ONTARIO ENERGY DEMAND CASE STUDY

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Prompt

You are a data analyst supporting Ontario's Energy & Sustainability team. Leadership wants to understand electricity demand trends for 2025 to better prepare for November operations and inform next month's budget planning.

You've been provided hourly demand data from IESO and temperature records from Toronto's primary weather station. Analyse electricity demand and provide your key insights and recommendations. Your findings will be reviewed alongside internal financial and operational datasets to guide capacity planning, cost optimization, and energy efficiency initiatives. Feel free to make assumptions.

Agenda

- Key Recommendations
- Analytical Framework
- Data Gaps And Assumptions
- Energy Demand Analysis
- Forecast

Key Recommendations

- Plan maintenance during low-demand seasons to improve efficiency and minimize operational disruptions.
- Develop predictive demand models that incorporate weather alerts to improve operational readiness.
- Strengthen response strategies during heatwaves to reduce peak stress and maintain system reliability.
- Use November forecast to fine-tune short-term planning and avoid overcapacity costs.

Analytical Framework

What do I want to know?

- Total Energy Demand
- Temperature Patterns
- Weather-driven Demand

Why do I want to know this?

- Understand consumption variations
- Assess weather impact on demand
- Identify baseline and variable consumption

So what?

- Support demand forecasting and budgeting decisions.

Measured by:

- Total Demand (MWh)
- Mean Temperature (°C)
- HDD/CDD
- Variance %

Data Gaps And Assumptions To Clarify Analytical Scope

Data Limitations:

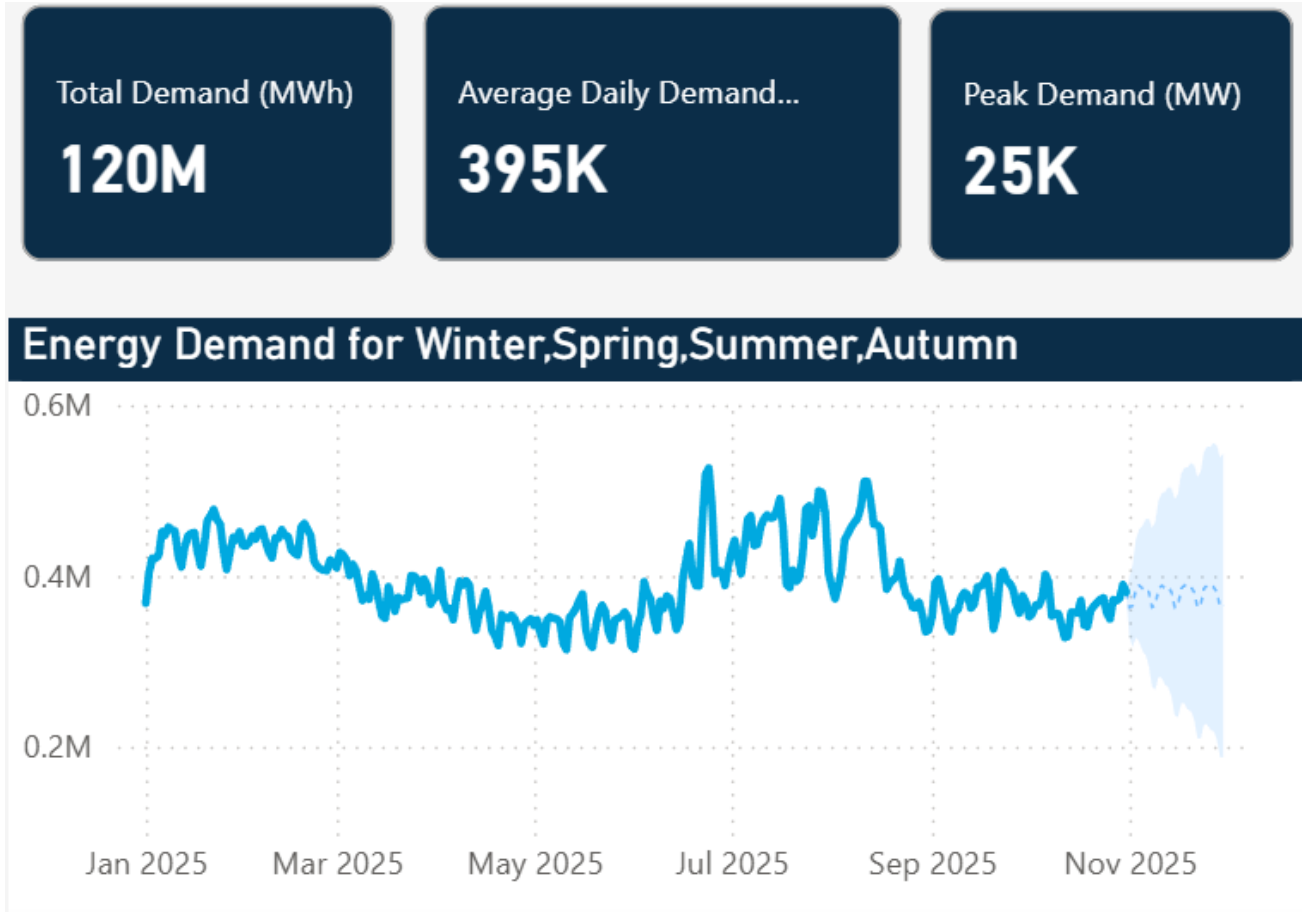
- Weather data only sourced from Toronto's primary station, not across multiple Ontario regions.
- IESO dataset covers market and Ontario demand but lacks granularity by sector or region.
- No access to real-time operational data.
- Historical comparison (pre-2025) not included.

Assumptions:

- Toronto temperature is representative of broader Ontario weather patterns.
- September is the baseline chosen due to minimal HDD and CDD, representing "neutral" demand conditions.
- Demand variations primarily reflect temperature effects, not behavioral or policy shifts.

TOTAL ENERGY DEMAND TREND

Energy Demand Trended Upward Mid-year, Peaking During Summer Months And Stabilizing Afterward To Support Planning Insights.

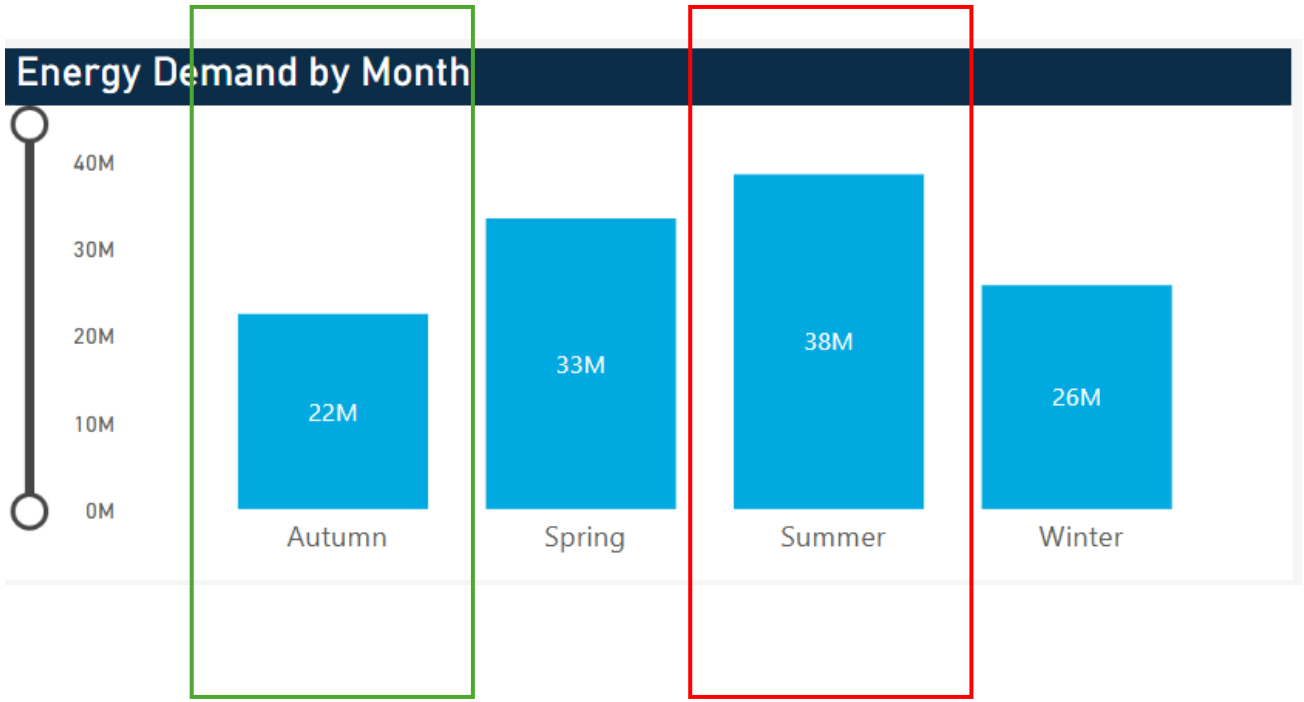


Demand increased steadily from May, reaching a peak in June.
Daily **volatility aligns with seasonal consumption patterns**.
Demand stabilizes toward September, suggesting return to baseline activity.

Since mid-year demand trends reveal recurring seasonal peaks, use these insights to anticipate future surges and inform proactive energy allocation strategies.

TEMPERATURE PATTERNS

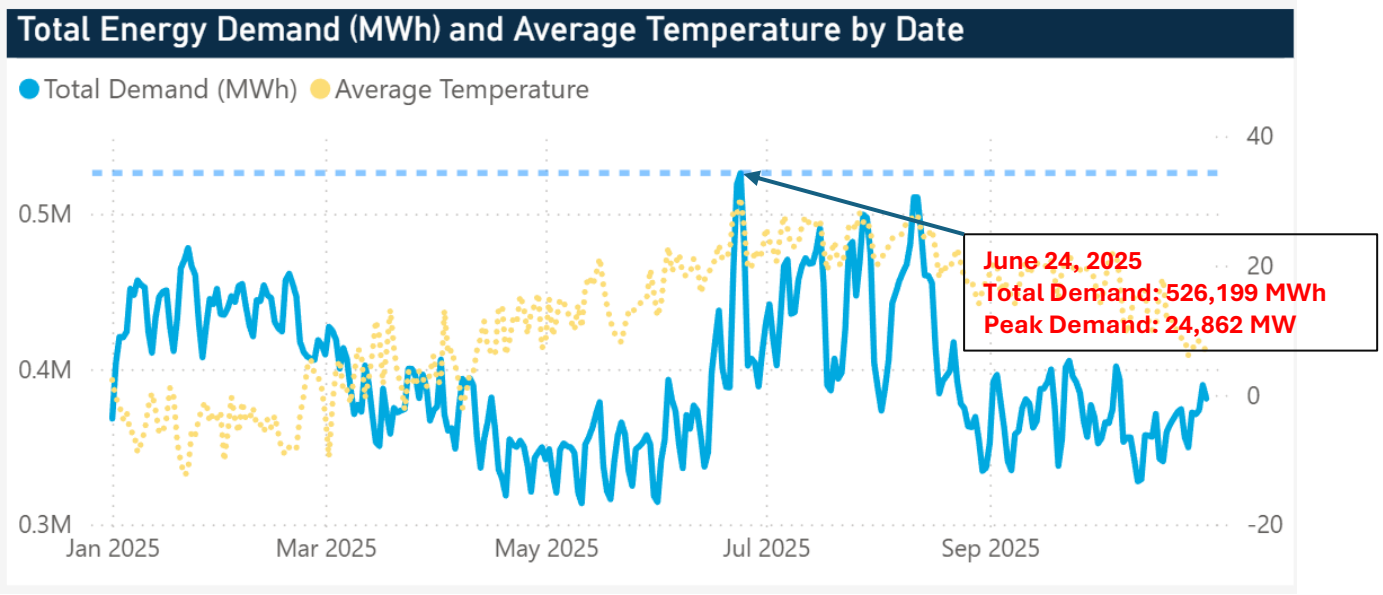
Summer Was The Highest Consumption Season, Highlighting Cooling As A Key Driver For Energy Use And Cost.



Summer recorded the **highest total energy demand.**
Spring followed closely, while **Autumn saw the lowest usage**.
Correlates strongly with temperature-driven cooling needs.

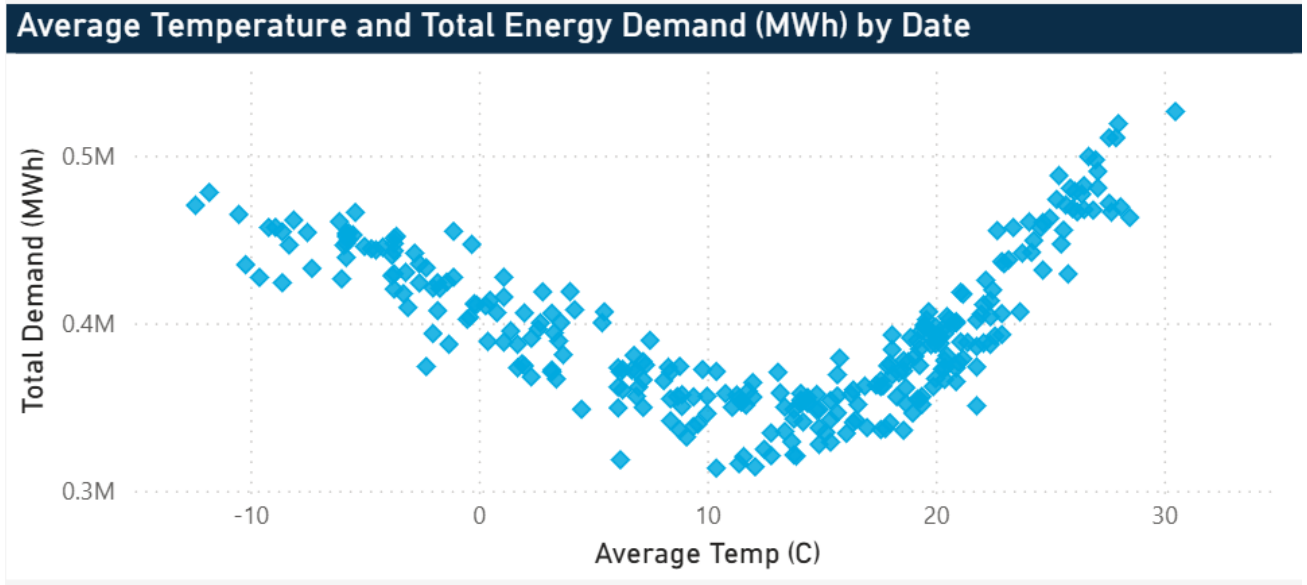
Because energy demand is lowest during mild-weather seasons, schedule maintenance and system optimization activities during these periods to improve efficiency and minimize operational disruptions.

Nine-Year High Heatwave Peaks Demand



June 24, 2025, marked peak energy usage; **526,199 MWh** total demand, **24,862 MW** peak hourly demand. Event coincided with a Toronto **heatwave** (36°C); the highest in nine years.

Temperature Shifts Strongly Influence Energy Use, Confirming Weather As A Critical Determinant Of Energy Demand.



High demand at both low (<0°C) and high (>20°C) temperatures.
Moderate temperatures represent baseline energy needs.
Chart suggests **strong correlation between thermal comfort and electricity usage.**

Because temperature extremes significantly influence daily energy demand, develop predictive demand models that incorporate real-time weather alerts to improve operational readiness and prevent capacity strain.

WEATHER DRIVEN DEMAND

September Serves As The Baseline Energy Month, Isolating Weather-driven Demand For Performance Evaluation.

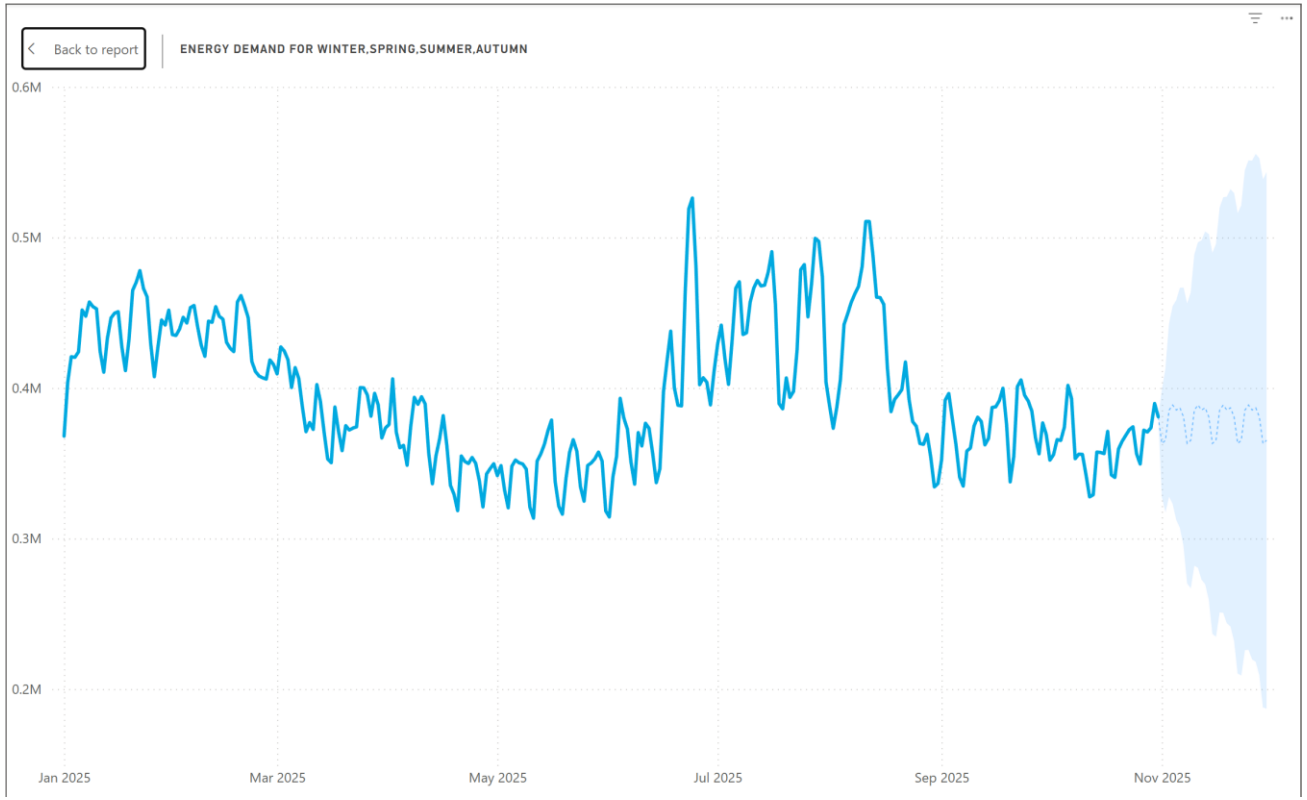
Monthly Energy Demand Analysis

MonthName	Total Demand (MWh)	Weather-Driven Demand (MWh)	HDD Total	CDD Total	Variance %
Jan	13,563,432	2,346,118	689.10	0.00	20.92%
Feb	12,181,126	963,812	602.70	0.00	8.59%
Mar	11,988,832	771,518	461.30	0.00	6.88%
Apr	10,762,945	0	287.40	0.00	0.00%
May	10,677,319	0	125.10	5.50	0.00%
Jun	11,796,265	578,951	12.20	97.50	5.16%
Jul	13,838,122	2,620,808	0.00	197.60	23.36%
Aug	12,864,235	1,646,921	9.50	125.50	14.68%
Sep	11,217,314	0	15.60	38.70	0.00%
Oct	11,227,735	10,421	165.90	10.60	0.09%
Total	**120,117,325**	**8,938,549**	**2,368.80**	**475.40**	**7.97%**

September identified as **baseline month (11M MWh).**
Weather-driven demand has added **9M MWh** so far across the year.
Variance highest in July (23%) likely due to cooling demand from a historic heat wave event.

Since fixed and weather-driven consumption vary significantly throughout the year, differentiate these components to refine budgeting accuracy and improve long-term forecasting precision.

Forecast Shows Stable Demand Outlook For November, Suggesting Manageable Grid Operations Post-summer Peak.



Predicted demand remains close to fall baseline levels.
Model anticipates limited temperature-driven volatility suggesting **operational stability heading into winter.**

As demand forecasts for November indicate system stability, maintain steady resource planning and focus on operational efficiency.

THANK YOU