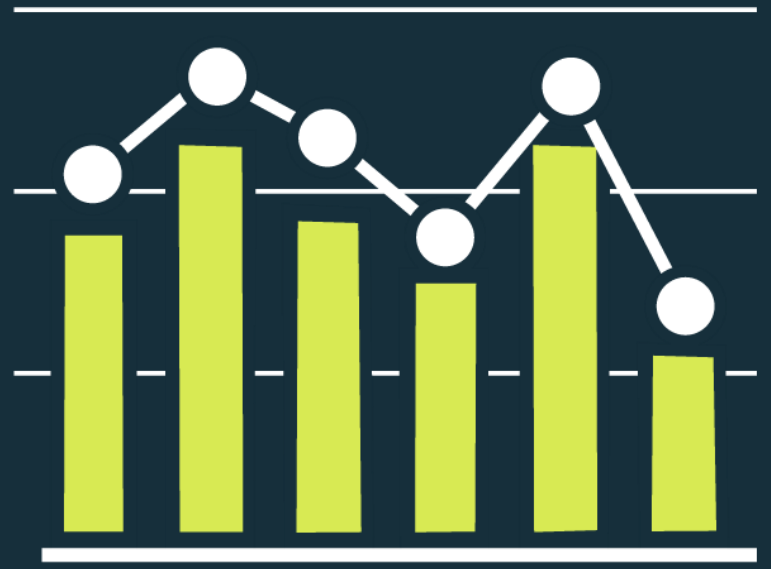
ENERGYCAP®

Inside the peak: interval data, demand charges, and demand response



A little background...

What's EnergyCAP?

Expert-driven energy management

45 years of industry leadership

Utility Management: Our core platform centralizes all your utility and energy data.

- **Emissions:** Powerful utility-based carbon tracking and GHG reporting
- **Interval Data:** Interval data to surface to-the-minute insights and savings
- **Bill Operations:** EnergyCAP's bespoke bill processing services suite

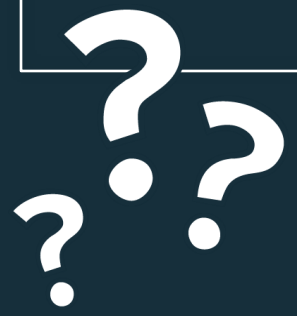
Who's Tom?

- Partnered with 250+ organizations nationwide to optimize energy management
- Experienced across diverse industries and sectors
- Focused on strategies that cut consumption and reduce costs



POLL

Are you currently part of a Demand Response (DR) program?



Feedback:

- No – but we're excited to give it a try
- Yes – but there have been some challenges
- Yes – with great success

Your 2026 (and beyond) strategy roadmap

Embed and evolve



Agenda



- Review utility bill fundamentals
- Understand interval data and load profiles
- Highlight the economic impact
- Identify savings opportunities
- Demand reduction strategies
- How demand response programs are structured
- A practical action plan

Tariffs – what are they?

- **Tariff** - is an official, government-approved document from an electric power company. It sets the rules, terms, and complete pricing setup for how customers pay for electricity.

- **Key Parts of a Tariff**

1. Fixed Charges – A set fee paid every month just to stay connected to the power grid.
2. Energy Charges (based on kWh) – The cost for the actual amount of electricity you use.
3. Demand Charges (based on kW) – Extra fees for businesses based on their highest moment of power use.
4. Rules and Riders – Extra adjustments for fuel costs, delivery fees, or special rules. Some fees are based on the number of days in the billing cycle.

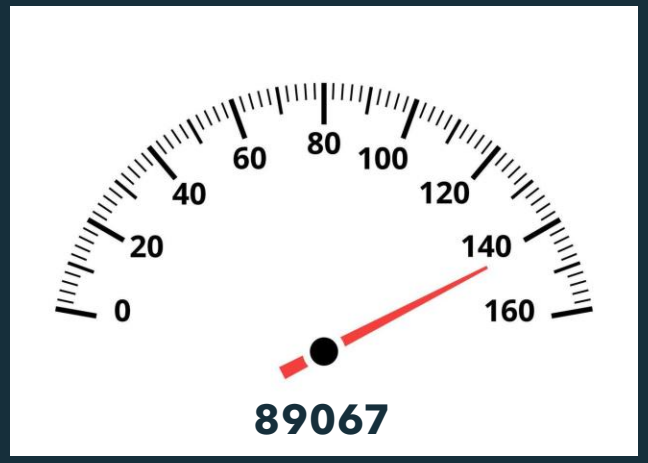
- **Common Tariff Types**

Flat Rate – you pay the same price for power all day and night

Time-of-Use (TOU) – Power costs more during busy peak hours and less during slow off-peak hours.

Tiered Rate – The price per unit goes up or down depending on how much total power you use.

Speedometer Analogy



Energy (kWh) vs Load (kW)

- **(kWh)** – A unit of energy, measuring the total amount of energy used or produced over a period to time. 1 kWh represents 1 kilowatt of power used continuously for one hour

- **(kW)** – A unit of power (Load), indicating how much energy is being used or produced at that given moment. 1kW = 1,000 Watts

Two buildings can use the same kWh but have very different load shapes. A single brief event may establish the monthly billing peak

Other charges

▸ Power Factor

The ratio of real power (kW) to apparent power (kVA). **It essentially measures how effectively electrical power is used and converted into useful work.** A power factor of 1.0 indicates perfect efficiency, while a value less than 1.0 indicates that extra power is required to achieve the desired task

▸ Load Factor

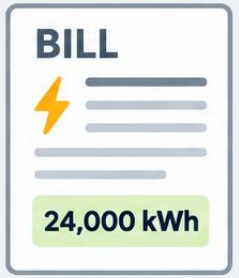
A measure of how consistently electrical power is used over a period, comparing average demand to peak demand. It's a ratio, typically expressed as a percentage, of total energy consumed to the potential energy that could have been used at peak demand. A higher load factor indicates more consistent usage and generally translates to lower overall energy costs. **Usually shown as a percentage.**

What Is Interval Data?

A time-stamped record of energy use—typically in 15-minute or hourly intervals—that shows how much electricity you use throughout the day, week, or month.

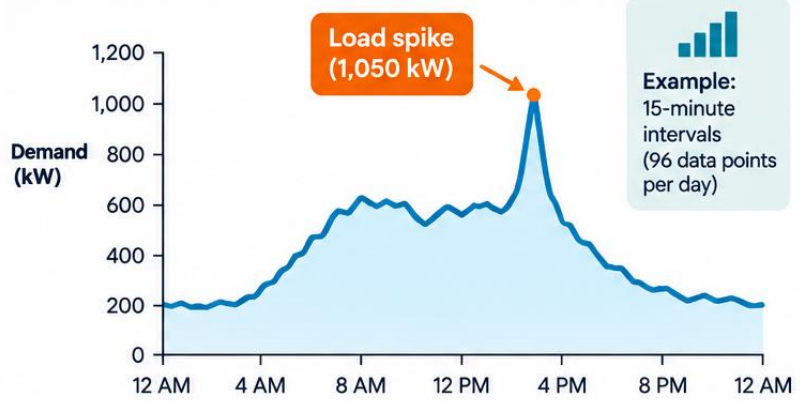
In short: Interval data shows when and how your energy is used.

Monthly Utility Bill (Total Use)



Tells you what you paid in total, but not when or why it happened.

Interval Data (Time-Based Use)



Example: 15-minute intervals (96 data points per day)

Key Takeaways

- **Adds context** — Reveals patterns, peaks, and operational trends.
- **Controls cost** — Helps reduce demand charges and avoid unnecessary use.
- **Improves operations** — Identifies off-schedule use, conflicting systems, and opportunities for optimization.
- **Enables flexibility** — Supports demand response and other grid programs.

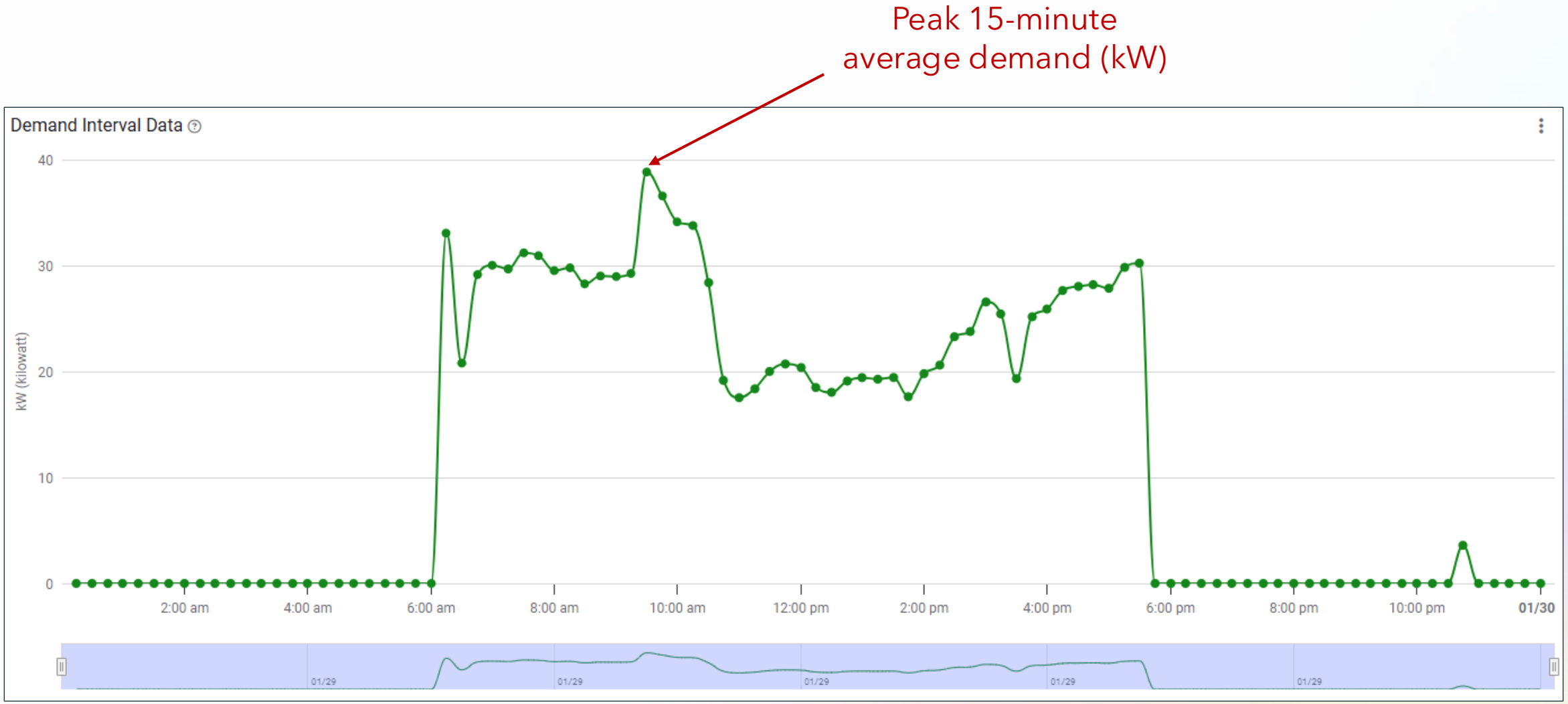
Common Interval Data Intervals

- **15 minutes** — Most common (96 data points per day)
- **1 hour** — Also common (24 data points per day)

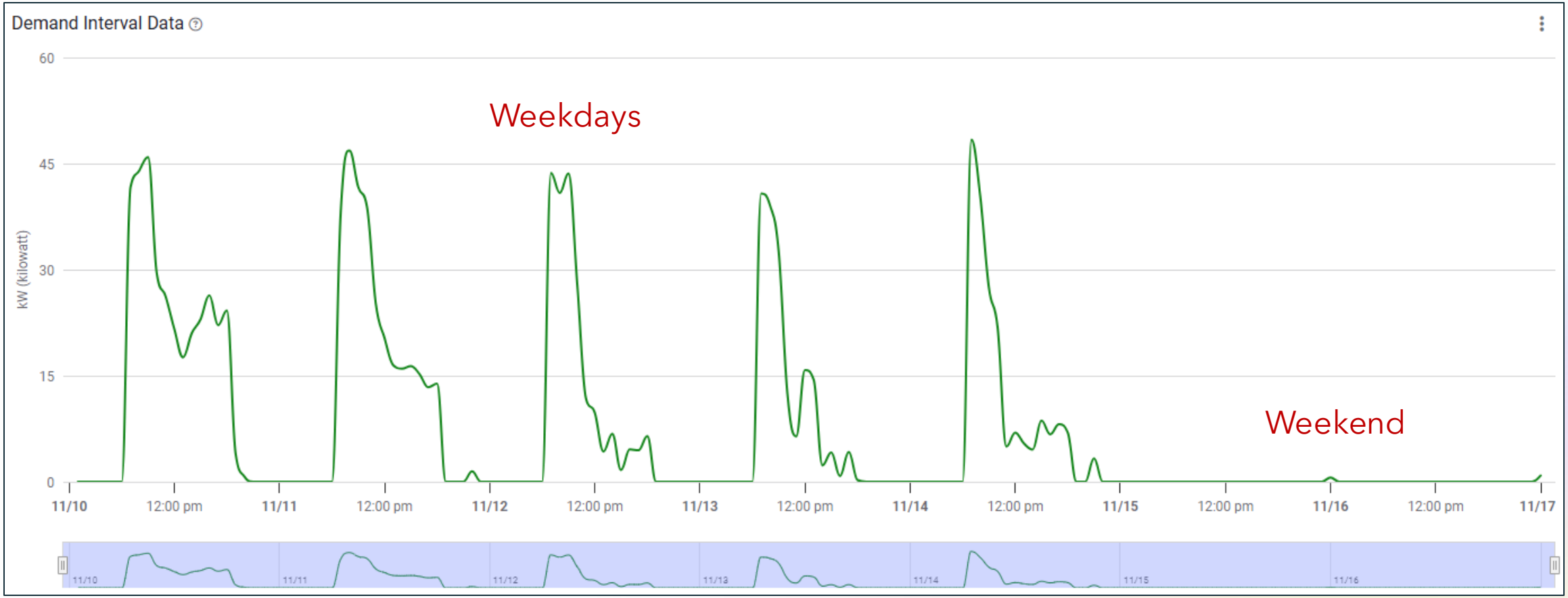
The big picture:
Monthly bills tell you what happened. Interval data helps you understand why—and what to do about it.

Graphical representation of energy use

Single day load profile

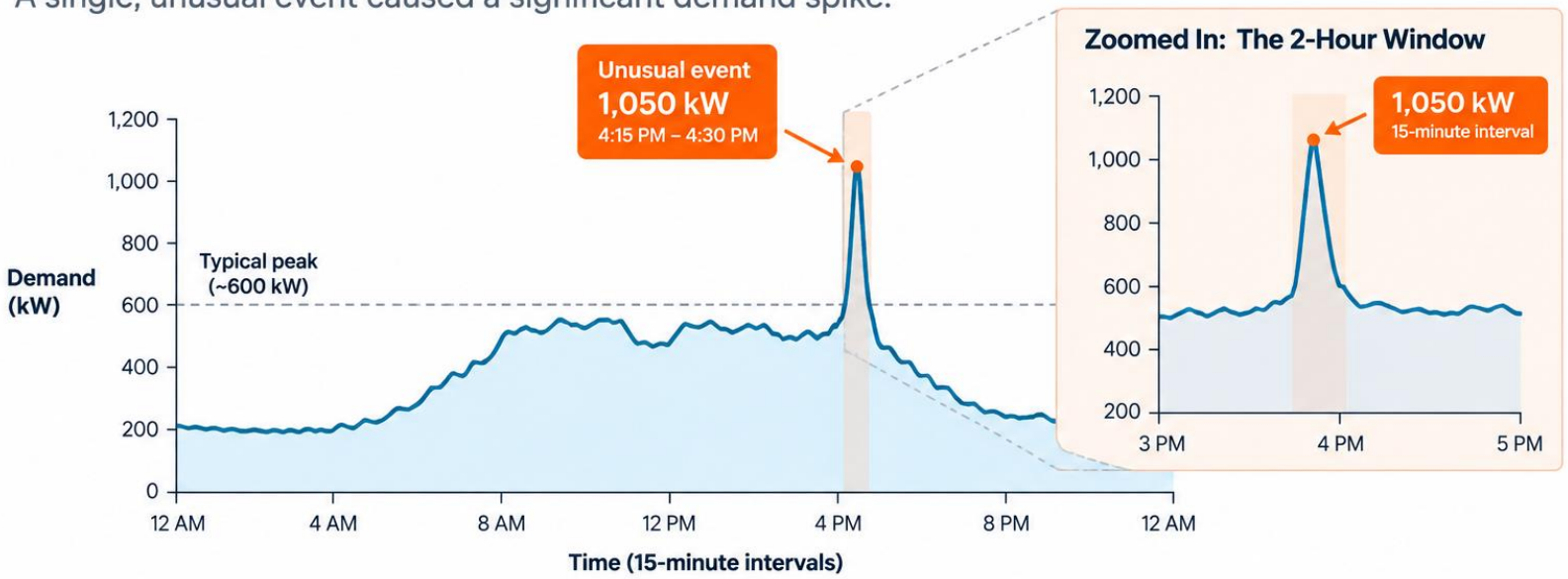


Weekly load profile



Interval Data Reveals the “Why”

A single, unusual event caused a significant demand spike.



Normal Operations

- Overnight load: ~200 kW
- Typical daytime peak: ~600 kW
- Consistent load profile based on occupancy and scheduled operations

Unusual Event

- Short-duration spike to 1,050 kW
- Occurred at 4:15 PM on a hot summer day
- Likely caused by simultaneous startup of chillers and large pumps after a power outage or control system reset
- Event lasted only one 15-minute interval

Why It Matters

- That single 15-minute interval set the monthly demand charge.
- A short, avoidable event can significantly increase the utility bill.
- Interval data helps identify the cause so similar events can be prevented.

Economic Impact

600 kW x $15/kW = $9.000

1,050 kW x $15/kW = $15,750

$15,750 - $9,000 = **$6,750**

Potential with 12-month ratchet

12 x $6,750 = **$81,000**

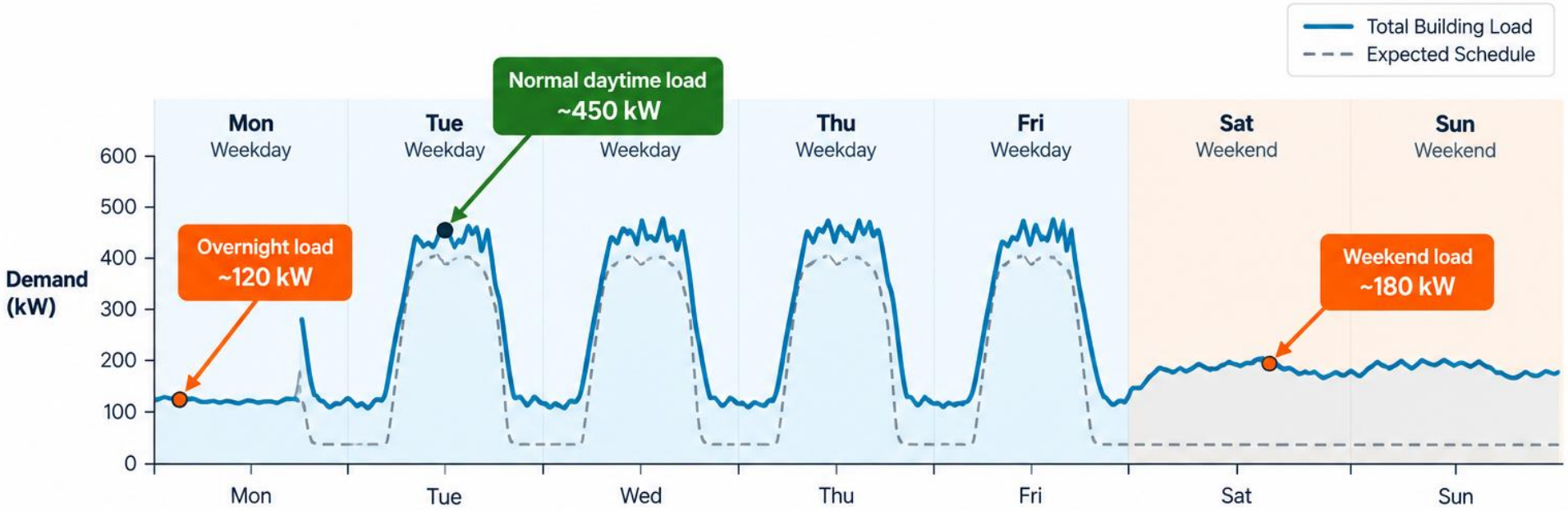
Find the root cause, not just the spike

- Flag unusual intervals and compare against a normal baseline
- Overlay occupancy, weather, utility peak windows, and BAS trends
- Interview operators and review alarms, overrides, and work orders
- Implement a controlled change and monitor the next peak

Data identifies the opportunity. Facilities expertise delivers the improvement.

Interval Data Reveals Off-Schedule Operation

Equipment continued to run overnight and on the weekend, increasing demand and energy costs.



Expected Schedule

- Building operates Monday – Friday
- Occupied from 7 AM – 6 PM
- HVAC and other large equipment off nights and weekends
- Expected overnight/weekend load: < 50 kW

What the Interval Data Shows

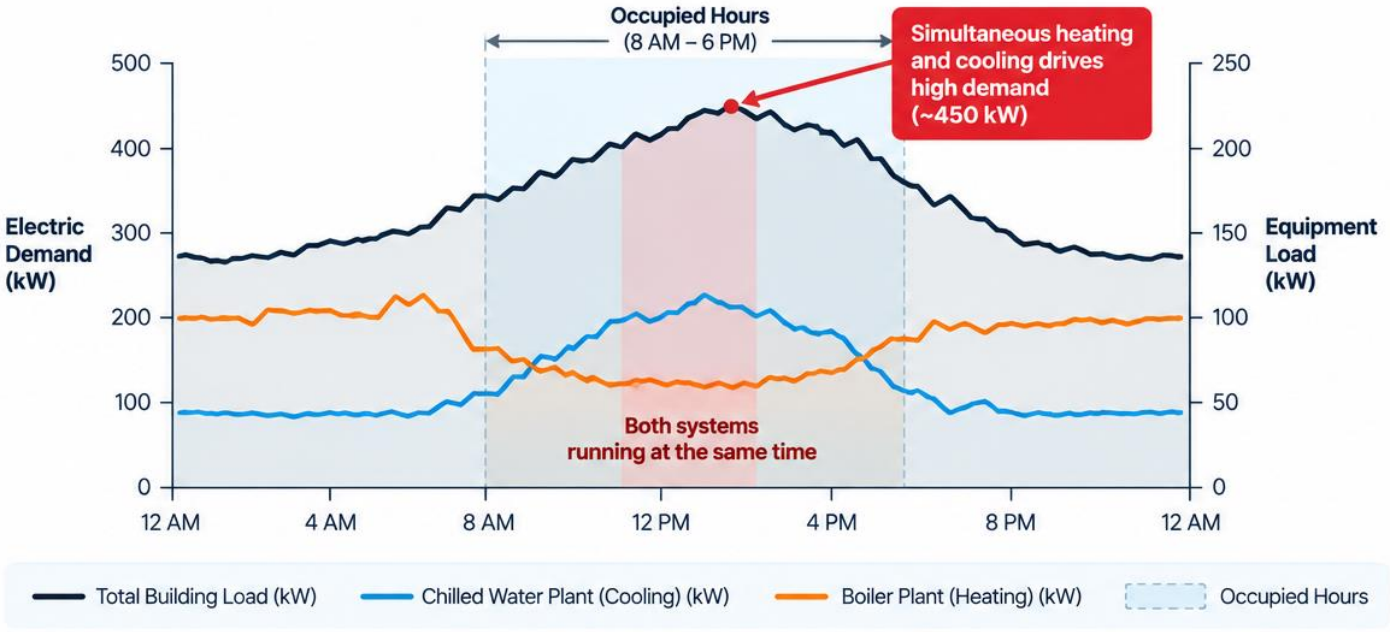
- Load remains elevated overnight (~120 kW)
- Similar load on weekends (~180 kW)
- Indicates HVAC, pumps, or other equipment running off schedule
- Adds unnecessary energy use and increases monthly demand charges

Why It Matters

- Increases total energy consumption (kWh)
- Can increase demand charges if the weekend or overnight load becomes the monthly peak
- Represents avoidable cost
- Interval data helps you identify when and what equipment is running

Simultaneous Heating and Cooling

Interval data reveals when opposing systems are running at the same time, wasting energy and increasing costs.



Key Insights

High Demand
Building demand peaks at ~450 kW when heating and cooling run at the same time.

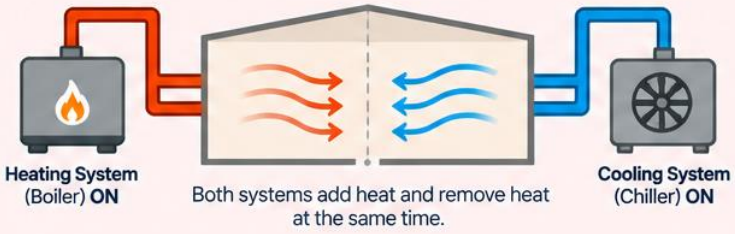
Opposing Systems
The boiler plant and chilled water plant are both operating during the same hours.

Unnecessary Cost
Running both systems wastes energy and can increase demand charges.

Interval Data Helps
15-minute data makes it easy to see when and how long both systems are operating so corrective action can be taken.

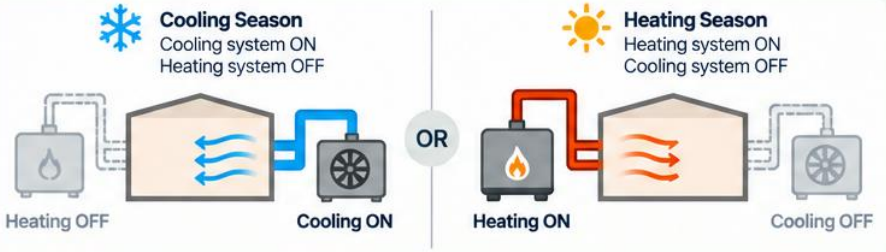
The Problem

Heating and cooling systems operate at the same time, fighting each other.



The Solution

Coordinate controls and set proper heating and cooling lockouts so only one system operates at a time.



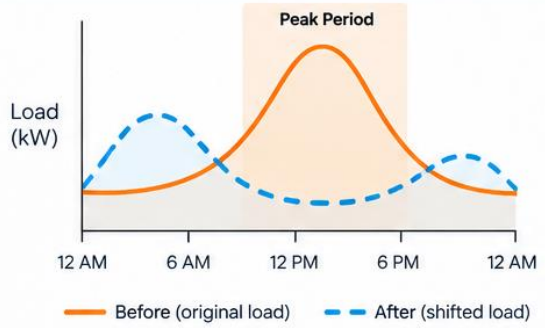
Three Ways to Reduce Demand

Different strategies. Different load shapes. The same goal — lower demand costs.

1 Load Shifting

MOVE LOAD TO A DIFFERENT TIME

Reduce demand during peak periods by moving flexible loads to off-peak periods, often without changing total energy use.



How it works

Move electricity use from peak periods to off-peak periods.

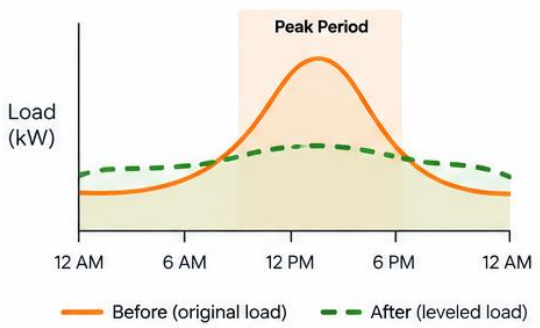
Typical methods

- Shift process loads or charging to overnight
- Pre-cool or pre-heat buildings
- Reschedule large equipment (e.g., chillers, pumps, compressors)

2 Load Leveling

MAKE LOAD MORE CONSISTENT

Reduce peaks and fill in valleys to create a more consistent, steady load profile, which can lower demand charges and improve overall system efficiency.



How it works

Reduce high-demand periods and increase low-demand periods to create a flatter, more consistent load.

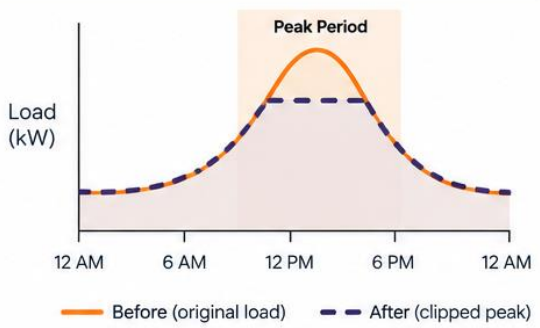
Typical methods

- Optimal scheduling and controls
- Thermal storage (ice or hot water)
- Battery energy storage systems (charge when low, discharge when high)
- Coordinated equipment operation

3 Load Clipping

REDUCE THE PEAK

Lower the highest peaks by curtailing or limiting load during peak periods.



How it works

Temporarily reduce or limit the highest demand during peak periods.

Typical methods

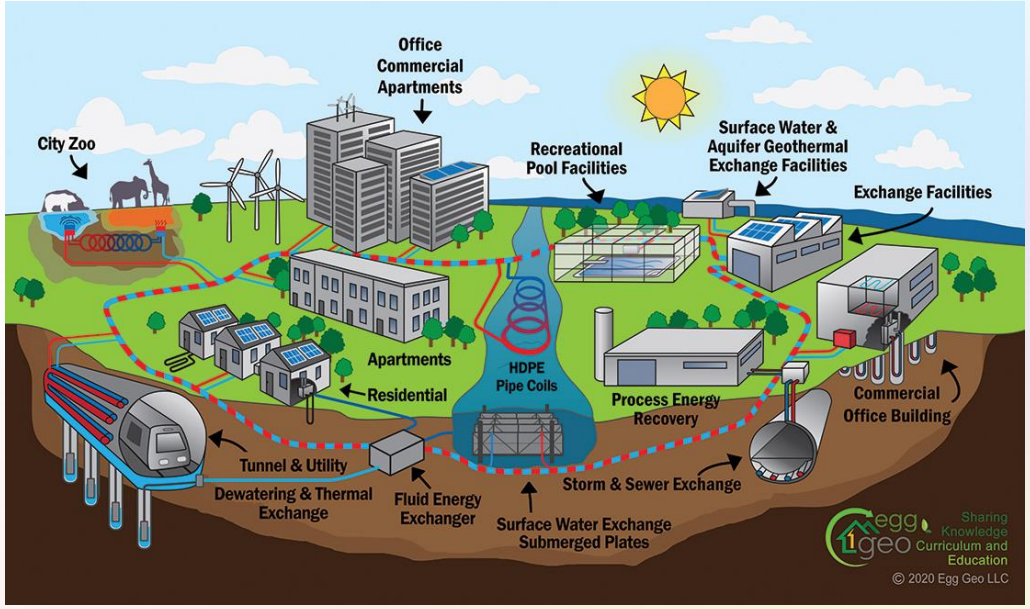
- Shed non-critical loads
- Demand response programs
- Battery energy storage systems (discharge during peaks)
- On-site generation
- Real-time demand controls

Demand-reduction strategies

- Thermal Energy Storage (TES)
- Thermal Energy Networks (TENS)
- Battery Energy Storage System (BESS)
- Energy efficiency upgrades – Peak shrinking
- On-site distributed generation



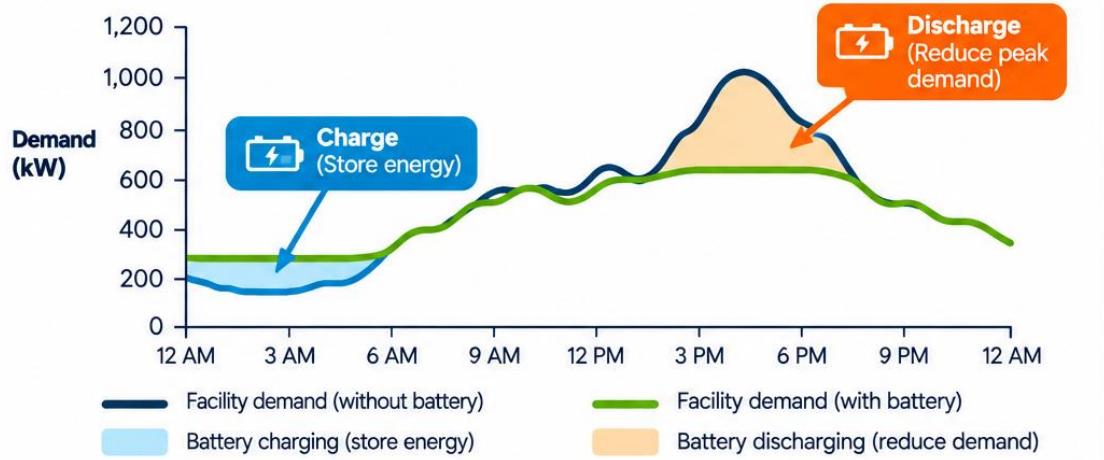




Battery Storage (BESS)

A Battery Energy Storage System (BESS) stores electricity when it's less expensive or when demand is low, and discharges it when demand and costs are high.

How Battery Storage Reduces Demand and Cost



Key Benefits

Lowers costs
Reduces peak demand charges and can take advantage of lower off-peak rates.

Manages demand
Shaves peak loads and helps cocily costly demand spikes.

Adds resilience
Provides backup power during outages.

Supports sustainability
Enables more use of renewable energy and can reduce emissions.



Common Use Cases

Peak shaving
Reduce the highest periods of demand.

Load shifting
Store energy during low-cost periods and use it later.

Grid support / demand response
Reduce load when the utility calls an event.

Backup power
Keep critical operations running during an outage.

Utility-sponsored Demand Response (DR) programs

DR - arrangement in which a utility company compensates customers for reducing electricity demand during specific periods when the electric grid is stressed, electricity supply is expensive, or systems demand is unusually high.

- Compensation for committing a certain amount of demand reduction and being available when called.
- Compensation based on the actual kW or kWh reduction achieved during the event.

The 7 Core Principles of a Utility Demand Response Program

Reduce demand when the grid needs it most, get compensated, and support a more reliable electric system.

1 Enrollment and Commitment

Join the utility program and commit to reducing a specified amount of demand (kW).

What to know:

- Program eligibility
- Minimum kW commitment
- Contract term
- Participation obligations

2 Event Notification

The utility calls an event when grid conditions or price signals warrant demand reduction.

What to know:

- Advance notice (often hours to day-ahead)
- Event duration
- Maximum number of events per year

3 Load Reduction

Reduce electric demand during the designated event window using pre-approved strategies.

What to know:

- HVAC adjustments
- Lighting reductions
- Process scheduling
- Equipment shutdowns
- Battery discharge
- Other flexible loads

4 Operational Safeguards

Maintain comfort, safety, and essential operations while reducing load.

What to know:

- Define comfort limits and safety requirements
- Identify critical equipment exclusions
- Establish override procedures

5 Measurement and Verification

The utility compares your actual demand to an approved baseline to determine the verified reduction.

What to know:

- Baseline methodology (varies by program)
- Interval meter data is essential
- Understand adjustments and settlement rules

6 Financial Incentives

Get compensated for being available, and/or for the actual demand reduction achieved.

What to know:

- Capacity/availability payments
- Performance-based payments
- Payment rates and timing
- Program-specific incentives or bill credits

7 Performance Accountability

The utility evaluates whether you met your commitment and follows program rules for payments or penalties.

What to know:

- Event performance requirements
- Potential penalties for underperformance
- Reporting and documentation
- Keep strategies reliable and repeatable

How a Utility Demand Response Event Works

From notification to payment — a typical event flow.

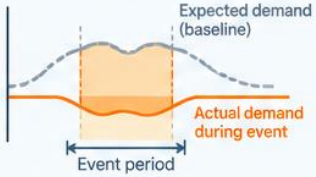
1 Receive Event Notification
Utility notifies you (day-ahead or hours ahead).



2 Implement Load Reduction
Execute pre-approved strategies (BAS, onsite staff, or automated controls).



3 Maintain Reduction During Event
Hold reduced demand for the required event duration.



4 Verify Performance
Utility compares actual demand to baseline using interval meter data.



5 Receive Payment
Get compensated based on availability and/or verified kW reduction.



Important program details to investigate before enrolling

- **Dispatch frequency**: How many events can the utility call annually?
- **Event duration**: How long must the facility maintain its reduction?
- **Notification period**: How much time is available to prepare?
- **Baseline methodology**: How will the utility calculate the reduction?
- **Testing**: Is a demonstration event required before participation?
- **Penalties**: What happens if the facility cannot meet its commitment?
- **Program stacking**: Can the facility earn demand response incentives while also benefiting from demand-charge reduction or other utility programs?

Practical strategies for commercial building demand management

- Raise chill-water temperature setpoints
- Reduce noncritical ventilation and pumping
- Change occupied set points
- Stagger large equipment operation
- Plan by pre-cooling spaces
- Stage loads
- Utilize thermal storage
- Pause EV charging
- Could be controlled/programmed by the BAS

The objective is not to shut down the building but to reduce load while protecting the building's core mission

Demand Response (DR):

The objective is controlled flexibility, not discomfort or disruption

Which loads are truly flexible?

- Inventory large loads and identify critical versus deferrable uses
- Estimate available kW, response speed, and allowable duration
- Define comfort, indoor air quality, process, and safety guardrails
- Test response strategies before enrolling in a program

Not every load should be shed, reliability comes first

Core principles of demand response

1. **Visibility** — Know your load - Use interval data to understand when, where, and why electricity demand occurs. Establish normal operating profiles and identify controllable loads.

2. **Flexibility** — Identify what can change - Determine which equipment can be temporarily reduced, delayed, cycled, or supported by storage. Examples include HVAC, pumps, EV charging, and noncritical processes.

3. **Operational protection** — Establish guardrails - Define acceptable temperature ranges, minimum ventilation requirements, critical equipment exclusions, and override procedures before an event occurs.

4. **Responsiveness** — Act when signaled - Establish clear procedures for responding to utility or grid-operator events. Understand notification times, event duration, frequency, and required reduction levels.

5. **Reliability** — Make reductions repeatable - Use tested building automation sequences, designated responsibilities, and documented operating procedures. A dependable 100 kW reduction can be more valuable than an unpredictable 200 kW reduction.

6. **Measurement and verification** — Prove performance - Compare actual event demand against an approved baseline to quantify the achieved reduction. Account for the program's baseline methodology, adjustments, and settlement rules.

7. **Financial value** — Make participation worthwhile - Evaluate incentive payments, avoided demand charges, equipment impacts, operational costs, and nonperformance penalties. The best program delivers a positive net benefit, not just a large kW reduction.

Important distinctions

- **Demand response is not the same as demand management**. Demand management continuously reduces or optimizes facility peaks to control utility bills. Demand response typically involves a specific event, dispatch instruction, price signal, or program commitment.
- **Load reduction must be measurable**. Turning equipment off is not enough; the program needs to demonstrate how many kilowatts were reduced compared with what would otherwise have happened.
- **Participation must be operationally sustainable**. A strategy that repeatedly creates comfort complaints, disrupts production, or causes large rebound peaks is unlikely to be successful over time.

Effective demand response starts with data, succeeds through operational coordination, and proves its value through measurement.

A practical action plan

- Collect interval data, bills, tariffs, and occupancy schedules
- Identify baseload, top peaks, and off-schedule patterns
- Meet with facilities and prioritize two low-risk adjustments
- Implement, compare load profiles, and document results
- Track kW peak, off-hours kWh, cost impact, and occupant feedback

Upcoming webinars & events

Keep learning

- November 19
  From Implementation to Impact: Lessons in Utility management from Indurent
- December 9
  Energy Strategy Series, Part 12
  Aligning carbon reporting with renewable investment

POLL

Would you like someone from EnergyCAP to reach out regarding our solution?



- Yes
- No

Questions?

Thanks for attending!



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