THINK DIFFERENTLY!
Proactively respond to change
“Vision without action is a dream. Action without vision is simply passing the time. Action with Vision is making a positive difference.”

- Joel Barker
LEARNING OBJECTIVES

Credentials

Changes in Education

Changes in Building Performance Codes
20 places from which we serve our clients
DEcision Cycle

School Board

Why
How
What

Users

Why
How
What

Supt

Finance

Operations
“We can't solve problems by using the same kind of thinking we used when we created them.”

- Albert Einstein, 1921.
TODAY VS TOMORROW

A WHOLE NEW MIND

Why Right-Brainers Will Rule the Future

Daniel H. Pink

Conceptual Age

Concept Workers*

Information Age

Knowledge Workers

Industrial Age

Factory Workers

Agricultural Age

Farmers

21st Century

20th Century

19th Century

18th Century
TODAY VS TOMORROW

Philosophy – “Why”

Activities – “How”

Tools – “What”
### TODAY VS TOMORROW

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THE "WHAT"

- Studio
- Think Tank
- Small Workshop
- Open Box
- Interdisciplinary Studio
- Large Workshop
- Admin
THE “WHAT”
TOOLS ARE CHANGING
TOOLS ARE CHANGING
TOOLS ARE CHANGING
EXPENSE VS INVESTMENT

- Investment
  - “Bang for the buck”
  - Supports Learning

- Quality
  - Cost
  - Performance

- Quantity
  - Space
  - Experience

- Value

Determined by Industry
Facilitated by Architect
Approved by District

Determined by Education
Facilitated by Architect
Set by District
1. Condition
2. “Fit”
3. Performance

1. Environment
   - Acoustics
   - Lighting
   - Comfort
   - Air Quality

2. Energy Use
   - Water
   - Gas
   - Electric
New Energy Codes in the Midwest

- Energy Codes update in the Midwest, how did we get here?
- What does it mean and **how to comply**?
- Energy Codes Future, Industry Trends, Next Steps for 2015
- Linking School Performance to Experience
New Illinois State Energy Code

CODE CHANGE: TIMELINE

All permits applications in Illinois prior to January 1, 2013 will remain under the old code.

All permits applications in Illinois after January 1 must comply with IECC 2012.

Iowa – March 2014
A Brief History of Commercial Codes

Energy Use Index (1975 use = 100)

- 14% savings from Std. 90A-1980
- 4% savings from Std. 90.1-1989
- 11% savings from Std. 90.1-1999
- 5% savings from Std. 90.1-2004
- 25% savings from Std. 90.1-2007
- 30% savings from Std. 90.1-2010
ENERGY CODES: IMPACT

1. New Construction
2. Major Renovations
3. Capital Improvements
WHAT NEEDS TO COMPLY?

- All jurisdictions in IL have to enforce the code.

- If a unit of local government does not regulate energy efficient building standards all design and construction is still subject to the provisions in the Act.
  - New Buildings
  - Additions to Existing Buildings
  - Alterations of Existing Buildings
  - Replacements of Portions of Existing Buildings
IECC 2012 versus 2009: THE BOTTOM LINE...

- Envelope: Higher R-Values (walls & roof) Continuous Air Barrier requirements
- High Roof Reflectance requirements
- Max. window to wall ratio of 30% for above-grade walls (40% if daylighting)
- Daylighting: Skylights mandatory for large spaces (+10K SF) with tall (15’) ceilings
IECC 2012: COMMISSIONING REQUIREMENTS

• Mechanical Systems Commissioning and completion prior to final mechanical inspection

• Prelim Cx report to Owner with Owner’s letter of transmittal and copy of preliminary Cx report to AHJ

• **No Certificate of Occupancy** until owner, CxA & AHJ sign off on Cx report
IECC 2012: MANDATORY HVAC PROVISIONS

Provisions applicable to ALL HVAC systems:
• HVAC load calculations and Equipment and system sizing (per ASHRAE Standard 183)
• HVAC Equipment Efficiencies (per C403.2.3)
• Ventilation Controls
  • Set back
  • Optimal Start
  • DCV (>3000 CFM >500 SF)
• Energy Recovery Ventilation Systems
• Economizers (> 3 tons)
• Piping Insulation
• HVAC Functional Testing (> 40 tons)
Mandatory Lighting and Power Provisions:
• Occupancy Sensors required
  • Classrooms, conference rooms, restrooms, private offices
• Daylight Zones (2’x2’x15’)
  • Must have multilevel lighting controls
    • Exception if LPD < 0.5 w/SF
• Lower LPD allowances (w/SF) open office = 1.0
• Half of all 125V 15 & 20 amp receptacle tied into BAS
Mandatory High Efficiency Package:
• Must select one additional efficiency package from:
  1. Higher Efficiency lighting system
  2. Higher Efficiency HVAC equipment
  3. Design for on-site renewable energy for at least 0.5 W/SF
IECC 2012 COMPLIANCE PATHS

Mandatory Provisions

Envelope
HVAC
Water Heating
Lighting
Plug Loads

Prescriptive Option
Trade Off/Total Building Performance Option

ASHRAE 90.1-2010

Compliance
CONCEPTUAL ENERGY MODELING
QUICK ENERGY ANALYSIS
CODE COMPLIANCE

DAYLIGHT STUDY

Daylight (fc)
Sep 21 15:00

1130.21
1076.39
1022.57
968.75
914.93
861.11
807.29
753.47
699.65
645.83
592.02
538.20
484.38
430.56
376.74
322.92
269.10
215.28
161.46
107.64
53.82
0.00
In the Midwest this year, **Chicago and Minneapolis** have adopted an energy benchmarking and disclosure rule for commercial buildings.

All Public Buildings > 25,000 SF Report & Disclose Energy usage in 2013

Commercial Buildings >100,000 SF will be required ANNUALLY to Report beginning June 1, 2014 & Disclose by August 30th, 2014
ENERGY REDUCTION ROADMAP

Big Savings Opportunity

- **PROCESS**
  - Retrocommissioning
  - Lighting Retrofits
  - Behavioral Changes
  - Prescriptive Upgrades
  - BAS optimization

- **DEEPER CAPITAL INVESTMENT**
  - Energy Upgrades, Ongoing Commissioning

- **ENERGY PRODUCTION**
  - Net Zero Energy Building

- **SAVINGS**
  - 2012 to 2014 Action Items: 10% to 25%
  - 2012 to 2017 Analysis & Implementation: 25% to 60%
  - 2012 to 2017 and ongoing to 2050: 50% to NZEB
TYPICAL RETRO-COMMISSIONING MEASURES

Low-cost, no-cost tune up measures

• Optimizing systems set-points, sequences and schedules
• Optimizing ventilation rates
• Maximizing free cooling (economizers)
• Eliminate simultaneous heating & cooling
• Reducing supply air temperature and fan speed in AHU’s
• Decreasing supply air pressure set-points
MANDATORY VERSUS VOLUNTARY

BUILDING ENERGY QUOTIENT

In Operation: Indicates the energy consumption of this building in actual use.

Date of Issue: In Operation Date
Building Location: Sample Building 1999 Any Street
Anytown, USA 10000

Zero Net Energy A+
High Performance A
Very Efficient A-
Efficient B
Average C
Inefficient D
Unsatisfactory F

LEED v4

Verses
WHERE ARE WE GOING?
1. Environment
   - Adequate Ventilation
   - Thermal Comfort
   - Air Quality
   - Lighting/Daylighting
   - Acoustics

2. Energy Use
   - Water
   - Gas
   - Electric
ENERGY CODES

Future Energy Reduction Proposal

- Standard 90.1
- AEDG
- ASHRAE BOD Goal
- Standard 189

Energy (Btu/ft²-yr) vs Year

2010 2015 2020 2025 2030

410,000 kJ/m²-yr
• Mandatory updates every 3 years per ARRA funding conditions
• Bigger emphasis on **OUTCOME** based compliance
  - Measurement & Verification
  - Continuous Commissioning
• Higher thresholds for **Renewable Energy** +1W/SF
• Higher priority on **passive design strategies**
  - Natural/Mixed Mode Ventilation
  - Thermal Mass Heating/Cooling
  - Daylighting & Solar Shading
• Lower EUI mandatory targets
• Getting tools in place for **Net-Zero Design**

**UPDATES IN 2015**

2015
• Talk to your A&E design team early, do they understand the new Energy Code?

• Focus on Mandatory requirements during Preconstruction; Prescriptive vs Performance route?

• Work with the Commissioning Authority early to avoid problems before project close-out
• Change
  • Think Differently
    • “Why”
    • Investment
  • Rules
    • Energy Code
    • Commitment
QUESTIONS?

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