

# Co-Benefits Risk Assessment (COBRA) Screening Model

A Tool For Estimating  
Air Quality, Human Health and Societal Benefits

A Presentation to the NYS Climate Smart Communities  
By Denise Mulholland





# Co-Benefits Risk Assessment (COBRA) Screening Model At-A-Glance



Energy choices affect peoples' health and social wellbeing. Yet, often policymakers consider only the economic costs of the investment – just a part of the story – and not the benefits.



State and local policymakers can use COBRA to estimate the economic value of human health improvements associated with clean and renewable energy projects and tell the whole story.



State and local policymakers can also use COBRA to estimate and present via easy-to-read maps the local impacts of switching to clean energy.





# Energy Choices Matter



## Energy from Fossil Fuels

- In 2010, fossil fuels accounted for 70% of the almost 4 trillion kWh of electricity generated in the U.S.
- Burning fossil fuels causes emission of air pollutants like particulate matter, carbon monoxide, sulfur dioxide, and nitrogen oxides.
- Electricity generation is the largest source of U.S. CO2 emissions, representing 38% of total emissions and contributing to climate change in the long term.

Major Source of Air Pollution

Harms Health

- Air pollution decreases the quality of air and increases:
  - Respiratory and cardiovascular illnesses, such as asthma, chronic bronchitis, and heart attacks; and
  - Premature death.
- Children and the elderly are most vulnerable.

- These health effects result in:
  - Work days lost due to illness of employee or family member;
  - School days lost;
  - Medical bills; and
  - Pain and suffering.

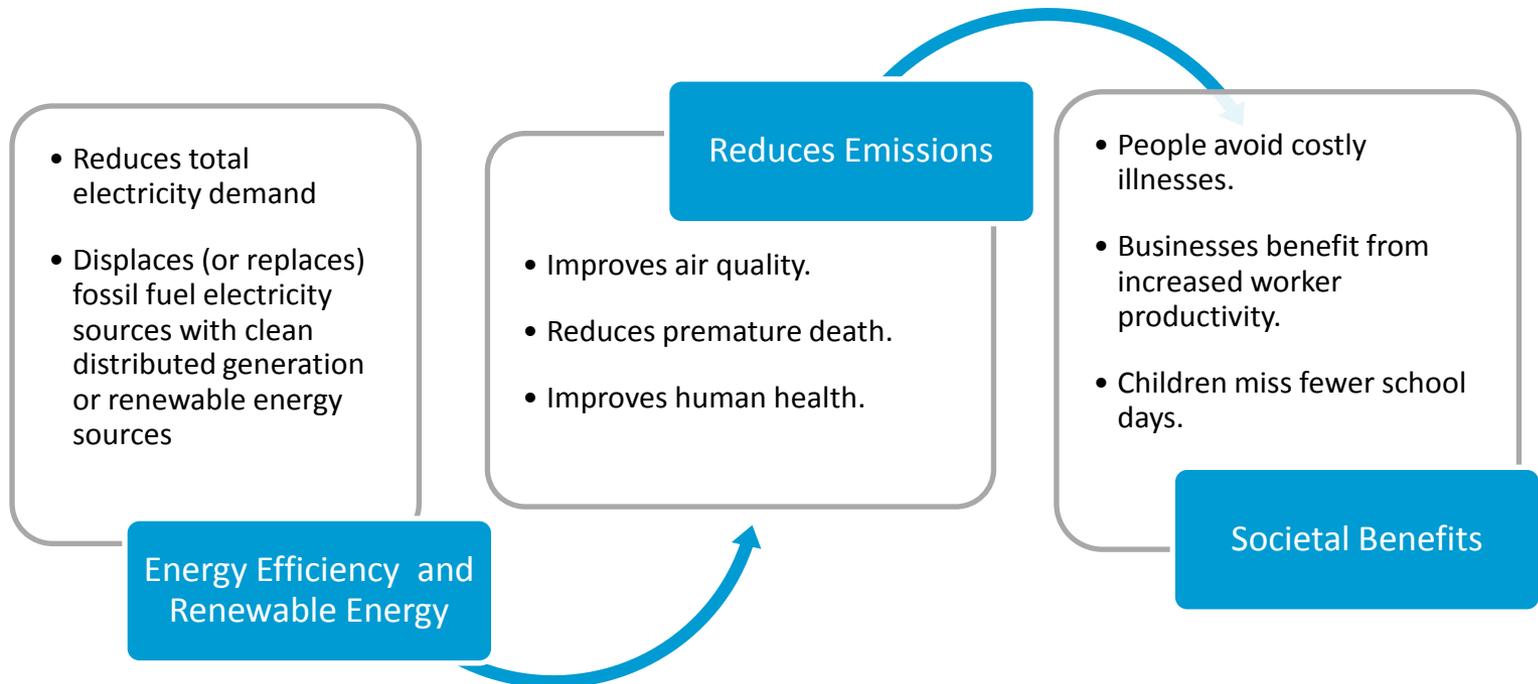
Societal Costs





# Energy Choices Matter

## Clean Energy





# What is COBRA and How Does It Work?



COBRA<sup>1</sup> is a screening model that converts emission reductions into changes in air quality and estimates the number of cases of illness and death avoided as well as the economic value of those benefits.

**Inputs = Change in 2017 Emissions**  
- PM2.5, SO2, NOx, NH3, VOCs



**Outputs = Tables and maps of illnesses and deaths avoided and the related economic value.**

<sup>1</sup>COBRA is a peer-reviewed screening model that based on rigorous methods used by EPA health benefits assessments as described in the User Manual.

<sup>2</sup> COBRA estimates only particulate matter-related benefits and may be conservative in that respect.



# Human Health Effects in COBRA

- COBRA estimates the number of health incidences avoided AND the related economic value for the following:
  - Adult Mortality,
  - Infant Mortality,
  - Non-fatal Heart Attacks,
  - Respiratory Hospital Admissions,
  - Cardiovascular-related Hospital Admissions,
  - Acute Bronchitis,
  - Upper Respiratory Symptoms,
  - Lower Respiratory Symptoms,
  - Asthma Exacerbations (attacks, shortness of breath, & wheezing),
  - Asthma Emergency Room visits,
  - Minor Restricted Activity Days,
  - Work Loss Days





# Who can use COBRA and For What?

Analysts, planners and officials from environmental, health, energy, transportation and economic development agencies can use COBRA to understand and communicate the potential for health and related economic benefits of clean energy. COBRA can be used:



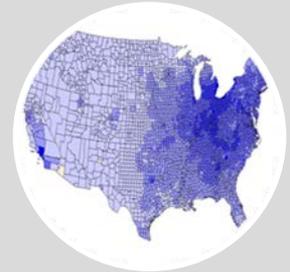
To quickly and inexpensively compare different clean energy policies and identify those that:

- Are likely to result in the greatest health benefits
- Are expected to reduce health risks in the most cost-effective manner



To estimate and promote improvements in air quality and economic value of associated human health benefits of:

- Clean and/or renewable energy projects
- Other types of projects, such as transportation or municipal waste



To visually convey - using COBRA's mapping capabilities - how clean energy benefits can go beyond a single county and impact people at the state, regional, and national levels





# Case Study: Estimate the health and related economic benefits of a local energy efficiency or renewable energy program



- Here, we explore the benefits associated with increasing the efficiency of municipal facilities and operations in Wise County, Virginia.
- Modeled after another program, Fresh AIRE - Arlington Initiative to Reduce Emissions, assume Wise County can achieve similar reductions in annual electricity use: 3,000,000 kWh from county buildings
- We used eGrid\* Non-baseload output emissions rates for Virginia to estimate the emissions impacts:
  - 3,000,000 kWh = 3,000 MWh
  - 3,000 MWh \* 5.0473 lbs SO<sub>2</sub> per MWh = 15,142 lbs SO<sub>2</sub>
  - 3,000 MWh \* 1.3047 lbs NO<sub>x</sub> per MWh = 3,914 lbs NO<sub>x</sub>

\* eGRID is available at <http://www.epa.gov/cleanenergy/energy-resources/egrid/index.html>



# Enter Data Into COBRA



Define scenario

VA

- Select your location(s) and enter emission reductions by category

**Define Virginia's emission increases/reductions:**

statewide

for individual counties:

<input type="checkbox"/> Scott	<input type="checkbox"/> Warren
<input type="checkbox"/> Shenandoah	<input type="checkbox"/> Washington
<input type="checkbox"/> Smyth	<input type="checkbox"/> Westmoreland
<input type="checkbox"/> Southampton	<input checked="" type="checkbox"/> Wise
<input type="checkbox"/> Spotsylvania	<input type="checkbox"/> Wythe
<input type="checkbox"/> Stafford	<input type="checkbox"/> York
<input type="checkbox"/> Suffolk	
<input type="checkbox"/> Surry	
<input type="checkbox"/> Sussex	
<input type="checkbox"/> Tazewell	
<input type="checkbox"/> Virginia Beach	

<-- Back      Continue -->

VA

Wise

To change emissions estimates, click on a source category and enter your changes in the panel below. You MUST click the Apply Edits button after editing each source category for your changes to be recorded.

**Currently active category:**

FUEL COMB. ELEC. UTIL.

- CHEMICAL & ALLIED PRODUCT MFG
- FUEL COMB. ELEC. UTIL.
  - COAL
  - GAS
  - INTERNAL COMBUSTION
  - OIL
  - OTHER
- FUEL COMB. INDUSTRIAL
- FUEL COMB. OTHER
- HIGHWAY VEHICLES
- METALS PROCESSING
- MISCELLANEOUS
- NATURAL SOURCES
- OFF-HIGHWAY

PM 2.5:  reduce by   percent  tons

SO2:  reduce by   percent  tons

NOx:  reduce by   percent  tons

NH3:  reduce by   percent  tons

VOC:  reduce by   percent  tons

Apply Edits

<< Back

Summarize Edits

Run Scenario >>





# View Results – As A Table...

COBRA Screening Model

File View Help

Overview Emissions **Wise County**

Air Quality: Tables Health Effects: Tables Results: Maps

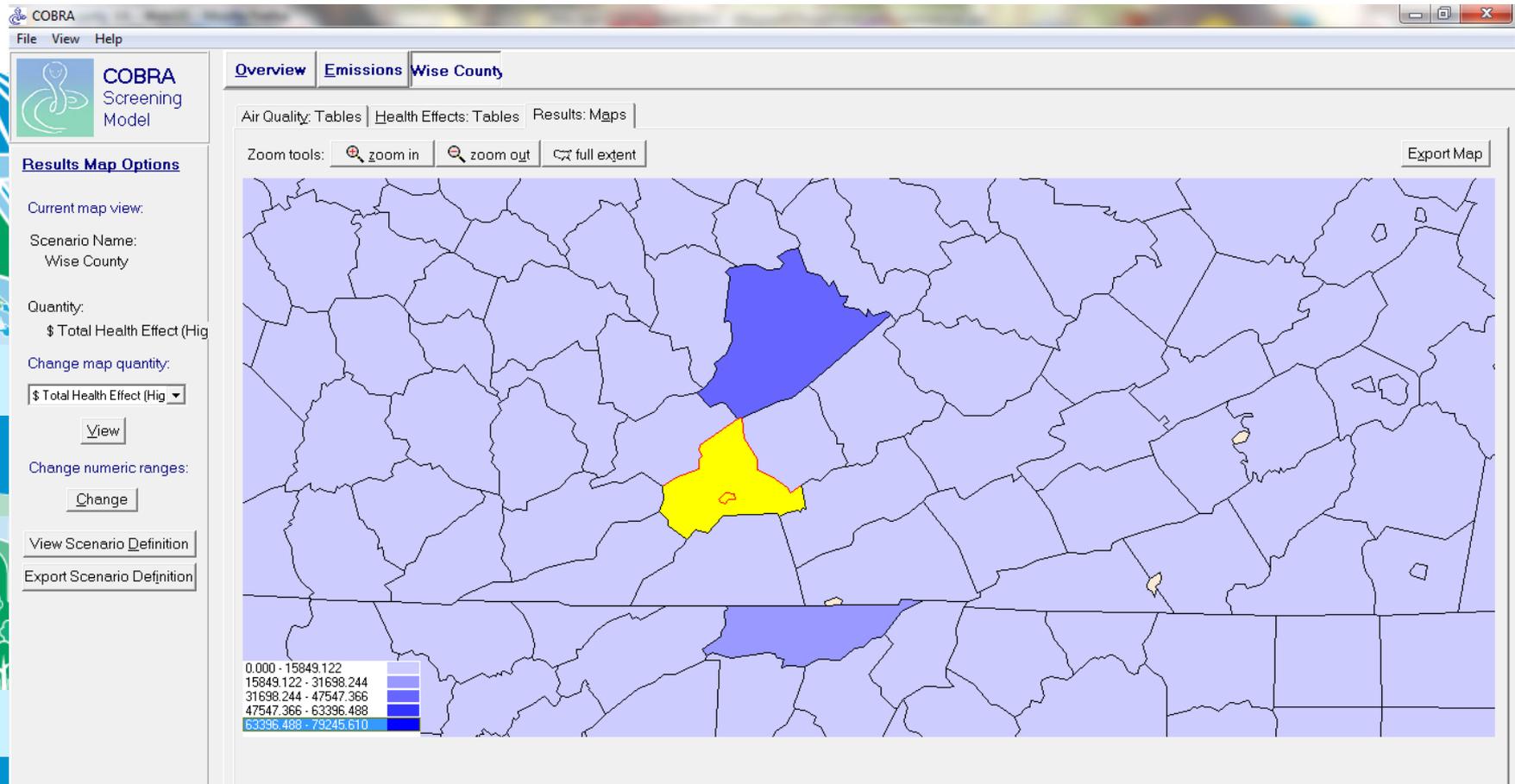
Export current data view

State	County	FIPS	\$ Total Health Effects (H)	\$ Total Health Effects (L)	Adult Mortality (C)	\$ Adult Mortality (low)	Adult Mortal	\$ Adult Mortality (high)	Infant Morta	\$ Infant Mortality	Non
VA	Rockbridge	51163	636.49	249.2	0	245.58	.0001	628.75	0	.42	
VA	Rockingham	51165	1,696.09	663.65	.0001	650.54	.0002	1,671.16	0	1.9	
VA	Russell	51167	4,749.03	1,843.53	.0002	1,821.33	.0006	4,700.98	0	1.66	
VA	Scott	51169	5,358.93	2,099.54	.0002	2,076.29	.0006	5,306.18	0	2.37	
VA	Shenandoah	51171	754.31	295.07	0	290.96	.0001	745.46	0	.46	
VA	Smyth	51173	2,982.92	1,164.14	.0001	1,150.92	.0004	2,953.92	0	1.5	
VA	Southampton	51175	464.73	181.9	0	179.65	.0001	459.64	0	.22	
VA	Spotsylvania	51177	1,820.49	712.68	.0001	696.26	.0002	1,790.2	0	2.95	
VA	Stafford	51179	1,087.75	426.72	0	415.25	.0001	1,067.1	0	1.63	
VA	Surry	51181	88.5	34.56	0	33.93	0	87.18	0	.07	
VA	Sussex	51183	330.85	129.47	0	127.76	0	327.32	0	.26	
VA	Tazewell	51185	5,716.78	2,233.16	.0003	2,208.04	.0007	5,661.1	0	3	
VA	Warren	51187	523.64	203.37	0	199.59	.0001	516.22	0	.59	
VA	Washington	51191	8,036.3	3,146.48	.0004	3,106.13	.0009	7,949.68	0	5.6	
VA	Westmoreland	51193	276.35	108.12	0	106.63	0	273.11	0	.22	
VA	Wise	51195	79,245.61	30,885.15	.0036	30,497.26	.0093	78,431.17	0	48.23	
VA	Wythe	51197	1,443.21	565	.0001	556.95	.0002	1,425.94	0	.93	
VA	York	51199	1,165.68	455.42	.0001	446.71	.0001	1,147.53	0	.92	
VA	Alexandria	51510	1,024.69	402.49	0	391.82	.0001	1,004.05	0	1.74	
VA	...	...	...	...	...	...	...	...	...	...	...
			\$232,146.96	\$90,681.42	.0106	\$89,314.11	.0272	\$229,345.77	.0000	\$182.06	

View Scenario Definition  
Export Scenario Definition



# EPA ... Or a Map



For more information or to download COBRA, go to:

<http://www.epa.gov/statelocalclimate/resources/cobra.html>

# Greenhouse Gas Equivalencies Calculator

A Tool For Communicating  
Greenhouse Gas Emission Reductions  
In Terms People Understand



State and Local  
Climate and Energy Program





# Greenhouse Gas Equivalencies Calculator

Did you ever wonder what reducing carbon dioxide (CO<sub>2</sub>) emissions by 1 million metric tons means in everyday terms? The greenhouse gas equivalencies calculator can help you understand just that, translating abstract measurements into concrete terms you can understand, such as "equivalent to avoiding the carbon dioxide emissions of 183,000 cars annually."

This calculator may be useful in communicating your greenhouse gas reduction strategy, reduction targets, or other initiatives aimed at reducing greenhouse gas emissions.

## Enter Your Data

There are two options for entering reduction data into this calculator.

If You Have Energy Data

If You Have Emissions Data

Please note that these estimates are approximate and should not be used for emission inventory or formal carbon footprinting exercises. Read more about the caveats and explanations on the [Calculations and References page](#)

3000000

Calculate

- choose a unit -
- choose a unit -
- gallons of gasoline
- kilowatt-hours of electricity
- therms of natural gas
- passenger vehicles

Available at:

<http://www.epa.gov/cleanenergy/energy-resources/calculator.html>



# Communicate With The Results

## Equivalency Results

The sum of the greenhouse gas emissions you entered above is Carbon Dioxide Equivalent. This is equivalent to:

2,117 Metric Tons of

## Annual greenhouse gas emissions from

441 <sup>i</sup>

---



passenger vehicles

793 <sup>i</sup>

---



tons of waste sent to the landfill instead of recycled

Plus other equivalencies, including annual home electricity use, railcars full of coal, propane cylinders for BBQs, barrels of oil, annual power plant emissions, carbon stored by trees, etc.

## CO<sub>2</sub> emissions from

-or-

237,293 <sup>i</sup>

---



gallons of gasoline consumed

27.9 <sup>i</sup>

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tanker trucks' worth of gasoline

106 <sup>i</sup>

---



homes' energy use for one year

-or-

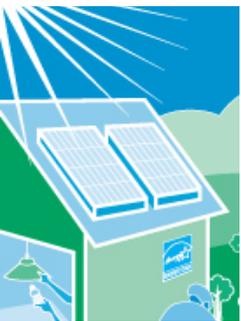
-or-

-or-





# How can I learn more?



## Contact:

Denise Mulholland

EPA State and Local Climate and Energy Programs

(202) 343-9274

[Mulholland.Denise@epa.gov](mailto:Mulholland.Denise@epa.gov)



State and Local  
Climate and Energy Program



 ENERGY STAR®  
**PortfolioManager®**

Leslie Cook  
US Environmental Protection Agency  
ENERGY STAR Commercial Buildings

# ENERGY STAR

## Commercial Buildings Program

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- Offers a strategic approach to energy management
- Enables building owners, managers, and tenants to save money & protect the environment
- Provides organizations with measurable information on energy savings and greenhouse gas emissions reductions from commercial buildings
- Builds on strong ENERGY STAR brand recognition
- ENERGY STAR on a building = Superior Energy Performance
- Benchmarking is the first step

- **Management Tool** – Helps business and organizations by offering a platform to:
  - Assess whole building energy and water consumption
  - Track changes in energy, water, greenhouse gas emissions, and cost over time
  - Track green power purchase
  - Share/report data with others
  - Create custom reports
  - Apply for ENERGY STAR certification
- **Metrics Calculator** – Provides key performance metrics to integrate into a strategic management plan
  - Energy consumption (source, site, weather normalized)
  - Water consumption (indoor, outdoor)
  - Greenhouse gas emissions (indirect, direct, total, avoided)
  - ENERGY STAR 1-to-100 score (available for many building types)

→ **Accessible in a free, online secure platform:**  
[www.energystar.gov/benchmark](http://www.energystar.gov/benchmark)

# Understand Comparative Performance

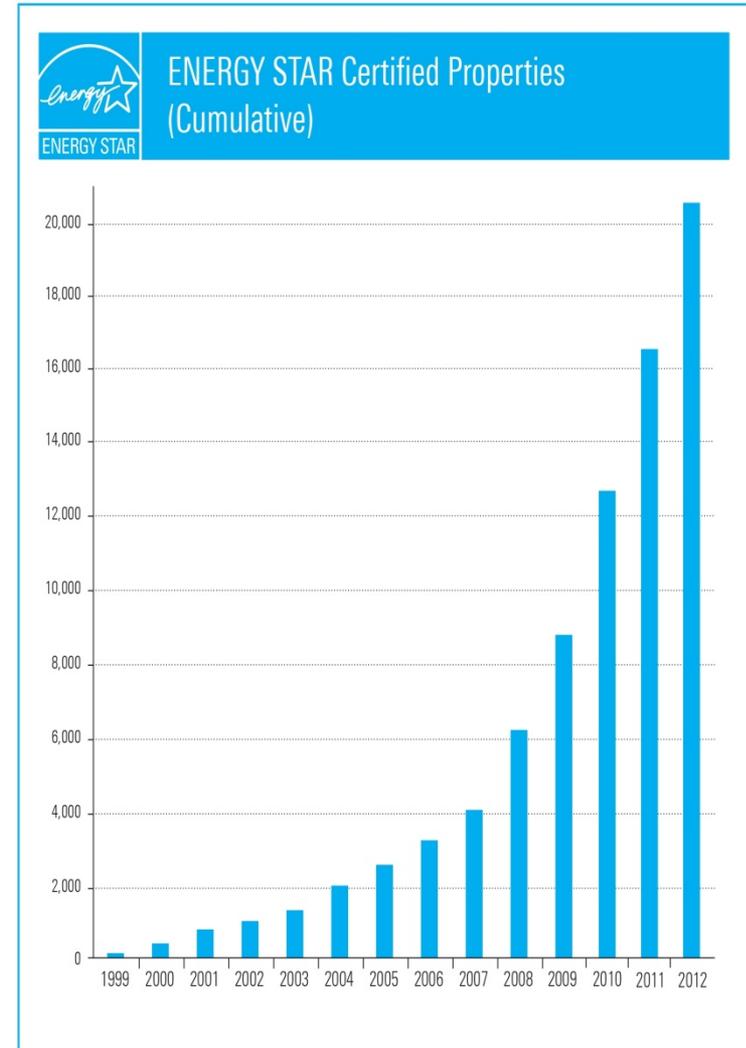
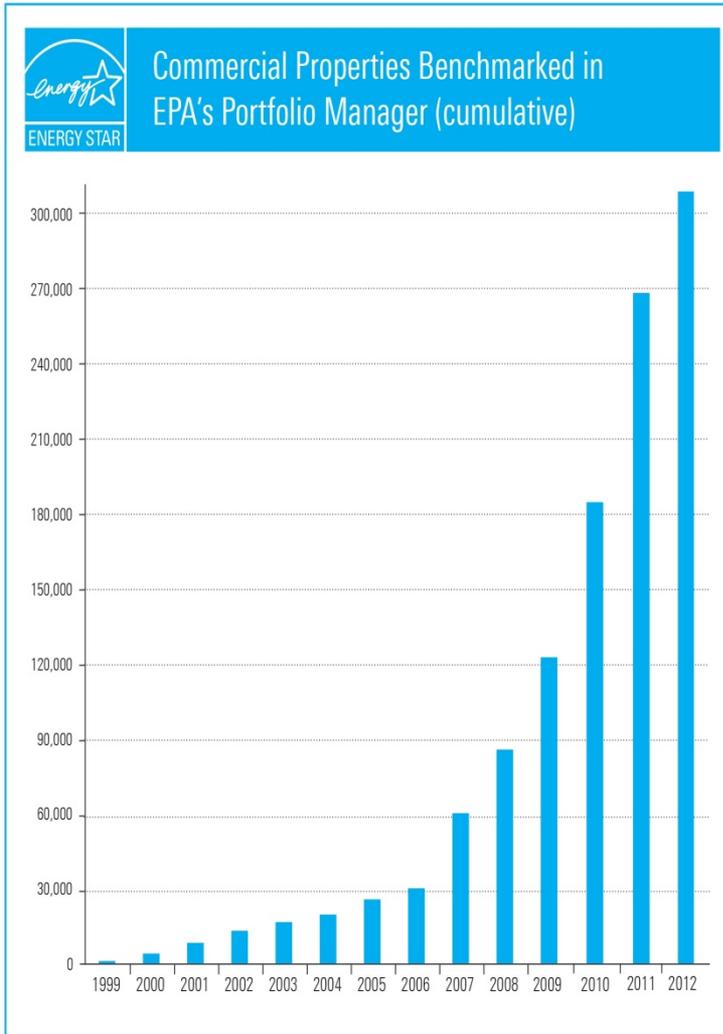


- ALL buildings can be benchmarked
- Benchmarking through Portfolio Manager enables you to:
  - Compare one building against a national sample of similar buildings
  - Compare all of your buildings of a similar type to each other
  - Set priorities and targets for the use of limited staff time and/or investment capital
  - Track performance over time and gain recognition

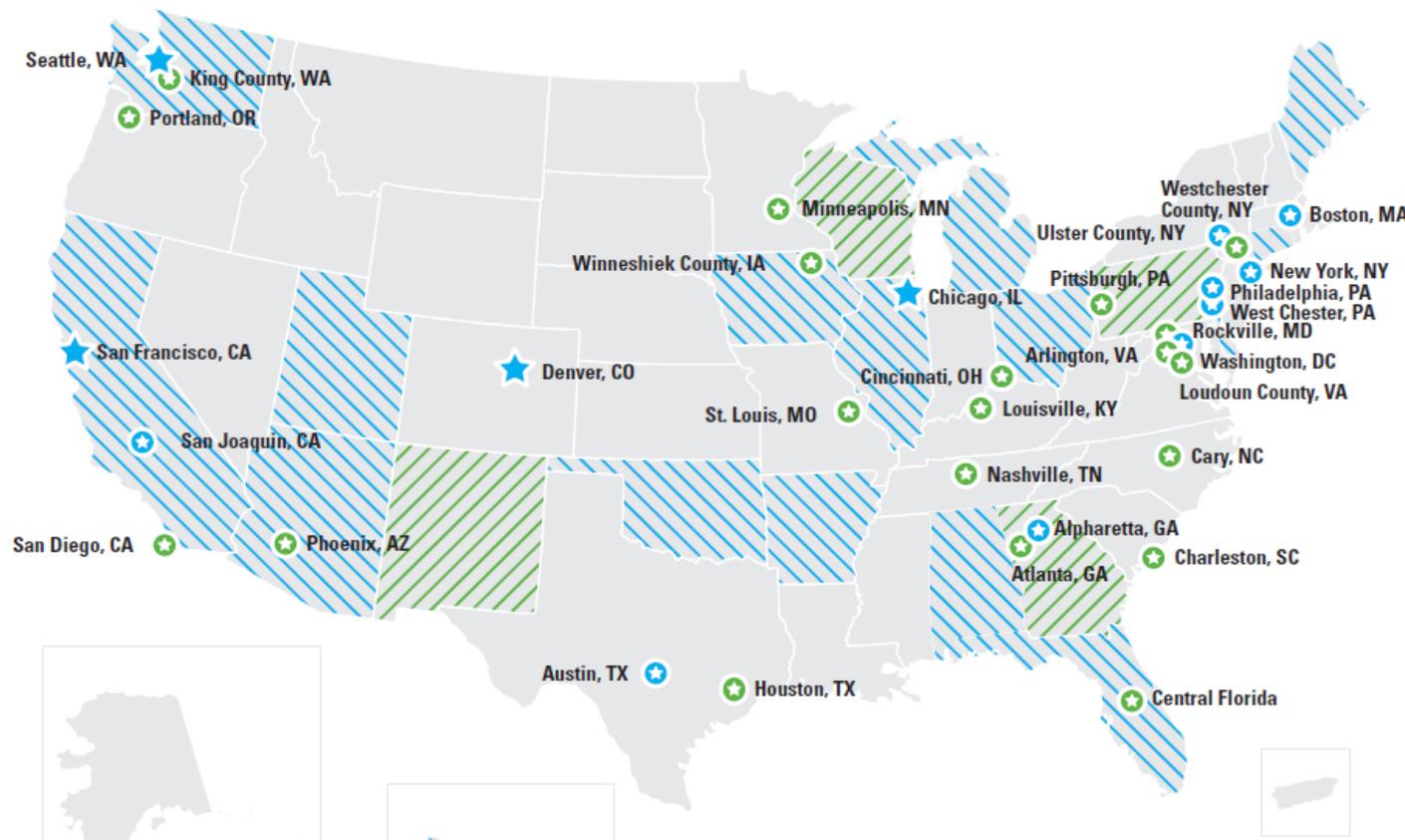
# Tremendous Growth



30%  
Commercial  
Building  
floorspace



# State and Local Energy Efficiency Programs Leveraging Portfolio Manager



- Local Benchmarking Policy
- Local Voluntary Program
- Local Benchmarking Policy and Voluntary Program
- State Benchmarking Policy
- State Voluntary Program



# Impact of Adopted Benchmarking and Disclosure Policies



## BUILDING AREA (IN SQUARE FEET) COVERED ANNUALLY

Each year, existing policies will impact more than **51,000** properties totaling approximately **5.6 billion SF** of floor space in major real estate markets

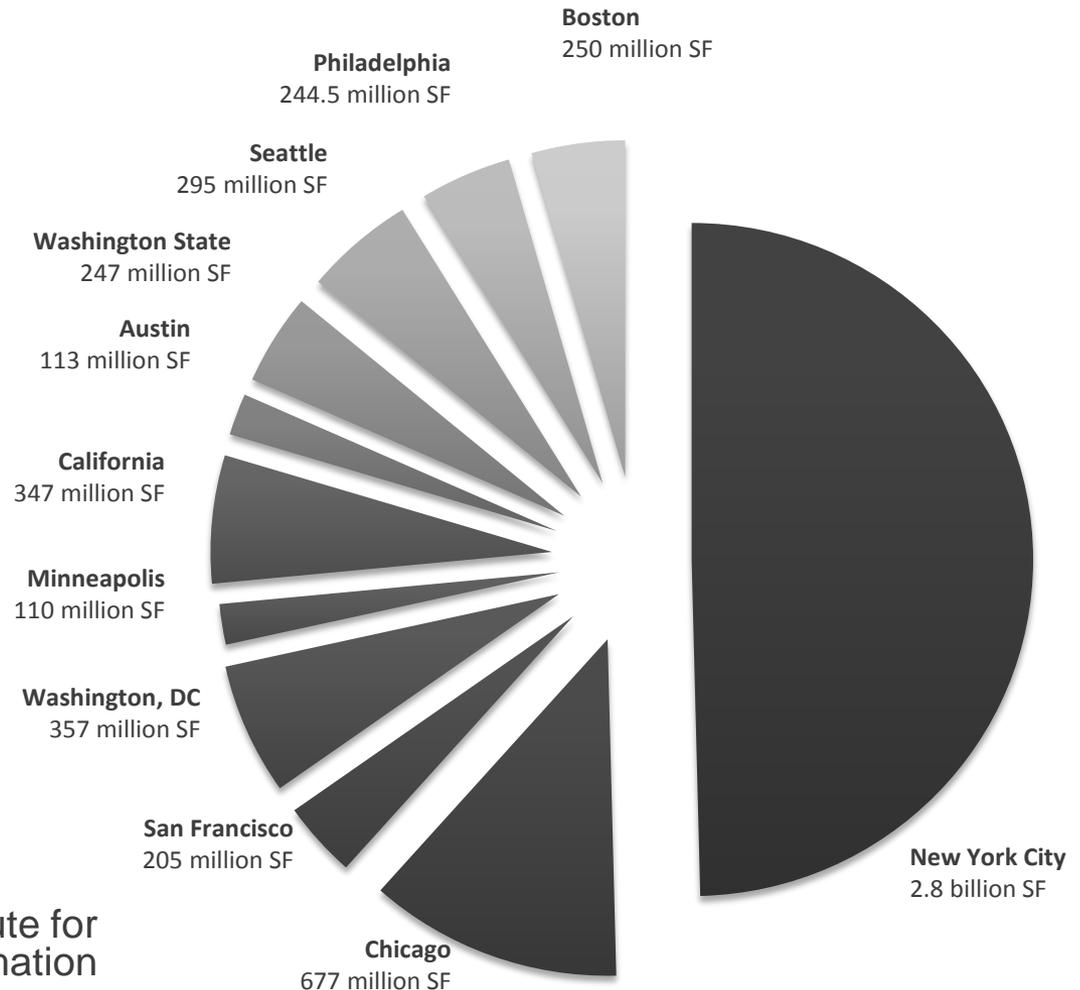


Image credit: Institute for Market Transformation

# Consistent Benchmarking Results in Energy and GHG Reductions

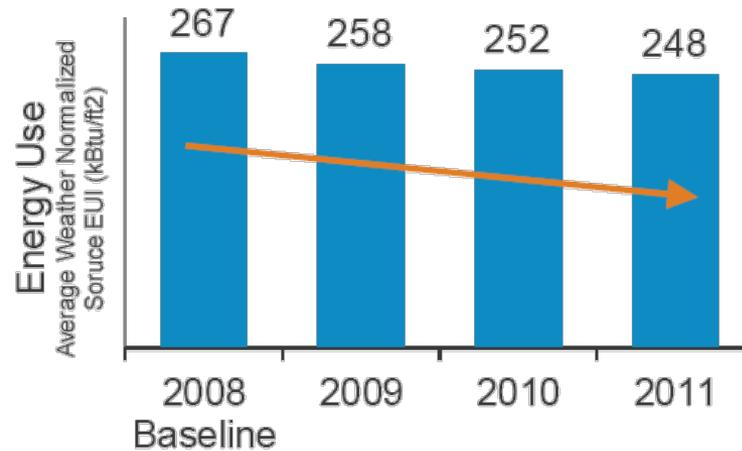


**7% average energy savings  
and 6 point ENERGY STAR  
increase among Portfolio  
Manager buildings**

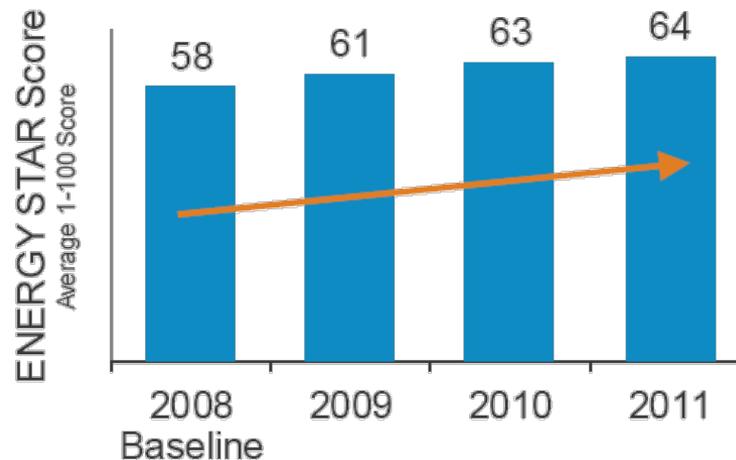
**6% average greenhouse gas  
reductions**

[www.energystar.gov/datatrends](http://www.energystar.gov/datatrends)

## Energy Savings in Portfolio Manager



**7%  
Savings**

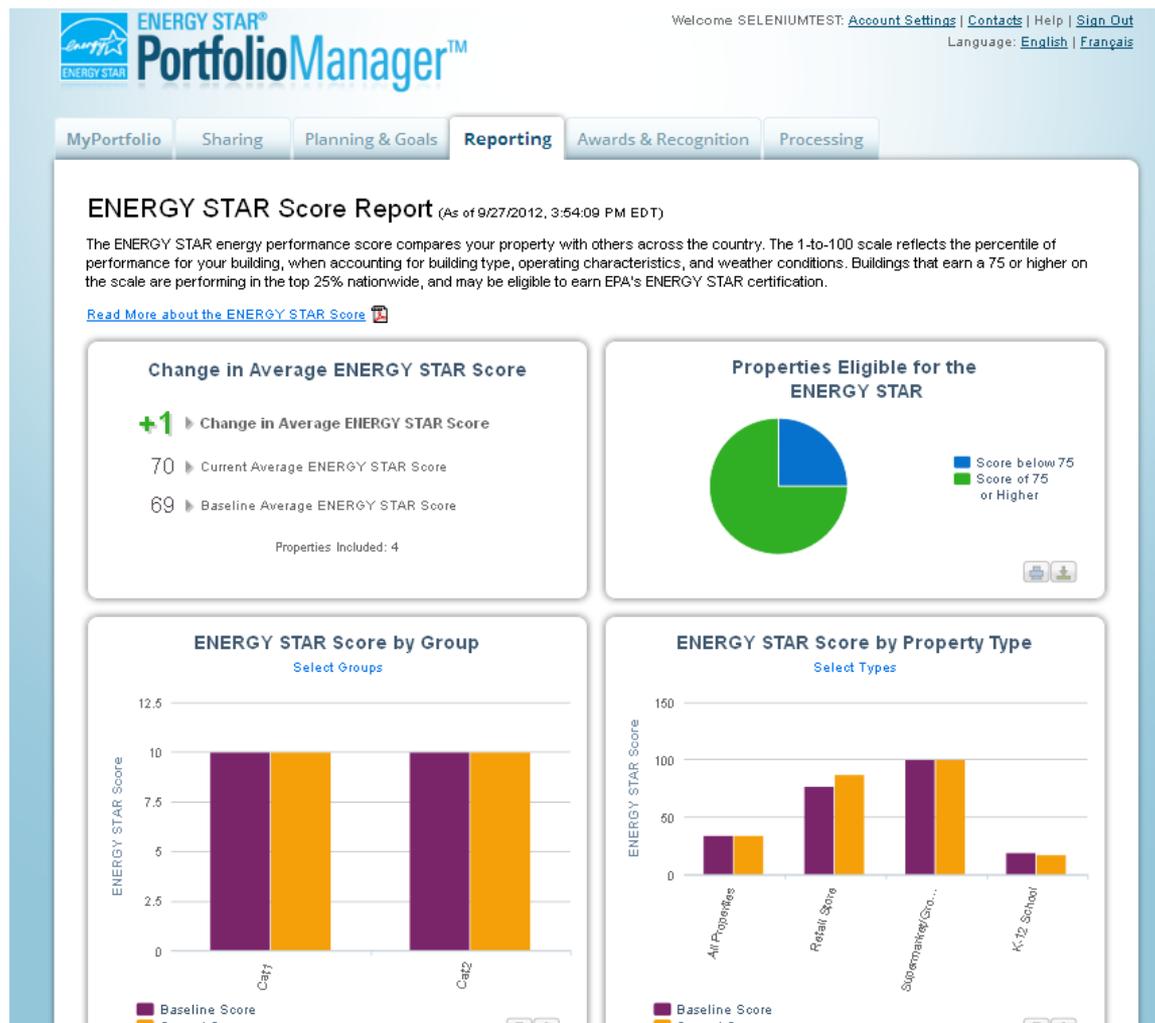


**6 point  
increase**

# ENERGY STAR® PortfolioManager™



- New enhanced tool launched July 2013!
- Completely new look and feel
- New features throughout
  - Navigate with ease
  - Create new reports
  - Connect to other users



# Uploading and Managing Data



- 3 ways to enter data for your property or portfolio:
  1. Enter data manually
  2. Upload data using spreadsheet templates
  3. Work with 3<sup>rd</sup> party providers that exchange data directly with Portfolio Manager via web services

# Get Data In: Manually with the help of Portfolio Manager prompts



The screenshot shows the ENERGY STAR Portfolio Manager interface. At the top, there are navigation tabs: MyPortfolio, Sharing, Planning, Reporting, and Recognition. Below the tabs, there are three main sections:

- Properties (5)**: A section with a red circle around the **Add a Property** button.
- Notifications (0)**: A section indicating no new notifications.
- Source EUI Trend**: A line graph showing energy usage trends over time. The y-axis ranges from 0 to 1,000. The data points are approximately: 480, 450, 480, 400, 350, 850, 350.

On the right side, there is a **My Properties (5)** section with a filter dropdown set to **View All Properties**. Below the filter, there are links for **Create Group** and **Manage**. A table below shows a property named **Federal Building**.

# Navigate the New Portfolio Manager



Five portfolio level tabs



Five property tabs



Intuitive navigation – multiple ways to get to the same place

# Navigate the New Portfolio Manager



Portfolio level



ENERGY STAR® **PortfolioManager™**

Welcome : [Account Settings](#) | [Contacts](#) | [Help](#) | [Sign Out](#)  
Language: [English](#) | [Français](#)

**MyPortfolio** | [Sharing](#) | [Planning](#) | [Reporting](#) | [Recognition](#)

**Properties (5)**  
[Add a Property](#)

**Source EUI Trend**

**Total GHG Emissions Trend**

**Notifications (0)**  
You have no new notifications.

**My Properties (5)** [Add a Property](#)

Filter by:  Search  [Search](#)  
[Create Group](#) | [Manage Groups](#)

Name	Action
<a href="#">Federal Building</a>	I want to... <input type="text"/>
<a href="#">Higher Campus</a>	I want to... <input type="text"/>
<a href="#">Hill Store</a>	I want to... <input type="text"/>
<a href="#">Insurance Office</a>	I want to... <input type="text"/>
<a href="#">Sunnyside Elementary</a>	I want to... <input type="text"/>

Page 1 of 1 | View 1 - 5 of 5  
[Download Entire Portfolio](#)

**!** If you're a pro, you may want to [upload and/or update multiple properties](#) at once using an Excel spreadsheet. This can be done to create new properties, add use details, create meters and add meter consumption data.

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# Navigate the New Portfolio Manager



The screenshot shows the ENERGY STAR Portfolio Manager interface. At the top, there is a navigation bar with tabs for 'MyPortfolio', 'Sharing', 'Planning', 'Reporting', and 'Recognition'. The 'MyPortfolio' tab is active. Below the navigation bar, the property name 'Insurance Office' is displayed, along with its address: '5201 Blue Lagoon Dr, Arlington, VA 20221'. A red arrow points to the 'Insurance Office' text, with the label 'Property level' next to it. To the right of the address, there is a button that says 'Finish your application for ENERGY STAR Certification'. Further right, there is a box showing the 'ENERGY STAR Score' with a 'Current Score' of 94 and a 'Baseline Score' of 83. Below the address, there are tabs for 'Summary', 'Details', 'Meters', 'Goals', and 'Design'. The 'Summary' tab is selected. In the 'Summary' view, there is a 'Source EUI Trend' line graph showing data from 2007 to 2012. To the right of the graph, there is a 'Notifications' section stating 'You have no new notifications.' and a 'Sharing this Property' section showing it is shared with one contact, 'Miller, Clara', with 'Full Access' permissions. There is an 'Edit Multiple Permissions' button at the bottom right of the sharing section.

Property level

ENERGY STAR®  
PortfolioManager™

Welcome [Account Settings](#) | [Contacts](#) | [Help](#) | [Sign Out](#)  
Language: [English](#) | [Français](#)

**MyPortfolio** | [Sharing](#) | [Planning](#) | [Reporting](#) | [Recognition](#)

**Insurance Office** [Finish your application for ENERGY STAR Certification](#)

5201 Blue Lagoon Dr, Arlington, VA 20221 | [Map It](#) EXISTING  
Portfolio Manager Property ID: 5000003 | Primarily: [Office](#)  
Year Built: 1995 EXISTING

**ENERGY STAR Score**  
**Current Score:** 94  
**Baseline Score:** 83

[Summary](#) | [Details](#) | [Meters](#) | [Goals](#) | [Design](#)

**Source EUI Trend**

Year	Source EUI
2007	240
2008	235
2009	225
2010	220
2011	230
2012	210

**Notifications**  
You have no new notifications.

**Sharing this Property**  
Shared with: 1 [Contacts](#) ( [ABS](#) )  [Share](#)

Name	Permissions	Action
<a href="#">Miller, Clara</a>	Full Access	I want to... <input type="text"/>

[Edit Multiple Permissions](#)



# Standard Reports

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- Performance Highlights
- Energy Performance
- Emissions Performance
- Water Performance
- Fuel Performance
- ENERGY STAR Certification Status
- Partner of the Year Report
- Sustainable Buildings Checklist Report

# Reporting in the New Portfolio Manager



MyPortfolio | Sharing | Planning | **Reporting** | Recognition

### Charts & Graphs

*Source EUI*

What is the total energy footprint of my properties, including raw fuel associated with generation and transmission?

### ENERGY STAR Performance Documents

- [Statement of Energy Performance \(SEP\)](#)
- [Statement of Energy Design Intent \(SEDI\)](#)
- [Data Verification Checklist](#)
- [Progress & Goals Report](#)
- [ENERGY STAR Score Card](#)

### Templates & Reports (8) Create a New Template

Name	Status	Action
Water Performance	No Report Generated	<input type="text" value="I want to..."/> <span style="float: right;">▼</span>
Sustainable Buildings Checklist Report	No Report Generated	<input type="text" value="I want to..."/> <span style="float: right;">▼</span>
Performance Highlights	No Report Generated	<input type="text" value="I want to..."/> <span style="float: right;">▼</span>
Partner of the Year Report	No Report Generated	<input type="text" value="I want to..."/> <span style="float: right;">▼</span>
Fuel Performance	No Report Generated	<input type="text" value="I want to..."/> <span style="float: right;">▼</span>
ENERGY STAR Certification Status	No Report Generated	<input type="text" value="I want to..."/> <span style="float: right;">▼</span>
Energy Performance	No Report Generated	<input type="text" value="I want to..."/> <span style="float: right;">▼</span>
Emissions Performance	No Report Generated	<input type="text" value="I want to..."/> <span style="float: right;">▼</span>

Choose from Pre-set Chart & Graph options

Download Performance Documents

Create and generate Templates & Reports



# Reporting Tab: Charts & Graphs



MyPortfolio   Sharing   Planning   **Reporting**   Recognition

## Source EUI Report (As of 6/3/2013, 6:50:25 PM EDT)

Source Energy Use Intensity (EUI) is a unit of measurement that describes a building's energy use relative to its size. "Source energy" is the total amount of raw fuel that is required to operate the building. In addition to what the building consumes on-site, source energy includes losses that take place during generation, transmission, and distribution of the energy, thereby enabling a complete [More...](#)

[Read More about the Source EUI](#)

### Portfolio Average Source EUI

**-27** ▾ Change in Average Source EUI

148 ▾ Current Average Source EUI

174 ▾ Baseline Average Source EUI

Properties Included: 4

### Your Properties Compared to the National Median Source EUI

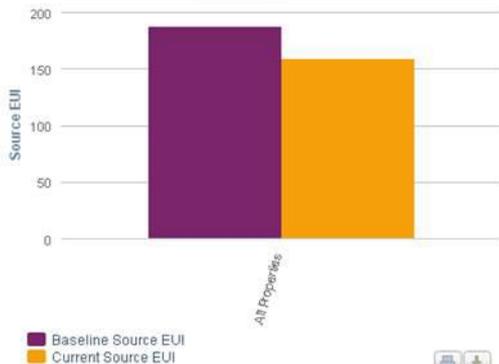


■ Source EUI Equal to or Below the Median  
■ Source EUI Above the Median



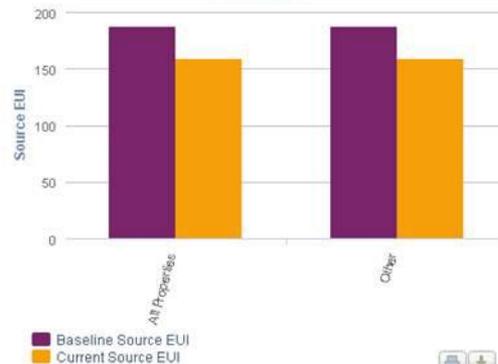
### Source EUI by Group

[Select Groups](#)



### Source EUI by Property Type

[Select Types](#)



< Previous Report

Print

Next Report

Cancel

- Each of the figures can be printed or downloaded for easy insertion into a presentation or document
- If you scroll down on the page, you can view and export the raw data for the charts & graphs



# Want to learn more??

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- Visit: [www.energystar.gov/buildingshelp](http://www.energystar.gov/buildingshelp)
- Additional Portfolio Manager training resources available at: [www.energystar.gov/portfoliomanager](http://www.energystar.gov/portfoliomanager)
- Register for regular ENERGY STAR webinars at: <http://esbuildings.webex.com>

# Climate Smart Communities Webinar

## E-Mail Addresses



- Mark Lowery  
[mdlowery@gw.dec.state.ny.us](mailto:mdlowery@gw.dec.state.ny.us)
- Kim Farrow  
[kxfarrow@gw.dec.state.ny.us](mailto:kxfarrow@gw.dec.state.ny.us)
- Climate Change Office  
[climatechange@gw.dec.state.ny.us](mailto:climatechange@gw.dec.state.ny.us)

# Climate Smart Communities Webinar

**Website Address**



<http://www.dec.ny.gov/energy/50845.html>