



# Benchmarking and Specialized Commercial Buildings

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# Agenda

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- Overview
- Building use and benchmarking
  - Accounting for building operation
  - Similarities among commercial buildings
  - Differences among commercial buildings
- Unique building types
  - ENERGY STAR for Data Centers
- EPA's Portfolio Manager

# Overview

## Goals for benchmarking



- Verify pre- and post-project energy use, GHG emissions, and energy costs
- Identify under-performing facilities
- Assess effectiveness of current operations, policies and practices
- Assist in planning: set goals, targets, and timelines
- Set investment priorities
- Be more responsive to on-going issues
- Identify billing errors



[www.energystar.gov/benchmark](http://www.energystar.gov/benchmark)

# Overview

## Benchmarking reference data

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- Individual building
  - Track energy consumption at an individual building over time
  - Verify savings from energy efficiency improvements
  - Account for changes in the building from year to year (e.g. weather)
- Portfolio of buildings
  - Track a group of buildings that may have a similar function, management/ownership, or location
  - Prioritize investments among a group of buildings
  - Identify top performers
- National population of buildings
  - Understand performance relative to the national population of commercial buildings
  - Account for a wider variation in operation and climate

# Building use

## Commercial building similarities

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- Many different building types share key drivers of energy use
  - Square footage
  - Hours of operation
  - Number/Density of Workers
  - Number/Density of Computers
- Some different use types actually have similar average EUI values
  - Office and retail buildings have national average Source EUI values of 191 and 193 kBtu/ft<sup>2</sup>, respectively
  - Many commercial building types have average Source EUI values close to 200 kBtu/ft<sup>2</sup> +/- 15%

# Building use

## Commercial building differences

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- Some commercial buildings may deserve special attention due to the different effects of key variables:
  - Square footage: The most unique buildings are those which do not have a correlation between energy and square footage
  - Weather: Some buildings are so dominated by internal loads, that the effects of weather are not statistically significant
  - Manufacturing and production: Industrial facilities are driven by methods and types of production
- Unique buildings can often still be benchmarked effectively relative to each other
  - Care should be taken in comparisons with other types of commercial buildings

# ENERGY STAR for Data Centers



- Benchmarking
  - Over 600 stand alone Data Centers in Portfolio Manager
  - Ability to track energy, water, GHG emissions
  - Ability to track IT consumption at four different locations
    - UPS Output, PDU Input, PDU Output, Server/IT input
- EPA ENERGY STAR energy performance score
  - 1-to-100 score
  - Percentile ranking of the Power Usage Effectiveness
  - ENERGY STAR scores available for stand alone Data Centers and for larger buildings that contain Data Centers
- Certification
  - 8 Data Centers have earned the ENERGY STAR

# 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**



**Senior Care Communities**



**Supermarkets**



**Warehouses**



**Wastewater Treatment Plants**





# EPA's Portfolio Manager



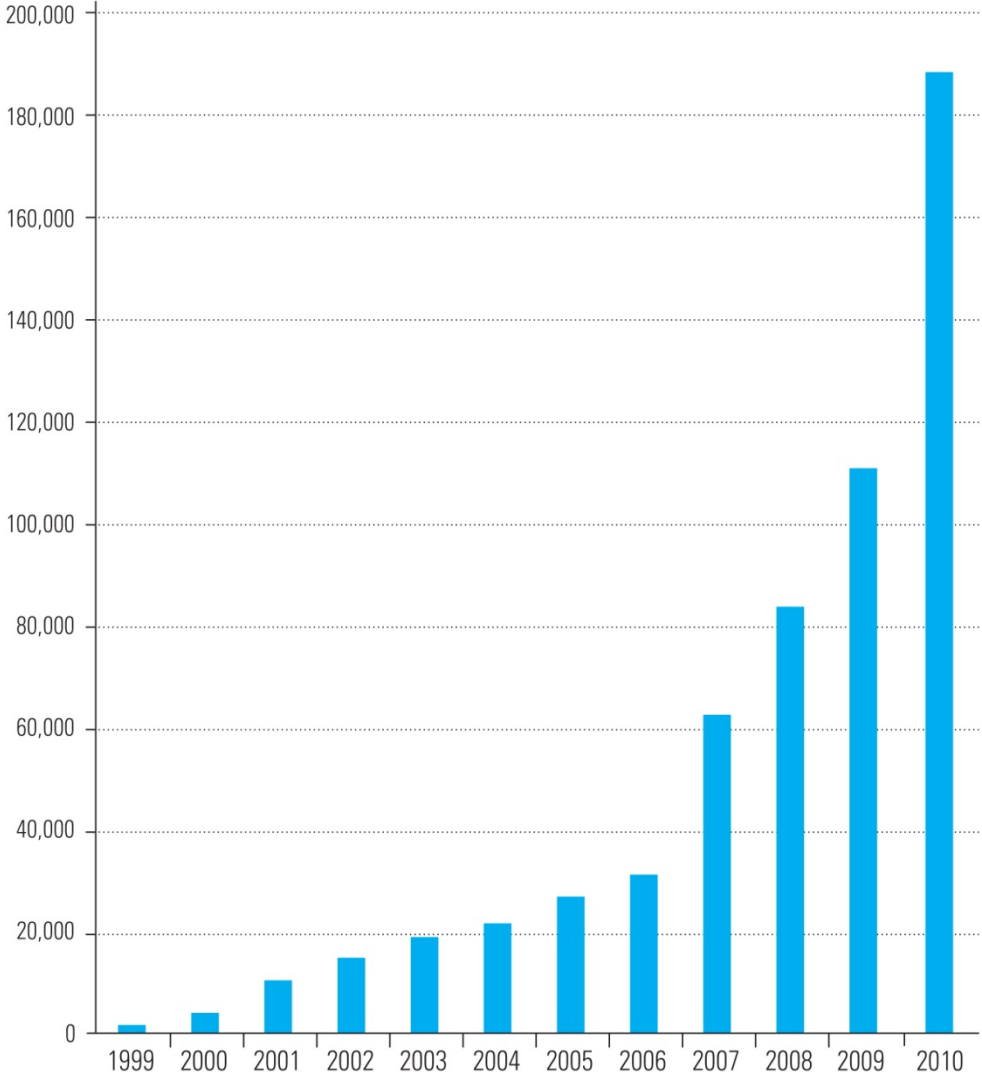
- Industry standard
  - Clear, simple, available to all
  - Exponential growth in buildings benchmarked
- Uses
  - Assess whole building energy consumption
  - Track changes in energy, water, GHG, and cost over time
    - At a single building or across a portfolio
  - Track onsite green power purchases
  - Create custom reports
  - Share data with others
- Building types
  - Available for every commercial building type
- Metrics
  - Energy Consumption (source, site, weather normalized)
  - Water Consumption (indoor, outdoor, sewage)
  - Greenhouse Gas Emissions (indirect, direct, total, avoided)
  - ENERGY STAR score
    - Available for certain building types



# Benchmarking Activity in Portfolio Manager Continues to Increase



Commercial Buildings Benchmarked (cumulative)



# Conclusions

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- Benchmarking is the key component to successful energy management
  - All types of commercial buildings should benchmark to verify savings from efficiency improvements
- There are many broad similarities among different types of commercial buildings
  - Even unique buildings can benchmark energy, water, emissions, and cost
- Portfolio Manager is an effective platform for benchmarking any building
  - Widely used and accepted as the industry standard
  - Component of many public and private energy efficiency programs for all types of buildings
  - Incorporated in benchmarking legislation that covers the entire market