



Filling the Pipeline with Savings in Public Buildings

Cathy Higgins
Research Director

*ACEEE Energy Efficiency
as a Resource
Phoenix, AZ*

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nbi new buildings
institute

NBI is a national nonprofit working to improve buildings for people and the environment.

Program Areas:

- 1. Best practices in new and existing buildings*
- 2. Continuous code and policy innovation*
- 3. Zero net energy leadership and market development*



Jurisdictional Action Paths to Zero



Municipal Building Leadership

- Benchmark and Prioritize the Portfolio
- Implement Deep Energy Retrofit and ZE pilot opportunities
- Update Facility Master Plan and City Policies
- ZE Pilot Projects



Market Leadership & Development

- Provide Public Acknowledgement and Recognition
- Support Widespread ZE Outreach
- Connect with Other Jurisdictions
- Build Resiliency



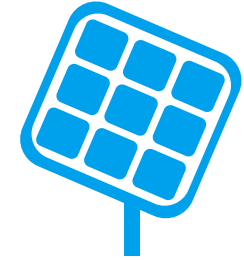
Codes & Policies

- Accelerate Benchmarking and Disclosure
- Utilize Building Performance Targets and Improvement
- Set Local Goals for Energy Code Improvement



Finance & Incentives

- Provide City Financial and Regulatory ZE Incentives
- Encourage Utility (Municipal or IOU) Support for ZE Buildings and Grid Stability



Clean Power

- Enable Community-Scale Renewables and Storage Systems
- Encourage Low or Zero Carbon Grid-Based Electricity and Gas

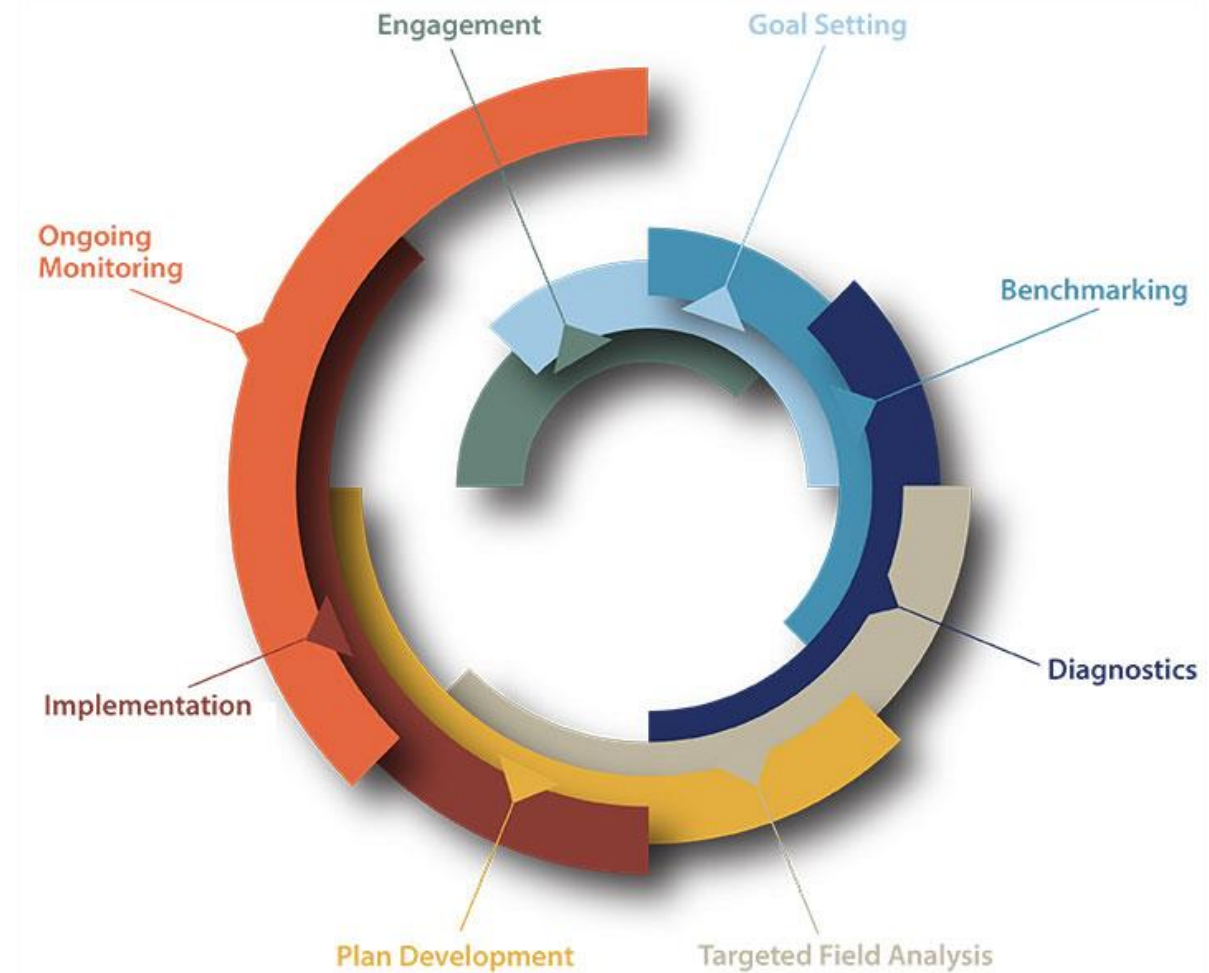
City Benefits of Leadership by Example



- Achieve climate goals
- Demonstrate good governance
- Be fiscally responsible
- Save energy
- Facilitate communications & coordination
- Increase transparency
- Enhance staff accountability
- Improve service delivery

Steps to Leading by Example

- Create a city-wide team
- Benchmark and prioritize the municipal portfolio
- Target field assessments
- Set goals and energy targets by building type
- Implement deep energy retrofits
- Uncover ultra-low and zero energy pilot projects
- Conduct policy gap analysis




Municipal Building Inventory

- Comprehensive list of energy using assets / collect utility bills
- Cross department representation
 - City Hall and office buildings
 - Parks & Recreation
 - First Stations
 - Police Stations
 - Libraries
 - Wastewater treatment facilities
 - Transportation street lighting
 - Arenas, airports and other specialty spaces



Energy Star Portfolio Manager

 ENERGY STAR®
PortfolioManager®

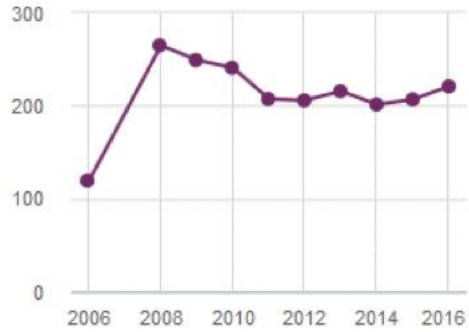
Welcome LEICHNER: [Account Settings](#) | [Contacts](#) | [Help](#) | [Sign C](#)

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Properties (60)

[Add a Property](#)

Source EUI Trend (kBtu/ft²)



Year	Source EUI (kBtu/ft²)
2006	120
2007	260
2008	270
2009	250
2010	240
2011	210
2012	210
2013	220
2014	200
2015	210
2016	220

Notifications (180) [View All](#)

	ANNUAL Energy Benchmarking Reporting Last	Clear
	Natural Gas - Share accepted	Clear
	Natural Gas - Share accepted	Clear

Properties (60) [Add a Property](#)

Filter by: [View All Properties \(60\)](#) [Search](#)

[Create Group](#) | [Manage Groups](#)

Name	Action
911 Center	<input type="text" value="I want to..."/>

Automated Data Cleaning



DISCOVER A
SUSTAINABLE
WORLD

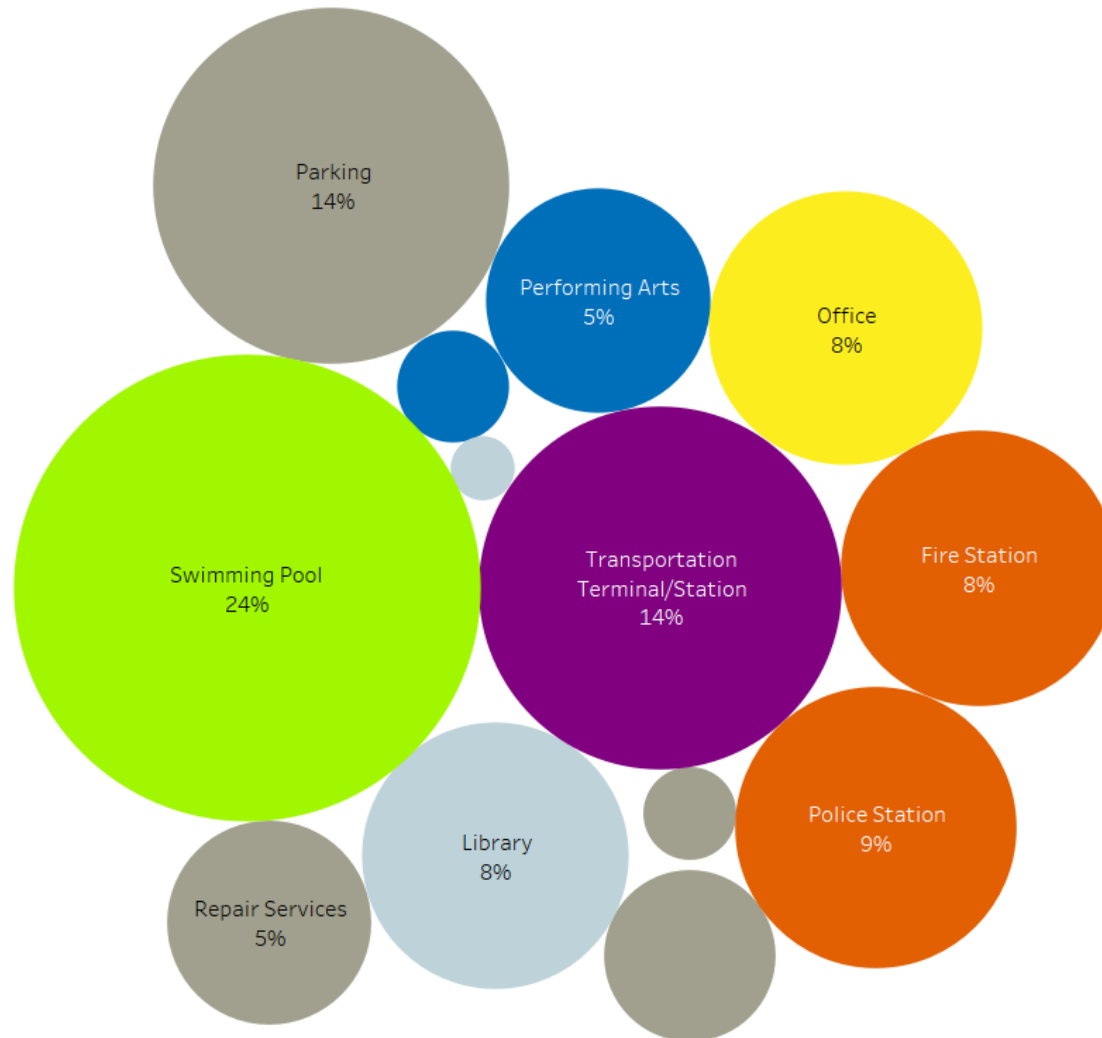
Data Validators

Delivered Electricity Resource Value	<input type="checkbox"/> Start Time Before End Time
	<input type="checkbox"/> Exists For Each Month
	<input type="checkbox"/> Jump From Last Year months: <input type="text" value="3"/> threshold: <input type="text" value="50"/>
	<input type="checkbox"/> Data Gap
	<input type="text" value="New Validator"/>
Natural Gas Resource Value	<input type="checkbox"/> Start Time Before End Time
	<input type="checkbox"/> Exists For Each Month
	<input type="checkbox"/> Jump From Last Year months: <input type="text" value="3"/> threshold: <input type="text" value="50"/>
	<input type="checkbox"/> Data Gap
	<input type="text" value="New Validator"/>
Enter New Field: <input type="text" value="New Field"/>	

Discard Changes

Save

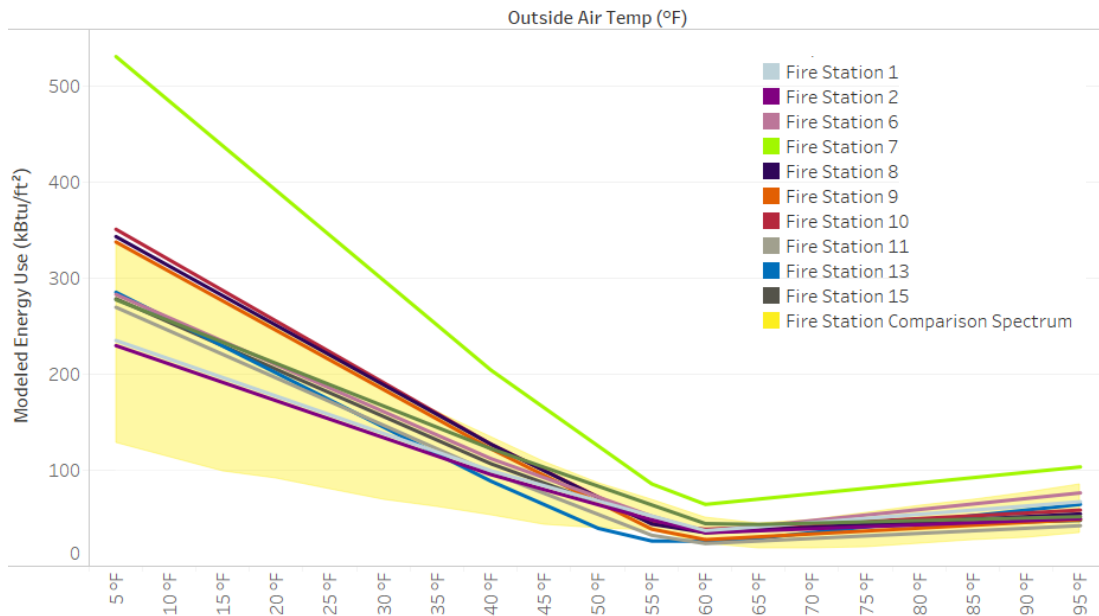
Data Analysis and Diagnostics



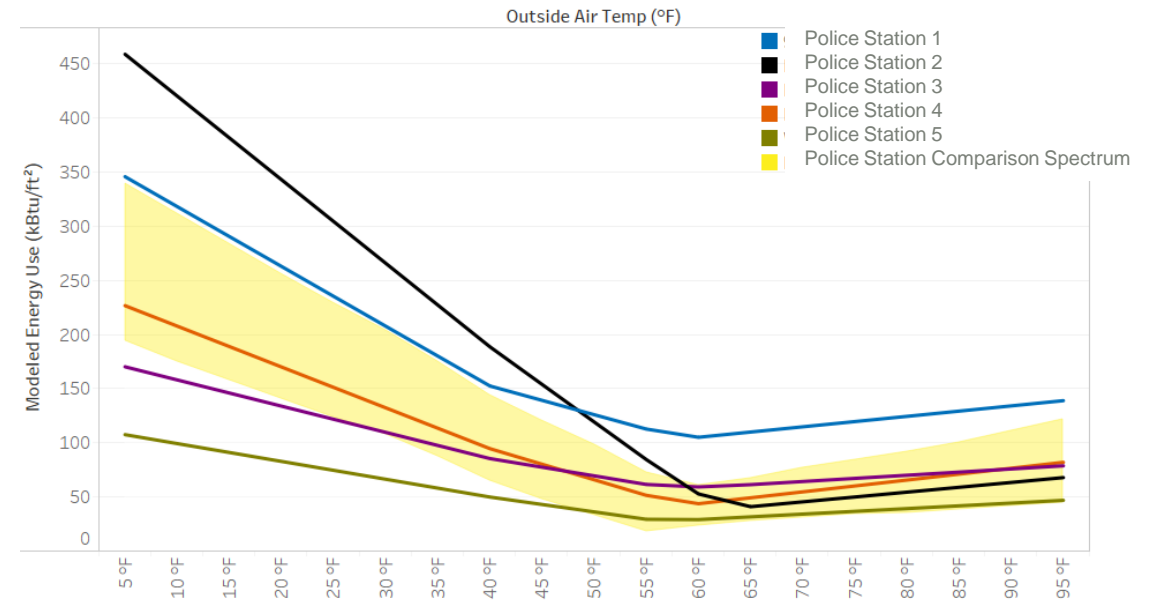
- Swimming Pool
- Transportation Terminal/Station
- Library
- Museum
- Social/Meeting Hall
- Performing Arts
- Office
- Fire Station
- Police Station
- Other - Public Services
- Non-Refrigerated Warehouse
- Parking
- Repair Services

Department Level Analysis

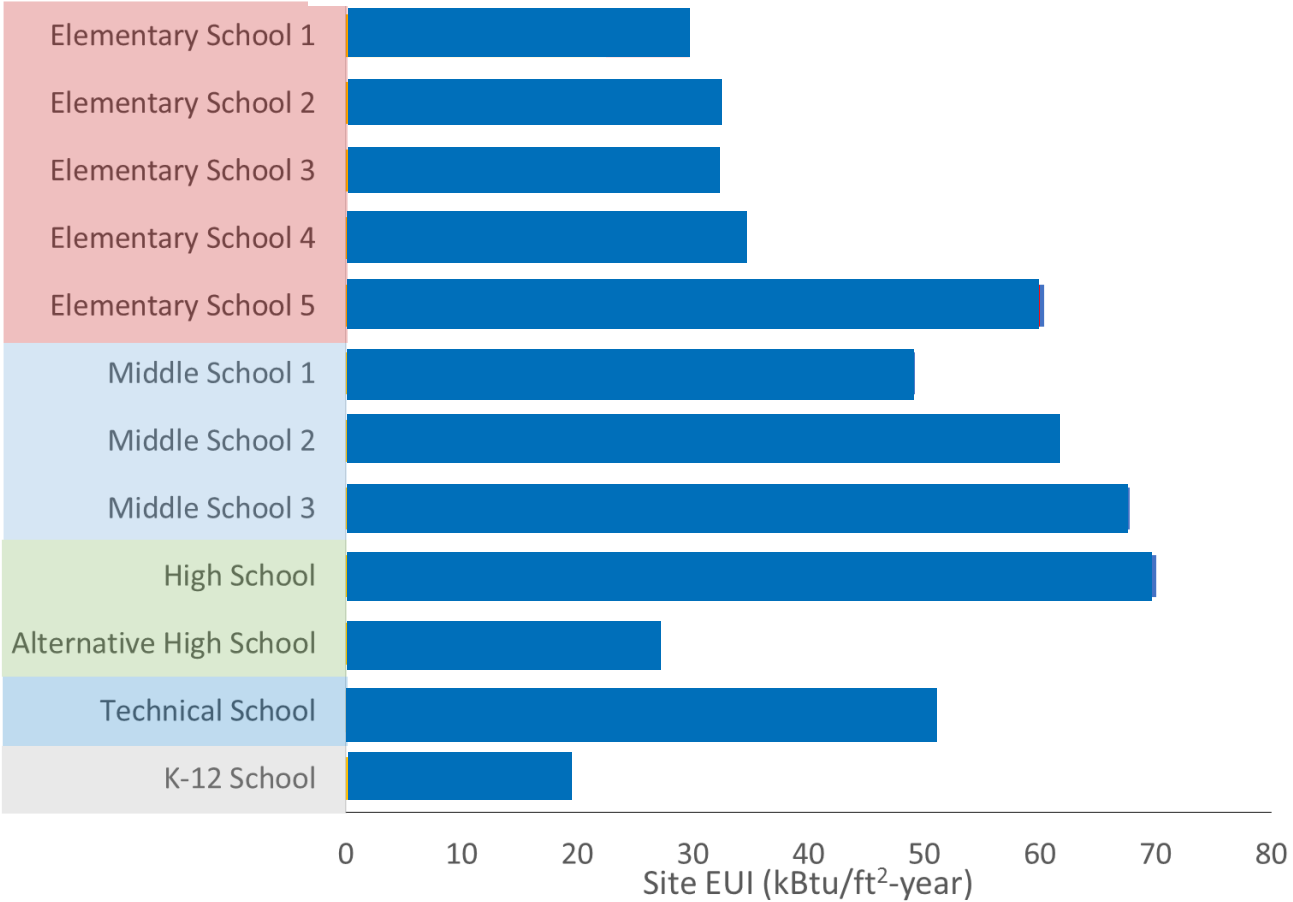
Fire Stations



Police Stations

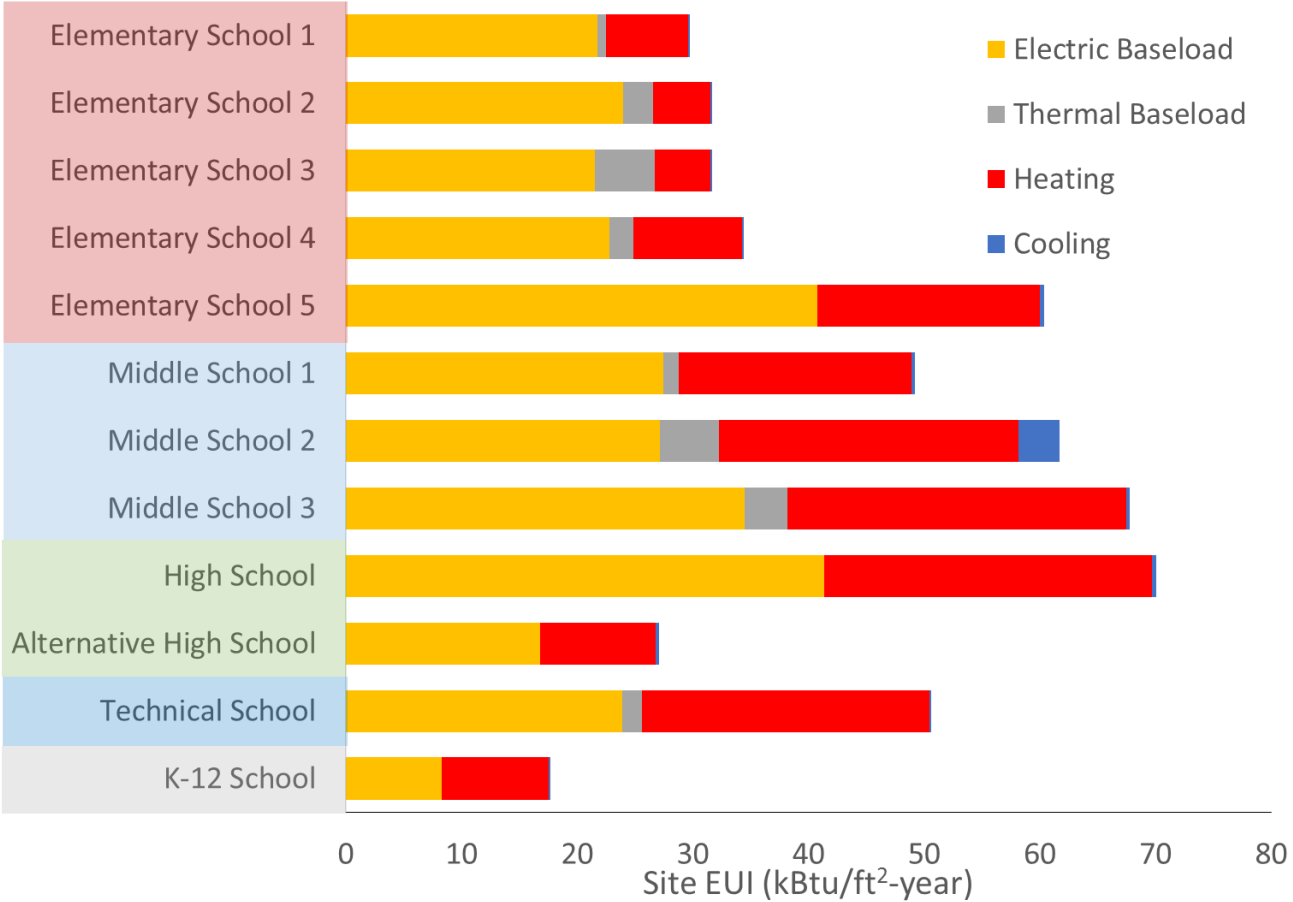


Portfolio-Level: EUI *only*



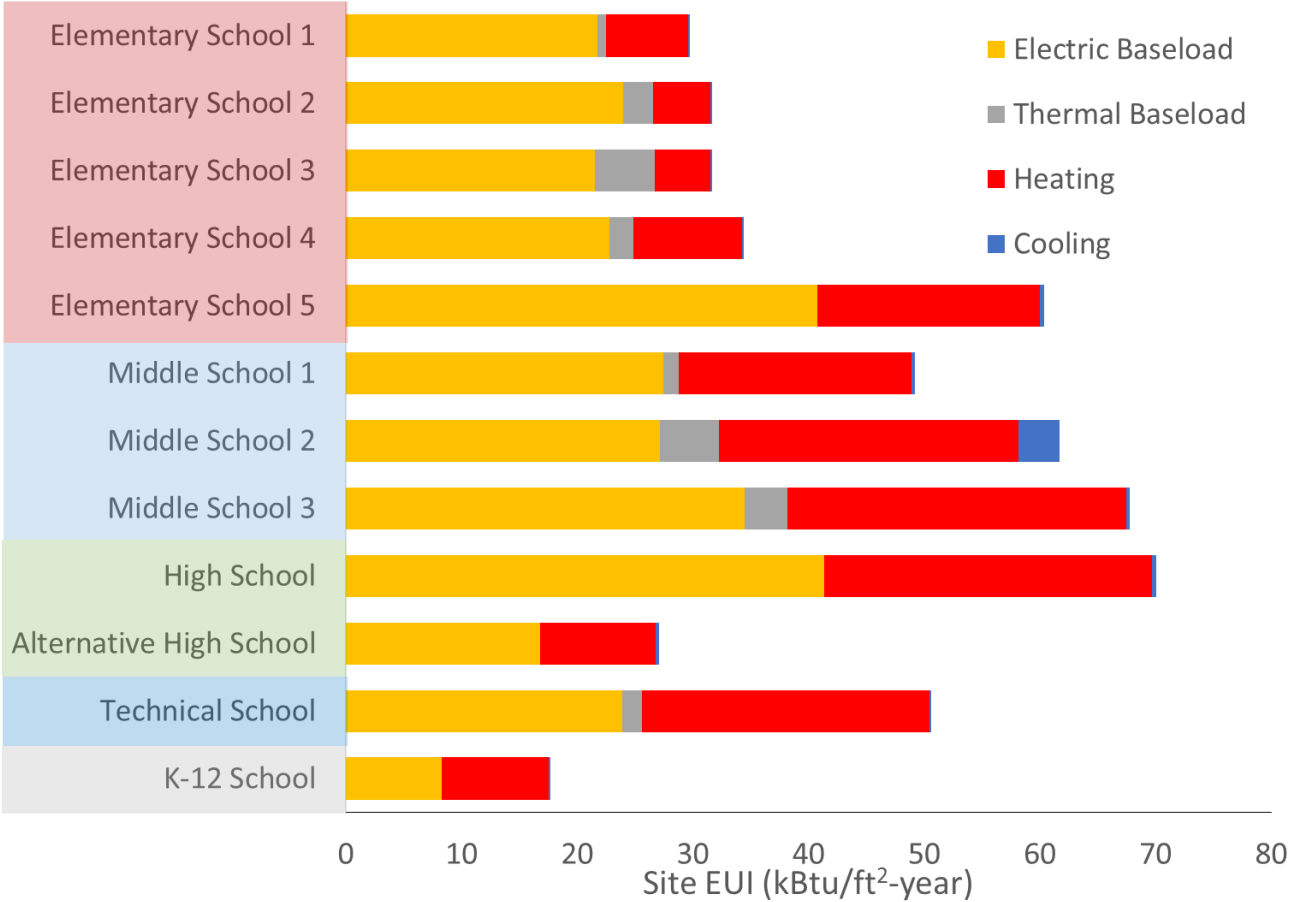
Portfolio-Level: *Disaggregated Energy*

Weather Normalized Building EUI by End-Use



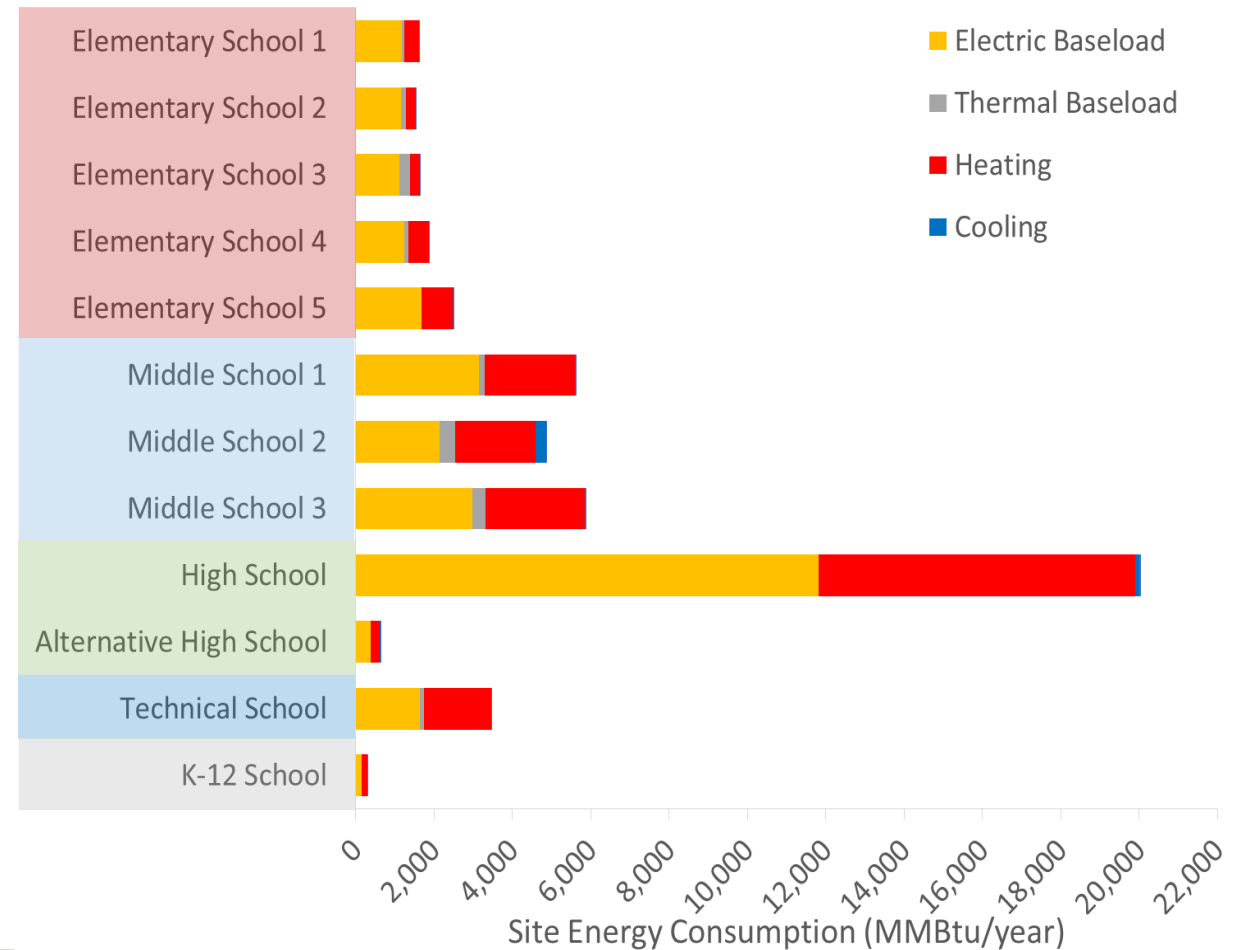
EUI

Weather Normalized Building EUI by End-Use



Total Consumption

Weather Normalized Building Total Energy Usage by End-Use

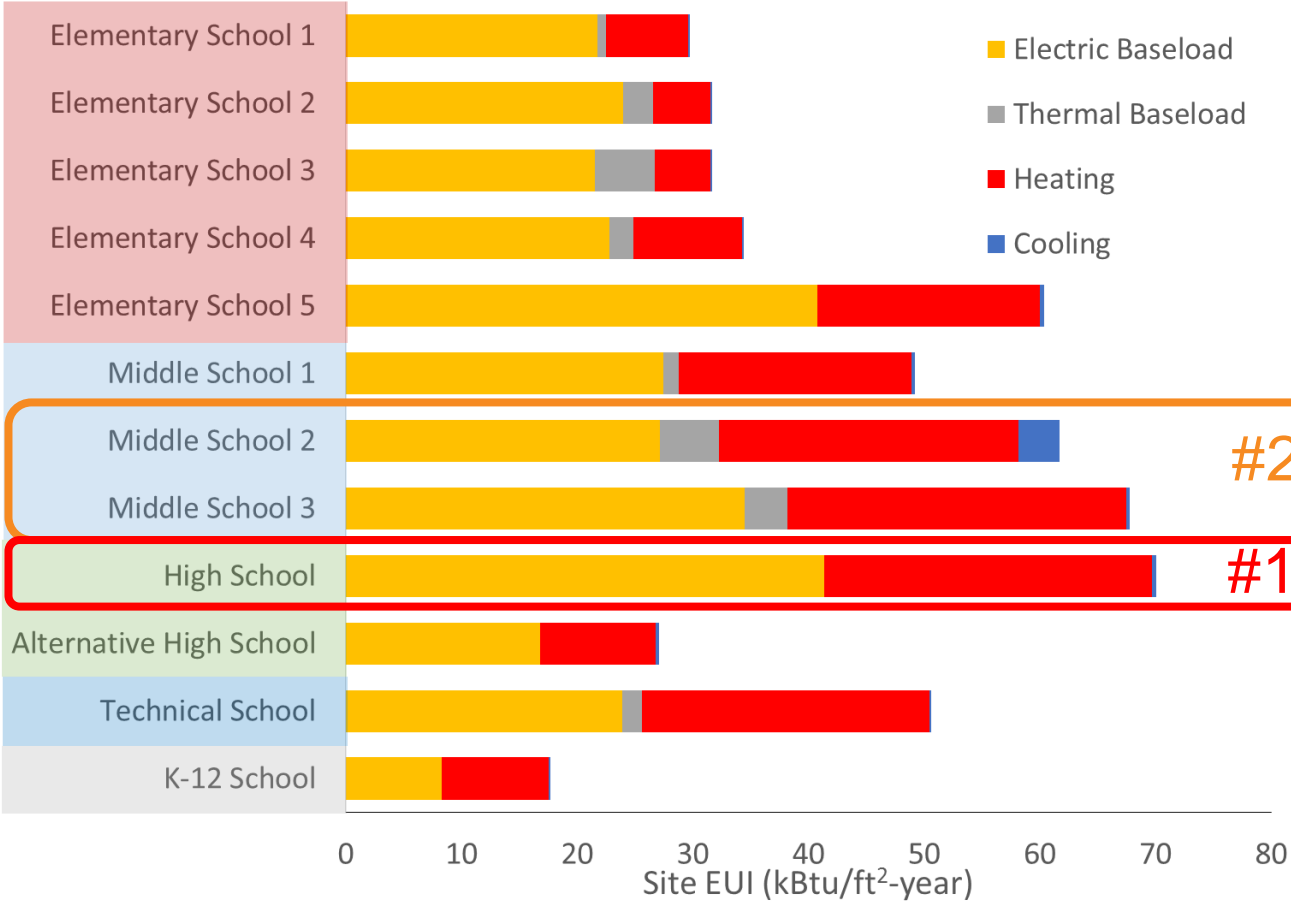


Strategic Approach to Retrofits & ZNE

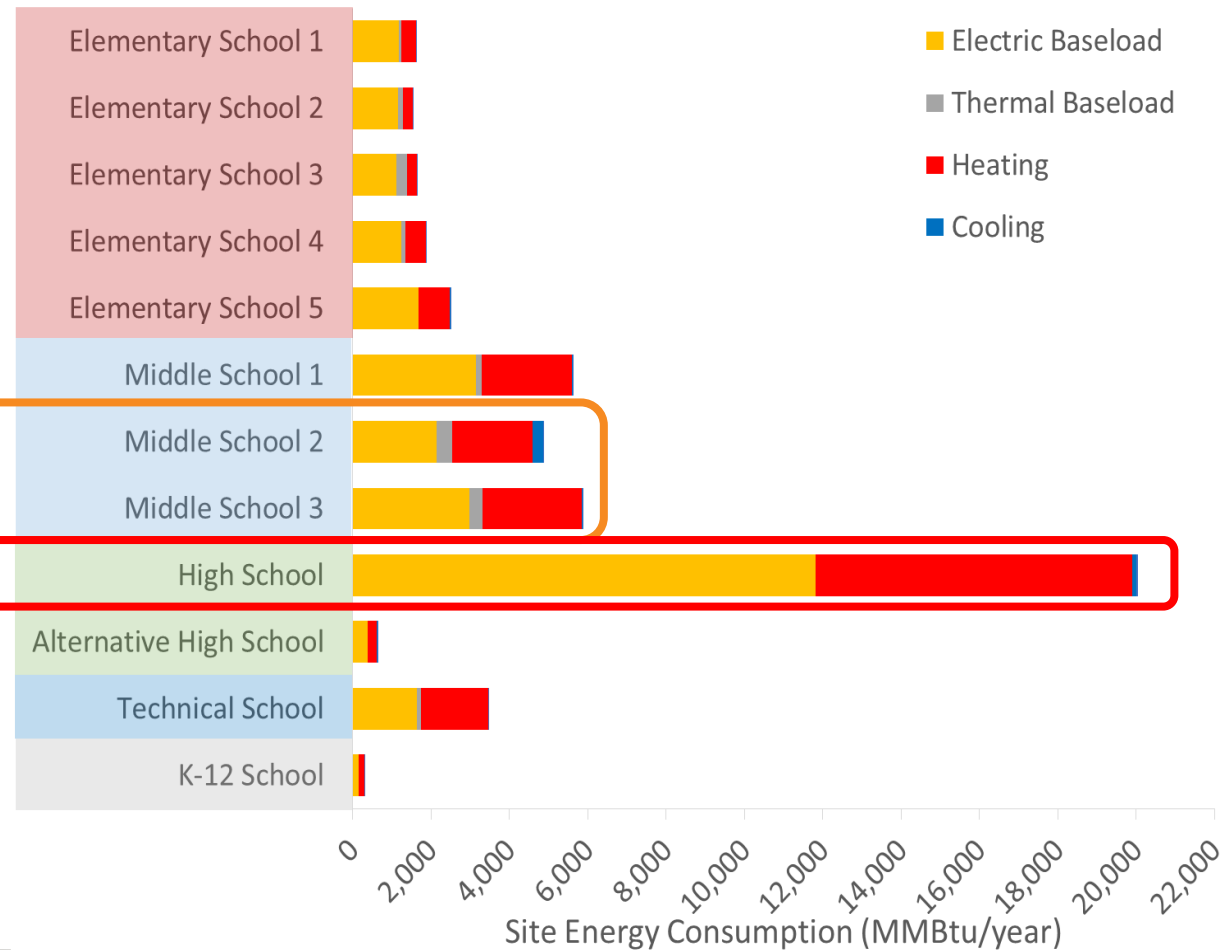
EUI

Total Consumption

Weather Normalized Building EUI by End-Use



Weather Normalized Building Total Energy Usage by End-Use

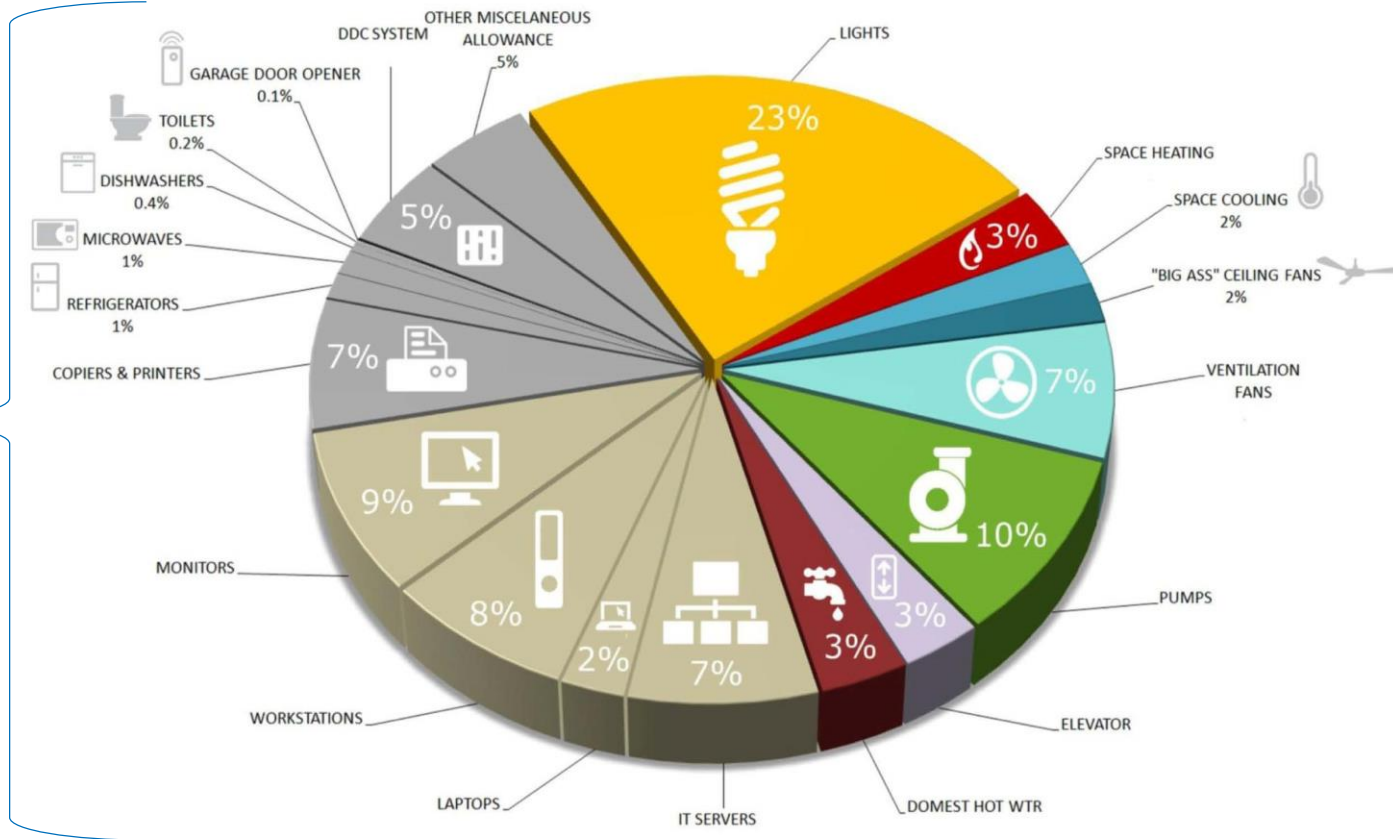


City Wide Prioritization

- 1** Priority level 1 - a strong reason to invest!
- 2** Priority level 2 - a good candidate for upgrades
- 3** Priority level 3 - minimal energy reason to upgrade
- 4** Priority level 4 - minimal upgrades are worthwhile

Focus In-Field Assessments

Occupants and Operators



The right buildings

The right systems

Targeted sub-metering

Energy audits

- ASHRAE Level 2 or 3

Building operator training where needed

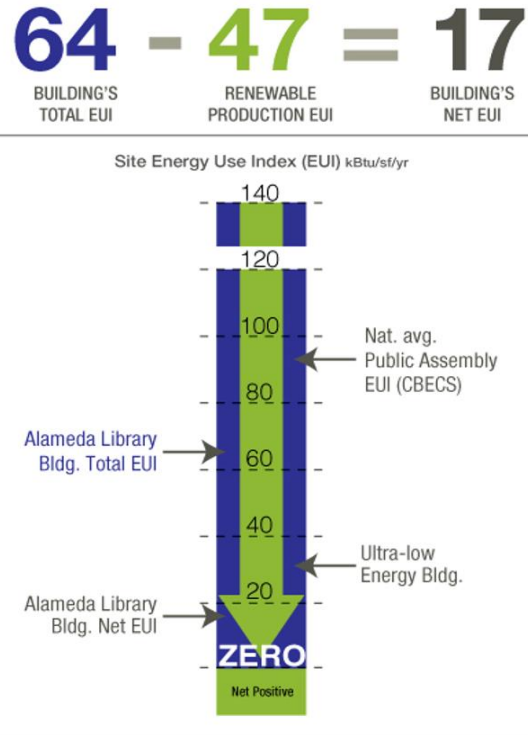
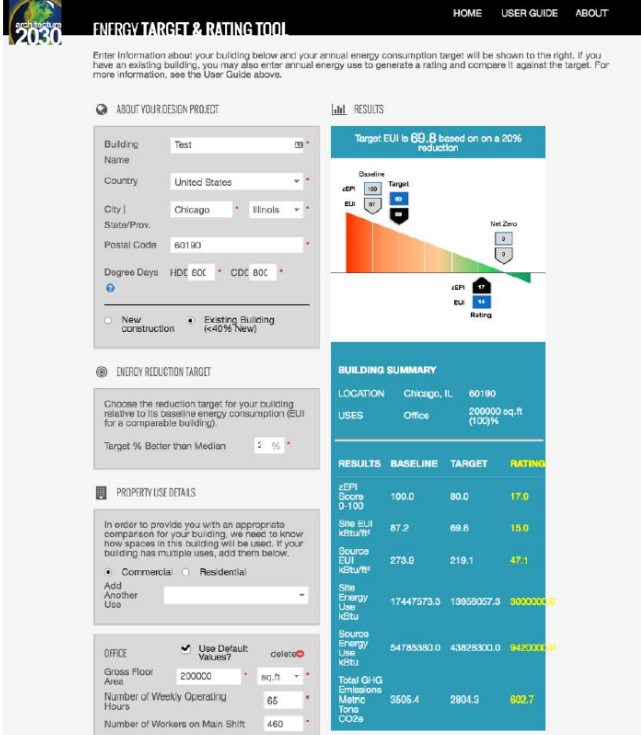
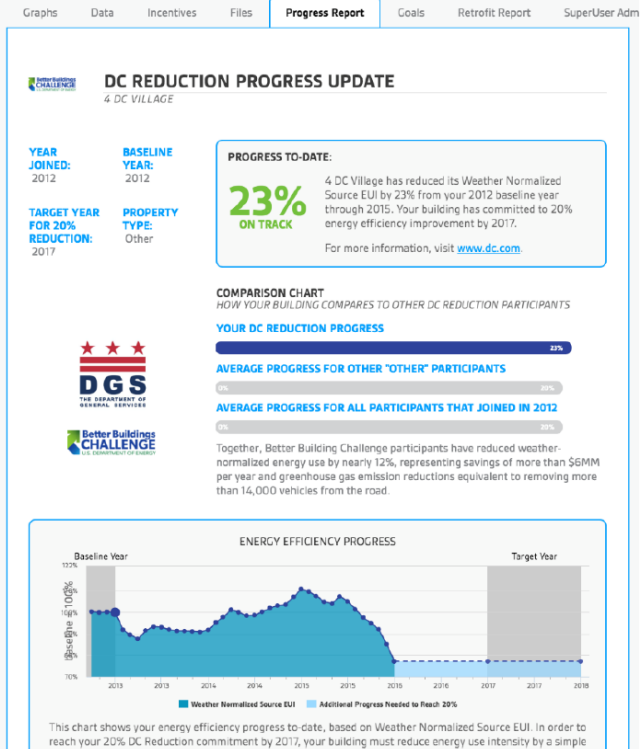
7-Step Implementation Plan

1. Set interim, building-specific, departmental goals
2. Establish EUI targets for existing and new buildings
3. Incorporate criteria for building upgrades
4. Inventory equipment with estimated life expectancy
5. Conduct targeted field analysis
6. Log ECMs, ROI, capture savings for future projects
7. Track energy performance on a trajectory



Photo Courtesy of Darrin Hunter, Dish Design LLC

Track Progress and Establish Metrics



zEPI Index

Case Study: Boise, Idaho

- Set EUI Target for new Fire Station of 27 kBtu/sf/yr
- Toured “best-in-class” example in Issaquah, WA
- Inter-departmental communication also captured savings on retrofit for separately managed fire station at airport



Photo courtesy of Cole Architects

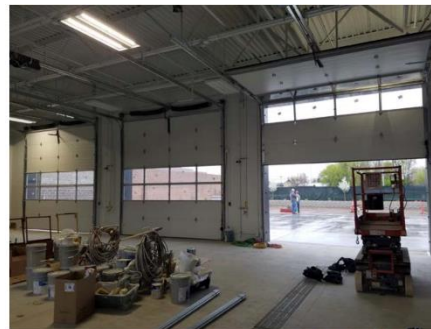


Photo courtesy of Sharon Grant



Photo courtesy of Cole Architects



Photo courtesy of Cole Architects

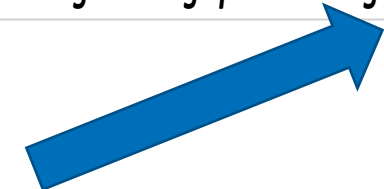
Public Buildings Estimating Savings

Building Type	Per City Buildings			2 Project Cities Totals		
	#	SF (000s)	Total SF (000s)	Combined SF Potential (000s)	Std. EUI by type	Total kBtu (000s)
Admin. Offices	6	37	222	444	70	31,080
Fire Stations	12	14	168	336	80	26,880
Police Stations	4	28	112	224	90	20,160
Library / Museum	3	21	63	126	70	8,820
Community / Recreation	7	24	168	336	60	20,160
Maintenance Facilities	7	26	182	364	65	23,660
	39		915	1,830		130,760

Project Savings Projections					
Retrofit % Savings Potential	Target EUI	Building Retrofits per City	% of Total SF impacted	EUI savings	Total kBtu Potential (000s)
43%	40	4	67%	30	8,880
56%	35	8	67%	45	10,080
50%	45	2	50%	45	5,040
29%	50	2	67%	20	1,680
50%	30	3	43%	30	4,320
54%	30	4	57%	35	7,280
					37,280
<i>Portfolio average Savings per Building:</i>					29%

Averages from 4 nbi participating U.S. cities populations: 79,000-211,000

~30% avg. Savings per Portfolio Building



Utility Benefits of Public Buildings Leadership by Example

- Uncover energy savings opportunities
- Reduce program administration costs
- Early awareness of new construction projects
- Continual flow of projects to pipeline
- Customer engagement mechanism





Thank you!

Cathy Higgins

Research Director

higgins@newbuildings.org

Amy Cortese

Program Director

amy@newbuildings.org