



# Advanced Building Guidelines: *E-Benchmark<sup>TM</sup>*

***Jeff Johnson, Executive Director***

A not-for-profit public benefits corporation helping to  
make buildings better for people and the environment

<http://www.newbuildings.org>

# New Buildings Institute



- ◆ Formed in December 1997 as 501(c)3
- ◆ Offices in CA and NW
- ◆ Working with partners in:
  - California
  - Northwest
  - Northeast
  - Midwest
- ◆ Annual revenues of over \$2 million

# FY 2003 Project Portfolio



- ◆ Building Science Research
  - HVAC, Daylighting and Outdoor Lighting (PIER)
  - New Building Performance (EPA)
- ◆ Guidelines
  - Advanced Lighting Guidelines
  - Advanced Building Guidelines
- ◆ Codes
  - Acceptance Testing (California's Title 24)
  - Targeted National, Regional and State Support (IECC)
- ◆ Other
  - Web site

# 2003 Sponsors



- Efficiency Vermont
- Energy Foundation
- Iowa Energy Center
- National Grid, USA
- New York State Energy Research and Development Authority
- Northeast Energy Efficiency Alliance
- Sacramento Municipal Utility District
- Southern California Edison Company

# Institute Strategy

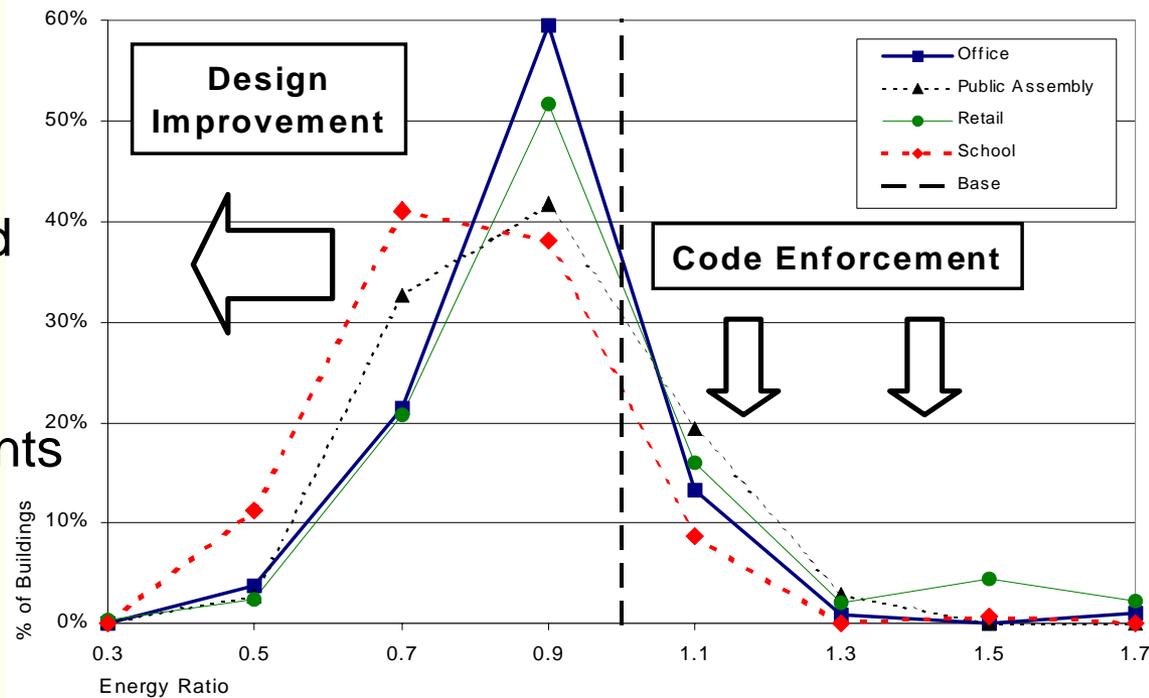


## ◆ Market Push

- Code upgrades, effective implementation and enforcement

## ◆ Market Pull

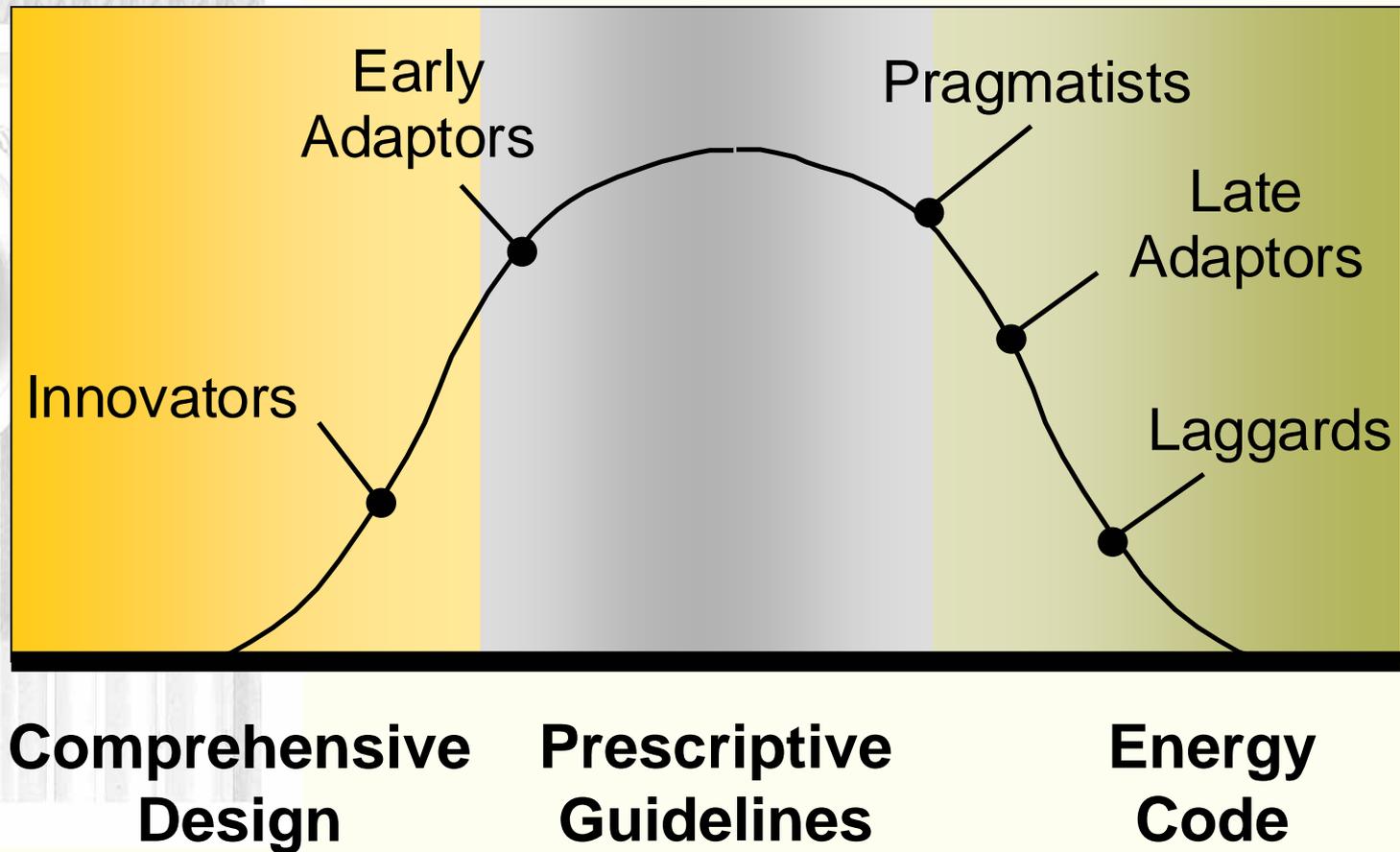
- Design improvements through targeted information, design guidelines, and building science research



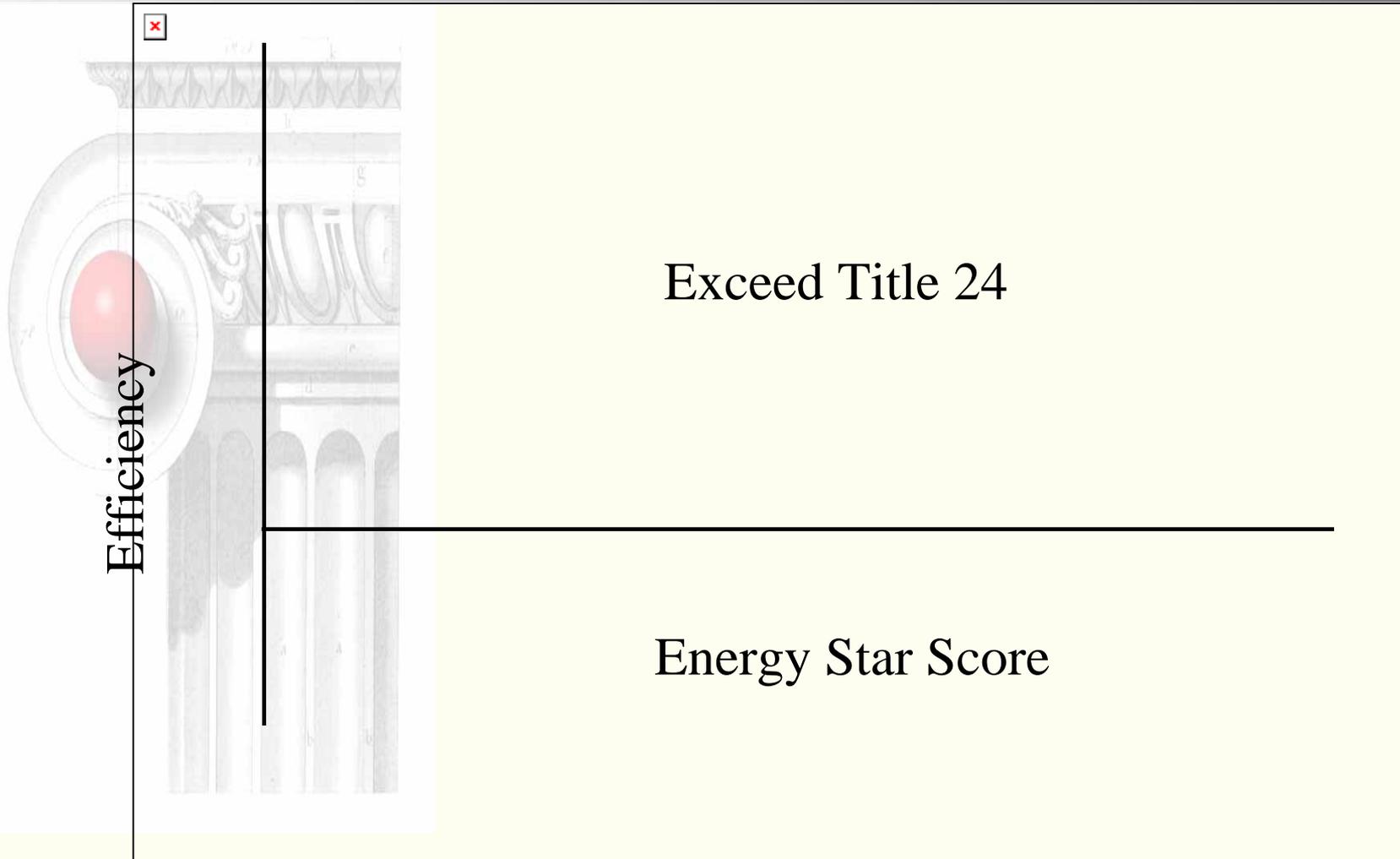
**Energy Ratio of 1.0 = Code**

Source - Nonresidential New Construction Study, RLW Analytics

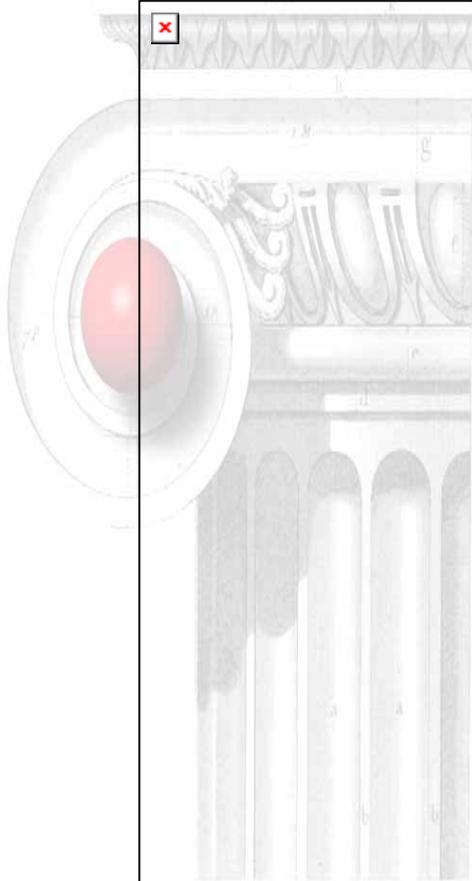
# Why Guidelines?



# Calibrated vs. Benchmark



# Delta Score vs % Savings



# Advanced Building Guidelines



- ◆ E-Benchmark™
  - National beyond-code criteria
- ◆ Best Practices Manual
  - How to from design team perspective
- ◆ Owners Guide
  - What are the benefits to building to the E-Benchmark?

*Focus on Delivering Performance*

# E-Benchmark™



- ◆ Nationally recognized efficiency targets
  - Envelope
  - Mechanical
  - Lighting
  - Power (demand and renewables)
- ◆ Exemplar Processes
  - Integrated Design
  - Commissioning
  - Operations/Maintenance
- ◆ Two Approaches
  - Prescriptive “patterns”
  - Whole-building simulation

# Meeting the E-Benchmark



Money Isn't All You're Saving

Energy Targets and Design/Bid Review

Voluntary

Acceptance Testing



Money Isn't All You're Saving

Operations

Regulatory

Building Code

Code

Sell

Design

Construct

Start-up

Operate

Maintain

Industry

Building Design Team

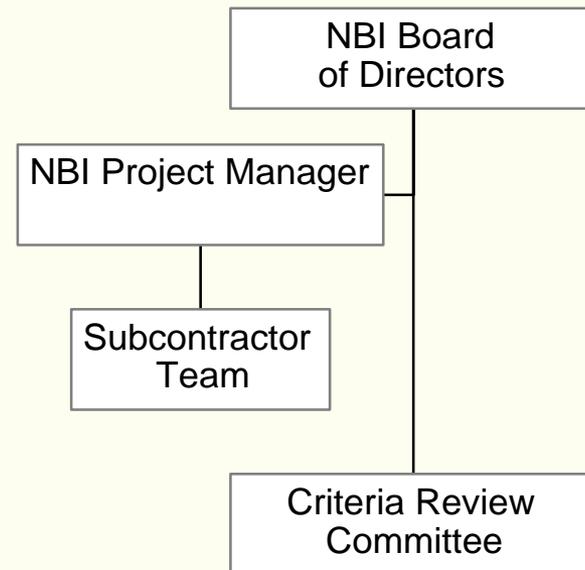
Construction Team

Building Operations Team

# Development Process



- ◆ ANSI Procedure
  - Committee Balance
  - Public Review Process
- ◆ Committee Participation
  - Face-to-face
  - Conference Calls
- ◆ Schedule
  - September 02 Draft
    - Chicago Review (October)
  - February 03 Draft
    - Atlanta Review (March)
  - NBI Board Review
    - Washington, DC (May)
  - Publish
    - July 2003



# Example - Envelope



- ◆ DOE Proposed Climate Regions
- ◆ Opaque and Fenestration
- ◆ Indoor Environmental Quality
  - Infiltration control
  - Moisture control



# Example - Mechanical



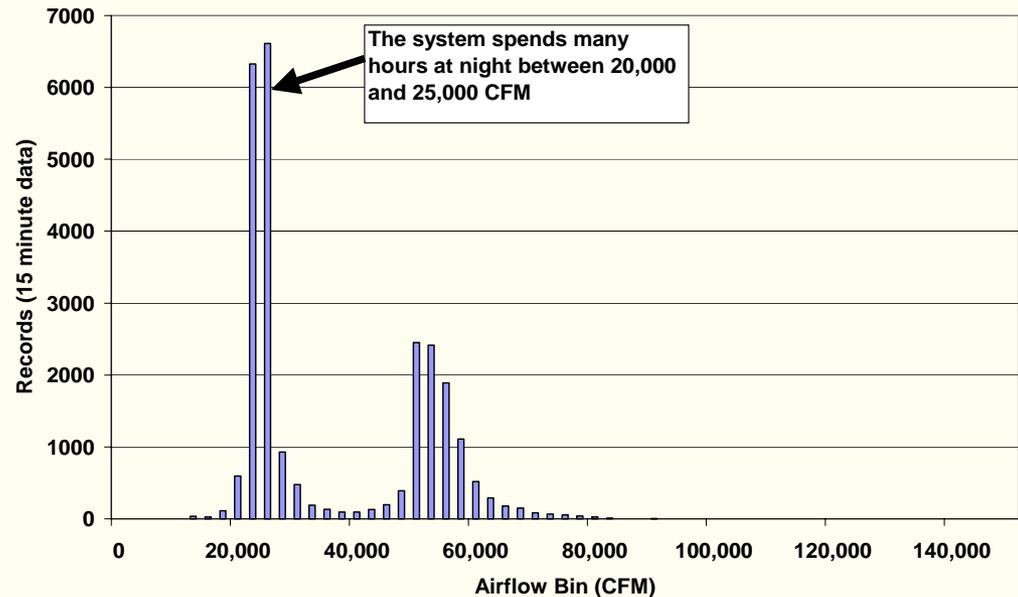
## ◆ Equipment Efficiency

- Typically EPA, CEE Tier 2, or best utility program levels
- ASD's on single chillers and fans/pumps > 10 hp

## ◆ Systems

- Sizing at multiple loads

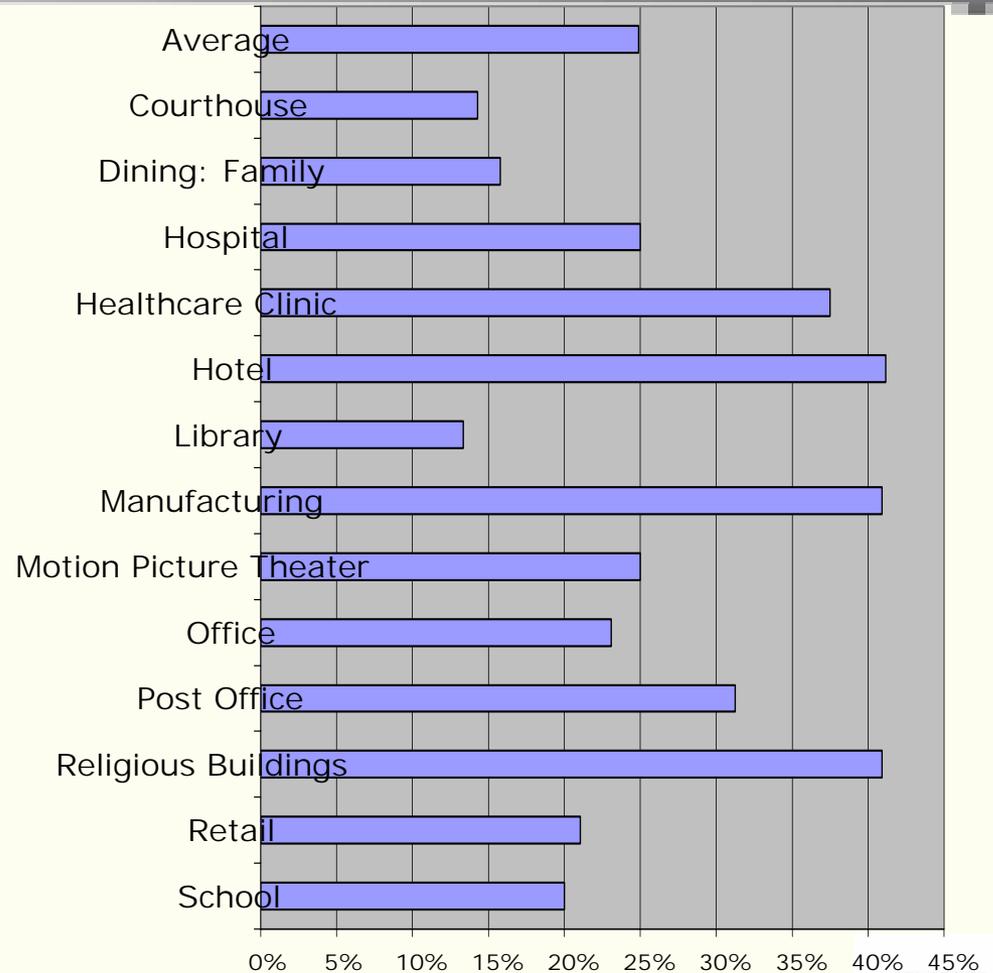
Histogram of Site 1 Total CFM



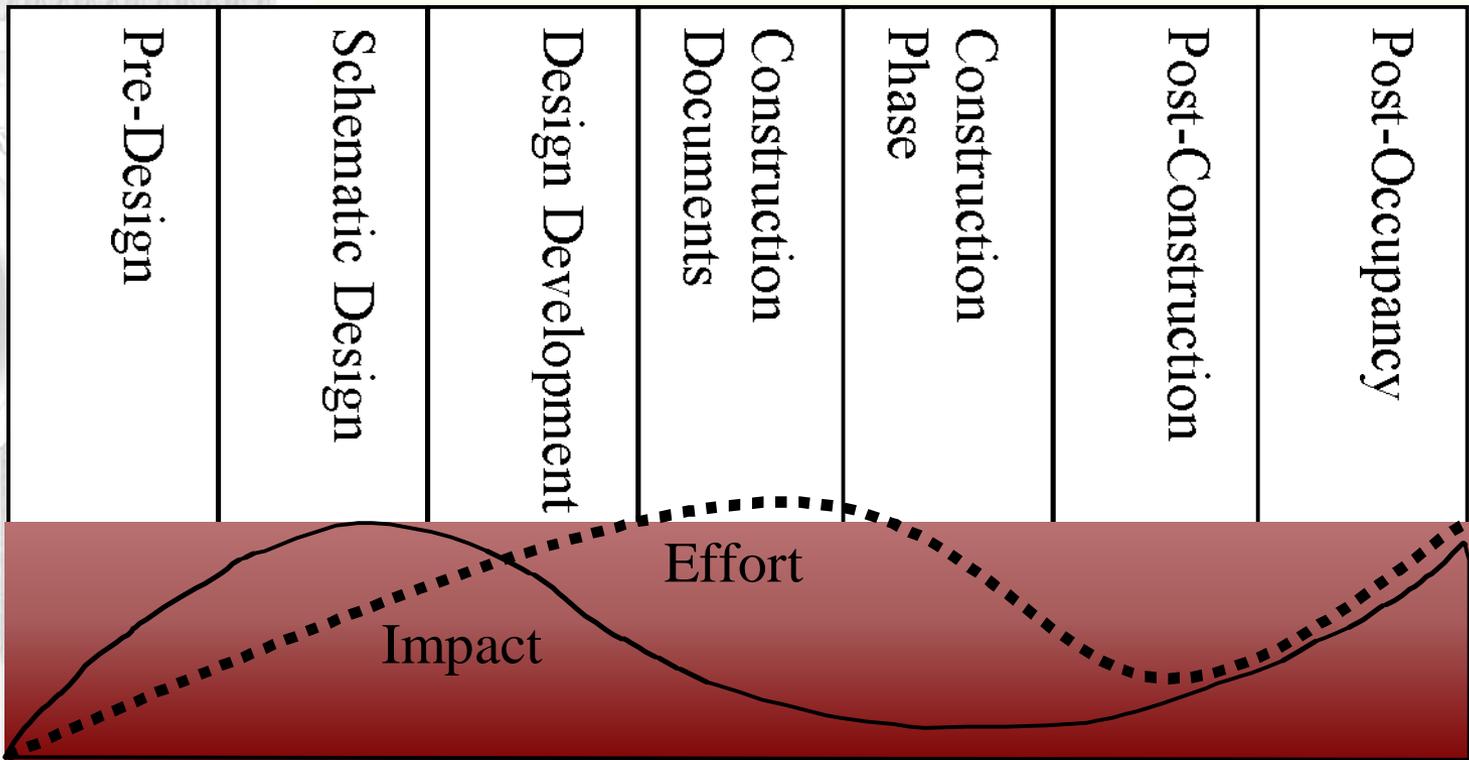
# Example - Lighting



- ◆ IESNA Models
- ◆ New Technologies
  - Super T-8
  - Ceramic Metal Halide
- ◆ Controls
- ◆ Daylighting controls optional “credit” D



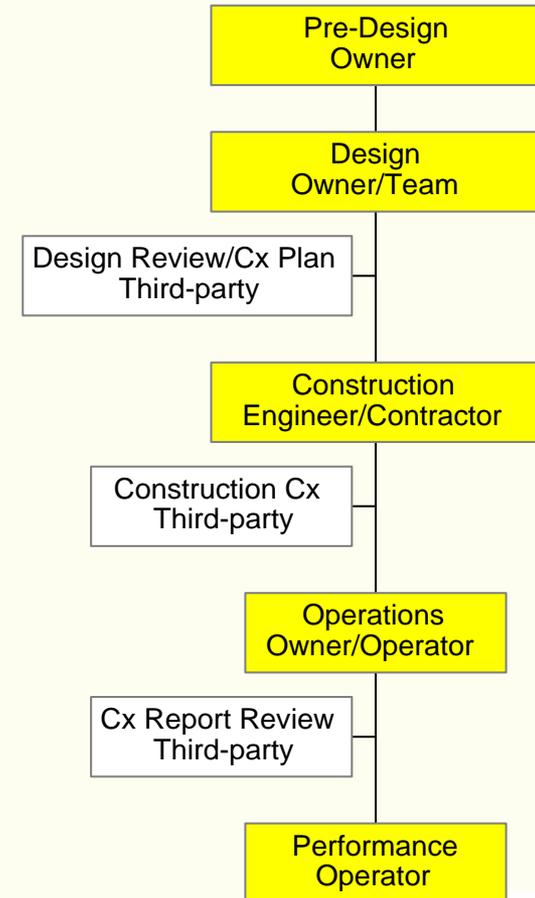
# Design Process



# E-Benchmark Process



- ◆ Pre-design Certification
  - Statement of goals and principles
- ◆ Design Process Certification
  - Statement of Intent
  - Final plans/specs/Cx Plan
- ◆ Construction Certification
  - Submittal/Cx Report
- ◆ Operations Certification
  - Trend-log/Warranty
- ◆ Performance Certification
  - Measurement and Verification



# Impacts



## ◆ Ventilation and Productivity

- \$154 to \$280 per employee (CMU-BIDS)
- Direct result of explicit process requirements

## ◆ Costs

- Ranges from \$0.75 to \$1.40/sf with supermarket up to \$3.50/sf including commissioning

## ◆ Savings

- Ranges from \$0.20 to \$0.80/sf with schools \$0.10 to \$0.15/sf
- Electric savings at 4 to 8 kWh/sf
- Ventilation benefits not included in cost savings

## ◆ Avoided Costs

- \$0.01 to \$0.03/kWh with schools up to \$0.07

# Best Practices Manual



- ◆ Modeled after:
  - Volume II: Design Guide
- ◆ Expanded to include:
  - Other building types
  - Design process oriented
  - National climates
  - Regional case studies
  - Energy focus

the  
S  
collaborative  
P  
for high  
H  
performance  
S  
schools



# Owners Guide



- ◆ Assist in “selling” high-performance buildings
- ◆ Speak to this audience in terms they understand
- ◆ Example
  - Daylighting is not a wall of view glass -- it is daylight filtered through glass that creates a soft, diffuse light that moves throughout the day without heat or glare.



Developer Bob Gerding, Gerding-Edlen Development Company, outlines role of betterbricks.com in Brewery Blocks project in Portland, Oregon.

Photo and text courtesy of betterbricks.com

# Influence



## ◆ ASHRAE

- Currently negotiating a co-sponsorship agreement between NBI, ASHRAE, IESNA and US DOE

## ◆ US EPA

- Will use E-Benchmark criteria as reference efficiency levels

## ◆ US Green Building Council

- Support development of a E-Benchmark/ LEED™ user guide

## ◆ FEMP

- Reviewing for possible procurement standard

## ◆ NAIMA

- Referencing E-Benchmark insulation requirements in new guidebook

# Connections



- ◆ LEED
  - Energy and Atmosphere Points
- ◆ New Construction Programs
  - Next generation program design
- ◆ Public Buildings
  - Advanced specification
- ◆ Tax Credit (In Congress)
  - *How to exceed ASHRAE by 50%*
- ◆ Energy Codes
  - Next generation code levels



# Benefits



- ◆ Lower cost per transaction
  - High quality materials and pre-defined path provide economical access to guide smaller buildings
- ◆ Cost effective whole-building performance solution
- ◆ Comprehensive educational materials
- ◆ Connections to LEED, rebates, etc.
- ◆ Assist in implementing market transformation strategy
  - Guidelines “pull” market beyond standard practice
  - Codes “push” market to standard practice

# Phase II Sponsor Status



## ◆ Current Sponsors

- NEEA (NW)
- WI Dept of Admin (WI)
- Iowa Energy Center
- National Grid (MA)
- CA Energy Commission -PIER
- Efficiency Vermont

## ◆ CY 03 Prospects

- NSTAR (Boston)
- Savings by Design (CA)
- NYSERDA/LIPA (NY)
- US EPA
- Maine Public Utility Commission
- SCE
- US DOE

