



Visualizing Carbon and Energy

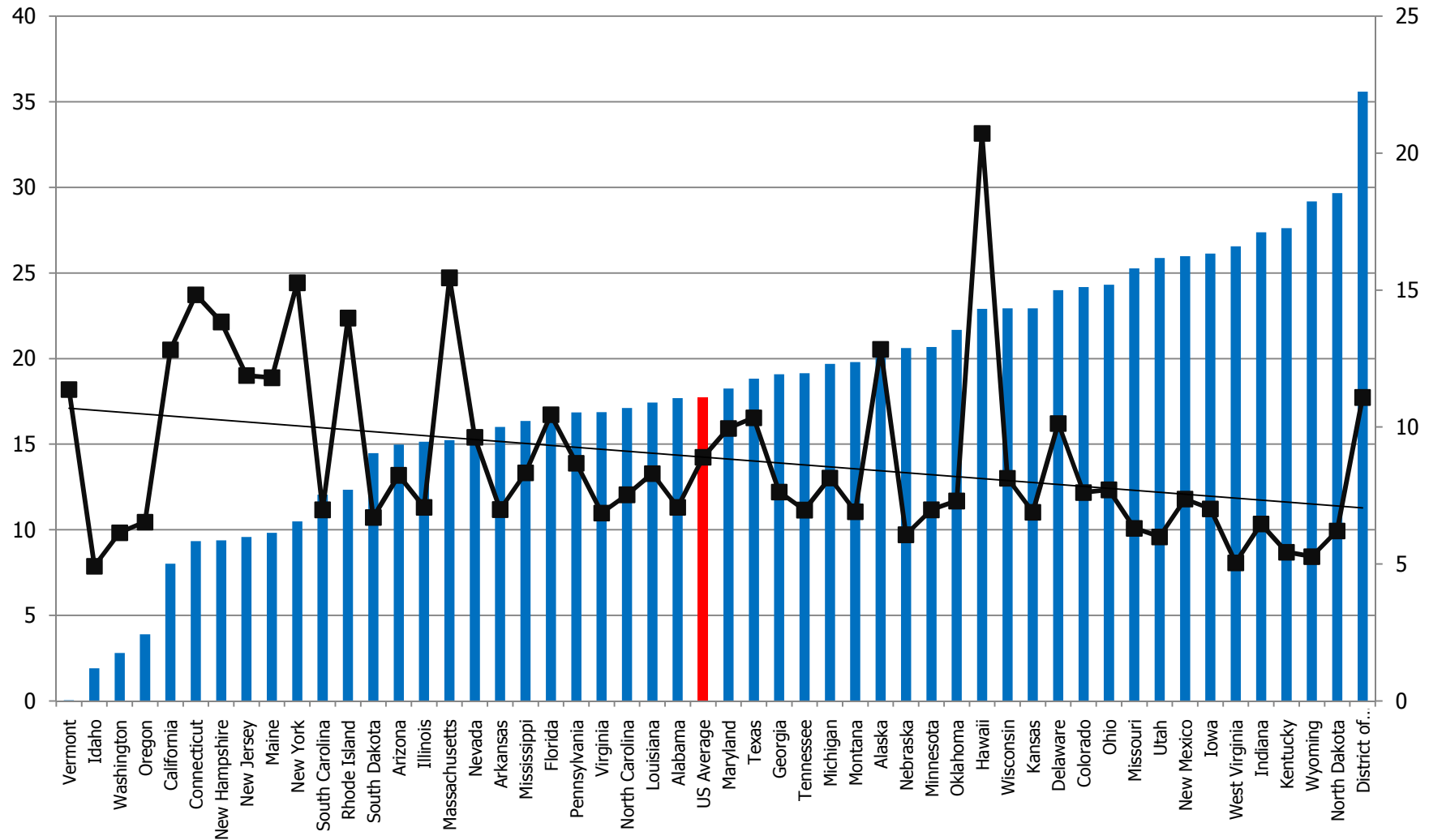
Gregory Thomas
Performance Systems
Ithaca, NY

Who is Performance Systems?

- Ithaca NY based, 50+ person company
- Development (Nationally)
 - Software and Training
 - Compass Benchmarking, TREAT, BPI, RESNET and Contractor Training
 - State and Utility Program Support
 - NY, NE, NH, PA, OH, MD, CA, MA, WI (Home Performance, Multi and Commercial)
 - Energy and Green Building Services for Building Owners
 - Multifamily and Commercial Energy Audits, M&V and Evaluation
- Contracting (Locally)
 - Home Performance with Energy Star
 - Energy Star Energy Ratings
 - Geothermal Systems
 - Solar Thermal and Photovoltaic Systems
 - Multifamily Retrofit

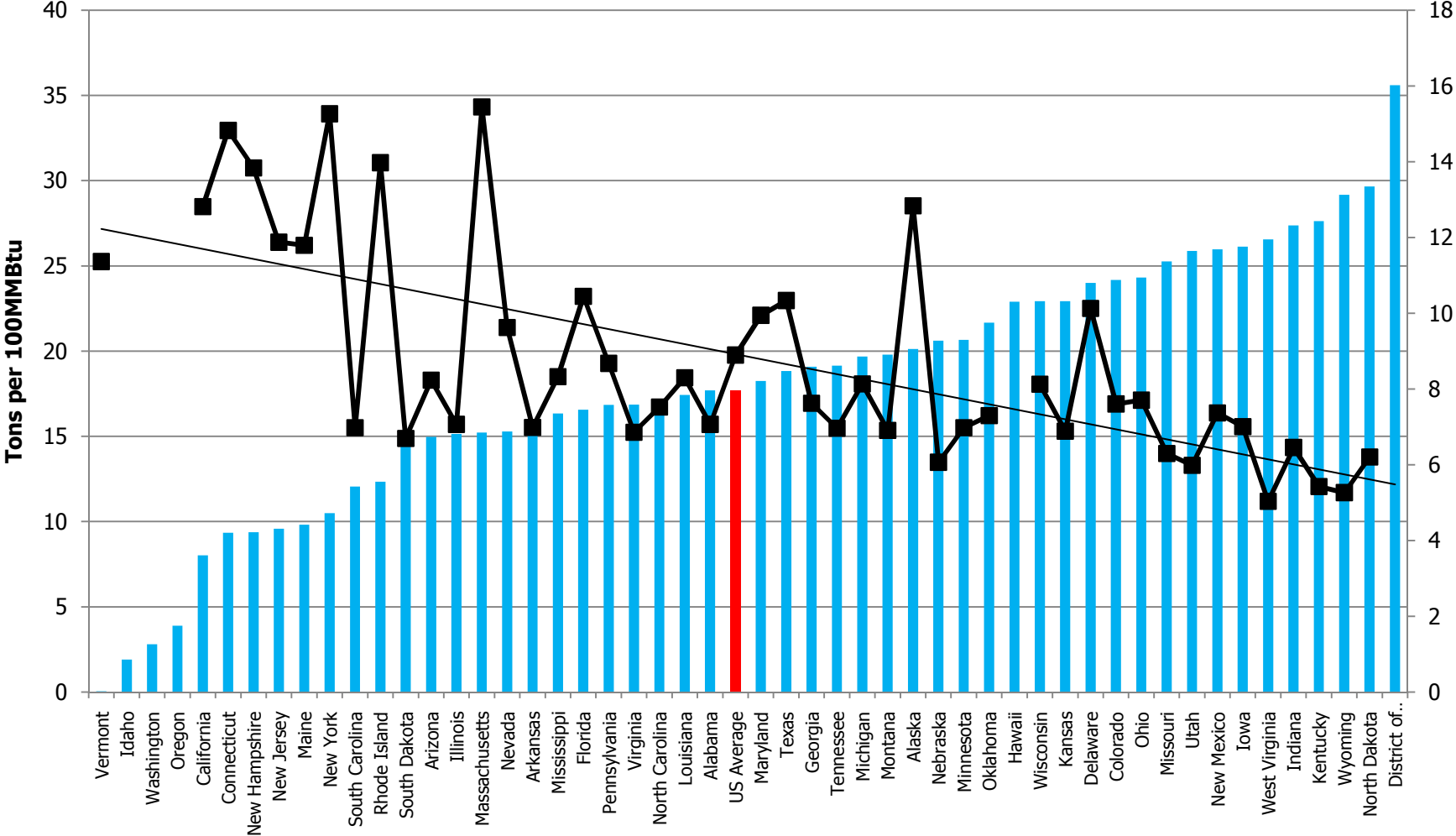
kWh Carbon Intensity to Cost Comparison

EIA 2006

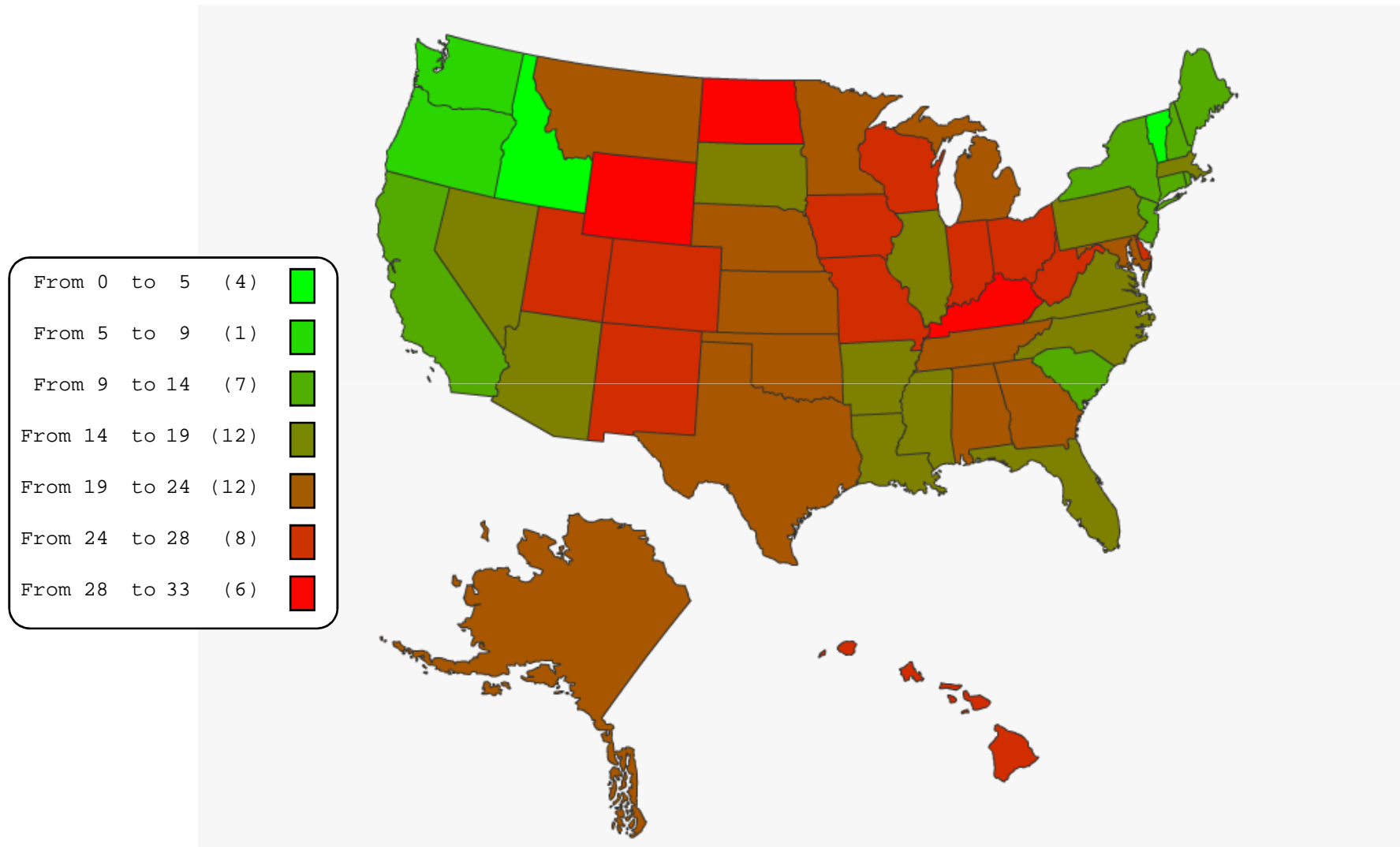


kWh Carbon Intensity to Cost Trend Line with Pacific NW Hydro and HI Removed

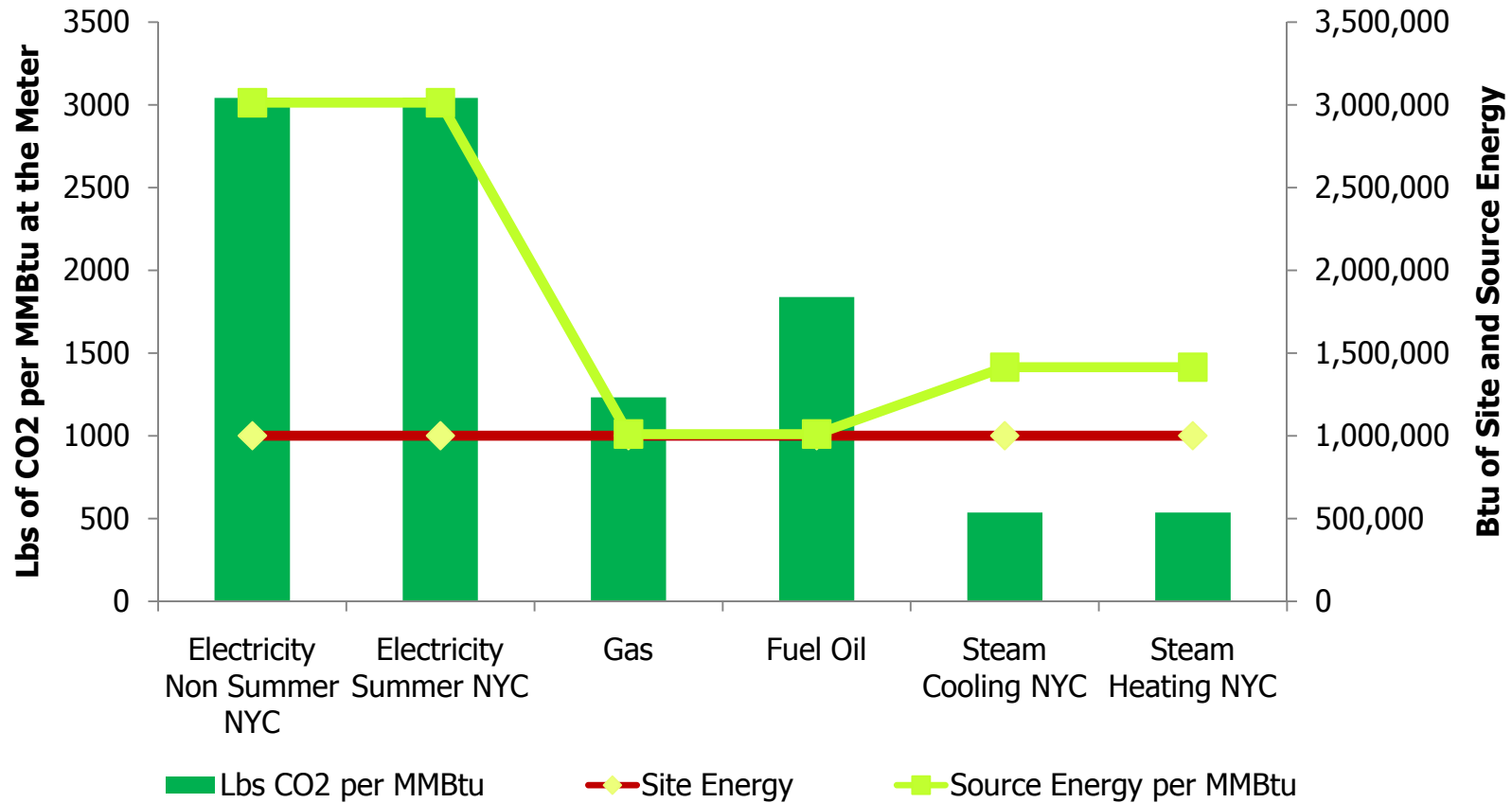
EIA 2006



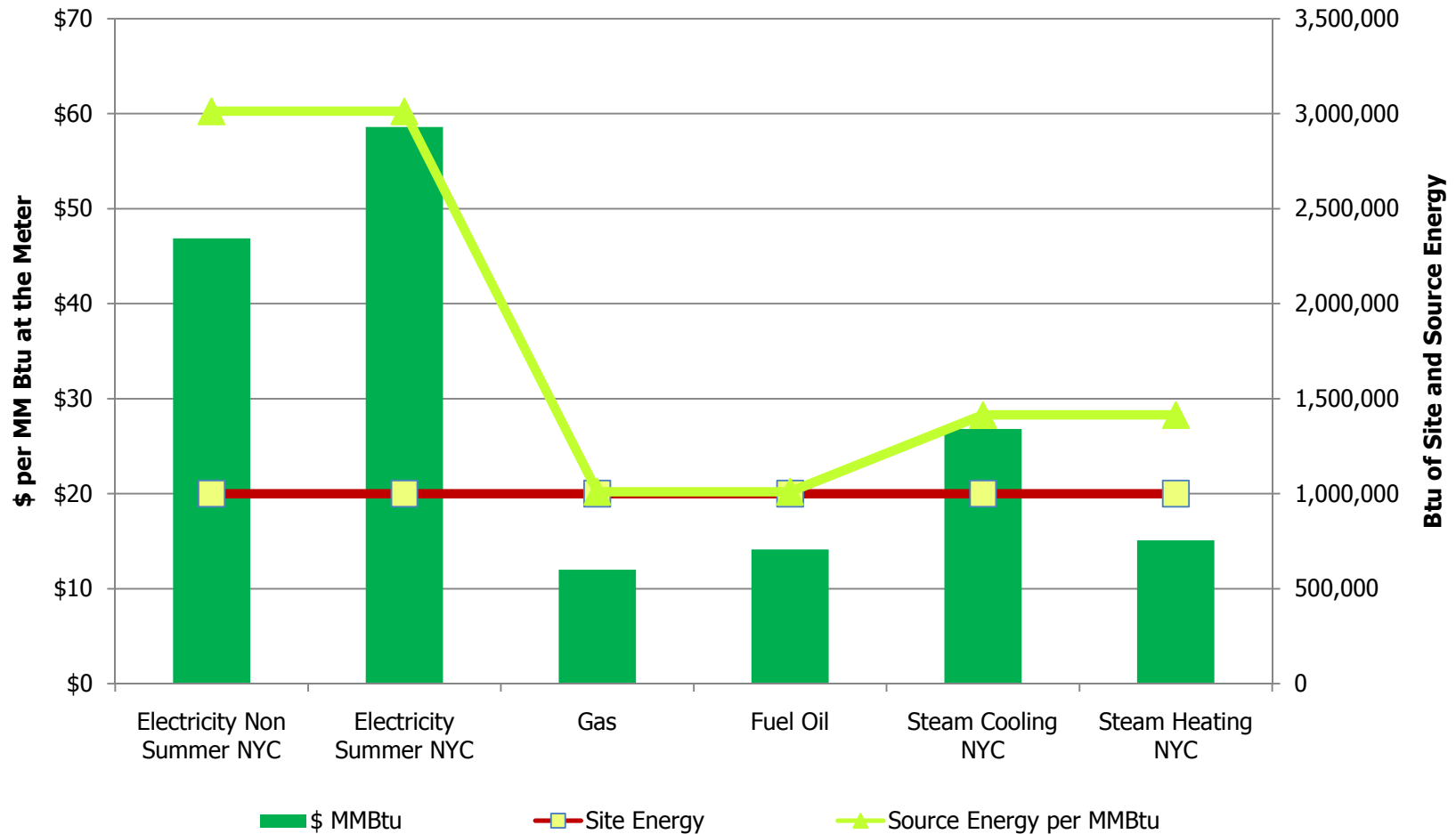
National Carbon per kWh Intensity - 2006



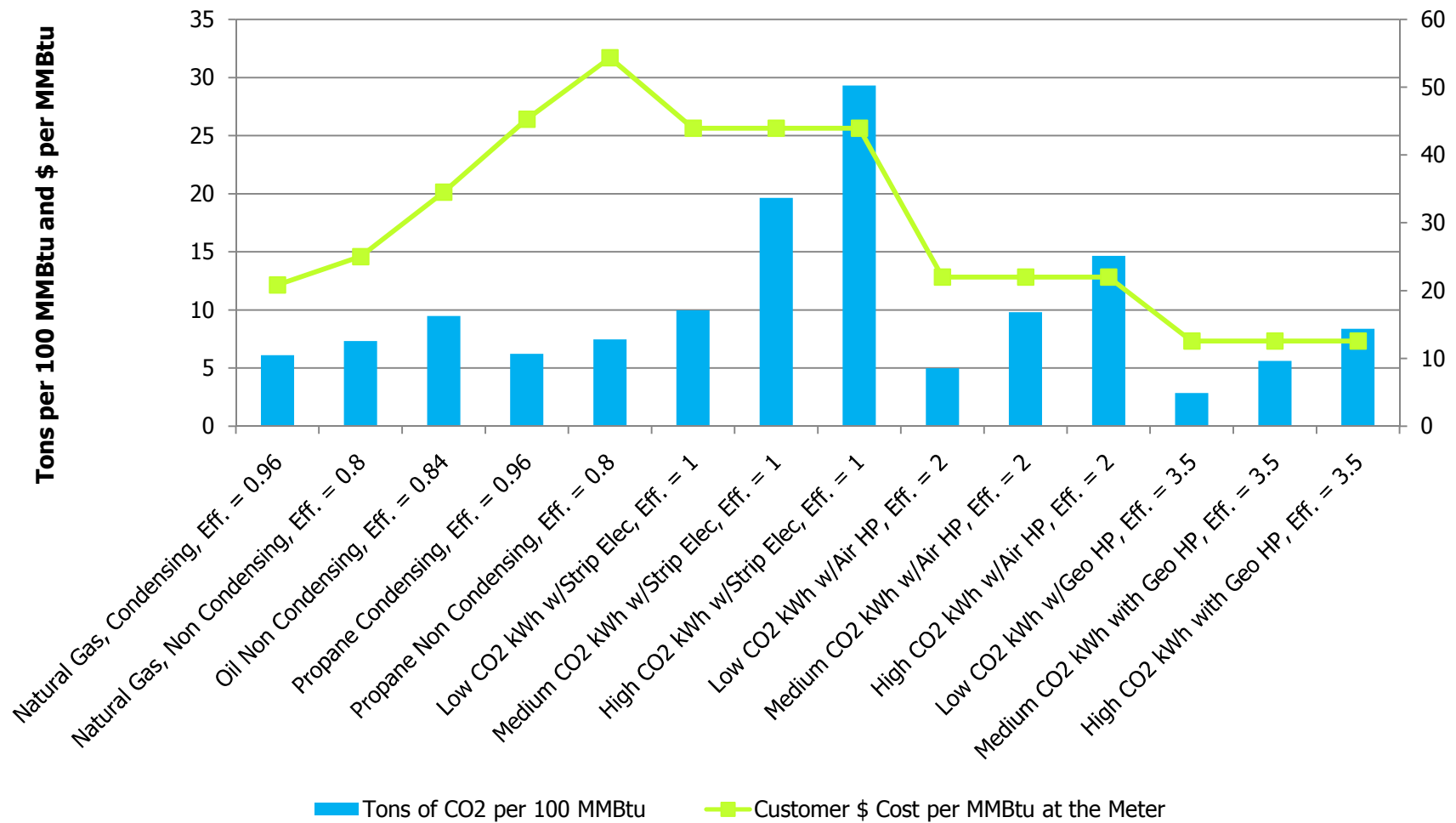
All Btus Are Not Created Equal - Lbs CO2 per MMBtu



All Btus Are Not Created Equal - \$ Per MMBtu

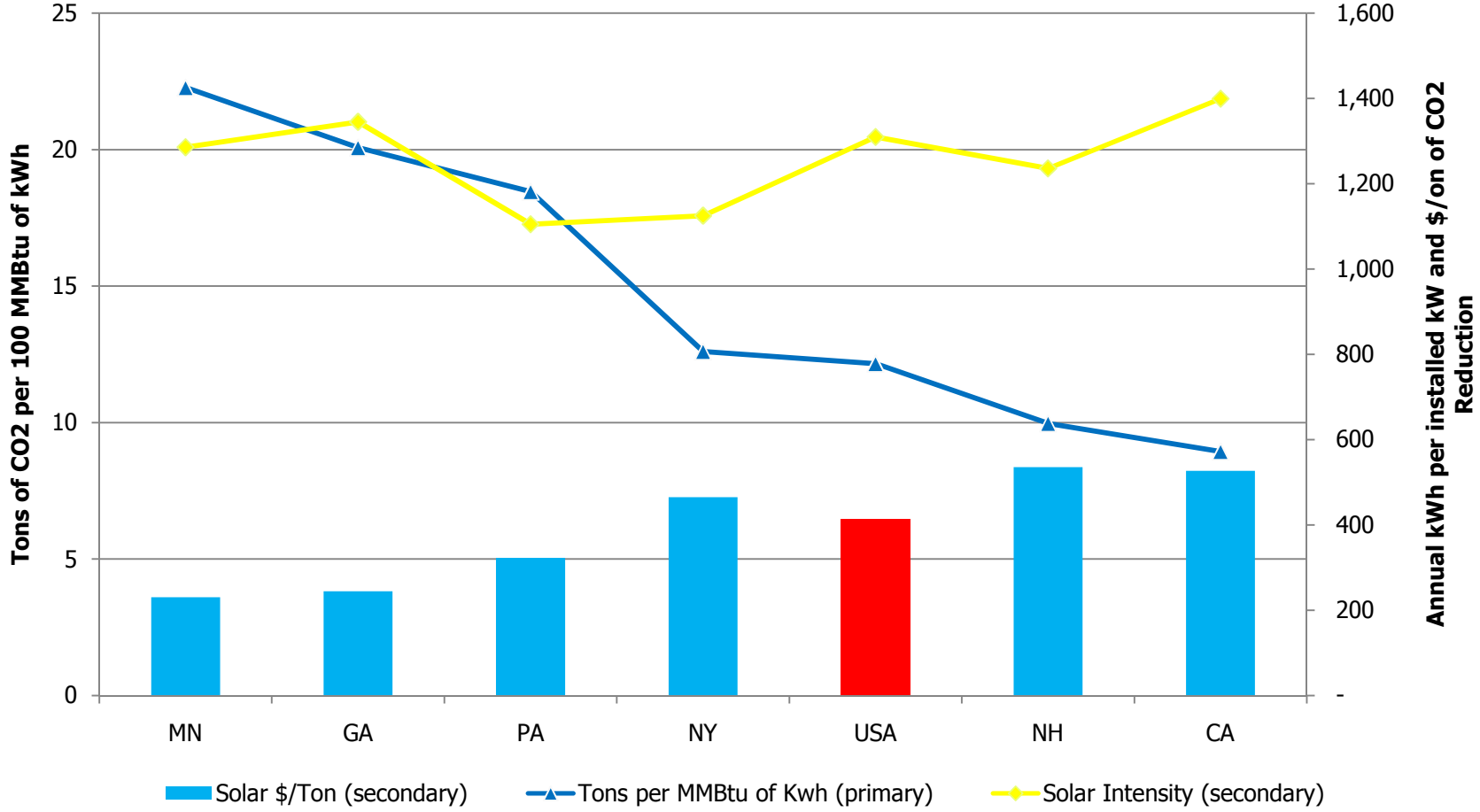


Cost and Carbon per 100 MMBtu of Delivered Energy

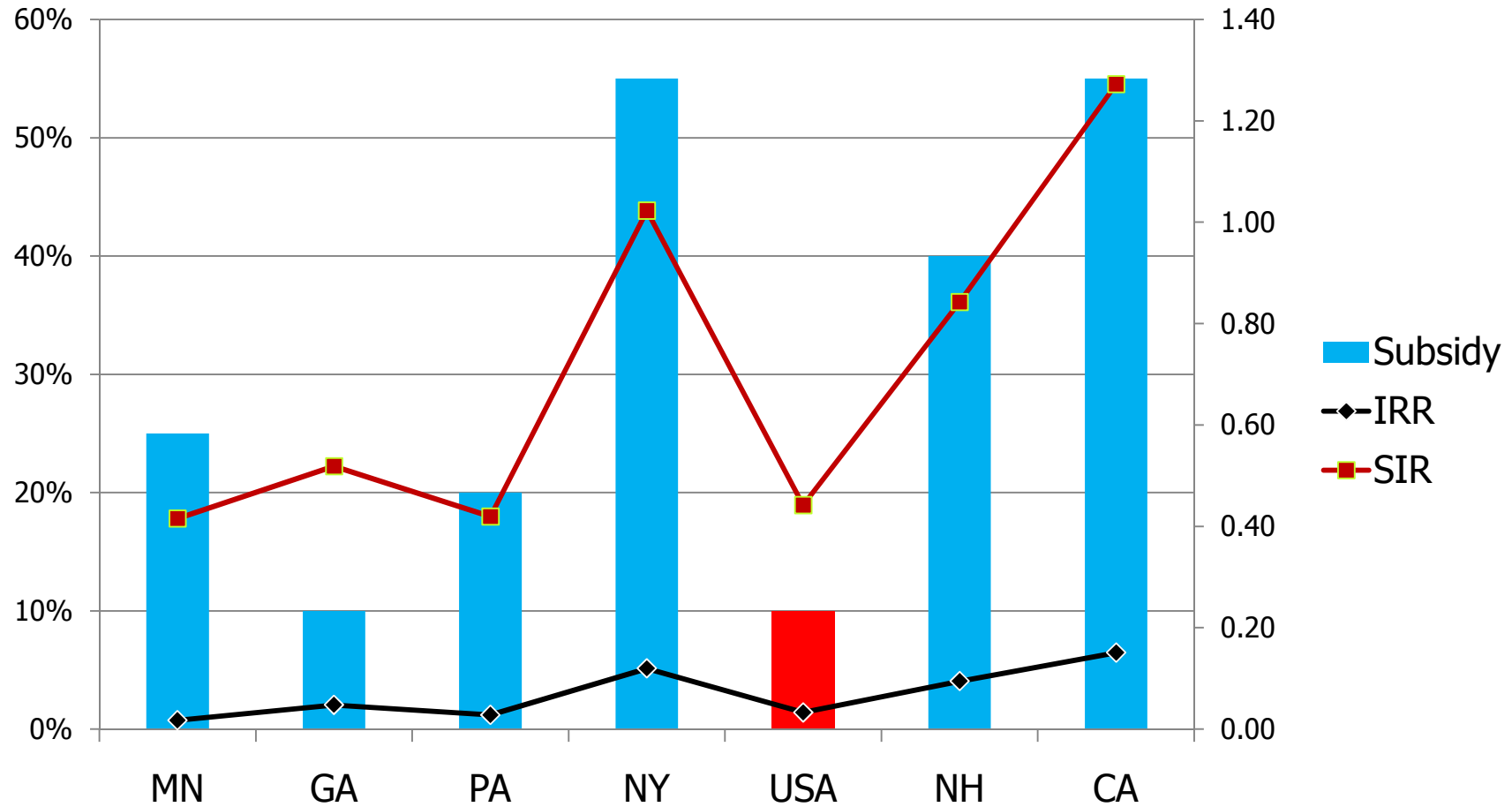


Gas = \$2 per Therm, Oil = \$4 per Gallon, Propane = \$4 per Gallon, kWh = \$.15

Solar Intensity and kWh Carbon combine to create \$/ton of Solar CO2 reduction

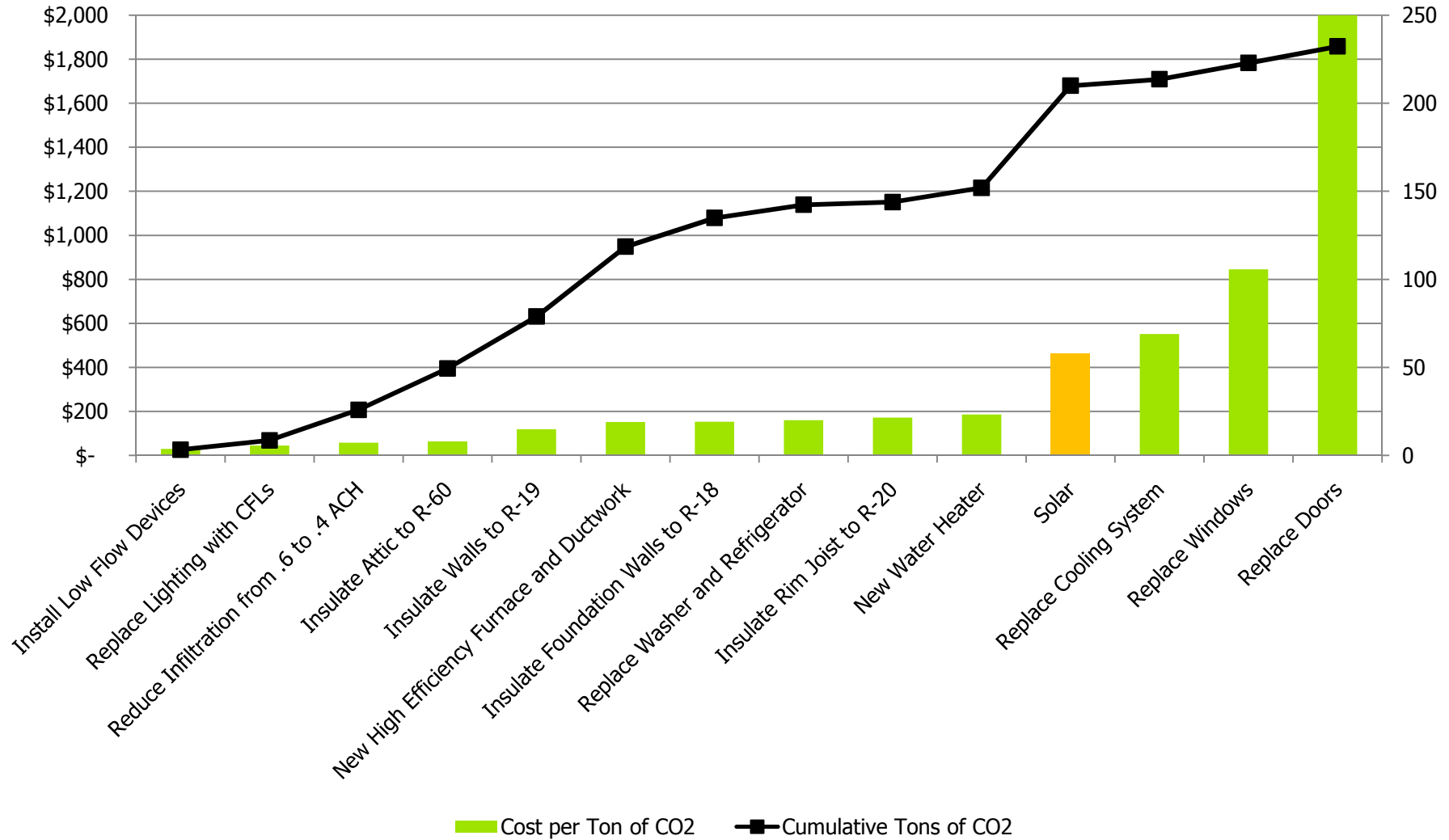


Solar Return on Investment with Subsidy



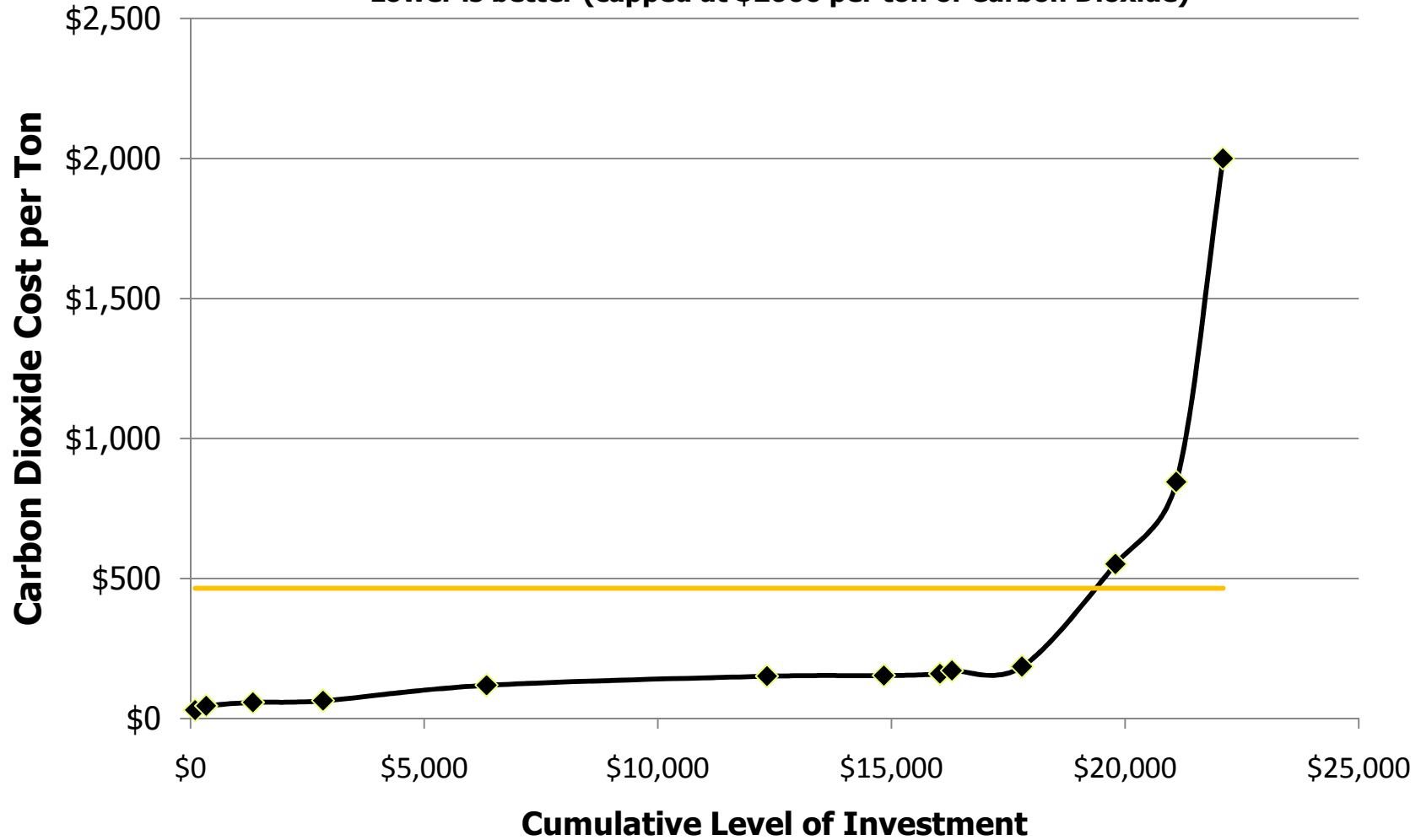
Cost per Ton of CO2 by Improvement

New York



New York Cost per Ton of Carbon

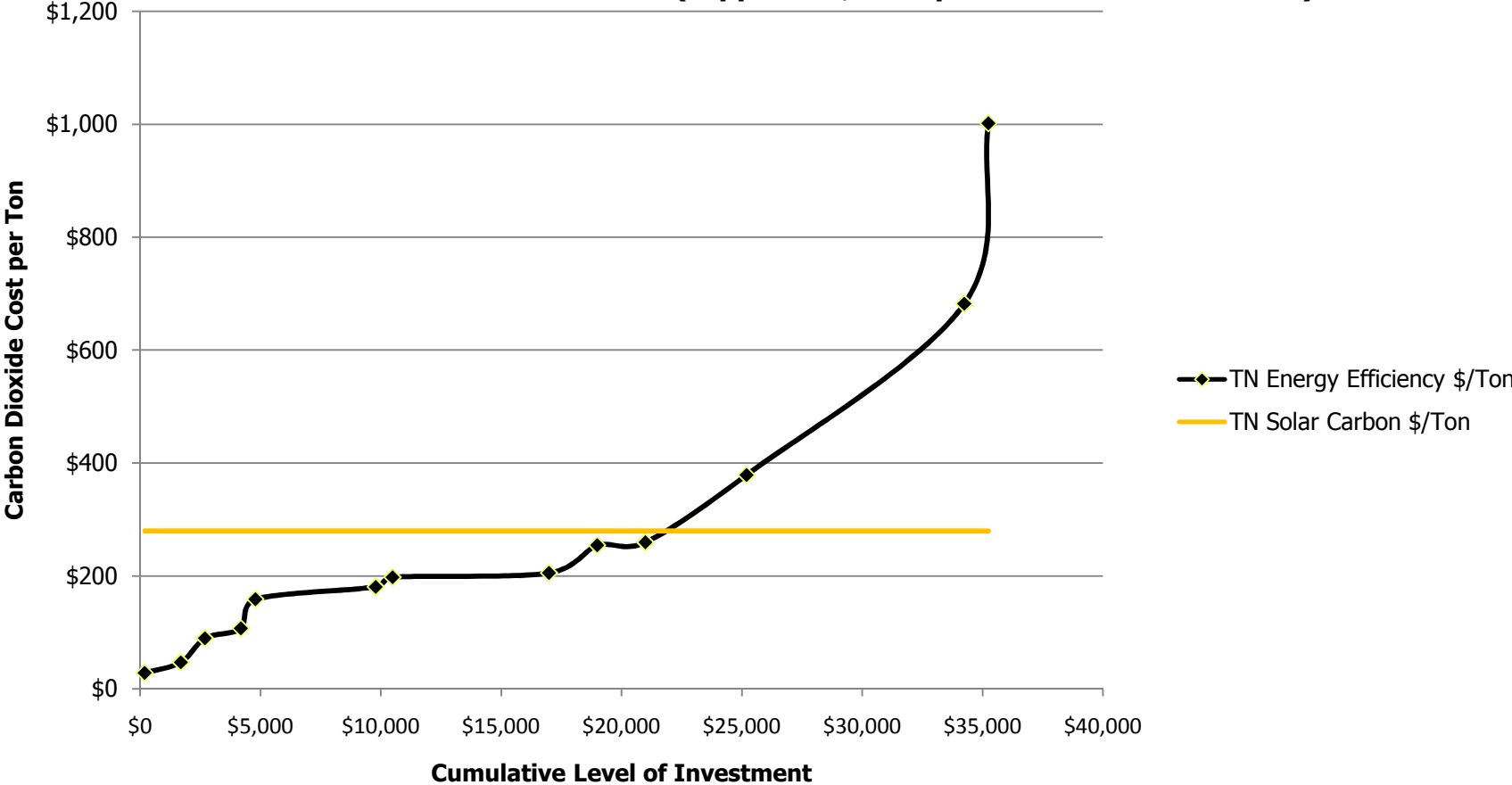
Lower is better (capped at \$2000 per ton of Carbon Dioxide)



◆ NY Energy Efficiency \$/Ton — NY Solar Carbon \$/Ton

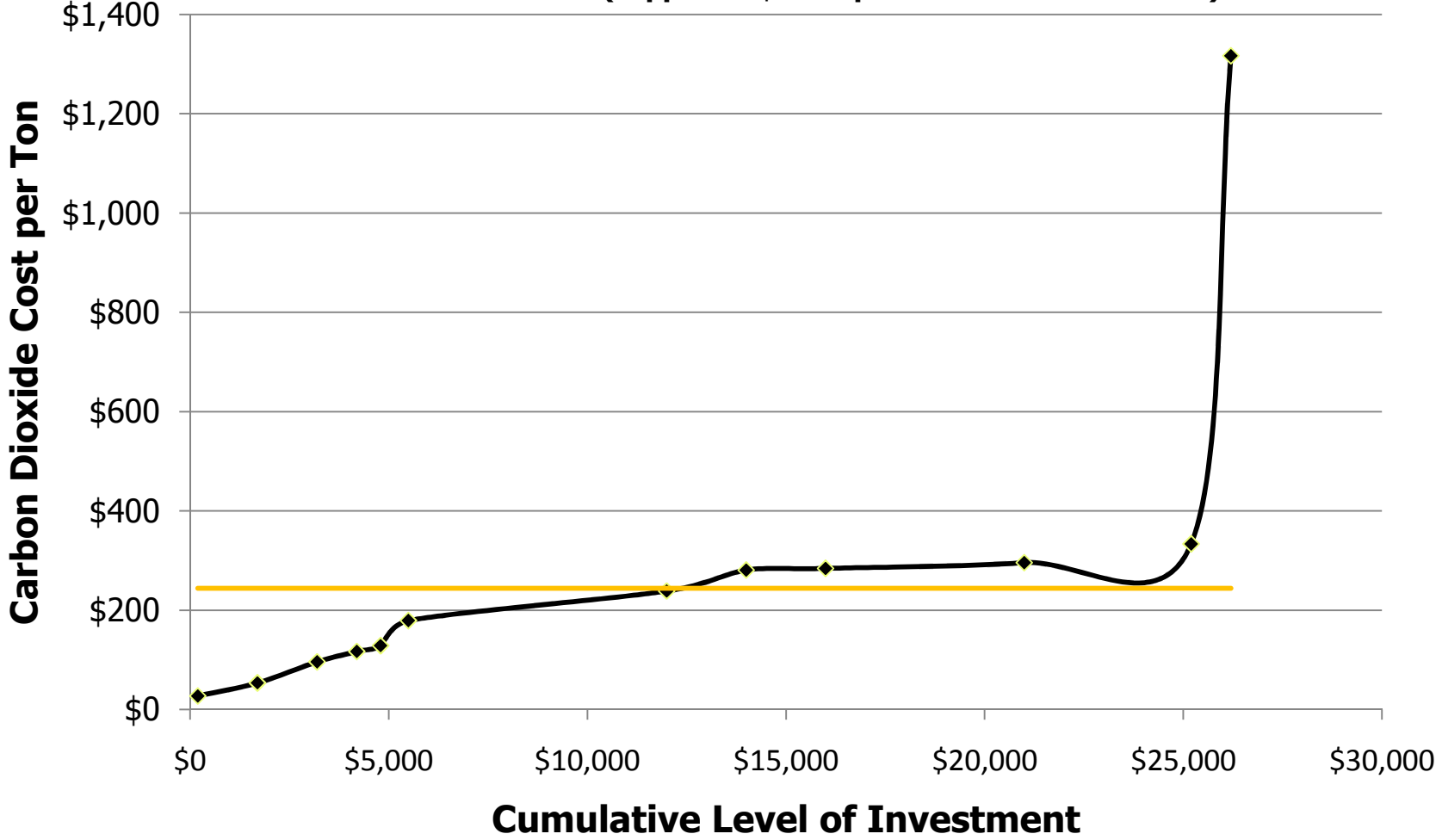
Tennessee Cost per Ton of Carbon Saved

Lower is better (capped at \$2000 per ton of Carbon Dioxide)



Georgia Cost per Ton of Carbon

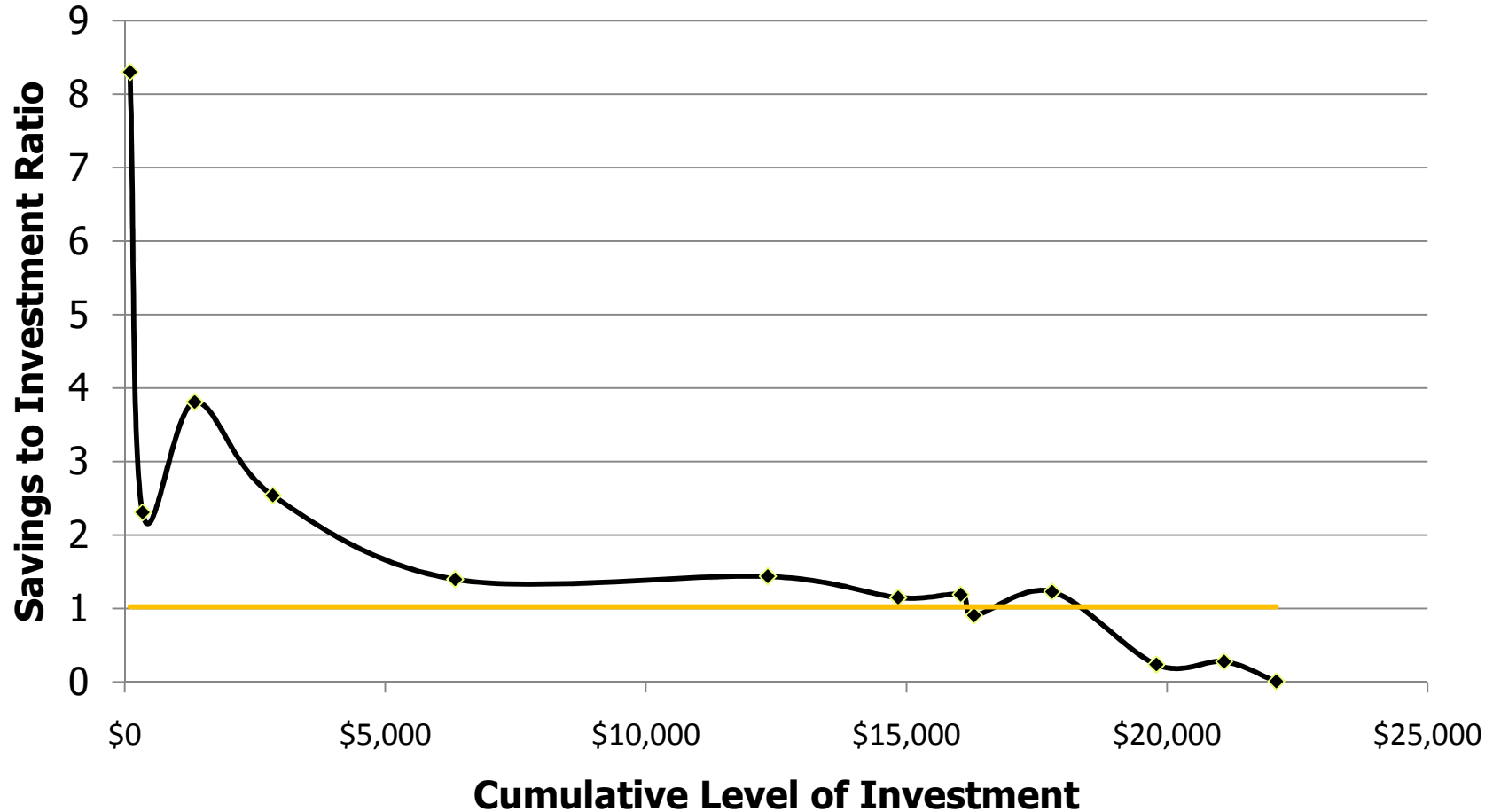
Lower is better (capped at \$2000 per ton of Carbon Dioxide)



—◆— GA Energy Efficiency \$/Ton — GA Solar Carbon \$/Ton

New York Savings to Investment Ratio Comparison

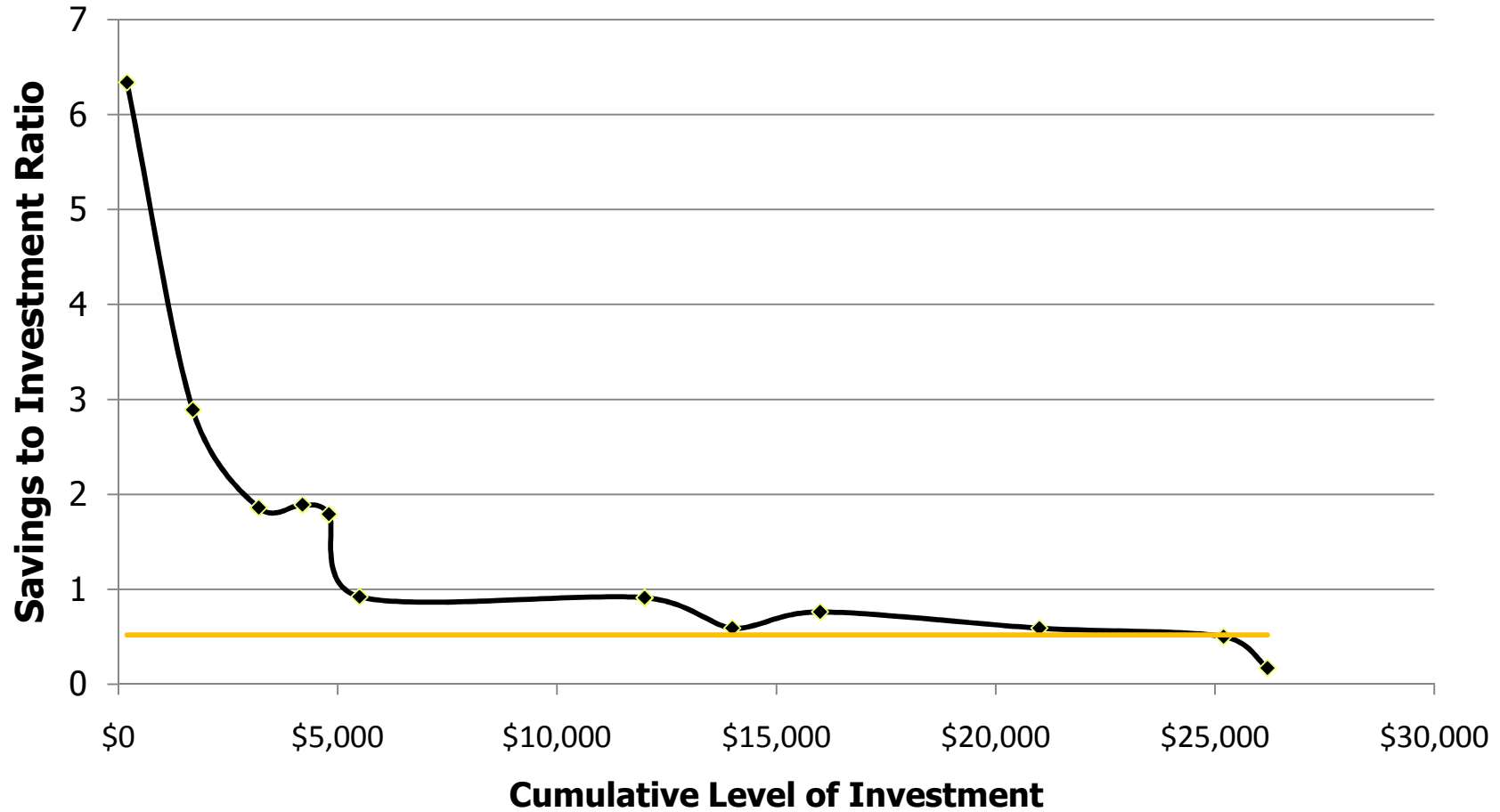
Higher is better (capped at SIR of 10)



◆ Eff SIR — Solar PV SIR

Georgia Savings to Investment Ratio Comparison

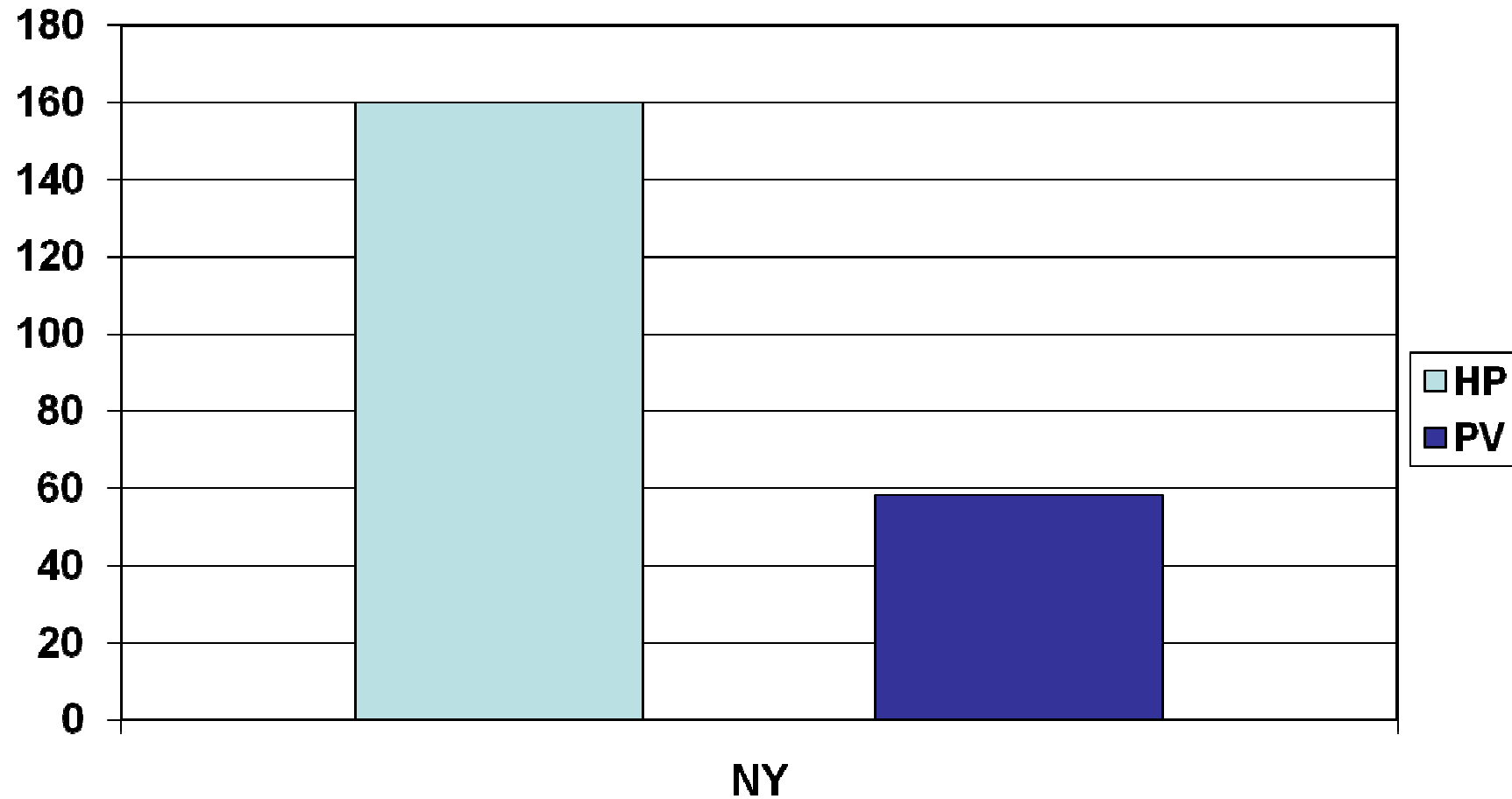
Higher is better (capped at SIR of 10)




◆ Energy Efficiency SIRs — Solar PV SIR

Total Lifetime Carbon Savings

An \$11K HP job vs an \$11K 3 kW PV job (after incentives)



Asset and Operational Ratings

Energy Certificate	Building Energy Performance >		As built:	In use:
	Certificate Type	Full	Asset Rating	Operational Rating
	Building Type	Office		
	Whole or part of building	Whole Building		
	Very energy efficient			
	A			
	B		B	
	C			
	D			D
	E			
	F			
	G			
	Not energy efficient			
	Asset rating method:	UK National Standard 2004	Calculated	Actual
	Operational rating method:	UK Office Tailored Benchmarks 2002	48	83
Units used:	Kg CO ₂ per sq m of net area per annum >			
Occupancy level	Square metres net usable area per person	14	14	
Equipment heat gain level:	Watts per square metre net	12	12	
Weekly occupancy hours	Hours per week	55	55	
Heating performance ratings		ABCDEFG	ABCDEFG	
HVAC performance ratings (cooling, fans and pumps)		ABCDEFG	ABCDEFG	
Lighting performance ratings		ABCDEFG	ABCDEFG	
Management rating (for in-use performance only)			ABCDEF	
Internal Environmental Quality			Not assessed	
Risk Level			Not assessed	
Further information can be found in the energy Log Book				
GB 2005				
		 Directive 2002/91/EC		

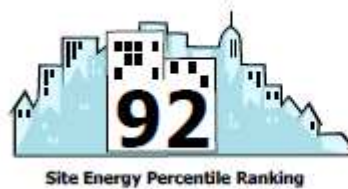
Energy Analysis Report

Pentagon Skyline

142 W. Clinton Street, NY, NY 12345

Owner: Energy Saver Co.
Year Built: 1921
Square Footage: 345,095 sf

Analysis Period: 12/1/2007 - 12/1/2008



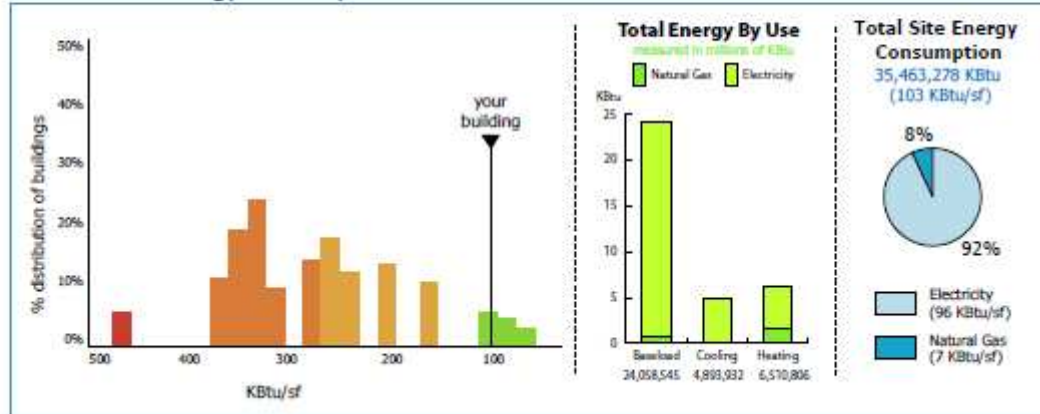
Total Carbon Footprint

3,450,950
lbs/year

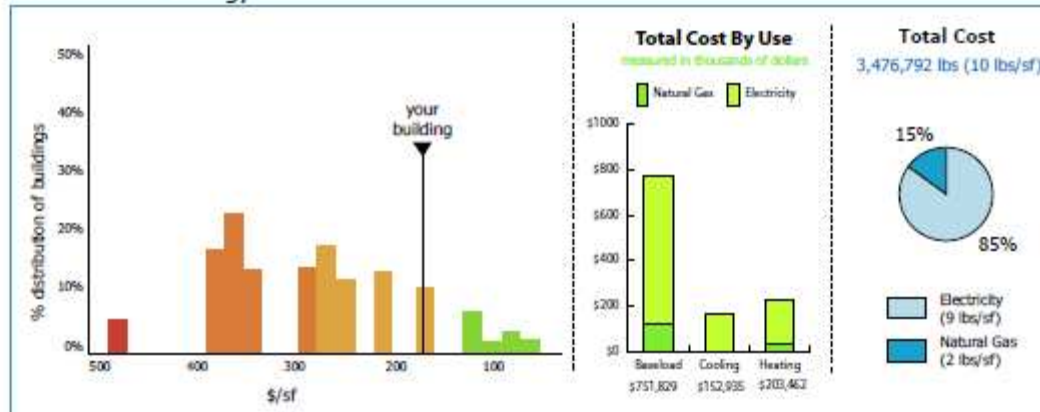
The total building energy is converted to one consistent unit (Btus) to allow for comparison with other buildings. It adjusts the energy used at the building to account for the source of fuel input at the power plant (i.e. coal, gas, oil, nuclear, renewables).

Report Date: April 19, 2009

Annual Site Energy Consumption



Total Annual Energy Cost



powered by BUILDING PERFORMANCE COMPASS

80

EPA
Portfolio Manager
Score

Scoring date:
02.15.09

FOCUS CRE BENCHMARKING SCORECARD

830 Main Street

830 Main Street
ny, NY 10022

Owner:

Year built: 1954

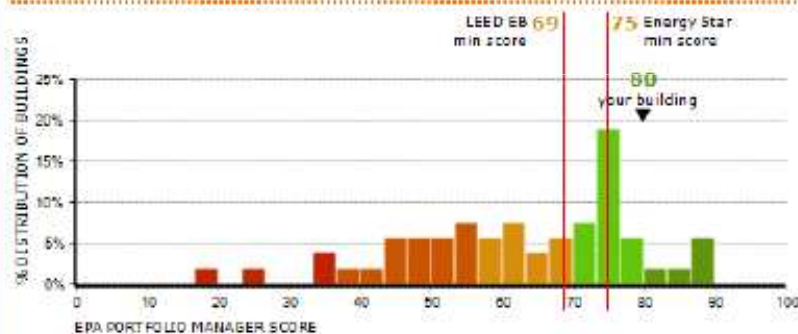
Square footage: 140,000 sf



Passed CRE Data Checks Data Verified By Engineer

Your building:

compared to the Portfolio Manager Score of other Focus CRE buildings that have received initial QA/QC.

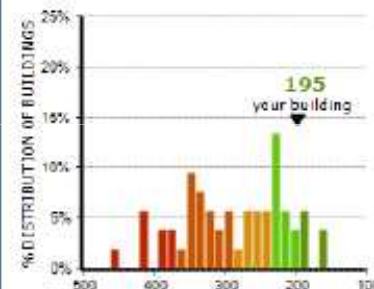


Implementation Contractor for NYSERDA's
Focus on Commercial Real Estate Program HR&A Advisors, Inc.
For more information, call 1-866-NYSERDA, or email: FocusCRE@nyseda.org

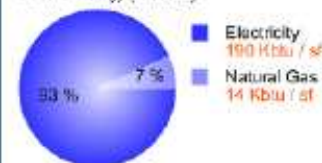
REGIONAL PERFORMANCE COMPARISON SOURCE ENERGY CONSUMPTION

This measurement converts all of the energy used in a building to one consistent unit (Btu) to allow for comparison with other buildings. It adjusts the energy used at the building to account for the source of fuel input at the power plant (i.e. coal, gas, oil, nuclear, renewables).

Total Annual Source Energy Consumption
Building: 20,942,066 kBtu (thousand Btu)
197 kBtu / sf



Annual Source Energy Consumption
Source energy (kBtu / sf)

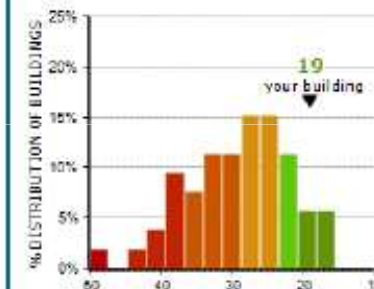


New York City building metrics reflect New York City specific source energy conversion factors.

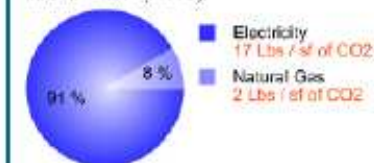
REGIONAL PERFORMANCE COMPARISON CARBON DIOXIDE IMPACT

This measurement converts all of the energy used in a building to one consistent unit (Btu) to allow for comparison with other buildings. It adjusts the energy used at the building to account for the source of fuel input at the power plant (i.e. coal, gas, oil, nuclear, renewables).

Total Annual Carbon Dioxide Impact
Building: 2,020,530 Lbs
19 Lbs / sf



Annual Carbon Dioxide Impact
Carbon dioxide (Lbs / sf)



New York City building metrics reflect New York City specific carbon conversion factors.

Home Energy Usage Report

page 1

How Does Your Home MEASURE UP?

0.7

EPA ENERGY STAR Home Energy Yardstick Results

Your Yardstick score is calculated against similar homes nationally and is scored between 0 and 10, with 10 being the most energy efficient. 5 is average.

Annual CO₂ Emissions:
33600 lbs of CO₂.

Your Home

Building Information:
123 E 45th Street
Testville, Alabama 10001

Occupants: 3

Square Footage: 2400

Year Built: 1/1/1950

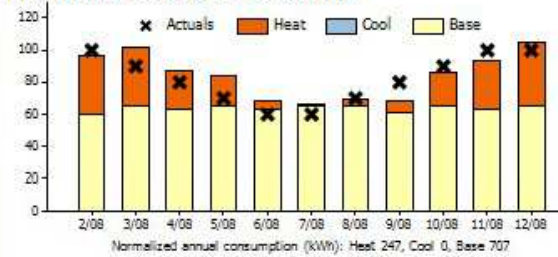
Hot Water Source:
Electricity

Annual Usage:
Electricity: 900 kWh/yr
Natural Gas: 2400 therms/yr
Propane: 250 gal/yr

Report Date: March 27, 2009

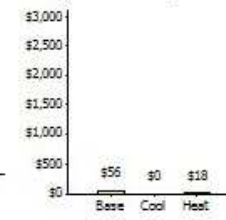
Your Energy Usage

Electricity Use By Month (kWh)

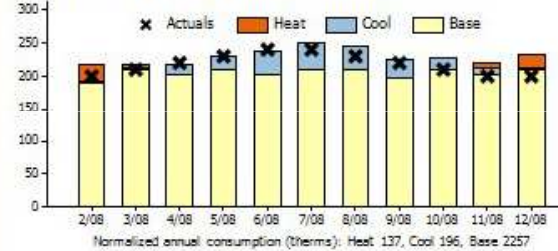


Electricity Cost By Use

Annual Energy Cost
Avg. unit cost: 8¢/kWh

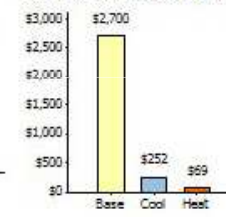


Natural Gas Use By Month (therms)

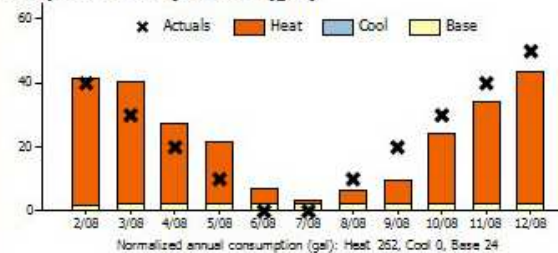


Natural Gas Cost By Use

Annual Energy Cost
Avg. unit cost: \$1.20/therms

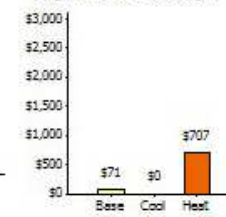


Propane Use By Month (gal)



Propane Cost By Use

Annual Energy Cost
Avg. unit cost: \$3.00/gal



Keystone HELP
HOME ENERGY LOAN PROGRAM

powered by **AFCFIRST**

PENNSYLVANIA DEPARTMENT OF ENVIRONMENTAL PROTECTION
PENNSYLVANIA TREASURY DEPARTMENT
PENNSYLVANIA HOUSING FINANCE AGENCY

Your Savings Potential

Category	20% Annual Savings
Electricity	
Heating	\$4
Cooling	\$0
Baseload	\$11
Natural Gas	
Heating	\$33
Cooling	\$47
Baseload	\$542
Propane	
Heating	\$157
Cooling	\$0
Baseload	\$14
Total Energy	
Heating	\$194
Cooling	\$47
Baseload	\$567

Your Carbon Footprint



In one year, your home uses the carbon of...

2.8 cars

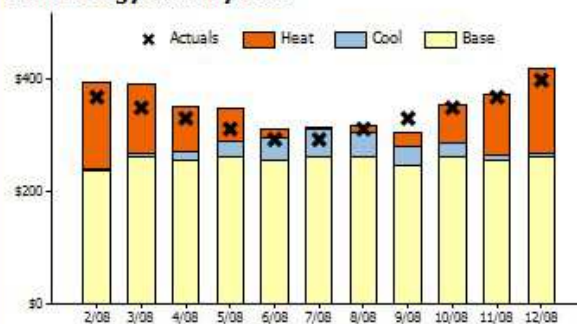
What's a Footprint?

A Carbon Footprint is a snapshot of how much greenhouse gas, or carbon dioxide (CO₂), is being produced in a particular span of time by an area, object, or person. In this case, it is a measure of your home's CO₂ production over a 12 month period. Typically the higher this is, the greater potential there is for reduction and savings.

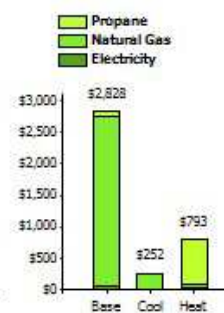
Report Date: March 27, 2009

Total Energy Usage

Total Energy Cost By Use



Total Cost By Use



5 Things You Can Do To Shrink Your Footprint

Cost effective energy use reductions of 40% to 50% can be realized when you use a whole house, performance tested approach on your current home.

- Set back your thermostat:** Setting thermostats down to 60 degrees when you are in bed or away saves significant energy. Automatic thermostats, adjusted to your schedule, make this very easy.
- Stop using unnecessary refrigerators:** Refrigerators significant energy users. Turn off unused refrigerators that are only needed seasonally, and consolidate the contents of nearly empty refrigerators and freezers.
- Lower your water heater tank temperature setting:** Reducing hot water tank temperature down to 120 degrees, or lower, can save significant energy, while reducing the risk of scalding. This lower setting will not reduce your bathing enjoyment.
- Use compact fluorescent or LED lighting:** Compact fluorescent light (CFL) bulbs are a very cost effective way to reduce energy consumption. They are available in many sizes and shapes for most any location. LED bulbs are even more efficient than CFL and are extraordinarily effective for many locations.
- Use a low-flow showerhead:** Heating water takes energy, so using half the amount of hot water saves substantial energy. There are a wide variety of low-flow showerheads available that provide a satisfying experience while conserving energy.

Carbon Savings Potential

Electricity

20% Annual Savings

Heating 68 lbs CO₂
Cooling 0 lbs CO₂
Baseload 194 lbs CO₂

Natural Gas

20% Annual Savings

Heating 321 lbs CO₂
Cooling 458 lbs CO₂
Baseload 5281 lbs CO₂

Propane

20% Annual Savings

Heating 1153 lbs CO₂
Cooling 0 lbs CO₂
Baseload 105 lbs CO₂

Total Energy

10% Annual Savings

Heating 1542 lbs CO₂
Cooling 458 lbs CO₂
Baseload 5579 lbs CO₂

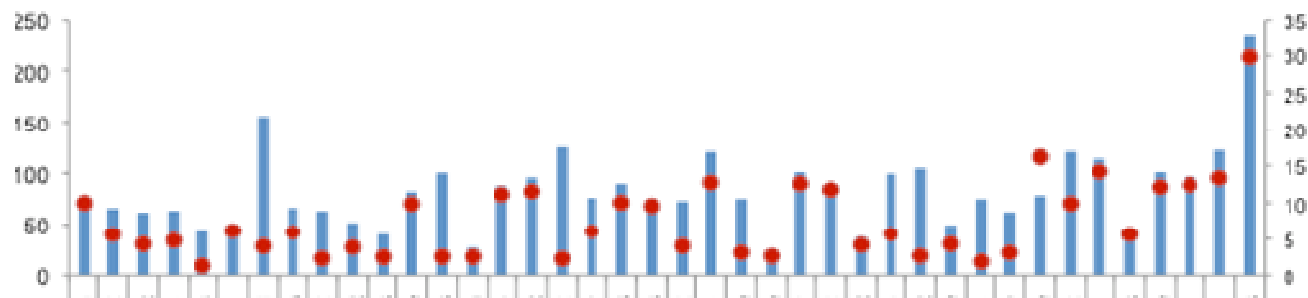
Explanation of Terms

Baseload energy is the energy not affected by outdoor temperature. This includes appliances, lighting, and hot water.

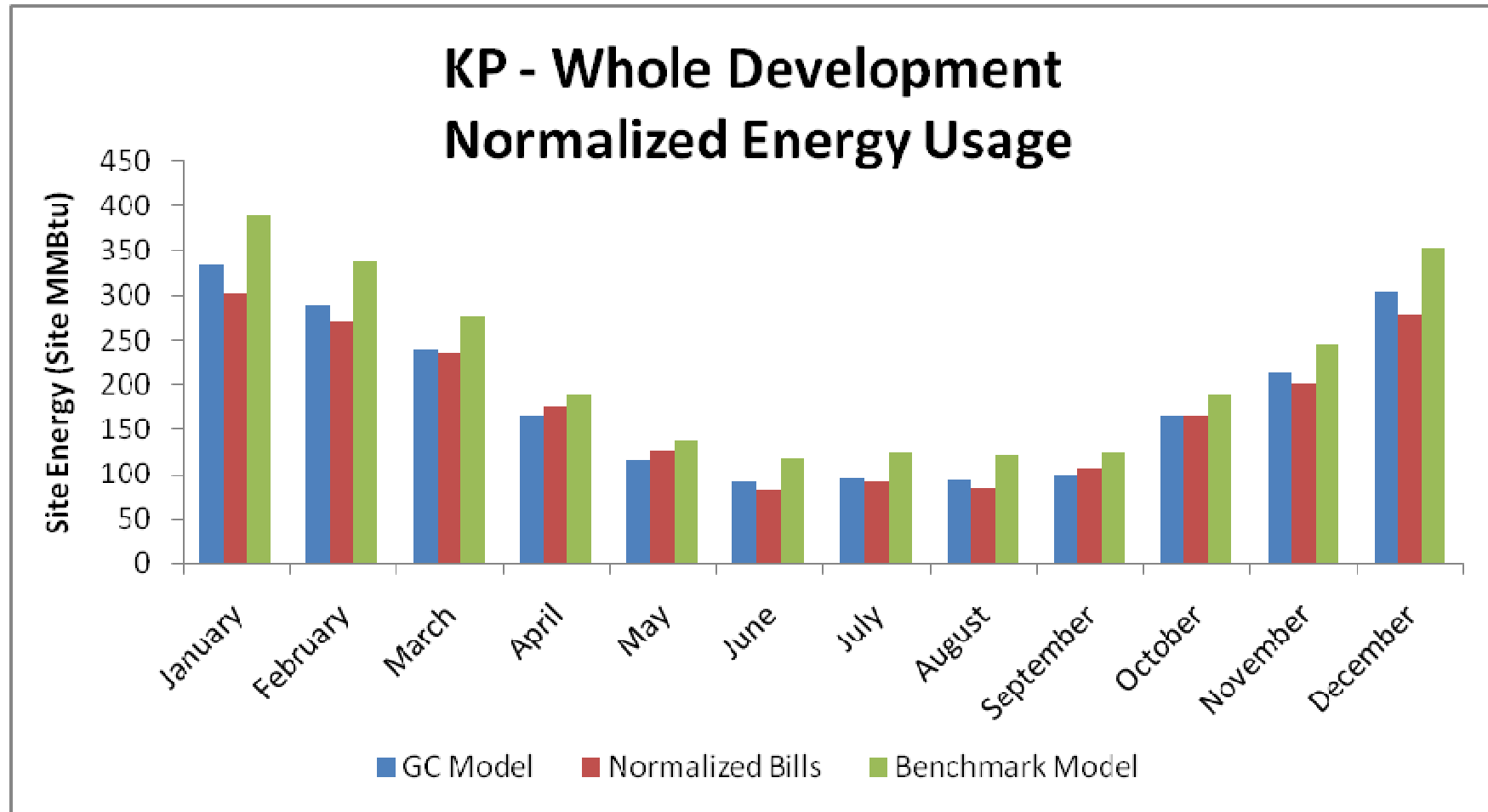
Actuals are your recorded monthly consumption.

Relative Source and Carbon Impacts Across Multifamily Developments

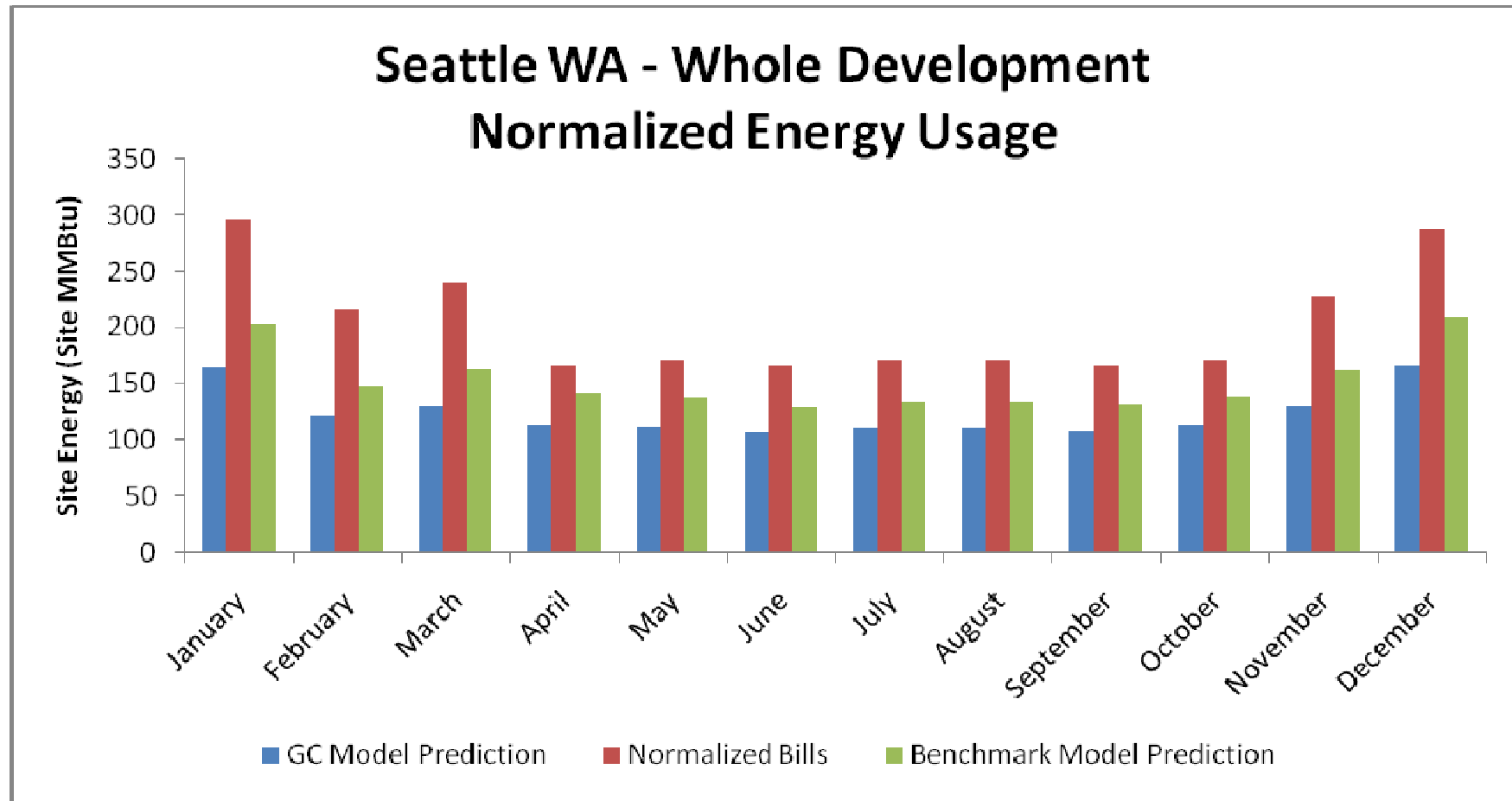
Source Energy & Carbon Intensities of Green Communities Developments



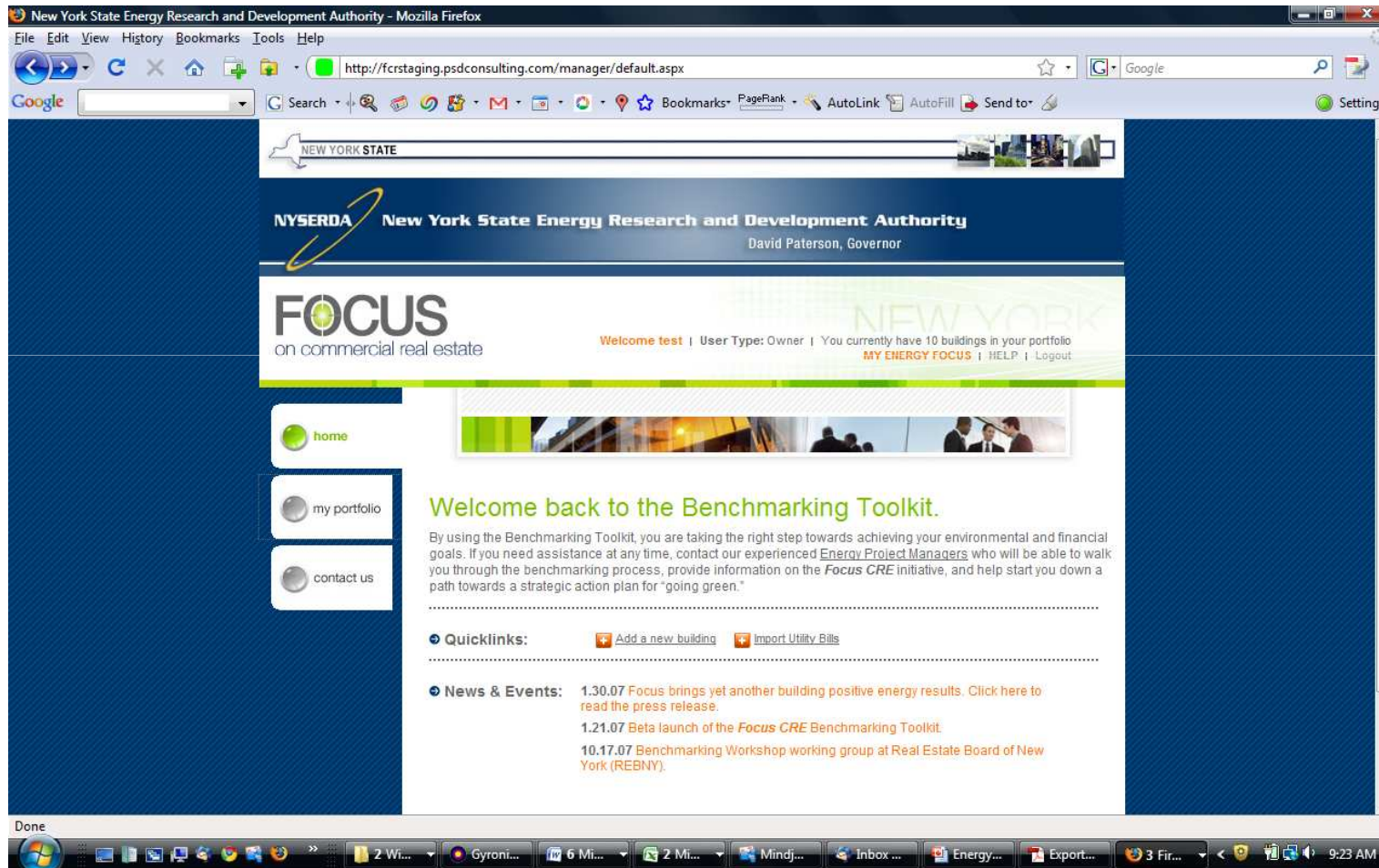
Actual Performance as Expected



Poor Performance Detected



NYSERDA Benchmarking Tool



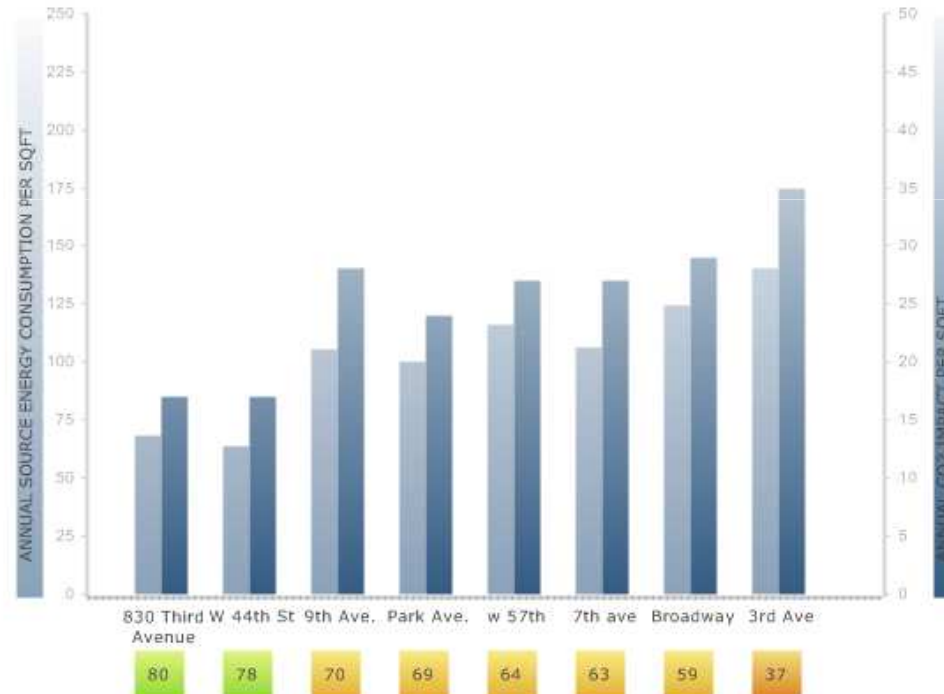
Compare to Your Community



Compare Buildings You Support

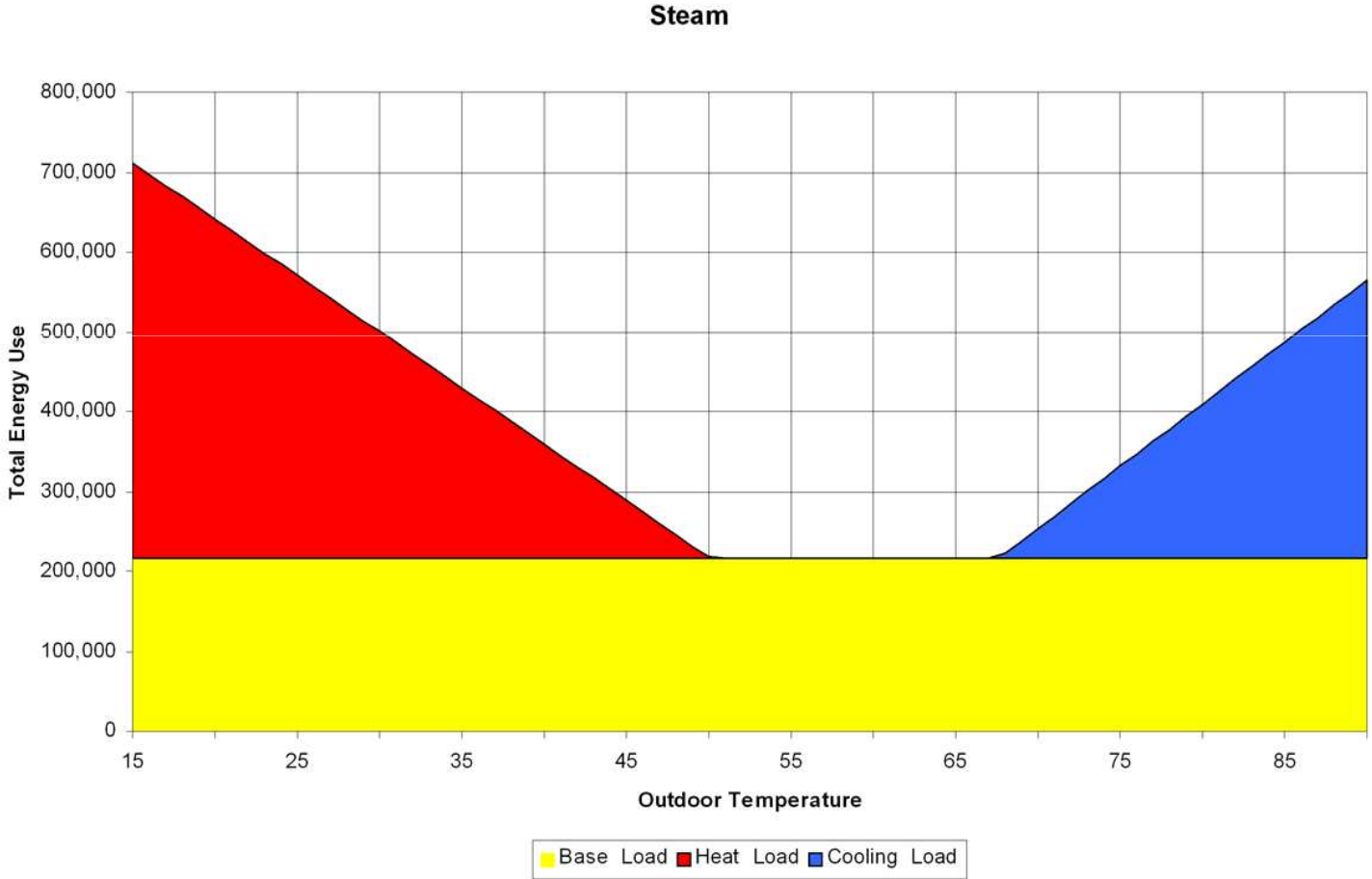
Building Portfolio Summary

Source Energy Consumption and Carbon Dioxide Impact

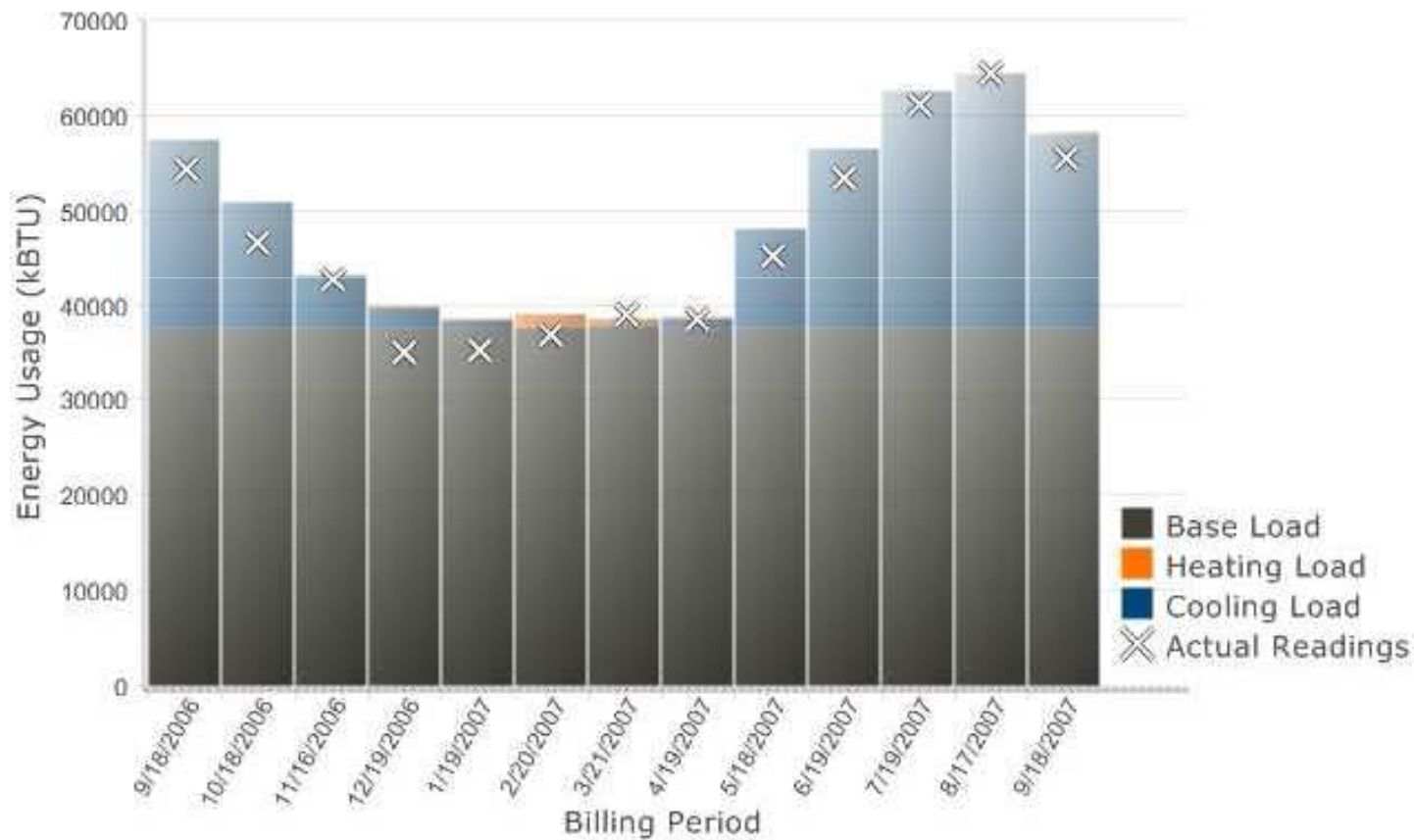


* New York City Metrics reflect New York City Specific Energy Usage Factors

Understand Building Performance



Track Energy Over Time





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