But what is green building?
What problems are we trying to fix?

- Lack of design integration / missed opportunities
  includes unneeded features, suboptimal design
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includes unneeded features, suboptimal design

- Stifled design process
  prescriptive versus performance-based criteria
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prescriptive versus performance-based criteria

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  what can the occupants tell us? maintenance?
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Element of surprise
specific language in RFQs/RFPs, contracts
What problems are we trying to fix?

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  - prescriptive versus performance-based criteria
- Value engineering without good stakeholder input
  - what can the occupants tell us? maintenance?
- Element of surprise
  - specific language in RFQs/RFPs, contracts
- Overpaying for new technologies & processes
How can we make room for good ideas?
How can we make room for good ideas?
LEED™
Leadership in Energy and Environmental Design

- Developed by the US Green Building Council
- Creates a definition of “green”
- Standardized point system with prerequisites, credits and innovation points
- Four levels of certification
  - Certified
  - Silver
  - Gold
  - Platinum

KEMA Xenergy
LEED™ Projects

- 23 Certified projects
- More than 500 registered projects
- 75 Million square feet
- 3% of new commercial space

KEMA Xenergy
LEED Registered Projects in U.S.
LEED percentage of new floorspace
LEED™ Credit Categories

- Sustainable Sites
- Water Efficiency
- Energy & Atmosphere
- Materials & Resources
- Indoor Environmental Quality
- Innovation and Design Process
Sustainable Sites
Energy and Atmosphere
Energy and Atmosphere
Materials and Resources
Materials and Resources
Indoor Environmental Quality
Benefits of Green Building

- Future costs outweigh construction costs
  - Only 2% are construction costs
  - 6% are for O&M
  - 92% are for labor

- Investment in green buildings pays off
  - Reduced energy and water costs
  - Reduced maintenance, improved durability
  - Increased productivity of 5-20% or more
  - Decreased costs to society: pollution, waste

KEMA Xenergy
What is KEMA Xenergy doing?

- Developing ordinances
  - San Jose, Pleasanton, Dublin, Livermore, Berkeley, etc.

- Coordinating vendor stocking and outreach

- Trainings and charrettes

- Construction research

- Project assistance
  - Courthouses, libraries, fire and police stations, community centers, city halls, offices, and a prison.
Project Assistance Detail

- Set preliminary LEED goal & budget
- Write RFQ/Ps with LEED requirements
- Integrated design with charettes + commissioning
- Real value engineering
- Contractor pre-bid training + LEED in contract
- Construction oversight by 3rd party commissioner
- Post construction and post occupancy commissioning
Challenges for Capital Construction

- Return on investment
- Cost benefit analysis
- Fixed price, low bid
Challenges for Capital Construction

- Electricity
- Gas
- Water

KEMA Xenergy
Challenges for Capital Construction

- Limited construction budgets
- Strict operating budgets
- Environmental considerations
- Intensity of use
- Efficient, safe and productive workplaces
- Preserving beauty
The Upfront Capital Costs of LEED

Figure 1. Incremental capital cost of meeting LEED as a percent of total project cost

| Level     | 0 | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 | 12 | 13 | 14 | 15 | 16 | 17 | 18 | 19 | 20 | 21 | 22 | 23 | 24 | 25 | 26 | 27 | 28 | 29 | 30 |
|-----------|---|---|---|---|---|---|---|---|---|---|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|
| Certified |   |   |   |   |   |   |   |   |   |   |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |
| Silver    |   |   |   |   |   |   |   |   |   |   |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |
| Gold      |   |   |   |   |   |   |   |   |   |   |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |
| Platinum  |   |   |   |   |   |   |   |   |   |   |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |

KEMA Xenergy
435 LEED™ Registered Projects

Commercial Office 121
Education 96
Government 48
Interpretive Center 30
Medical/Lab 27
Industrial 19
Multi-Family Residential 18
Library 17
Assembly 16
Retail 14
Transportation 8
Special Needs Housing 5
Hotel/Resort 4
Daycare 3
Other 9

KEMA Xenergy
# Energy and Atmosphere

<table>
<thead>
<tr>
<th>Requirement</th>
<th>Description</th>
<th>Points</th>
</tr>
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<tbody>
<tr>
<td>Prereq 1</td>
<td>Building Commissioning</td>
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<tr>
<td>Prereq 2</td>
<td>Minimum Energy Performance</td>
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<td>Prereq 3</td>
<td>CFC Reduction in HVACR Equipment</td>
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<tr>
<td>Credit 1</td>
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<td>Renewable Energy</td>
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<tr>
<td>Credit 3</td>
<td>Additional Commissioning</td>
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<td>Credit 4</td>
<td>Elimination of HCFCs and Halons</td>
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<td>Credit 5</td>
<td>Measurement and Verification</td>
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</tr>
<tr>
<td>Credit 6</td>
<td>Green Power</td>
<td>1</td>
</tr>
</tbody>
</table>

**Total Points:** 17
Seattle Justice Center

- 500,000 sf Courthouse
- LEED™ 2.0 Registered Project

KEMA Xenergy
Seattle Justice Center
Seattle Justice Center

- Part of new Civic Campus
- Design charrette
- Glazed thermal buffer - glass curtainwall
- Daylighting throughout
- Green, vegetated roof
- Seattle requires LEED™ Silver
Marion County Courthouse, Salem, OR

- 153,293 gsf Courthouse
- LEED™ 1.0 Registered Project

KEMA Xenergy
Water Efficiency Credit: Water Use Reduction

- Reduce potable water use by 20% = 1 point
- Reduce by additional 10% (30% total) = 2 pts.

Strategies:
- Low-flow faucets, toilets
- Waterless Urinals
- Composting toilets
Whitehead Research, Atlanta, GA

- 350,000 sf Laboratory and Office
- LEED™ 2.0 Registered Project

KEMA Xenergy
Greenwood Elementary, Seattle, WA

- 61,000 sf Elementary School
- LEED™ 1.0 Registered Project
Old National Bancorp, Evansville, IN

- 291,000 sf Commercial Office Building
- LEED™ 2.0 Registered Project
Eugene Public Library, Eugene, OR

- 127,531 sf Library
- LEED™ 2.0 Registered Project

KEMA Xenergy
Regional Fire Operations and Training Center, Orange, CA

- 243,000 sf Local government
- LEED™ 2.0 Registered Project

KEMA Xenergy
PNC Firstside Center, Pittsburg, PA

- 647,000 sf Commercial Office Building
- LEED™ 2.0 Silver, 2000
Phillip Merrill HQ, Annapolis, MD

- 30,600 sf Environmental Center
- LEED™ 1.0 Platinum, 2000

KEMA Xenergy
Buzzwords of the CA Building Industry

1950  affordable
1960  local, union
1970  ecological, solar, environmental
1980  water efficient
1990  energy efficient, sustainable
2000  green

KEMA Xenergy
ACWMA GREEN BUILDING DESIGN TOOLS

RESIDENTIAL

NEW HOME CONSTRUCTION GREEN BUILDING GUIDELINES

HOME REMODELING GREEN BUILDING GUIDELINES

LEED

Leadership in Energy and Environmental Design

KEMA Xenergy
How Does the ACWMA and Member Agencies Use LEED™?

- RFPs/RFQs and Contract Requirements
  - Architects & Builders -- LEED™ certified professionals
  - Building Certification -- must achieve specific LEED™ credit

- Goal Setting in Building Design Assistance
  - Use as a “best practices” tool in building design

- LEED™-based Regulations
  - ACWMA Model Civic Green Building Ordinance
  - LEED™-based Codes

KEMA Xenergy
How To Use LEED™

■ Design Guide
  ❖ RFPs, RFQs, (Hiring Architects & Contractors)
  ❖ Goal setting

■ Certification
  ❖ Process (registration, documentation, commissioning, certification)
  ❖ Public Recognition
Benefits of LEED Certification

- **Political**
  - International recognition
  - Local impact: press coverage, plaque

- **Documentation and Process**
  - Commissioning manuals
  - Measurement and verification data
  - System documentation
  - Staff training materials and procedures
LEED™ Draws Out Additional Benefits

- More than just on-time and on-budget
  - Designing for comfort, health, the environment
  - Best investment is not always the least first cost
  - IAQ is normally treated solely as a code issue
- Goal setting
  - LEED provides focus for the design team
  - Collection of best practices shortens the learning curve