



# Building Energy Rating Systems: Operational Ratings

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- ICF Benchmarking Expertise
- Benefits and Challenges of Operational Ratings
- Operational Ratings around the World
- ENERGY STAR Portfolio Manager
- Rating Development Considerations

- Overview
  - 40 years of experience
  - ~3,500 employees
- Markets & Service Area
  - Energy
  - Environment
  - Transportation
  - Social Programs
  - Emergency Management and Homeland Security
  - Defense
- Clients
  - International
  - Federal
  - Regional
  - Private
- Primary Offices
  - USA (32 locations)
  - London
  - Toronto
  - Rio de Janeiro
  - Moscow
  - New Delhi
  - Beijing

**A leading management, technology, and policy firm combining extensive industry knowledge; multidisciplinary professionals; innovative analytics; and strong implementation capabilities to support decision makers**

# ICF Benchmarking Expertise for C&I Buildings

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- U.S. EPA ENERGY STAR Program for C&I Buildings
  - Have developed building ratings for 11 commercial building types and 10 industrial building types
  - Provide outreach and assistance to large C&I partners
- U.S. – China Sustainable Buildings Partnership
  - Developed a National Hotel Energy Performance Benchmarking Tool
- Association of Municipalities of Ontario
  - Applied 3D benchmarking process to 400 municipal facilities, including management best practices, energy use, and technical best practices
- South Africa Green Building Council
  - Consulting on the development of a new operational rating
- Private Utilities
  - Extracting data from customer billing databases to develop benchmarks

## Benefits of an Operational Rating

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- Provides accurate representation of **actual** energy use, as opposed to modeled energy consumption
  - Accounts for effects of hours of operation, workers, etc. which are assumed to be default values in many asset rating models
- Accounts for energy-efficient operations and maintenance practices
  - Two buildings with identical asset ratings could have very different operational ratings
- Shows improvement over time
  - An asset rating is fairly constant
- Simpler and more cost-effective to generate
  - Requires 12 months of bills and limited building information

## Challenges/Limitations with Operational Ratings

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- Does not evaluate the efficiency of the building design independently of the building operation
  - Some buildings have an excellent design, but poor operation
  - Some buildings are operated well, but will never get a high rating due to an inefficient building design
- Does not provide a comparison between two buildings operated under standard conditions
  - Results are dependent on building operation and tenant behavior
  - This may be more important for real estate and assessment community
- Does not provide guidance on how to improve performance

## Operational Ratings Around the World

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- **USA** – ENERGY STAR Portfolio Manager
- **Australia** – National Australian Built Environment Rating System (NABERS)
- **Europe** – For the Energy Performance of Buildings Directive, some operational ratings are used for public or large buildings
- **China** – Prototype operational rating for hotels developed based on Portfolio Manager, offices and government are next
- **Canada** – Expanding Portfolio Manager to Canadian buildings
- **South Africa** – Developing an operational rating for office buildings, considering elements of Portfolio Manager & NABERS



# Eligible to Receive an ENERGY STAR score



**Bank/Financial Institutions**



**Courthouses**



**Data Centers**



**Dormitories**



**Hospitals**



**Hotels**



**Houses of Worship**



**K-12 Schools**



**Medical Offices**



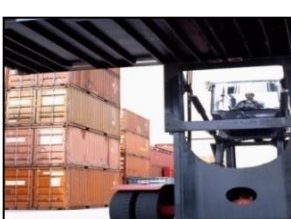
**Office Buildings**



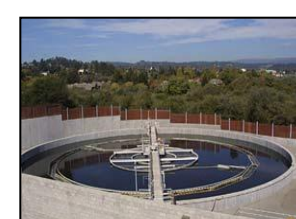
**Retail Stores**



**Supermarkets**



**Warehouses**



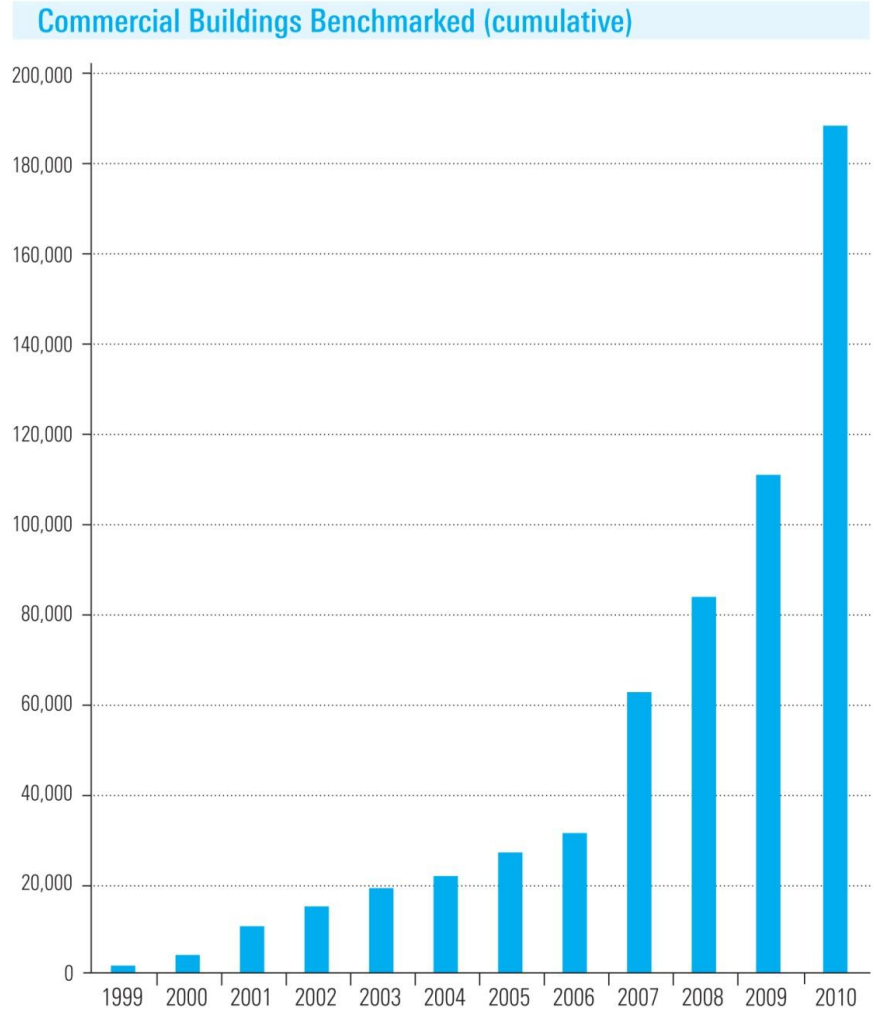
**Wastewater Treatment Plants**



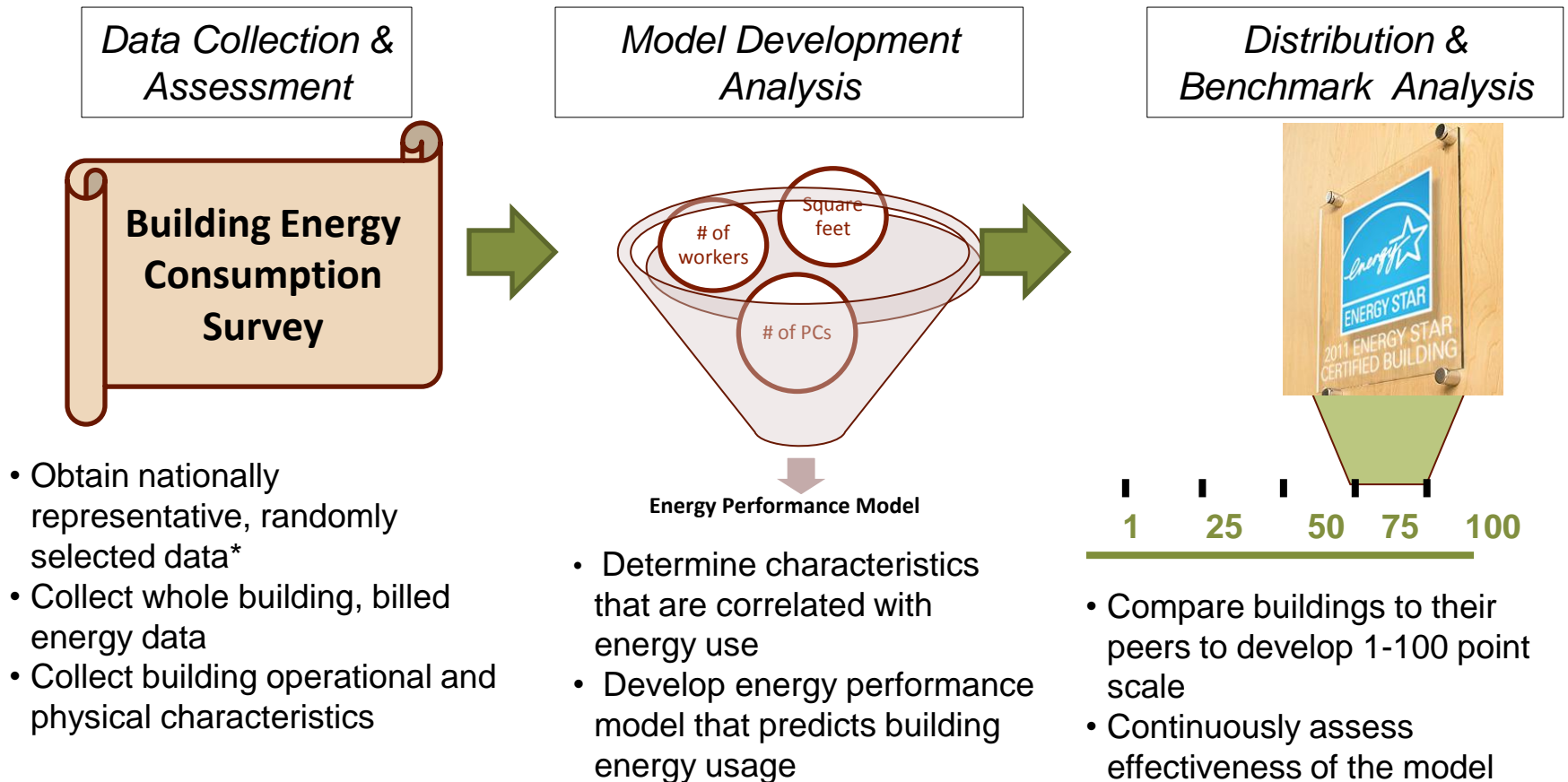
**Senior Care Communities**

# ENERGY STAR Market Penetration

- Launched in 1999
- Rapid growth in last 5 years
- More than 200,000 buildings have measured energy use
- Greater than 22 billion square feet
- 25% of commercial building market



# Generating ENERGY STAR Energy Performance Scales



\* Sources of this data include CBECS, RECS, industry/association surveys, but NOT Portfolio Manager

# Designed to Earn the ENERGY STAR

- New Building Designs can be rated in EPA’s Target Finder tool
  - Provides 1-100 energy performance score
  - Uses Portfolio Manager algorithms and operating characteristics
  - Must enter an estimate for annual energy consumption
- Differs from Asset Rating approach being pursued by ASHRAE bEQ, DOE, and DOER
  - These reference standardized operating inputs (often based on COMNET modeling guidelines)



# Designed to Earn vs. Standard Operating Inputs

	Designed to Earn	Standard Operating Inputs
Operating parameters	Enter planned operating hours, workers, etc. into model	Enter standard operating hours, workers, etc. into model
Rating	Rates predicted performance, under planned operating conditions	Rates predicted performance, under standard operating conditions
Predicted Energy Use Intensity (EUI)	Predicts actual energy use for the building	Predicts building energy use under standard conditions
Benefit of Rating/ Predicted EUI	<p>Provides good comparison with actual EUI, indicates how the building should operate</p> <p>Provides expected 1-100 operational rating, and potential eligibility for ENERGY STAR certification</p>	Provides good comparison with predicted EUI and asset ratings for other buildings

# Rating Development Considerations

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- Audience
  - Owner/Operators, Investors, Tenants, Appraisers, Designers
- Metrics
  - Source Energy, Site Energy, Greenhouse Gas emissions
- Calculation Methodology
  - Linear regression vs. modeling
  - Standard inputs vs. actual
- Rating Scale
  - Percentile rank vs. physical vs. interval
  - Numbers, letter grades, stars, etc.

# Questions?

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