Sustainable Office Design: Transforming Tenant Efficiency

April 2015, ACEEE Market Transformation Symposium

NSTAR | Sustainable Office Design Program | nationalgrid

Panel Introductions

- **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

The Commercial Real Estate Market

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

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

*Per Colliers and MG Commercial Q3 2014 market data

**Based on SOD calculated savings estimates

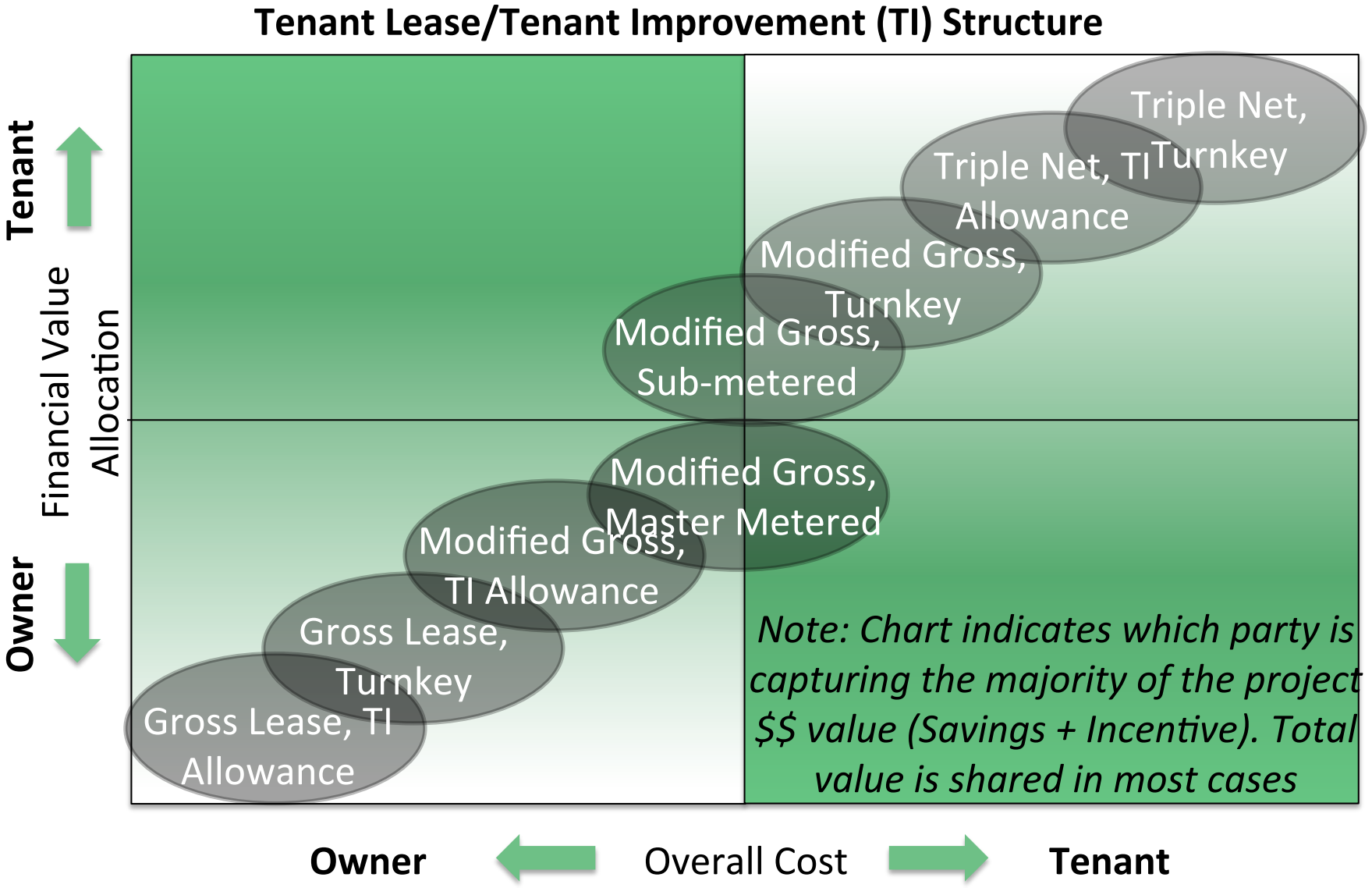
Lease Types and Tenant-Improvement (TI) Structures

Lease Type	Description
Gross Lease	Owner receives full energy savings
Modified Gross	Split Energy Savings between owner and tenant
Triple Net	Tenant receives full energy savings

TI Structure	Description
TI Allowance	Pushes first cost to the owner
Turnkey	Pushes first cost to the tenant

Meter Type	Description
Mastered Meter	Allows owner to capture full amount of energy savings a building generates
Submetered	Allows tenants to capture the full amount of energy savings they generate

Owner versus Tenant Financial Values



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

Green Lease Clause Types	Example	Overall Benefit to Owner/Tenant
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

Commercial Efficiency Barriers – Part 1

Barrier Type	Definition	Example
Financial	A barrier that prevents investment in energy efficiency due to actual or perceived costs associated with assessing or implementing energy efficiency projects.	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
Market Structure	Barriers resulting from differing motivations and incentives across the range of market actors.	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.

Commercial Efficiency Barriers – Part 2

Barrier Type	Definition	Example
Information and Knowledge	Informational barriers result from a lack of transparency and information about energy use, costs, benefits and savings.	A building owner or tenant being unaware of what efficiency options or utility programs are available to them
Physical Building	Physical building barriers result from the existing nature of the building and its current state of improvements.	A recent building renovation that took place without considering energy efficiency, limiting capital funding availability for future improvements.

Keys to Mitigating Barriers

Financial Strategies	• 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)
Market Structure Strategies	• 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)
Information and Knowledge	• 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.
Physical Building	• Understand the critical nature of project timing, and align outreach/engagement to building lifecycles

The Sustainable Office Design Program

Rishi Sondhi, Eversource

Sustainable Office Design (SOD) Program

- 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/ft^2 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

Introduction to SOD Lighting Program

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

SOD Program Origination

- 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.

Addressing Split Incentives: Innovative Program Benefits Owners and Tenants

Benefits for Owners/Managers:

- Energy cost savings in Gross/ Modified Gross lease spaces
- Improved tenant satisfaction and higher occupancy/retention rates

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[1]

Benefits for Tenants:

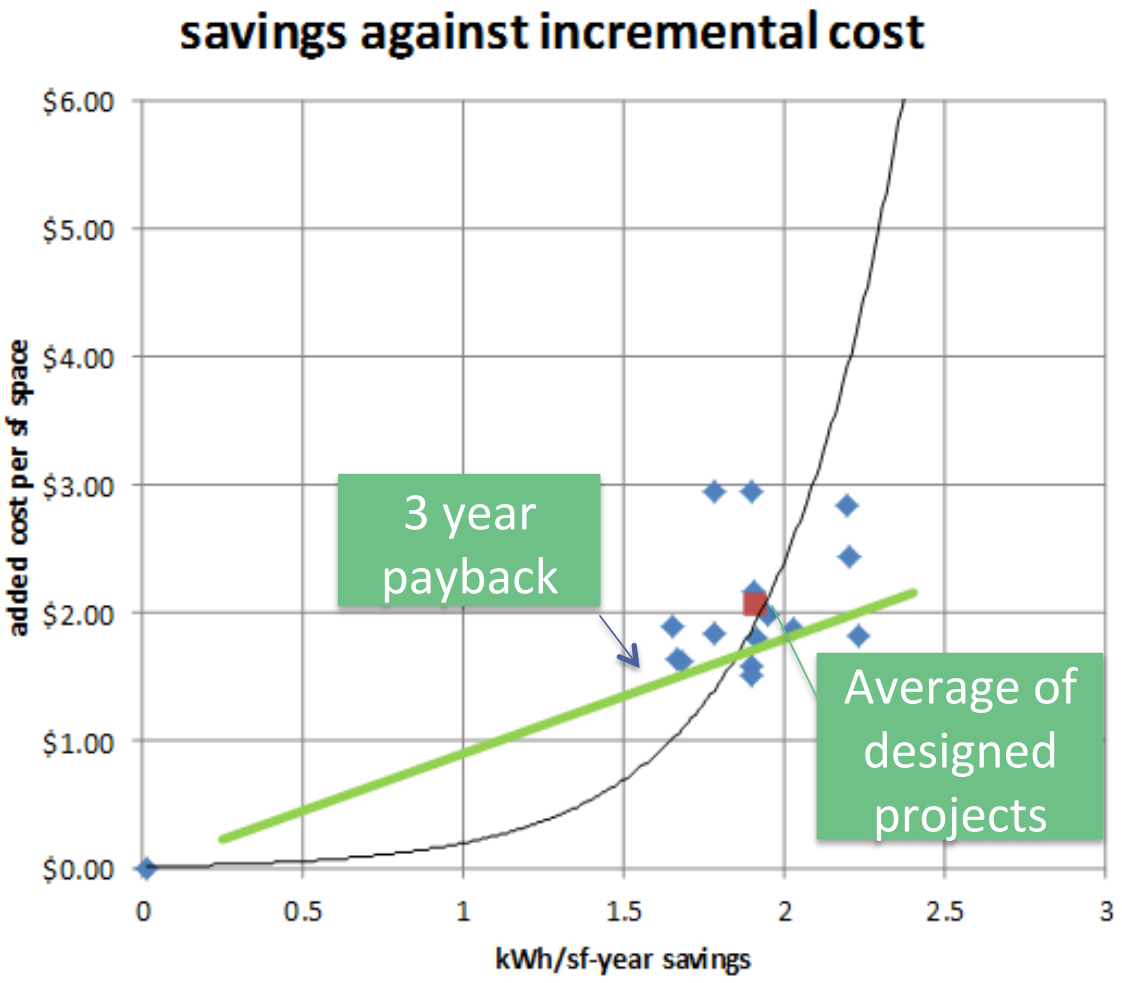
- Energy cost savings in Triple Net/ Modified Gross lease spaces
- Higher employee productivity:

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.) [1]

[1] *Based on U.S. DOE "Energy Efficiency and Financial Performance" Market Evaluation, March 2014*

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)



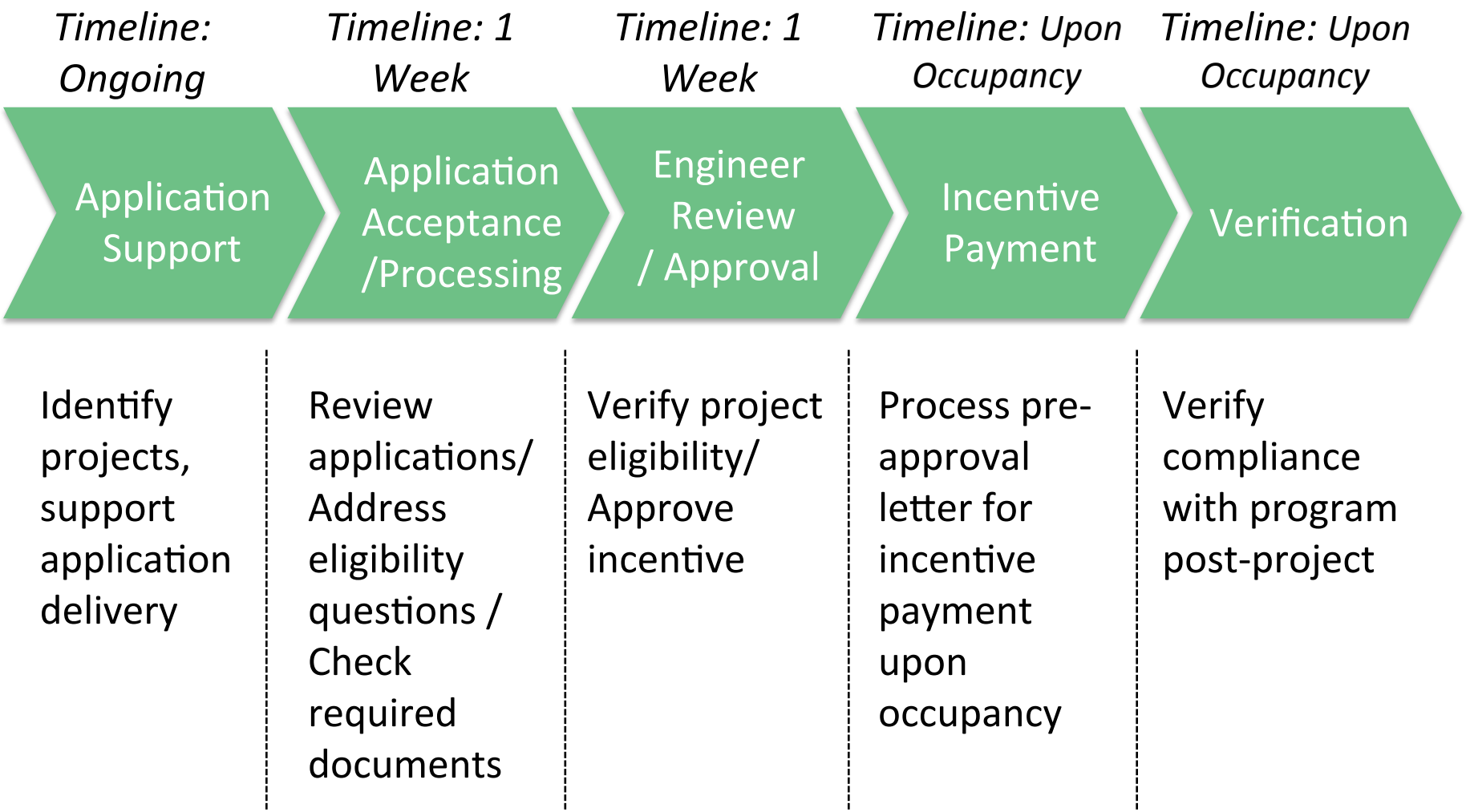
Program Incentive may be assigned to whichever party is incurring the up-front cost of the efficiency improvement

Key Program Messaging

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

	Key Value/Targeted Messages
Owners	• Save on operational costs (where lease permits) • Improve building value/rents • Help attain LEED or ENERGY STAR certification • Improve customer service to tenants/branding in market
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



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

LEED-CI Rating	Points
Certified	40-49
Sliver	50-59
Gold	60-79
Platinum	80-100

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

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.

Program Design Requirements

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

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

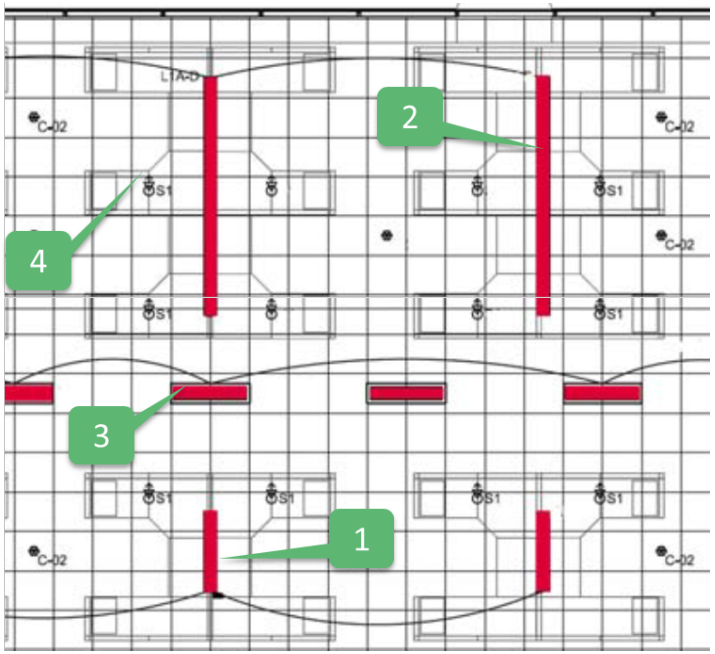
*based on IECC 2012 code

**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

Office-Space Type	SOD Lighting Control Category
Open Office	A
Open Office Daylight Zone	B
Private Offices (<300 SF in size)	C
Large Private offices (>300 SF in size)	D
Conference and Training Rooms	E/F
Corridors	G
Copy, File, and Work Rooms	H
Reception, Lobby, and Waiting	K
Storerooms	O
Employee Break Rooms	P

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 bu g management contro hours
- Occupan 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%
- nated after hours shut o ime-clock or BMC sys

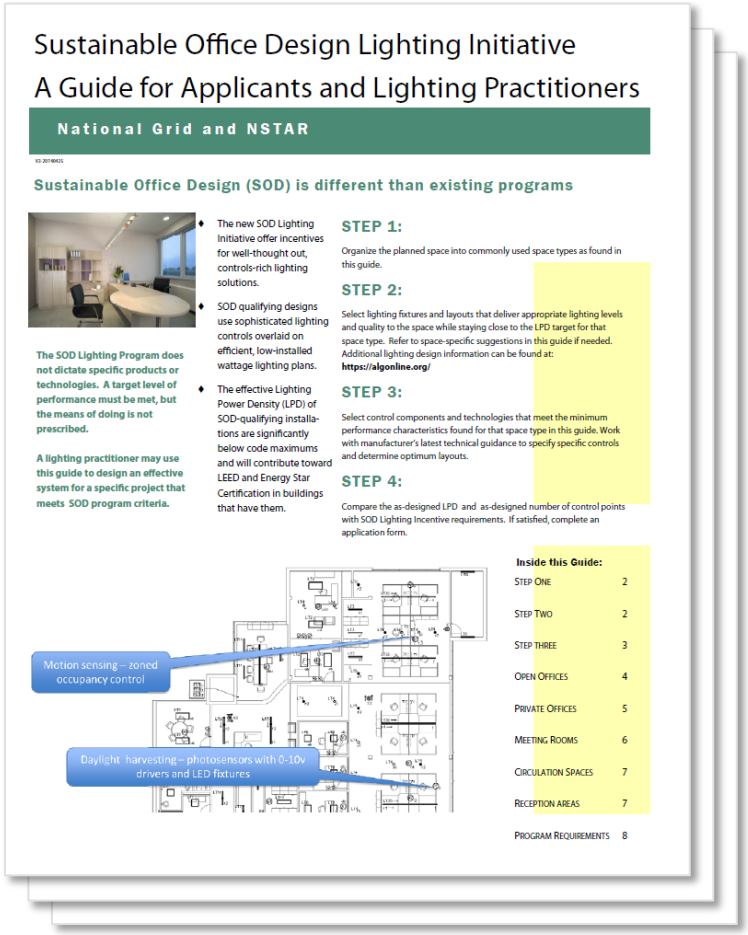
Code baselines shown

Appropriate SOD controls listed

Communicating the Technical Details

Design Guide

Technical design requirements and guidance to reach them



Sustainable Office Design Lighting Initiative

A Guide for Applicants and Lighting Practitioners

National Grid and NSTAR

Sustainable Office Design (SOD) is different than existing programs

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.

A lighting practitioner may use this guide to design an effective system for a specific project that meets SOD program criteria.

- 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.

STEP 1:

Organize the planned space into commonly used space types as found in this guide.

STEP 2:

Select lighting fixtures and layouts that deliver appropriate lighting levels and quality to the space while staying close to the LPD target for that space type. Refer to space-specific suggestions in this guide if needed. Additional lighting design information can be found at: **https://algonline.org/**

STEP 3:

Select control components and technologies that meet the minimum performance characteristics found for that space type in this guide. 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.

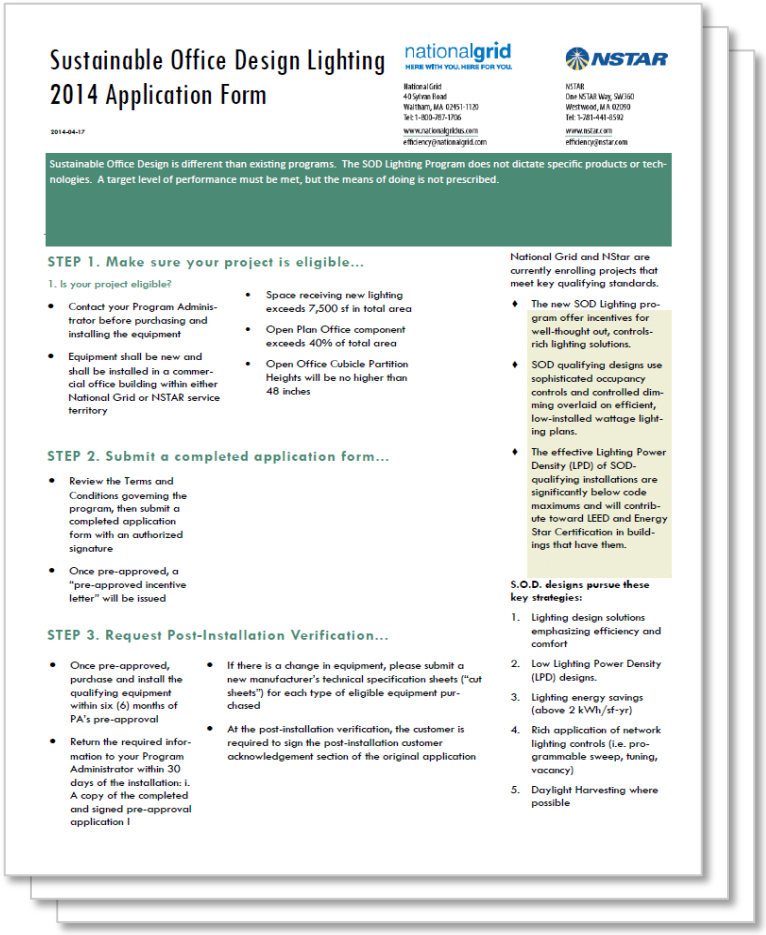
Motion sensing – zoned occupancy control

Daylight harvesting – photosensors with 0-10v drivers and LED fixtures

Inside this Guide:

Application

Short, simple, and clear application with 1-month turnaround



Sustainable Office Design Lighting 2014 Application Form

nationalgrid HERE WITH YOU. HERE FOR YOU.

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2014-04-17

Sustainable Office Design is different than existing programs. 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.

STEP 1. Make sure your project is eligible...

1. Is your project eligible?

- Contact your Program Administrator before purchasing and installing the equipment
- Equipment shall be new and shall be installed in a commercial office building within either National Grid or NSTAR service territory
- Space receiving new lighting exceeds 7,500 sf in total area
- Open Plan Office component exceeds 40% of total area
- Open Office Cubicle Partition Heights will be no higher than 48 inches

STEP 2. Submit a completed application form...

- Review the Terms and Conditions governing the program, then submit a completed application form with an authorized signature
- Once pre-approved, a "pre-approved incentive letter" will be issued

STEP 3. Request Post-Installation Verification...

- Once pre-approved, purchase and install the qualifying equipment within six (6) months of PA's pre-approval
- Return the required information to your Program Administrator within 30 days of the installation: i. A copy of the completed and signed pre-approval application l
- If there is a change in equipment, please submit a new manufacturer's technical specification sheets ("cut sheets") for each type of eligible equipment purchased
- At the post-installation verification, the customer is required to sign the post-installation customer acknowledgement section of the original application

National Grid and NStar are currently enrolling projects that meet key qualifying standards.

- The new SOD Lighting program offer incentives for well-thought out, controls-rich lighting solutions.
- SOD qualifying designs use sophisticated occupancy controls and controlled dimming 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.

S.O.D. designs pursue these key strategies:

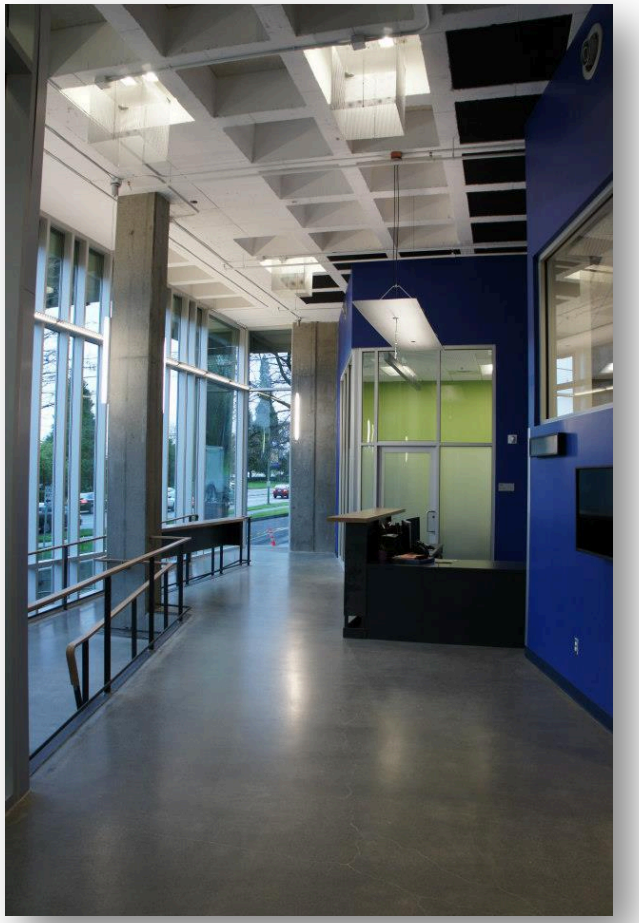
1. Lighting design solutions emphasizing efficiency and comfort
2. Low Lighting Power Density (LPD) designs.
3. Lighting energy savings (above 2 kWh/sf-yr)
4. Rich application of network lighting controls (i.e. programmable sweep, tuning, vacancy)
5. Daylight Harvesting where possible

SOD Project Examples

Details	Project 1	Project 2
Location	Waltham, MA	Boston, MA
Size (Square Feet)	198,778 SF	19,218 SF
Estimated Annual Savings (kWh)	397,556 kWh	31,517 kWh
Incentive Value ($)	$198,778	$19,218
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

Discussion Questions

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.

Technical FAQs (part 2)

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)

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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

Source: 2014 World Energy Engineering Congress, Institute for Market Transformation