Metered Energy Data Display

A GUIDE FOR BUILDING OPERATORS

Energy Display Systems

Energy data display systems are software platforms that compile metered data into actionable visual information. Seattle Energy Code requires the installation and commissioning of energy display systems in new commercial construction and additions, greater than 20,000 square feet, to enable better energy management. These code requirements, as well as the intended use of the system, should be considered in the both electrical design and the selection, installation and commissioning of the building control system.

Reference the 2015 Seattle Energy Code for complete description of requirements:
http://www.seattle.gov/dpd/codesrules/codes/energy/overview/

Commissioning

Failure to commission sub-metering and energy display systems correctly is a common pitfall in their effective use. When commissioning the sub-metering and associated energy display system, the following considerations are suggested to effectively meet the requirements of the code:

	Code Requirements	Considerations
Commissioning of Metering and Display System (Seattle Energy Code Section C408.6, C409.4.1)	■ Metering system devices and components work properly under low and high load conditions ■ Metered data is delivered in a format compatible with data collection system ■ Energy display is accessible to building operation and management personnel	■ Provide clear mapping of electrical design (what is being metered) to commissioning team ■ Ensure sub-meters are communicating as intended to data acquisition system ■ Ensure that all systems, including metering, data acquisition and data display, work in a fully integrated way, and that one party takes responsibility for all integration and functioning

Uses and Visuals

To meet the intent of the code, energy data display systems should be used to help better manage building energy use. Potential uses of energy display systems include:

- Tracking energy use and identifying inefficiencies
- Benchmarking building performance and identifying areas for improvement
- Performing measurement and verification to track energy savings projects
- Automating utility bill analysis and estimating the cost of each energy end-use
- Incorporating data quality verification to self-diagnose any errors with the system

A description of each these functions, along with example visuals, is provided on subsequent pages.

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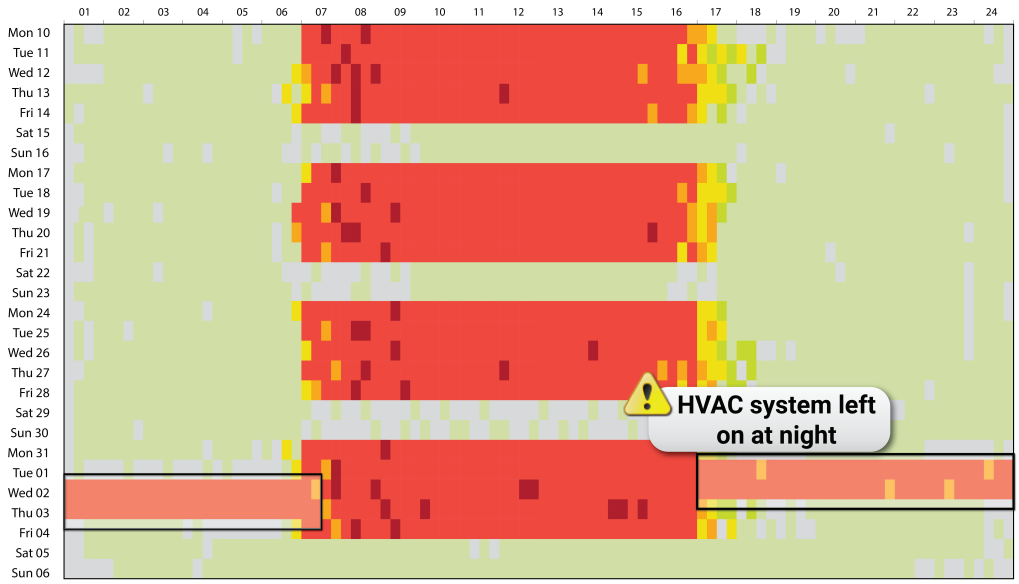
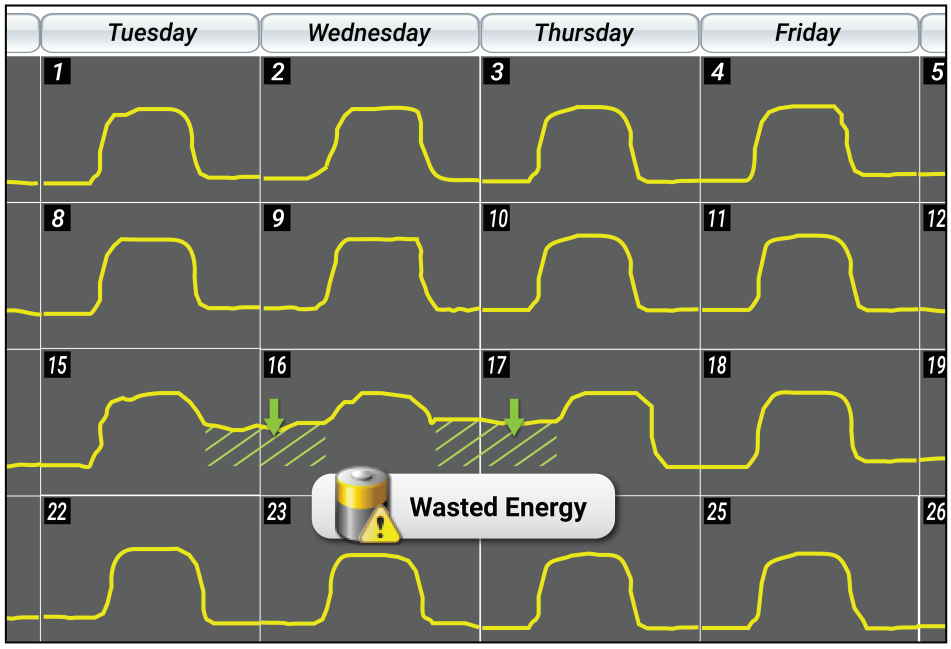
Energy Display System Uses and Visuals *(Cont.)*

TRACKING ENERGY USE

- **Heat Map** identifying a building's HVAC system operating at full capacity overnight.



- **Calendar View** of lighting sub-meter showing an abnormal profile on the 16th, likely indicating main office lighting was left on overnight.



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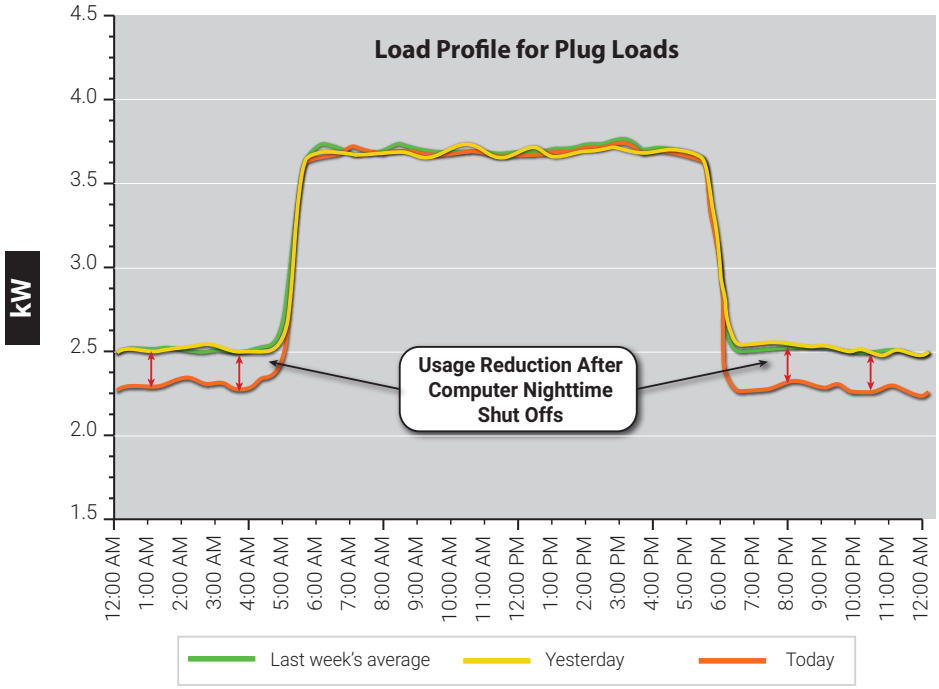
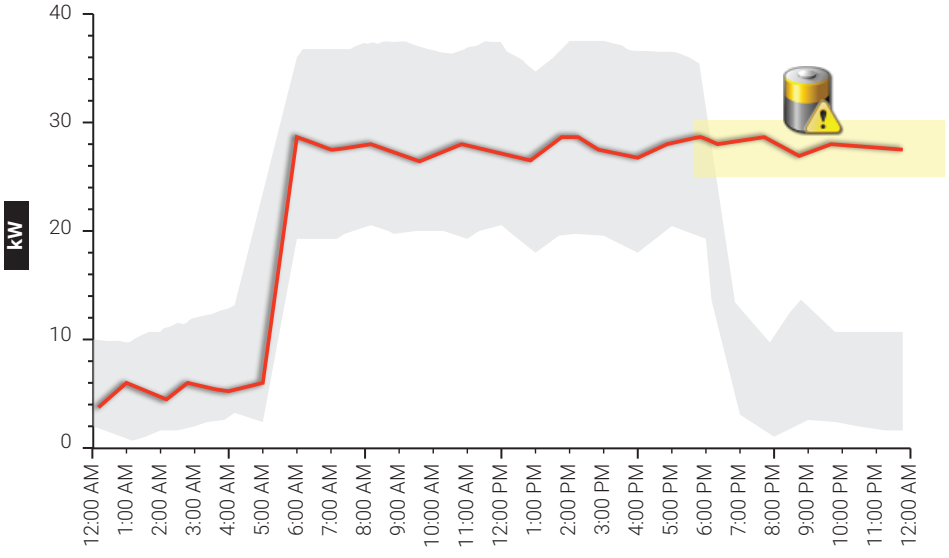
Energy Display System Uses and Visuals *(Cont.)*

TRACKING ENERGY USE

Overlay showing a reduction in today's plug load power draw overnight compared to yesterday and last week's average after a nighttime shut down of all personal computers was implemented.



Trend Analytics delivering a notification that the building's lighting system is operating outside the expected profile.



• Notifications •

Excessive lighting energy usage detected after 7pm

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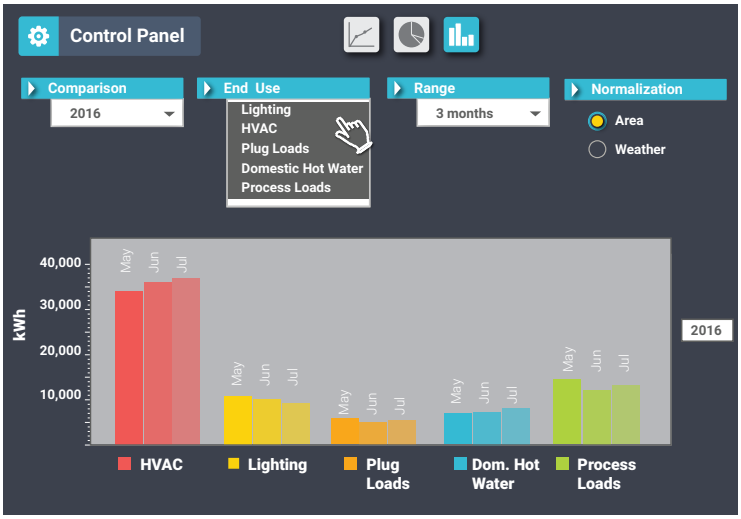
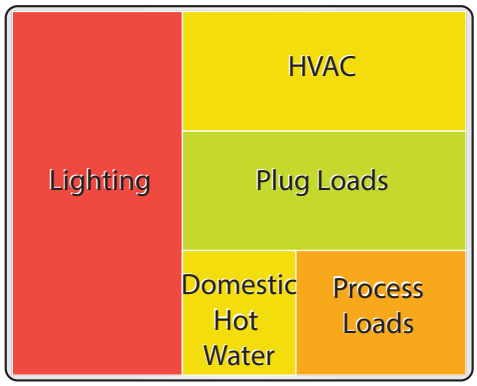
Energy Display System Uses and Visuals *(Cont.)*

BENCHMARKING BUILDING ENERGY PERFORMANCE

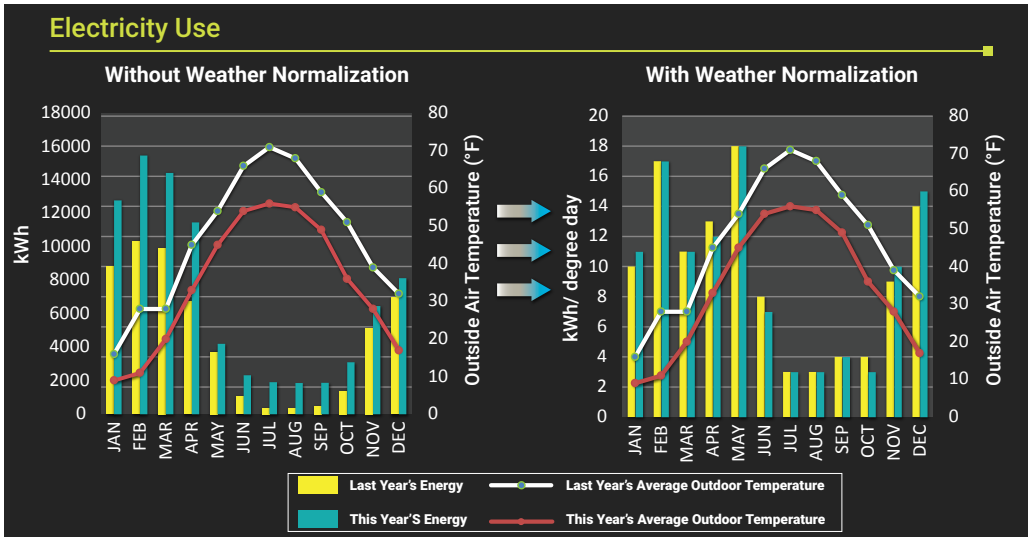
Benchmarking comparing energy use for each end use category over three months.



Sub-Meter Portfolio View showing lighting as the major energy contributor to the overall building load yesterday (relative size of rectangle) and showing an increase in lighting energy consumption between yesterday and last week (red color).



Normalization removing the impact of weather for benchmarking against last year's performance.



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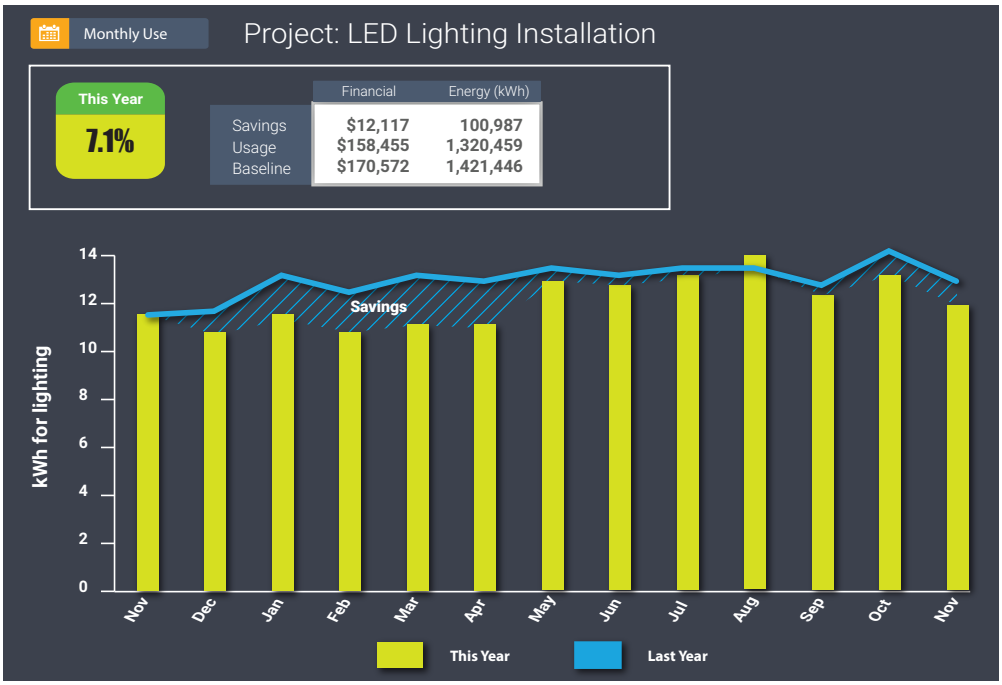
A GUIDE FOR BUILDING OPERATORS

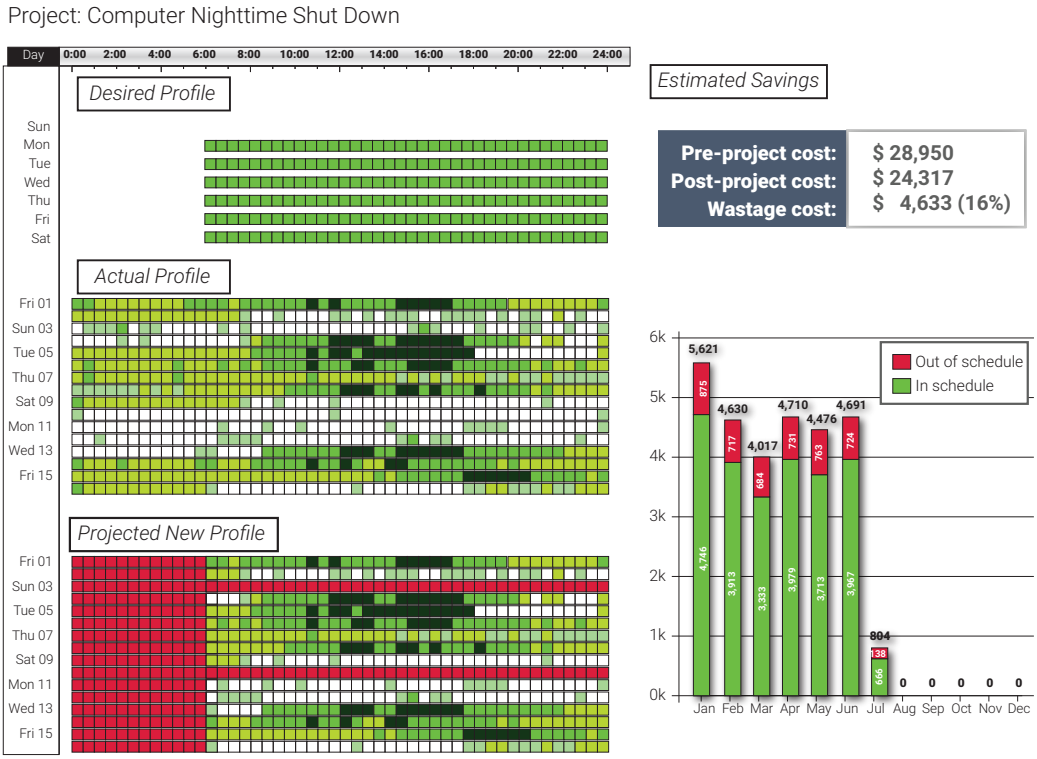
Energy Display System Uses and Visuals *(Cont.)*

MEASUREMENT AND VERIFICATION (M&V)

Project Tracking comparing lighting energy use before and after replacing all lights with light emitting diodes (LEDs).



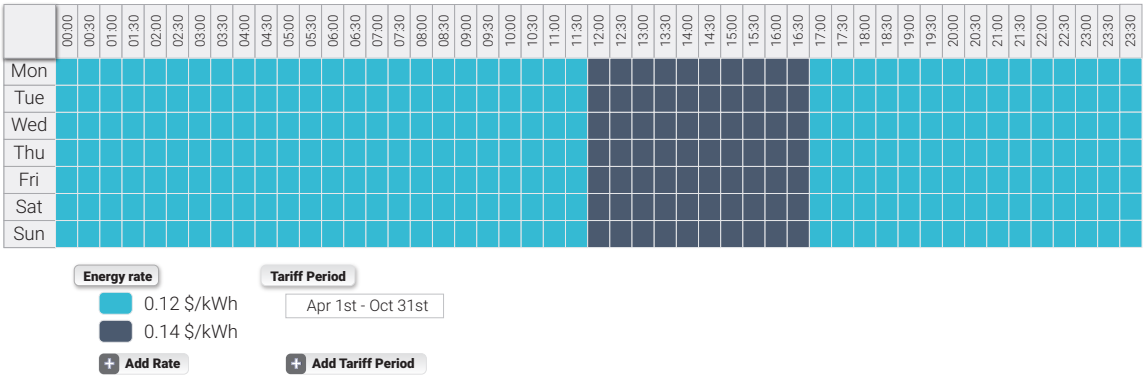
Energy Savings Estimation allowing a user to input a desired profile for plug loads based on a conservation measure (e.g. nighttime computer shutdown).

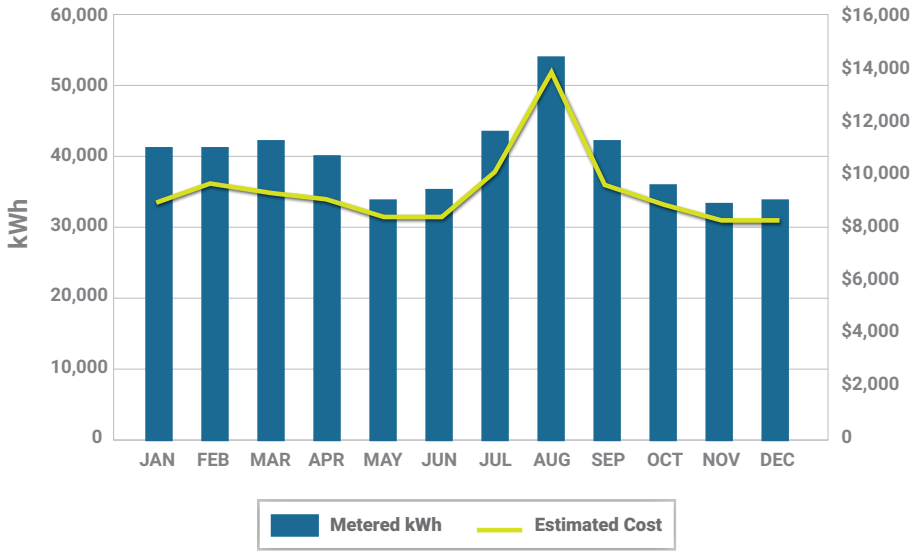


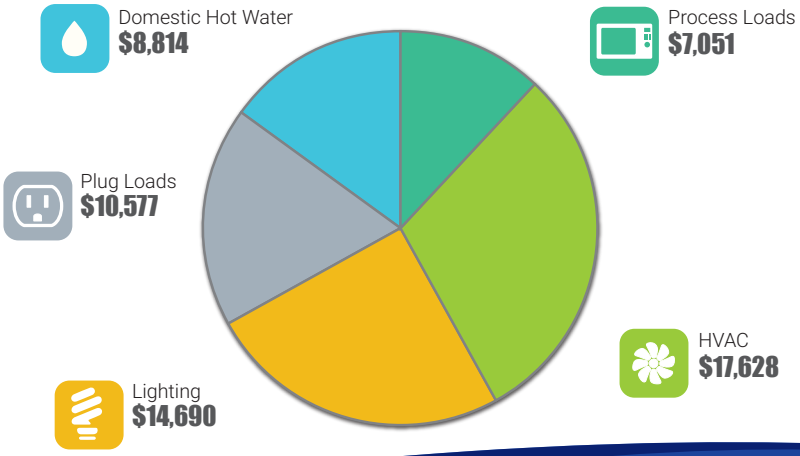
Energy Display System Uses and Visuals *(Cont.)*

UTILITY BILL ANALYSIS

Cost Estimation allowing a user to input their utility rate structure and applying that rate structure to estimate the cost of the metered data use at both the whole building level and the end use category level.



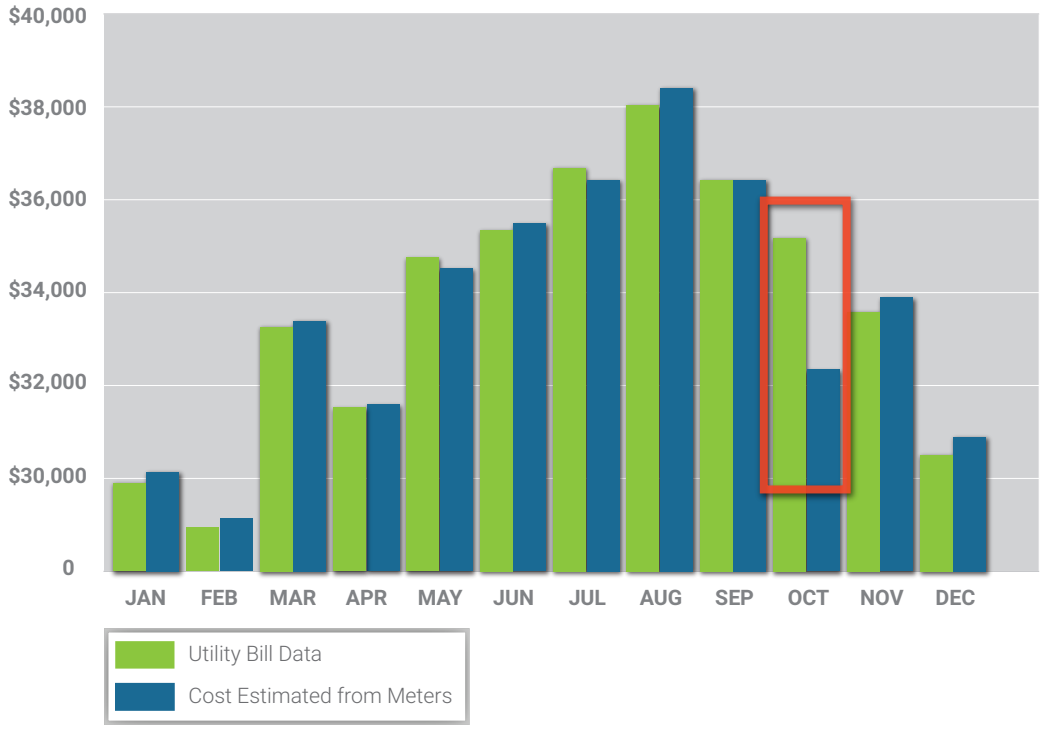




Energy Display System Uses and Visuals *(Cont.)*

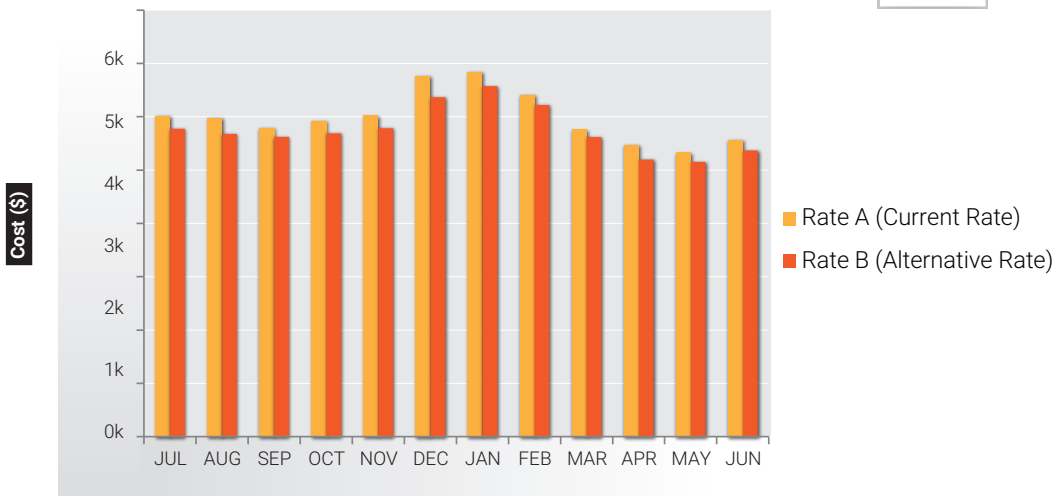
UTILITY BILL ANALYSIS

Utility Bill Validation showing a comparison of the building energy costs estimated from the metered data and the actual utility bills.



"What if?" Utility Bill Analysis comparing the building's energy costs using the current rate structure to the costs if another rate structure was used.

		JUL	AUG	SEP	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	Total
RATE A	$	6,012	5,975	5,794	5,924	6,023	6,772	6,845	6,413	5,763	5,469	5,327	5,568	$ 71,885
RATE B	$	5,772	5,676	5,620	5,687	5,782	6,366	6,571	6,221	5,619	5,196	5,151	5,368	$ 69,028
														-3.9%



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Energy Display System Uses and Visuals *(Cont.)*

DATA QUALITY VERIFICATION

- **Alarms and Notifications** warning a user of uncharacteristic data spikes indicating likely metering errors.