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Building Triage: What to Fix First

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RESNET Conference

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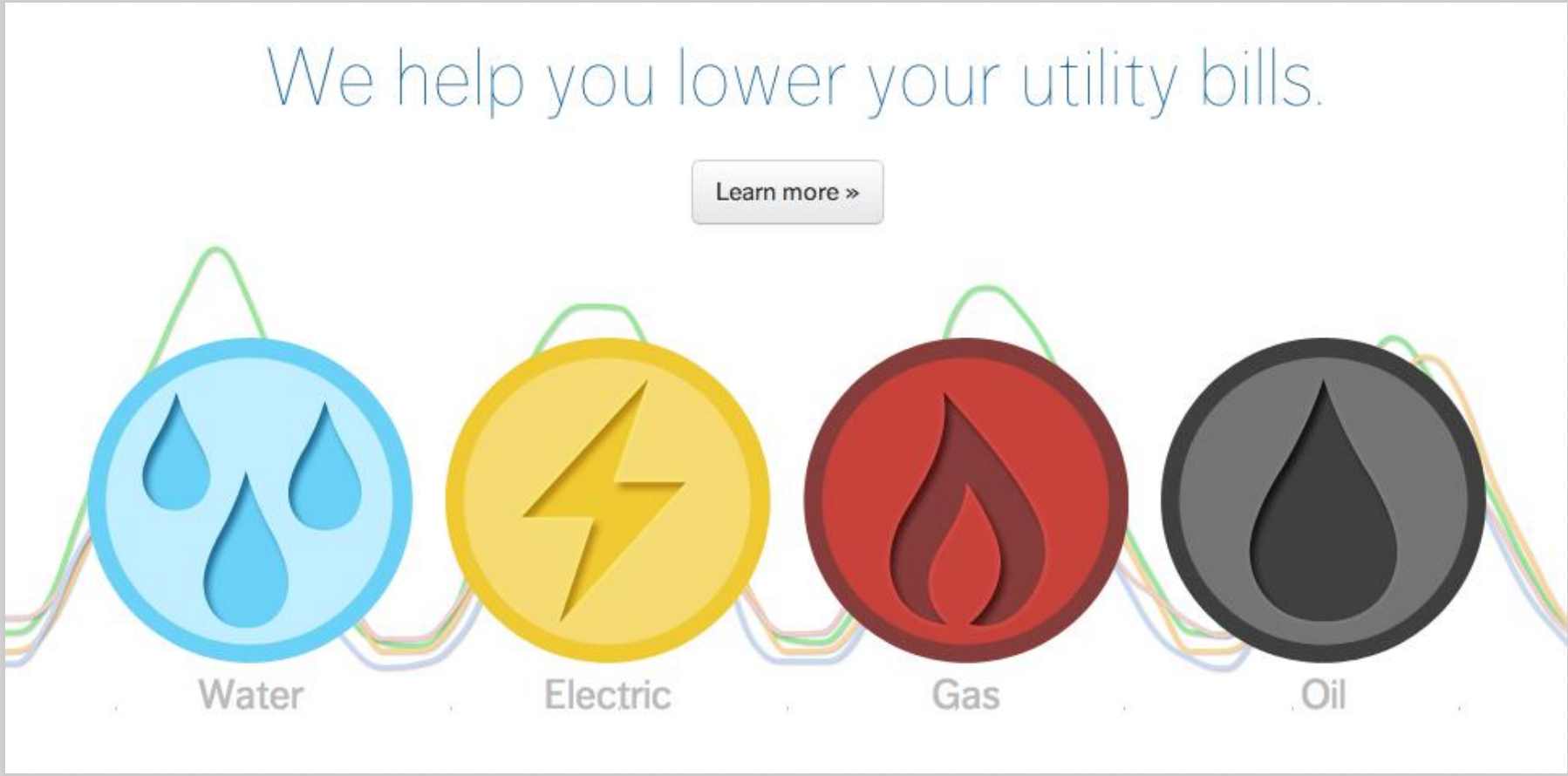


- Automated utilities tracking
- Web-based analytics accessible anywhere
- Expert reports for non-experts

Triage Your Buildings

Target Audience:

- Energy Efficiency Programs
- Retrofit/EE measure funders
- HERS Raters/energy auditors

Learning Objectives:

- Triage for programs
- Triage for owners of many buildings
- Triage before going into a single or multi-family building

What exactly do we mean by triage?

- Which buildings are hemorrhaging water or energy?
- What might be the cause?
- How do we staunch the flow?
- What's the potential for savings?

Essentially, which are the worst buildings and how do we get them fixed?

That sounds great, but how?

Do we look at **age** of building? **Size**? Kinds of **mechanical systems**? **Insulation** levels? Old **windows**? **Infiltration**? **Duct leakage**? **Occupant type**?

There are a lot of variables. It turns out that really only one thing matters…

How much energy does it use?

A Deutsche Bank study released January 2012 looked into trends in pre- and post-retrofit building performance and the reliability of savings projections using a sample of 231 multi-family buildings.

Four central findings:

1. Building retrofits save money.
2. Fuel measures save more than electric measures.
3. **Actual savings are strongly correlated with pre-retrofit fuel usage.**
4. Strategic capping of savings projections means reality matches up better with models.

Study involved Steven Winter Associates, Michael Blasnick & Associates
Buildings were a variety of vintage, heating systems, utility data spanned a 9 year range (lots of weather varieties and data was weather normalized).

https://www.db.com/usa/img/DBLC_Recognizing_the_Benefits_of_Energy_Efficiency_01_12.pdf

So pre-retrofit usage is important…what about other things?

Only pre-retrofit fuel usage intensity was a statistically significant predictor of post-retrofit results.

What was not?

- Building age
- Building size
- Number of units
- High-rise vs low-rise
- Total square footage
- Heating system type
- Fuel type

https://www.db.com/usa/img/DBLC_Recognizing_the_Benefits_of_Energy_Efficiency_01_12.pdf

Metrics

Energy measurement relied on two metrics:

- **Fuel use intensity:** kBTU per square foot (weather-normalized fuel use for a typical year)

- **Owner-paid electric use intensity:** kWh per square foot (weather-normalized electric use for a typical year)

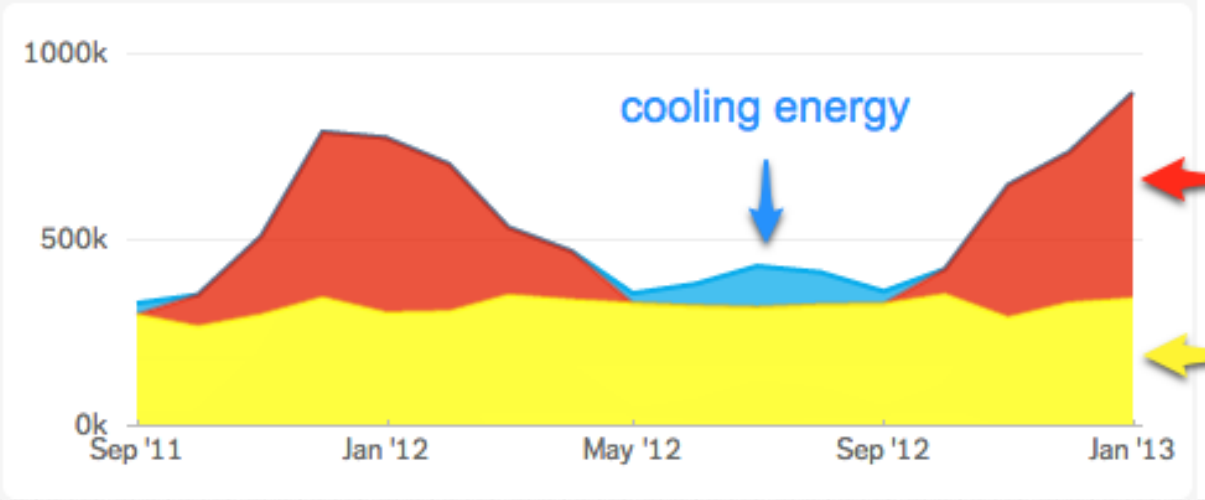
Why these two metrics?

- It's important to normalize to make an apples to apples comparison between buildings.
- You want to look at both a building's heating/cooling related energy usage as well as baseload usage.

https://www.db.com/usa/img/DBLC_Recognizing_the_Benefits_of_Energy_Efficiency_01_12.pdf

How do I determine pre-retrofit fuel usage intensity?

Total Energy:
gas + electric



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How do I determine pre-retrofit fuel usage intensity?

1. Get 1 year of utility bills for whatever fuel provides your heat.

2. Determine the 3 lowest months of usage and average them together. This is your average monthly baseload.

Month starting:	HDD	therms
2/1/12	801	134
3/1/12	608	103
4/1/12	398	65
5/1/12	204	36
6/1/12	94	19
7/1/12	2	24
8/1/12	2	22
9/1/12	91	23
10/1/12	281	42
11/1/12	699	106
12/1/12	822	145
1/1/13	1024	240

Annual Therms	959
Baseline	21.6666667
Therms for heating	699
Btu for heating	69946805.5
Annual HDD	5026
btu/hdd	13916.9927
btu/hdd/cond sq ft	10.8051186

Baseload

3. Add up your annual usage.

4. Multiply your monthly baseload by 12 and subtract from your annual usage.

5. Download the corresponding Heating Degree Days (HDD)—I like degreeday.net

6. Total the annual HDD.

7. Divide your annual heating related usage by HDD. Then divide by cond. sq. ft.

8. Now you have your weather-normalized fuel usage intensity!

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Triage for Energy Efficiency Programs

The Problems:

-Who should get funding?

-How do we know that funding is working?

Funding Distribution

According to DSIRE, there are currently 1,134 rebates for energy efficiency in the US...at least one in every state and the District of Columbia.

Financial Incentives for Energy Efficiency

Federal = State = Utility = Local =

State	Personal Tax	Corporate Tax	Sales Tax	Propert Tax	Rebates
Federal	2	3	0	0	0
Alabama					8 1
Alaska					1 2
Arizona				1	18 2
Arkansas					12
California					2 75 2
Colorado					44 3
Connecticut			1		1 10
Delaware					1
Florida		1			32 1
Georgia		1	1		21
Hawaii					4 1
Idaho	1				20
Illinois					2 30
Indiana					1 45
Iowa					35
Kansas					1
Kentucky	1	1	1		1 29 1
Louisiana					1 3
Maine					4 3
Maryland			1	2 6	2 18 1
Massachusetts					2 31 2
Michigan					1 23
Minnesota					92 1
Mississippi					12
Missouri	1		1		38 1

Funding Distribution

How is funding usually distributed for these programs?

First come first serve, usually with requirements for how bad certain components are.

Audit based suggestions.

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Funding Distribution

We can do better.

Set thresholds and screen.

BTU/HDD/cond. Sq. ft

Screening in Action

Low Income Energy Affordability Network (LEAN) funding program in Massachusetts

-9 utility companies contribute
-Specifically for existing affordable multi-family properties
-Originally only for properties with non-profits in the ownership structure, but now for for-profit owned also
-www.leanmultifamily.org

Funding recipients apply, receive a free energy audit, then receive funding for upgrades to heating systems, water heating systems, building envelope, lighting, controls, ventilation, and appliances.

Screening in Action

Application and Review Process

Step 1: Owner completes online application form to provide information on ownership structure and development specific data.

Step 2: Applicant creates account in WegoWise, a web tool to benchmark energy use. Applicant enters basic building and utility meter data. (Some information required for WegoWise can be challenging to gather, e.g. building square footage and heating/ cooling/ hot water system details. Review the WegoWise data needs before completing your application.) WegoWise staff obtain energy usage data and calculate benchmark.

Step 3: Program reviews application and energy benchmark and informs owner if additional information is required.

Step 4: Program informs owner if project is selected for funding.

Screening in Action

- All applicants must have their building's energy use assessed.
- The metric for assessment is heating energy intensity (BTU/HDD/cond. Sq. ft)
- Projects over 10 BTU/HDD/cond sq ft automatically qualify.
- Those between 7-9 are discussed to determine whether they can proceed or not
- Those ≤6 do not qualify.
- *All electrically heated buildings qualify (these are electric baseboard, not heat pumps).

Screening in Action

To replicate:

-Need a metric and thresholds.
-Need building information.
-Need utility data.

Screening in Action

Metrics

- First, assess goals.
  - What is your target building stock?
  - What is your target retrofit?
    - Lighting? Electric baseload (kWh/sq ft)
    - Shell improvements? Heating or cooling energy
    - Equipment replacement? Heating or cooling energy
    - Gas equipment only? Therms/sq ft

Screening in Action

Thresholds

-Need to know what's out there first for the housing stock that's being targeted.

- Knowledge based off experience with that housing stock
- Publicly available benchmarks (Portfolio Manager)
- Results from studies
- Benchmarks from large databases of similar buildings
- Benchmarks based off applicant's data (determine cutoffs after people apply)

-Questions to ask if using other people's numbers

- How similar are the buildings in their sample set to my target?
- Are those buildings in my area or is the data weather normalized?
- Is it a large enough sample set to make you comfortable?

Screening in Action

For the LEAN program:

-Shell and equipment retrofits being funded

-Heating dominate climate

-For affordable multi-family housing

Settled on heating energy intensity for the metric

Thresholds set based off years of experience with affordable multifamily housing

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Building Characteristics

Age & Type of Building
Built in 1920
Multi-family home

Housing Category
Low-income housing
Resident type: Other

Structure
Masonry (load-bearing) construction
No basement

Size
4,947 square feet in total
4,000 sq. ft. in apartments
3 stories tall
4 apartments
11 bedrooms

Energy Efficiency
Not certified as a green building

Heating
Gas heat
Boiler (Hot water)

Cooling
None

Hot Water
Gas hot water heater
Stand-alone storage water heater

Facilities
No laundry
0 elevators
No ventilated garage
No pool

Electric Accounts
Apartments have electric meters
1 electric account

Gas Accounts
Gas meters are all building-wide
1 gas account

Water Accounts
Water meters are all building-wide
1 water account

Notes

Utility Data

End Date MM/DD/YYYY	Start Date MM/DD/YYYY	Usage Btu	Usage Therms	Total Charge
07/16/2011	06/17/2011	40,500,000 Btu	405 thm	$761.53
06/16/2011	05/17/2011	107,950,000 Btu	1,080 thm	$1,793.53
05/16/2011	04/17/2011	168,600,000 Btu	1,686 thm	$2,735.46
04/16/2011	03/21/2011	216,800,000 Btu	2,168 thm	$3,503.99
03/20/2011	02/17/2011	281,300,000 Btu	2,813 thm	$4,543.54
02/16/2011	01/20/2011	289,600,000 Btu	2,896 thm	$4,655.04
01/19/2011	12/20/2010	257,200,000 Btu	2,572 thm	$4,162.26
12/19/2010	11/17/2010	230,300,000 Btu	2,303 thm	$3,764.59
11/16/2010	10/17/2010	168,466,667 Btu	1,685 thm	$2,722.26
10/16/2010	09/17/2010	89,500,000 Btu	895 thm	$1,492.22
09/16/2010	08/17/2010	41,166,667 Btu	412 thm	$764.11
08/16/2010	07/17/2010	38,533,333 Btu	385 thm	$720.86
07/16/2010	06/17/2010	40,500,000 Btu	405 thm	$761.53
06/16/2010	05/17/2010	107,950,000 Btu	1,080 thm	$1,793.53
05/16/2010	04/17/2010	168,600,000 Btu	1,686 thm	$2,735.46
04/16/2010	03/17/2010	216,800,000 Btu	2,168 thm	$3,503.99

Screening in Action

Not satisfied with just screen applicants….simultaneously a goal was set to **benchmark 75% of the affordable multi-family housing stock** in Massachusetts.

-3 year initiative, currently in the last 6 months of the program

-Over 8,000 buildings (not units, buildings) have been benchmarked to date

-Program organizers get monthly lists of new buildings and benchmarks (a giant punch list of the worst buildings in the state, essentially)

-Annual report generated with metrics

-At end of program, comprehensive metric will be generated

Screening in Action

And that's not all:

- When retrofits are performed, results are tracked
  - Determine measures with biggest impact
  - Quality assurance

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Screening in Action

Effect of Hvac/Lighting Upgrades (August 1, 2012)

Back to list of all upgrades

Natural gas use in Btu per square foot

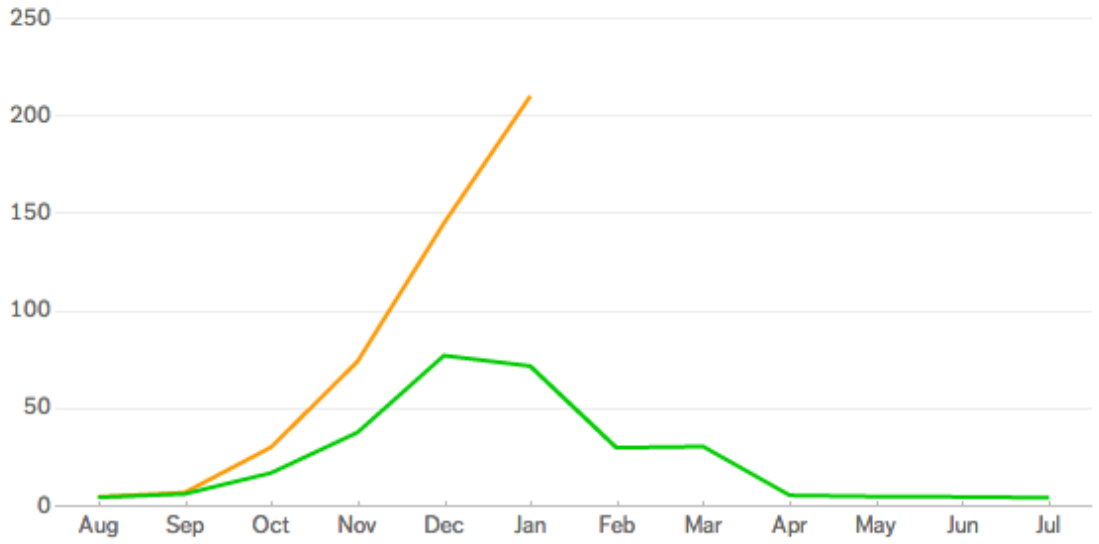
Raw Data | Bookmark | Download

Date Range	Full-Year Sum
Aug 12 - Jul 13	Less than 1 year of data
Aug 11 - Jul 12	8.81K

Detailed Data per Month (Deselect All)

Click a square to show or hide an item on the graph

Click & drag to zoom in



Before: Old Hvac Equipment, Old Lights.

After: Upgraded Hvac Equipment and Lighting.

Cost: $0.00

Actual Savings: unknown

Categories

HVAC — Heating — Mechanical Equipment
HVAC — Cooling — Mechanical Equipment
Water — Domestic Hot Water — Distribution
Lights and Appliances — Lighting

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Screening in Action

Effect of Hvac/Lighting Upgrades (August 1, 2012)

Back to list of all upgrades

Heating energy in Btu per square foot (conditioned)

Raw Data | Bookmark | Download

Date Range	Full-Year Sum
Aug 12 - Jul 13	Less than 1 year of data
Aug 11 - Jul 12	5.33

Detailed Data per Month (Deselect All)

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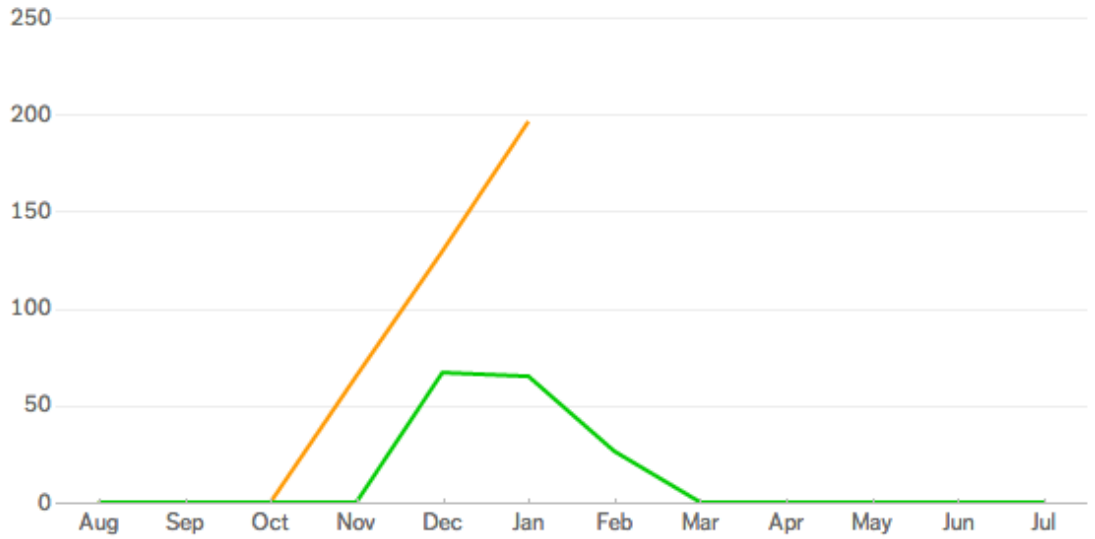
Click & drag to zoom in



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Cost: $0.00

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Categories

HVAC — Heating — Mechanical Equipment
HVAC — Cooling — Mechanical Equipment
Water — Domestic Hot Water — Distribution
Lights and Appliances — Lighting

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Screening in Action

Effect of Windows (April 7, 2010) Back to list of all upgrades

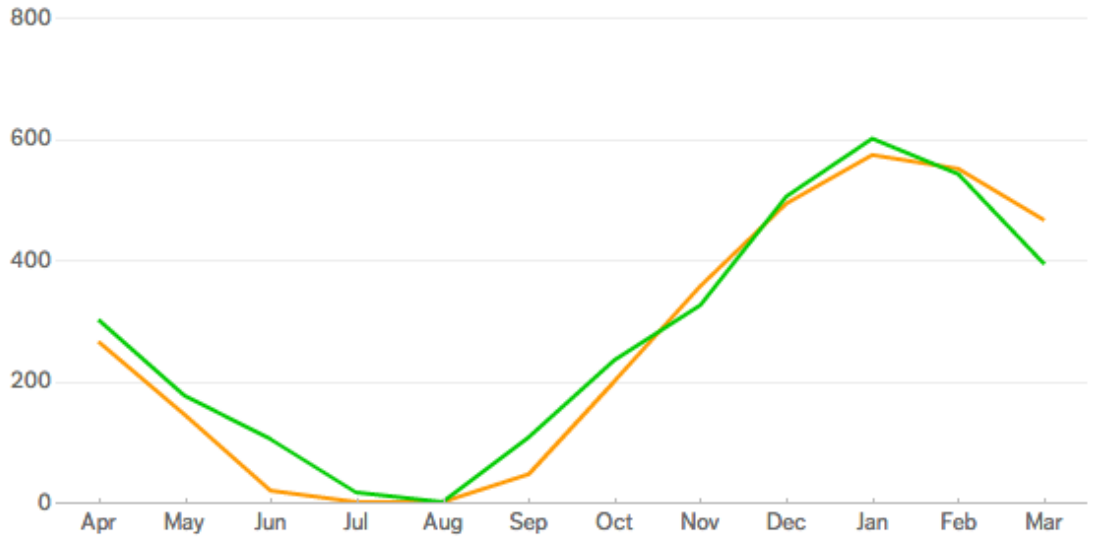
Heating energy in Btu per square foot (conditioned) | Raw Data | Bookmark | Download

Date Range	Full-Year Sum
Apr 10 - Mar 11	13.4
Apr 09 - Mar 10	13.6

Detailed Data per Month (Deselect All)

Click a square to show or hide an item on the graph

Click & drag to zoom in



Before: Bad Windows

After: New Windows

Cost: $0.00

Expected Savings: 30%

Actual Savings: 2% (0 Btu / conditioned sqft / HDD)

Categories

Building Envelope — Windows

LEAN Multifamily Benchmarking Inventory

- LEAN: Low-Income Energy Affordability Network
- Two components:
  - Benchmarking Inventory
  - Funding Program
- Project scope: 13,532 buildings benchmarked over three years (approx. 376 bldgs/mo) with individual quotas for utility companies

Benchmarks Generated by the Inventory

Gas Usage (therms/conditioned ft²)	Energy Efficiency Classification
< .65	Energy Efficient
.65 - .86	Better Than Average
.87 - 1.09	Worse Than Average
> 1.09	Poor

Whole Building Electricity Usage (kWh/bldg ft²)	Energy Efficiency Classification
< 4.91	Energy Efficient
4.91 - 6.42	Better Than Average
6.43 - 7.85	Worse Than Average
> 7.85	Poor
Common Area Electricity Usage (kWh/Common Area ft²)	**Energy Efficiency Classification**
< 1.35	Energy Efficient
1.35 – 2.94	Better Than Average
2.95 – 5.03	Worse Than Average
> 5.03	Poor
Electrically Heated (kWh/bldg ft²)	**Energy Efficiency Classification**
< 12.46	Energy Efficient
12.46 – 15.11	Better Than Average
15.12 - 17.66	Worse Than Average
>17.66	Poor

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Key Findings

The energy savings that would be achieved if each building that fell into the 'poor' were improved to function at the level of the 'median' buildings are substantial.
Massachusetts could expect to save:

- 53,076,549 kWh annually
- 2,058,616 therms annually
- And $10,000,000 dollars

By improving just 1,464 buildings.

Energy savings from electrically heated buildings:

Utility Company	Energy Savings in kWh	# of Buildings
National Grid	16,956,159	185
Nstar	4,104,796	45
Unitil	91,484	1
WMECO	214,926	16

Energy savings from buildings with whole building electric usage:

Utility Company	Energy Savings in kWh	# of Buildings
National Grid	24,898,499	208
Nstar	5,881,222	157
Unitil	485,454	21
WMECO	444,009	8

Energy savings from buildings that utilize gas for heat and domestic hot water production:

Utility Company	Energy Savings in Therms	# of Buildings
Berkshire Gas	14378	12
Columbia	198,555	111
NE Gas	47,661	36
National Grid	1,099,587	395
NStar	650,670	246
Unitil	47,765	23

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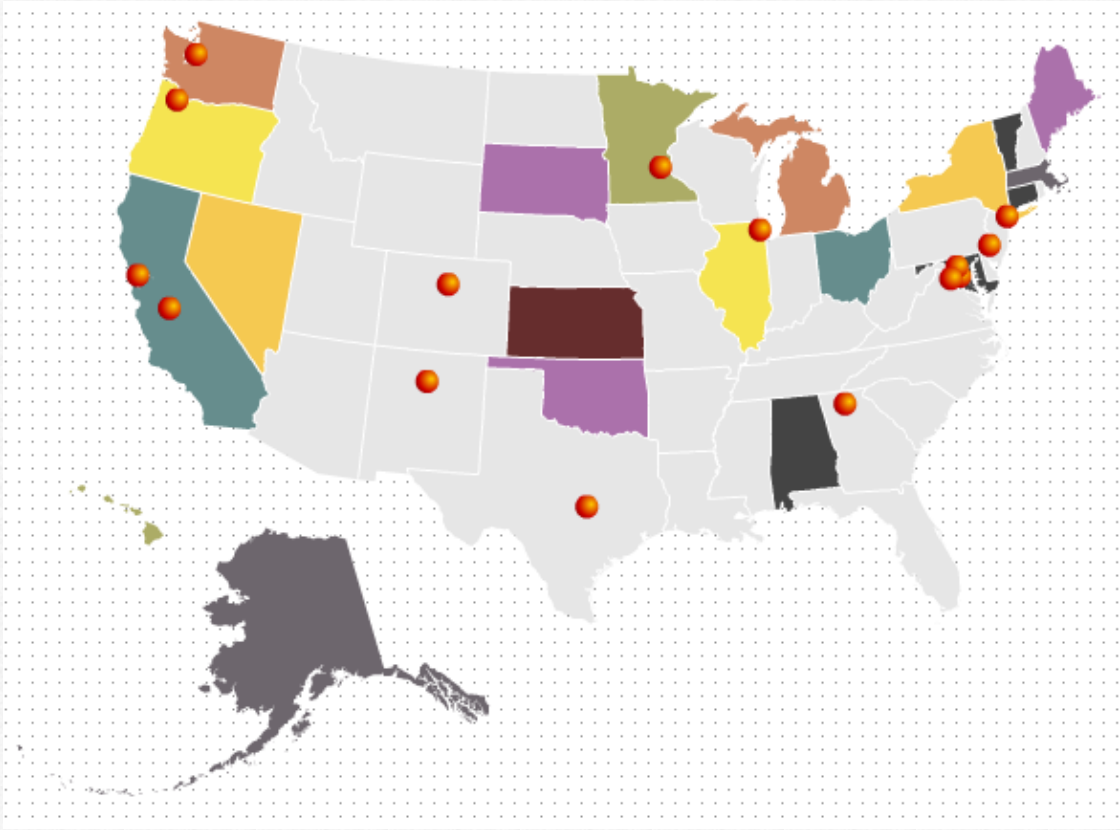
Even Local Government is Catching On

- Commercial and sometimes multi-family buildings over a certain size
- Utility data for a year submitted annually
- Sometimes results are made public

Last week, Boston became the latest to join in and Minneapolis did a few weeks before that. DC's first round of reporting is due April 1.



Buildingrating.org

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For Auditors and HERS Raters

-Working with owners of many buildings
-Motivating single family homeowners
-Knowing what you're getting into before going on site
-Tracking your results
-Marketing to potential customers

Portfolio Owners

May want to do something…but where to start?

-Not likely to spend money on audits for all buildings.
-May pay for 1 or 2.
-Want to see real savings before doing more.

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Create a Punch List

Showing kWh/sq ft or BTU/sq ft prbably won't get your point across, but people understand visuals.

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Market Analysis

Natural gas use in Btu per square foot

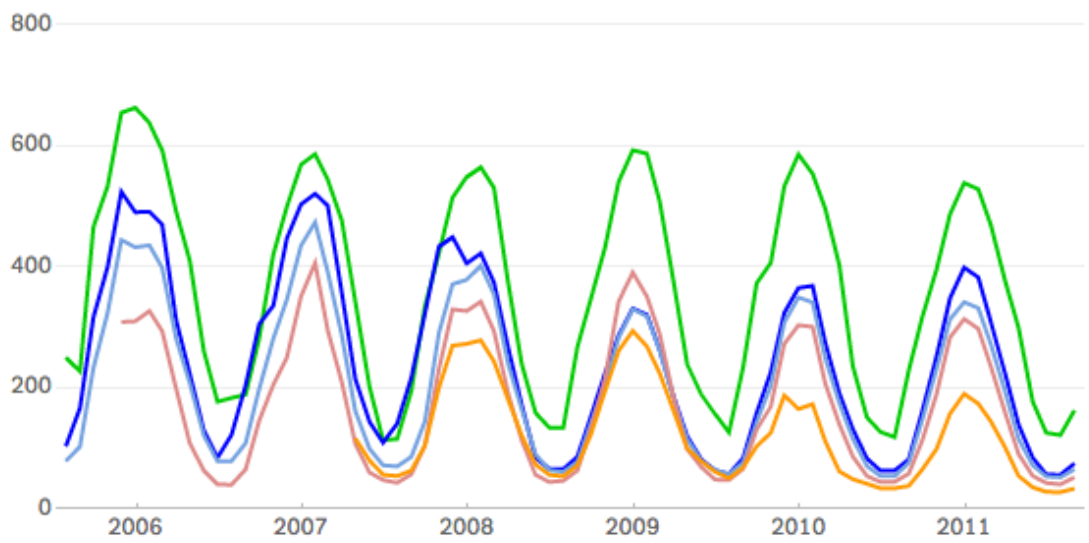
Add Benchmark | Raw Data | Bookmarked | Download

Name (Click for detailed data)	Full-Year Sum
16 Ritchie Ranch	120K
Public Housing	74.2K
Aff. Housing	65.3K
Market Rate Housing	55.6K
Efficient Housing	32.5K

Detailed Data per Month (Deselect All)

Click a square to show or hide an item on the graph

Click & drag to zoom in



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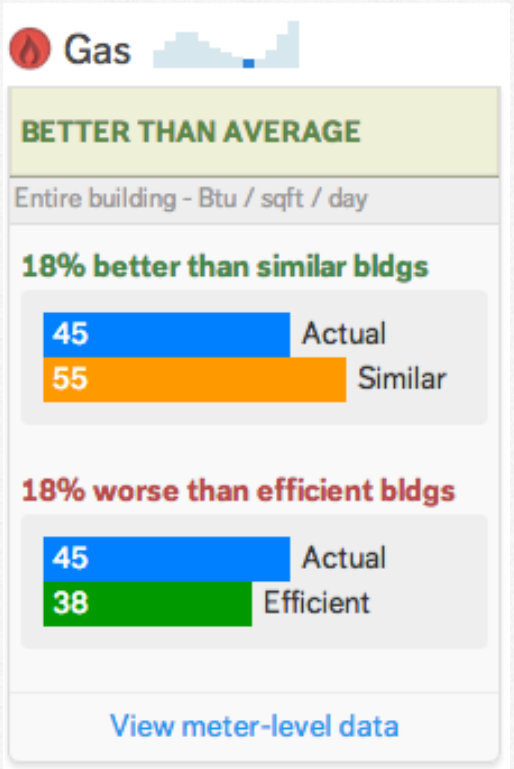
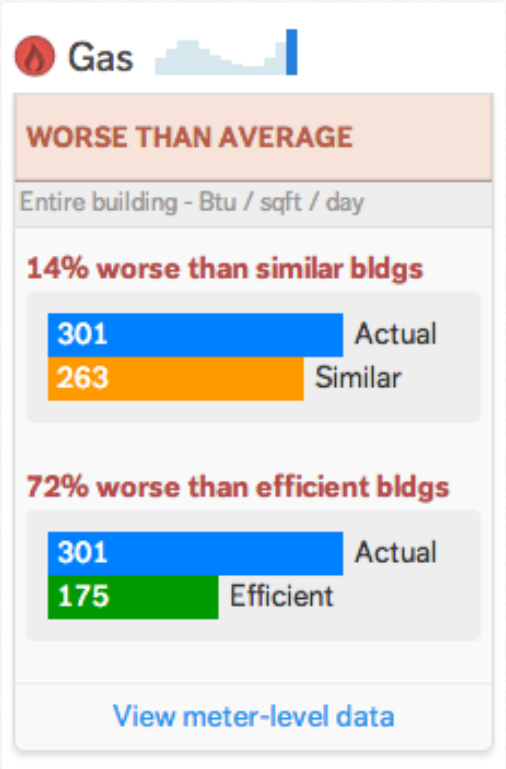
For Single and Multi-Family Properties

Know what you're getting into before you go on site.





Where would you look in this building?

-Gas heat, gas hot water

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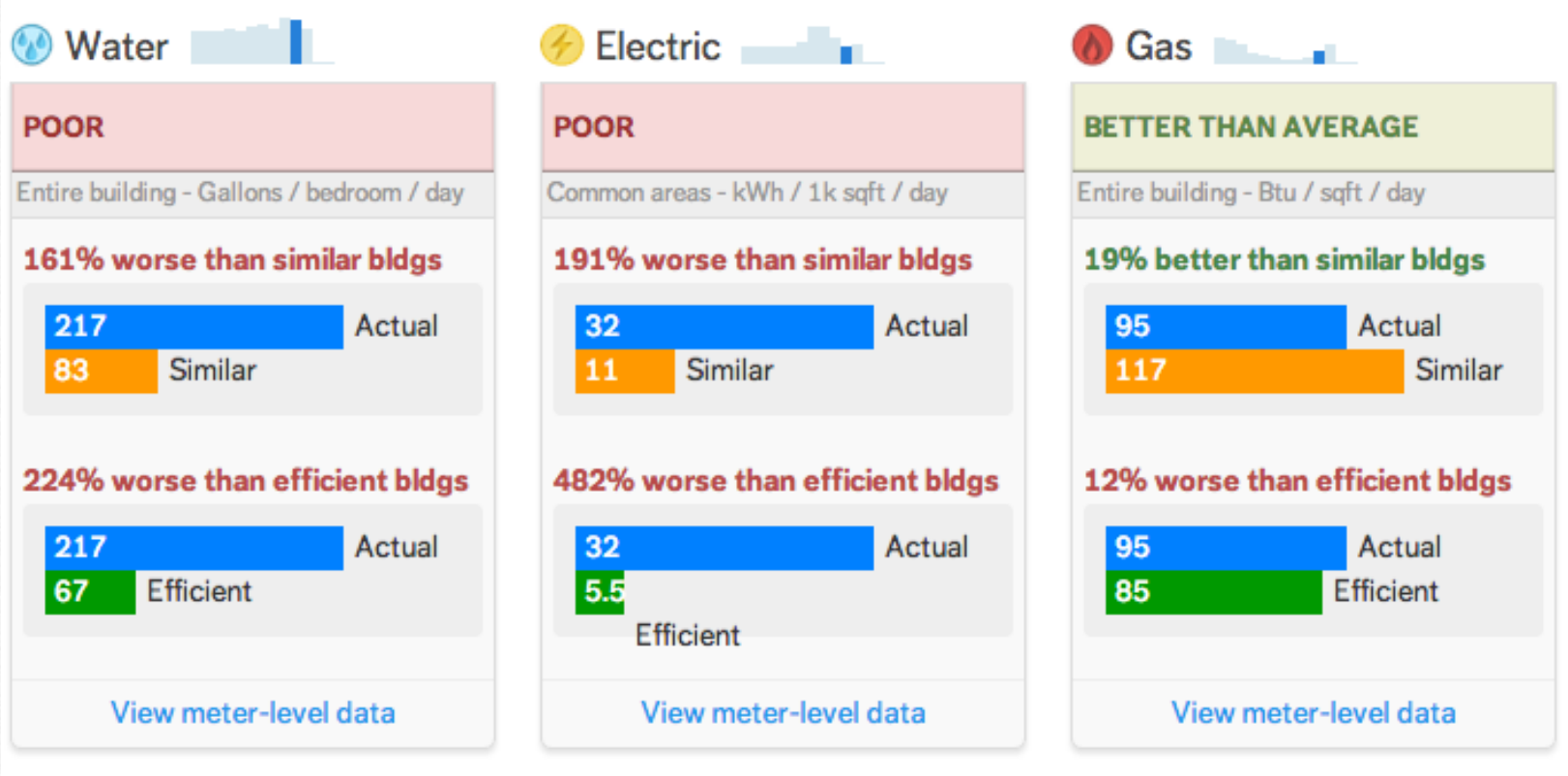
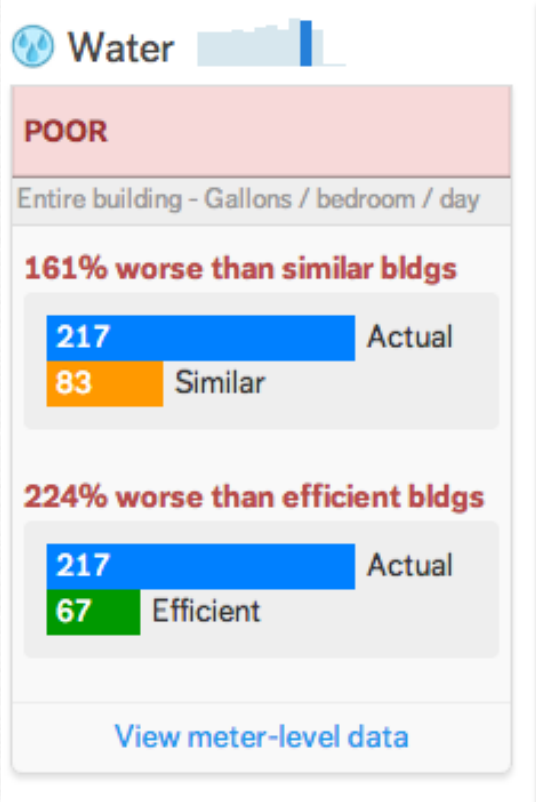
For Single and Multi-Family Properties



Where would you look in this building?
What is the potential for savings?

Savings Potential



Using 217 gallons/bedroom/day, 134 gallons more than similar buildings.

134 * 72 bedrooms = 9,648 gallons/day

9,648 * 365 days = 3,521,520 gallons per year

Cost? ~$45,780 (at Boston water rates of about $.013/gallon)

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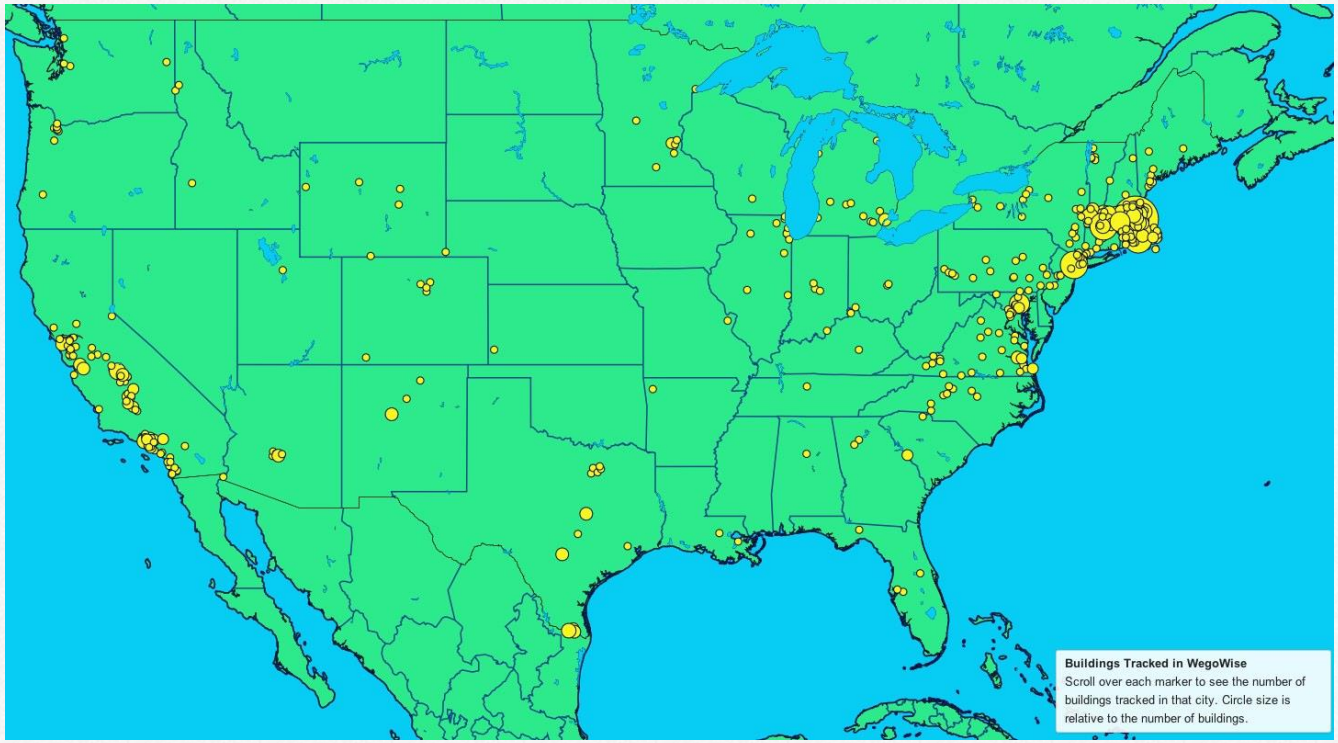
Compare Against Similar Buildings

How do we determine “similar?”

- Climate zone
- Building type: single family attached + detached; low, mid, and high rise multifamily
- Heating fuel
- Hot water fuel
- Size

What’s in our database?

- 12,000+ buildings
- 190,000+ units
- nationwide coverage



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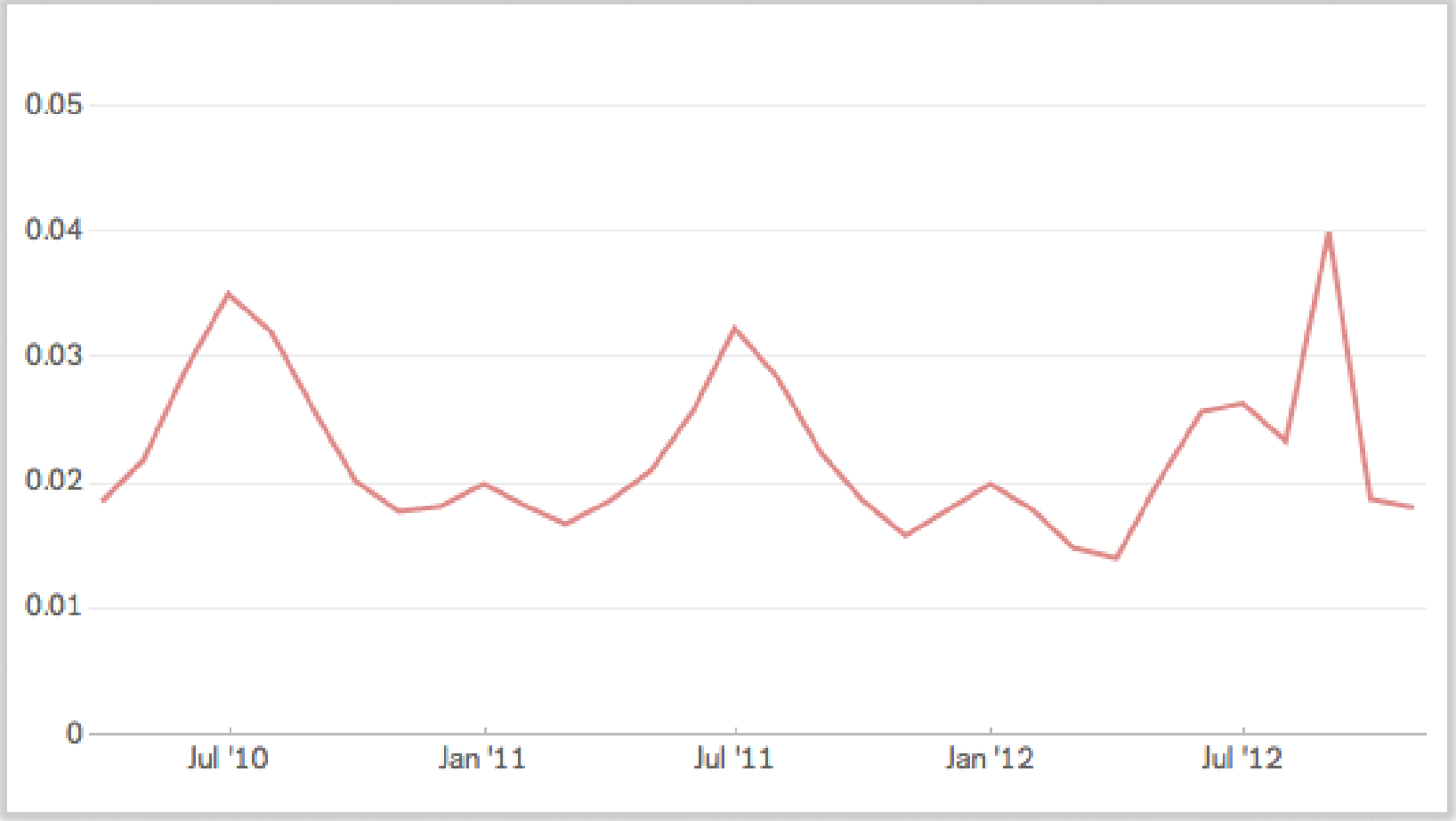
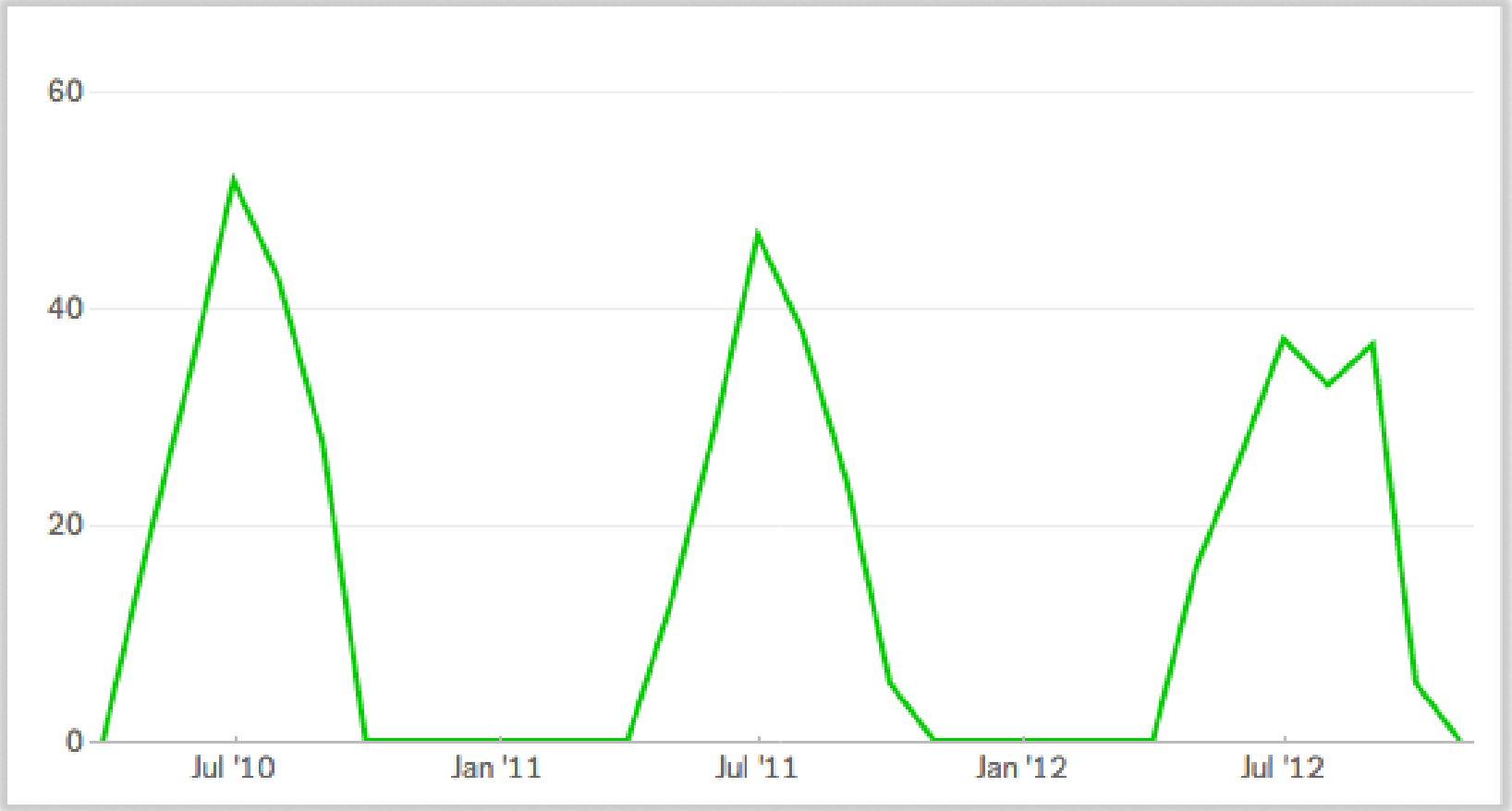
Follow the Squiggly Line



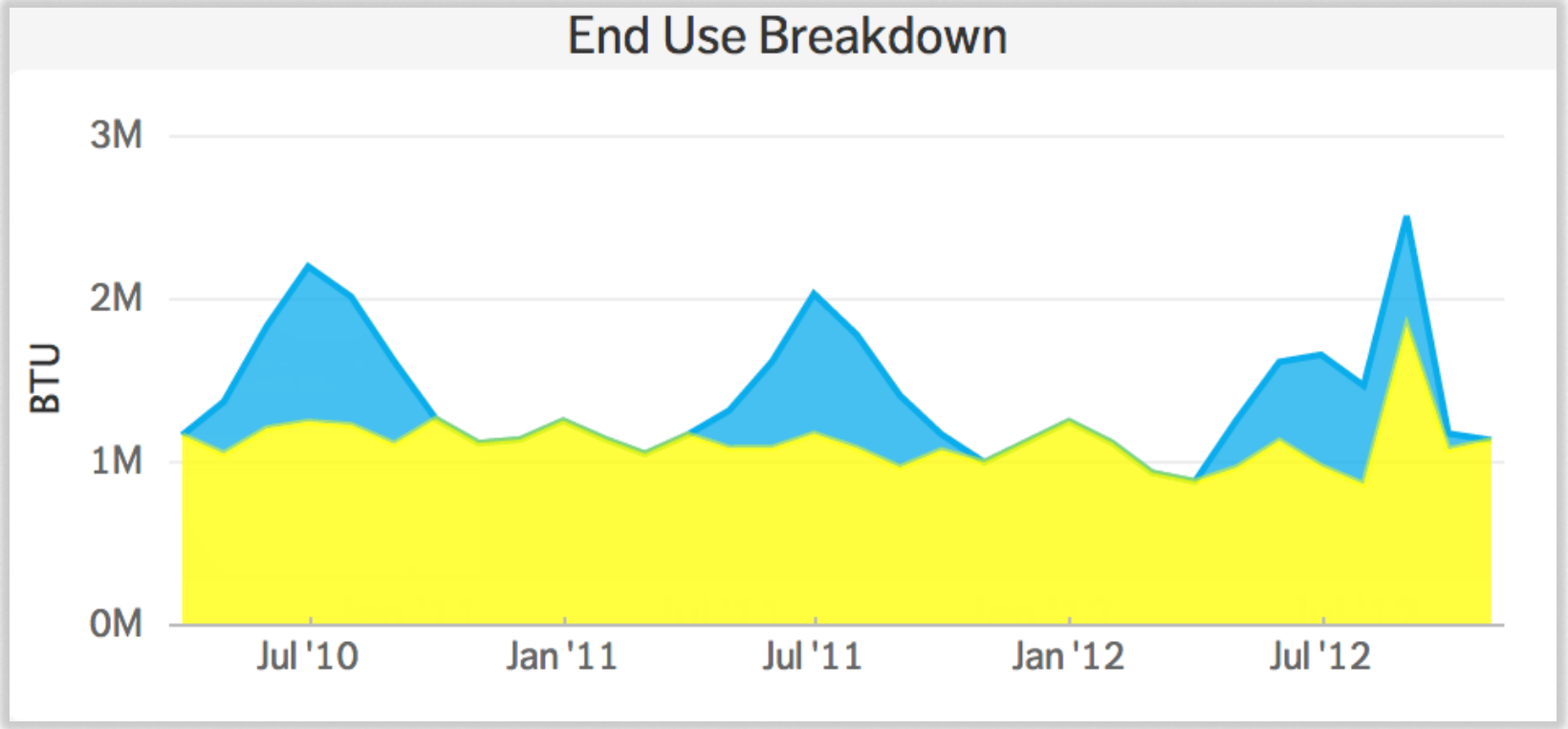
Electric usage, not weather normalized.
Electric usage spikes in September.

Follow the Squiggly Line



Electric usage, cooling energy.
Most of spike not related to cooling.

Follow the Squiggly Line



The building owner will probably never get into this much depth.
This is where your expertise comes into play.

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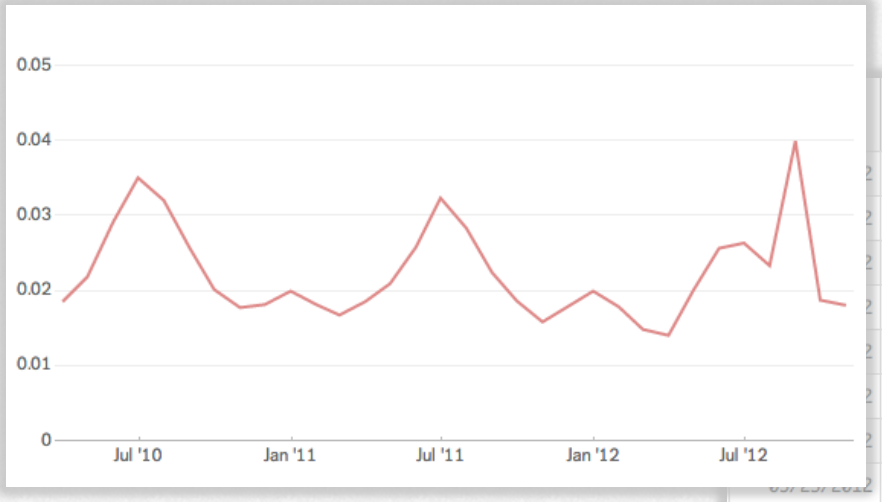
Follow the Squiggly Line



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Start Date MM/DD/YYYY	Usage kWh	Demand Usage	Total Charge	Supply Charge	Delivery Charge
11/20/2012	10,300 kWh	30 kW	$1,263.02	$771.05	$491.97
10/20/2012	9,780 kWh	27 kW	$1,366.10	$904.65	$461.45
09/22/2012	10,040 kWh	29 kW	$1,406.00	$928.70	$477.30
08/23/2012	26,780 kWh	47 kW	$3,541.36	$2,477.15	$1,064.21
07/21/2012	7,840 kWh	12 kW	$1,039.80	$725.20	$314.60
06/23/2012	17,320 kWh	47 kW	$2,395.00	$1,602.10	$792.90
05/24/2012	12,500 kWh	48 kW	$1,816.92	$1,156.25	$660.67
04/25/2012	10,100 kWh	31 kW	$1,430.19	$934.25	$495.94
04/24/2012	03/21/2012	8,120 kWh	31 kW	$1,197.31	$751.10	$446.21
03/20/2012	02/17/2012	9,680 kWh	31 kW	$1,382.09	$895.40	$486.69
02/16/2012	01/20/2012	9,840 kWh	33 kW	$1,410.92	$910.20	$500.72
01/19/2012	12/20/2011	11,540 kWh	34 kW	$1,652.42	$1,067.45	$584.97
12/19/2011	11/23/2011	8,020 kWh	29 kW	$1,164.94	$741.85	$423.09
11/22/2011	10/19/2011	10,060 kWh	36 kW	$1,452.04	$930.55	$521.49
10/18/2011	09/21/2011	10,600 kWh	43 kW	$1,563.27	$980.50	$582.77
09/20/2011	08/25/2011	11,500 kWh	39 kW	$1,649.78	$1,063.75	$586.03
08/24/2011	07/26/2011	16,400 kWh	47 kW	$2,290.47	$1,517.00	$773.47
07/25/2011	06/24/2011	19,340 kWh	51 kW	$2,672.79	$1,788.95	$883.84
06/23/2011	05/19/2011	15,520 kWh	42 kW	$2,154.83	$1,435.60	$719.23
05/18/2011	04/20/2011	10,120 kWh	36 kW	$1,449.12	$936.10	$513.02
04/19/2011	03/23/2011	9,360 kWh	29 kW	$1,294.93	$865.80	$429.13

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M & V - Track Savings

Effect of Ghhi Upgrades (February 8, 2010) Back to list of all upgrades

Cost of all energy in $ (not normalized) Show Raw Data Bookmark This Report Download Data (.csv)

Date Range	Full-Year Sum
Feb 10 - Jan 11	1.53K
Feb 09 - Jan 10	2.7K

Before: pre-upgrade

After: post-upgrade

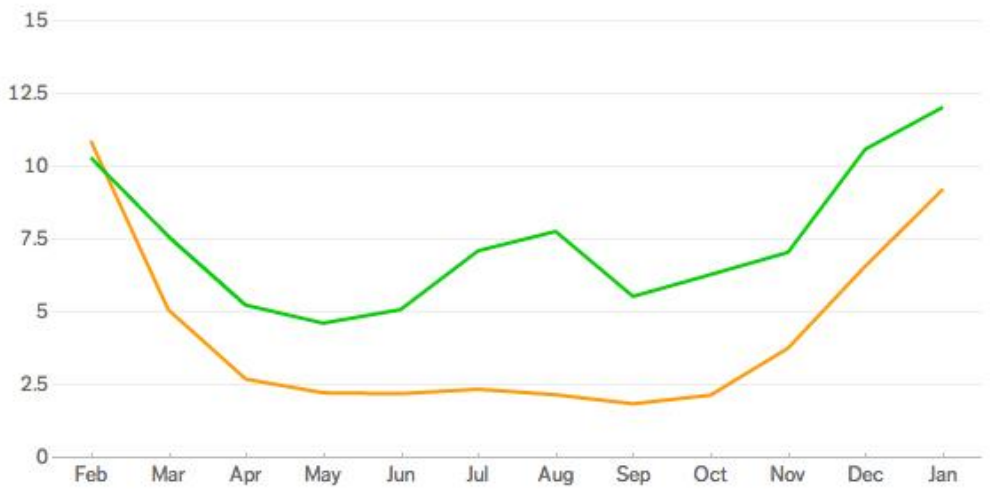
Cost: $300.00

Actual Savings: 43% (1,171 $)

Detailed Data per Month (Deselect All)

Click a square to show or hide an item on the graph

Click & drag to zoom in



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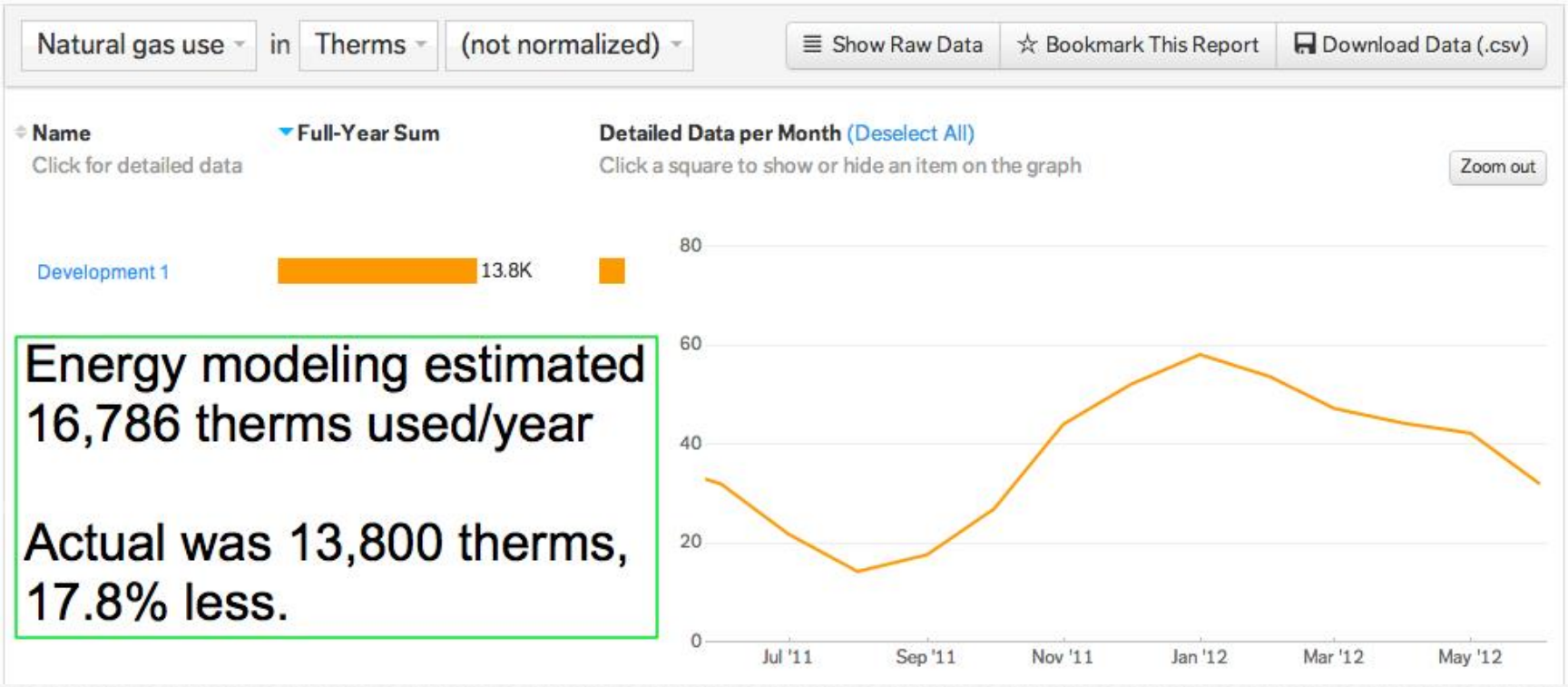
New Construction

Annual End-Use Consumption	
Heating (kWh)	1807
Cooling (kWh)	1008
Water Heating (CCF)	154
Lights & Appliances (kWh)	4003

In REM/Rate, this is in the Fuel Summary Report.

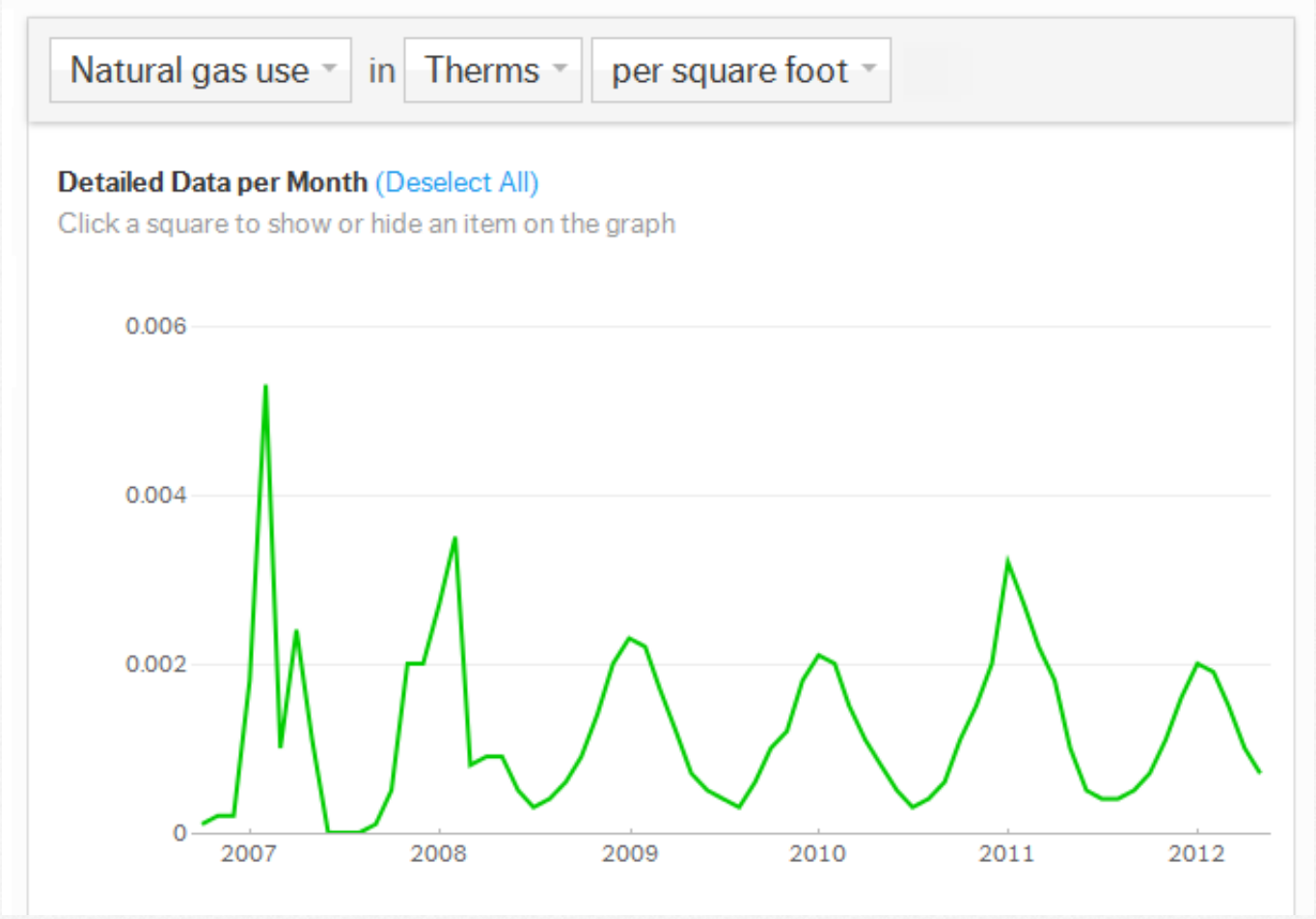


Energy modeling estimated 16,786 therms used/year

Actual was 13,800 therms, 17.8% less.

New Construction

- 1st winter: usage 3x higher than expected.
- 2nd winter: usage still high
- 3rd winter: usage back to where it should be.



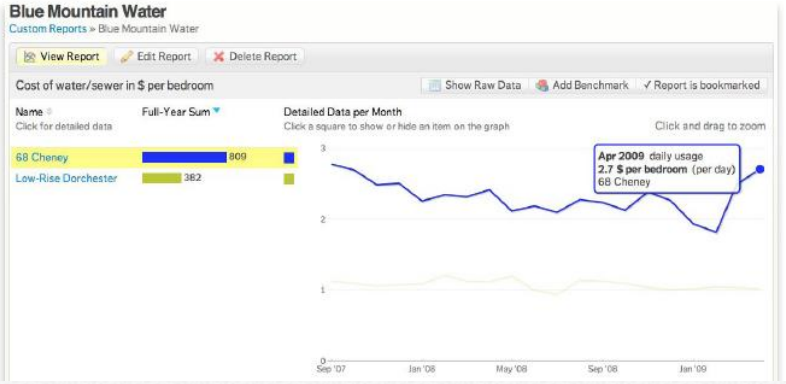
Market Yourself: Case Studies

- Track retrofits
- Quantify savings
- Package numbers with glossy photos
- Customers want numbers and reassurance

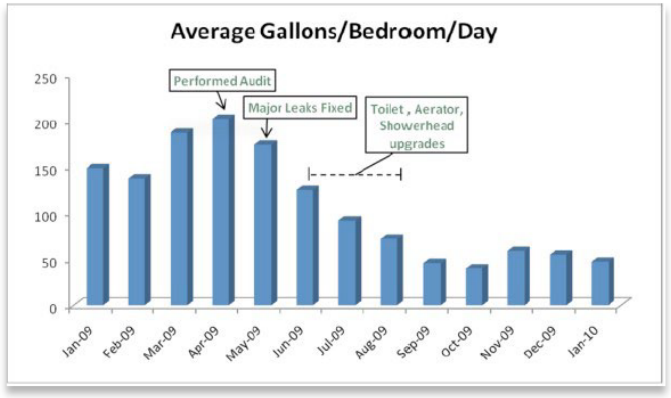
United Housing:
In winter of 2009, United Housing Management LLC asked WegoWise and New Ecology to look into their Blue Mountain development and identify opportunities for energy and water efficiency work. An analysis of the development identified many problem areas, but the 68 Cheney Street building proved to be a particularly problematic water hog.

68 Cheney St. is a 12,000 square foot three-story masonry walk-up in Dorchester, Mass. built around 1920.

Analysis and Identification:
The graph below shows how much water 68 Cheney was using compared to similar low-rise apartment buildings in Dorchester. The green line represents the median usage from 80 low rise apartment buildings in the same neighborhood. The blue line is 68 Cheney's water usage.



Audit and Upgrade:
New Ecology performed an on-site water audit and identified malfunctioning flapper valves in toilets, leaky aerators and high-usage shower heads. Their audit report suggested replacing the toilets and installing low-flow faucets and shower heads. The upgrades cost United Housing about $2,000 dollars and showed immediate results.



United Housing continues to monitor water use in 68 Cheney and has been saving nearly $1,200/month as a result of their water conservation work. They have since expanded on the efforts at 68 Cheney and implemented the same retrofits in other buildings in the Blue Mountain development.

By analyzing usage data, identifying the worst performing building, following through on audit recommendations and continuing to monitor the payback on their investments, United Housing is greatly benefitting from following water conservation best practices.

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Take Aways

- There is a lot of information to be had from dumb data
- Programs can be much smarter about funding to have a larger impact
- Programs and auditors have the ability to do QA on retrofits cheaply and remotely *and* catch problems before clients do
- Auditors can help property managers/owners finally get past their paralysis
- Auditors can show potential clients real results + numbers *and* understand what measures work the best

All you need is a little bit of this

Age & Type of Building
Built in 1920
Multi-family home

Housing Category
Low-income housing
Resident type: Other

Structure
Masonry (load-bearing) construction
No basement

Size
4,947 square feet in total
4,000 sq. ft. in apartments
3 stories tall
4 apartments
11 bedrooms

Energy Efficiency
Not certified as a green building

Heating
Gas heat
Boiler (Hot water)

Cooling
None

Hot Water
Gas hot water heater
Stand-alone storage water heater

Facilities
No laundry
0 elevators
No ventilated garage
No pool

Electric Accounts
Apartments have electric meters
1 electric account

Gas Accounts
Gas meters are all building-wide
1 gas account

Water Accounts
Water meters are all building-wide
1 water account

Notes

And a little bit of that

End Date MM/DD/YYYY	Start Date MM/DD/YYYY	Usage Btu	Usage Therms	Total Charge
07/16/2011	06/17/2011	40,500,000 Btu	405 thm	$761.53
06/16/2011	05/17/2011	107,950,000 Btu	1,080 thm	$1,793.53
05/16/2011	04/17/2011	168,600,000 Btu	1,686 thm	$2,735.46
04/16/2011	03/21/2011	216,800,000 Btu	2,168 thm	$3,503.99
03/20/2011	02/17/2011	281,300,000 Btu	2,813 thm	$4,543.54
02/16/2011	01/20/2011	289,600,000 Btu	2,896 thm	$4,655.04
01/19/2011	12/20/2010	257,200,000 Btu	2,572 thm	$4,162.26
12/19/2010	11/17/2010	230,300,000 Btu	2,303 thm	$3,764.59
11/16/2010	10/17/2010	168,466,667 Btu	1,685 thm	$2,722.26
10/16/2010	09/17/2010	89,500,000 Btu	895 thm	$1,492.22
09/16/2010	08/17/2010	41,166,667 Btu	412 thm	$764.11
08/16/2010	07/17/2010	38,533,333 Btu	385 thm	$720.86
07/16/2010	06/17/2010	40,500,000 Btu	405 thm	$761.53
06/16/2010	05/17/2010	107,950,000 Btu	1,080 thm	$1,793.53
05/16/2010	04/17/2010	168,600,000 Btu	1,686 thm	$2,735.46
04/16/2010	03/17/2010	216,800,000 Btu	2,168 thm	$3,503.99

Thank you!

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