Sustainable Office Design: Transforming Tenant Efficiency

April 2015, ACEEE Market Transformation Symposium
• **Patrick Finch, Waypoint Building Group**; Director of Professional Services. He oversees program design and deployment for Waypoint’s Utility and Government customers. Patrick will highlight the need for this program based on the current market landscape, including key barriers and how the program addresses them.

• **Rishi Sondhi, Eversource**; Product Manager with the Energy Efficiency group at Northeast Utilities. He works on product development, program design and marketing strategy for Commercial & Industrial (C&I) and Residential sectors. Rishi will describe the high-level program and its inception, including future plans for the program.

• **Edward Bartholomew, National Grid**; Technical Expert and Commercial Lighting Program Manager. He is responsible for implementing customer oriented lighting incentive programs for commercial and industrial energy efficiency projects. Edward will describe the technical aspects of the program including details on how the incentive value was calculated.
Introduction to the Leased Commercial Market
Patrick Finch, Waypoint Building Group
Traditionally, a difficult niche of the market for energy efficiency programs to engage is the **Multi-Tenant Commercial** sector
- This sector represents a significant chunk of the overall commercial market
- The presence of multiple occupants, lease types, and financial structures often generates split incentives
- As a result, there are few standard efficiency programs that work to meet the additional requirements of this sector

**The split incentive barrier occurs when the party who pays the upfront costs of an efficiency improvement is different from the one who benefits from energy savings**

<table>
<thead>
<tr>
<th>MA and RI Leased Office Sector Size</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Total Leasable SF*</td>
<td>134,317,381 SF</td>
</tr>
<tr>
<td>Energy Savings per SF**</td>
<td>1.21 kWh/SF</td>
</tr>
<tr>
<td>Total Potential Energy Savings</td>
<td>162,524,031 kWh</td>
</tr>
<tr>
<td>Average Vacancy %</td>
<td>19.35%</td>
</tr>
<tr>
<td>Annual Turnover</td>
<td>25,988,984 SF</td>
</tr>
<tr>
<td>Savings Per Year</td>
<td>31,446,671 kWh</td>
</tr>
</tbody>
</table>

*Per Colliers and MG Commercial Q3 2014 market data
**Based on SOD calculated savings estimates
## Lease Types and Tenant-Improvement (TI) Structures

<table>
<thead>
<tr>
<th>Lease Type</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Gross Lease</td>
<td>Owner receives full energy savings</td>
</tr>
<tr>
<td>Modified Gross</td>
<td>Split Energy Savings between owner and tenant</td>
</tr>
<tr>
<td>Triple Net</td>
<td>Tenant receives full energy savings</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>TI Structure</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>TI Allowance</td>
<td>Pushes first cost to the owner</td>
</tr>
<tr>
<td>Turnkey</td>
<td>Pushes first cost to the tenant</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Meter Type</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Mastered Meter</td>
<td>Allows owner to capture full amount of energy savings a building generates</td>
</tr>
<tr>
<td>Submetered</td>
<td>Allows tenants to capture the full amount of energy savings they generate</td>
</tr>
</tbody>
</table>
Owner versus Tenant Financial Values

Tenants Lease/Tenant Improvement (TI) Structure

Note: Chart indicates which party is capturing the majority of the project $$ value (Savings + Incentive). Total value is shared in most cases.
Green Lease Options & Strategies

- Green leases range in complexity from basic sustainability clauses (e.g., recycling) to cost pass-through clauses.
- Green leasing does not directly create energy savings, but this strategy can be used to overcome misaligned incentives between tenants and owners.

<table>
<thead>
<tr>
<th>Green Lease Clause Types</th>
<th>Example</th>
<th>Overall Benefit to Owner/Tenant</th>
</tr>
</thead>
</table>
| General Sustainability   | • Recycling  
                          • Equipment requirements (e.g., low flow toilets) | • Improve Branding / reputation |
| Building Certification   | • LEED  
                          • Energy Star | • Improve Building value  
                          • Branding / reputation |
| Cost Pass Through        | • NYC energy-aligned lease | • Mitigate Split incentive |
| Other EE Best Practices  | • Access to tenant data  
                          • Weekend HVAC shut off  
                          • Retro-commissioning | • Improve access to key Information |
<table>
<thead>
<tr>
<th>Barrier Type</th>
<th>Definition</th>
<th>Example</th>
</tr>
</thead>
<tbody>
<tr>
<td>Financial</td>
<td>A barrier that prevents investment in energy efficiency due to actual or perceived costs associated with assessing or implementing energy efficiency projects.</td>
<td>Office tenants with medium-length leases (3-5 years) are especially sensitive to the timing of financial returns. Reaching a 3 year payback or under is often a target milestone.</td>
</tr>
<tr>
<td>Market Structure</td>
<td>Barriers resulting from differing motivations and incentives across the range of market actors.</td>
<td>The often-cited split incentive barrier, in which the costs and benefits of an energy efficiency improvement are aligned between owners and tenants, causing one or both parties to reject energy efficiency projects.</td>
</tr>
<tr>
<td>Barrier Type</td>
<td>Definition</td>
<td>Example</td>
</tr>
<tr>
<td>---------------------------</td>
<td>---------------------------------------------------------------------------</td>
<td>---------------------------------------------------------------------------------------------------</td>
</tr>
<tr>
<td>Information and Knowledge</td>
<td>Informational barriers result from a lack of transparency and information about energy use, costs, benefits and savings.</td>
<td>A building owner or tenant being unaware of what efficiency options or utility programs are available to them</td>
</tr>
<tr>
<td>Physical Building</td>
<td>Physical building barriers result from the existing nature of the building and its current state of improvements.</td>
<td>A recent building renovation that took place without considering energy efficiency, limiting capital funding availability for future improvements.</td>
</tr>
</tbody>
</table>
### Keys to Mitigating Barriers

<table>
<thead>
<tr>
<th>Financial Strategies</th>
<th>• Align ECM business case to metrics that commercial owners and customers respond to, such as $ spend/square foot, simple payback, and ROI (may vary by space type)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Market Structure Strategies</td>
<td>• Determine what basic value propositions are for all parties and align incentives for each stakeholder early in the process (ensure flexibility in program design to allow this)</td>
</tr>
<tr>
<td>Information and Knowledge</td>
<td>• Communicate consistently, and consider how customers prefer to receive information. One example: Energy Efficient tenant spaces save money and increase asset value by contributing to industry certifications such as LEED and ENERGY STAR.</td>
</tr>
<tr>
<td>Physical Building</td>
<td>• Understand the critical nature of project timing, and align outreach/engagement to building lifecycles</td>
</tr>
</tbody>
</table>
The Sustainable Office Design Program
Rishi Sondhi, Eversource
• National Grid and Eversource are introducing a new initiative called Sustainable Office Design (SOD) as a means of delivering integrated technical solutions to the leased commercial office market.

• The goal is to increase penetration of utility-delivered savings in the leased office TI sector through a quick-turnaround, $1/ft² lighting incentive based on achievement of pre-approved energy performance targets.

• Eversource and NGrid are evaluating the uptake of the lighting/controls components now, but would eventually like to expand to a more comprehensive technical approach, including, but not limited to, plug-loads, shades, and HVAC controls.
Sustainable Office Design (SOD) Program targets quick energy efficient lighting solutions to the leased commercial office market.

- Obtain better savings by moving beyond simple prescriptive lighting incentives with integrated design solutions
- Targeted at the Building Management/ Tenant Improvement market
- An incentive at $1.00 per sq/ft of leased space (net of common areas)
  - This is paired with complementary, but separate, incentive for design teams for maximum market appeal
- Simple application process with quick 1-month turnaround
The program was developed and managed in partnership (co-funded, co-managed by Eversource and NGrid).

It is operating as a separate incentive program at each utility currently. It originated out of a national coalition of utilities called the “Office of the Future” program.

These entities pooled resources to evaluate solutions and identify best practices to obtain energy savings in tenant spaces.

Eversource and NGrid chose to pursue a regional effort outside of the coalition after a basic agreement was reached on best practices.

The program was designed to drive energy efficiency improvements into the dynamic tenant improvement sector in commercial office spaces.
Benefits for Owners/Managers:
• Energy cost savings in Gross/Modified Gross lease spaces
• Improved tenant satisfaction and higher occupancy/retention rates

Benefits for Tenants:
• Energy cost savings in Triple Net/Modified Gross lease spaces
• Higher employee productivity:

One 2010 study found that LEED buildings have 16-18% higher occupancy than a non-rated building, while ENERGY STAR buildings have 10-11% higher occupancy; A second measured these premiums at 8% for LEED and 3% for ENERGY STAR respectively.

Based on a 2009 CBRE study, 55% of 534 tenants across the U.S. who moved into LEED and ENERGY STAR buildings agreed that employees were more productive, and 45% measured an average of 2.88 fewer sick days taken (resulting in an average positive productivity impact of $1,228 per worker or $4.91 per sq. ft.)

Cost Effectiveness of the SOD Program

• While incremental design costs may be incurred to comply with program designs, they will more than be offset by the combination of energy cost savings and program rebates.

• The $1/SF program incentive is designed to allow the standard program design to pay back within 36 months (for projects received in 2014).

Program Incentive may be assigned to whichever party is incurring the up-front cost of the efficiency improvement.
### Key Program Messaging

Marketing and outreach materials are tailored specifically to highlight the value proposition for the leased market space stakeholders:

<table>
<thead>
<tr>
<th>Key Value/Targeted Messages</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Owners</strong></td>
</tr>
<tr>
<td>• Save on operational costs (where lease permits)</td>
</tr>
<tr>
<td>• Improve building value/rents</td>
</tr>
<tr>
<td>• Help attain LEED or ENERGY STAR certification</td>
</tr>
<tr>
<td>• Improve customer service to tenants/branding in market</td>
</tr>
</tbody>
</table>

| **Tenants**                  |
| • Save on operational costs (where lease permits) |
| • Meet corporate sustainability goals/improve branding in market |
| • Contribute to LEED CI credits |
| • Improve quality of space/employee happiness and productivity |

| **Design/Engineering Teams** |
| • Clear and attainable technical requirements |
| • Flexible approach allows retention of creativity in design and does not limit technology options |
| • Quick-turnaround |
| • Allows participating firms competitive advantage by bringing incentive dollars to prospective clients |
SOD Application Process

**Target Timing: 1 month**

**Timeline: Ongoing**
- Identify projects, support application delivery

**Timeline: 1 Week**
- Review applications/
  Address eligibility
  questions /
  Check required documents

**Timeline: 1 Week**
- Verify project eligibility/
  Approve incentive

**Timeline: Upon Occupancy**
- Process pre-
  approval letter for
  incentive payment
  upon occupancy

**Timeline: Upon Occupancy**
- Verify compliance with program post-project
Compatibility with LEED-CI/Energy Star

Compliance with the SOD program could be worth up to 14 LEED-CI Points
- Minimum of 40 points required for LEED-CI certification
- SOD Program Point breakdown:
  • Energy & Atmosphere: 11
  • Indoor Environmental Quality: 3

A building’s ENERGYSTAR score is improved by reducing energy consumption
- The amount of energy consumption the SOD program reduces on the building as a whole will impact the building’s ENERGY STAR score
- The more energy reduction obtained, the more the tenant helps increase the building’s Energy Star score

<table>
<thead>
<tr>
<th>LEED-CI Rating</th>
<th>Points</th>
</tr>
</thead>
<tbody>
<tr>
<td>Certified</td>
<td>40-49</td>
</tr>
<tr>
<td>Sliver</td>
<td>50-59</td>
</tr>
<tr>
<td>Gold</td>
<td>60-79</td>
</tr>
<tr>
<td>Platinum</td>
<td>80-100</td>
</tr>
</tbody>
</table>

Criteria for EnergyStar Performance Ratings
- Evaluate energy performance for the whole building
- Reflect actual billed energy data
- Normalize for operation
- Provide a peer group comparison
Sustainable Office Design Technical Approach
Edward Bartholomew, National Grid
SOD is Different than Existing Programs

- The new SOD Lighting Initiative offer incentives for well-thought out, controls-rich lighting solutions.

- SOD qualifying designs use sophisticated lighting controls overlaid on efficient, low-installed wattage lighting plans.

- The effective Lighting Power Density (LPD) of SOD-qualifying installations are significantly below code maximums and will contribute toward LEED and Energy Star Certification in buildings that have them.

The SOD Lighting Program does not dictate specific products or technologies. A target level of performance must be met, but the means of doing is not prescribed.
All projects qualifying for this program must:

• Be a code-dependent office fit-out project or extensive/substantial renovation project

• Provide maintained lighting levels (based on IESNA standards)

• Provide high quality lighting solutions (including daylight & views)

• Exceed current state and local energy code requirements

• Follow the recommended SOD incentive processes

All program requirements were developed using existing tenant spaces to determine actual savings from meeting a range of technical standards
Finalized Required Design Criteria

The SOD Lighting Program does not dictate specific products or technologies. A target level of performance can be met through thoughtful, integrated design.

- Minimum Space Requirement – 7,500 sf
- Open Office Component - >40%
- Partition Heights - <48 inches
- Lighting Power Density - <0.675 W/sf
- Control Density - <290 sf/control

Compliance with these requirements assures availability of program incentives

Note: These requirements exceed the IECC 2012 code
# Design Lighting for Common Space Types using LPD guidelines

<table>
<thead>
<tr>
<th>Space Type</th>
<th>LPD* (W/sf)</th>
<th>Notes</th>
<th>fC** (horizontal)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Open Offices</td>
<td>0.6</td>
<td>Shared workspace with open desks or &lt;48 in. high cubical partitions. Max 2,500 SF per control area.</td>
<td>30-50 fC</td>
</tr>
<tr>
<td>Private Offices</td>
<td>0.7</td>
<td>Private, enclosed office with one primary occupant</td>
<td>30-50 fC</td>
</tr>
<tr>
<td>Small Meeting Rooms</td>
<td>0.9</td>
<td>Workroom with area &lt; 300 SF</td>
<td>20-70 fC</td>
</tr>
<tr>
<td>Conference Rooms</td>
<td>1.1</td>
<td>Workroom with area &gt; 300 SF and multipurpose lighting</td>
<td>20-70 fC</td>
</tr>
<tr>
<td>Corridors</td>
<td>0.5</td>
<td></td>
<td>10-20 fC</td>
</tr>
<tr>
<td>Lobbies &amp; Reception Areas</td>
<td>1.0</td>
<td></td>
<td>5-20 fC</td>
</tr>
<tr>
<td>Copy, File &amp; Work Rooms</td>
<td>0.7</td>
<td></td>
<td>20-50 fC</td>
</tr>
</tbody>
</table>

*based on IECC 2012 code

**based on IES "The Lighting Handbook" 10th Edition
Efficient Fixtures help meet LPD Targets for each Office-Space Type

Efficient fixtures can meet 0.6 W/SF LPD target in Open Offices
Possible fixture choices for these areas include:

- **Fixture 1** – Indirect/direct suspended fixtures or high-efficiency recessed provide the general illumination in work areas.
- **Fixture 2** – Provide continuous dimming down to 10% or lower of full output. These fixtures are capable of reducing electric light in response to the availability of functional daylight, and are controlled by photosensors.
- **Fixture 3** – Fixtures used for ambient lighting in circulation zones.
- **Fixture 4** – Task lights supplement lighting for any employee who simply desires more light.
## Match Office-Space Types with a SOD Lighting Control Category

<table>
<thead>
<tr>
<th>Office-Space Type</th>
<th>SOD Lighting Control Category</th>
</tr>
</thead>
<tbody>
<tr>
<td>Open Office</td>
<td>A</td>
</tr>
<tr>
<td>Open Office Daylight Zone</td>
<td>B</td>
</tr>
<tr>
<td>Private Offices (&lt;300 SF in size)</td>
<td>C</td>
</tr>
<tr>
<td>Large Private offices (&gt;300 SF in size)</td>
<td>D</td>
</tr>
<tr>
<td>Conference and Training Rooms</td>
<td>E/F</td>
</tr>
<tr>
<td>Corridors</td>
<td>G</td>
</tr>
<tr>
<td>Copy, File, and Work Rooms</td>
<td>H</td>
</tr>
<tr>
<td>Reception, Lobby, and Waiting</td>
<td>K</td>
</tr>
<tr>
<td>Storerooms</td>
<td>O</td>
</tr>
<tr>
<td>Employee Break Rooms</td>
<td>P</td>
</tr>
</tbody>
</table>
Lighting Control Categories are described for each Space Type

**SOD Lighting Plans exceed the following typical Code Requirement (2012 IECC)**

- Manual control of two lighting loads to allow reasonably uniform 50% reduction in connected load
- Lighting in daylit zones controlled separately from general lighting, with stepped or continuous dimming to minimum 35%
- Automated shut off from time-clock or building management system
- Occupancy controls required

**Use Control Category A in interior Open Offices**

- Manual control of two lighting loads to allow reasonably uniform 50% reduction in connected load
- Dual Technology Zoned occupancy controls
- Automated after hours shut off from time-clock or BMC system

**Use Control Category B in day-lit Open Office**

- Manual control of two lighting loads to allow reasonably uniform 50% reduction in connected load
- Dual Technology Zoned occupancy controls
- Photosensors for 0-10 VDC electronic dimming in day-lit zones to minimum 20%
- Automated after hours shut off from time-clock or BMC system

Code baselines shown

Appropriate SOD controls listed
Communicating the Technical Details

**Design Guide**

Technical design requirements and guidance to reach them

**Application**

Short, simple, and clear application with 1-month turnaround
## SOD Project Examples

<table>
<thead>
<tr>
<th>Details</th>
<th>Project 1</th>
<th>Project 2</th>
</tr>
</thead>
<tbody>
<tr>
<td>Location</td>
<td>Waltham, MA</td>
<td>Boston, MA</td>
</tr>
<tr>
<td>Size (Square Feet)</td>
<td>198,778 SF</td>
<td>19,218 SF</td>
</tr>
<tr>
<td>Estimated Annual Savings (kWh)</td>
<td>397,556 kWh</td>
<td>31,517 kWh</td>
</tr>
<tr>
<td>Incentive Value ($)</td>
<td>$198,778</td>
<td>$19,218</td>
</tr>
</tbody>
</table>
| Other Details                | - Used nLight lighting control system with sensor-based, manual on, lighting control via relays, daylight sensors, vacancy sensors and low voltage switches  
   - Overall interior LPD is reduced by ~50% over 2009 IECC code | - Layering of controls for an “effective” LPD of 0.31 W/SF  
   - 42% Open Office  
   - 52% savings over 2009 IECC code baseline  
   - Design Densities of 274 SF/Control and 34 SF/Fixture |
Incentivizing Lighting Designers to Participate

- The lighting designer receives a sum that equals 20% of the total utility lighting incentives are for this project, up to $15,000.

- This incentive goes directly to the lighting design team to fund their design and modeling efforts to achieve deep lighting energy savings.

- Incentive will be paid upon confirmation of the project’s lighting installation and controls initialization. *This incentive may also be divided to allow for a phased project schedule.*
Lighting Designer Incentive – Criteria

- Eligible projects can be interior or exterior projects of any size and complexity in MA and RI territories.
- Lighting design must exceed **IECC 2012** energy code by a minimum of **15%** (matches SOD requirement).
- Projects must have code mandated lighting controls, or participate in the *Network Lighting Controls* initiative. (matches SOD requirement)
- Only lighting designers who have obtained LC, CLEP CLD certification, or are current members of IALD are eligible.
- The lighting designer must design, engineer, or install, and not profit solely from the sell of the lighting.
- The design team’s lighting specification must adhere include DesignLights Consortium’s LED technical requirements.
Open Discussion
1. What has been the biggest struggle in convincing design teams to buy into the incentive?

2. How does this program model differ from traditional utility incentive models?

3. How does your utility achieve such a short application turn-around time? What organizational structure enables the streamlined approach?

4. How are utility efforts interacting with the evolution of commercial building lighting codes and code enforcement? DLC certifications, IES or IALD inputs etc.

5. How do you market the program to tenants and building owners?

6. How would you build out this program to support other energy-efficiency measures in a tenant-leased space, such as HVAC? Are there unique attributes to lighting that make this feasible?
Technical FAQs (part 1)

Q. How is the rebate calculated?
A. Qualifying projects receiving an incentive of $1.00 per sq/ft, in controlled, conditioned interior spaces. 100% of the incentive will be paid after project occupancy.

Q. What are the basic project qualifications?
A. The project must be at least 7,500 square feet. At least one (1) lighting control point must be provided for every 290 square feet of space. The project must achieve a lighting power density (LPD) not greater than 0.675 W/sf.

Q. When calculating the threshold (7,500sf) for the incentive, can this include connecting corridors and common areas if they are engrossed in a lighting upgrade with a TI work? Or is this strictly on the USF of the defined space?
A. The SOD lighting applies only to individual tenant spaces. Common areas, building lobbies and corridors between discrete tenants can not be used as part of the qualifying square footage nor is that square footage eligible for the SOD incentive.

Q. How is the minimum area square footage (SF) verified?
A. SF (area square footage) is verified by examination of a signed COMcheck report. COMCheck documentation is using space-by-space method.
Q. Does qualifying for Sustainable Office Design Lighting incentives make me eligible for other lighting incentives?
A. Projects that are eligible for this incentive program are not eligible for other prescriptive lighting incentives that support ballasts, occupancy sensors, photocells and time clocks.

Q. Are exterior lighting projects eligible?
A. No, exterior lighting systems are not eligible for this program. Qualifying projects must be in controlled, conditioned interior spaces.

Q. Are LED lighting technologies eligible for this program?
A. Yes, as long as the LED fixtures are approved by ENERGY STAR® or DesignLights Consortium (DLC) and are installed in conjunction with the program’s qualifications. Integral LED replacement lamps must also be approved by Energy Star.

Q. Where can I find a list of approved products?
A. All LED lighting fixtures must be DesignLights Consortium (DLC) or ENERGY STAR listed, all T8 fluorescent fixtures must meet the CEE HPT8 specification. All exceptions must be approved by the technical program manager (http://www.designlights.org/, http://www.energystar.gov/certified-products/detail/commercial_light_fixtures, http://library.cee1.org/sites/default/files/library/2743/CEE_ComLit_HP_Lighting_Spec.pdf)
Contact Information

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  - Edward.Bartholomew@nationalgrid.com
  - 781-907-1533
Appendix: Reference Materials
4 Steps for Project Lighting Designer

- **Step 1:** Organize the planned space into commonly used space types.

- **Step 2:** Design the lighting with fixtures that deliver appropriate light levels and quality to the space while staying close to the LPD target for that space type.

- **Step 3:** Design controls system that meets the minimum performance characteristics for that space type. *Work with manufacturer’s latest technical guidance to specify specific controls and determine optimum layouts.*

- **Step 4:** Compare the as-designed LPD and as-designed number of control points with SOD Lighting Incentive requirements. If satisfied, complete an application form.

Designers should engage National Grid or Eversource in this process as soon as possible to ensure project eligibility!
Components of a Green Lease

Green Leases may include some or all of the following:

- Site selection language that prioritizes green certifications
- Energy efficient build-out specifications
- Tenant cost recovery clause
- Disclose monthly utility data for purposes of whole-building energy benchmarking
- Request building energy consumption info and Energy Star score
- Sustainable operations and maintenance rules & regulations
- Sub-metering of tenant space or separate metering of tenant plug load and equipment
- Energy management best practices for building operations
- Language encouraging energy efficient improvements to be implemented in the building