



## Planning Tools: Utility Data, Management, and Benchmarking

Better Buildings Summit

May 10, 2016

9:45-11:00 AM



# Today's Presenters



**Ellen Sargent**  
Chicago Housing  
Authority

**Jon Braman**  
Bright Power





# Data Jamming at the Chicago Housing Authority

## Ellen Sargent

# DATA JAMMING AT THE CHICAGO HOUSING AUTHORITY

Ellen Sargent

Director of Sustainable Initiatives and Projects, Property Office  
Chicago Housing Authority

A case study for energy benchmarking, reporting and  
strategic capital planning



**CHA**

CHICAGO HOUSING  
AUTHORITY™

# **CHICAGO HOUSING AUTHORITY GENERAL BACKGROUND**

- Third largest PHA in the U.S.
- 19,500 traditional housing units categorized into:
  - Senior high rise buildings
  - Family property row houses or mid-rise buildings
  - Scattered site single family homes and various 2-6 unit buildings
- Administers over 36,000 housing choice vouchers for apartments in privately owned buildings

# NATIONAL TRENDS OF BENCHMARKING & TRANSPARENCY POLICIES

## Seattle, WA:

- Passed 1/2010
- Municipal, Commercial, Multi-family
- Tenant & Transactional Disclosure Only

## Portland, OR:

- Passed 4/2015
- Municipal, Commercial, Multi-family
- Disclosure

## Berkley, CA:

- Passed 3/2015
- Municipal, Commercial, Multi-family
- Public Disclosure
- Single Family Homes - at Time of Sale (w Audits)

## San Francisco, CA:

- Passed 2/2011
- Municipal, Commercial
- Public & Transactional Disclosure
- Mandatory Audits

## Minneapolis, MN:

- Passed 2/2013
- Municipal, Commercial
- Public Disclosure

## Kansas City, MO:

- Passed 6/2015
- Municipal, Commercial, Multi-family
- Public Disclosure

## Chicago, IL:

- Passed 9/2013
- Municipal, Commercial, Multi-family
- Public Disclosure
- Data verification

## Austin, TX:

- Passed 11/2008
- Municipal, Commercial, Multi-family
- Transactional disclosure
- Mandatory audits for multifamily

## Washington, DC:

- Passed 7/2008
- Municipal, Commercial, Multi-family
- Public Disclosure

## Atlanta, GA:

- Passed 4/2015
- Municipal, Commercial, Multi-family
- Public Disclosure

## Cambridge, MA:

- Passed 7/2014
- Municipal, Commercial, Multi-family
- Public Disclosure

## Boston, MA:

- Passed 5/2013
- Municipal, commercial, multi-family
- Public Disclosure
- Mandatory Audits

## New York, NY:

- Passed 12/2009
- Municipal, Commercial, Multi-family
- Public Disclosure
- Mandatory Audits, Retro-commissioning, Lighting upgrades

## Philadelphia, PA:

- Passed 6/2012
- Commercial only
- Public & Transactional disclosure

# THE CITY OF CHICAGO'S ORDINANCE REQUIRES BENCHMARKING, VERIFICATION AND DISCLOSURE

## 1.) Energy Benchmarking

- **Non-industrial buildings greater than 50,000 ft<sup>2</sup> track their energy consumption annually**
- This involves entering basic building info (address, size, space use, occupancy, etc.) and energy use data (kWh, cubic feet gas) into free, web-based software
- There are exemptions for financial hardship, low occupancy, and new buildings

## 2.) Data Verification

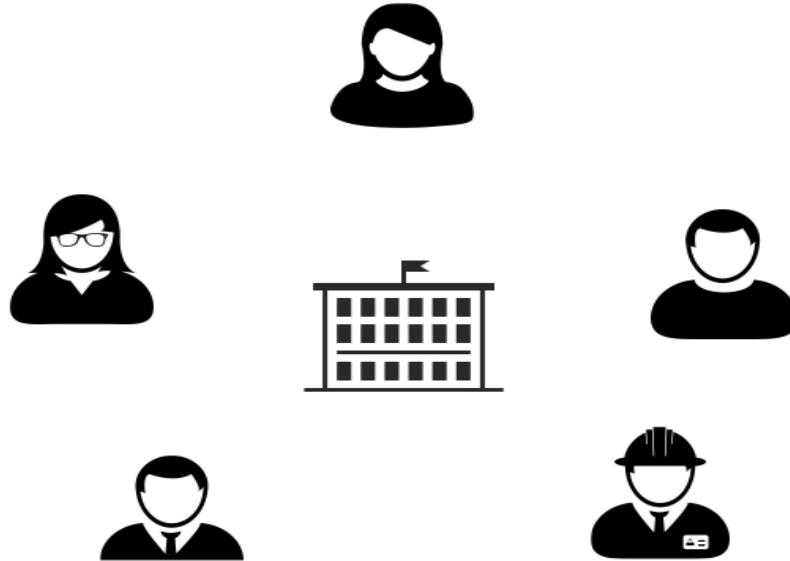
- **In the first and every third year after, buildings have their energy usage data verified** by in-house or 3<sup>rd</sup> party architect, engineer, or other trained professional
- Verification improves data quality and allows for direct comparisons of similar covered buildings
- There are also no-cost and low-cost verification options and waivers for financially-strained buildings.

## 3.) Reporting & Disclosure

- **Buildings report energy use annually** using the automated software tool
- **The City reports annually** on our broader efficiency trends
- **The City is authorized to make energy scores public** after 2.5 - 4.5 years
- The City does not disclose the energy data from the first year.
- Initial exemptions for buildings with TV studios, trading floors, or data centers representing 10%+ of square footage

**The Ordinance is information (not investment) focused:** The ordinance is focused explicitly on improving information on overall efficiency. There is no requirement to invest capital in energy efficiency, to retrofit, or to audit the building.

# WHAT IS A DATA JAM?



**ILLINOIS**





# Chicago Housing Authority Data Jam

Building Homepage →

↓ Portfolio Manager Homepage

## Ella Flagg Young Apartments

4645 N. Sheridan Road, Chicago, IL 60640 | [Map It](#)

Portfolio Manager Property ID: 3996742  
Year Built: 1968

[Edit](#)

Not eligible to apply for ENERGY STAR Certification

**ENERGY STAR Score (1-100)**  
 Current Score: 98  
 Baseline Score: 98

Summary
Details
Meters
Goals
Design

**Notifications (0)**

You have no new notifications.

**Property Profile**

You haven't created a profile for your property yet. Profiles are a way to supplement the information in Portfolio Manager with additional information about your property, including a photo.

[+ Create Profile](#)

**Source EUI Trend (kBtu/ft<sup>2</sup>)**

**Total GHG Emissions Trend (Metric Tons CO2e)**

**Metrics Summary** [Change Time Period](#)

Metric	Baseline (Dec 2013)	Current (Dec 2014)	Change
ENERGY STAR score (1-100)	98	98	0(0.0%)
Source EUI (kBtu/ft <sup>2</sup> )	73.2	71.6	-1.6(-2.2%)
Site EUI (kBtu/ft <sup>2</sup> )	52.9	51.4	-1.5(-2.8%)
Energy Cost (\$)	161,171.01	Not Available	N/A
Total GHG Emissions (Metric Tons CO2e)	1,213.8	1,188.7	-25.1(-2.1%)

**Check for Possible Data Errors**

Run a check for any 12-month time period to see if there are any possible errors found with your data.

[Check for Possible Errors](#)

**Sharing this Property**

5 People Have Access to this Property [Share](#)

Name	Permissions	Action
Chicago Housing Authority (ikhan5561)	Property Data Administrator	I want to...
Data Exchange ComEd (COMEDABS)	Exchange Data Shared by Chicago Housing Authority	I want to...

Information needed to Benchmark: property info (building owner, type, address); base building data (gross area, use details, utility details); energy consumption data; plans for data analysis

5

# Chicago Housing Authority Data Jam

- Meters for Electric, Natural Gas and Water

- CHA Meter & Residents Meter (common areas and individual units)

- Input can be manual or automatic

- Energy Benchmarking Process

- Collect building characteristics
- Collect utility data
- Input info into tool
- Gain overall results
- Analysis and energy conservation measures as necessary



Manage Bills (Meter Entries) for [Ella Flagg Young Apartments](#)

You have successfully updated the basic meter information for Electric Grid Meter.

Meter Selection:  [Delete Meter](#)

Basic Meter Information

Monthly Entries

Display Year(s):

	Start Date	End Date	Usage kWh (thousand Watt-hours)	Cost (\$)	Estimation	Green Power	Last Updated
<input type="checkbox"/>	1/1/2015	1/31/2015	74,585		<input type="checkbox"/>	<input type="checkbox"/>	11/6/2015 <a href="#">Data Exchange</a> <a href="#">ComEd</a>
<input type="checkbox"/>	2/1/2015	2/28/2015	65,434		<input type="checkbox"/>	<input type="checkbox"/>	11/6/2015 <a href="#">Data Exchange</a> <a href="#">ComEd</a>
<input type="checkbox"/>	3/1/2015	3/31/2015	55,324		<input type="checkbox"/>	<input type="checkbox"/>	11/6/2015 <a href="#">Data Exchange</a> <a href="#">ComEd</a>
<input type="checkbox"/>	4/1/2015	4/30/2015	56,002		<input type="checkbox"/>	<input type="checkbox"/>	11/6/2015 <a href="#">Data Exchange</a> <a href="#">ComEd</a>
<input type="checkbox"/>	5/1/2015	5/31/2015	54,244		<input type="checkbox"/>	<input type="checkbox"/>	11/6/2015 <a href="#">Data Exchange</a> <a href="#">ComEd</a>
<input type="checkbox"/>	6/1/2015	6/30/2015	62,259		<input type="checkbox"/>	<input type="checkbox"/>	11/6/2015 <a href="#">Data Exchange</a> <a href="#">ComEd</a>
<input type="checkbox"/>	7/1/2015	7/31/2015	57,312		<input type="checkbox"/>	<input type="checkbox"/>	11/6/2015 ikhan5561
<input type="checkbox"/>	8/1/2015	8/31/2015	71,788		<input type="checkbox"/>	<input type="checkbox"/>	11/6/2015 <a href="#">Data Exchange</a> <a href="#">ComEd</a>
<input type="checkbox"/>	9/1/2015	9/30/2015	68,535		<input type="checkbox"/>	<input type="checkbox"/>	11/6/2015 <a href="#">Data Exchange</a> <a href="#">ComEd</a>

# WHAT HAPPENS AFTER BENCHMARKING



# NEXT STEPS

- Continued reporting, pursue voluntary benchmarking
- Use energy utilization data for property manager performance incentives
- Improve and monitor preventative maintenance programs
- Enhance Operations Budget Forecasting
- Generate standardized energy usage expectations for new acquisitions
- Implement Strategic Capital planning
  - Attain Energy Star certification
  - Ensure capital investment projects are need based
  - Establish ROI documentation using in house staff and data

# ADDITIONAL RESOURCES

- City of Chicago Energy Benchmarking homepage and 2015 report:

[www.cityofchicago.org/city/en/progs/env/building-energy-benchmarking---transparency.html](http://www.cityofchicago.org/city/en/progs/env/building-energy-benchmarking---transparency.html)

[www.cityofchicago.org/content/dam/city/progs/env/EnergyBenchmark/](http://www.cityofchicago.org/content/dam/city/progs/env/EnergyBenchmark/)

[2015 Chicago Benchmarking Report Web 16DEC2015.pdf](#)

- EPA Portfolio Manager home page: [www.energystar.gov](http://www.energystar.gov)
- Chicago Housing Authority homepage: [www.thecha.org](http://www.thecha.org)



# Energy and Water Benchmarking in Multifamily Buildings

Jon Braman

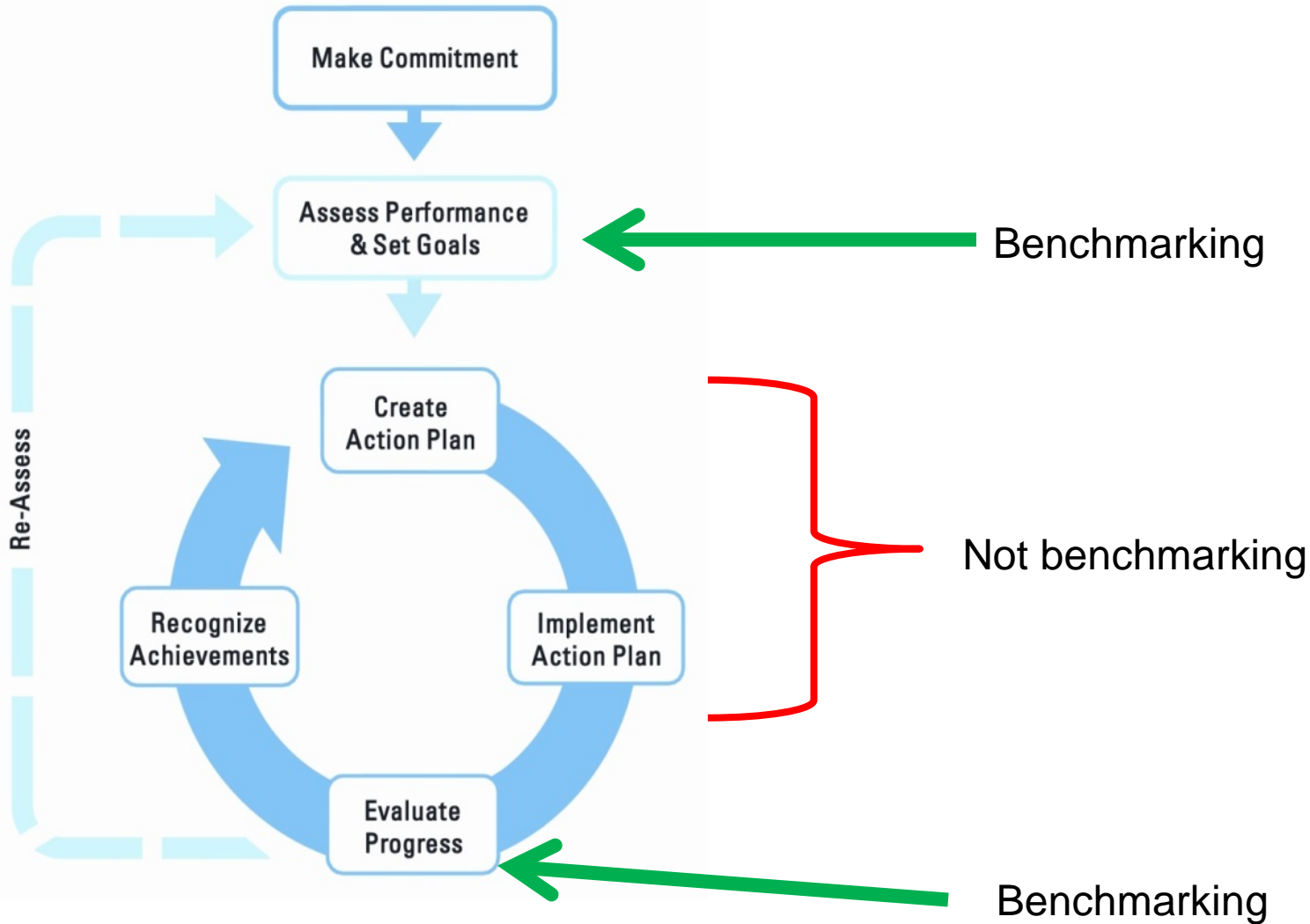
# Energy and Water Benchmarking in Multifamily Buildings

## 2016 Successes vs. Ongoing challenges

Jon Braman  
VP Strategic Initiatives  
[jbraman@brightpower.com](mailto:jbraman@brightpower.com)



# Energy Management Process





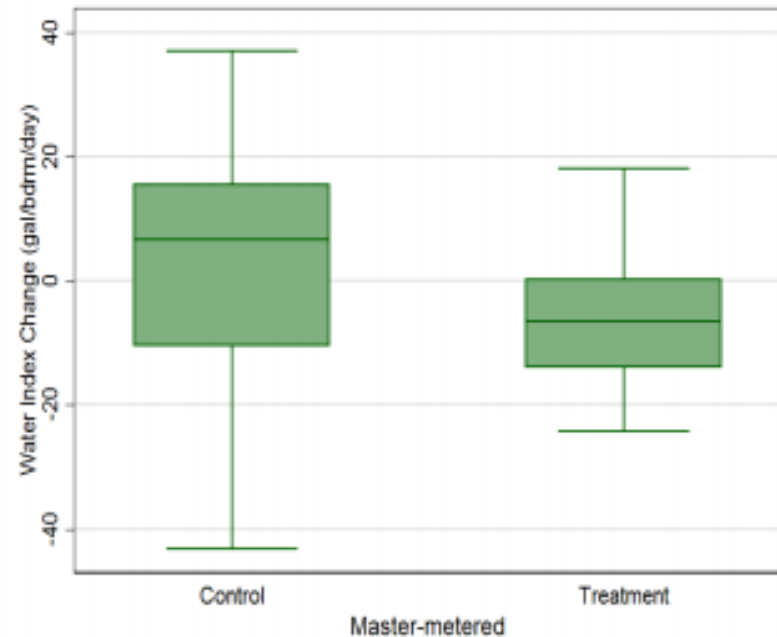
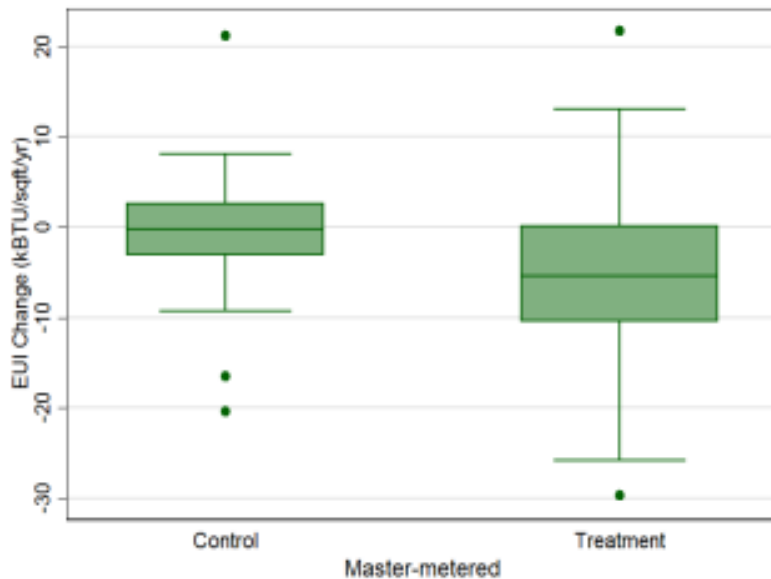
# Takeaways

1. Benchmarking works (i.e. really does help save)
2. Benchmarking is useless (by itself)
3. Sometimes it's hard just to get (good) data
4. Gradually, the situation is improving



# 1. Benchmarking works (i.e. really does help save energy and water)

EnergyScoreCards Minnesota:



# First experimental multifamily benchmarking impact study at scale.

Results from 550+ building sample in Minnesota (with third-party analysis review from CEE):

Statistically significant energy and water savings were found in *master-metered* buildings receiving the EnergyScoreCards service in comparison to the control group.

- **5% energy savings**
- **25% water savings**

measured at the 95% confidence interval.













# Benchmarking working as first step to reach portfolio goals

## Portfolio Measurement and Verification

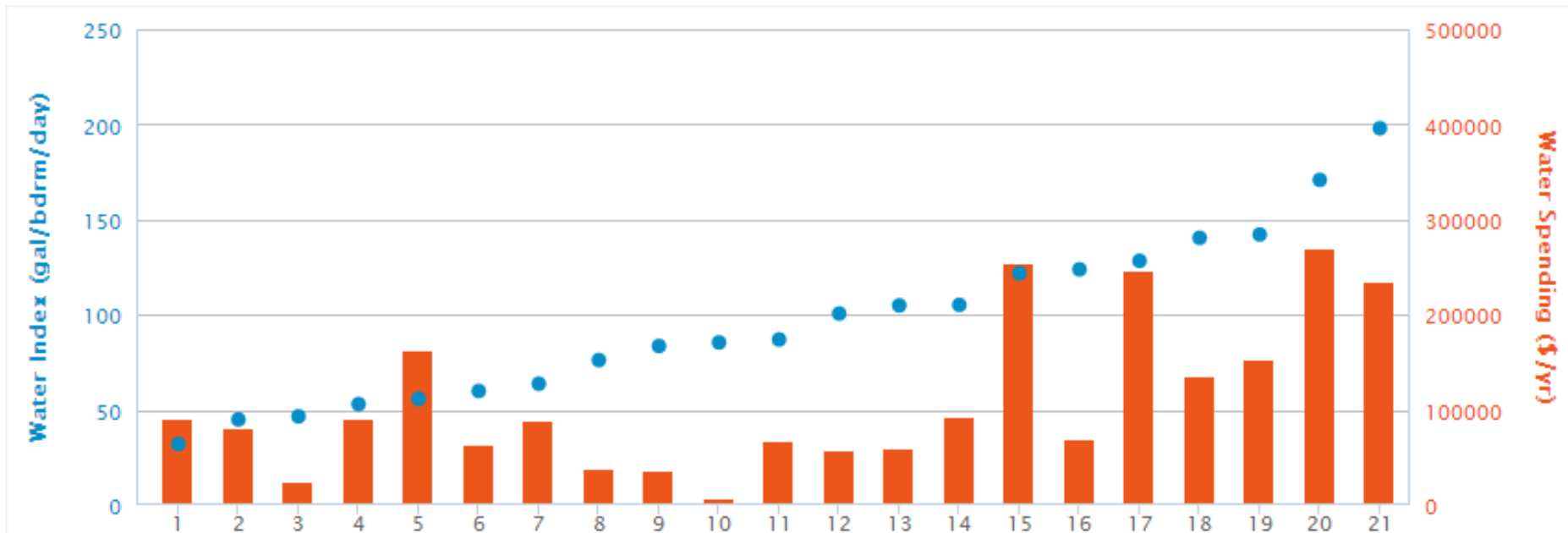
Owner Total Weather Normalized Actual

There are **5** out of **7** properties with both scorecards

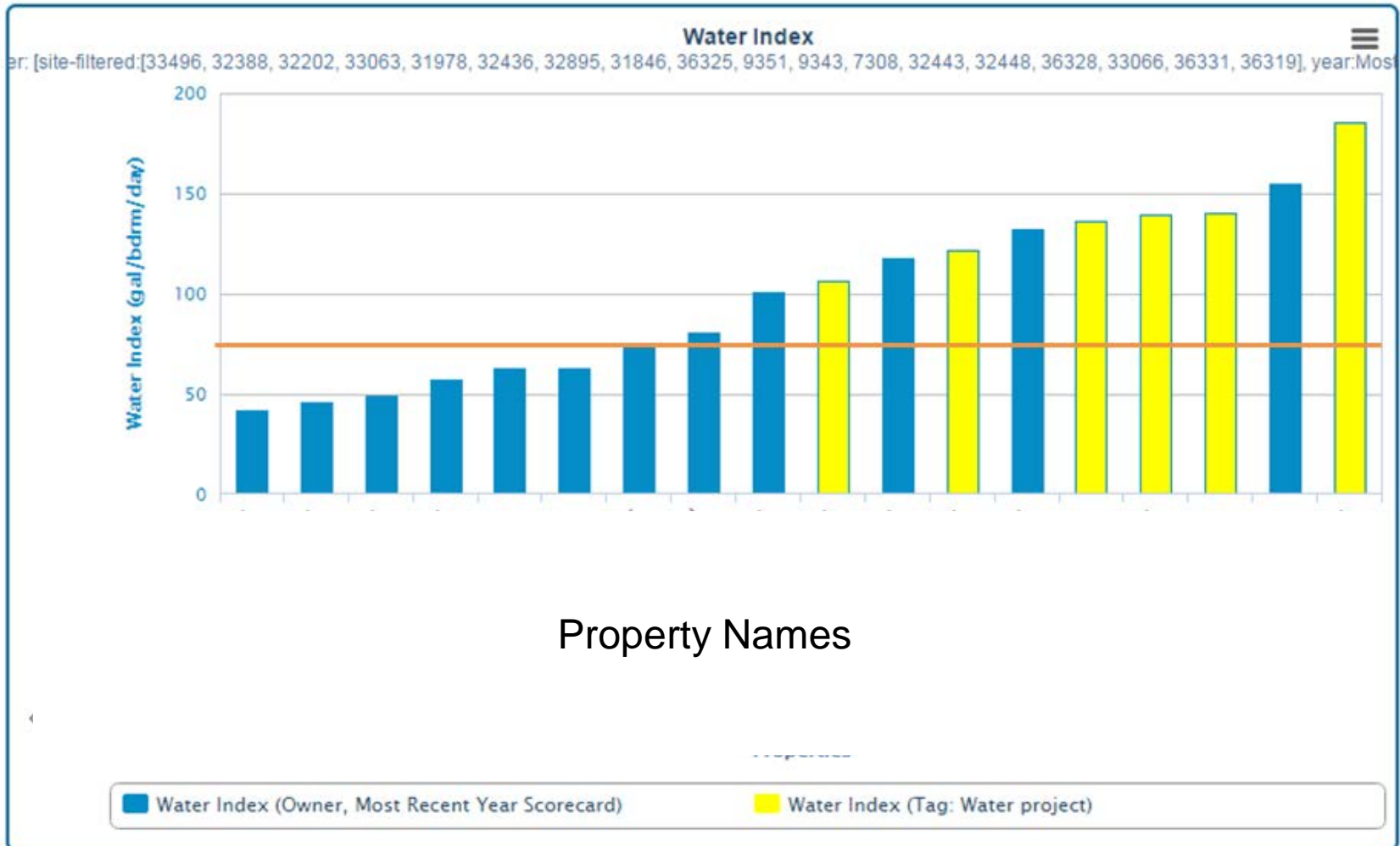
Energy Use	Full Year 2012	Full Year 2014	Difference	Unit
 Total Energy	45,687	42,489	 -3,198 -7%	mmBTU
 Cooling Energy	2,270	1,805	 -465 -20%	mmBTU
 Heating Energy	24,469	21,612	 -2,857 -12%	mmBTU
 Electric Baseload Energy	8,427	8,611	 184 2%	mmBTU
 Fossil Fuel Baseload Energy	10,521	10,462	 -59 -1%	mmBTU



## 2. Benchmarking is useless (by itself)



# Where will you take action?



# Take action.

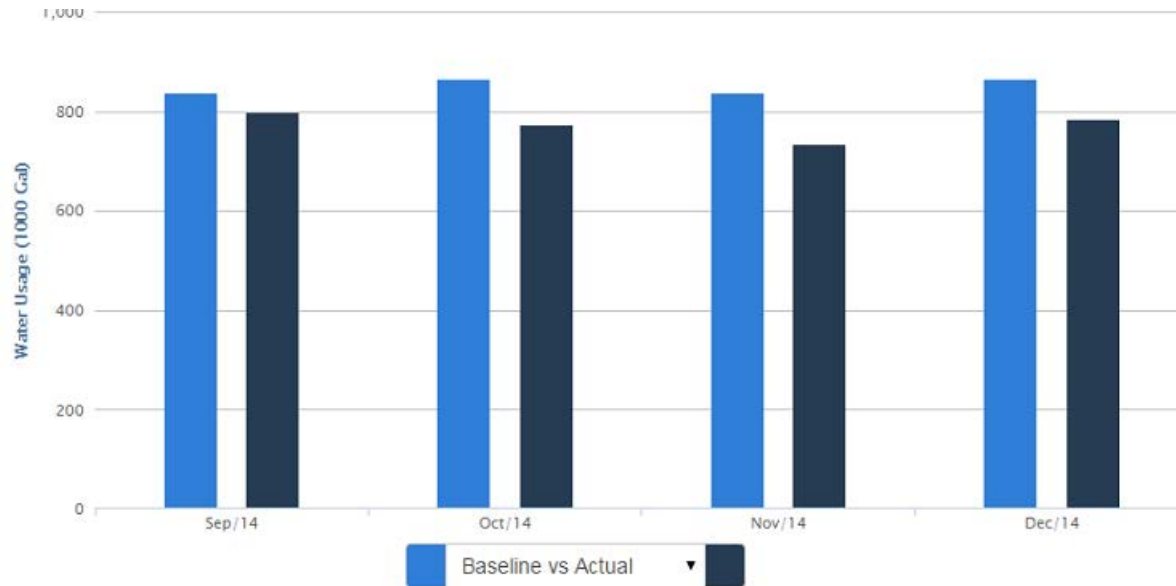
# BRIGHT POWER



- Toilet Replacements - Tank
- Toilet Replacements - Commercial
- Tank toilet fill valve installation
- Tank toilet flush valve & handle
- Toilet rebuilding - Commercial
- Urinal rebuilding
- Kitchen faucet aerator installation
- bathroom faucet aerator installation
- Faucet leak repair
- Showerhead installation - Deluxe
- Showerhead installation Standard
- In line shower flow control
- Tub spout diverter replacement
- Heating system repairs



# Watch results.



## COST SAVINGS



	Start Date	End Date	Days Billed	Baseline Charge/day	Usage (HCF)	Water Charge	Sewer Charge	Total Charge
Historical Baseline	-	-	115	\$772.65	-	-	-	\$88,854.34
Current Bill	9/11/2014	1/4/2015	115	-	3850	\$14,245.00	\$22,649.55	\$36,894.55
<b>Total Savings: \$51,959.79</b>								

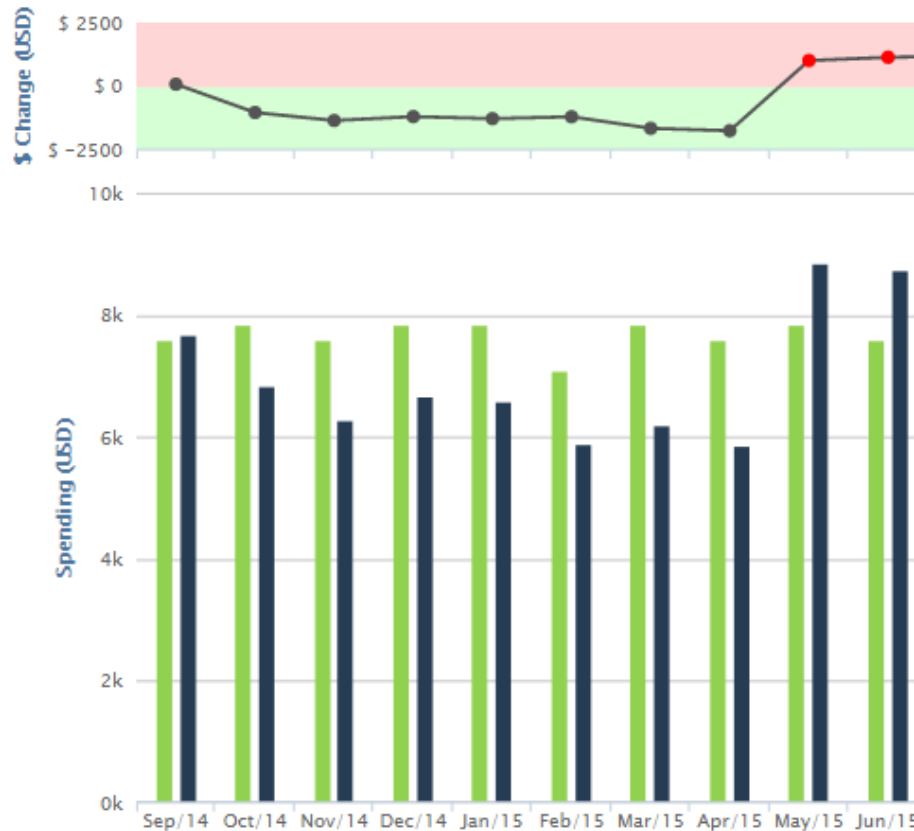




## Keep watching.

Package: **Water Fixture Upgrades**

Status: **Exceeding Projections!**

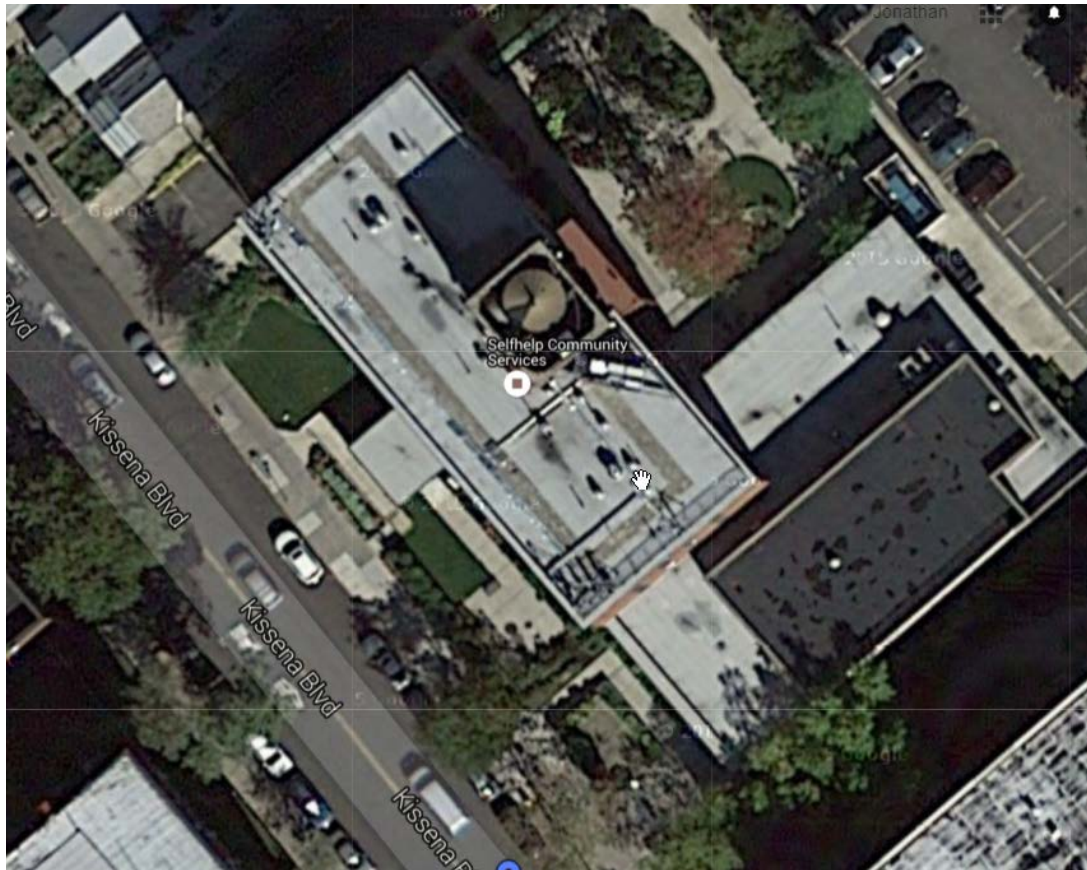


Uh oh.

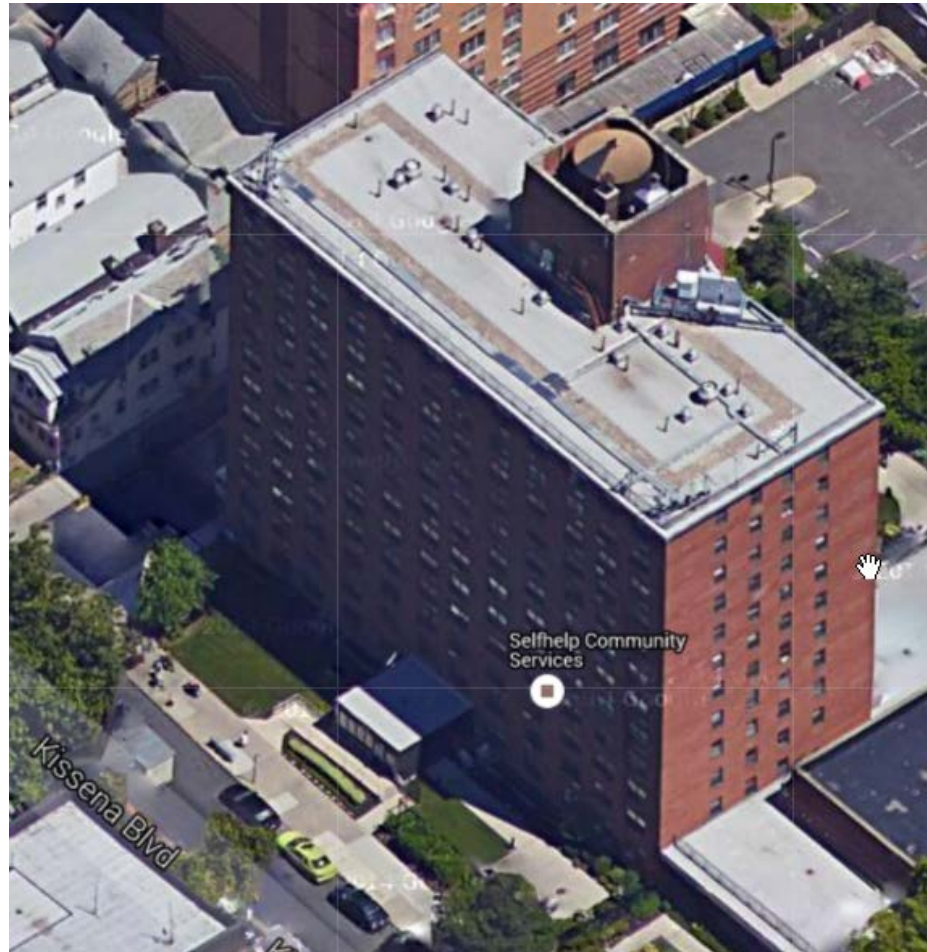
So what do I  
do next?



# Can you spot the problem?



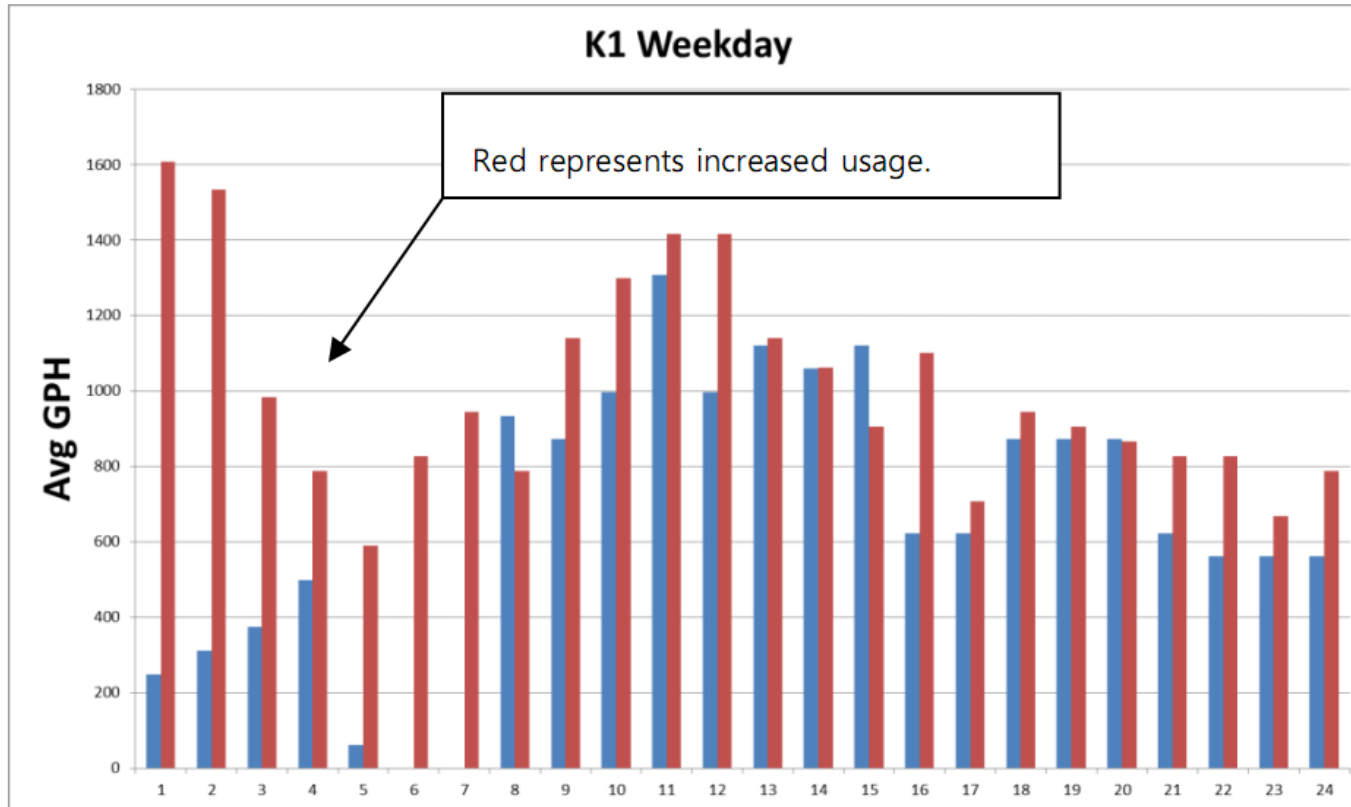
# Can you see it now?



**Can you figure it out over the phone?**



# More granular data helps.



# **But sometimes it takes a midnight detective trip....**



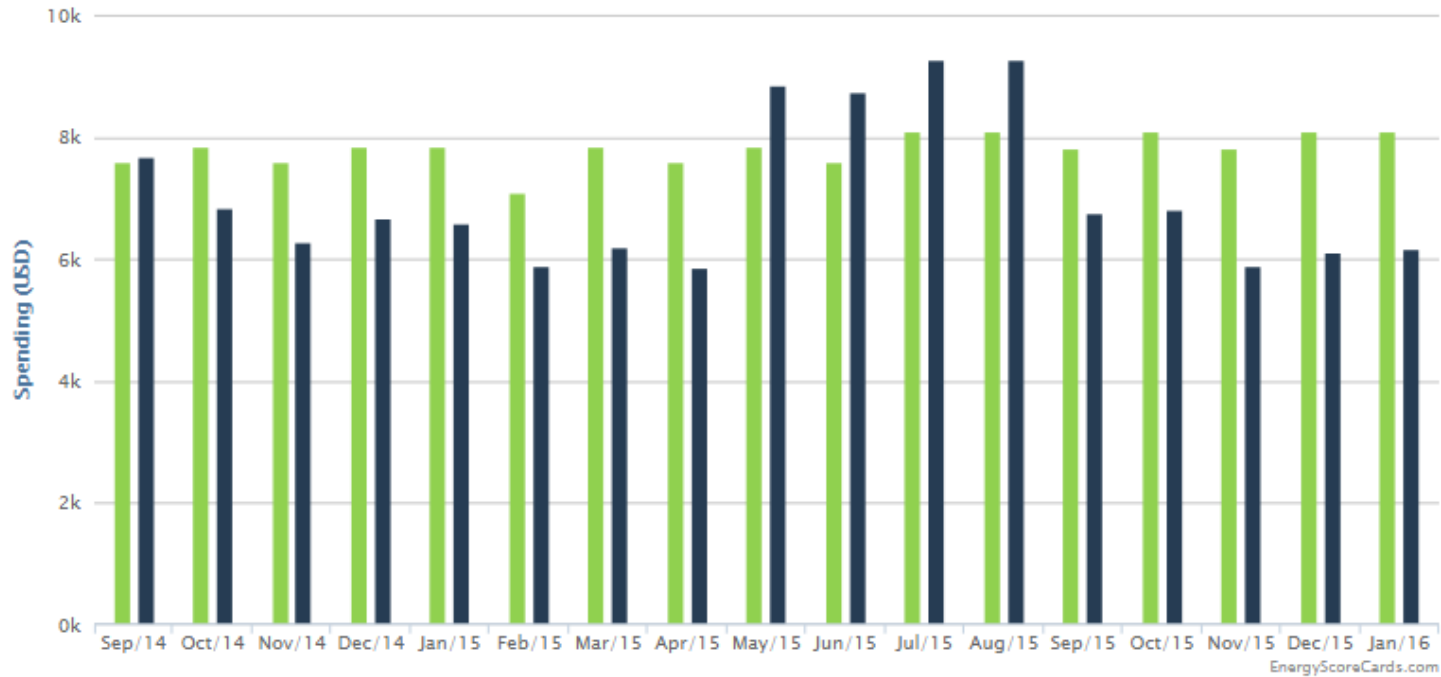
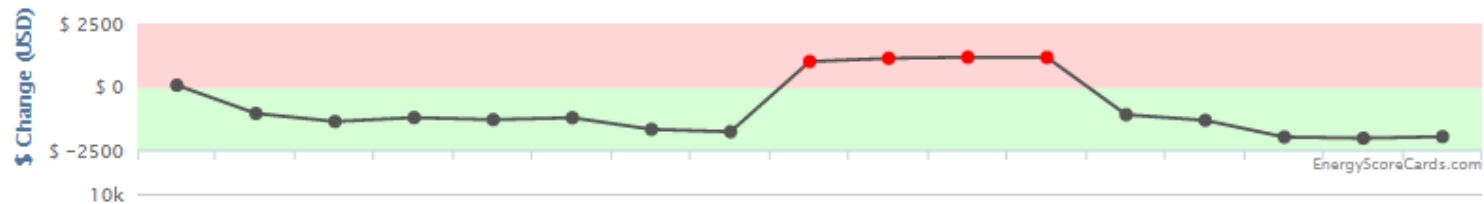
# Keep watching.

Package: **Water Fixture Upgrades**

Status: **Exceeding Projections!**

Savings to Date: **\$14,442**

Water Savings: **10.76%**



# Are there other ways to 'watch' your buildings?

## Hot Water Boiler DAILY INSPECTION

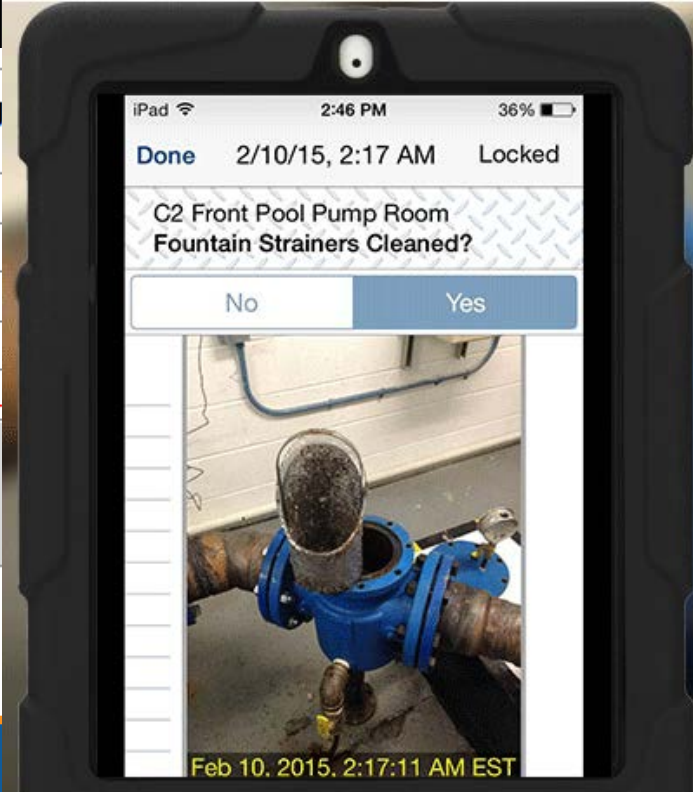
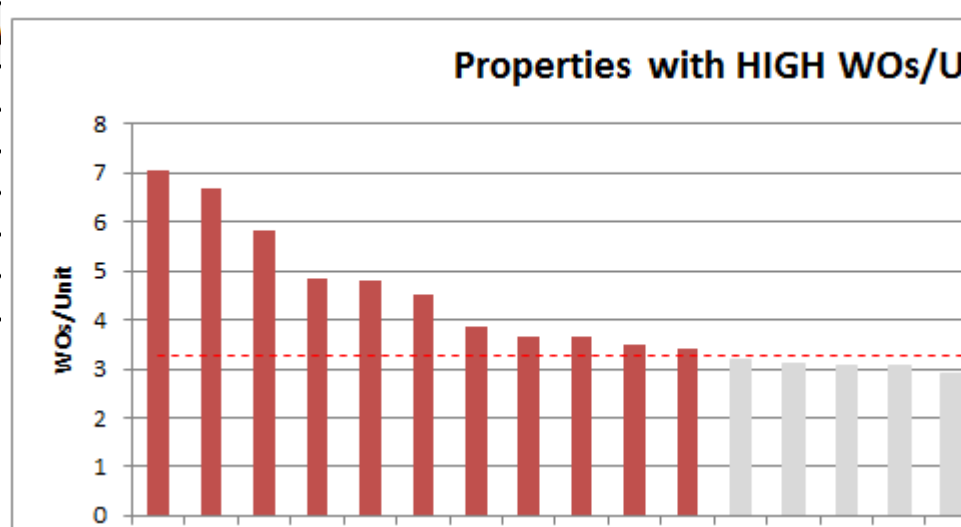
BUILDING \_\_\_\_\_

LOCATION \_\_\_\_\_

EQUIPMENT ID \_\_\_\_\_

DAY	TIME	Outside Air Temp (°F)	Burner Control Set on AUTO?	Burner Runtime (hours)	Highest Stack Temp (°F)	Operating & Aquastat Setting	Hot Water Supply Temp (°F)	Hot Water Return Temp (°F)	Check Pumps for
-----	------	-----------------------	-----------------------------	------------------------	-------------------------	------------------------------	----------------------------	----------------------------	-----------------

Call Me	
1	
2	
3	
4	
5	
6	
7	





## 3. But sometimes it's hard to get (good) data






- Data collection pain not (always) correlated with value
- Data collection pain varies a lot between properties/ portfolios
- Let's start using the easier-to-get data now!
- But keep working on the hard-to-get data



# Easy to get: large, master-metered

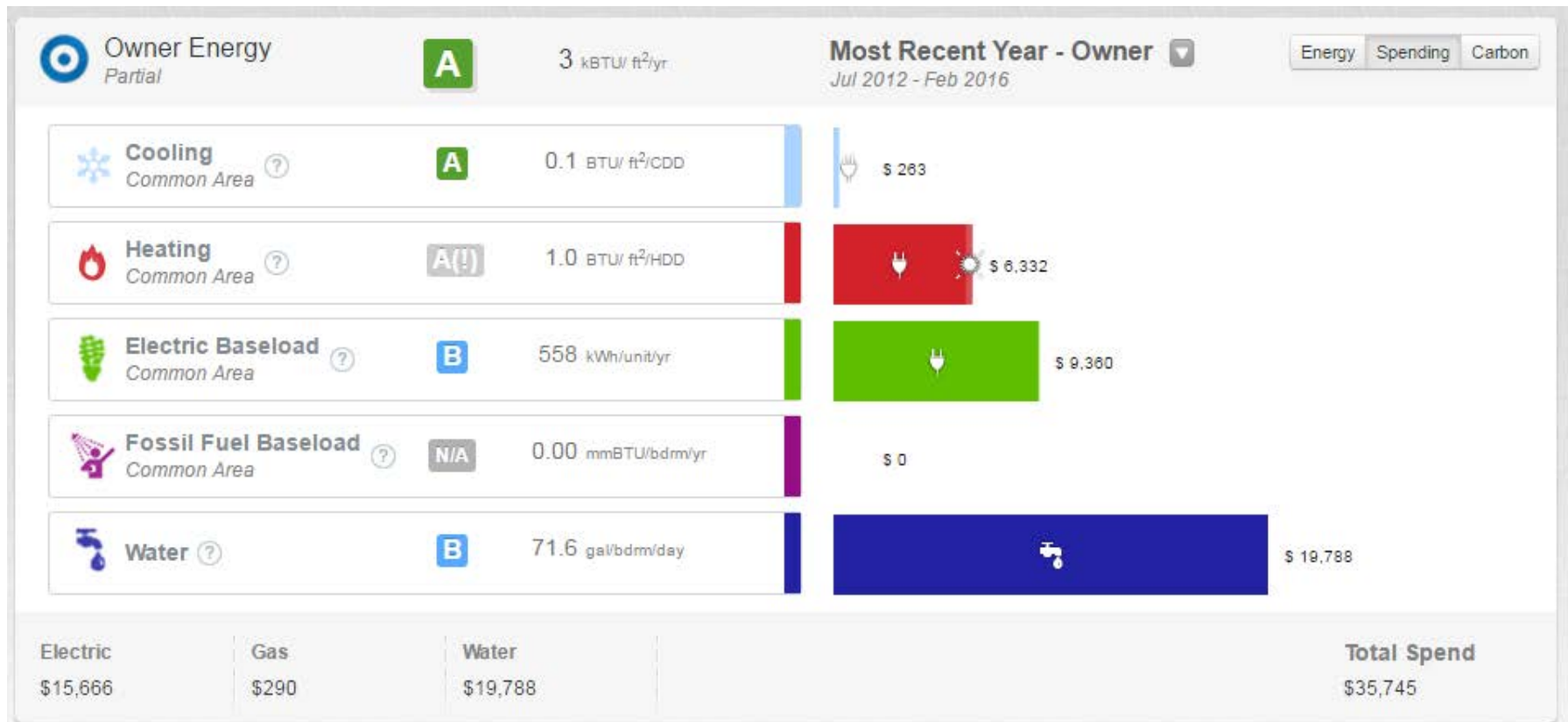


# All that consumption, 4 accounts!

	Account	Utility Provider	# Bills	Rate	Usage/Day, BTU	Last Bill		
<input type="checkbox"/>	 [Redacted] Elec	ConEd - Consolidated Edison - Electricity	68	\$0.04/kWh	141,021,014	01/26/2016	Model	Edit
<input type="checkbox"/>	 Combine [Redacted] Gas, Account for [Redacted] & II	ConEd - Consolidated Edison - Gas	35	\$5.81/mmBTU (Million BTU)	466,113,693	02/25/2013	Model	
<input type="checkbox"/>	 [Redacted] Gas	ConEd - Consolidated Edison - Gas	35	\$0.58/Therms	463,624,086	02/25/2013		Edit
<input type="checkbox"/>	 Account for [Redacted] I & II	Unknown Oil Utility	23	\$0.00/Oil #2 Gallons	3,800,328	09/30/2012		Edit
<input type="checkbox"/>	 [Redacted] I & II Cooking Gas	ConEd - Consolidated Edison - Gas	66	\$0.49/Therms	22,841,567	10/23/2015	Model	Edit



# Hard to get: lots of accounts, tenant paid



# 65 utility accounts





















## Owner Accounts

	▲	Account	# Bills	Rate	Usage/Day, BTU	Last Bill		
<input type="checkbox"/>	+		41	\$0.24/kWh	8,998	02/08/2016	Model	Edit
<input type="checkbox"/>	+		40	\$0.25/kWh	8,316	02/08/2016	Model	Edit
<input type="checkbox"/>	+		41	\$0.18/kWh	16,064	02/08/2016	Model	Edit
<input type="checkbox"/>	+		39	\$0.22/kWh	9,878	02/08/2016	Model	Edit
<input type="checkbox"/>	+		41	\$0.12/kWh	72,303	01/20/2016	Model	Edit
<input type="checkbox"/>	+		41	\$0.33/kWh	5,327	02/08/2016	Model	Edit
<input type="checkbox"/>	+		40	\$0.06/kWh	-60,157	01/24/2016	Model	Edit
<input type="checkbox"/>	+		41	\$0.24/kWh	8,711	02/08/2016	Model	Edit
<input type="checkbox"/>	+		39	\$0.36/kWh	4,743	02/08/2016	Model	Edit
<input type="checkbox"/>	+		41	\$0.17/kWh	18,159	02/08/2016	Model	Edit
<input type="checkbox"/>	+		39	\$0.37/kWh	4,657	02/08/2016	Model	Edit
<input type="checkbox"/>	+		42	\$0.25/kWh	8,142	02/08/2016	Model	Edit



<input type="checkbox"/>			42	\$0.27/kWh	7,263	02/08/2016	<a href="#">Model</a>	<a href="#">Edit</a>
<input type="checkbox"/>			40	\$0.09/kWh	964,976	02/10/2016	<a href="#">Model</a>	<a href="#">Edit</a>
<input type="checkbox"/>			39	\$0.29/kWh	6,392	02/08/2016	<a href="#">Model</a>	<a href="#">Edit</a>
<input type="checkbox"/>			40	\$0.22/kWh	10,001	02/08/2016	<a href="#">Model</a>	<a href="#">Edit</a>
<input type="checkbox"/>			40	\$0.31/kWh	5,728	02/08/2016	<a href="#">Model</a>	<a href="#">Edit</a>
<input type="checkbox"/>			42	\$0.15/kWh	25,554	02/08/2016	<a href="#">Model</a>	<a href="#">Edit</a>
<input type="checkbox"/>			42	\$0.44/kWh	3,729	02/08/2016	<a href="#">Model</a>	<a href="#">Edit</a>
<input type="checkbox"/>			42	\$0.12/kWh	66,541	02/08/2016	<a href="#">Model</a>	<a href="#">Edit</a>
<input type="checkbox"/>			41	\$0.22/kWh	9,816	02/08/2016	<a href="#">Model</a>	<a href="#">Edit</a>
<input type="checkbox"/>			30	\$0.42/kWh	-326	02/08/2016	<a href="#">Model</a>	<a href="#">Edit</a>
<input type="checkbox"/>			32	\$2.31/Therms	46,794	01/20/2016	<a href="#">Model</a>	<a href="#">Edit</a>
<input type="checkbox"/>			35	\$0.00/Gallons	0.00	12/31/2015	<a href="#">Model</a>	<a href="#">Edit</a>
<input type="checkbox"/>			37	\$0.00/Gallons	0.00	12/31/2015	<a href="#">Model</a>	<a href="#">Edit</a>
<input type="checkbox"/>			37	\$0.00/Gallons	0.00	12/31/2015	<a href="#">Model</a>	<a href="#">Edit</a>
<input type="checkbox"/>			37	\$0.00/Gallons	0.00	01/31/2016	<a href="#">Model</a>	<a href="#">Edit</a>
<input type="checkbox"/>			35	\$0.00/Gallons	0.00	01/31/2016	<a href="#">Model</a>	<a href="#">Edit</a>
<input type="checkbox"/>			36	\$0.00/Gallons	0.00	12/31/2015	<a href="#">Model</a>	<a href="#">Edit</a>
<input type="checkbox"/>			36	\$0.00/Gallons	0.00	12/31/2015	<a href="#">Model</a>	<a href="#">Edit</a>
<input type="checkbox"/>			38	\$0.00/Gallons	0.00	12/31/2015	<a href="#">Model</a>	<a href="#">Edit</a>



<input type="checkbox"/>			37	\$0.00/Gallons	0.00	12/31/2015		Model	Edit
<input type="checkbox"/>			36	\$0.00/Gallons	0.00	12/31/2015		Model	Edit
<input type="checkbox"/>			13	\$0.00/Gallons	273	11/17/2015		Model	Edit
<input type="checkbox"/>			13	\$0.01/Gallons	227	11/17/2015		Model	Edit
<input type="checkbox"/>			13	\$0.01/Gallons	219	11/20/2015		Model	Edit
<input type="checkbox"/>			13	\$0.01/Gallons	220	11/17/2015		Model	Edit
<input type="checkbox"/>			13	\$0.00/Gallons	258	11/17/2015		Model	Edit
<input type="checkbox"/>			13	\$0.00/Gallons	477	11/17/2015		Model	Edit
<input type="checkbox"/>			13	\$0.00/Gallons	255	11/24/2015		Model	Edit
<input type="checkbox"/>			13	\$0.00/Gallons	2,710	11/17/2015		Model	Edit
<input type="checkbox"/>			13	\$0.00/Gallons	3,433	11/17/2015		Model	Edit
<input type="checkbox"/>			13	\$0.01/Gallons	269	11/20/2015		Model	Edit
<input type="checkbox"/>			13	\$0.00/Gallons	761	11/17/2015		Model	Edit
<input type="checkbox"/>			13	\$0.01/Gallons	225	11/17/2015		Model	Edit
<input type="checkbox"/>			13	\$0.00/Gallons	369	11/17/2015		Model	Edit
<input type="checkbox"/>			13	\$0.01/Gallons	219	11/17/2015		Model	Edit
<input type="checkbox"/>			13	\$0.01/Gallons	114	11/17/2015		Model	Edit
<input type="checkbox"/>			13	\$0.00/Gallons	387	11/17/2015		Model	Edit
<input type="checkbox"/>			13	\$0.01/Gallons	243	11/17/2015		Model	Edit
<input type="checkbox"/>			13	\$0.00/Gallons	310	11/17/2015		Model	Edit
<input type="checkbox"/>			13	\$0.00/Gallons	339	11/17/2015		Model	Edit
<input type="checkbox"/>			13	\$0.00/Gallons	0.00	11/17/2015		Model	Edit



<input type="checkbox"/>	<input checked="" type="radio"/>		13	\$0.00/Gallons	1,335	12/23/2015	Model	Edit
<input type="checkbox"/>	<input checked="" type="radio"/>		13	\$0.01/Gallons	19.5	11/17/2015	Model	Edit
<input type="checkbox"/>	<input checked="" type="radio"/>		13	\$0.01/Gallons	220	11/17/2015	Model	Edit
<input type="checkbox"/>	<input checked="" type="radio"/>		37	\$0.00/Gallons	0.00	01/31/2016	Model	Edit
<input type="checkbox"/>	<input checked="" type="radio"/>		34	\$0.00/Gallons	0.00	01/31/2016	Model	Edit
<input type="checkbox"/>	<input checked="" type="radio"/>		34	\$0.00/Gallons	0.00	01/31/2016	Model	Edit
<input type="checkbox"/>	<input checked="" type="radio"/>		34	\$0.00/Gallons	0.00	01/31/2016	Model	Edit
<input type="checkbox"/>	<input checked="" type="radio"/>		34	\$0.00/Gallons	0.00	01/31/2016	Model	Edit
<input type="checkbox"/>	<input checked="" type="radio"/>		34	\$0.00/Gallons	0.00	01/31/2016	Model	Edit
<input type="checkbox"/>	<input checked="" type="radio"/>		34	\$0.00/Gallons	0.00	01/31/2016	Model	Edit

**And that was just the owner accounts**





## 4. Gradually, the situation is improving

---

New benchmarking laws spur utility improvements

---

New tools (EPA and HUD) to find utilities with whole building data

---

Options for services to help collect data

---

Options for services to help curate, analyze, interpret data

---

Multifamily Portfolio Manager Score, water score in the works

---

City resources and reports online



# What do you think?

- ▲ NEWHAB benchmarking survey! Last day to complete....





# Discussion