

AMI Intelligence-Connected Building Energy Model

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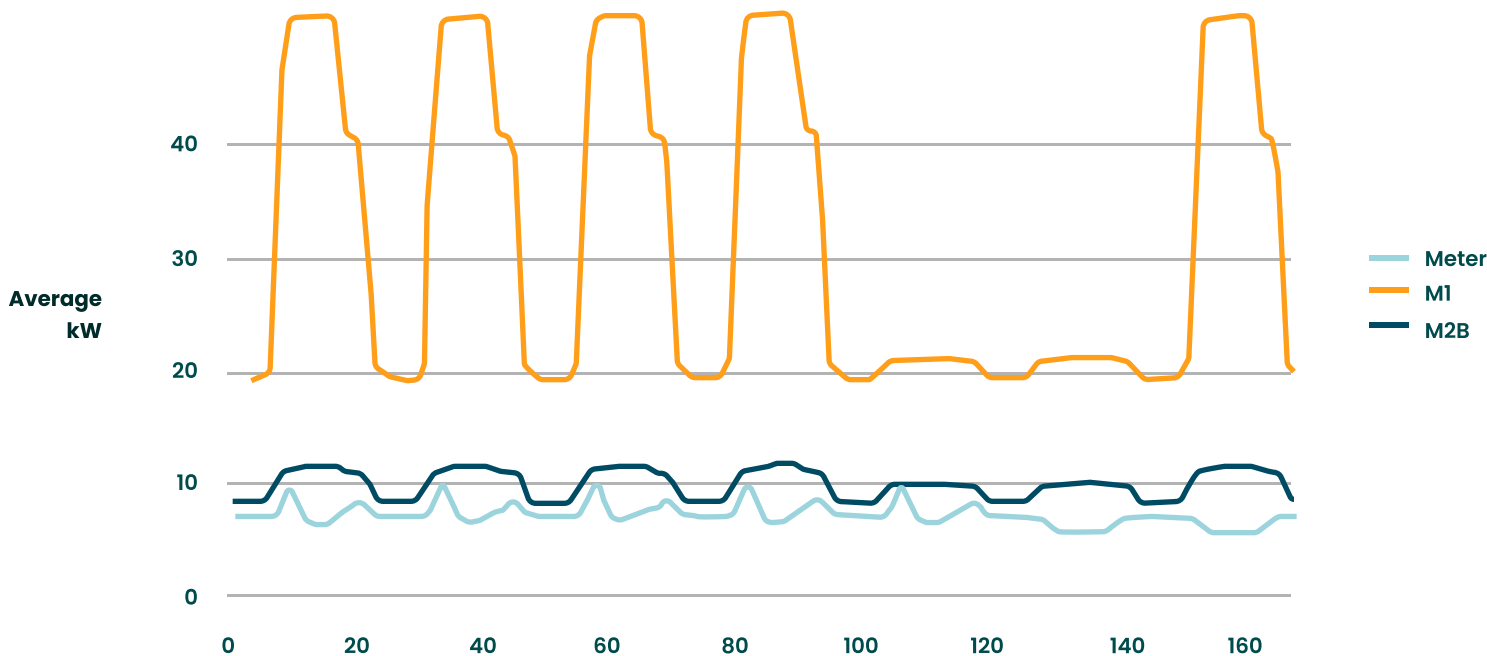
The Challenge

Energy efficiency upgrades to commercial buildings are often made without the benefit of data and building energy modeling insights. This absence prevents risk-averse building managers and owners from achieving energy savings. If these building managers or owners cannot employ energy modeling, they must either make decisions without historical energy consumption or undergo a costly calibration process. Additionally, high upfront costs — which range from \$30,000 to \$200,000—can prevent many small or medium business owners from upgrading their buildings. These buildings are often located in disadvantaged or hard-to-reach communities that are already burdened with a greater share of energy costs.

The Impact

For small and medium commercial buildings, making zero-to-low-cost adjustments like heating and cooling setpoints, economizer improvements, and daylighting control can result in tens of thousands of dollars in energy savings annually. Building energy modeling is the best way to ensure that building owners and managers can optimally measure these changes to their building's size, age, and climate zone.

Meter kW vs Model kW in Weekly Schedule



The Solution

VEIC developed a publicly accessible building energy modeling software that automatically tunes the baseline model to historical Advanced Metering Infrastructure (AMI) utility data, which increases its predictive capabilities. The modeling tool can provide energy models for commercial buildings in a fraction of the time required for traditional methods, reducing the average modeling time from two weeks to just 40 minutes. The figure on the previous page illustrates how this modeling tool was used on an elementary school in northern California. In the figure, “Meter” is the AMI utility data, “M1” is the original predicted model, and “M2B” is the final model with tuning to the AMI signal.

Key Findings & Data Points

Improved Ease

- The modeling tool is easily customized. Its user interface includes selectable and adjustable measure change options at the front end and a detailed breakdown of electric and/or gas savings with payback periods in the output.
- The tool converts energy usage data in AMI and non-AMI formats into a consistent output, alleviating the user burden of formatting data in a specific way.
- The tool’s rapid modeling time allows commercial building managers to test multiple hypothetical upgrades to find the optimal path to savings.

Greater Access

- The tool is open source, meaning that it can be adopted (and adapted) by utilities across the US to provide rapid energy modeling access to their customers.
- The tool has no advanced computing requirements and can run on any modern computer.

High Accuracy

- The tool was trained on sites in the north and south of California, which allowed it to take these climate zones into account for more precise energy estimates.
- ASHRAE guidelines for modeling accuracy require a Net Mean Bias value of 5 or below. The tool has reached Net Mean Bias values of as low as 3.4 in some models.

Opportunity Areas

- The tool was trained on ten AMI data sites and was limited to lighting/ plug improvements. Having greater amounts of data and including heating/cooling improvements in calculations would vastly improve the tool’s accuracy without sacrificing its superior turnaround time.

**To access the final report for the AMI
Intelligence-Connected Building Energy Model,
go to the VEIC website or scan this QR code**

