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Introduction to Advanced Benchmarking

Part B
Tracking Energy Data: Why, What, How?

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Benchmarking Definition

The process of accounting for and comparing a metered building's current energy performance with its energy baseline, or comparing a metered building's energy performance with the energy performance of similar types of buildings. Benchmarking can be used to compare performance over time, within and between peer groups, or to document top performers.

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Why Track Energy Data?

- Measurement is necessary to plan and track operational & capital improvements

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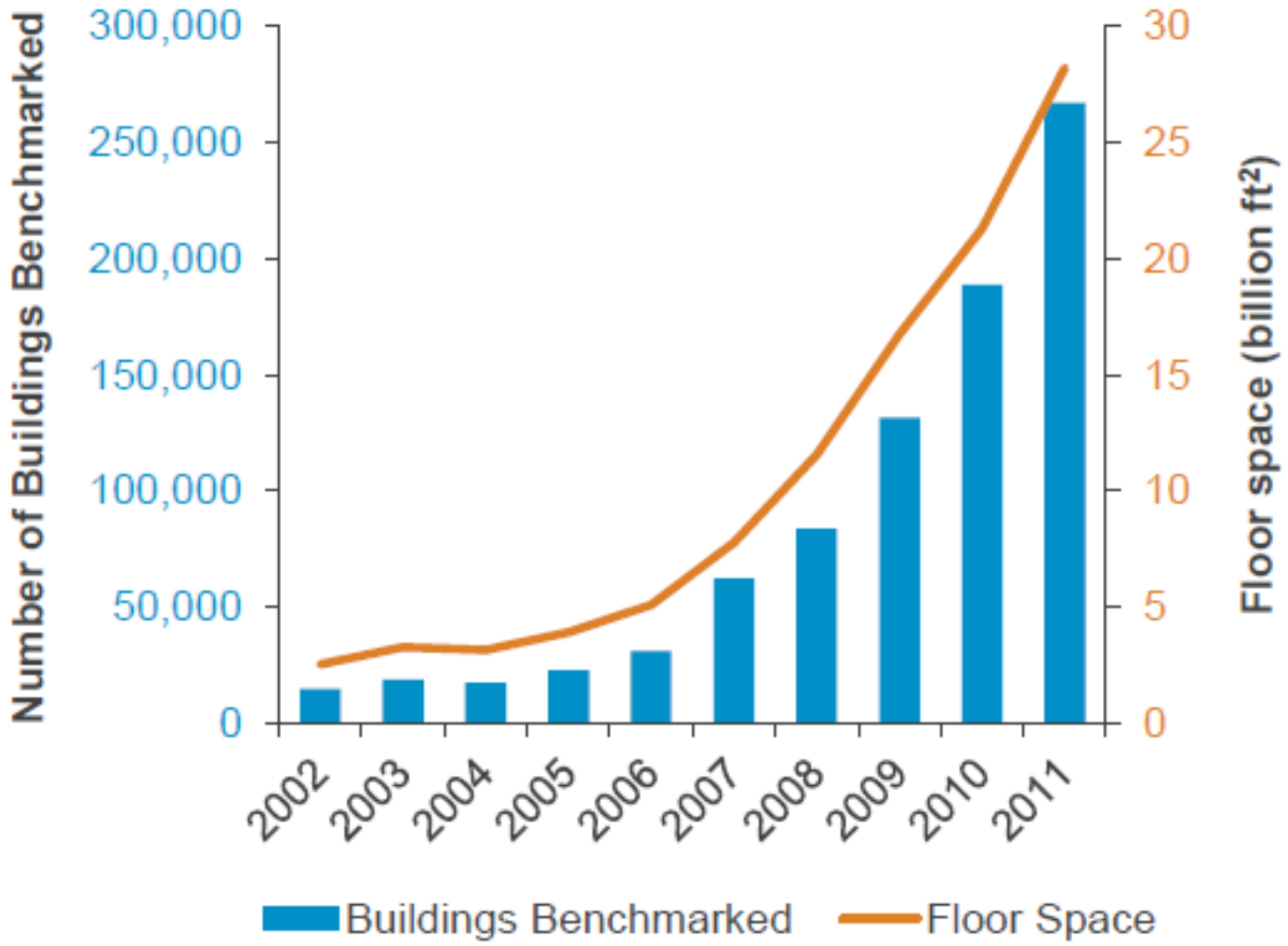
Growth in Benchmarking



Source: EPA Energy Star

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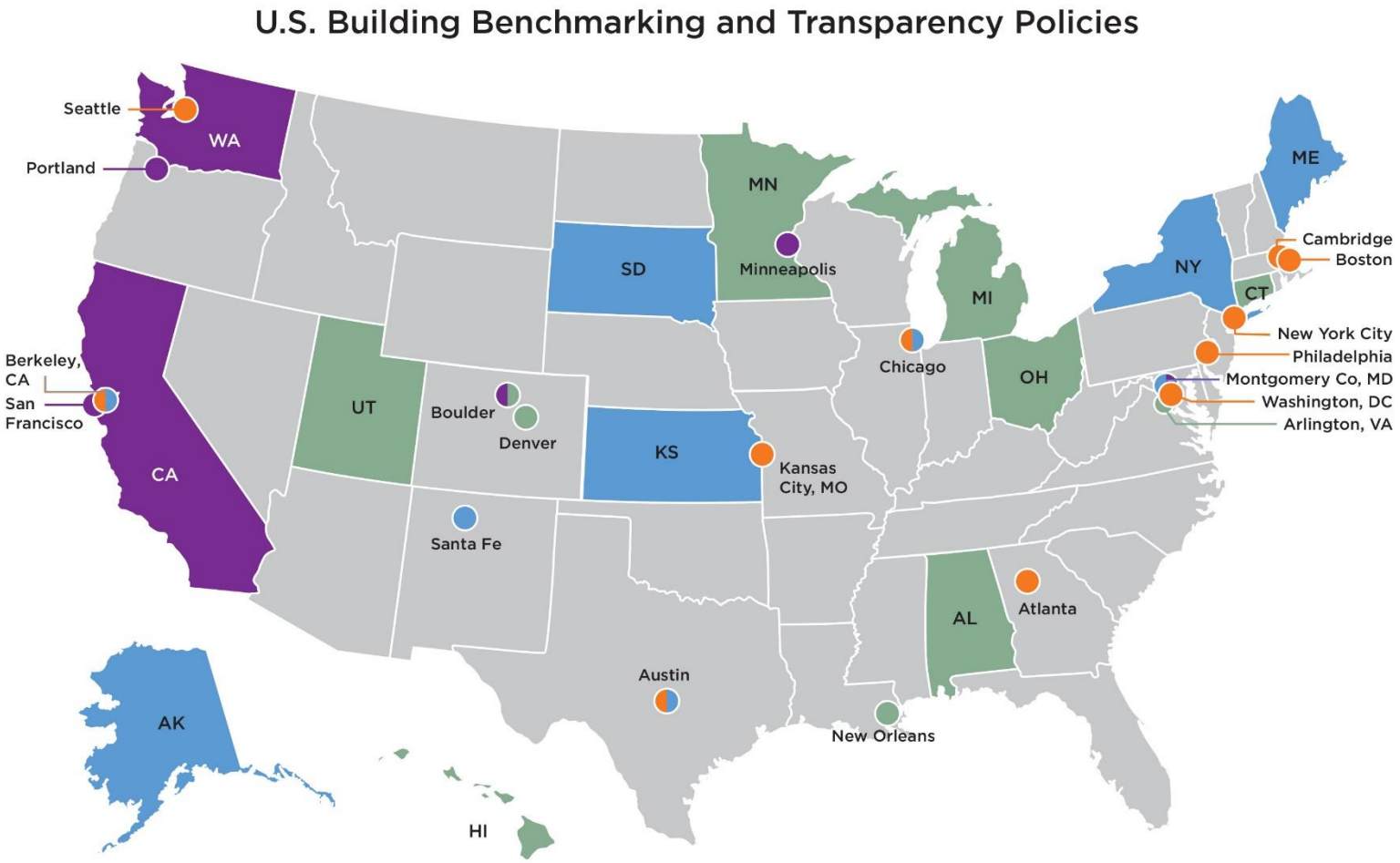
Disclosure & Benchmarking



nbi Building Rating SHARING TRANSPARENCY FOR A MORE EFFICIENT FUTURE

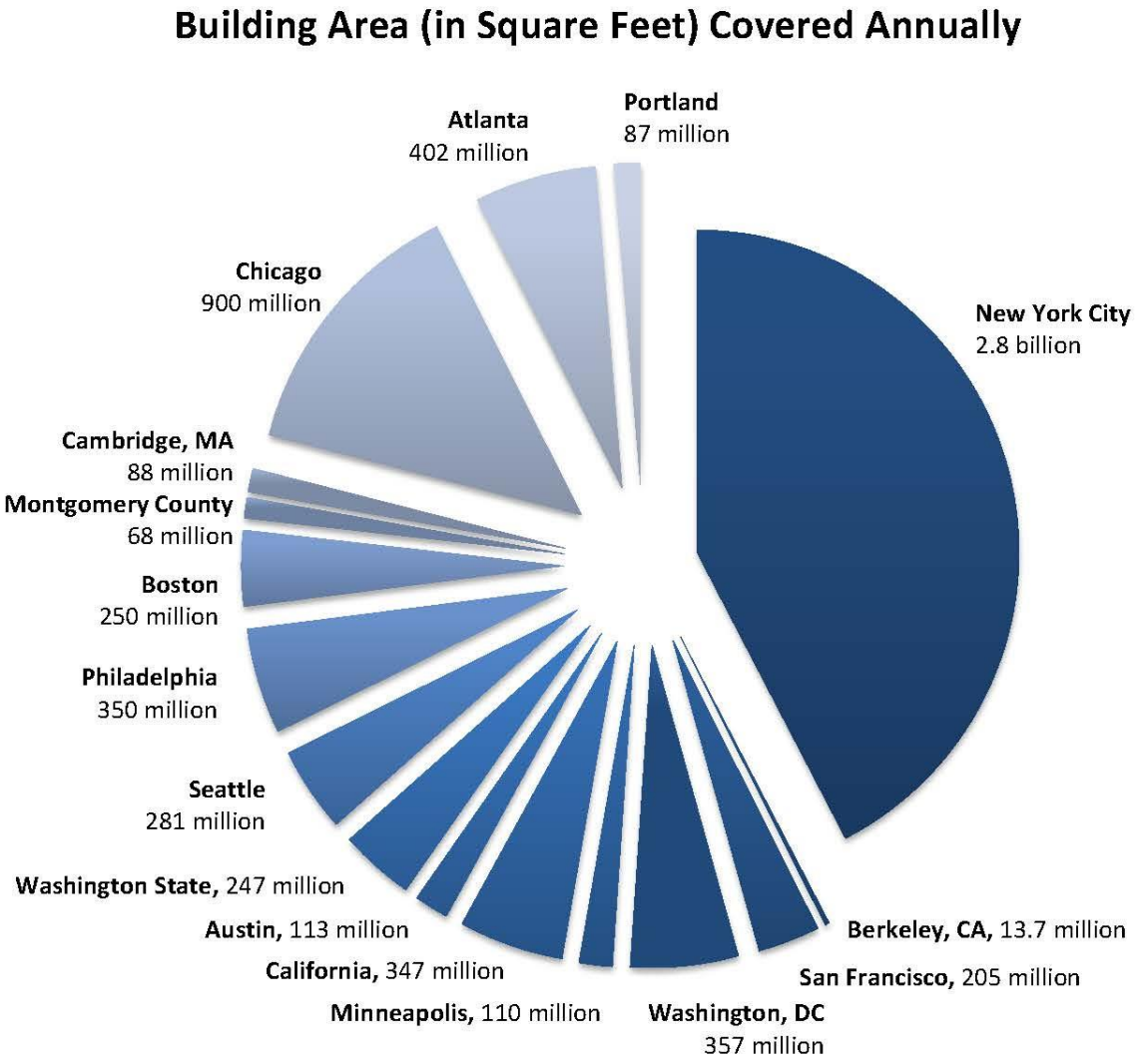
IMT INSTITUTE FOR MARKET TRANSFORMATION

Disclosure & Benchmarking

Totaling approximately

6.6 billion SF

of floor space in major real estate markets



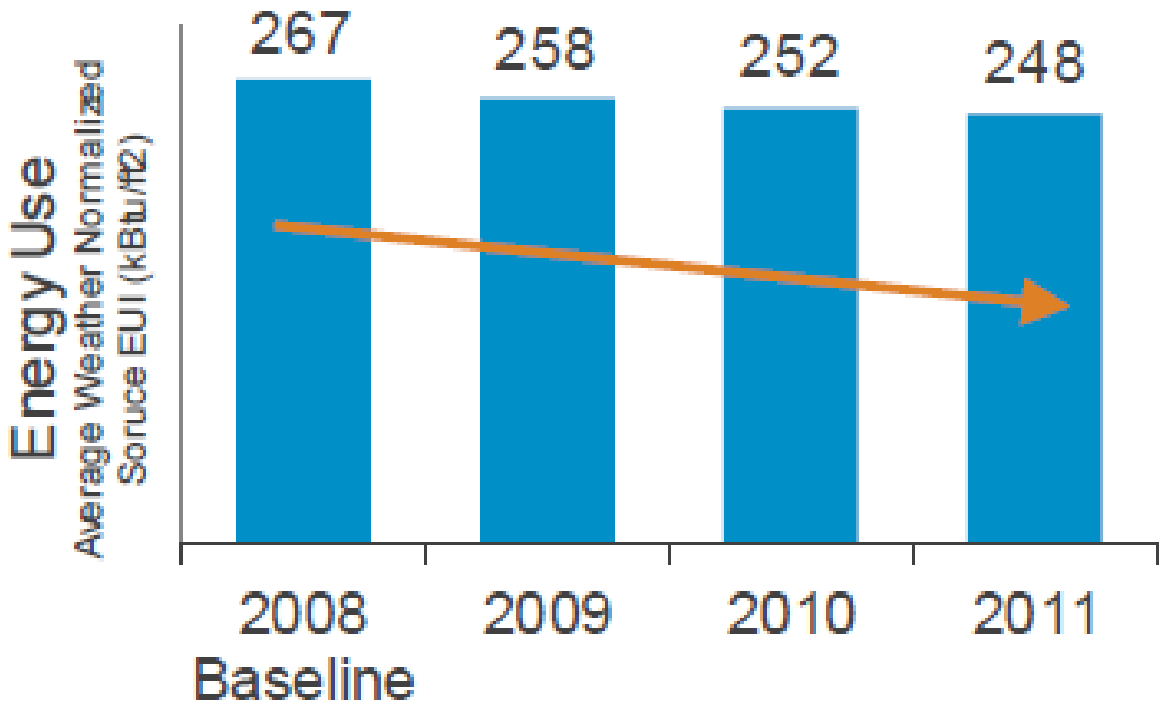
Source: IMT

IMT INSTITUTE FOR MARKET TRANSFORMATION

Building Rating

Energy Benchmarking Benefits

Energy Savings in Portfolio Manager



7% Savings

Source: EPA Energy Star

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Energy Benchmarking Benefits

- Valuation
  - Disclosure required upon sale in CA, more jurisdictions to come
  - Higher net operating income
  - Market Differentiation
- Fault Detection
  - Detect anomalies early

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Benchmarking Data

- Basic Building Characteristics
  - Building type
  - Size
  - Occupancy
- ALL Energy Usage
  - Electricity from Grid
  - Electricity from on-site generation (e.g. solar)
  - Fuels e.g. natural gas, oil (metered/delivered)
  - District Energy or other sources

KPIs

- Key performance indicators (KPIs)
  - Track performance parameters
  - Maintain consistent indicators over time
  - Maintain consistent indicators across buildings

What do we Measure?

- Garbage In, Garbage Out: Benchmarking must be based on consistent data sources

KPI Sources: **Building Characteristics & Energy Usage**				
Location	Date of Construction or Major Renovation	Building Size (Square Feet)	Principal Building Activity	Occupancy: FTEs & Hours per year
Annual Energy Usage (all sources combined)				

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Reporting Performance

- Standard KPIs across market:
  - Report building performance
  - Track building performance over time

KPIs: **Measured Performance Data**		
Energy Use Intensity (EUI)	Energy Star Score	Zero Energy Performance Index (zEPI)

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Reporting Performance: EUI

- Energy Use Intensity (EUI)
  - Most common benchmark metric

$$EUI = \frac{Total\ Annual\ Energy\ Use\ (kBtu/yr)}{Building\ Size\ (ft^2)}$$

Reporting Performance: EUI

- Site: Total energy used on-site
- Source: Total raw energy required

Example: US Median Office Building EUI

148.1 kBtu/ft^2/yr **Source** 67.3 kBtu/ft^2/yr **Site**

Source: EPA Energy Star

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Reporting Performance: Energy Star Score

- 0-100 score assessing commercial building performance by percentile
  - Accounts for location, occupancy, activity
  - Requires Energy Star Portfolio Manager tool
  - 100 is best, 50 is median

✓ The Score Does	✗ The Score Does Not
✓ Evaluate actual metered energy use	✗ Sum the energy use of each piece of equipment
✓ Normalize for business activity (hours, workers, climate)	✗ Credit specific technologies
✓ Compare buildings to the national population	✗ Compare buildings with others in Portfolio Manager
✓ Indicate the level of energy performance	✗ Explain why a building performs well or poorly

Source: Energy Star

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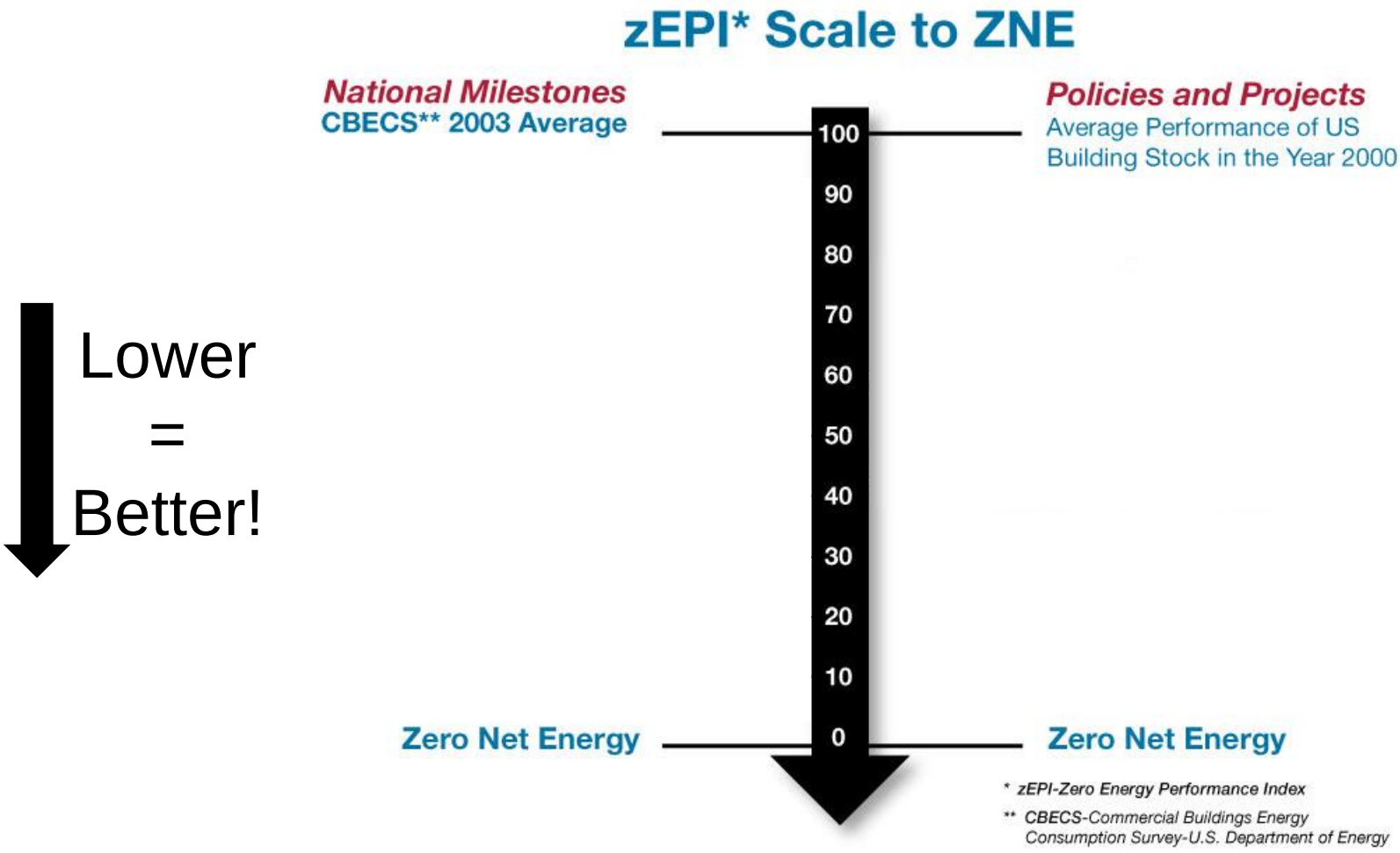
Reporting Performance: zEPI



Source: NBI

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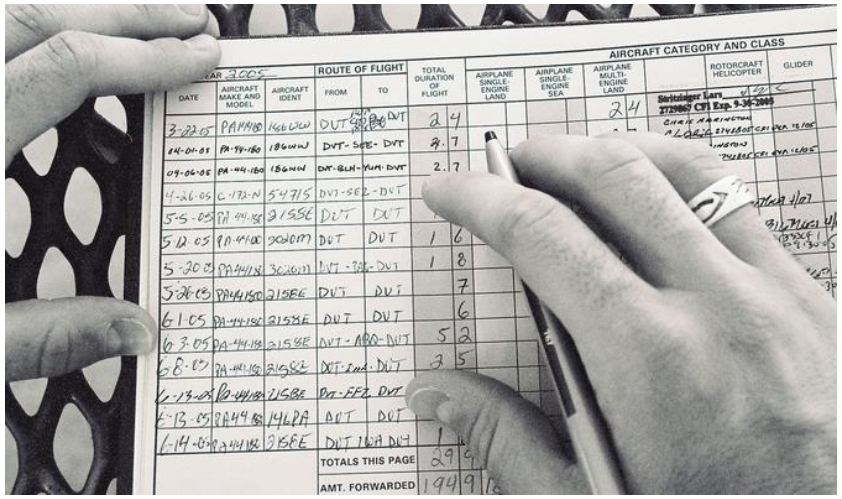
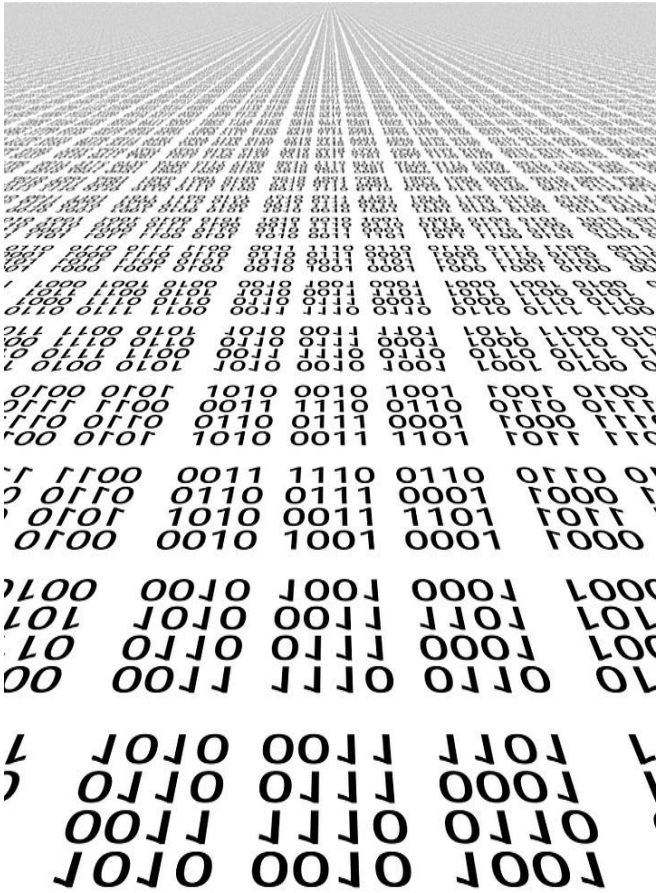
How to Track Usage

- Methods
  - Manual entry (spreadsheet)
  - Automated tools





How to Track Usage

- Tools available
  - Energy Star Portfolio Manager
  - Others (mainly private sector)

Source: EPA Energy Star

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Energy Star Portfolio Manager

- Free tool for commercial and multifamily building owners, operators
- Performance data tracking & storage
- Benchmarking comparisons to peers
- Most disclosure ordinances mandate Portfolio Manager for reporting

Source: EPA Energy Star

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Benchmarking Summary

- Why
  - Leads to Energy Savings
  - Track Building Performance
  - Required by Mandatory Disclosure
- What
  - Track Building Characteristics & Energy Usage
- How
  - Record Data
  - Calculate Key Performance Indicators
  - Benchmarking Tools: Portfolio Manager & Others

Source: Energy Star

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End of Part B