



EPA ENERGY STAR Target Finder

Metro DC Council of Governments Energy Advisory Committee

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Commercial Building Design



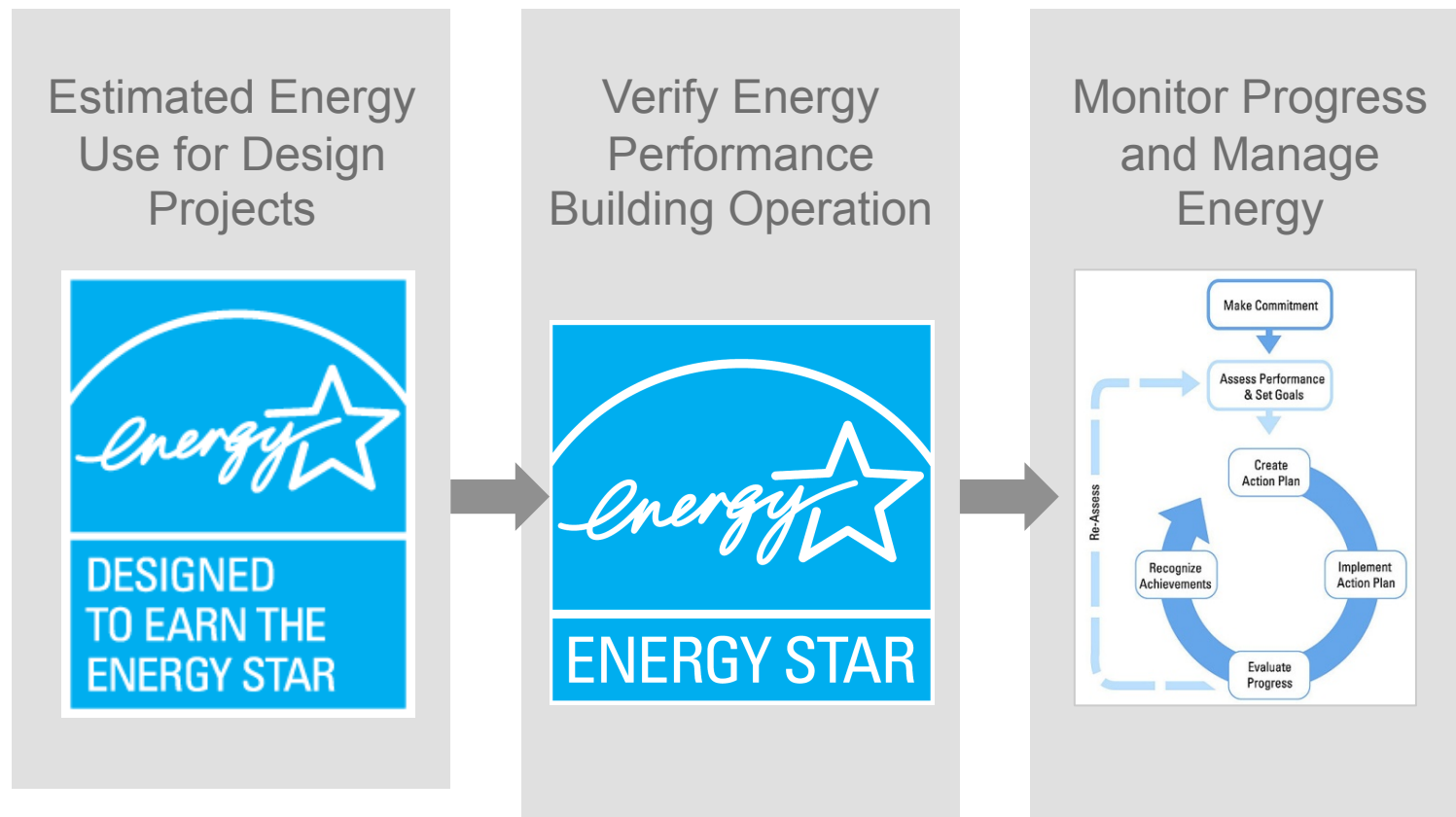
Learn more at energystar.gov

The Role of EPA



- ENERGY STAR Labeling Program
 - Products
 - New homes and whole-house retrofits
 - Commercial buildings:
 - Design projects—Target Finder
 - Existing buildings—Portfolio Manager
- Outreach and Education

Standardized Metrics



ENERGY STAR Approach



- Whole Building Consumption Targets
 - By building type
 - Source energy metric
 - Climate and occupancy adjusted
 - Augment codes with performance-based path

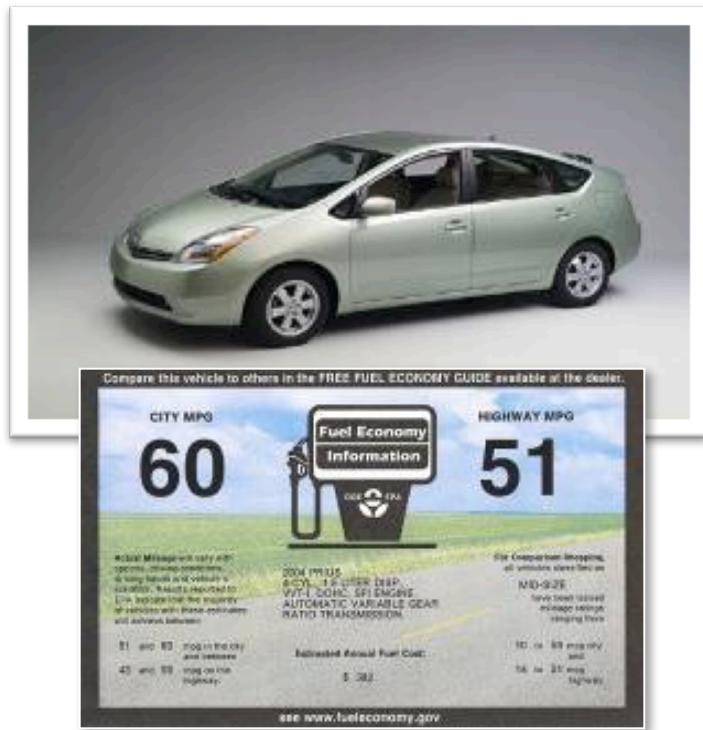
- Compliance based on performance outcome
 - Close gap between performance and actual performance
 - Enforcement after occupancy

- Peer comparison and public disclosure
 - Provide market with a way to understand the value commercial building energy-efficiency

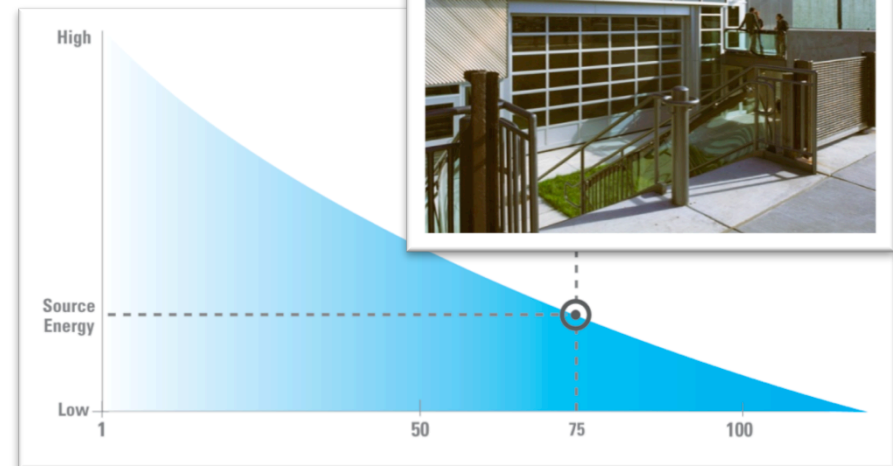
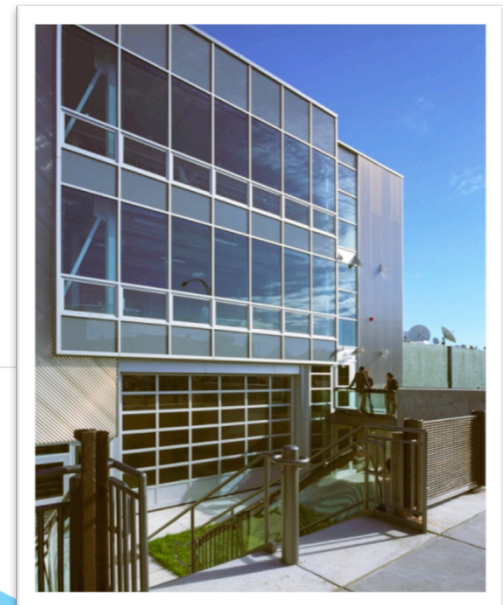
EPA Performance Scales



Fuel Efficiency: MPG



Energy Performance Scale: 1 – 100 (EUI)



Target Finder & Portfolio Manager



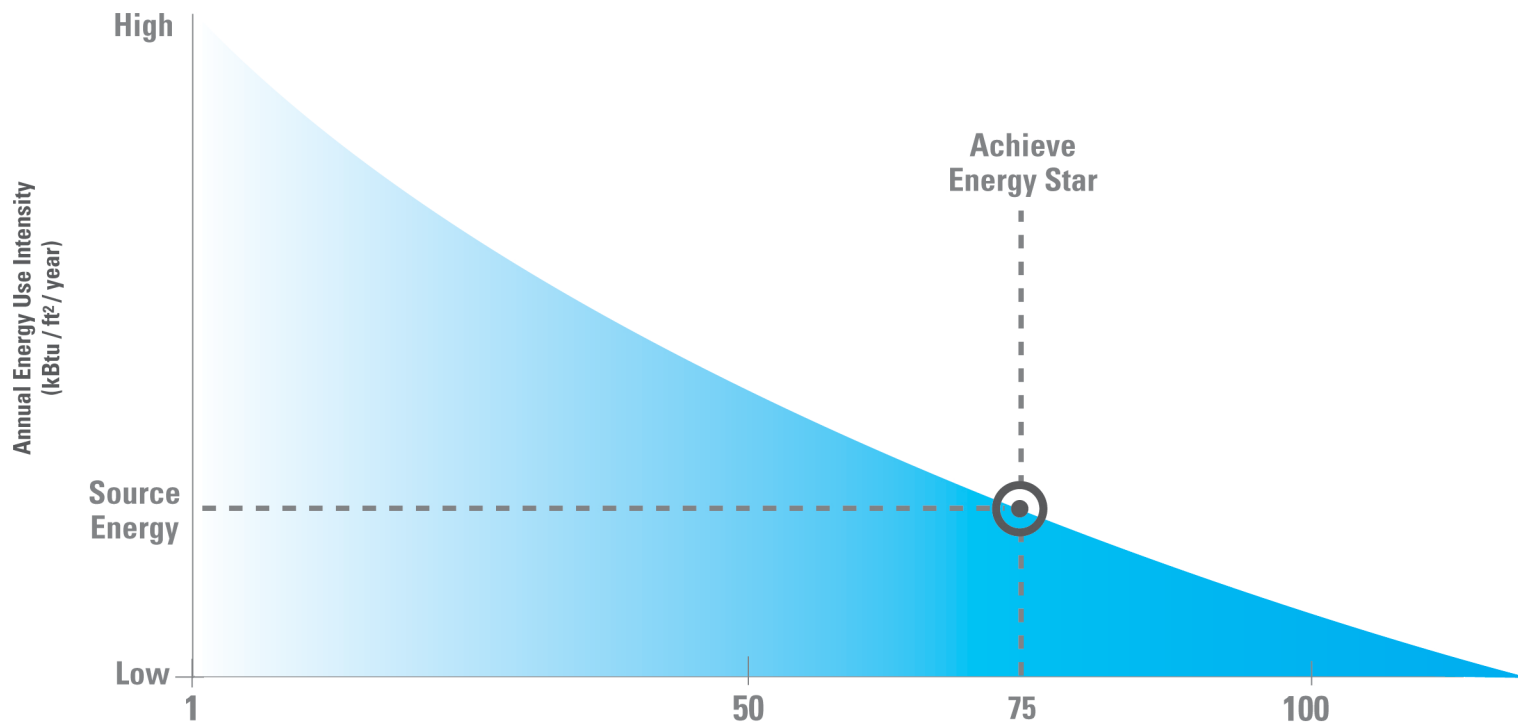
- Target Finder for design projects
 - Energy use target
 - Design score
- Benchmark–based performance targets
- Portfolio Manager for existing buildings
 - Track monthly energy use
 - Benchmark energy performance



ENERGY STAR Scale

- 1 – 100 score for energy use intensity (EUI)
- Measured in kBtu/sf/year
- Regionalized by zip code; normalized weather/ climate
- Targets/benchmarks derived from actual building energy performance – CBECS
- Scale based on source energy
- Determines percent better than average building: energy & carbon

ENERGY STAR Scale



ENERGY STAR Scale



The Score Does...

- ✓ Evaluate actual billed & estimated design energy use
- ✓ Normalize for operational characteristics (e.g., size, number of employees, computers, climate)
- ✓ Express the performance of a building/design compared to its peers, as described by a nationally representative survey

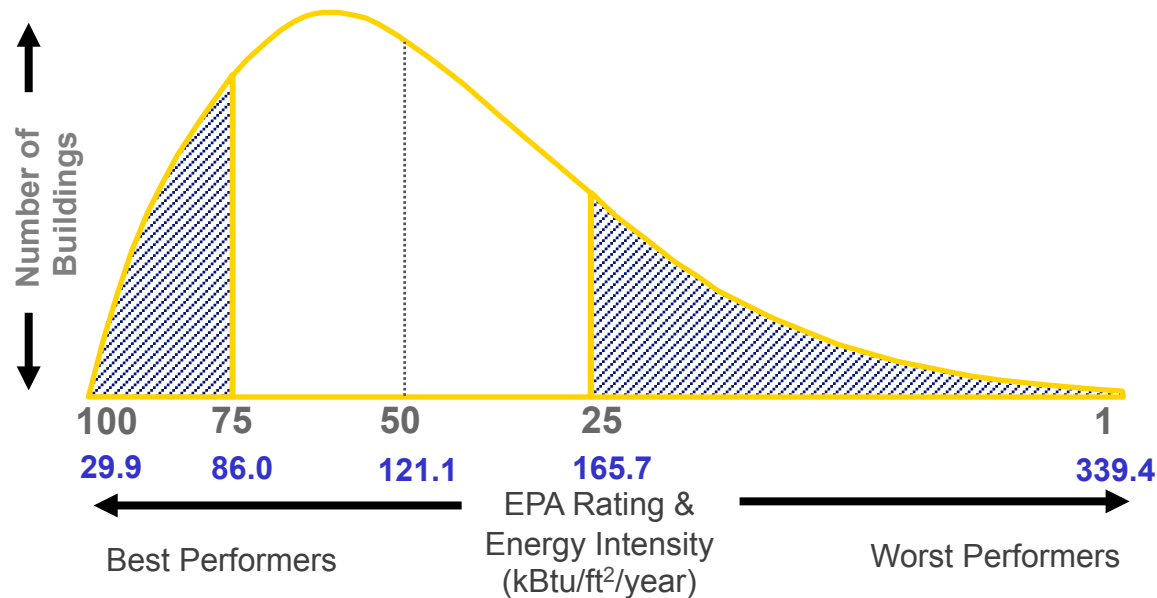
The Score Does Not...

- ✗ Sum the energy use of each piece of equipment
- ✗ Evaluate buildings relative to others in Portfolio Manager
- ✗ Normalize for technology choices or market conditions (e.g., type of lighting, energy price)
- ✗ Explain why a building operates (or intended) as it does

Why Building EUI?



Similar Buildings Perform Differently Energy Intensity of Office Buildings



EPA Energy Performance Scale: 75 or EUI 86.0 kBtu/sf/yr

Site vs. Source Energy



- Only 33% of fuel's embodied energy is converted to electricity
- 67% is lost to generation and transmission

Targets & Metrics



50%
Compared to
What?



*A target is a reference point to shoot for;
derived from benchmarks of past performance.*

Know Where You Are Going



- Set energy use target for design projects – Target Finder
- Calculate whole-building energy use
 - Regulated and non-regulated loads
 - Integrated systems design
- Evaluate energy—early and throughout the design
- Determine if energy design intent was achieved in the operating building – Portfolio Manager



Target Finder Space Types



About ENERGY STAR - News Room - FAQs - **KIDS** -

- PRODUCTS
- HOME IMPROVEMENT
- NEW HOMES
- BUILDINGS & PLANTS**
- PARTNER RESOURCES

Buildings & Plants [Home](#) > [Buildings & Plants](#) > [Tools & Resources Library](#) > [Commercial Building Design](#) > [Target Finder](#)

Eligible Building Types

Target Finder provides an EPA energy performance score for the following commercial building [space types](#):

- Bank/Financial Institutions
- Courthouses
- Data Centers
- Hospitals (General Medical and Surgical)
- Hotels/Motels
- Houses of Worship
- K-12 Schools
- Medical Offices
- Offices
- Residence Halls/Dormitories
- Retail Stores
- Senior Care
- Supermarkets/Grocery Stores
- Warehouses (Refrigerated and Unrefrigerated)

Space Types

(not eligible for EPA score/Target Finder)




2003 CBECS ¹ National Median Source Energy Use and Performance Comparisons by Building Type			
Building Use Description ²	Median Source EUI ³ (kBtu/Sqft)	Average Percent (%) Electric Use	Median Site EUI (kBtu/Sqft)
Education	144	63%	58
K-12 School	<i>Use EPA's Target Finder / Portfolio Manager</i>		
College/University (campus level)	244	63%	104
Food Sales	570	86%	193
Grocery Store/Food Market	<i>Use EPA's Target Finder / Portfolio Manager</i>		
Convenience store (with or without gas station)	657	90%	228
Food Service	575	59%	267
Restaurant/Cafeteria	434	53%	207
Fast Food	1170	64%	418
Inpatient Health Care (Hospital)	<i>Use EPA's Target Finder / Portfolio Manager</i>		
Lodging	163	61%	72
Dormitory/Fraternity/Sorority	<i>Use EPA's Target Finder / Portfolio Manager</i>		
Hotel/Motel/Inn	<i>Use EPA's Target Finder / Portfolio Manager</i>		
Mall (Strip and Enclosed)	247	71%	94
Nursing/Assisted Living	<i>Use EPA's Target Finder / Portfolio Manager</i>		
Office	<i>Use EPA's Target Finder / Portfolio Manager</i>		
Outpatient and Health Care	163	72%	62
Clinic/Other Outpatient Health	194	76%	67
Medical Office	<i>Use EPA's Target Finder / Portfolio Manager</i>		
Public Assembly	89	57%	42
Entertainment/Culture	94	63%	46
Library	246	59%	92
Recreation	100	55%	38
Social/Meeting	71	57%	43
Public Order and Safety	161	57%	82
Fire/Police Station	146	56%	82

54.28/kBtu/ft²
Electricity



Target Finder Input Screen



**TARGET FINDER**PRINTFAQ FREQUENTLY ASKED QUESTIONSCONTACT USHELP

[Return to ENERGY STAR Web site](#) > **Target Finder**

Target Finder

REQUIRED
Select a target rating and/or compare your Design Energy to the target.

1. Facility Information

*Zip Code Facility Name
Address City State

2. Facility Characteristics

*Select Space Type(s) for this project.
[Space Types]

Office <input type="button" value="Delete"/>					
*Gross Floor Area	*Weekly operating hours	*Workers on Main Shift	*Number of PCs	*Office Air-Conditioned	*Office Heated
<input type="text" value="50000"/> Sq. Ft.	<input type="text" value="55"/> Hours	<input type="text" value="300"/>	<input type="text" value="300"/>	<input type="text" value="50% or more"/>	<input type="text" value="50% or more"/>

3. The Target¹

[Target Rating](#) Or [Energy Reduction Target](#)

*Choose the design target and select "**View Results**" to display associated energy use for the target.



Target Finder Results Screen



Results

The design **must** achieve a rating of 75 or higher to be eligible for "Designed to Earn the ENERGY STAR".

[View Statement of Energy Design Intent](#)

NOTE: Assumptions are 74% Electricity - Grid Purchase and 26% Natural Gas. The Target & Median Building energy use for this facility are calculated based on the typical fuel mix in the zip code specified.

Results for Estimated Energy Use			
Energy	Design	Target	Median Building
Energy Performance Rating (1-100)	N/A	85	50
Energy Reduction (%)	N/A	38	0
Source Energy Use Intensity (kBtu/Sq. Ft./yr)	N/A	183	294
Site Energy Use Intensity (kBtu/Sq. Ft./yr)	N/A	67	108
Total Annual Source Energy (kBtu)	N/A	9,171,621	14,709,499
Total Annual Site Energy (kBtu)	N/A	3,353,858	5,378,937
Total Annual Energy Cost (\$)	N/A	\$ 111,188	\$ 178,324
Pollution Emissions			
CO2-eq Emissions (metric tons/year)	N/A	397	636
CO2-eq Emissions Reduction (%)	N/A	38%	0%

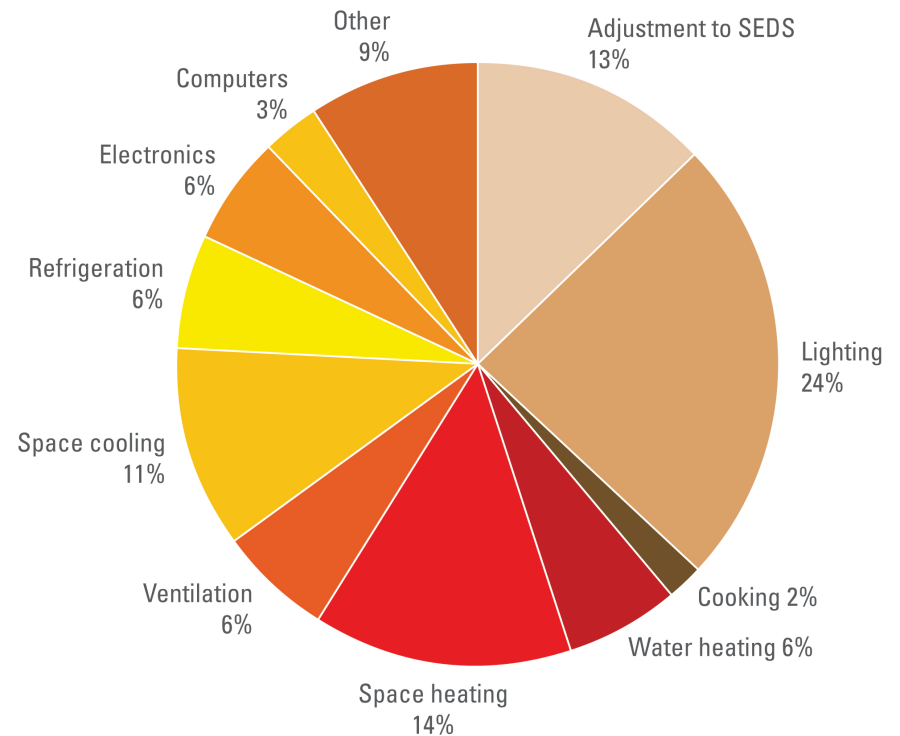
Design Target



Evaluate Design Strategies



- Energy modeling, BIM & energy analysis software
- Codes & Performance
- Compare design alternatives
- Check design energy use



Energy Codes



Modeling a design to an energy code-compliant baseline does not:

- Provide explicit targets
 - Btu/sf/yr for superior performance
 - Percent better than average energy use
- Accurately predict performance
 - if use prescriptive approach
 - with Appendix G – base building varies by designer
- Consider system and design interactions
- Facilitate measuring energy and providing feedback

Estimated Design Energy



4. Estimated Design Energy

Use results from energy analysis and enter total estimated energy for the design. Select "View Results" to compare Estimated Energy Use to your Target.

Energy Source	Units	Estimated Total Annual Energy Use ²	Energy Rate (\$/Unit)
Electricity - Grid Purchase	kBtu	2000000	\$ /kBtu
Natural Gas	kBtu	900000	\$ /kBtu
[Select Energy Source]			\$ /

Clear Form

View Results

Target Finder Results Screen



Results

The design achieved a rating of 75 or higher:

APPLY for "Designed to Earn the ENERGY STAR"

View Statement of Energy Design Intent

NOTE: Values are 69% Electricity - Grid Purchase and 31% Natural Gas. The Target & Median Building energy use for this facility are calculated based on fuel mix of input estimated energy use.

Results for Estimated Energy Use			
Energy	Design	Target	Median Building
<u>Energy Performance Rating (1-100)</u>	92	85	50
<u>Energy Reduction (%)</u>	48	38	0
<u>Source Energy Use Intensity (kBtu/Sq. Ft./yr)</u>	152	183	294
<u>Site Energy Use Intensity (kBtu/Sq. Ft./yr)</u>	58	70	112
<u>Total Annual Source Energy (kBtu)</u>	7,622,300	9,171,621	14,709,499
<u>Total Annual Site Energy (kBtu)</u>	2,900,000	3,489,458	5,596,414
<u>Total Annual Energy Cost (\$)</u>	\$ 92,564	\$ 111,379	\$ 178,630
Pollution Emissions			
<u>CO2-eq Emissions (metric tons/year)</u>	331	398	639
<u>CO2-eq Emissions Reduction (%)</u>	48%	38%	0%

Design Score



Designed to Earn ENERGY STAR



Statement of Energy
Design Intent

- Document
- Certify
- Promote



Design to Performance



Kinard Junior High, Fort Collins, CO	Estimated Use (Design)	Actual Use (Operations)
Site Energy Use Intensity*	28.1 kBtu/sf/yr	21.6 kBtu/sf/yr
Annual Energy Use	3,259,450 kBtu	2,435,076 kBtu
ENERGY STAR scores	91(2005 DEES)	95 (2007) 97 (2008) 99 (2009) 99 (2010) 100 (2011)

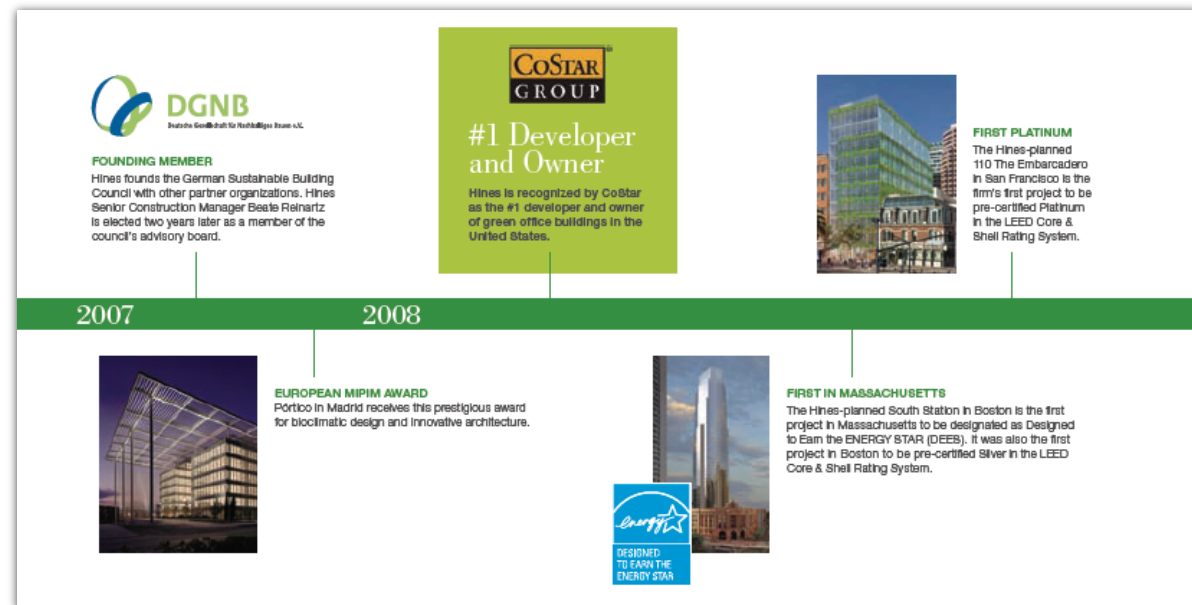


*ASHRAE cites the national average site EUI for K-12 schools as 60 kBtu/sf/yr

Making the Business Case



- Lower energy costs
- Increased net operating income and average rent
- Leadership and corporate social responsibility

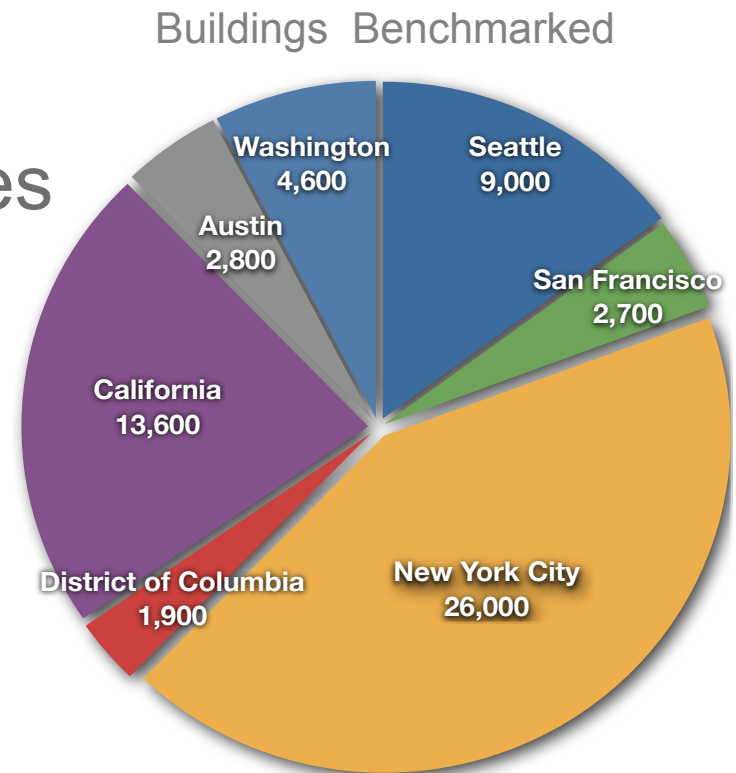


Benchmarking and Disclosure



- Policies in Seven U.S. Jurisdictions
 - > 60,000 buildings ~ 4 billion ft²
 - Policies begin in 2011 & 2012

- Interest from Cities and States
 - Driven by existing buildings
 - Market transparency
 - Policy makers want data

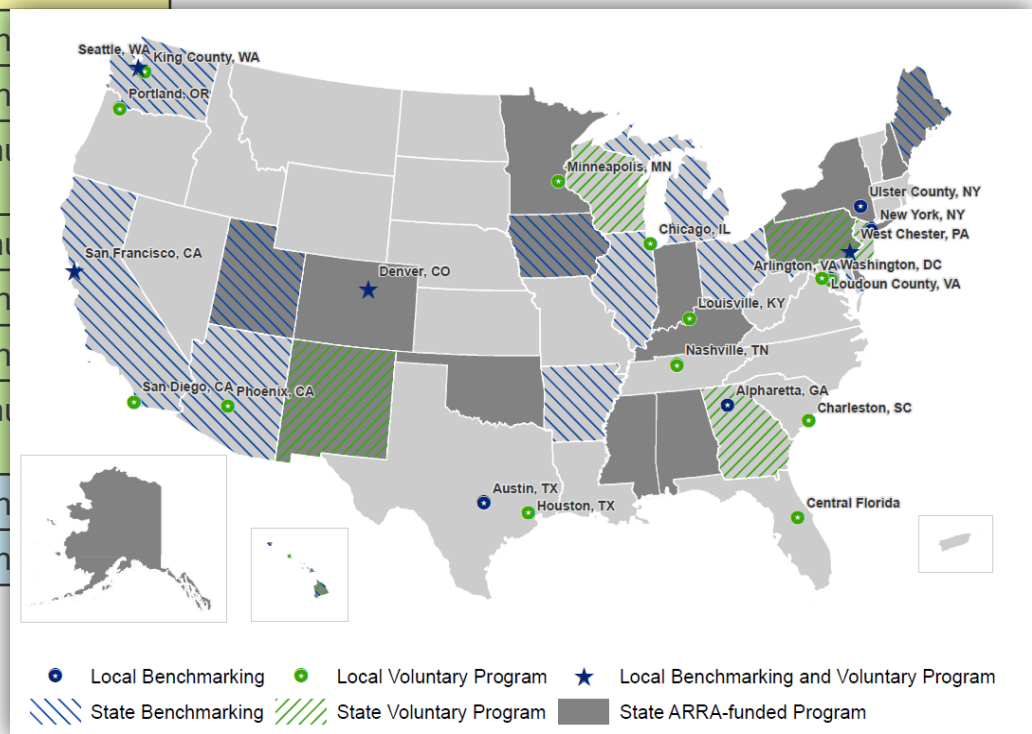


Source: Institute for Market Transformation

State & Local Benchmarking



Jurisdiction	Enacted	Public Buildings	Private Buildings	Disclosure
Michigan	Apr 05	√		
Ohio	Jan 07	√		
Hawaii	Jul 09	√		
Denver, CO	Oct 07	√		
California	Oct 07	√	√	Trans
Washington	May 09	√	√	Trans
District of Columbia	Jul 08	√	√	Ann
New York, NY	Dec 09	√	√	Ann
Seattle, WA	Jan 10	√	√	Trans
Austin, TX	Jun 11	√	√	Trans
San Francisco, CA	Feb 11	√	√	Ann
MD (pending)		√	√	Trans
CO (pending)			√	Trans



AIA 2030 Commitment and the 2030 Challenge

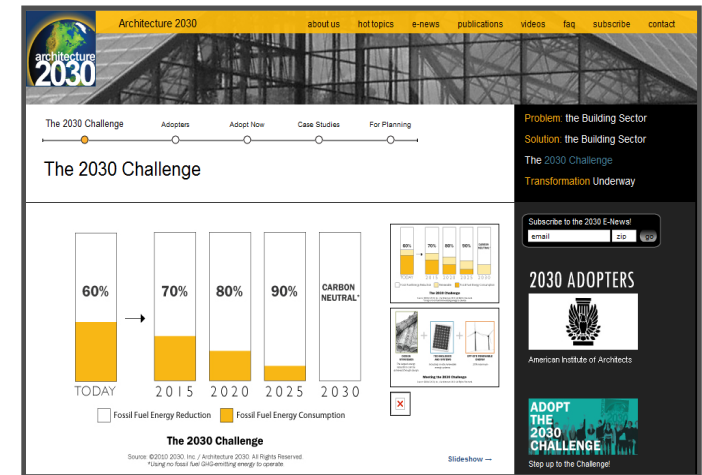


Similarities

- Shared reduction targets
- Shift the “business as usual” mindset

2030 Commitment Overview

- Developed specifically for design and construction firms; particularly AIA firms
- Required reporting protocol
- Platform for information sharing



The screenshot shows the AIA 2030 Commitment website. The header includes the title 'AIA 2030 Commitment' and navigation links: Home | The Commitment | Why Commit? | Join | Reporting | Resources. A news item states: 'New! Tool to measure progress towards the 2030 targets released. Read More!'. A prominent button says 'Join the 2030 Commitment'. Below this, there are three main sections:

- Why Commit?**: The profession is confronting the fact that buildings are the largest single contributor to production of greenhouse gases and almost half of the total annual production. As architects, we understand the need to exercise leadership in our role in creating the built environment. [Read more](#)
- Six Firms Join the Commitment in June!**: Schmidt Associates, Lake | Plato, In Balance, Licata Hansen Associates Architecture, FKP Architects, Helix Architecture + Design, Ratcliff, HMC Architects.
- Featured Firm**: VOST GRUBE HALL (with an image of the building).
- Progress Reporting Tool Released!** (with an image of the reporting tool interface).



AIA 2030 Commitment



AIA Sustainable Architectural Practice
Position Statement – December 2005

Fossil fuel consumption reduction
targets for new buildings and
renovations by

- 2010 - 50%
- **2010 – 60%**
- 2015 – 70%
- 2020 – 80%
- 2025 – 90%
- **2030 - net zero carbon emissions**

2030 Commitment Benchmarks

U.S. National Average Site EUI	
Building Type	U.S. National Average Site EUI
Bank/Financial Institution	77
Courthouse	118
Education - College/University (campus-level)	120
Education - General	76
Education - K-12 School	75
Entertainment/Culture	95
Food Sales - Convenience Store (w/ or w/out gas station)	241
Food Sales - General	225
Food Sales - Supermarket/Grocery	213
Food Service - Fast Food	534
Food Service - General	351
Food Service - Restaurant/Cafeteria	302
Health Care - Clinic	84
Health Care - Hospital Inpatient	227
Health Care - Medical Office	59
Health Care - Nursing/Assisted Living	124
Health Care - Outpatient - General	73
Laboratory	370
Library	104
Lodging - General	87
Lodging - Hotel/Motel	94
Lodging - Residence Hall/Dormitory	89
Office	77
Other - not classified	104
Public Assembly - General	66
Public Safety - Fire/Police Station	78
Public Safety - General	90
Recreation	65
Religious Worship	46
Residential - Mobile Homes	73
Residential - Multi-Family, 2 to 4 units	58
Residential - Multi-Family, 5 or more units	50
Residential - Single-Family Attached	44
Residential - Single-Family Detached	44
Retail - Mall	107
Retail - Non-mall, Vehicle Dealerships, misc.	82
Retail Store	72
Service (vehicle repair/service, postal service)	77
Social/Meeting	52
Storage - Distribution/Shipping Center	44
Storage - General	26
Storage - Non-refrigerated warehouse	31
Storage - Refrigerated warehouse	127
Warehouse - Self-storage	4
X - none apply, use code equivalent	NA



Resources



Designing Commercial Buildings to Achieve ENERGY STAR
U.S. ENVIRONMENTAL PROTECTION AGENCY

Building Design > Designed to Earn the ENERGY STAR



- 1 Take the Lead
- 2 Use Energy Design Guidance
- 3 Set Energy Use Targets & Rate Design
- 4 Apply for Designed to Earn the ENERGY STAR
- 5 Complete the Cycle
- 6 Frequently Asked Questions (FAQs)

Designed to Earn the ENERGY STAR Guide

SET ENERGY USE TARGETS AND RATE YOUR DESIGN

Use Target Finder throughout the design process to help translate design intent into superior operational performance. The rating applies the same performance metric from pre-design through schematic design development and during building operation to determine how the energy use ranks against similar buildings across the nation. To use Target Finder, complete all required fields.

Pre-Design: Set Energy Use Goal

1. FACILITY INFORMATION
Enter the ZIP code of the project location. Red asterisk (*) indicates required input field to calculate energy use target or rating.

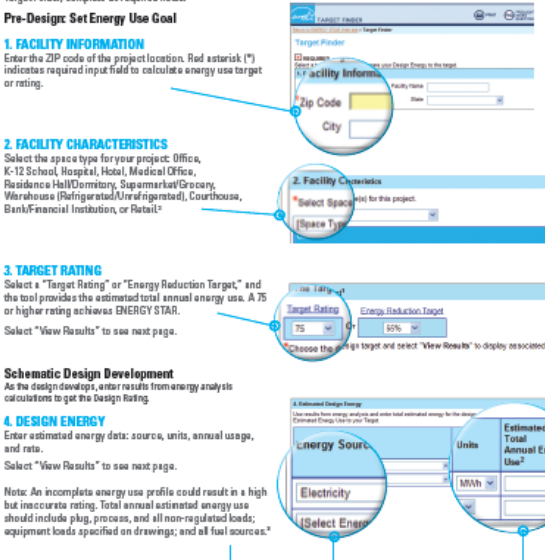
2. FACILITY CHARACTERISTICS
Select the space type for your project: Office, K-12 School, Hospital, Hotel, Medical Office, Residence Hall/Dormitory, Supermarket/Grocery, Warehouse (Refrigerated/Unrefrigerated), Courthouse, Bank/Financial Institution, or Retail.*

3. TARGET RATING
Select a "Target Rating" or "Energy Reduction Target," and the tool provides the estimated total annual energy use. A 75 or higher rating achieves ENERGY STAR. Select "View Results" to see next page.

Schematic Design Development
As the design develops, enter results from energy analysis calculations to get the Design Rating.

4. DESIGN ENERGY
Enter estimated energy data: source, units, annual usage, and rate. Select "View Results" to see next page.

Note: An incomplete energy use profile could result in a high but inaccurate rating. Total annual estimated energy use should include plug, process, and all non-regulated loads; equipment loads specified on drawings; and all fuel sources.*



Target Finder Brochure

Summary



- Use Target Finder for design projects
- Determine if design energy goals were achieved
- Use Portfolio Manager for operating buildings
- Determine if energy/carbon meets the 2030 goal
- Be recognized from EPA for design projects & buildings that achieves ENERGY STAR
 - ENERGY STAR Challenge: 2012 Race to DC

