Costs - AI-driven building management predicts peak pricing windows and shifts energy intensive loads, such as pre conditioning spaces, to off peak hours whenever operationally possible. This reduces exposure to the most expensive electricity on the grid and improves budget stability.

Automated Adjustments – Building systems driven by AI automatically identify inefficiencies, such as consistently unused classrooms, over ventilated spaces, or equipment that operates longer than needed. AI then fine tunes setpoints or schedules without requiring input from facility staff.

The AI-driven system then maintains comfort and indoor air quality through micro adjustments every few minutes which human operators cannot reasonably perform. This continuous optimization extends equipment life and strengthens the overall learning environment.

Extensive Visibility – An AI-driven building delivers clear, actionable insights that strengthen long term capital planning, budget forecasting, and sustainability reporting. AI turns HVAC performance data into strategic financial intelligence for more confident, data driven decisions that support both operational efficiency and organizational goals.

Smart Consumption - AI enables buildings to interact with the grid more intelligently, contributing to system wide stability while capturing cost savings. As renewables and dynamic pricing expand, AI is becoming essential to making electrification financially sustainable for schools, turning energy use from a fixed cost into a flexible, controllable strategy that reduces risk, strengthens resilience, and supports long term educational investment.

Creating Stability Through Smart Energy Management

Smart HVAC systems and AI enabled controls empower schools to take control of their energy future by reducing exposure to peak electricity pricing and improving operational efficiency and reducing waste. These systems also help them create predictable, stable financial pathways that support long term planning while enhancing comfort and reliability in learning environments.

[1] **Ontario:** The Ontario Secondary School Teachers' Federation reported widespread layoffs, overcrowded classrooms, and insufficient funding, following a trend of chronic underfunding, with a cumulative $6.35 billion gap cited over the past seven years.
[2] E3's 2026 Energy + Environmental Economics: Electricity Market Price Forecasts are available, now including Ontario.
[3] **Canada Energy Regulator – "Market Snapshot: Time-varying electricity pricing in Canada"**
https://www.cer-rec.gc.ca/en/data-analysis/energy-commodities/electricity/report/market-snapshot-time-varying-electricity-pricing-in-canada.html
[4] **Statistics Canada — Population Estimates by Province and Territory**
https://www150.statcan.gc.ca/t1/tbl1/en/tv.action?pid=1710000901
[5] **Canada Energy Regulator – "Market Snapshot: Time-varying electricity pricing in Canada"**
https://www.cer-rec.gc.ca/en/data-analysis/energy-commodities/electricity/report/market-snapshot-time-varying-electricity-pricing-in-canada.html
[6] **1. International Energy Agency (IEA)**
The IEA reports that global electricity consumption from data centres, AI, and crypto could double by 2026, reaching more than 1,000 TWh, and notes that AI is a major new driver of grid stress and investment needs.
Source: International Energy Agency — Data Centres & Data Transmission Networks
https://www.iea.org/reports/data-centres-and-data-transmission-networks
[7] **Canada Energy Regulator (CER) — "Market Snapshot: Canada's electricity demand is rising as data centres and electrification grow"**
https://www.cer-rec.gc.ca/en/data-analysis/energy-commodities/electricity/market-snapshots/2024-11-canada-electricity-demand-data-centres.html
[8] **Canada Energy Regulator – Energy Futures & Demand Analysis**
https://www.cer-rec.gc.ca
[9] *Source:* Canada Energy Regulator – Market Snapshots and Energy Futures Analysis
https://www.cer-rec.gc.ca

About the Author

Stephen Scott is Trane's Sustainable Systems Leader for Canada, where he mentors the field sales organization to promote sustainable systems such as electrification of heating and thermal energy storage. With a Bachelor of Science in engineering chemistry from Queen's University and extensive experience in the HVAC industry, Stephen is also an active member of ASHRAE and the Canadian Green Building Council.

Trane offers the expertise, digital services, and AI driven solutions that help schools confidently navigate the transition to smarter building management. Contact your local Trane office or your Trane account manager to discuss how your school can take a future-ready approach today to better manage energy costs and grid volatility for a more resilient, sustainable tomorrow.