

## Benchmarking Properties for Energy, Water, and Resident Complaints

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Special Thanks to: New Ecology & Cambridge  
Neighborhood Apartment Housing Services

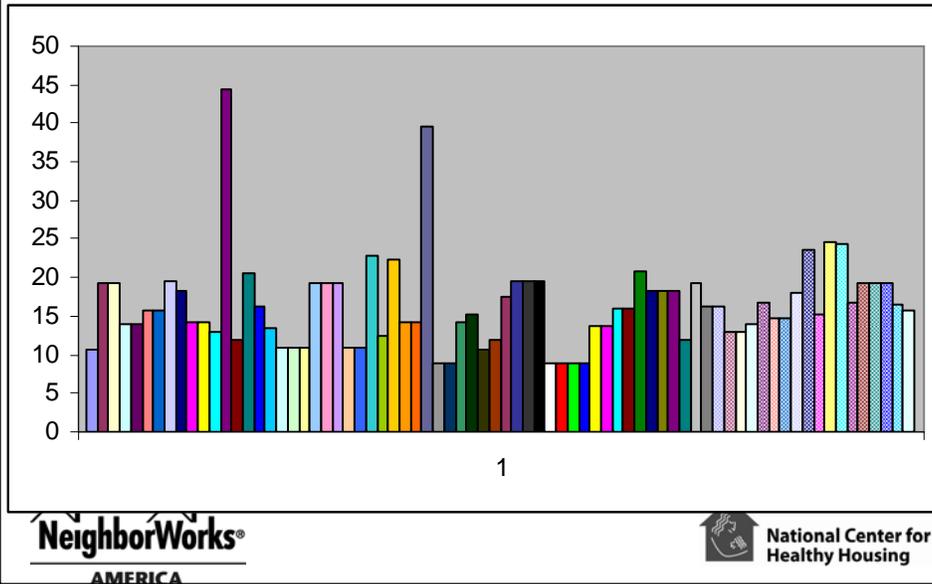


Who tracks usage?

What kind of information do you  
have at your fingertips?



### A Top 10 Owner of NYC Properties: Multifamily Energy Usage



## Why Measure Energy & Water Use?

- How much energy do we use ?
- Understand our carbon footprint?
- To compare energy usage between buildings?
- To target improvements to reduce operating expenses?
- To inform capital needs and renovation plans?
- What else?

## Benchmark Targets

Category	Target	Critical Action Needed
Space Heating	<10 BTU/FT <sup>2</sup> /HDD	>17 BTU/FT <sup>2</sup> /HDD
Electric Use	<4-5 kWh/FT <sup>2</sup> /YR	
Water Use	<50 gallons/person/day OR < 100 g/bedroom/day	>65 gallons/person/day
Hot Water		
Resident Complaints	No quantitative target	You'll know it

HDD – Heating Degree Day

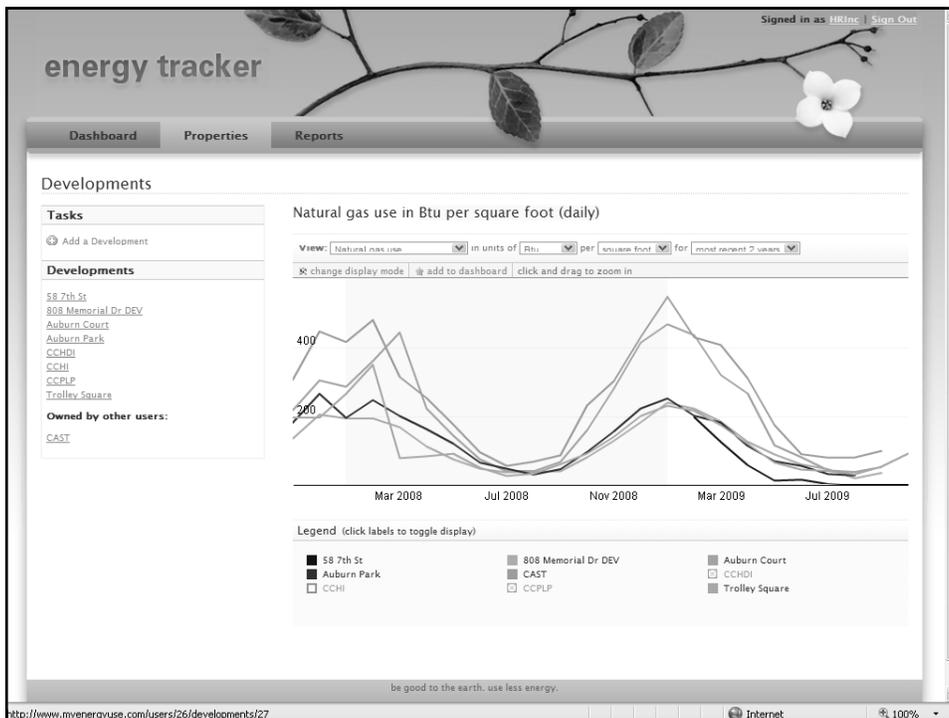
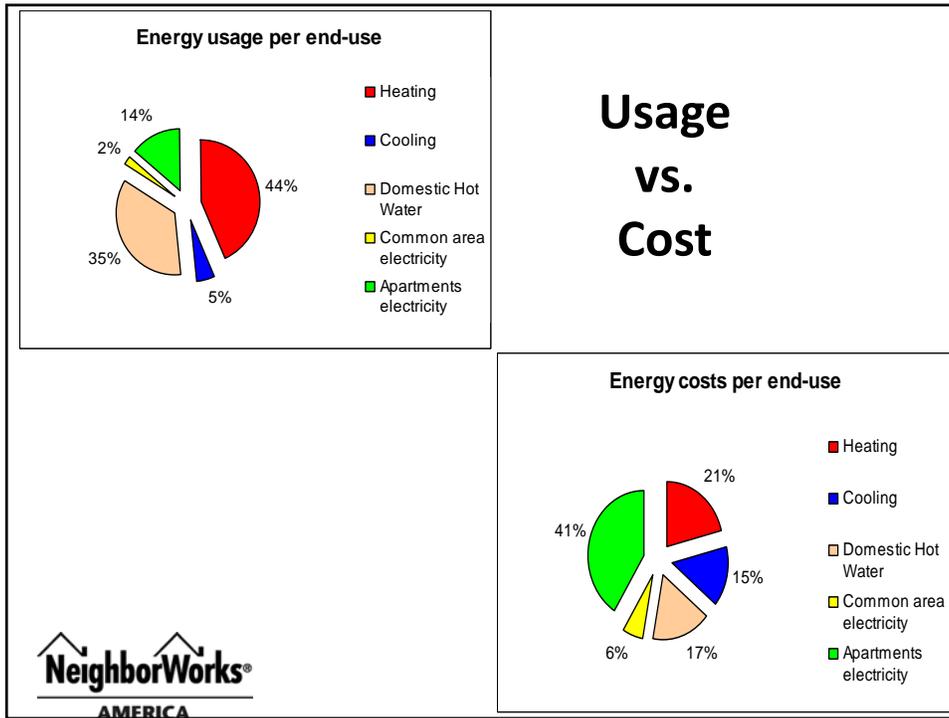
FT<sup>2</sup> = square feet



## What is a Heating Degree Day?

- To calculate the heating degree days for a particular day:
  - Find the day's average temperature by adding the day's high and low temperatures and dividing by two.
  - If the number is above 65, there are no heating degree days that day.
  - If the number is less than 65, subtract it from 65 to find the number of heating degree days.
- Find your HDD at [www.weather.com](http://www.weather.com)





## Oxford/Trowbridge

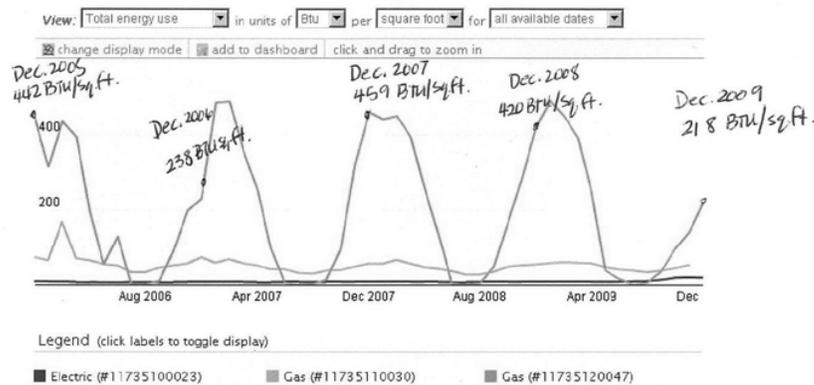
- Occupied Energy Retrofit
- 52 units
- High Efficiency Boilers
- Indirect Hot Water
- Air Sealing
- Change from Steam Distribution to hot water

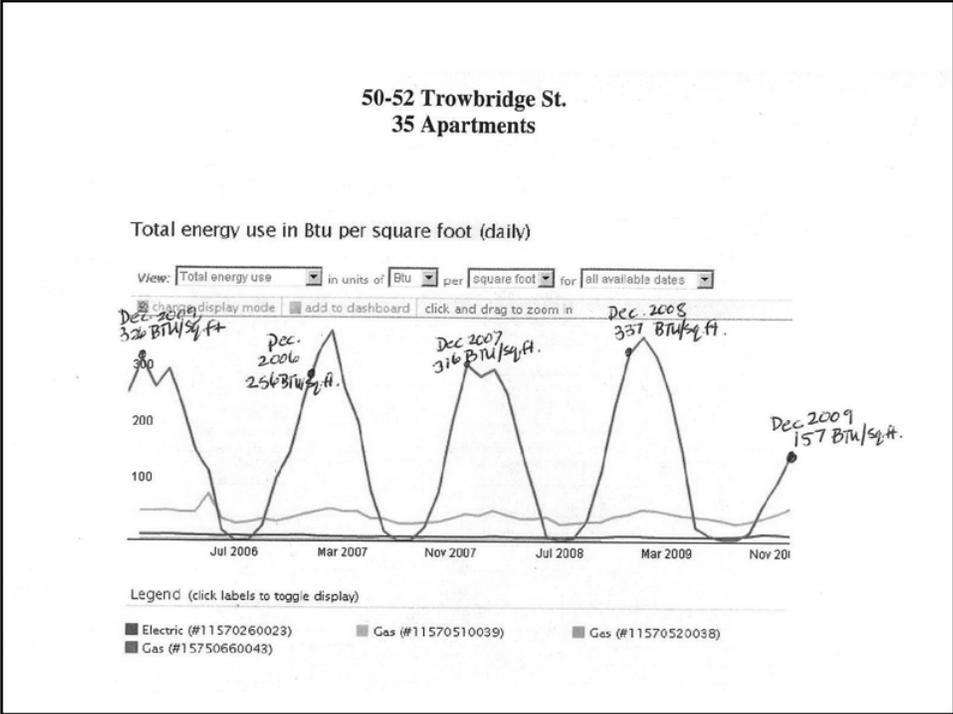


Source: Cambridge Neighborhood Apartment Housing Services, Inc.

### 64 Oxford St. 17 apartments

Total energy use in Btu per square foot (daily)



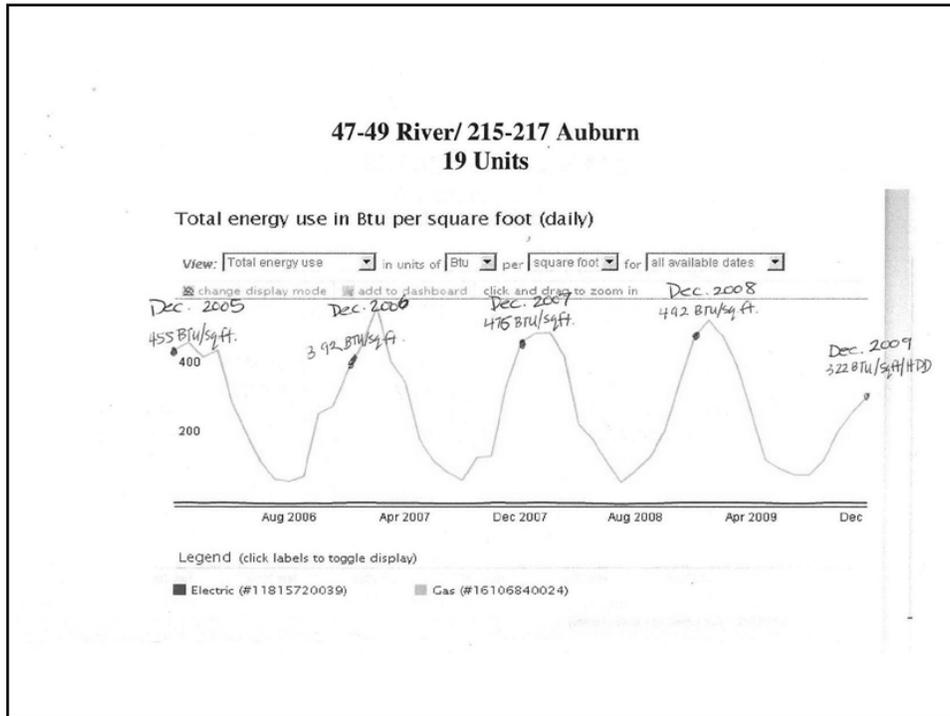


## Auburn St./Magazine St.



- Occupied retrofits
- High Efficiency, Modulating, Condensing Boilers





## Trolley Square



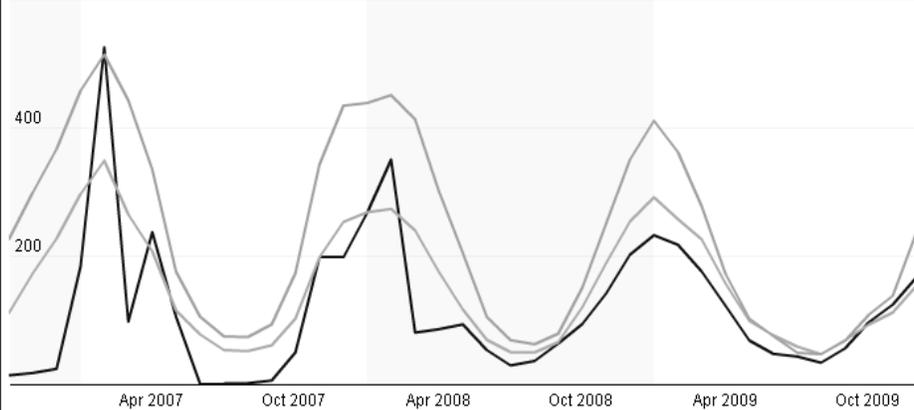
- 32 Units
- New Construction
- LEED NC Certifiable
- Energy Star
- PV
- Tenant Education

## It takes a while to get things right Measuring is Important

Report: Trolley EStar bldg

Natural gas use in *Btu per square foot (daily)* (full date range)

modify report  change display mode  filter displayed buildings  add to dashboard  click and drag to zoom in



## Ashes to Green 58 7<sup>th</sup> Street



### Building Envelope

- Walls Polycynene R-19 in walls
- Roof – R40
- Low E Glass windows
- HERS 34
- PV & Solar Domestic Hot Water

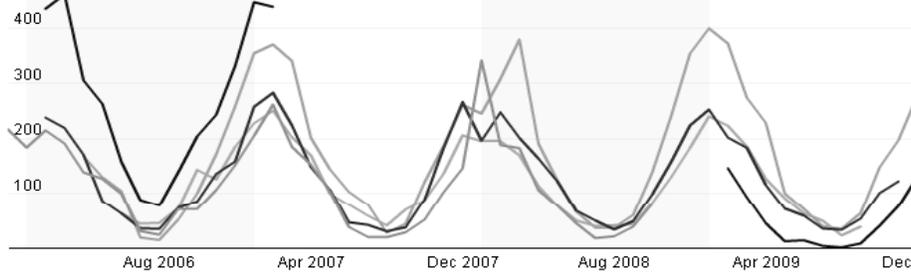


# Worst to Best- BTU/sq. ft.

Natural gas use in Btu per square foot (daily)

View: Natural gas use in units of Btu per square foot for all available dates

change display mode add to dashboard click and drag to zoom in



Legend (click labels to toggle display)

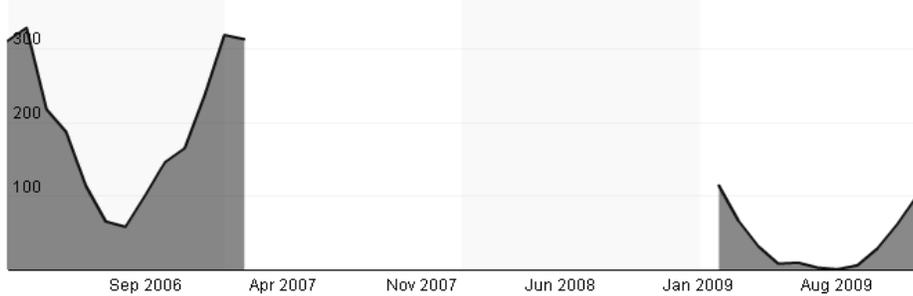
- 58 7th St
- 808 Memorial Dr DEV
- Auburn Court
- Auburn Park
- CAST
- CCHDI
- CCHI
- CCPLP
- Trolley Square

# 7th Street- CO2 footprint before/after

CO2 emissions in lbs. CO2 (daily)

View: Total energy use in units of CO2 per for all available dates

change display mode filter displayed buildings add to dashboard click and drag to zoom in



Legend (click labels to toggle display)

- 58 7th Street

## Centralized buildings use > 150% more electricity than renovated buildings (new buildings use 64% of electric old buildings use)

Electricity use in kWh per square foot (yearly)

View: Electricity use in units of kWh per square foot

change display mode filter displayed buildings add to dashboard click and drag to zoom in

Values presented below are per-year totals



## Reducing Bldg 14 to Comparable to Other will Save \$.44/SF/Year or >\$9,000

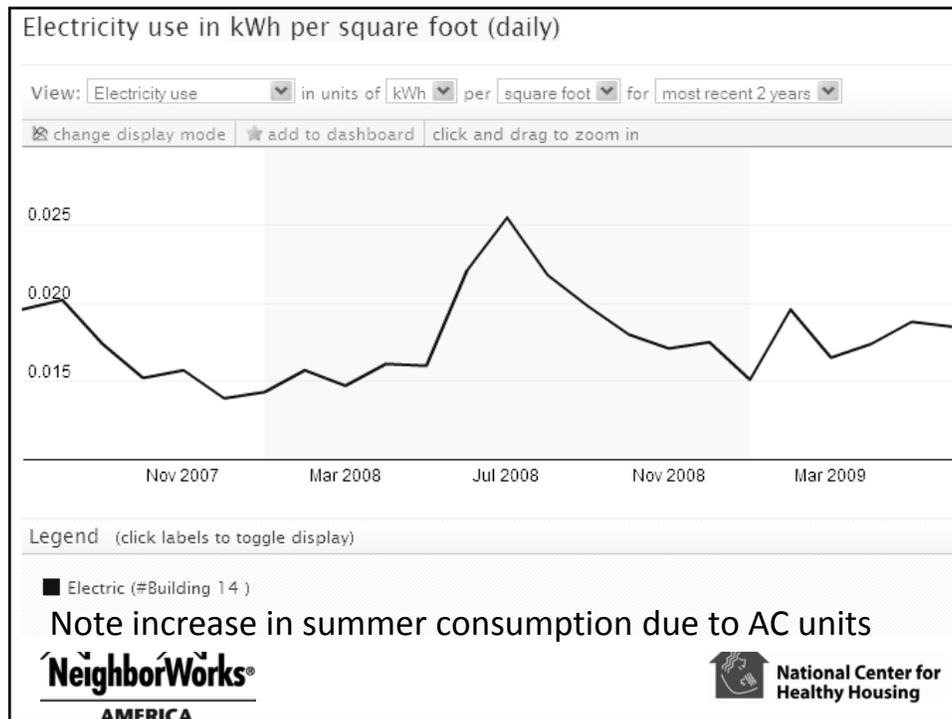
Total cost of electric in \$ per 1,000 square feet (yearly)

View: Cost of electricity in units of Total \$ per 1000 sq. ft.

change display mode filter displayed buildings add to dashboard click and drag to zoom in

Values presented below are per-year totals





## Parameters that can influence your energy bills:

- Weather conditions (if you are looking at heating or cooling bills)
- Energy prices: seasonal and market variation
- Changes in building occupancy or occupants' behavior
- Equipment failure
- Down time
- Building improvements

## Issues with Energy Data Analysis

- Difficult to determine exact square footage
  - Rentable sf vs. gross sf
- Meters can be wrong or you can not find all the meters
- Estimated usage
  - What data can I estimate?
- Cannot verify which meter goes to which system
  - Is the gas and water for laundry metered correctly?



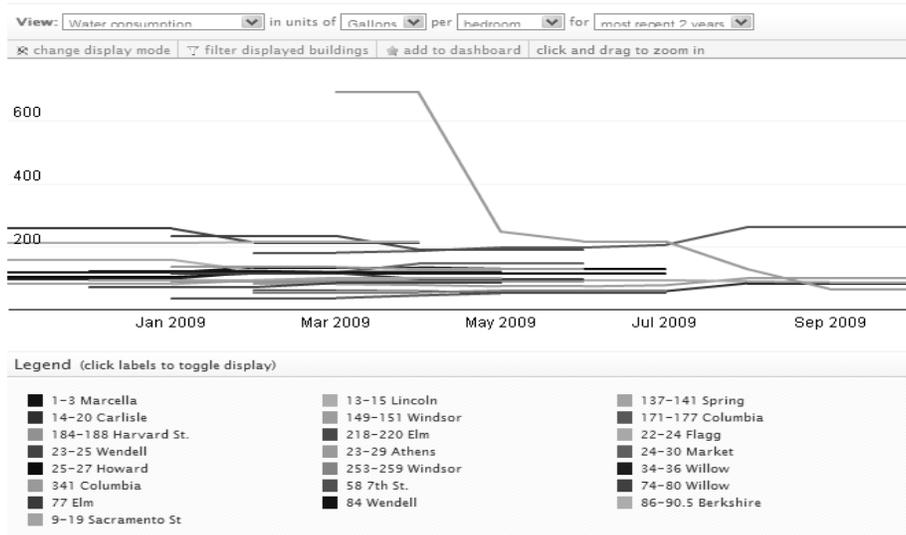
## Digging Deeper

- Separate out base load for electric and gas
  - Cooling climates: base is months with no AC (winter)
  - Heating climates: base is months with no heat needs (summer)
  - Base load for gas gives you domestic hot water use
  - Base load for electric is lighting, motors, etc not tied to heating or cooling



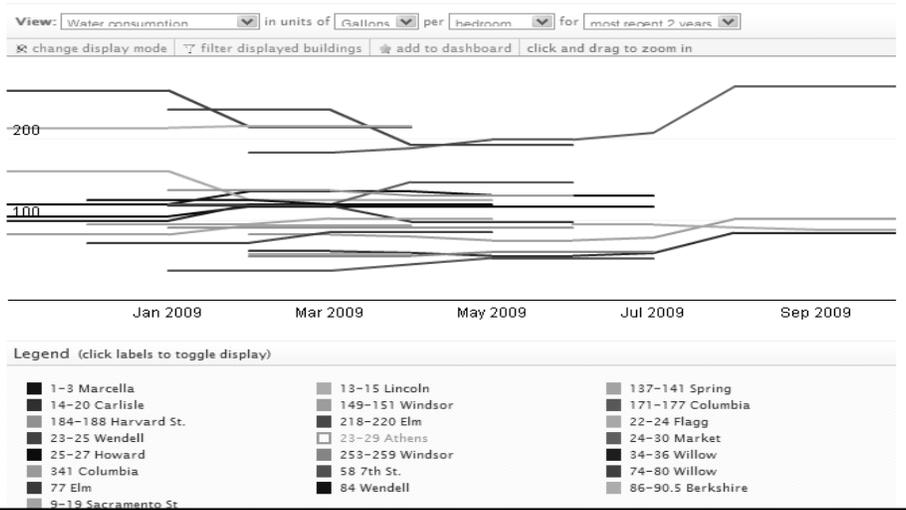
# 1 Building Uses 10xs Water Goal

Water use in Gallons per bedroom (daily)



# Slow Leak Toilets in 200 range

Water use in Gallons per bedroom (daily)



## Data to Organize

- Years worth of bills
- Know your meters and what they serve
- Square footage of occupied space
- Special conditions or events in past year – what would make the data odd?
- Heating Degree Days [www.weather.com](http://www.weather.com)



## Software Options

- Energy Tracker [www.newecology.org](http://www.newecology.org)
- Building Performance Compass  
[www.psdconsulting.com/buildingperformance](http://www.psdconsulting.com/buildingperformance)
- EPA Portfolio Manager  
[www.energystar.gov/index.cfm?c=evaluate\\_performance.bus\\_portfoliomanager](http://www.energystar.gov/index.cfm?c=evaluate_performance.bus_portfoliomanager)
- Your own spreadsheet

