DLR Group is ranked #1 by ARCHITECT, the official publication of the American Institute of Architects, in its 2012 ARCHITECT 50 ranking of U.S. firms. This ranking is based on design excellence (reflected in repeat clients, awards, and pro bono), sustainability (Architecture 2030 commitment, LEED, and proven building performance), and business practices.

DLR Group has ranked in the top 10 of U.S. firms each year since the ARCHITECT 50 debuted in 2009.
**FIRM INTRO**

**HONORS**

125+
Design awards, 2010-present

- AIA
- ASHRAE
- ASID
- CEFPI
- DBIA
- IIDA
- NSBA
- McGraw-Hill
- SCUP
- ICSC

**ENERGY CLIENTS**

- NRG Energy
- Philadelphia Eagles
- Washington Redskins
- New York Giants
- New York Jets
- New England Patriots
- Amery (WI) Public Schools
- Denver Public Schools
- Payson (AZ) Unified School District
- Continental (AZ) School District
- Scappoose (OR) School District
- Red Wing (MN) Public Schools

**LOCATIONS**

20 places from which we serve our clients.

- Chicago
- Springs
- Denver
- Des Moines
- Honolulu
- Kansas City
- Las Vegas
- Lincoln
- Los Angeles
- Minneapolis
- Omaha
- Orlando
- Phoenix
- Portland
- Riverside
- Sacramento
- Seattle
- St Paul
- Salt Lake City
- San Antonio
- Buffalo

**Integrated Energy Services**

- Holistic Building Energy Assessments
- Energy Master Planning
- Re/Retro/Ongoing Building Commissioning
- Energy Benchmarking to peer buildings
- ENERGY STAR Certification
- LEED Strategic Guidance and Certification
- Energy Efficiency Incentive/Rebate research and application
- Commissioning for New Construction
- Building Envelope Commissioning
- Advanced Building Energy Simulation
- Measurement & Verification Planning
‘Path to a Net-Zero Campus: New State Codes and Energy Optimization Strategies’

• Energy Codes in Illinois – Latest Code update, timeline, impact, history and future of energy codes

• What does it mean and how to comply

• Industry Energy Trends: Architecture 2030 Challenge

• Mandatory Energy Benchmarking & Disclosure Ordinances

• Path to net-zero: Energy Reduction Process
CODE CHANGE: TIMELINE

All permits applications in Illinois prior to Jan 1\textsuperscript{st}, 2013 will remain under the old code.

All permits applications in Illinois after Jan 1\textsuperscript{st} must comply with IECC 2012.
ENERGY CODES: FUTURE

Btu/ft²-yr Energy Reduction Proposal

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

Year

2010 2015 2020 2025 2030

36000 410,000 kJ/m²-yr
But we don’t need to worry about the new Energy Code...

WRONG!!!
ENERGY CODES: IMPACT

1. New Construction
2. Major Renovations
3. Capital Improvements
IECC 2012 vs 2009: THE BOTTOM LINE...

• 30% Improvement over 2006 IECC
• Must select an additional efficiency package
  - Higher efficiency lighting system
  - Higher Efficiency HVAC equipment
  - Design for on-site renewable energy for at least 0.5 W/SF
• Continuous Air Barrier requirements for most buildings
• Max. window to wall ratio of 30% for above grade walls (40% if daylighting)
• Skylights mandatory for large spaces (+10K SF) with tall (15’) ceilings
• Equipment efficiencies higher, energy recovery in more applications
• Cx is mandatory where HVAC >40 tons cooling
• Energy Modeling **early** in the design process is critical to success
• Life-cycle analysis to validate business case for investing in high-performance design strategies
IECC 2012 COMPLIANCE PATHS

- Envelope
- HVAC
- Water Heating
- Lighting
- Power

Mandatory Provisions

- Prescriptive Option
- Performance/Trade-Off Option
- Total Building Performance

Compliance
ENERGY MODELING: CURRENT

ICCCFO April 2013
ENERGY MODELING: REQUIRED

- High-Performance Feasibility
- Architectural Design
- MEP Design
- LEED Modeling
- Code Compliance
- Contractors
- Conceptual Modeling
- Schematic Design
- Design Development
- Construction Documents
- Construction
- Acceptance
- Post Acceptance
- Operation & Maintenance
- Low

ICCCFO April 2013
Architecture 2030 challenge

Basic Building Information

- Year Designed: 2010
- Year Built: 2011
- Building Size: 79,360 SF
- Annual Energy Use (kBtu): 2,713,429 kBtu
- Primary Mechanical System: Geothermal heat pump
- Renewables Source: N/A
- Energy Code (ASHRAE 90.1): 2004
- LEED Certification level: N/A

<table>
<thead>
<tr>
<th></th>
<th>Percent Reduction</th>
<th>EUI (kBtu/sf/yr)</th>
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<tbody>
<tr>
<td>Code Min EUI</td>
<td>7%</td>
<td>82</td>
</tr>
<tr>
<td>Modeled EUI</td>
<td>61%</td>
<td>34</td>
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<tr>
<td>EnergyStar bldg (75)</td>
<td>23%</td>
<td>68</td>
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<tr>
<td>Actual bldg EUI</td>
<td>#VALUE!</td>
<td>N/A</td>
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<tr>
<td>CBEC Average bldg EUI</td>
<td>-</td>
<td>88</td>
</tr>
<tr>
<td>Renewable Savings</td>
<td>9%</td>
<td>0</td>
</tr>
</tbody>
</table>

*Energy meter shows building energy performance, both targeted in design and actual, as measured on a percentage basis improvement over the average of all similar use buildings in the same geographical region (CBECs Average).
Architecture 2030 challenge
Mandatory Energy Disclosure

Similar ordinances currently in:
• New York
• San Francisco
• Austin, Texas

In the Midwest, **Minneapolis** has just 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
Commercial Buildings >75,000 SF will be required ANNUALLY to Report beginning June 1, 2015 & Disclose by August 30th, 2016

**Chicago and Illinois are next!**
Mandatory Vs Voluntary

BUILDING ENERGY QUOTIENT

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

Verses

ICCCFO April 2013
Utility Incentive Funding in Illinois

Public Sector: DCEO

Private Sector: ComEd Smart Ideas, Nicor etc.

Standard and Custom Incentive Programs
• The Standard Incentive Program provides set incentive levels for common retrofits for Lighting, HVAC, Water Heaters, Motors, Variable Frequency Drives
• The Custom Incentive Program provides incentives for energy efficiency improvements not listed in the Standard Incentive Program

Retro-Commissioning Programs
• Provides funding to identify and implement low cost tune-ups and adjustments that improve the efficiency of operating systems in existing public buildings by returning them to intended operation or design specifications, with a focus on building controls and HVAC systems.

The Smart Energy Design Assistance Center (SEDAC)
http://smartenergy.arch.uiuc.edu/
Energy Reduction Process

Stages of an integrated upgrade approach:
1. Retrocommissioning
2. Lighting upgrade
3. Supplemental load reductions
4. Air distribution systems upgrade
5. HVAC upgrade

Courtesy: E source
Energy Reduction Process

Big Savings Opportunity

PROCESS

Retrocommissioning
Lighting Retrofits
Behavioral Changes
Prescriptive Upgrades
BAS optimization

Deeper Capital Intensive
Energy Upgrades, Ongoing Commissioning

Energy Production

Net Zero Energy Building

TIMELINE

2012 to 2014
Action Items

2012 to 2017
Analysis & Implementation

2012 to 2017 and ongoing to 2050

SAVINGS

10% to 25%

25% to 50%

50% to NZEB

ICCCFO April 2013
Retro-commissioning is a process that ensures that the performance of building systems are optimized.

Retro-commissioning Yields Results:
• Identifies no-cost, low-cost energy improvements that payback in 1.5 years or Less
• RCx generally reduces energy use by up to 16%
Typical Retro-Commissioning Measures

Low-cost, no-cost tune up measures

• Fixing ventilation dampers
• Demand Control Ventilation
• Maximizing free cooling (economizers)
• Aligning zone temperatures set-points to match actual operating schedules
• Eliminate simultaneous heating & cooling
• Reducing supply air temperature and fan speed in AHU’s
• Decreasing supply air pressure set-points
Energy Savings Potential

"Energy use in buildings could be reduced by 10 to 40 % by improving operational strategies in buildings. This reduction in energy was not so much the result of changes in hardware and systems as it was the result of improvements in software and expert knowledge."

- 2008-2009 ASHRAE President William A. Harrison
• Mandatory updates every 3 years per ARRA funding conditions
• Bigger emphasis on **OUTCOME** based compliance
  - Measurement & Verification & Predicted vs Actual EUI’s
  - Continuous Commissioning/Facility Optimization
• 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’s
• **Mandatory Energy Benchmarking & Disclosure for all Buildings**
• Getting tools in place for **Net-Zero Design**
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