

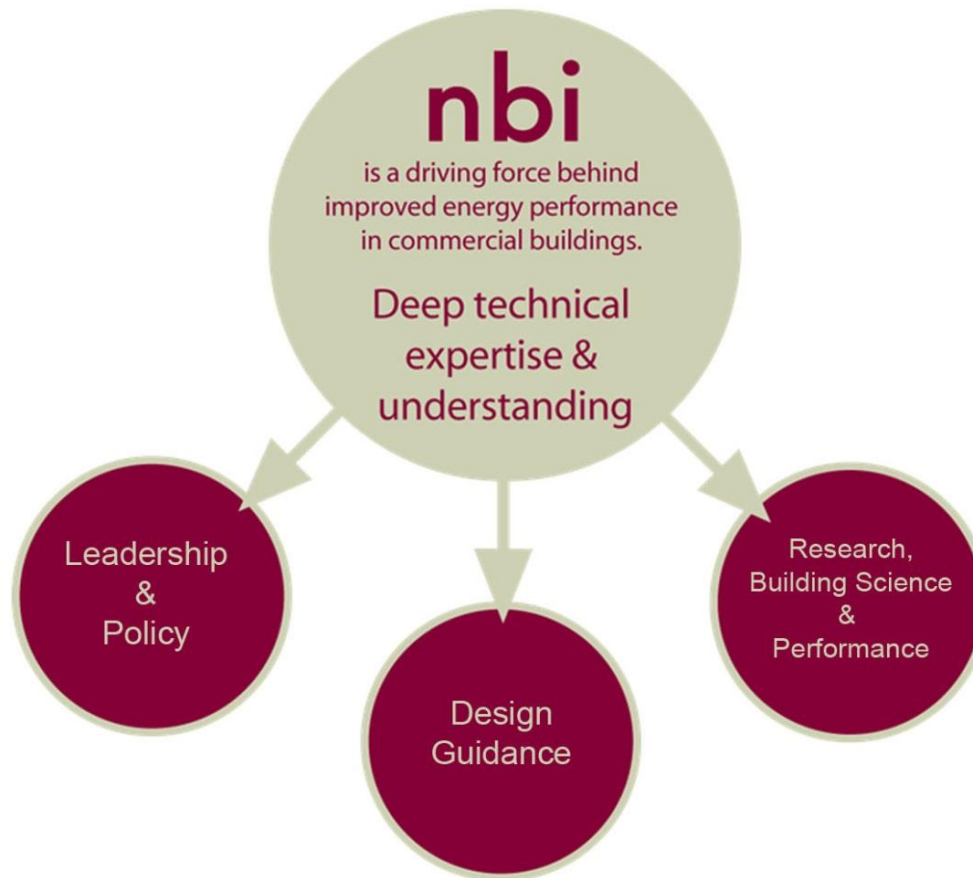
# Targeted Energy Outcomes

*“Beginning with the end in mind”*

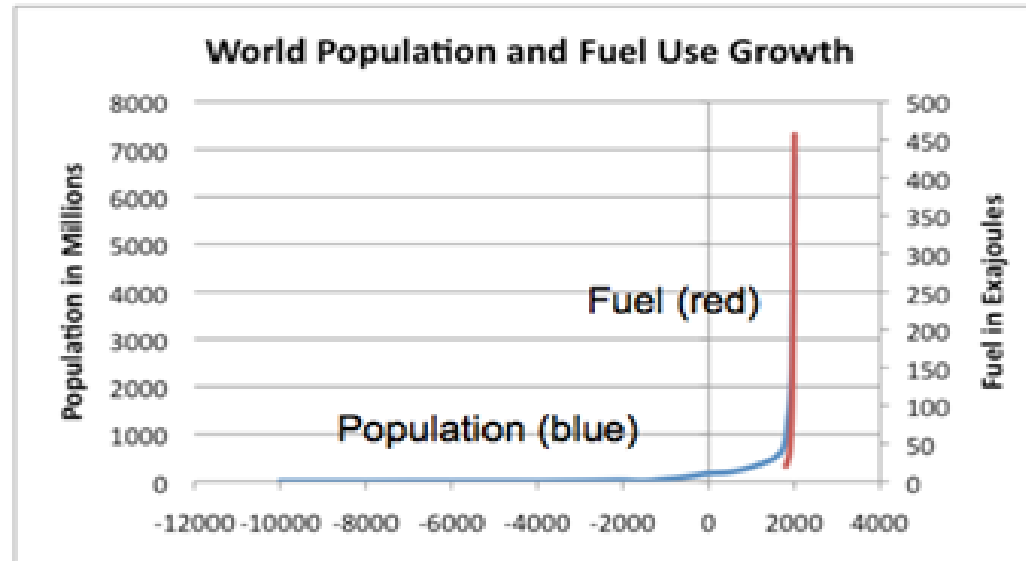
Symposium for Market  
Transformation

March 25, 2013

# New Buildings Institute



## Use of fossil fuels allowed population to expand greatly

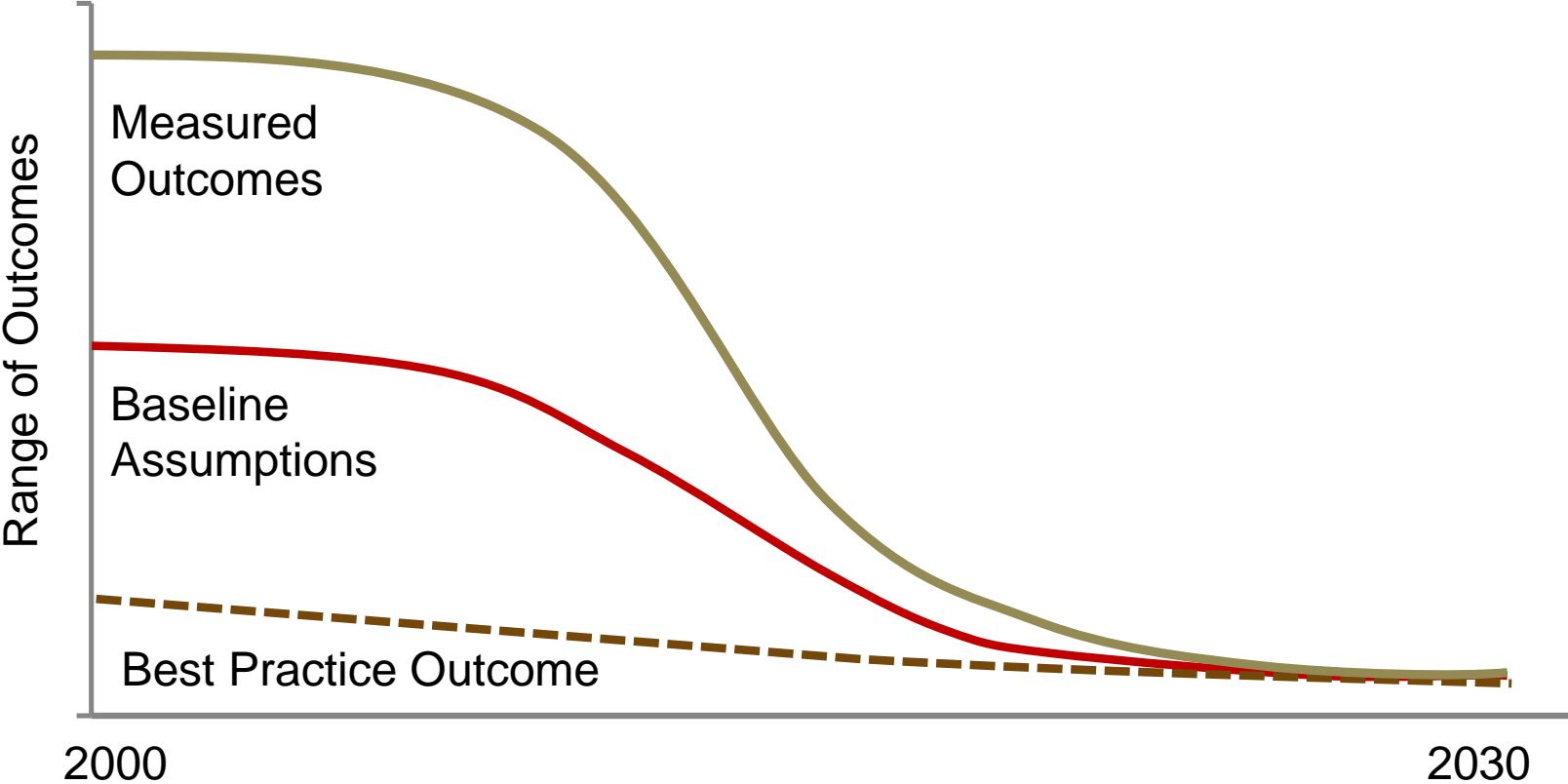


Note: Population from US Census Bureau website; fuel use from Energy Transitions: History, Requirements, Prospects, Appendix A by Vaclav Smil; Praeger, 2010.

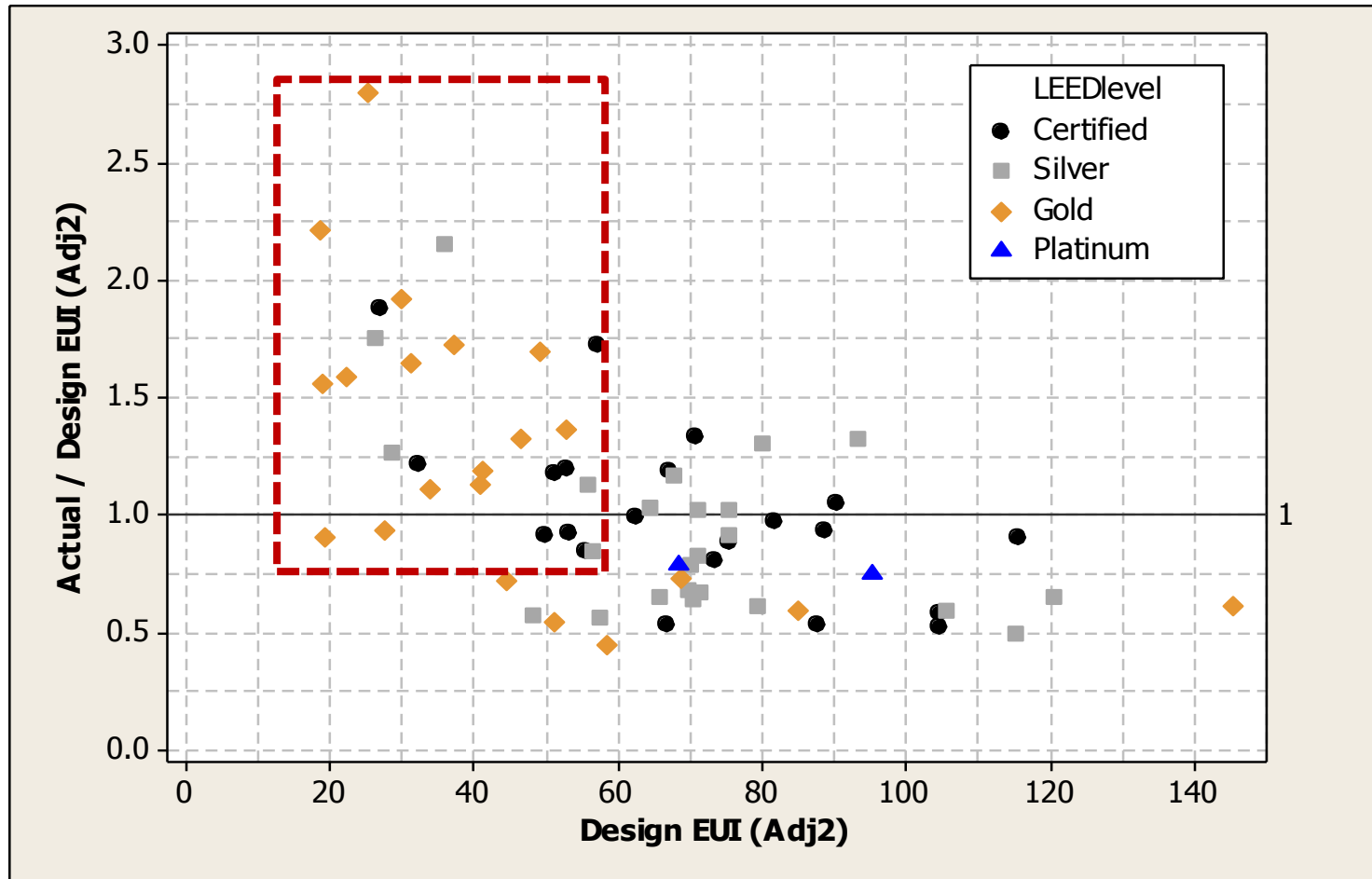
An aerial photograph of a city, likely Seattle, showing a dense urban area with various buildings, a large body of water (likely Puget Sound) in the background, and mountains under a cloudy sky. The text "Accelerated Energy Savings" is overlaid in a large, bold, red font on a semi-transparent white rectangular background in the lower-middle part of the image.

# Accelerated Energy Savings

# A Convergence to Low Energy



# A Range of Outcomes



# Plug loads to 2030

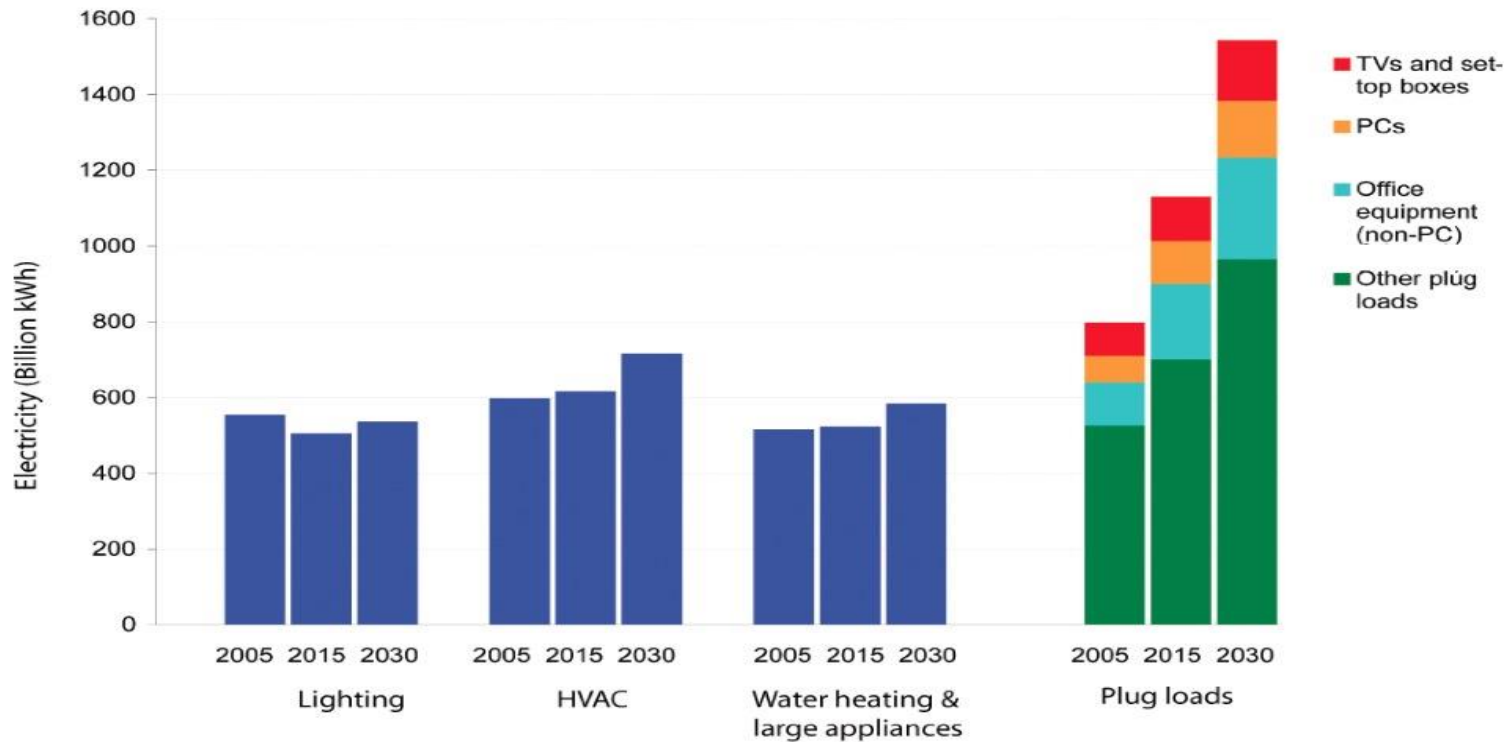


Figure 3: Change in Energy Use by System

Source: Graph created by Ecova with data from EIA 2008 Annual Energy Outlook

# Why Whole-Building, Absolute Energy Targets?

(credit to Mike Leach, PNNL, ACEEE Summer Study, 2012)

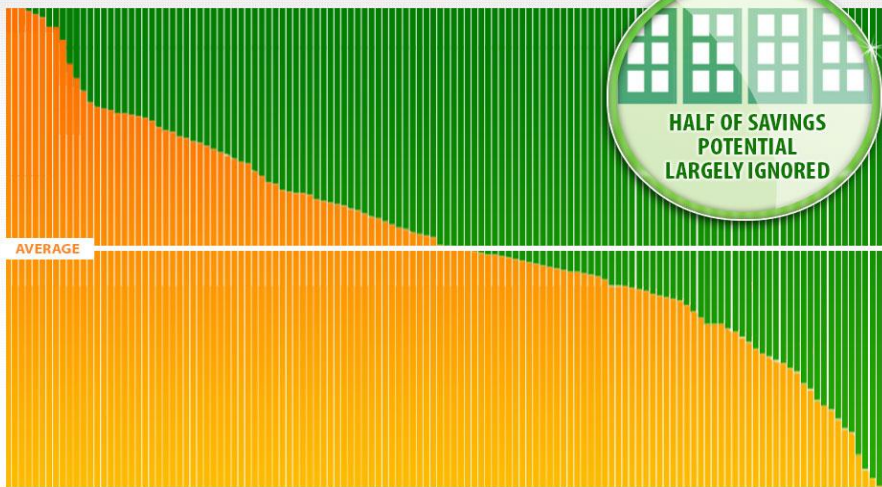
## **Definition: target that represents total, as-operated energy use**

- Clear goals without room for interpretation
  - No interpretation of codes or standards or assumptions of typical design and use are required
- Directly measurable
  - Encourages and facilitates goal verification
  - Enables contractual inclusion of energy goals
- Capture whole-building energy performance
  - Encourages design team to carefully consider aspects of building performance that may be overlooked by codes or standards
- Place focus on low-energy design
  - Project resources are applied to improving low-energy design
  - Allows for design flexibility and encourages innovative, cost effective, integrated design strategies

# why energy targets ?

## LOW / NO-COST OPERATIONAL CHANGES COULD DOUBLE ENERGY EFFICIENCY IN COMMERCIAL BUILDINGS

RETROFIT VS. OPERATIONAL SAVINGS POTENTIAL SPLIT



AVERAGE

↑ EACH BAR REPRESENTS A BUILDING  
 ● % OF RETROFIT SAVINGS  
 ● % OF OPERATIONAL SAVINGS

**HALF OF SAVINGS POTENTIAL LARGELY IGNORED**

### MOST COMMON OPERATIONAL SAVINGS

Can be implemented immediately by building operators once identified – often at little cost and fast payback periods.

#### **HVAC SCHEDULING**

60% of sampled buildings were ready for occupancy an hour or more before people arrive and after they leave.

#### **EQUIPMENT SEQUENCING**

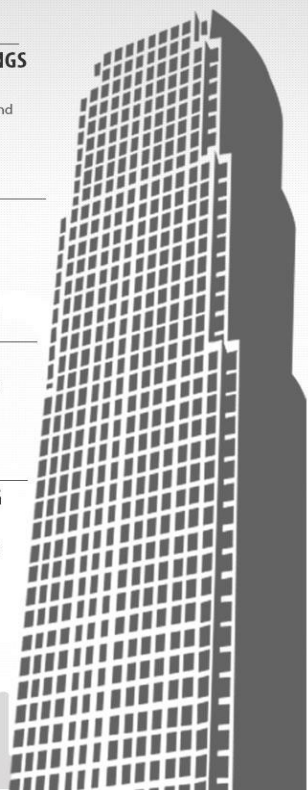
Over 60% of sampled buildings had equipment that was improperly sequenced, running less efficient equipment when not required.

#### **SIMULTANEOUS HEATING & COOLING**

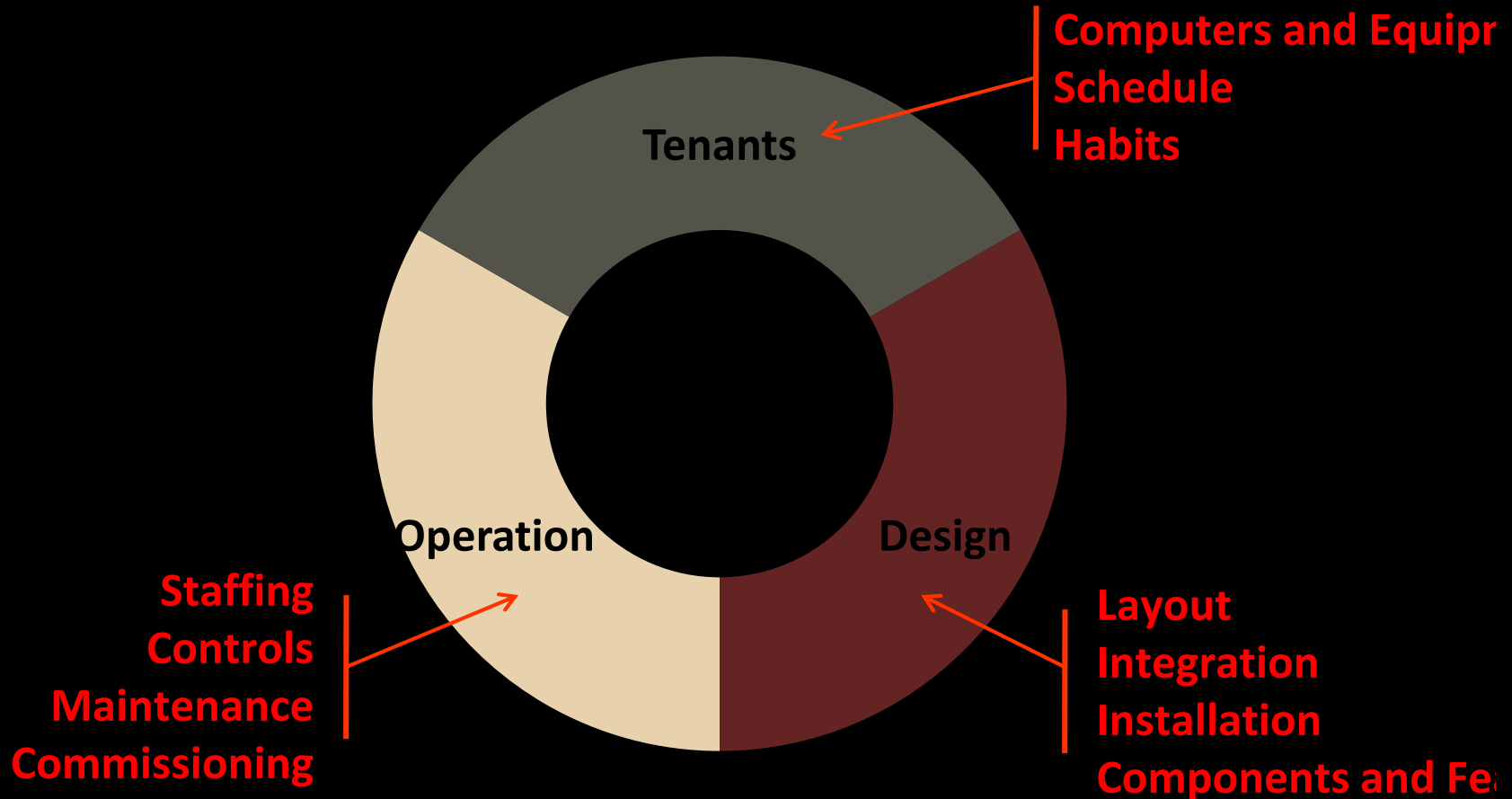
Many buildings use heating systems during 70+ degree outside temperatures, with cooling systems working in 'overdrive' to compensate.

### FIRSTFUEL SAMPLE BUILDING PORTFOLIO ( 60M SQFT )

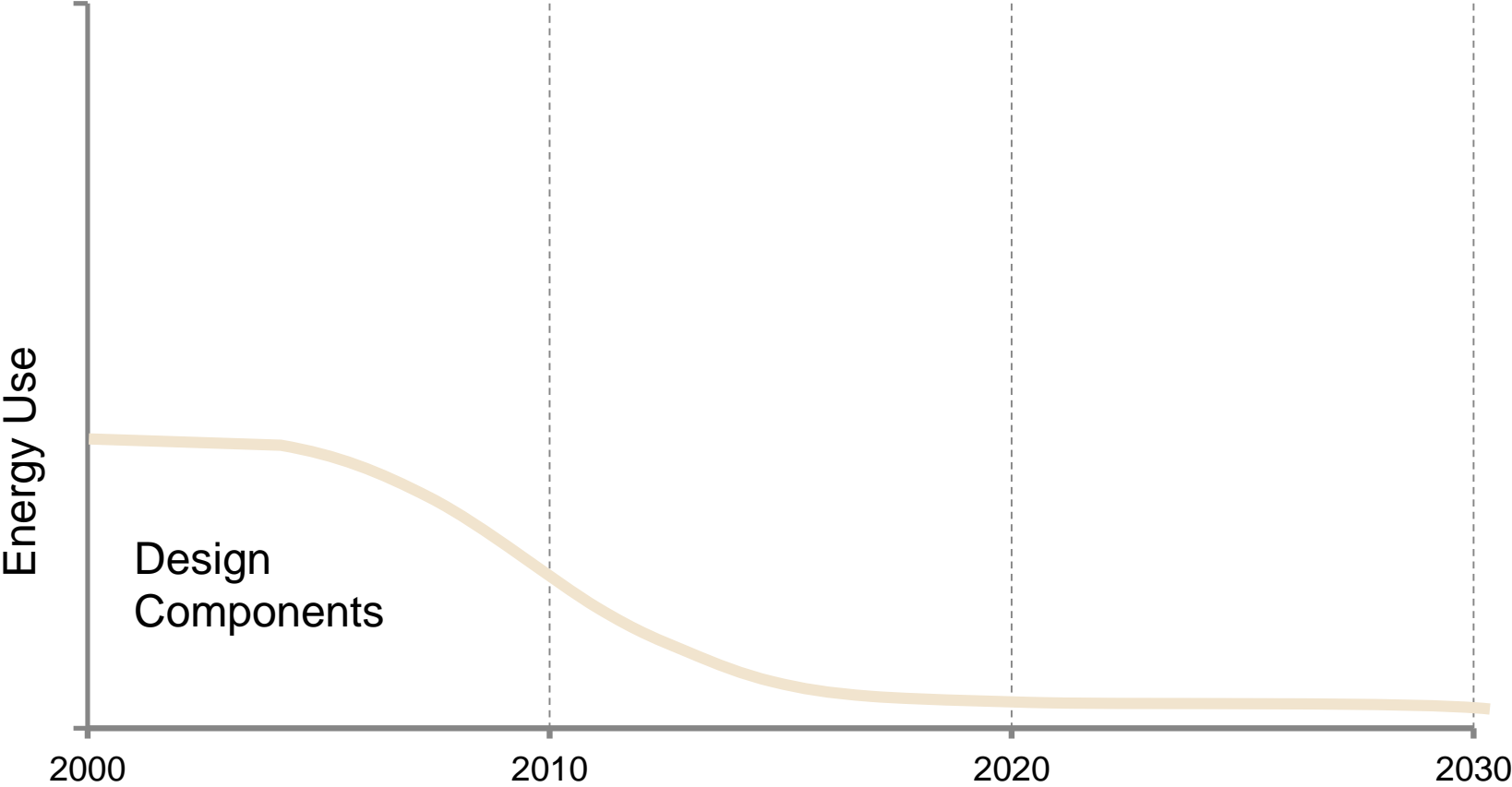
51 percent of all energy efficiency savings in commercial buildings are achievable through low / no-cost operational improvements. The portfolio above represents \$12M in operational savings potential, with a substantial return on investment.



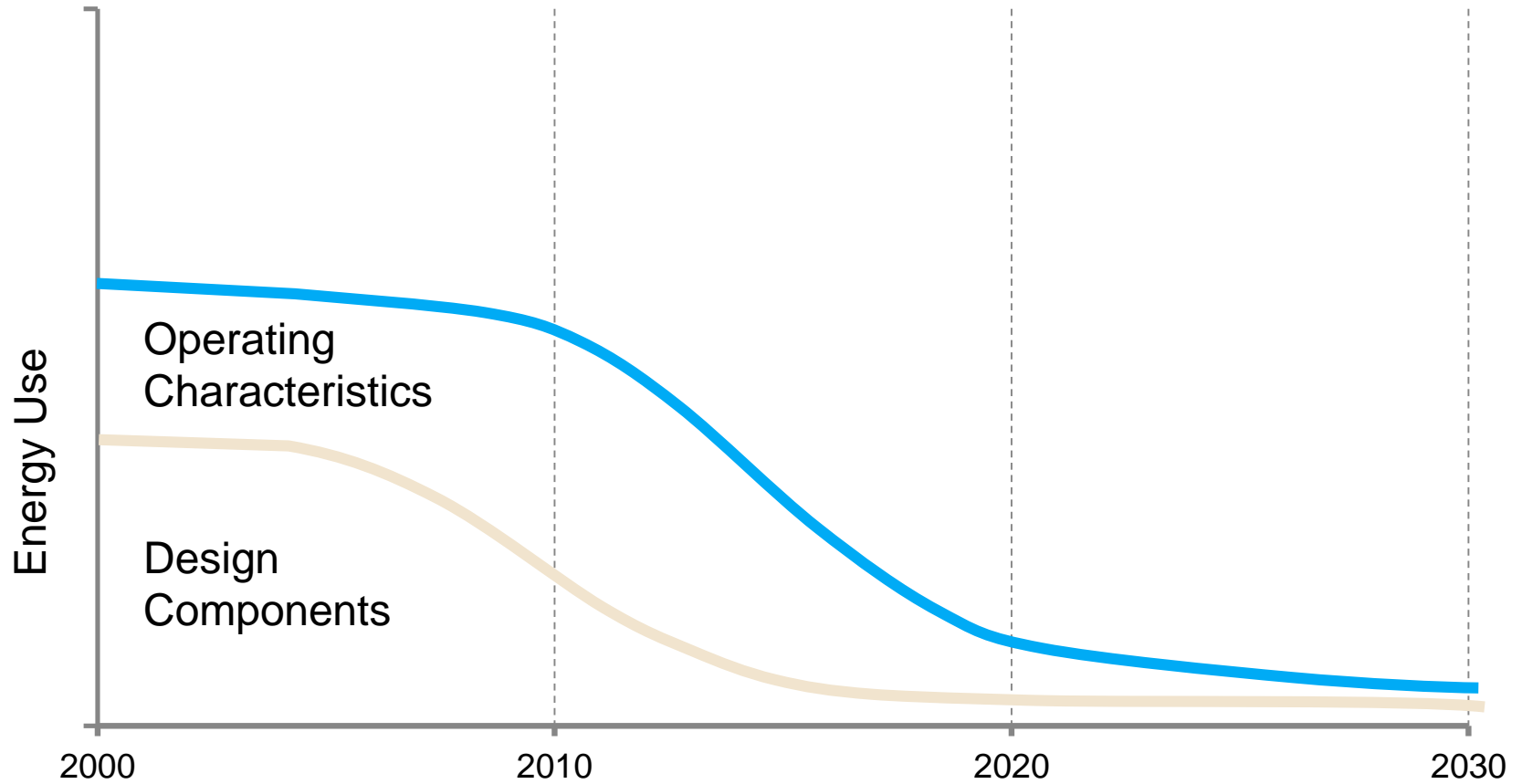
# Different Actors Affect Building Performance



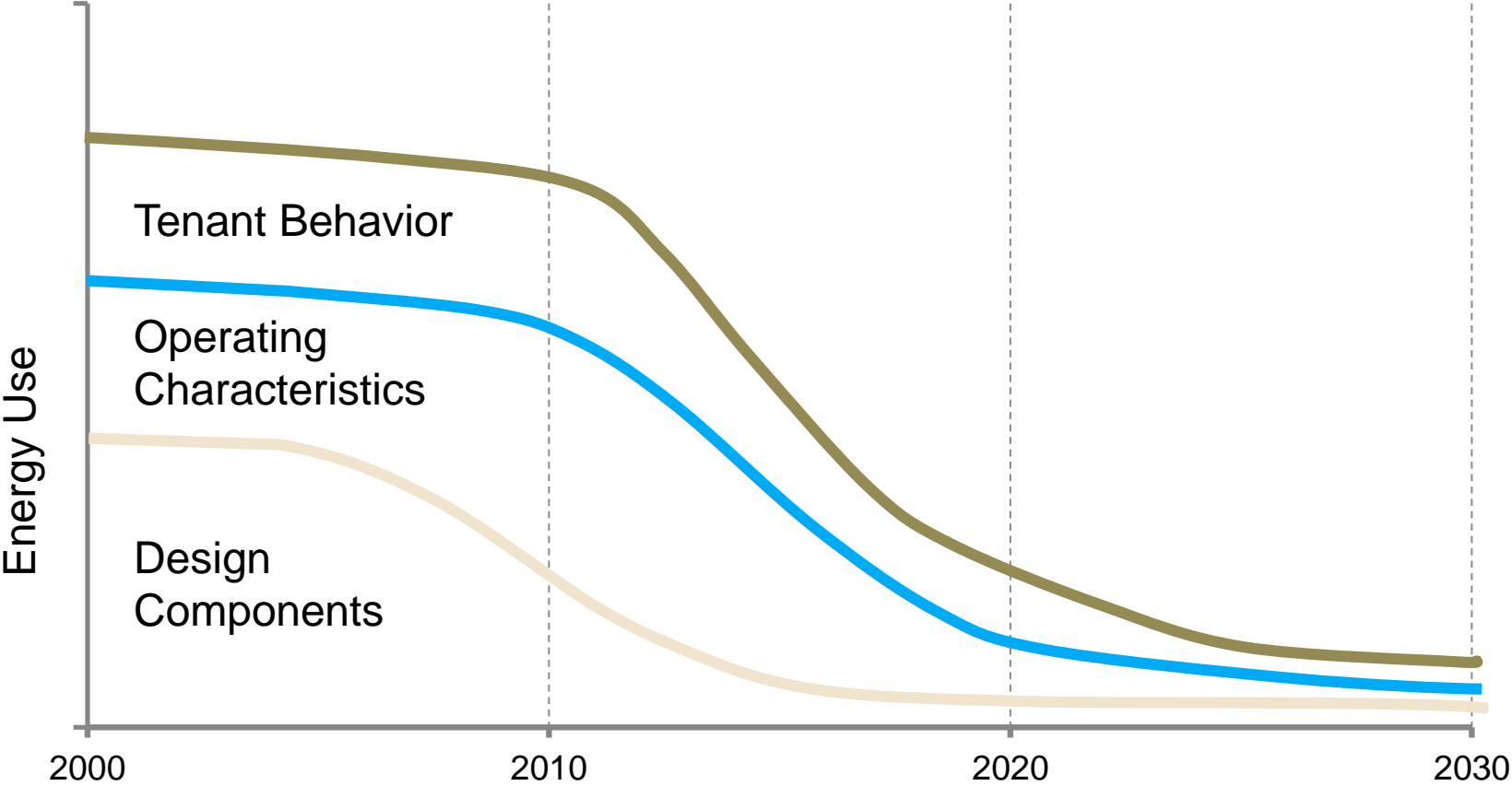
# Components of energy outcomes



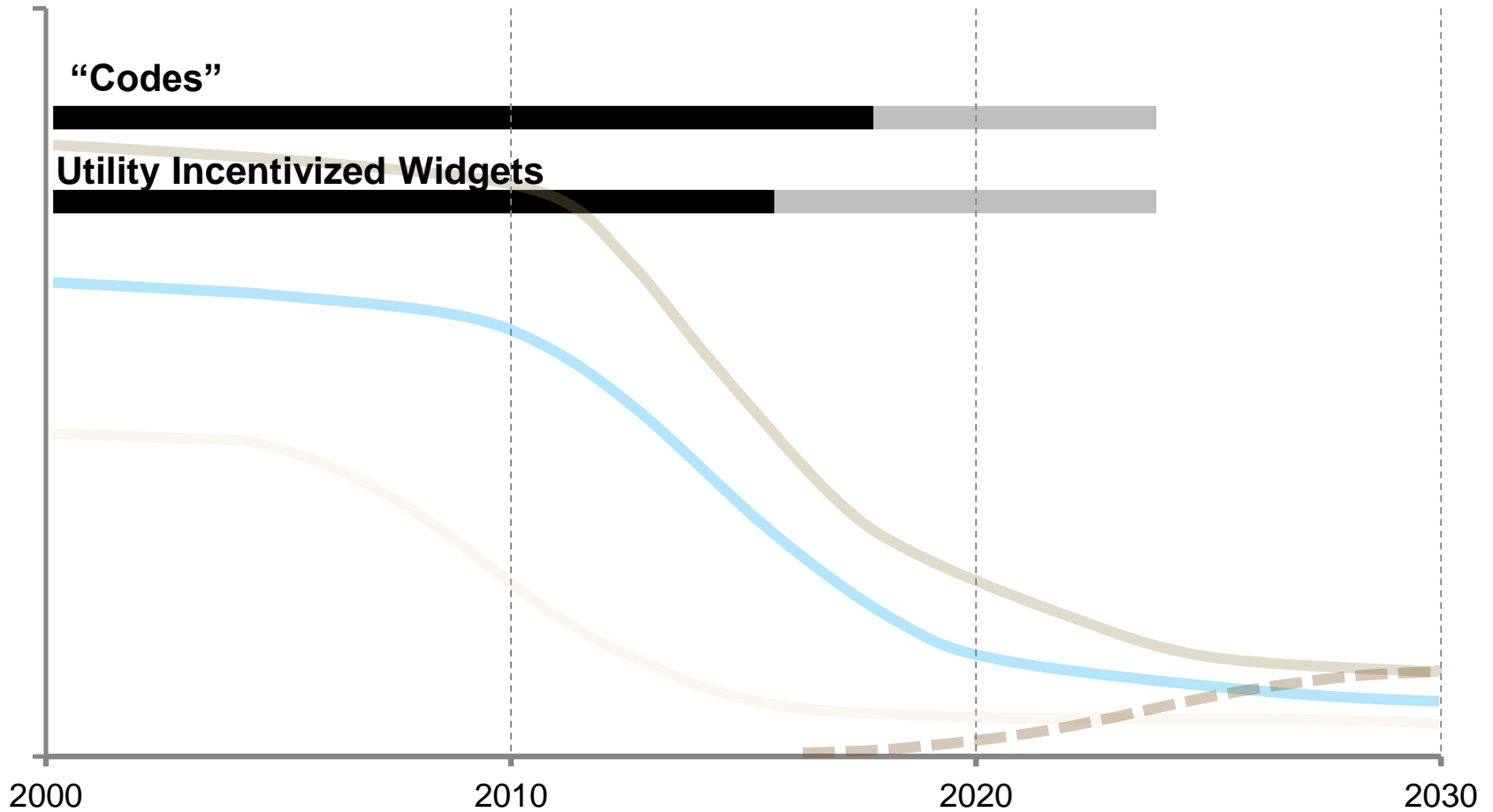
# Components of energy outcomes



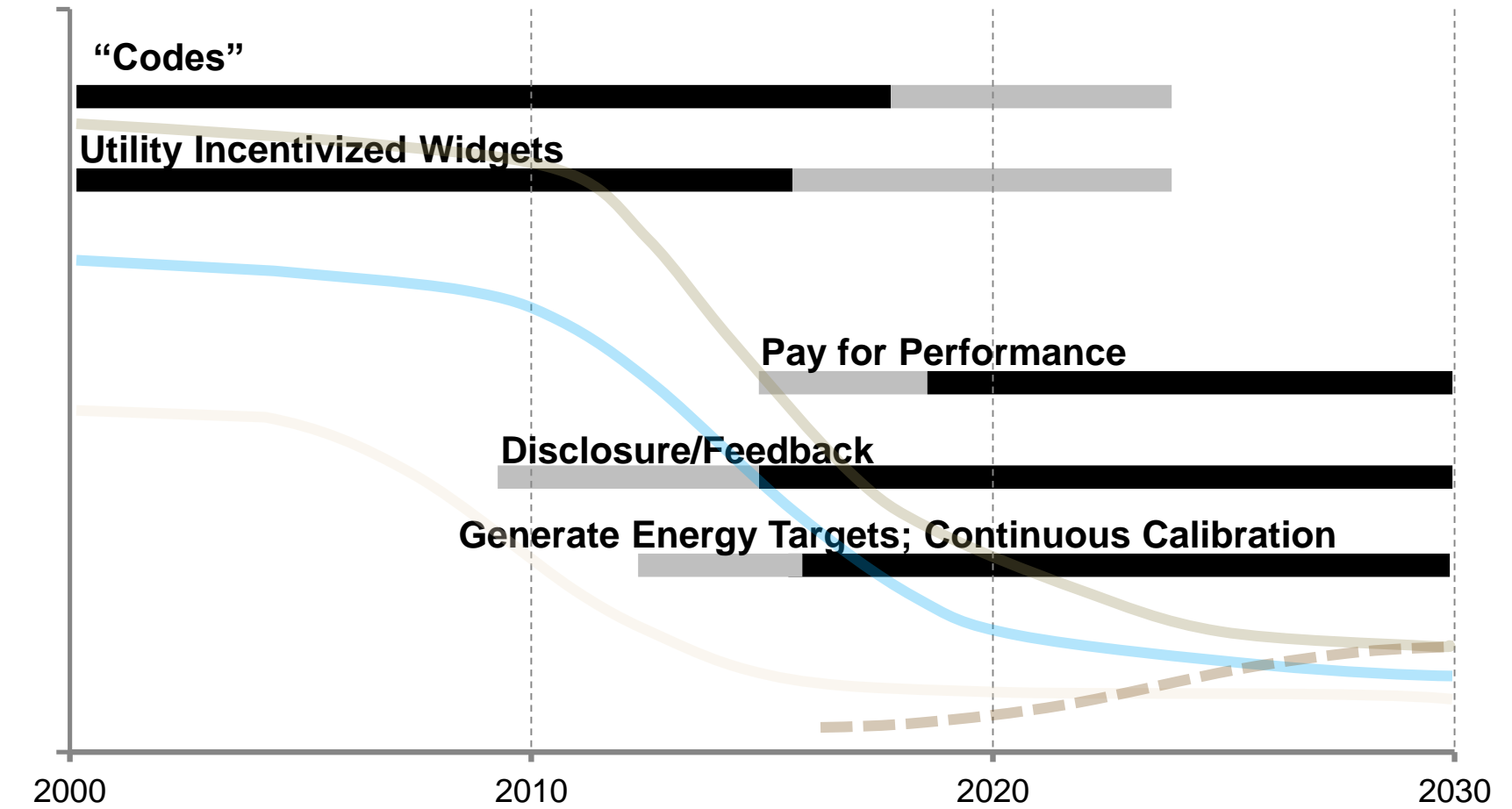
# Components of energy outcomes



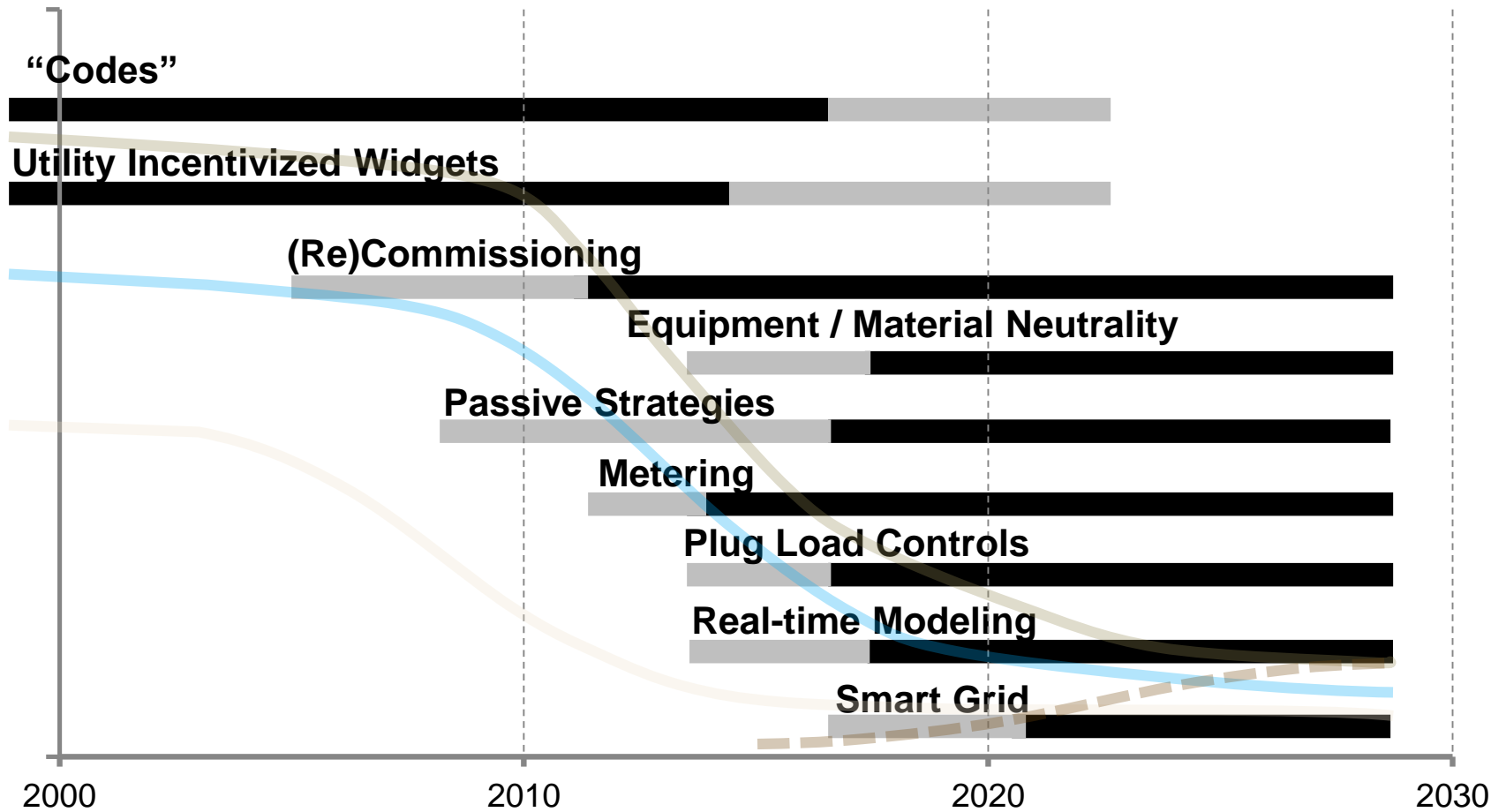
# Timing of Policies and Tools



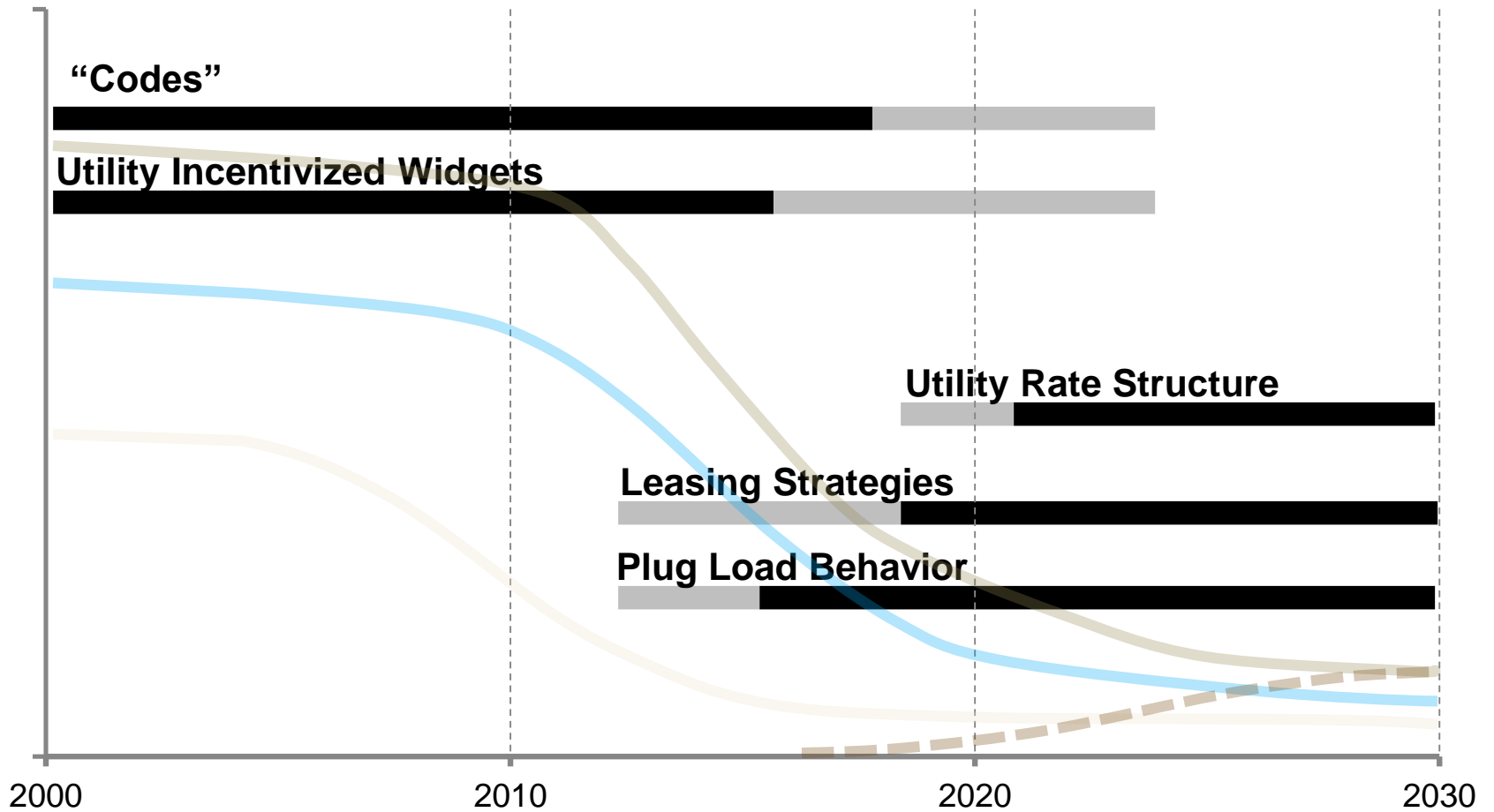
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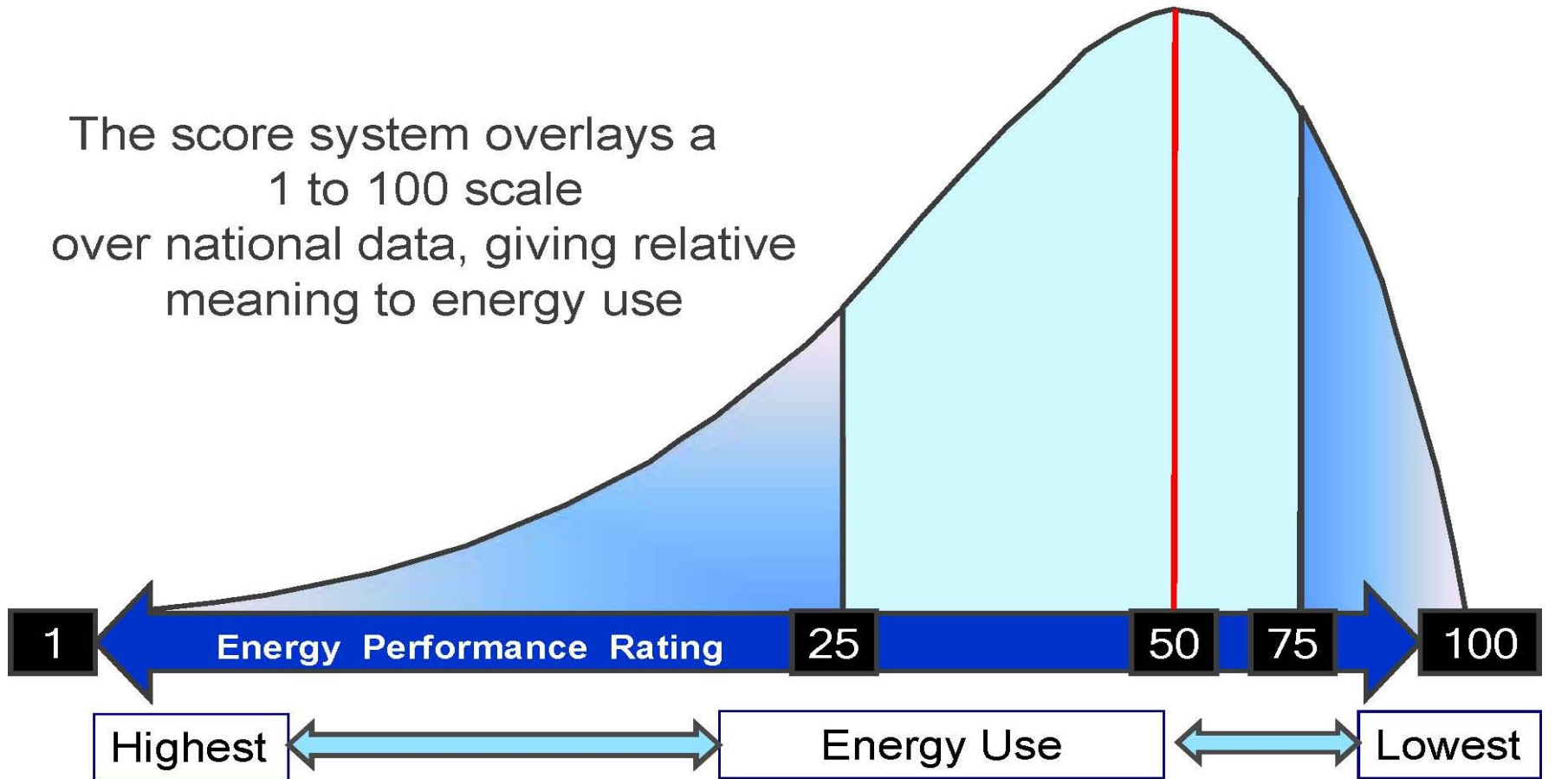
# EUI TARGETS ARE A COMMON CURRENCY

- **Energy Star**
- **Seattle 2030 District (5 more to come)**
  - **Minnesota Public Buildings - B3**
  - **Massachusetts Stretch Code (draft)**
    - **Better Buildings Challenge**
- **Proposals to the ICCPC, IEBC, and IPMC**
  - **Existing Buildings**

# EPA's National Energy Performance Score System



The score system overlays a 1 to 100 scale over national data, giving relative meaning to energy use



## One application for Energy Targets: Outcome-Based Energy Codes



An aerial photograph of a city, likely Seattle, showing a dense urban area with various buildings, a large body of water (likely Puget Sound) in the background, and mountains under a cloudy sky. The text 'Enforcing Outcomes' is overlaid in red on a semi-transparent white box in the center of the image.

# Enforcing Outcomes

# Enforcement Mechanisms

- **Performance/Surety Bond**
- **Tax Structure**
- **Utility Rate Structure**
- **Public Pillory/Accolades**
- **Mandatory RcX**
- **Litigation**

## **DIMENSIONS OF TRANSFORMATION**

<b>Market Transformation</b>	<b>Prescriptive Codes/Programs</b>	<b>Energy Targets</b>
Works for Moving Markets Permanently	<b>yes</b>	<b>yes</b>
Sends signals of upcoming trend	<b>no</b>	<b>yes</b>
Continuous improvement – deploy technology	<b>maybe</b>	<b>yes</b>
Can be aligned with utility programs	<b>maybe</b>	<b>yes</b>

# Targeted Energy Outcomes

Jim Edelson  
[jim@newbuildings.org](mailto:jim@newbuildings.org)

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