

A spiral-bound notebook with a light-colored, textured cover and a dark brown border. The spiral binding is on the left side.

# Building Energy Performance Ratings

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High Performance Buildings &  
Standards Development Office  
California Energy Commission

# Discussion Topics

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- Performance Rating Disclosures  
(AB 1103)
- Rating Energy Assets
- Asset Rating and RCx
- Performance Ratings and  
Performance Improvements  
(AB 758)

# Performance Rating Disclosure

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## Valuing the Energy Performance of Building Property

- AB 1103 (Saldana, 2007)
  - Commercial building energy consumption disclosure
  - Energy Star rating and data must be disclosed for whole buildings at time of sale, lease or financing
  - CEC developing regulations
  - Proposed implementation date of Jan 2011

# Issues with AB 1103

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## "Whole Buildings"

- Misses the majority of tenant leased space

## Operational Ratings

- Decision makers are concerned with property assets, not operational behavior

# Rating Types

## Operational

- Example: U.S. EPA's Energy Star Portfolio Manager
- Rating based on actual energy usage, adjusted for weather
- No inherent requirement for field verification
- Ratings typically adjusted based on levels of service
- Good for use in existing building energy efficiency incentive programs
- Good for managing building portfolios over time

Improve Operations

# Rating Types

## Asset

- Examples: RESNET and CEC Home Energy Rating Systems
- Rates the building, not the occupant
- Focus is on the physical building assets - the "bones and mortar" - plus permanent energy systems
- Differences in operational behavior are ignored
- Rating is derived from a model-based estimate of energy usage, compared to a stock median or building code baseline
- Field verification is a requirement
- Good for valuing building performance within a financial transaction
- Good for energy efficiency code compliance and beyond code new construction incentive programs

Value Property

# Issues with AB 1103

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- Misses the majority of tenant leased space

## Operational Ratings

- Decision makers are concerned with property assets, not operational behavior

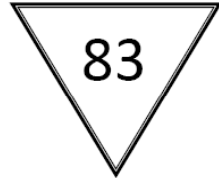
## Ratings vs. Data

- Decision makers should have a relative performance index
- Majority of CA buildings cannot get an Energy Star rating

# Commercial Building Energy Performance Disclosure

In conformance with California Code of Regulations, Title 20, Article 9 (2010)

ENERGY STAR PORTFOLIO MANAGER  
Commercial Building  
Energy Performance Disclosure  
*(U.S. EPA will design this box)*



Scale from worst to best  
1 to 100

United States Environmental Protection Agency

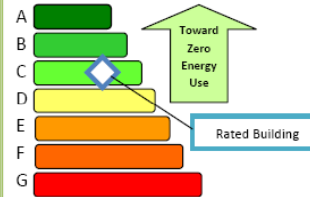
## Energy Use Index

Raw: 157

Weather  
Normalized:  
**142**

1,000 Btu  
per square foot  
per year

## California Commercial Building Energy Performance Disclosure



California Energy Commission

Building Name: **Mort's 02937753**  
Address: **1919 Pentane St.**  
City: **Lodi**  
Zip Code: **98776**  
Building ID Code: **00893472355**  
Certificate Issue Date: **January 3, 2011**  
Building Type: **Retail Store**

Gross Floor Space (square feet): **7,324**  
Annual Electricity Usage (kWhr): **43,564**  
Annual Natural Gas Usage (therms): **12,344,732**  
Other Annual Energy Usage: **None**  
Renewable Energy Production (kWhr): **None**  
Percent of Electricity from Renewables (%): **0**

The Energy Performance scores were determined for this building based on recorded energy consumption, the square footage of the buildings and the following default or actual building characteristic data:

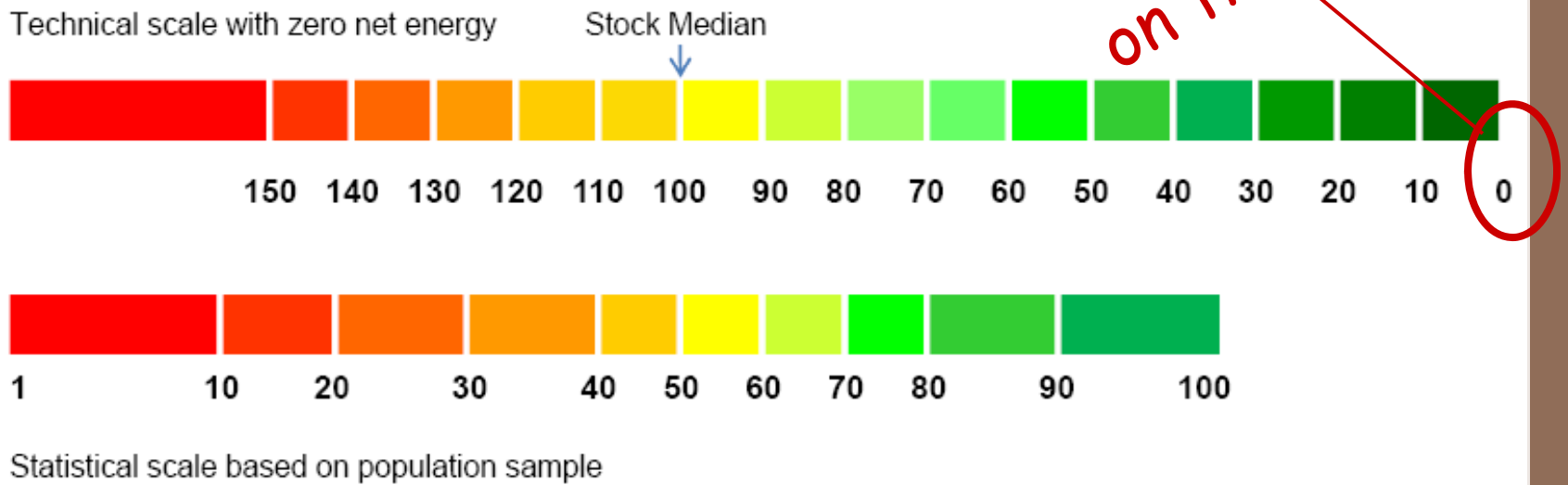
Default	Building Data	Building Characteristic
<input type="checkbox"/>	_____	Weekly operating hours
<input type="checkbox"/>	_____	Number of workers of main shift
<input type="checkbox"/>	_____	Number of personal computers
<input type="checkbox"/>	_____	Number of cash registers
<input type="checkbox"/>	_____	Number of walk-in refrigerator/freezer units
<input type="checkbox"/>	_____	Number of open and closed refrigeration/freezer units
<input type="checkbox"/>	_____	Percent of floor area that is cooled in 10% increments ( 10%, 20%, 30%, etc)
<input type="checkbox"/>	_____	Percent of floor area that is heated in 10% increments ( 10%, 20%, 30%, etc)
<input type="checkbox"/>	_____	Exterior entrance to the public (yes or no)

I, \_\_\_\_\_ on this date of \_\_\_\_\_  
Do hereby attest and affirm that all the information or selections that appear on this disclosure were entered by me and accurately represent the building identified to the best of my knowledge.

Signed: \_\_\_\_\_

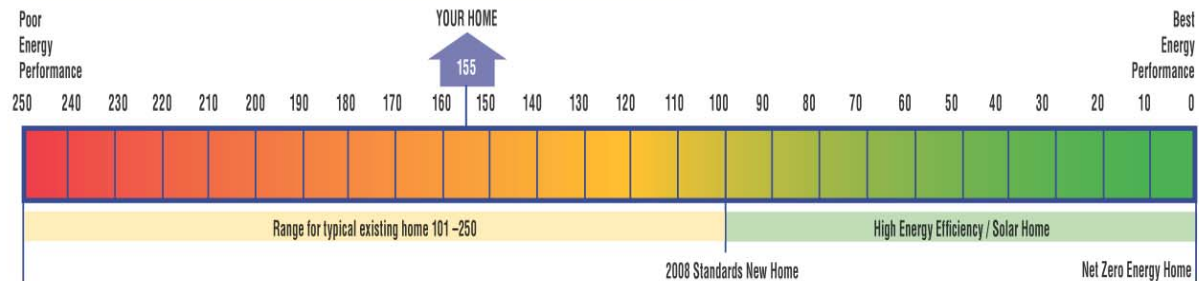
# CA Rating: Scale


## Peer Group vs. Technical Potential



# Home Energy Rating System

## California Home Energy Rating Certificate



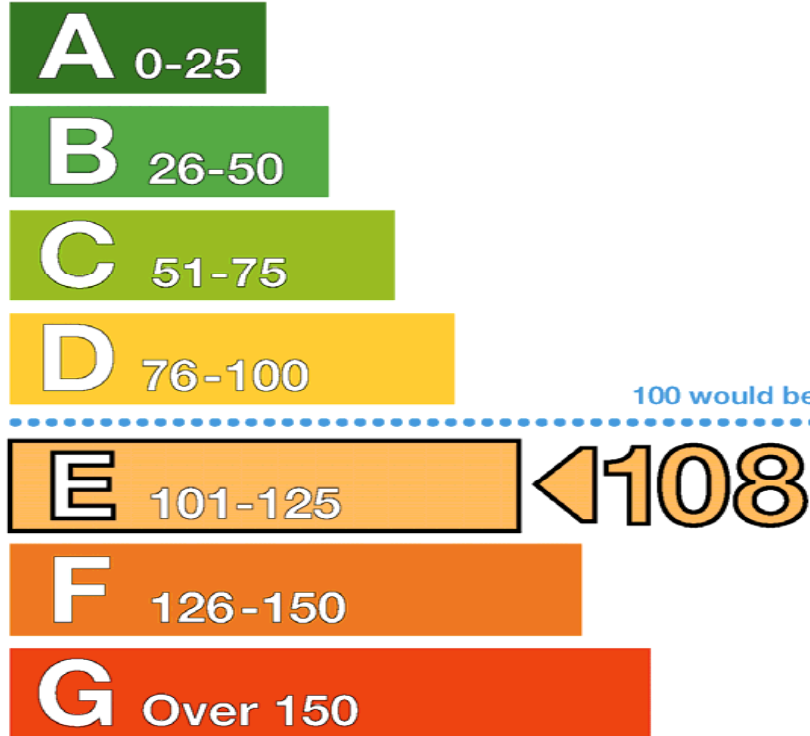
<p>Information goes here on compliance with other programs:</p> <p>Qualifying Information Goes Here:</p> <p>HERS Provider and/or Sponsor Co-Branding Logos Go Here:</p>	<p><b>Energy Impact</b></p> <p><b>Greenhouse Gas Emissions</b> Carbon Dioxide xxx tons/year</p> <p><b>Energy Consumption</b> Electricity (kWh/year) Cooling --- Lights --- Appliances --- Total --- Natural Gas (therms/year) Space Heating --- Water Heating --- Total ---</p> <p><b>Operating Cost (\$/year)</b> Electricity --- Gas --- Total ---</p> <p><b>Renewable Energy Production</b> None</p>	<p><b>Site Information</b></p> <p><b>Address</b> 123 Jones Street Anywhere, California 9410x</p> <p><b>General Information</b> Conditioned Floor Area 2,200 ft<sup>2</sup> Bedrooms 4 House Type Single Family Foundation Type Slab-on-Grade</p> <p><b>Energy Efficiency Features</b></p> <p><b>Insulation</b> Ceiling R-30 Wall R-11 Floor over crawlspace None Slab Edge None</p> <p><b>Windows</b> Frame Aluminum Glazing Double</p> <p><b>Heating System</b> Gas furnace, 0.80 AFUE Unsealed air distribution ducts</p> <p><b>Cooling System</b> None</p> <p><b>Water Heating System</b> Gas storage type, 0.52 EF</p>	<p><b>Official Home Energy Rating</b> in conformance with the requirements of the California Energy Commission <a href="http://www.energy.ca.gov">www.energy.ca.gov</a></p>  <p><b>HERS Provider:</b> Acme Energy Rated Homes 934 Energy Efficient Way Power Junction, California <a href="http://www.AcmeEnergyRatedHomes.com">www.AcmeEnergyRatedHomes.com</a></p> <p><b>Rating Information</b> Rating Number xxxx-yyyy Certified Rater EEH, Inc. Stockton, CA Rating Date: January dd, yyyy</p> <p>_____ Rater Signature                      Date</p>
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# UK Performance Ratings

## Energy Performance Operational Rating

This tells you how efficiently energy has been used in the building. The numbers do not represent actual units of energy consumed; they represent comparative energy efficiency. 100 would be typical for this kind of building.

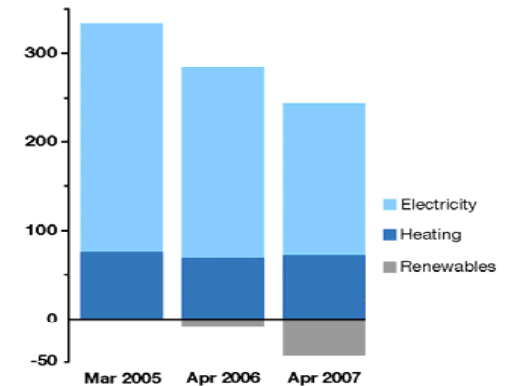
More energy efficient



Less energy efficient

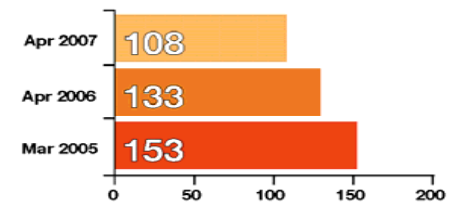
## Total CO<sub>2</sub> Emissions

This tells you how much carbon dioxide the building emits. It shows tonnes per year of CO<sub>2</sub>.



## Previous Operational Ratings

This tells you how efficiently energy has been used in this building over the last three accounting periods



# CA Commercial Building Stock Medians

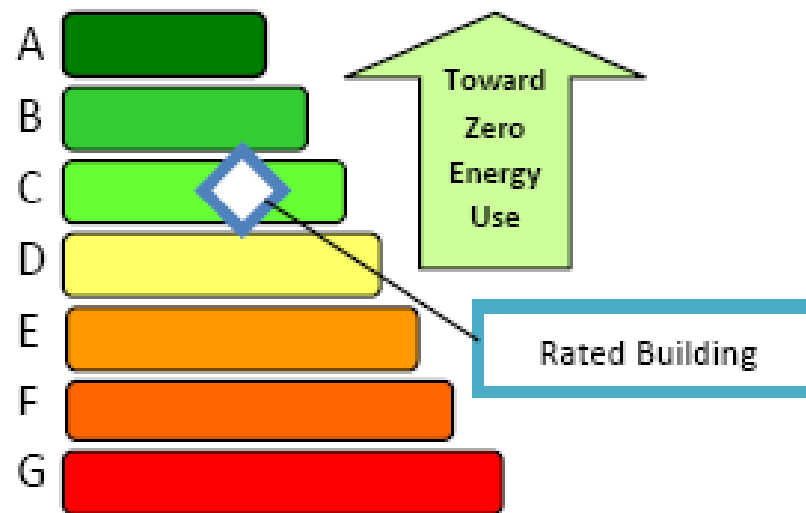
Building Type	Occupancy Type	Median EUI (kBtu/sf)
Education	Daycare or Preschool	66
	Elementary School	92
	Middle / Secondary School	119
	Vocational or Trade School	83
Grocery / Convenience Store	Convenience Store	923
	Liquor Store	456
	Small General Grocery	483
	Specialty / Ethnic / Other Grocery	457
	Supermarkets	544
Health Care	Clinic / Outpatient Care	223
	Hospital	484
	Medical / Dental Lab	253
	Medical / Dental Office	158
	Nursing Home	221
Lab / Technical	Data Processing / Computer Center	611
	Lab / R&D Facility	571
	Software Development	248
Lodging	Hotel	176
	Motel	154
	Resort	276
Office / Bank	Insurance / Real Estate	149
	Office / Bank	186

# CA Commercial Building Stock Medians

Other	All Other	287
	Assembly / Light Manufacturing	129
	Police / Fire Stations	183
Public Assembly	Health / Fitness Center	310
	Library / Museum	174
	Movie Theaters	235
	Other Recreational / Public Assembly	299
	Religious	66
	Theater / Perf. Arts / Community Ctr.	133
Restaurant	Bar / Tavern / Nightclub	367
	Fast Food or Self Service	1148
	Specialty / Novelty / Other Restaurant	712
	Table Service	749
Retail	Auto Sales	221
	Department / Variety Store	208
	Enclosed Mall	259
	Other Retail Store	148
	Retail Warehouse / Clubs	193
	Strip Mall	147
Service	Gas Station / Auto Repair	94
	Gas Station with Convenience Store	1162
	Other Services or Repair Shop	158
Warehouse	Conditioned Warehouse	98
	Refrigerated Warehouse	289
	Unconditioned Warehouse	51

# CA Rating for AB 1103

## California Commercial Building Energy Performance Disclosure



# Rating Energy Assets

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## Field Assessment

- Collect info necessary to construct simulation model
- Identify assets & operational characteristics
- Preliminary recommendations?

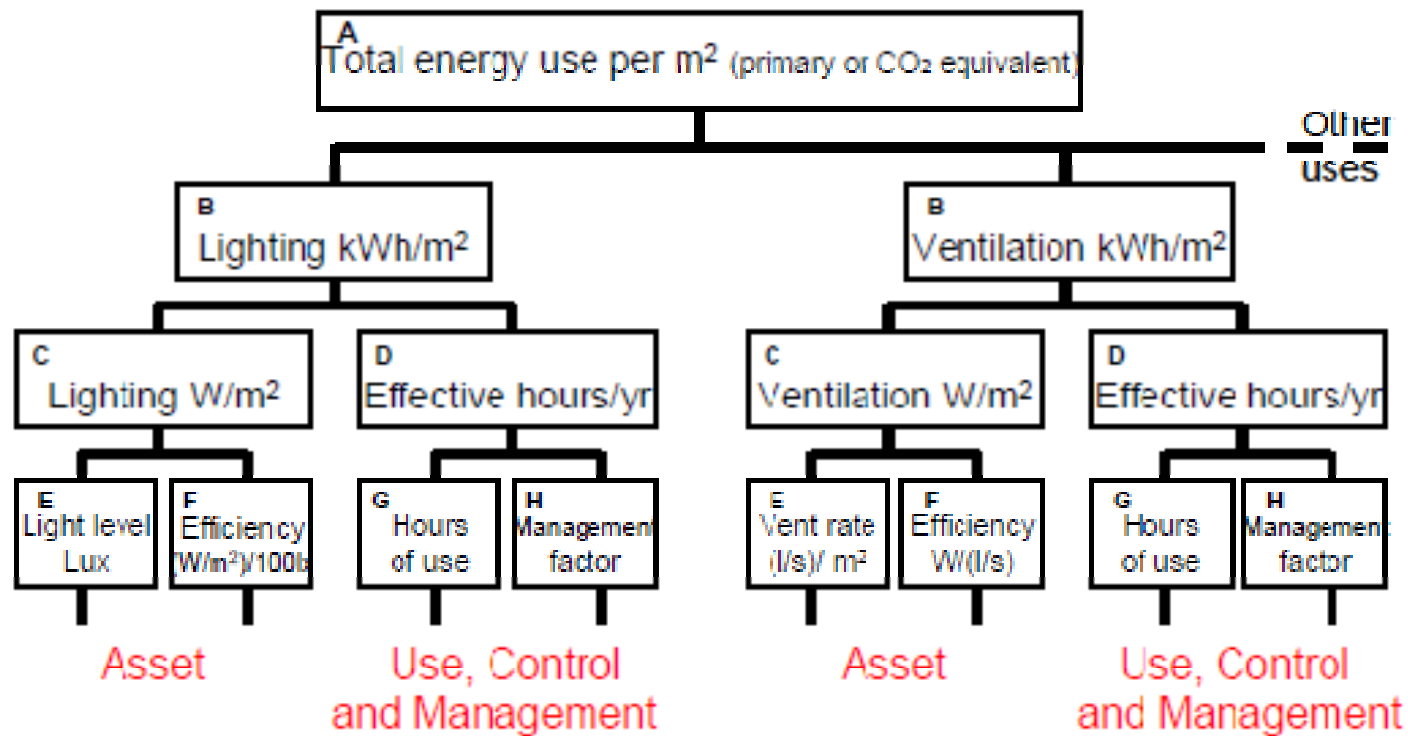
## Building Model

- Normalize weather & operational characteristics
- Estimate annual energy use and/or cost (TDV for CA)
- Generate rating

# Energy System Benchmarks

include both Asset and Operational components

Figure 3 The Tree Diagram description of a building's annual energy use



EPLabel: a graduated response procedure for producing a building energy certificate based on an operational rating

R. Cohen, Energy for Sustainable Development, [robert@esd.co.uk](mailto:robert@esd.co.uk)

W. Bordass William Bordass Associates, [BillBordass@aol.com](mailto:BillBordass@aol.com)

J. Field Target Energy Services, [jfield@targ.co.uk](mailto:jfield@targ.co.uk)

# Rating Field Assessment vs. RCx

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## Field Assessment

- Collect info necessary to construct simulation model
- Identify assets & operational characteristics
- Preliminary recommendations?

## RCx Screening

- Identify assets & operational characteristics

## RCx Investigation

- Develop recommendations

# New Energy Policy for Old Buildings

## AB 758 (Skinner, 2009)

- Calls for a comprehensive program to achieve energy savings in CA's existing building stock
- CEC must develop and implement program, in collaboration with all stakeholders



# New Energy Policy for Old Buildings

## AB 758 (Skinner, 2009)

- Program components will include:
  - Workforce Development
  - Public Awareness Campaign
  - Financing Options
  - Rating systems (e.g. HERS)
  - Labeling Programs
  - Audits & Commissioning Investigations
  - Retrofits & Retro-commissioning
- ~\$120M ARRA SEP green job training, financing and retrofit programs will serve as pilots

# Ratings → Improvements

## Potential Rating Requirements

- HERS rating disclosed at time of sale or other trigger points
- Commercial asset rating disclosures within financial transactions
  - Including tenant leased spaces
- Performance labels for all public buildings


## Potential Efficiency Improvement Requirements

- At time of financial transaction or other trigger points
- At date certain, depending on rating

# Side by Side Ratings

## Operational & Asset

### 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		B	D		
A					
B					
C					
D					
E					
F					
G		Calculated	Actual		
Not energy efficient					
Asset rating method:	UK National Standard 2004				
Operational rating method:	UK Office Tailored Benchmarks 2002			48	83
Units used:	kg CO <sub>2</sub> per sq m of net area per annum >				
Occupancy level	Square metres net lettable area per person			14	12
Equipment heat gain level	Watts per square metre net			12	12
Weekly occupancy hours	Hours per week			55	58
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)			ABCDEFg		
Internal Environmental Quality			Not assessed		
Risk level			Not assessed		
Further information can be found in the Energy Log Book					
GB 2004		 Directive 2002/91/EC			

# Public Awareness (not in Energy Units)



San  
Francisco

[Lightblueline.org](http://Lightblueline.org)

*“Drawing the line against  
climate change”*



# The End.



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