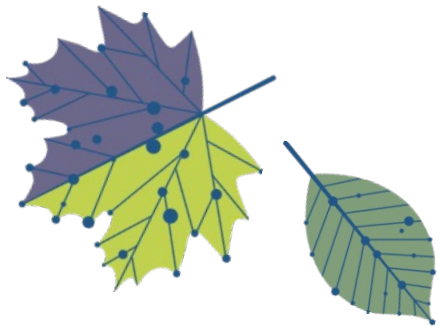


Pre-Panel Presentation: Asset vs. Operational Ratings

11/20/2024

Michael Sawford



Goal: Untangle the Landscape of Building Ratings

LEED Home Energy Rating Title 24 Part 6

Home Energy Score Energy Performance Certificates

Asset Ratings Building Performance Standards

ASHRAE 90.1 ECBM Operational Ratings

Two Ways to Evaluate a Building

Asset Rating

- **IS:** Rating design, materials, systems
- **IS NOT:** Rating use & operation

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Examples:

- Most Home Energy Ratings
- Energy Code Compliance
- Certain aspects of LEED certification

Two Ways to Evaluate a Building

Asset Rating

- **IS:** Rating design, materials, systems
- **IS NOT:** Rating use & operation

Examples:

- Most Home Energy Ratings
- Energy Code Compliance
- Certain aspects of LEED certification

Operational Rating

- **IS:** Rating energy or carbon in operation, reflecting both building design and occupant behavior

Examples:

- Building Performance Standards
- Benchmarking
- ENERGY STAR for Buildings
- Operational aspects of LEED

Two Ways to Evaluate a Building

Asset Rating



Rated MPG

- *Comparative method*
- *Consumer resource*

Operational Rating



Actual MPG

- *Based on usage*
- *Owner resource*

Home Energy Ratings and Labels

Asset Rating

What They Are:

- Comparative methods to determine and communicate energy efficiency based on **features and characteristics** of a home.
 - E.g., Home Energy Rating System (HERS) Index, Home Energy Score (HES), and Energy Performance Certificates (EPC)

Key Features:

- These ratings focus on the performance of the **design and construction** of a building.
- Commonly used comparatively **for buying, selling, or renting homes.**
- May be **voluntary or mandated** locally, especially for new or purchased homes.

Building Performance Standards (BPS)

**Operational
Rating**

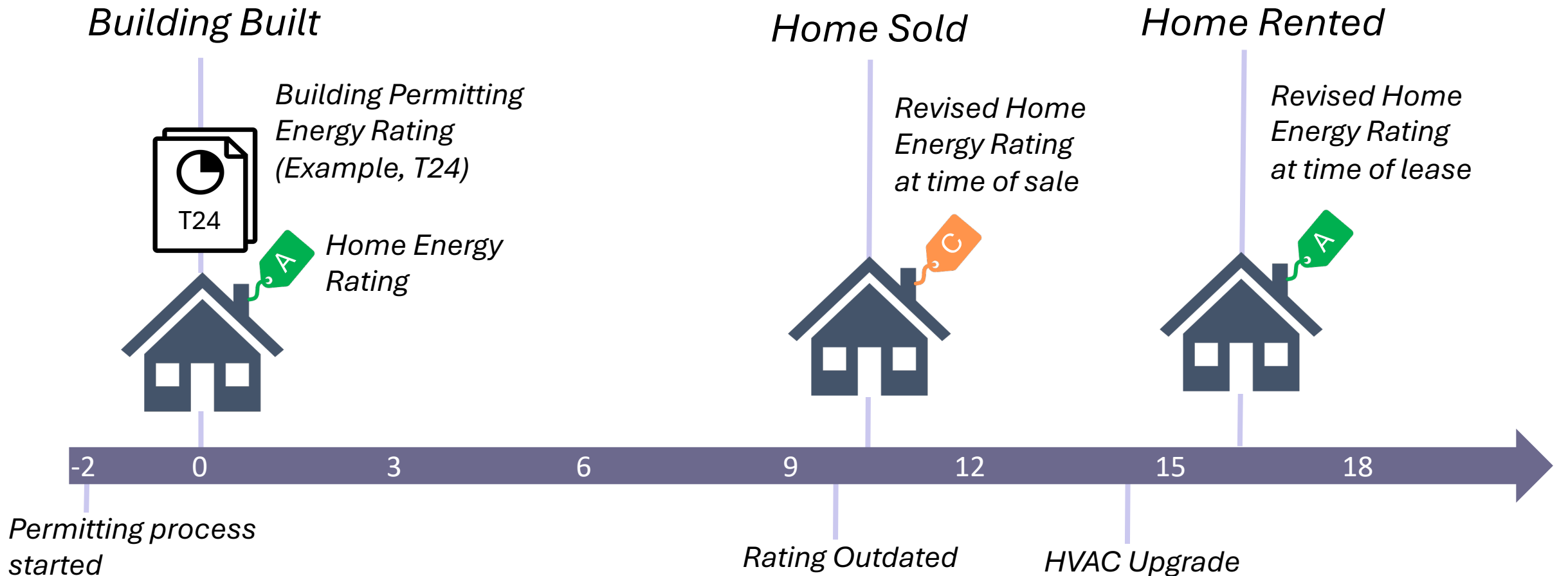
What They Are:

- **Mandatory energy or carbon targets**, to be met while in operation.
 - Enforcement can be at the city, state, or national level.
 - Targets are often based on benchmarking data.

Key Features:

- Common for **existing commercial buildings** above a certain size.
- Failure to meet performance standards can lead to **penalties**.

Example: Residential Home Energy Rating



EU/UK Example of Asset Rating (2007-Present)

UK EPC Ratings and Energy Performance Certificates


Rating by a Comparative Modeling Method (*being updated*)

- Simple model representation of actual building
- Compared to model(s) representing current code/ typical building stock
- Label in the form of a certificate with recommendations
- Minimum certificate rating E required from 2020 and rating C from 2030. Cost caps in place for efficiency measure upgrades and exemptions granted for 5 years.

Energy Performance Certificate (EPC)

17 Any Street, District, Any Town, B5 5XX

Dwelling type: Detached house
Date of assessment: 15 August 2011
Date of certificate: 13 March 2012



Reference number: 0919-9628-8430-2785-5996
Type of assessment: RdSAP, existing dwelling
Total floor area: 165 m²

Use this document to:

- Compare current ratings of properties to see which properties are more energy efficient
- Find out how you can save energy and money by installing improvement measures

Estimated energy costs of dwelling for 3 years	£5,367
Over 3 years you could save	£2,865

Estimated energy costs of this home			
	Current costs	Potential costs	Potential future savings
Lighting	£375 over 3 years	£207 over 3 years	<div style="border: 2px solid green; padding: 5px; display: inline-block;"> <p style="color: green; font-weight: bold; margin: 0;">You could save £2,865 over 3 years</p> </div>
Heating	£4,443 over 3 years	£2,073 over 3 years	
Hot water	£549 over 3 years	£222 over 3 years	
Totals:	£5,367	£2,502	

These figures show how much the average household would spend in this property for heating, lighting and hot water. This excludes energy use for running appliances like TVs, computers and cookers, and any electricity generated by microgeneration.

Energy Efficiency Rating

Very energy efficient - lower running costs

(92 plus) A
(81-91) B
(69-80) C
(55-68) D
(39-54) E
(21-38) F
(1-20) G

Not energy efficient - higher running costs

Current	Potential
49	76

The graph shows the current energy efficiency of your home.

The higher the rating the lower your fuel bills are likely to be.

The potential rating shows the effect of undertaking the recommendations on page 3.

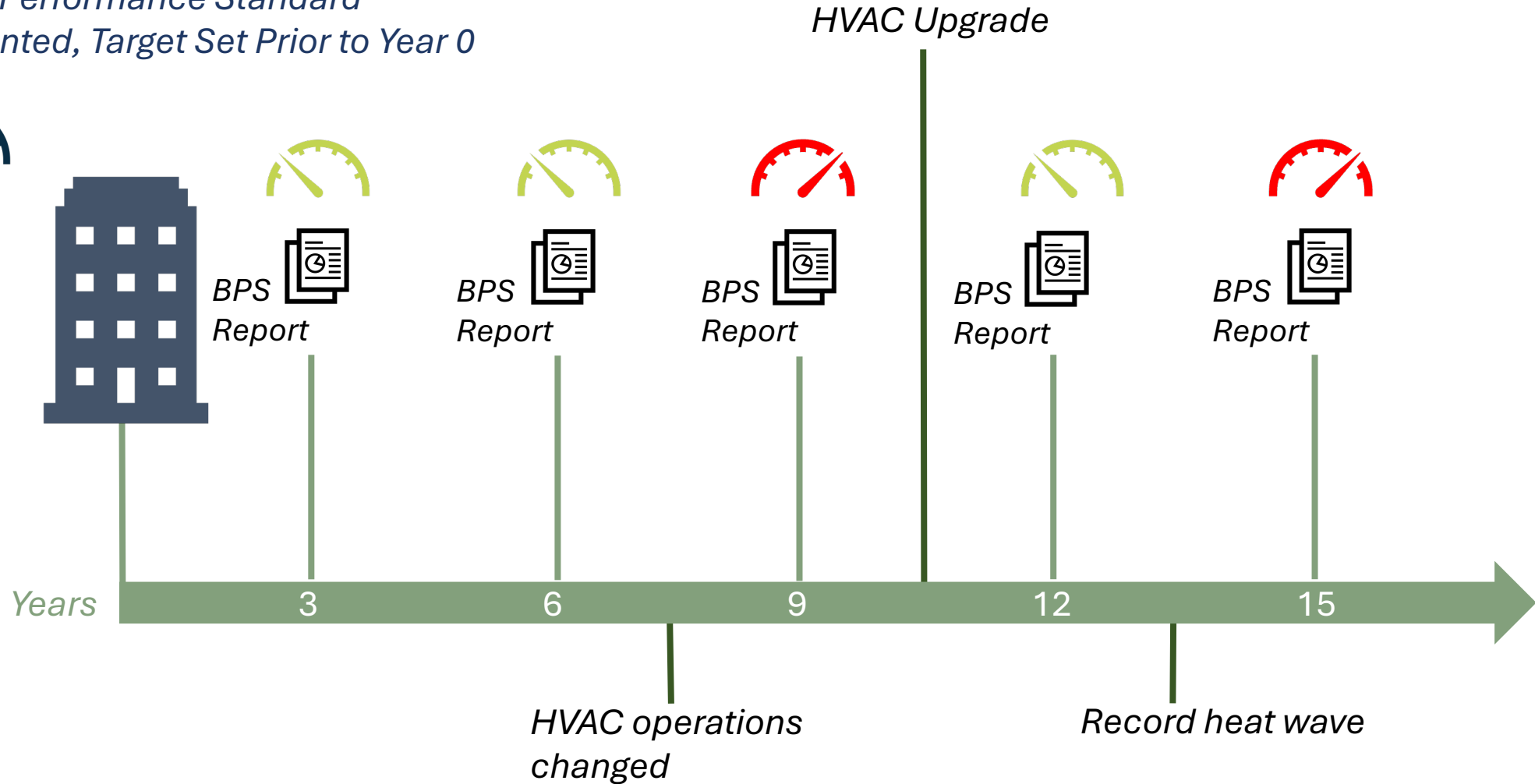
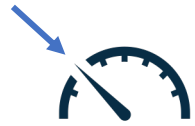
The average energy efficiency rating for a dwelling in England and Wales is band D (rating 60).

Top actions you can take to save money and make your home more efficient			
Recommended measures	Indicative cost	Typical savings over 3 years	Available with Green Deal
1 Increase loft insulation to 270 mm	£100 - £350	£141	✔
2 Cavity wall insulation	£500 - £1,500	£537	✔
3 Draught proofing	£80 - £120	£78	✔

See page 3 for a full list of recommendations for this property.

Example: Non-Residential BPS

*Building Performance Standard
Documented, Target Set Prior to Year 0*



Example: WA State Clean Building Act (CBPS)

Washington State Clean Buildings Performance Standard

July 2024 Version, includes covered buildings Tier 1 and Tier 2
 Powered by ANSI/ASHRAE/IES Standard 100-2018
 © 2024 ASHRAE

- Energy target sets by climate (4C, 5B)
- Uses Normalization factor for the number of hours occupied
- Applies factor to EUI target based on new construction or major renovation
- 15 months given to comply with BPS target for covered buildings.

Table 7-2a Building Activity Site Energy Targets (EUI_T) (I-P Units)

No.	Building Activity Type ^{1,2}			Notes	Climate Zone 4C	Climate Zone 5B
	Portfolio Manager Types	Portfolio Manager Subtypes	Subtypes: Detailed		EUI _T	EUI _T
68	Office	Medical office		3	60	65
69	Office	Office	Admin/professional office		63	66
70	Office	Office	Bank/other financial		69	71
71	Office	Office	Government office		66	69
72	Office	Office	Medical office (diagnostic)	3	60	65
73	Office	Office	Other office		66	68
74	Office	Veterinary office			90	96
75	Office	Other—office			66	68

How Does Building Energy Modeling Fit in?

- **Asset Ratings and Labels**
 - Use BEM to **comply with energy codes**. For example, Title 24 Part 6 is an asset rating.
 - Use of BEM to **calculate home energy ratings**, either before or after a building is occupied, to compare efficiency. For example, in Home Energy Ratings.
- **BPS and Operational Ratings**
 - BEM is less common in operational ratings (relying on real consumption data).
 - Use BEM to **predict whether a building will meet performance standards**, especially when upgrades or retrofits are planned.

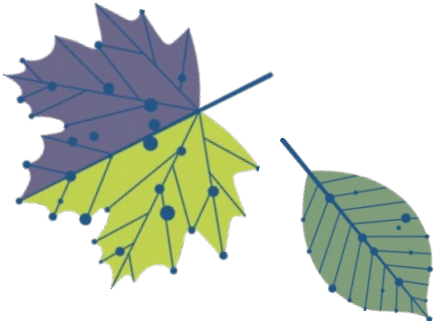
Key Takeaways

- Home energy ratings provide a consumer resource on potential performance, while BPS set targets for actual energy use over time.
- Jurisdictions use these systems differently across building types (residential, multifamily, nonresidential).
 - Larger buildings are typically subject to more comprehensive performance tracking (BPS, benchmarking).



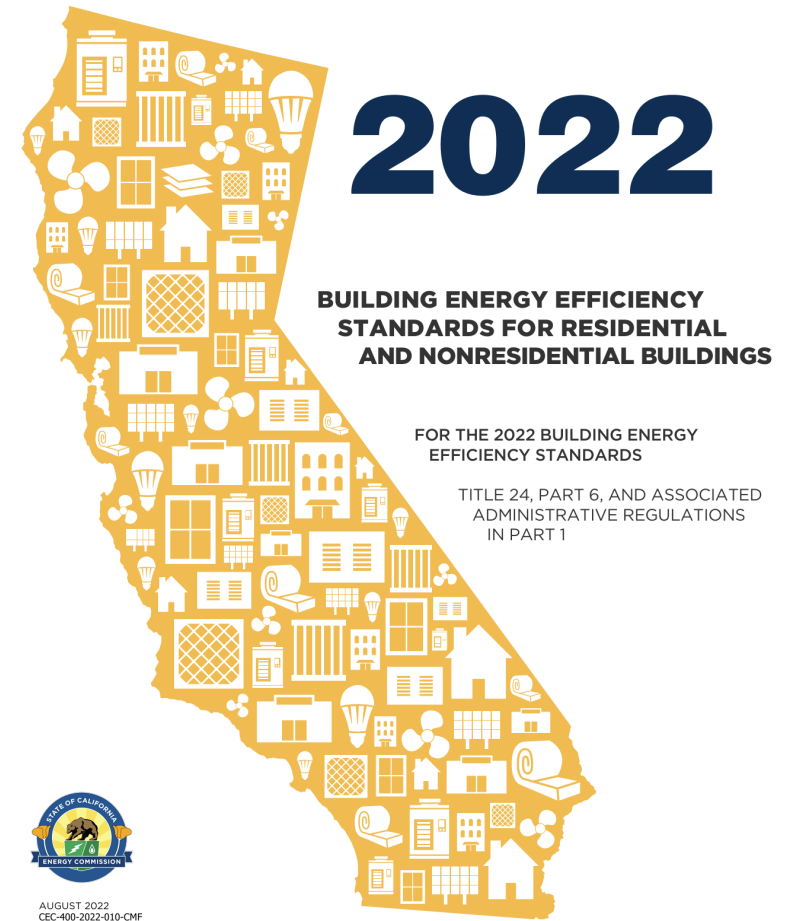
During today's panels, you'll learn more about each of these ratings and how they're applied in California and other states.

Example Asset and Operational Ratings



Permit Compliance, T24 (Type of Asset Rating)

- Title 24 Compliance
 - Compares a normalized design to a standard building
 - Uses simulation with predefined
 - Weather
 - Occupancy
 - Thermostats
 - Annual Energy Cost and Carbon Metrics

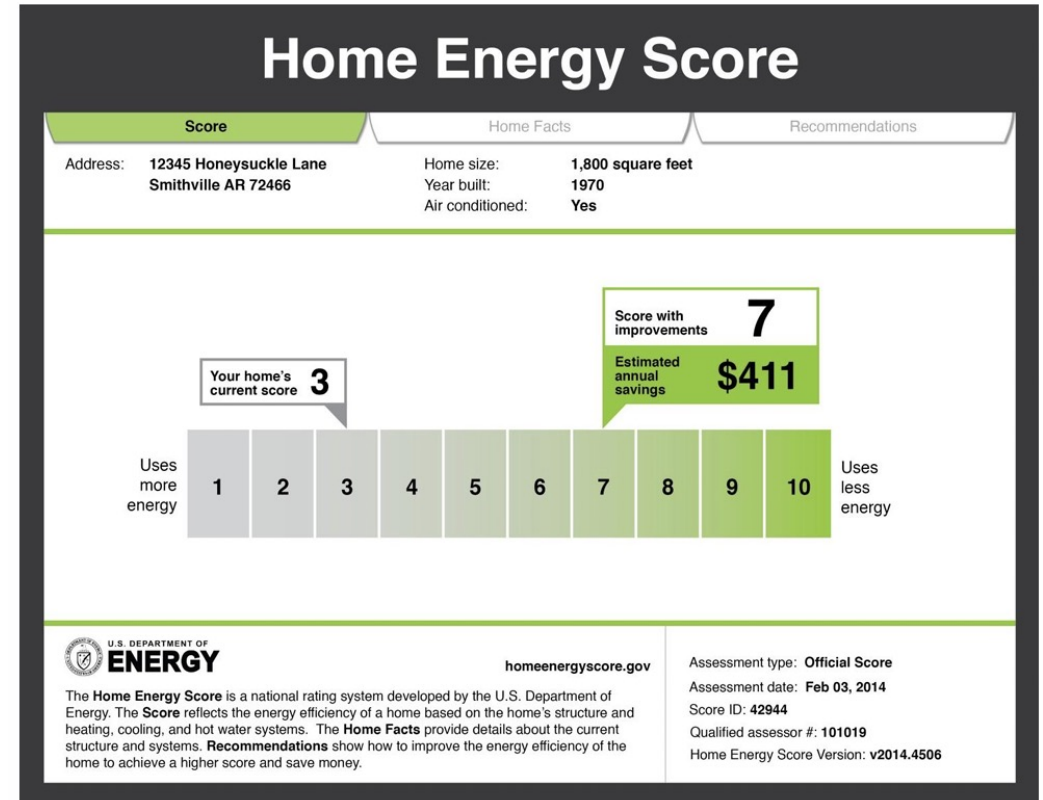


AUGUST 2022
CEC-400-2022-010-CMF

CALIFORNIA ENERGY COMMISSION
Gavin Newsom, Governor

BayREN - Asset Rating

- Uses the Home Energy Score
 - *The DOE/NREL created the Home Energy Score (HES) to serve as a nationally standardized “miles-per-gallon” rating for homes*
- Home Energy Score Report:
 - Asset Score between 1 and 10
 - Home Facts: List of data collected, and energy use calculations performed in EnergyPlus
 - Recommendations for improvements for now or later



BayREN - Asset Rating

- Home Energy Score Implementer: StopWaste
- Defines Assessor Qualifications/ Requirements:
 - Practical Test and Written Exam
 - Quality Assurance and Mentoring

Home Energy Score	
Qualification Requirements	
Eligibility and Credentialing Pre-Requisites	Candidate must work under StopWaste, an official DOE Partner <ul style="list-style-type: none">- Work in one of the nine Bay Area counties- Possess all required insurance- Hold a current DOE recognized credential
Practical Test	Candidate uses the Home Energy Score 3D Simulation Tool to retrieve home characteristic data and to score <ul style="list-style-type: none">- Three "Practice/Challenge" Homes (80 or better)- Two Test Homes (90 or better)
Written Exam	Score of 80 or better on multiple choice test that includes 20 questions regarding the Home Energy Score program only
Quality Assurance	5% of homes must be rescored under a DOE approved quality assurance plan
Mentoring	First home scored with a mentor; counts toward quality assurance requirement <ul style="list-style-type: none">- Mentoring will be performed by either a QA appointee OR another experienced Qualified Assessor

CA Building Performance Standard

- City of Chula Vista adopted the first building performance standards in 2021.
- Seven other cities and one county are working on building performance policies and are members of the National Building Performance Standards Coalition.
- CA signed onto the National BPS Coalition in 2022.

BPS in place:

- City of Chula Vista

BPS Policies being developed:

- Berkeley
- Los Angeles
- Sacramento
- San Diego
- San Francisco
- Santa Monica
- West Hollywood
- County of Los Angeles

CA Building Performance Standard

- Senate Bill 48, PRC 25402.16(b)
 - "...develop a strategy for using benchmarking data to track and manage the energy usage and emissions of greenhouse gases of covered buildings in order to achieve the State's goals, targets, and standards..."
- CEC to adopt recommendations by July 1 2026 and submitted to the Legislature on or before August 1 2026
 - Recommendations report to include research and documentation of example pathways for accomplishing the recommended building performance metrics and targets in real buildings

[RFP-24-401 - Building Energy Performance Strategy Report & Benchmarking Support \(ca.gov\)](#)

WA State Clean Building Act (CBPS)

Washington State Clean Buildings Performance Standard

July 2024 Version, includes covered buildings Tier 1 and Tier 2
Powered by ANSI/ASHRAE/IES Standard 100-2018
© 2024 ASHRAE

Table 7-2a Building Activity Site Energy Targets (EUI₁) (I-P Units)

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- Energy target sets by climate (4C, 5B)
- Uses Normalization factor for the number of hours occupied
- Applies factor to EUI target based on new construction or major renovation
- 15 months given to comply with BPS target for covered buildings.

NYC Local Law 95 and 97

- Local Law 97 – Building Performance Standard
- Uses utility bill data to measure energy performance with CO2e factors applied to determine compliance with CO2e limits.

How does Local Law 97 ensure compliance with CO2e limits?

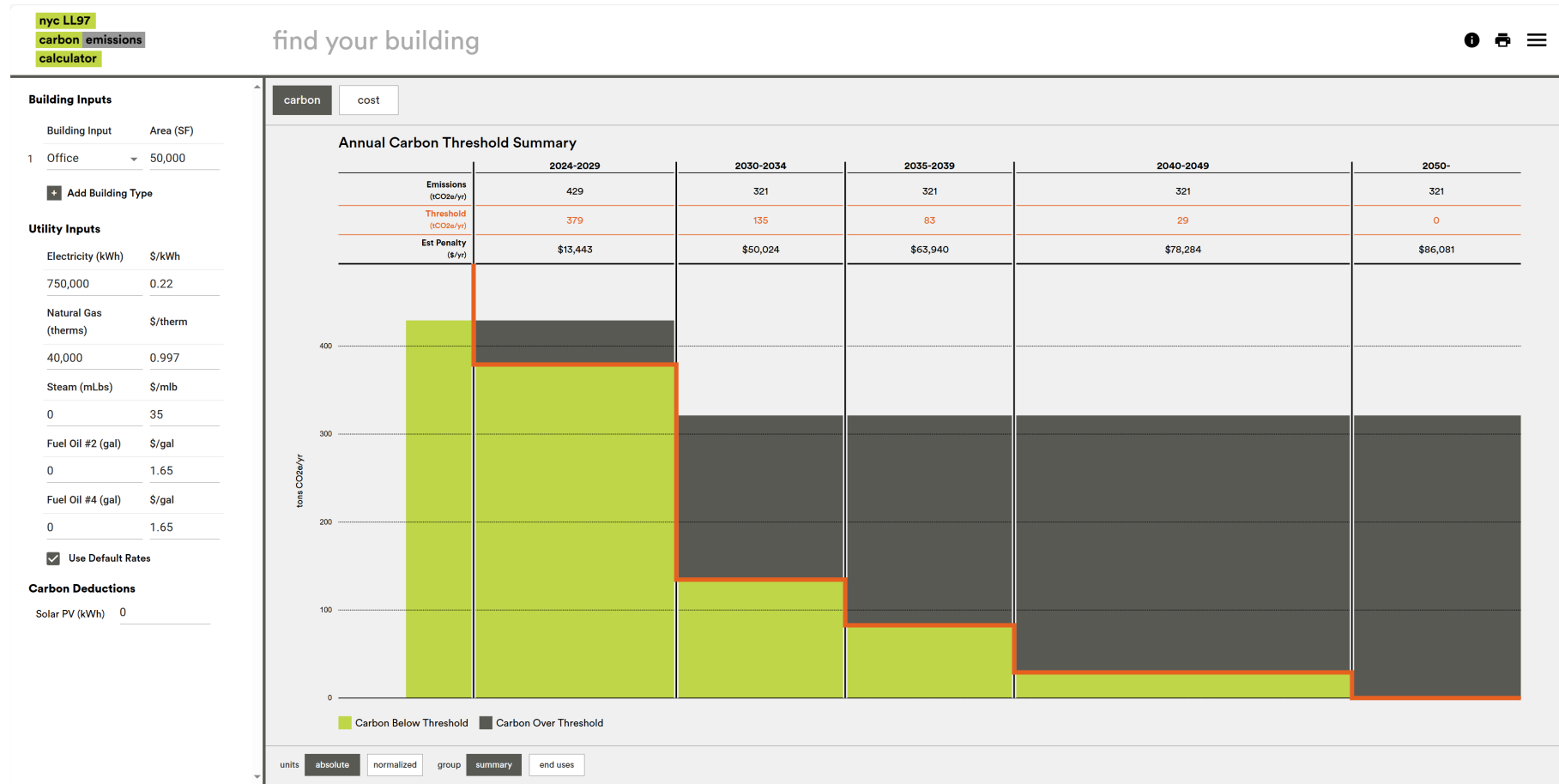
- Beginning May 1, 2025, and every year going forwards, an owner of a covered building must file an annual Greenhouse Gas Emission report for the previous year. The report must show that the building is either in compliance with its building emissions limit or not in compliance and if so by the amount it exceeds its limit.

What is the penalty for non-compliance with Local Law 97?

- Building owners whose building exceeded its annual building emissions limit will be liable for a civil penalty of \$268 per ton of carbon emitted in excess of its permitted emissions limit.
- [Local-Law-97-FAQ NY-NJ CHP TAP.pdf \(pace.edu\)](#)
- LL97 follows a typical approach to BPS.

Local Law 97, NYC - BPS

BE-EX Compliance Calculator



- The BE-EX Tool shows current performance and projected performance in shaded areas and CO2e limits in green
- The projected performance reduces in the future as NY updates the CO2e factors representing a cleaner grid.
- CO2e limits reduce every 4 years for the first 12 years after 2024, with the last decreases in 2040 and 2050 at the point where the CO2e limit reaches zero.

Local Law 95, NYC – Operational Rating Label

- Local Law 95 – Energy Efficiency Rating Labels
- Energy Star Score determined in the Energy Star Portfolio Manager.
- Uses **utility billing data** and building information to generate the rating, the same billing data used to show compliance with LL 97

Local Law 95 uses an alternative approach to setting an asset rating by using building utility data to set the rating and create the label.

- Though it does normalize for weather and operating characteristics through the Energy Star Score.

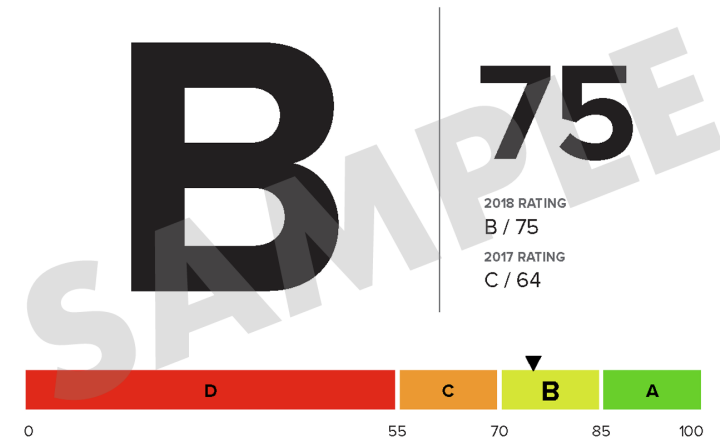


compares your building's energy performance to similar buildings nationwide, normalized for weather and operating characteristics. A score of 50 represents median performance. A higher score is better than average; lower is worse.

Local Law 95, NYC – Operational Rating Label

- Local Law 95 – Rating Label Sample
 - The score of 0 -100 translates to an A - D grade
 - For covered buildings, the rating must be displayed and follows a similar convention to ratings certificates seen in Europe (Energy Performance Certificates).

Building Energy Efficiency Rating



Building Specifications
DOB Property Address
Year of Compliance..... 2019
Borough, Block and Lot.... 1-12345-1234
NYC Average..... 50

More Information
The 1-100 ENERGY STAR® score compares this building's energy consumption to similar buildings.
Buildings with a score of 75 or better are high performers and eligible for ENERGY STAR certification.

Learn more about Building Energy Ratings.
Find ways to improve. Visit nyc.gov/energyrating



Voluntary Building Energy Performance Score Systems – Oregon (2009)

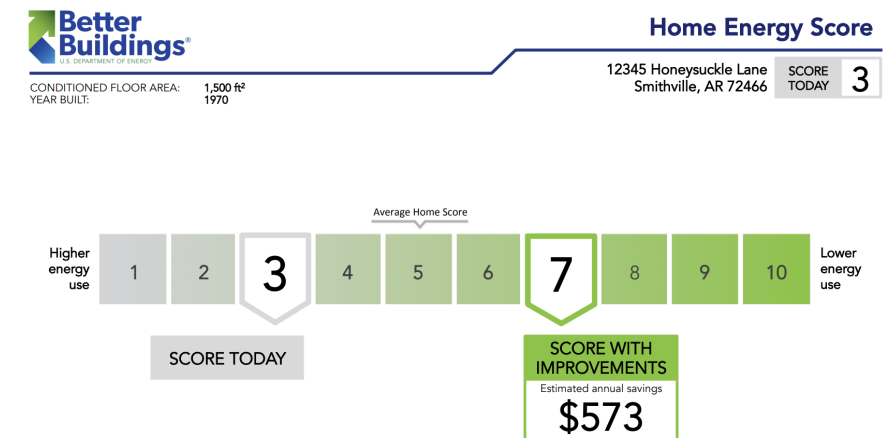
Oregon established requirements of a voluntary energy performance score system for the purpose of evaluating:

1. Energy conservation and energy efficiency of new and existing residential buildings in Oregon; and
2. Energy use in new and existing commercial buildings in Oregon.

Asset Rating means a representation of the building's energy efficiency or energy use generated by **modeling under standardized weather and occupancy conditions**.

Building energy assessment means a determination of a building's energy use and energy efficiency by **analyzing the building's physical systems and assuming certain operational characteristics**

[State of Oregon: Save Energy - Home Energy Scoring: For Consumers](#)



The U.S. Department of Energy's Home Energy Score assesses the energy efficiency of a home based on its structure and heating, cooling, and hot water systems. For more information visit [HomeEnergyScore.gov](#).

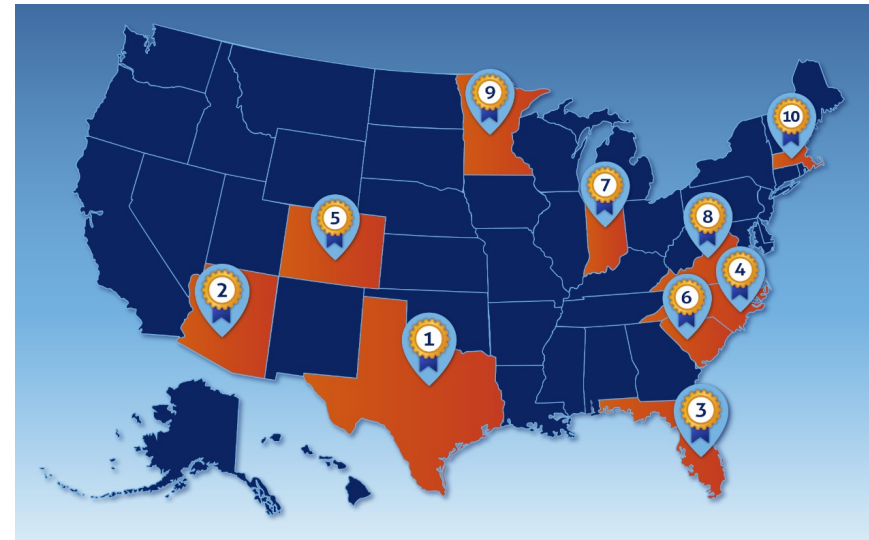
HERS Raters and the HERS Index

HERS Raters

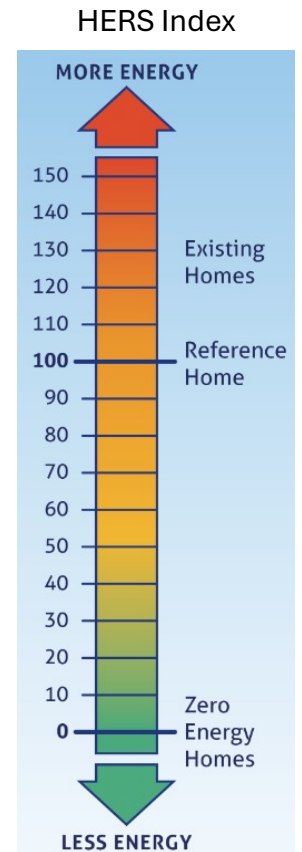
- California Home Energy Efficiency Rating Services (**CHEERS**) uses RESNET **HERS** raters

HERS Ratings/ Index

- **HERS Index** Score target is being used as a performance **compliance option in building energy codes**
- Texas sets requirements by climate zone for HERS Index scores (2021).
 - [87\(R\) HB 3215 - Enrolled version](#)



Top 10 states using HERS Ratings in 2021




EU/UK Example of Asset Rating (2007-Present)

UK EPC Ratings and Energy Performance Certificates

- If you are building, selling, or renting a residential home you are required to have a valid Energy Performance Certificate (EPC). EPCs are valid for 10 years. There are EPCs for commercial properties, however this information relates to residential homes which uses a different calculation method and label.
- The EPC Rating is the calculation of the performance of the building, performed by an accredited assessor (a Domestic Energy Assessor) using the approved SAP software. Although SAP is being replaced with the Home Energy Model (HEM) to increase robustness.
 - The new HEM model simulates energy performance for each half-hour of the day (as compared to each month for SAP), enabling a better representation of smart technologies and systems.*

[home-energy-model-consultation.pdf \(publishing.service.gov.uk\)*](http://home-energy-model-consultation.pdf (publishing.service.gov.uk)*)


Energy Performance Certificate (EPC)

17 Any Street, District, Any Town, B5 5XX


Dwelling type: Detached house Reference number: 0919-9628-8430-2785-5996
 Date of assessment: 15 August 2011 Type of assessment: RdSAP, existing dwelling
 Date of certificate: 13 March 2012 Total floor area: 165 m²

Use this document to:

- Compare current ratings of properties to see which properties are more energy efficient
- Find out how you can save energy and money by installing improvement measures

Estimated energy costs of dwelling for 3 years	£5,367
Over 3 years you could save	£2,865

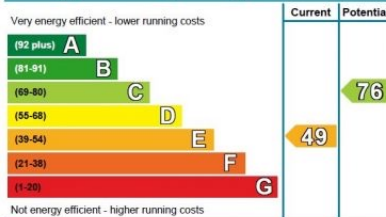
Estimated energy costs of this home

	Current costs	Potential costs	Potential future savings
Lighting	£375 over 3 years	£207 over 3 years	
Heating	£4,443 over 3 years	£2,073 over 3 years	
Hot water	£549 over 3 years	£222 over 3 years	
Totals:	£5,367	£2,502	

These figures show how much the average household would spend in this property for heating, lighting and hot water. This excludes energy use for running appliances like TVs, computers and cookers, and any electricity generated by microgeneration.

Energy Efficiency Rating

Very energy efficient - lower running costs



Not energy efficient - higher running costs

The graph shows the current energy efficiency of your home.

The higher the rating the lower your fuel bills are likely to be.

The potential rating shows the effect of undertaking the recommendations on page 3.

The average energy efficiency rating for a dwelling in England and Wales is band D (rating 60).

Top actions you can take to save money and make your home more efficient

Recommended measures	Indicative cost	Typical savings over 3 years	Available with Green Deal
1 Increase loft insulation to 270 mm	£100 - £350	£141	✔
2 Cavity wall insulation	£500 - £1,500	£537	✔
3 Draught proofing	£80 - £120	£78	✔


See page 3 for a full list of recommendations for this property.

EU/UK Example of Asset Rating (2007-Present)

UK EPC Ratings and Energy Performance Certificates

- The Energy Performance Certificate details the results of the rating, including energy, cost, CO2 emissions, and potential upgrades to improve the rating. Determining a final letter grade A through G from the score of 0 - 100.
- The penalty for not having a residential EPC is 500-5000GBP and the fine can be repeated every 28 days of non-compliance. The typical cost for an assessment is 50 to 150GBP
- The UK requires an asset ratings to be at certain levels before a home may be re-let.
 - Currently properties being re-let are required to meet band E.
 - The UK government is has committed to upgrade as many private rented sector homes as possible to (EPC) B and C by 2030, where practical, cost-effective and affordable.

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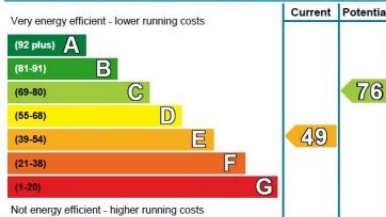
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