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The Premier Energy Training Workshop
and Trade Show for Federal Agencies

A River of Energy Solutions

Competitions @  pulse energy

Brent Bowker – Competitions Lead

Overview

- Intro to Pulse
- Our experience
- Results
- Case study 1 – University of Chicago
- Case Study 2 – Perkins & Will
- Reflections

Commercial Buildings...



Collect real-time data...



Archive and aggregate...



Analyze...

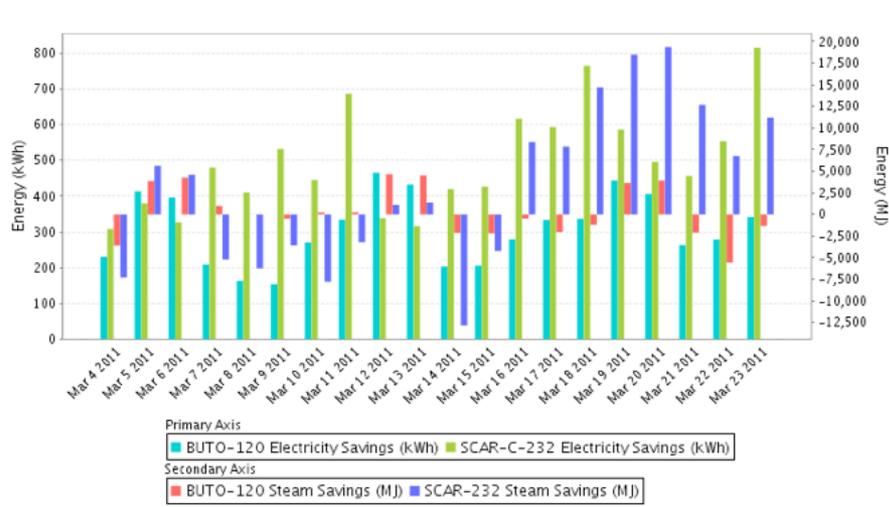
$$\frac{\partial}{\partial \theta} M T(\xi) = \frac{\partial}{\partial \theta} \int_{R_n} T(x) f(x, \theta) dx = \int_{R_n} \frac{\partial}{\partial \theta} T(x) f(x, \theta) dx$$
$$\frac{\partial}{\partial a} \ln f_{a, \sigma^2}(\xi_1) = \frac{(\xi_1 - a)}{\sigma^2} f_{a, \sigma^2}(\xi_1) = \frac{1}{\sqrt{2\pi\sigma}} \exp\left\{-\frac{(\xi_1 - a)^2}{2\sigma^2}\right\} \frac{\partial}{\partial a} \ln f_{a, \sigma^2}(\xi_1)$$
$$\int_{R_n} T(x) \cdot \frac{\partial}{\partial \theta} f(x, \theta) dx = M\left(T(\xi) \cdot \frac{\partial}{\partial \theta} \ln L(\xi, \theta)\right)$$
$$\int_{R_n} T(x) \cdot \left(\frac{\partial}{\partial \theta} \ln L(x, \theta)\right) \cdot f(x, \theta) dx = \int_{R_n} T(x) \cdot \left(\frac{\partial}{\partial \theta} \ln f(x, \theta)\right) \cdot f(x, \theta) dx$$
$$\frac{\partial}{\partial \theta} M T(\xi) = \frac{\partial}{\partial \theta} \int_{R_n} T(x) f(x, \theta) dx = \int_{R_n} \frac{\partial}{\partial \theta} T(x) f(x, \theta) dx$$
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Measure and verify savings...

- Reporting
- Reports
- Billing Analysis
- Accounts
- Invoices
- Custom Tariffs
- Upload ^{superuser}

BT and Scarfe Daily Performance

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Show chart

Date	BUTO-120 Electricity Savings (kWh) (kWh)	SCAR-C-232 Electricity Savings (kWh) (kWh)	BUTO-120 Steam Savings (MJ) (MJ)	SCAR-232 Steam Savings (MJ) (MJ)
Mar 4 2011	230.702	308.023	-3,621.064	-7,319.483
Mar 5 2011	414.146	380.236	3,860.327	5,619.788
Mar 6 2011	396.509	327.101	4,244.917	4,598.823
Mar 7 2011	208.765	480.311	987.357	-5,219.766
Mar 8 2011	163.081	410.127	13.905	-6,250.343
Mar 9 2011	153.901	532.243	-505.115	-3,597.031

Identify anomalies...



Educate occupants and the public...

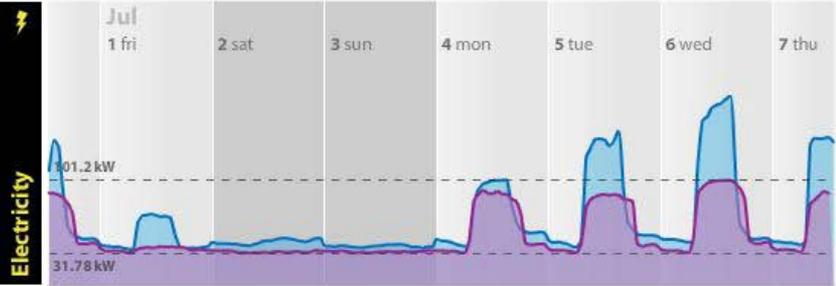
UBC Energy Dashboard OVERVIEW **LOCATIONS**     pulse energy

 a place of mind THE UNIVERSITY OF BRITISH COLUMBIA

← Buchanan Tower →

  Performance Compare Week

Buchanan Tower
10,290 m² ● Typical ● Actual



8,127 kWh of energy consumed in the past week is equivalent to...
Lighting the Eiffel Tower for **9.13** hours

Light up the Eiffel Tower

Green Features

Sustainability Coordinator

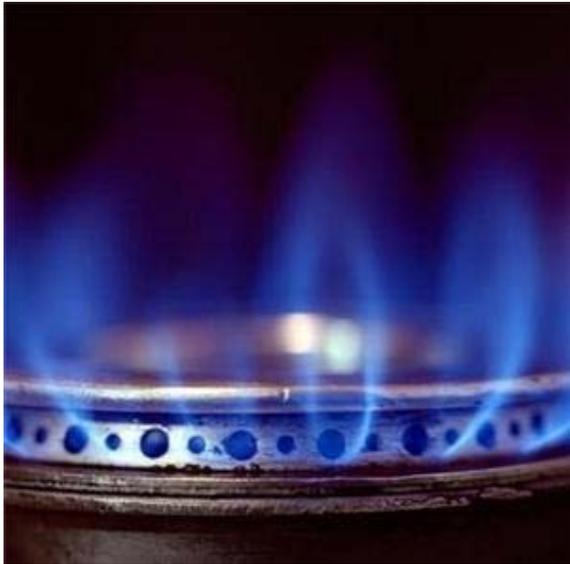


The Sustainability Coordinator (SC) in this building inspires their colleagues to make positive changes in energy, waste, food, purchasing and transportation and more. SCs provide information, organize events, and promote sustainability in their departments, from catering and event planning to workplace energy conservation and composting. SCs make

The Buchanan Tower, built in 1972, is named for the former Dean of Arts and Sciences, Daniel Buchanan. At the time it was completed, the Arthur Erickson-inspired building was the tallest building on the UBC campus.

The 12-floor concrete office tower has a heating & cooling system with two zones: one for inside offices and another for outside/window offices. This makes climate control problematic when the south side of the building is bathed in sunlight.

Not just measuring electricity...



Walk the talk!



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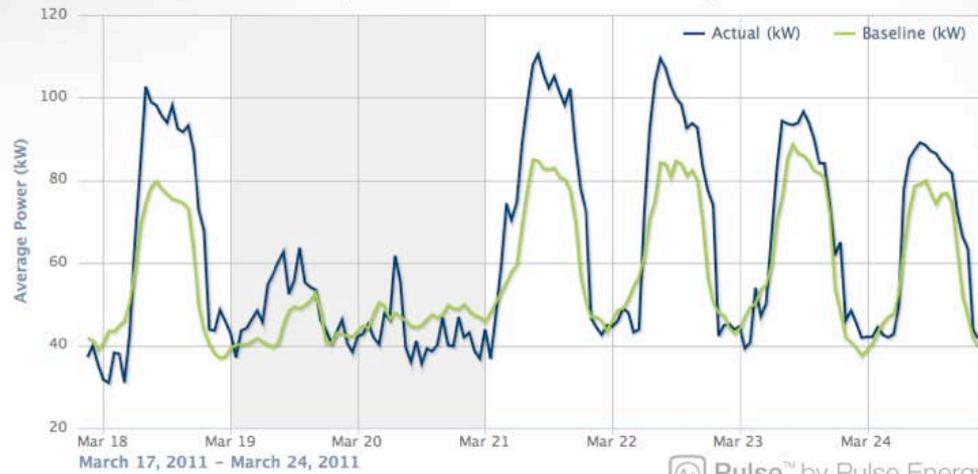


Pulse Energy Office

Pulse™ energy management software lets you manage individual or multiple systems in one unified chart.

[Get Started Now](#)

576 Seymour St. – Arts and Crafts Building



 Pulse™ by Pulse Energy

Our Competition Experience

- 9 competitions
- universities, office buildings, government
- 1 to 10 buildings
- 1 week to 3 months
- 1,000's of participants
- multiple time zones
- multiple countries



Results



- 1-2 weeks: 5-25%
- 1-3 months: 2-5% savings
- Up to 7% savings over 6 months





Competition as a race



Comparing buildings



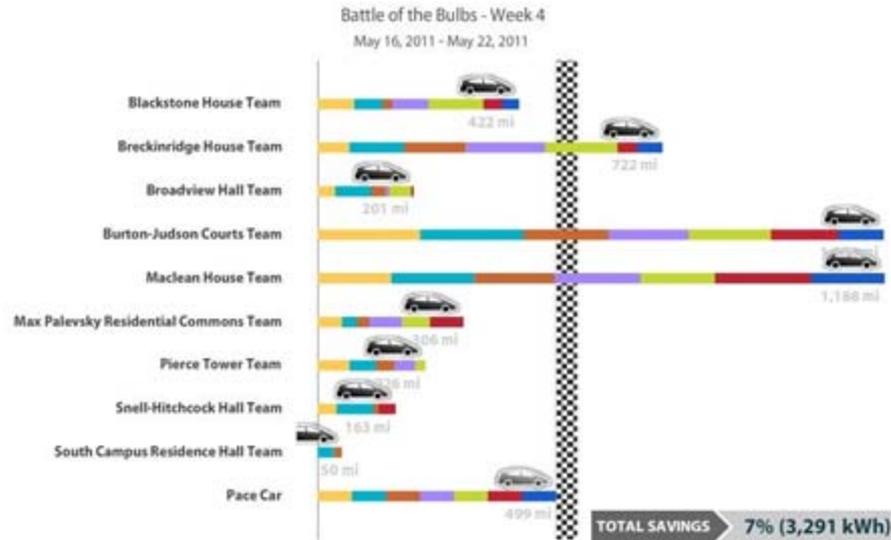
Energy savings potential



Handicap: fuel efficiency

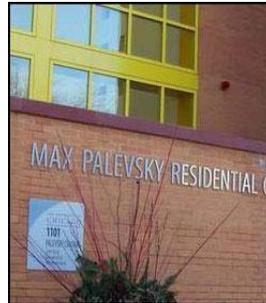


THE UNIVERSITY OF CHICAGO



Case Study: University of Chicago Battle of the Bulbs

- 9 residence buildings
- Baseline energy use 1 week prior
- 4 consecutive 1-week segments



Case Study: University of Chicago Top 3

Macleon House



22%

Burton-Judson



17%

Breckinridge House



16%

Case Study: University of Chicago Overall

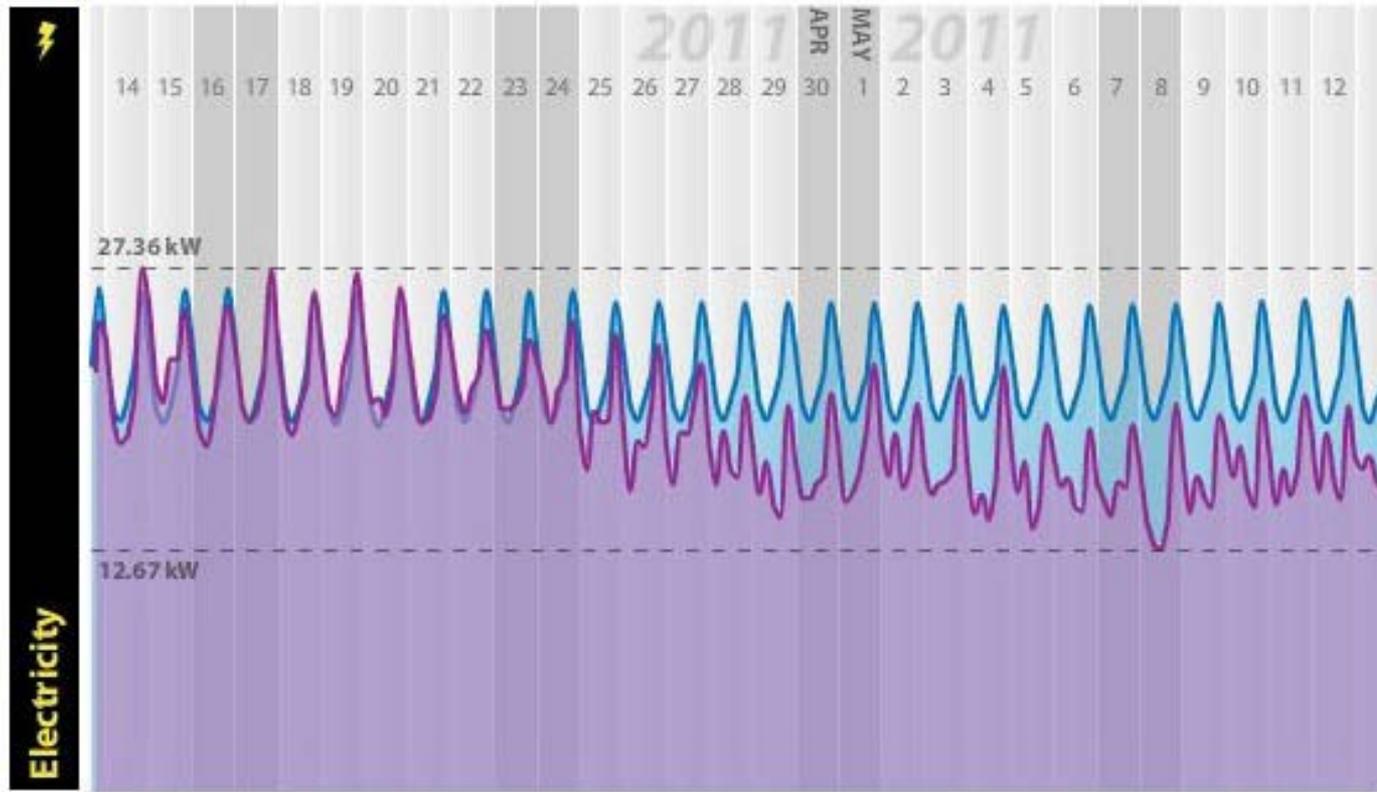
- Highly engaged population of occupants
- Extreme actions observed
 - Group studying in library
 - Frisbee outside instead of TV
- Distinct reductions visible on Dashboard
- Currently monitoring for persistent savings

Overall **5** % saved, **9,557** kWh

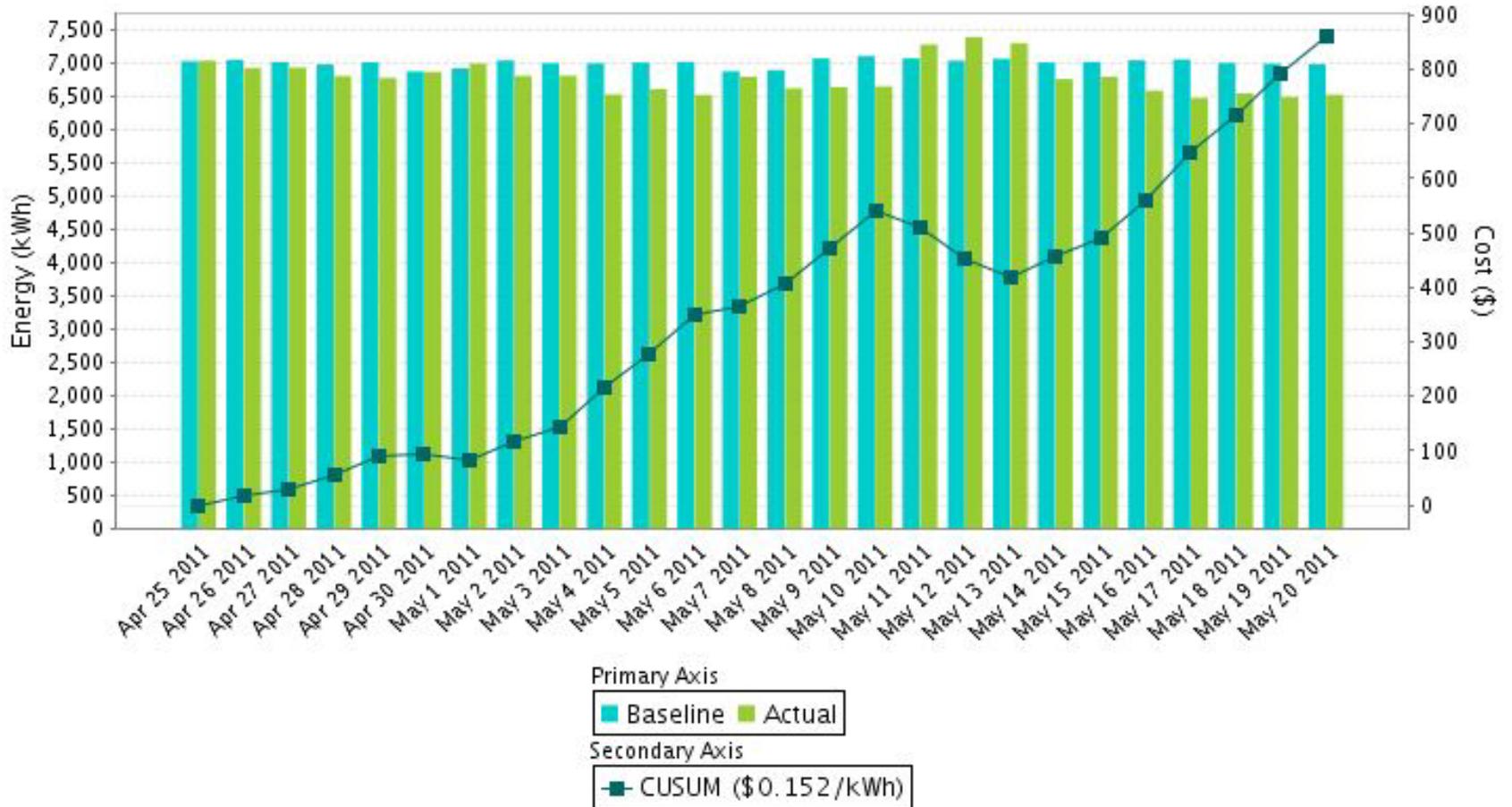
Highly visible savings

Maclean House
12,684 ft²

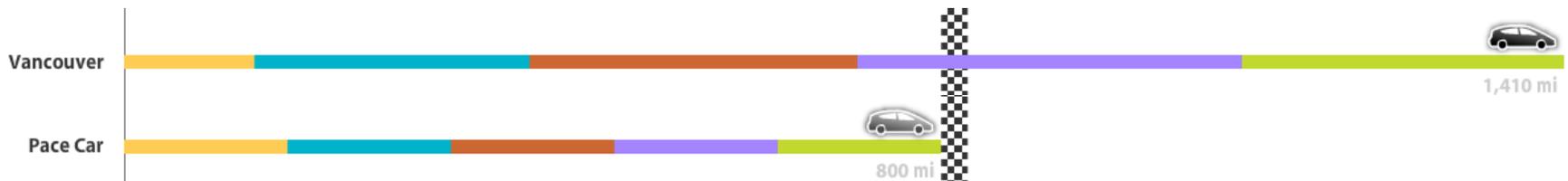
● Typical ● Actual



Battle of the Bulbs CUSUM



Case Study: Perkins+Will Energy Cup



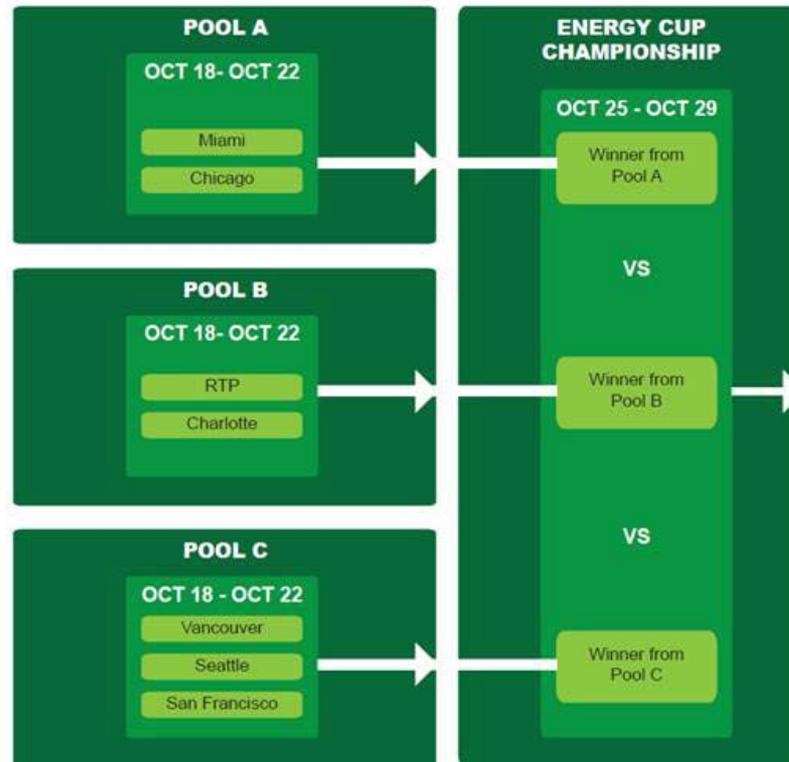
Perkins+Will Energy Cup

7 offices, 2 countries and 3 time zones

- 141,400 ft² of office space
- 590 employees

Two week, two round
playoff format

Goal: reduce energy
use by 8%





Charlotte

- 15,600 ft²
- 30 occupants
- VAV



San Francisco

- 20,000 ft²
- 100 occupants
- Passive



Chicago

- 65,000 ft²
- 272 occupants
- Fan Coil



Seattle

- 12,000 ft²
- 30 occupants
- Passive



Miami

- 7,700 ft²
- 50 occupants
- VAV



Vancouver

- 21,000 ft²
- 93 occupants
- Passive

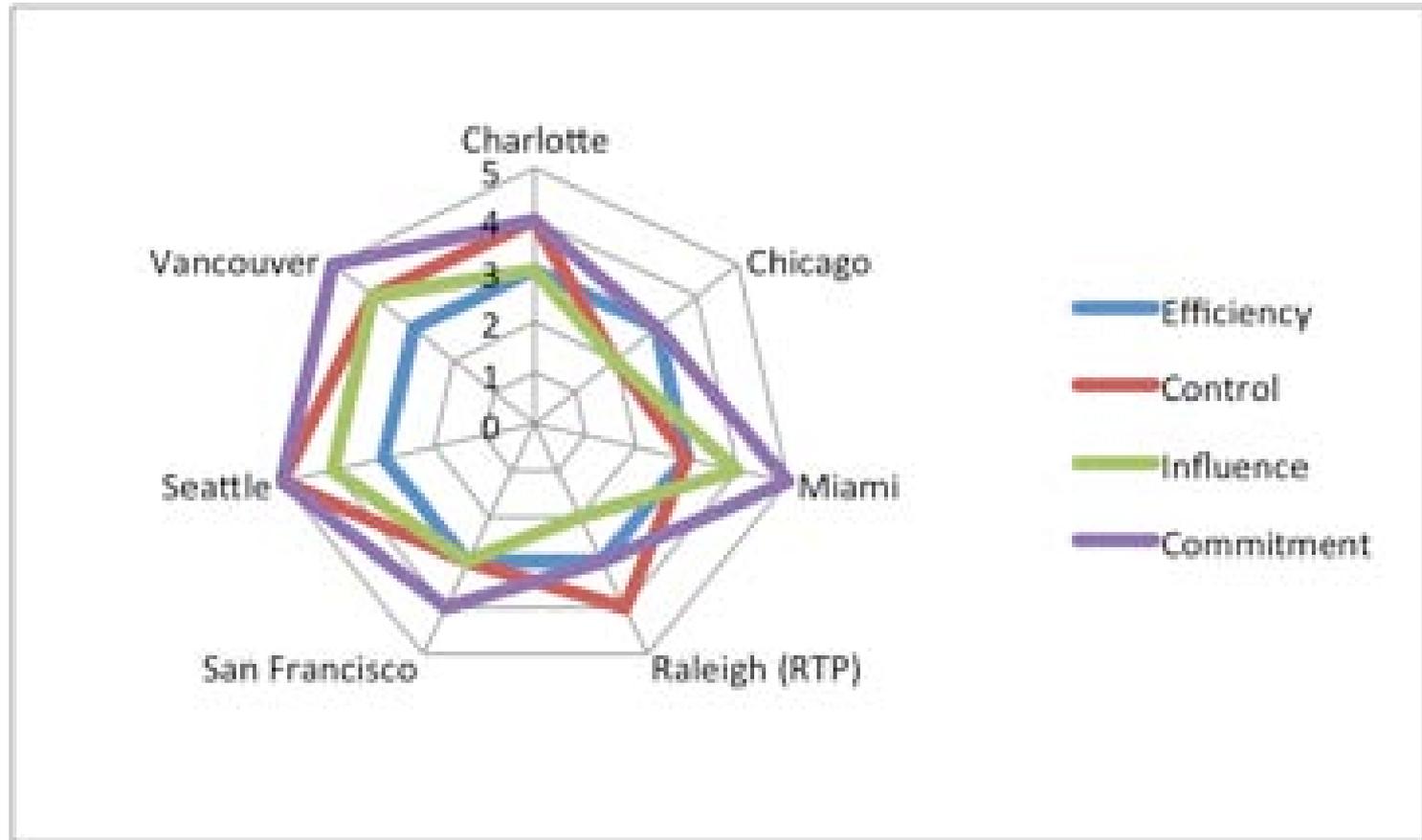


Raleigh (RTP)

- 8,300 ft²
- 28 occupants

Participating offices

Potential for savings? Ask the Occupants!



End results were correlated with the potential for savings quantified during a pre-competition survey.

Results

Average energy reduction across entire competition:

16.5%

Maximum daily energy savings achieved:

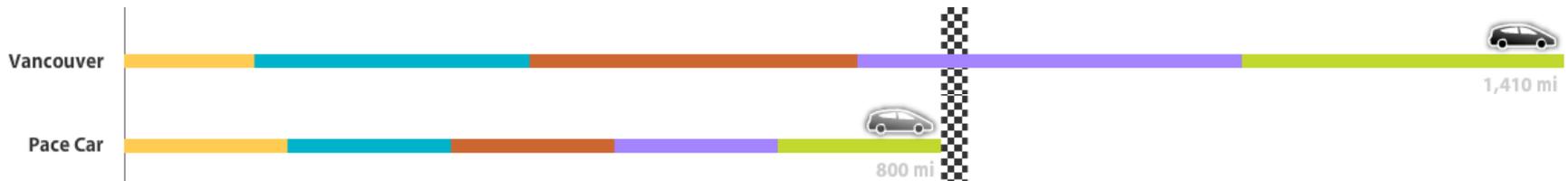
42%

Greenhouse gas emissions prevented:

0.75 tons

Total energy savings:

~2 MWhr





Charlotte

- Savings: 105 kWh
- Reduction: 11%
- GHGs: 60 kg



San Francisco

- Savings: 170 kWh
- Reduction: 24%
- GHGs: 43 kg



Chicago

- Savings: 20 kWh
- Reduction: 1%
- GHGs: 1 kg



Seattle

- Savings: 454 kWh
- Reduction: 24%
- GHGs: 63 kg



Miami

- Savings: 774 kWh
- Reduction: 33%
- GHGs: 456 kg



Vancouver

- Savings: 612 kWh
- Reduction: 18%
- GHGs: 23 kg

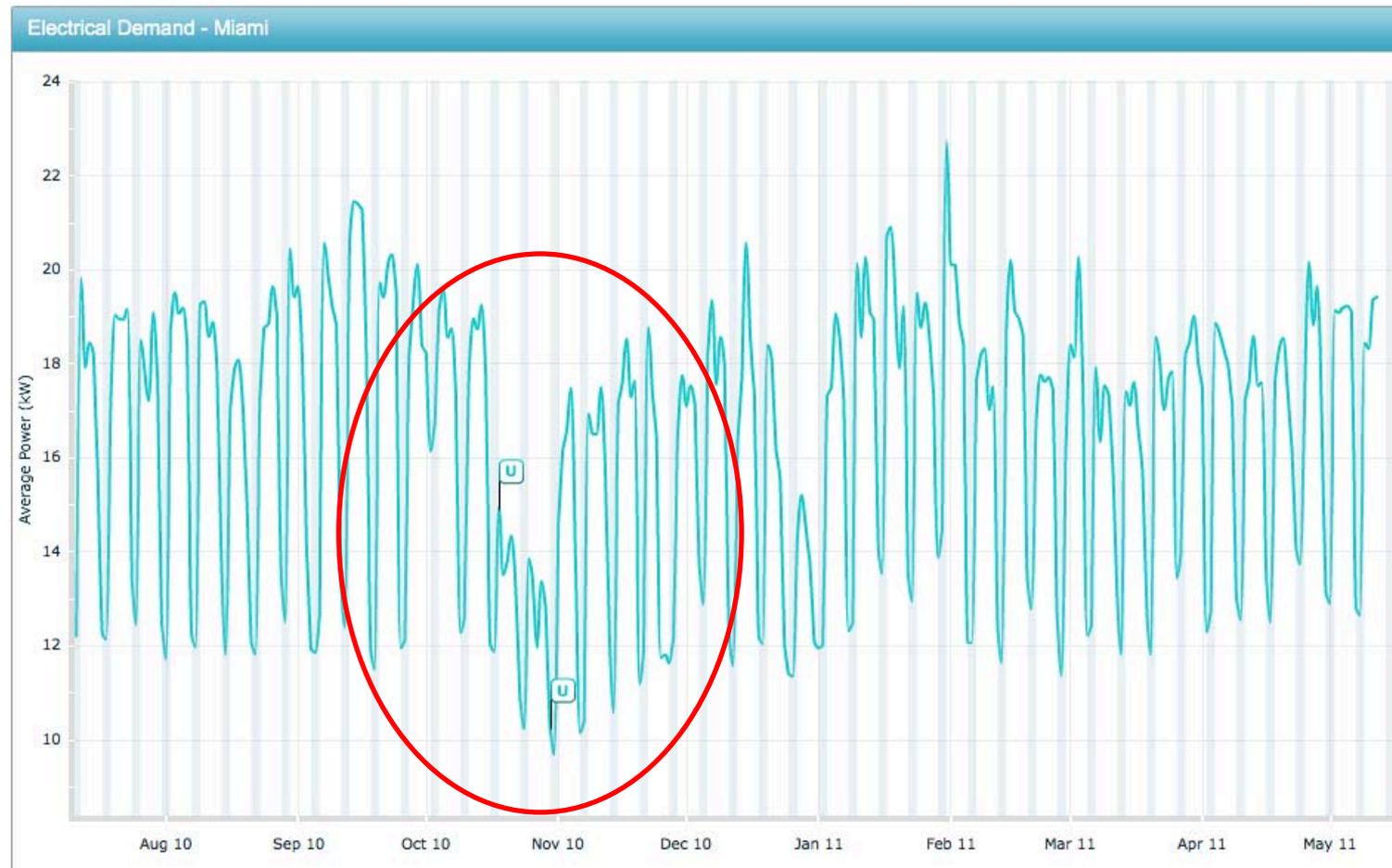


Raleigh (RTP)

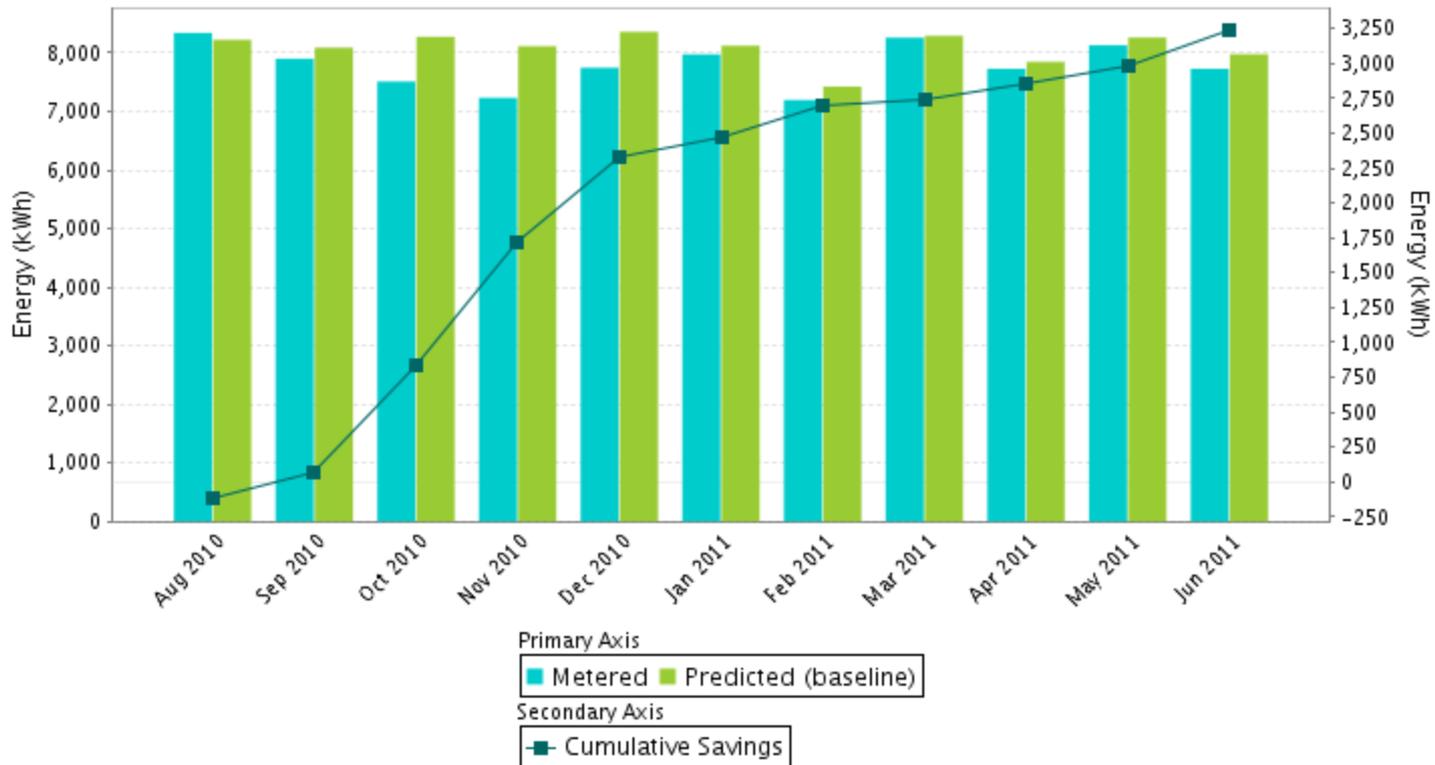
- Savings: 185 kWh
- Reduction: 11%
- GHGs: 107 kg

Race results (con't)

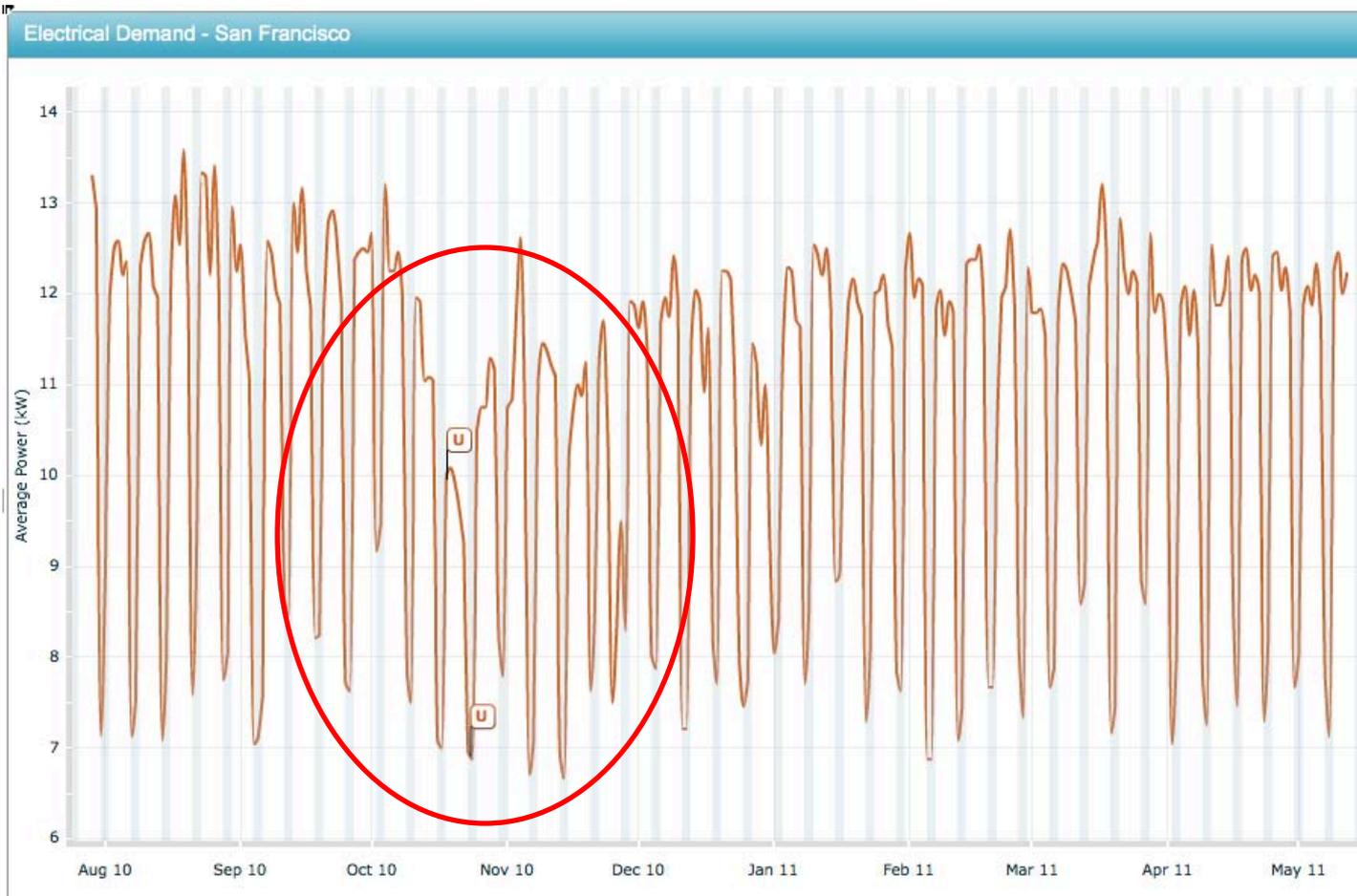
Persistent Savings - Miami



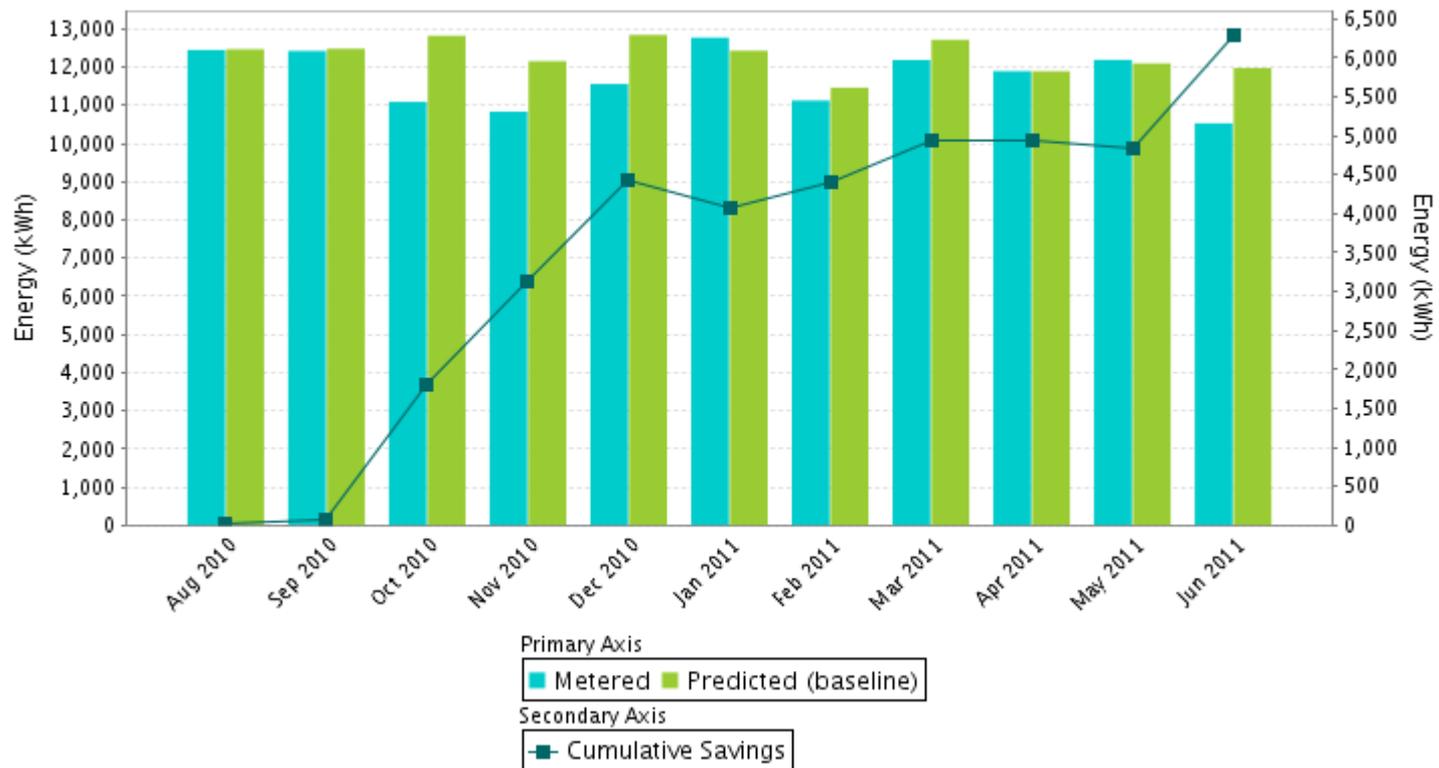
Persistent Savings - Miami



Persistent Savings – San Francisco

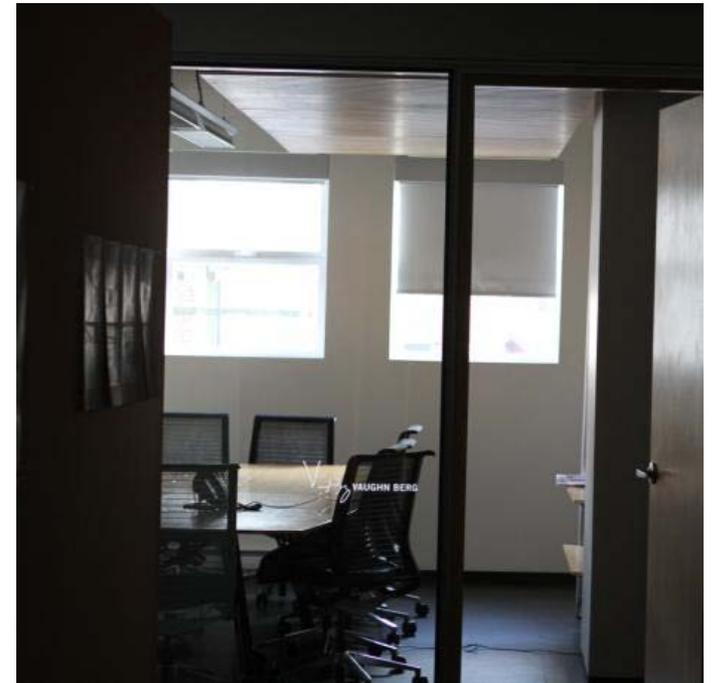


Persistent Savings – San Francisco



Behaviour efforts are effective and measurable

- Start simple and build upon previous successes – a competition is a great quick win with proven results
- Competitions spur creative approaches to energy savings. While some actions may not be persistent they may point towards the need for an operational change
- Some energy savings persist after competition ends (verified through metering and surveys)
- Savings can be measured, kWh & \$
- Visualization helps people understand, higher granularity helps make this clearer



Questions



Contact info

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