Advanced Energy Conference New York 2018

Making Commercial Buildings Responsive Loads

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Making Buildings Response Loads

- Why should Buildings be Responsive Loads
- What techniques have we used
- How do the results stack up

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Why should Buildings be Responsive Loads

Electricity
Supply
is changing

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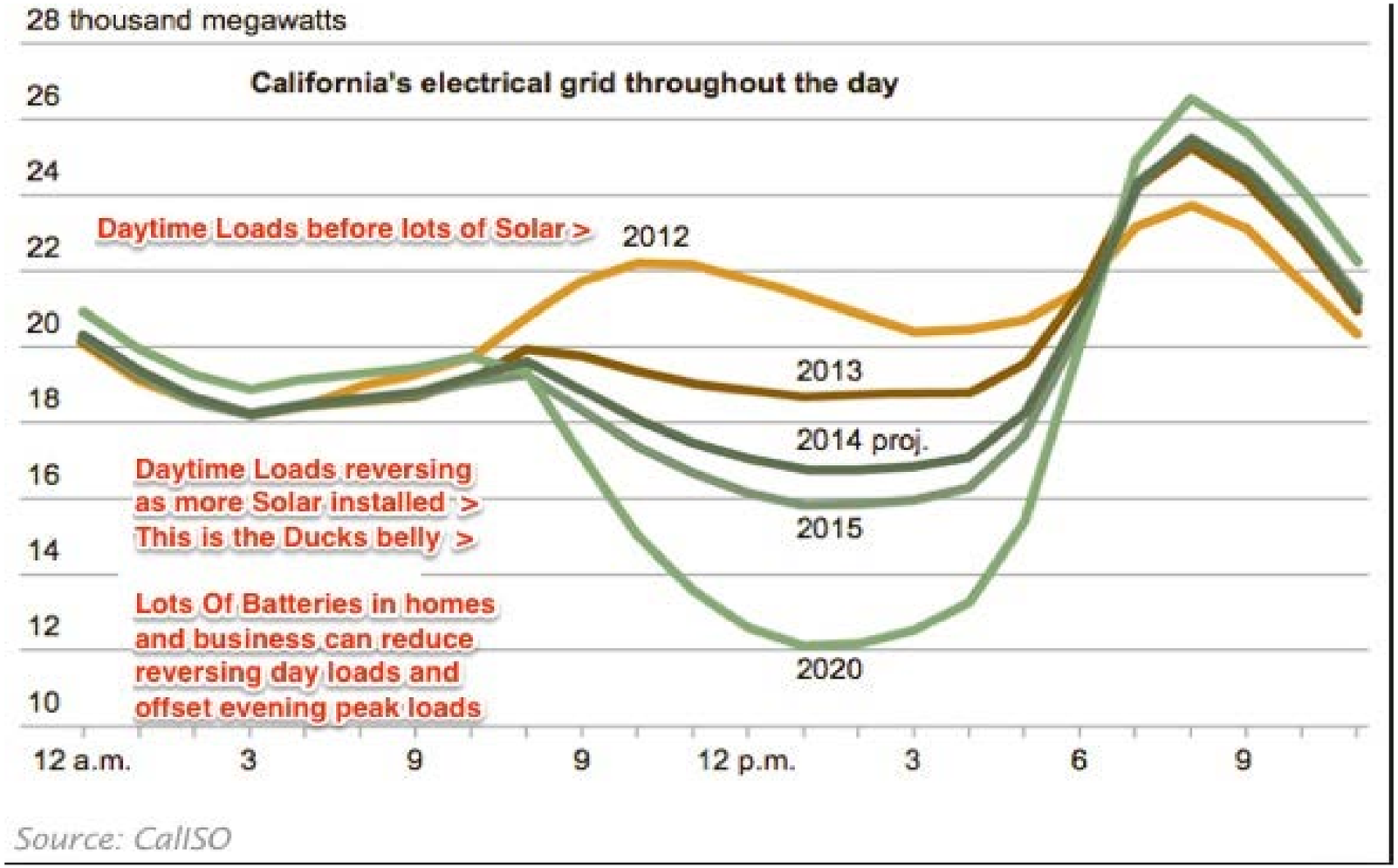
Demand Profile is Changing too



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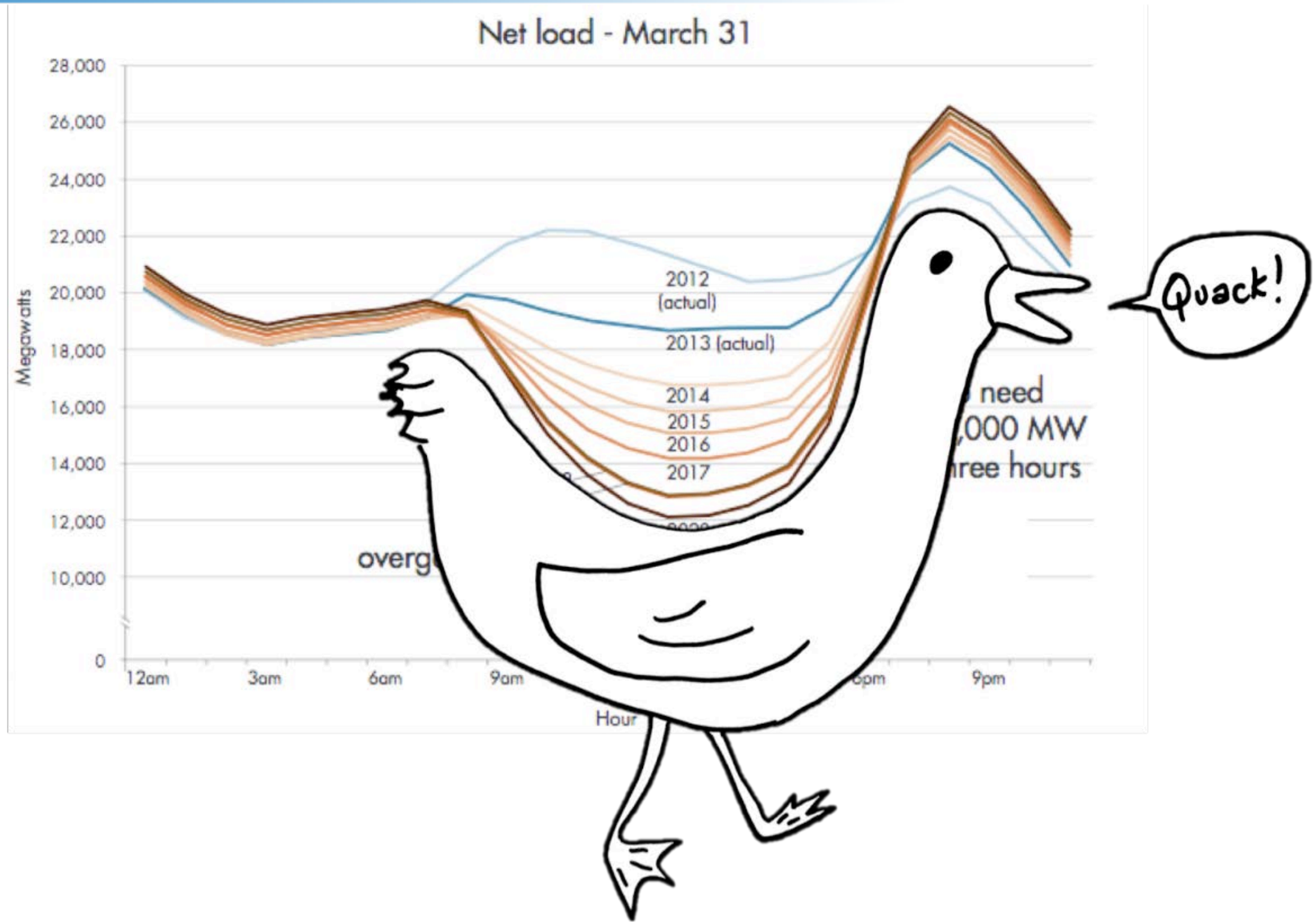
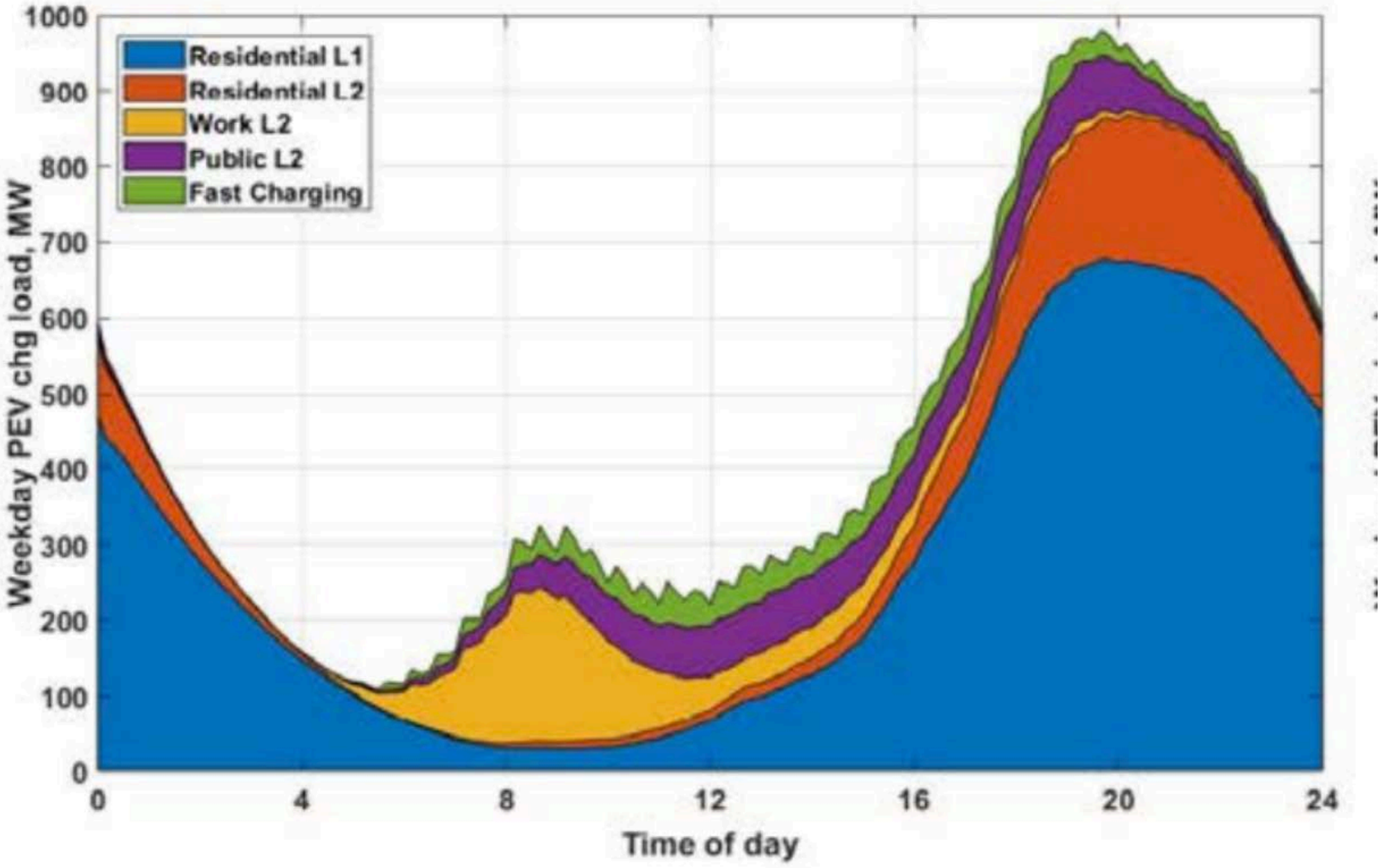
The Duck Curve



Projected effect of EV's – the Dragon Curve



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Different Methods to pay for Demand Reduction

Demand Response

paid to reduce demand

- **Capacity Market**
  Infrequent, long notice 24 hours
- **Spinning Reserves**
  30 min to 2 hours notice
  but 6 sec reporting required
- **Frequency Regulation**
  30 sec to 2 min response

Time of Use Pricing

Price changes with availability

- **DATOD**
  Day Ahead Time of Day Pricing
  Hourly pricing set previous day
- **Spot Pricing**
  Dynamic Market price
  Various forms

Peak Demand Pricing

Based on max demand in a period

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Example

Load Management
at a Retail Facility in Buffalo NY
with multiple Roof Top AC Units

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Techniques Deployed

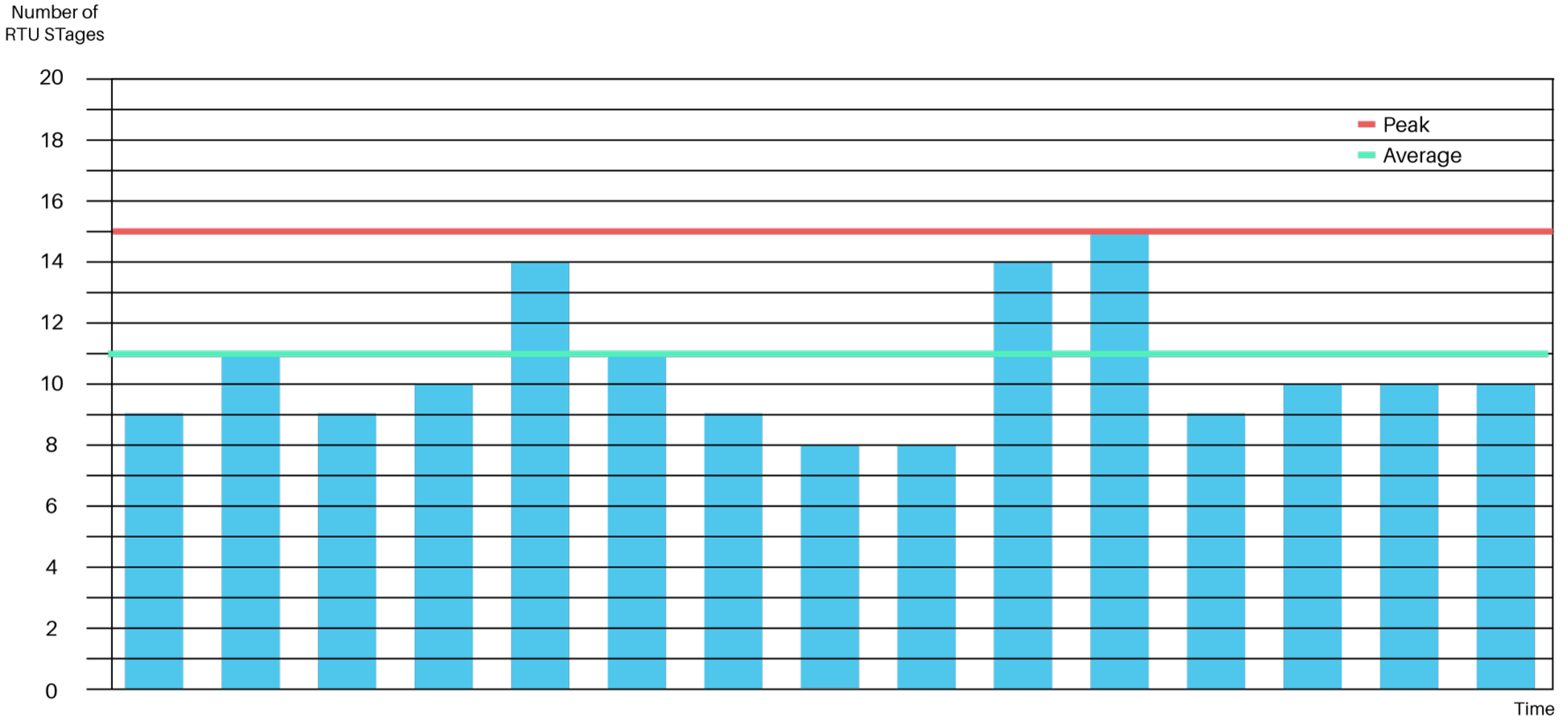
Energy Efficiency

- Time Schedules
- Demand Based Ventilation
- Analytics for Sensor and Plant Failure

Demand Limiting

- Load Synchronization
- Load Shifting by Temperature change

With individual Controls, demand is quite variable



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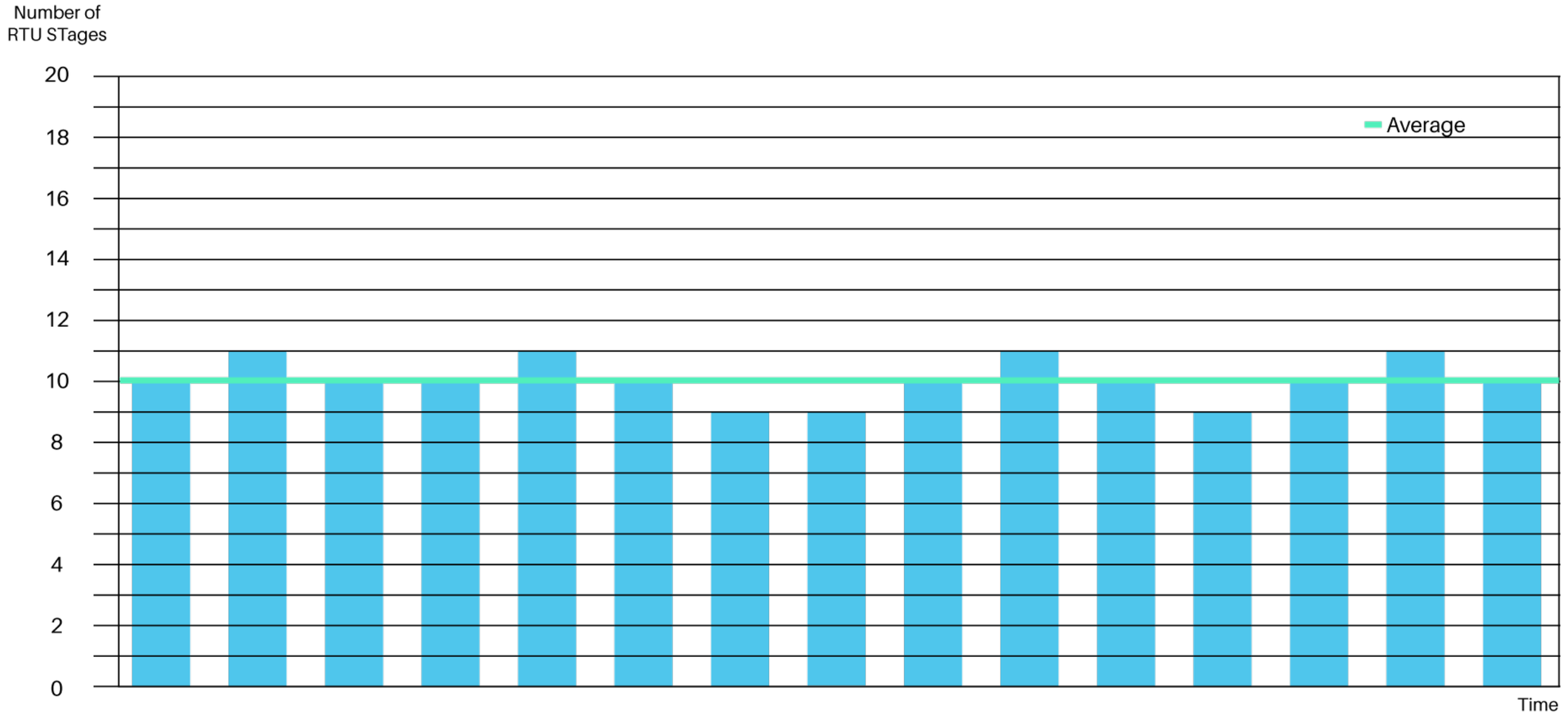
With Synchronized Control, Load is more even and Peak Demand lower



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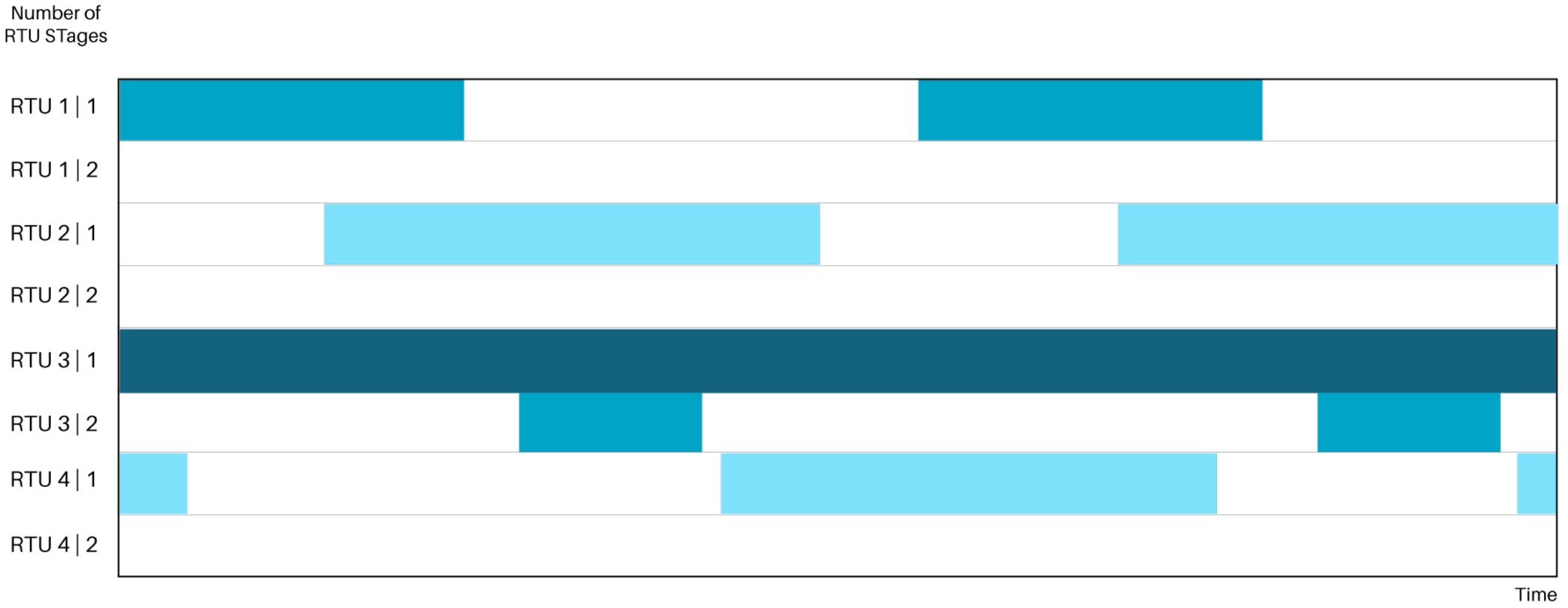
Load Synchronisation



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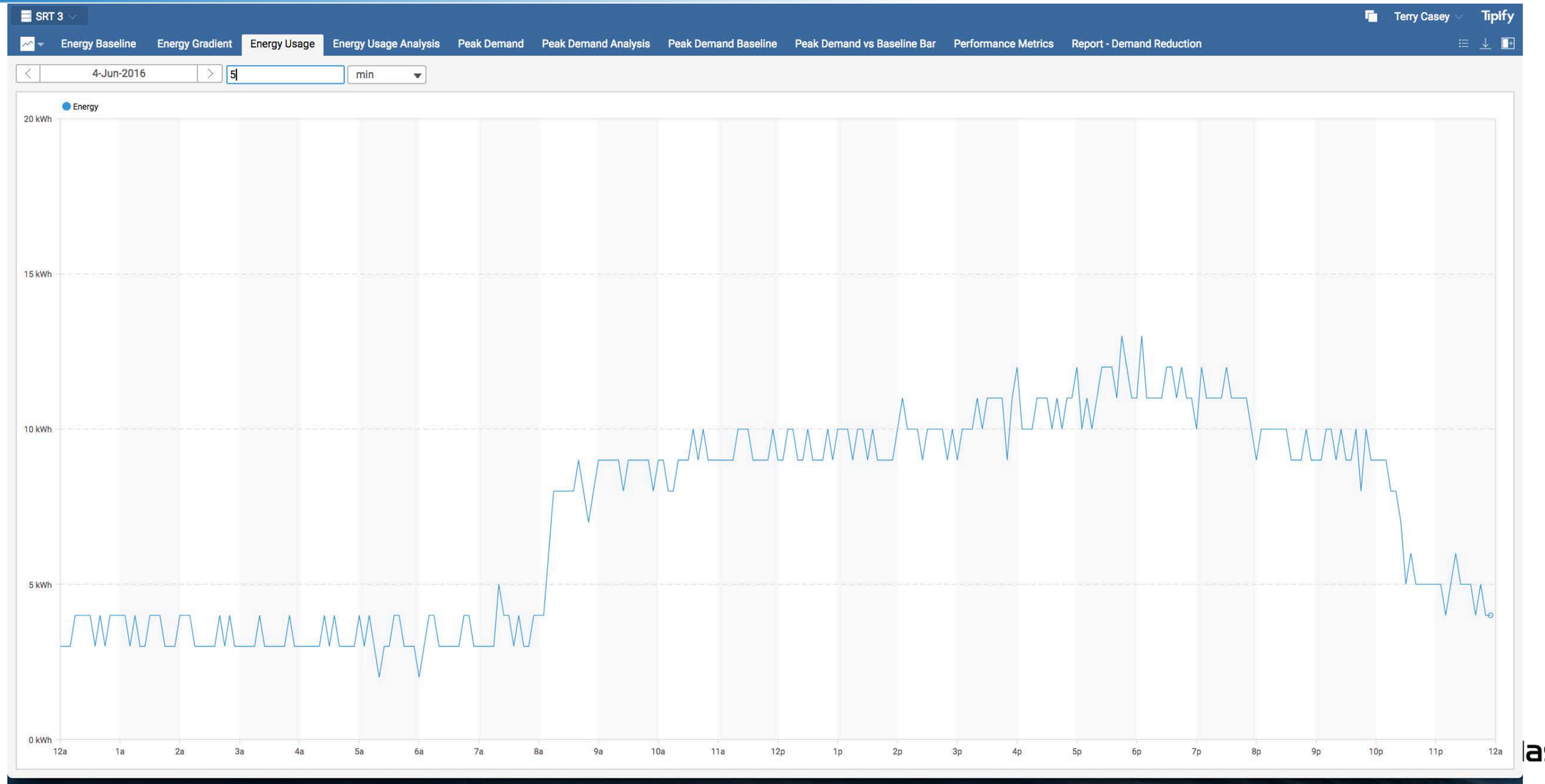
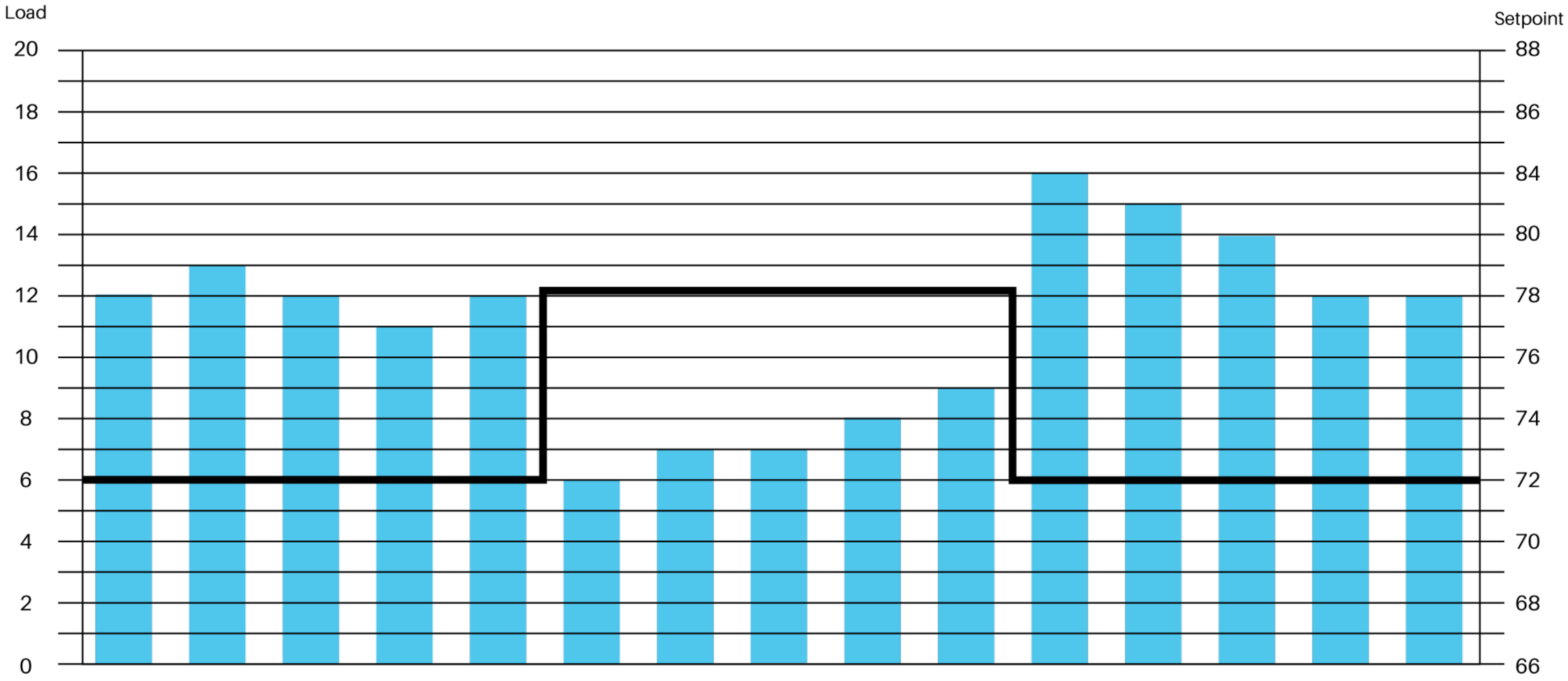
It works in reality



Load Shifting by changing Temperature Setpoint



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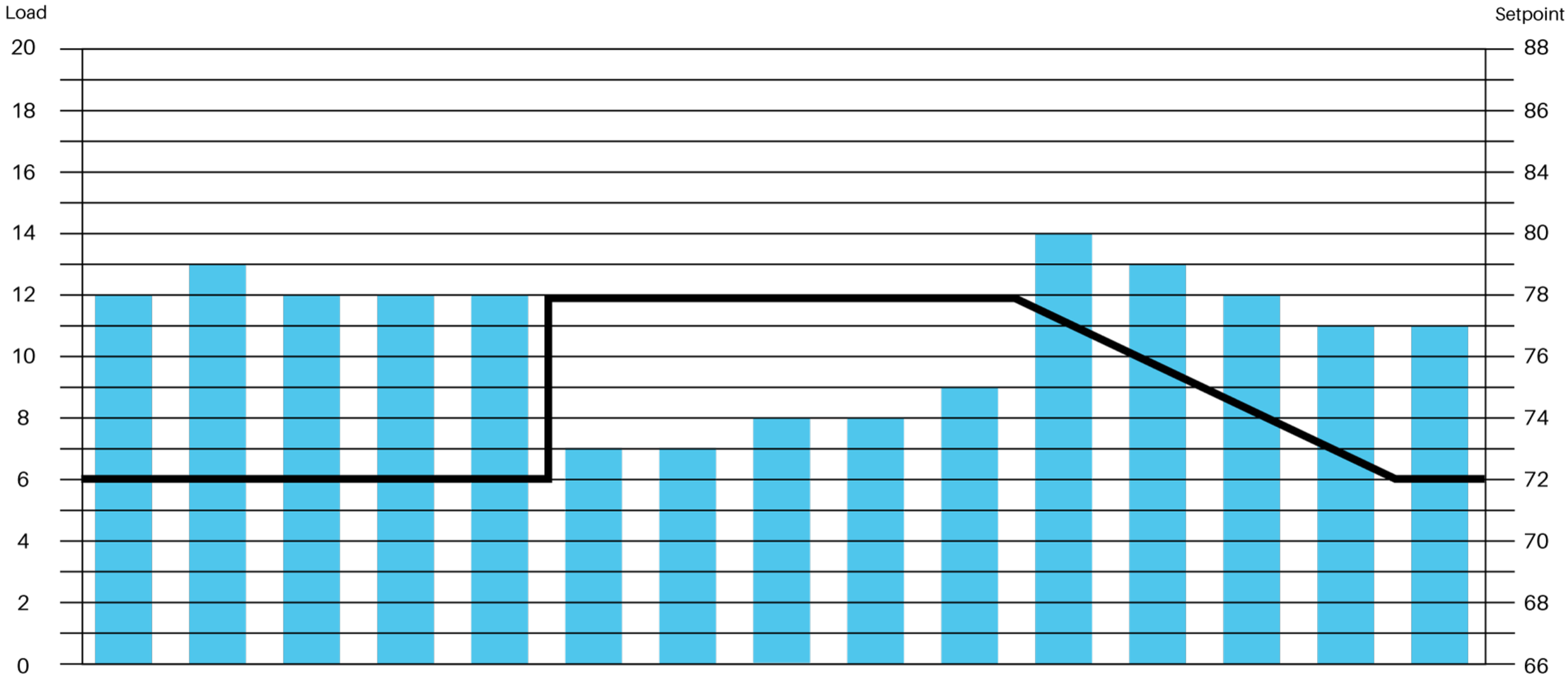
Reducing Peak Demand by Ramping Setpoint back



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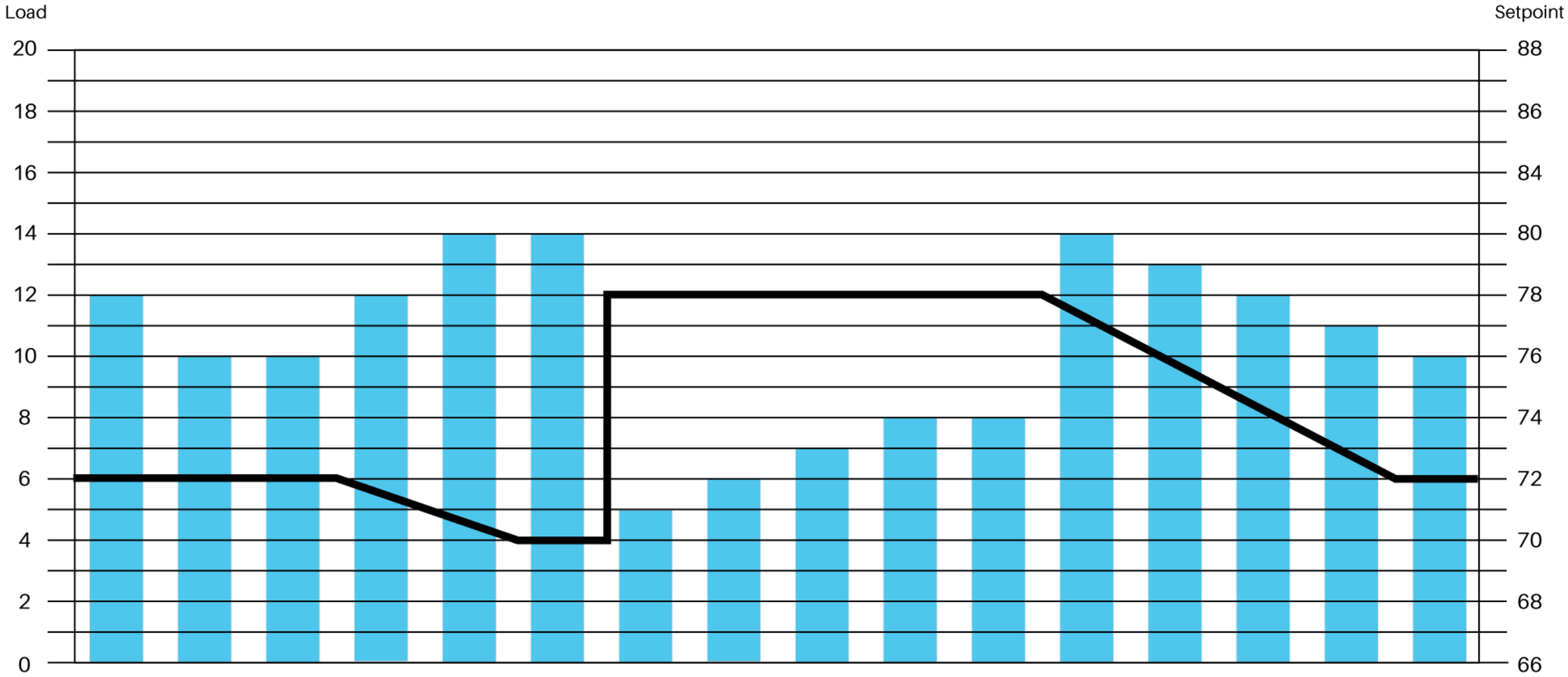
Adding in pre-Cooling of the space



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Results

SRT 3 | Terry Casey | Tipify

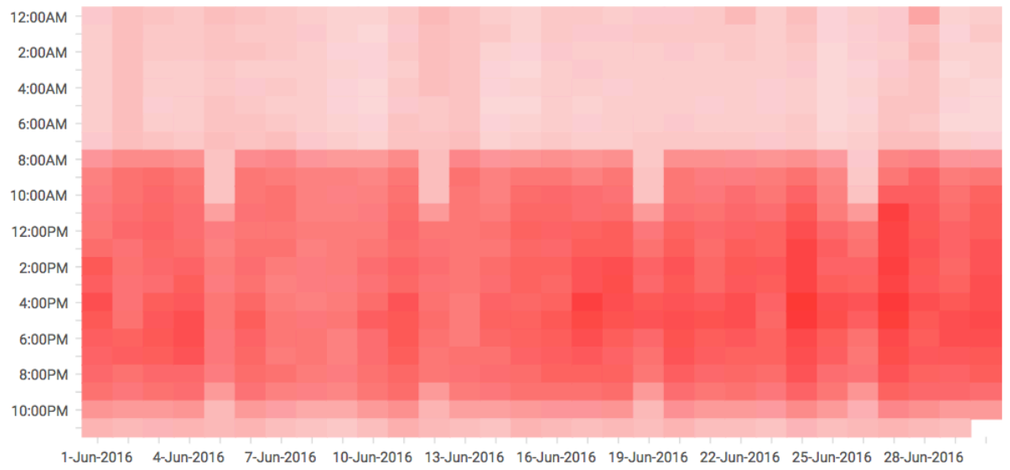
Energy Baseline | Energy Gradient | Energy Usage | Energy Usage Analysis | Peak Demand | Peak Demand Analysis | Peak Demand Baseline | Peak Demand vs Baseline Bar | Performance Metrics | Report - Demand Reduction

1-Jun-2016 | 15 | min | 21.5 | $

Jun-2016 | 0.12 | $

Power • Peak Demand vs Baseline

Consumption • Daily Gradient



Summary Data

from 2016-06-01 to 2016-06-30

Peak Demand

kW Reduction: 35.77kW

Cost Saved: $769.03

Percent Diff: 17.61%

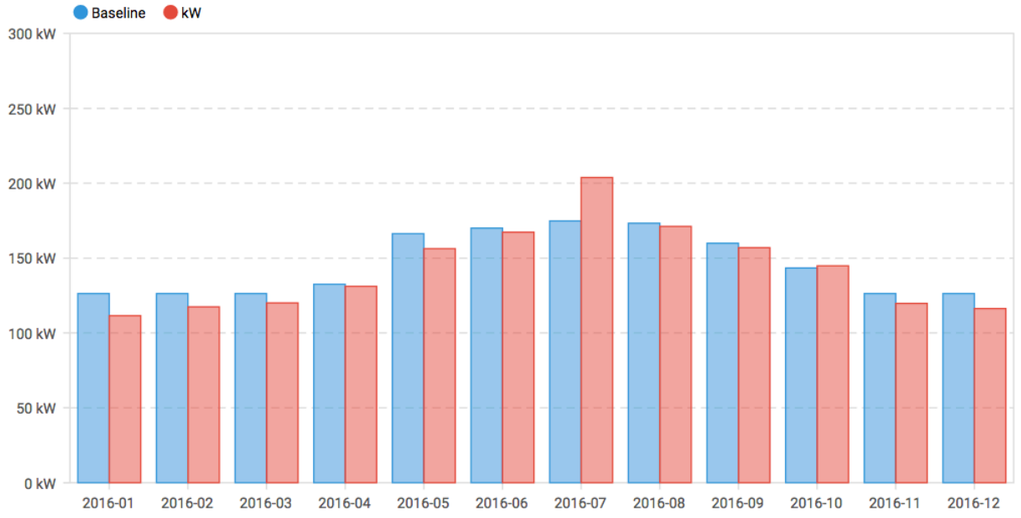
Energy Usage

kWh Reduction: 10189.61kWh

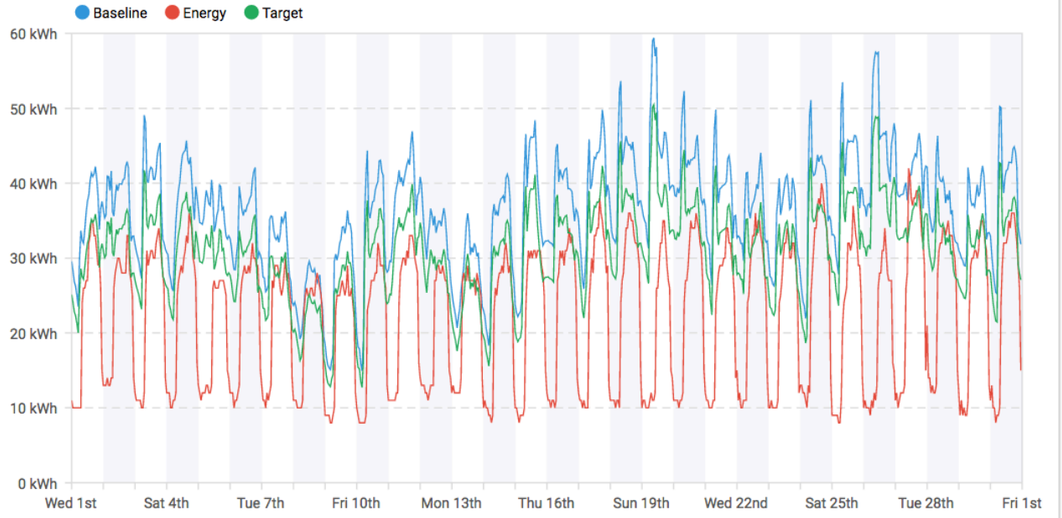
Cost Saved: $1222.75

Percent Diff: 38.74%

Peak Demand vs Baseline • Monthly



Consumption Comparison • Energy vs Baseline



Summary Data

for 2016

Year Peak kW Reduction: 37.1kW

Year Total Usage Reduction: 129640kWh

Results

Energy Consumption KWHr reduction 38%

- A number of time schedule and Plant faults discovered

Peak Demand Reduced by 17%

- Only Load Synchronization applied
- Time of Use ToU pricing not offered for this site

Simple Payback

- Less than 12 months

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