Harnessing Market Forces to Address the Landlord Tenant Split Incentive in the Commercial Building Market

Amy Cortese and Dan Harris, New Buildings Institute
Doug Avery, Southern California Edison

ABSTRACT

Offices are the largest total square footage building type in the U.S. (EIA CBECS, 2003), yet existing office buildings have been an energy efficiency challenge for decades. They have been subject to piecemeal installation of single technologies or resistant to programs due to the complexities of multiple tenants, speed of the tenant improvement process and the landlord/tenant "split-incentive" market barrier.

Office of the Future ("OTF") is a new efficiency program for existing commercial offices that leverages the tenant negotiation to encourage energy efficiency upgrades at the time of the tenant improvement. A consortium of utilities is working with commercial real estate ("CRE") representatives to create the program. The nationally-branded program aims to improve utility incentive program participation by property owners, management firms and tenants in multi-occupant buildings.

This paper shares the OTF technical requirements that direct the installation of suites of measures including advanced lighting and controls, plug load control, low-cost HVAC review and advanced metering designed for the office. The package targets a reduction in site energy consumption by at least 25% over ASHRAE 90.1-2004 or Title 24-2005.

Pilot data from field testing of the technical requirements and energy modeling projections will be normalized to create incentives on an industry-standard dollar-per-square-foot basis. Given the new "systems-based approach," this step is critical to creating a defensible program.

The program development, technical requirements, incentive structure and approach will be of interest to those involved in existing commercial building efficiency programs. Conclusions regarding the viability of OTF and lessons learned are presented, as well as opportunities for improved savings.

Energy Use in Commercial Offices

The 2003 CBECS survey suggests that offices are the most common type of commercial building, comprising 17% of energy consumed in buildings (EIA CBECS, 2009). According to the survey, the weighted mean energy use intensity of commercial office in the U.S. is 93 kBtu per SF per year (EIA CBECS, 2009). The California Commercial End Use Survey suggests that the California commercial office segment total covers 1,022,012,000 SF of space with an annual energy usage of 16,430 GWh of electricity and a non-coincident peak load of 4.23 W/SF. (CEUS, 2006) Interior lighting comprises 26.4 % of the load with office equipment at 19.2%. (CEUS, 2006)

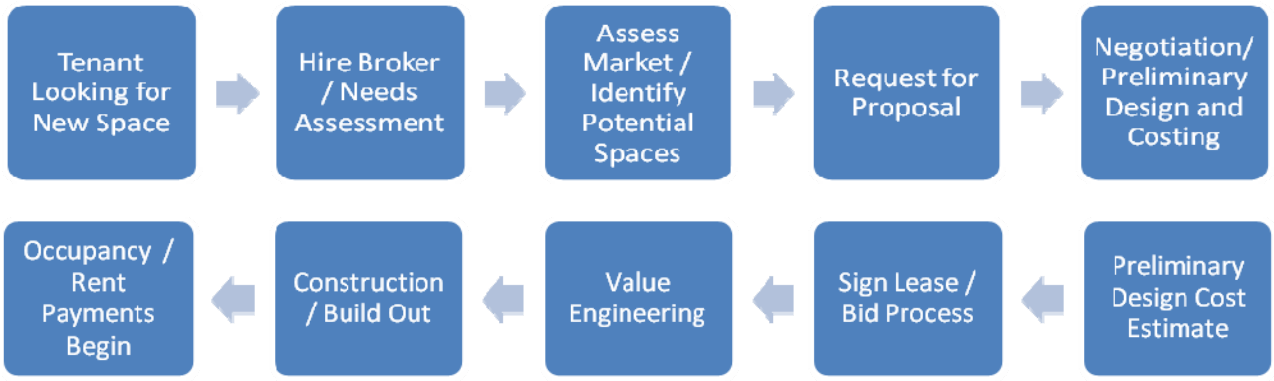
Moreover, the U.S. Environmental Protection Agency reports that energy use is the single largest operating expense in commercial office buildings and accounts for almost 20% of the nation's annual greenhouse gas emissions. (EPA Overview, 2010)

Multi-Tenant Office Market Characterization

The CRE market is based in longstanding personal relationships within a complex network of contractual and financial arrangements. According to Colliers International, the national commercial office market consists of 1,636,847,000 square feet of downtown office and 3,430,174,000 SF of suburban office space (Colliers, 2009, 2 and 4). Despite the large size of this overall market, average lease sizes are small. While definitions vary, on average a small lease is considered to be 3,000 SF, medium leases are between 3,000 and 10,000 SF, and large leases are more than 10,000 SF (OfficeSpace.com, 2010).

The process that prospective tenants use to find a space and sign a new lease has been described as "sprawling with a wide variety of possible players and lots of moving parts." (Point 380, 2008, 2) Each lease negotiation is a unique transaction, and many market actors are involved in the leasing and tenant improvement processes. Individuals representing tenants, building owners, managers, brokers, design firms and contractors may all be involved in identifying the property, negotiating the lease, and designing and constructing the renovation of the tenant space. In general, this process can be outlined as in Figure 1.

Figure 1. Typical Commercial Office Leasing Process



Source: Point 380, 2008, 2.

Lease terms vary based on the current economic cycle. Leases tend to be longer in positive economic conditions and shorter during recessions. (Perry, 2009) Landlord allowances for new/renewing tenants are commonplace. For example, in Denver, Colorado, tenant allowances negotiated during the lease transaction can range from $2/SF for new paint only to $50/SF for a complete interior renovation (Corporate Realty Advisors, 2010).

The Split Incentive in Leases

The split incentive market barrier in leased commercial office space is well documented. Otherwise known as the principal–agent market barrier, this "problem occurs when one party makes decisions affecting end-use energy efficiency…, and a different party bears the consequences of those decisions." (Prindle et al., 2007, 2). The International Energy Agency estimates that "up to 90% of commercial leased space energy use is subject to [principal-agent market] barriers." (Prindle et al. , 2007, p. 11)

In the context of multi-tenant commercial office buildings, the lease structure determines who pays for energy efficiency upgrades and who receives the benefits (Sinreich, 2008). In a gross lease, the tenant pays a fixed rent regardless of the landlord's operating costs and has little incentive to conserve energy because the owner sees all the financial benefits of energy efficiency. In a net lease, the owner has little incentive to assist with improvements in efficiency because the tenant is responsible for operating expenses such as maintenance, utilities, taxes and insurance. In net leases, the tenant gains the benefit of energy efficiency.

Sustainability: A Growing Trend in Commercial Real Estate

Participation in USGBC rating systems and Energy Star programs are evidence of a growing trend toward sustainability in the CRE market. Additional research and personal interviews suggest that most leading CRE companies have a stated commitment or programs that address sustainability. Many have begun to incorporate "green" clauses in their leases, but these typically cover practices like recycling, green housekeeping or the prohibition of smoking within 25 feet of the building.

Another way building owners promote sustainability is through tenant guidelines. Some owners are reluctant to require green practices of their tenants, so these are merely suggestions. Other CRE property owners make these requirements for tenant improvements within their buildings. Often driven by USGBC LEED guidelines, these may require low volatile organic compounds (such as paint, adhesives and/or sealants), recycled content in building materials or indoor air quality management best practices during construction. If energy efficiency is mentioned, it often mirrors language in the LEED rating systems (e.g., "reduce lighting power density by 15% over ASHRAE 90.1-2007") but typically offers no specific guidance on the technical solution sets (LEED 2009 for Commercial Interiors, 17).

The Office of the Future

The OTF consortium is a group of electric utilities across North America with progressive energy efficiency programs. Working together, these utilities aim to improve the energy performance and quality of the built environment in existing, multi-tenant commercial offices. OTF members believe a new approach to utility incentive programs will increase CRE participation in utility-sponsored efficiency programs.

Because many CRE firms have international real estate holdings, OTF consortium members in the U.S. and Canada agreed to create one program brand recognized beyond their utility district. This will help minimize the informational cost barriers that CRE firms face by learning many different utility programs. Although the brand and the application process for the OTF incentive will be national, the incentive rates may vary by utility.

The OTF consortium is taking a customer-centric approach to program design. Initial outreach is to large CRE owners, property managers and tenants with a clear commitment to sustainability and energy efficiency. The Energy Star-labeled building database provided the starting point for targeted firms. An analysis suggested that of all offices in the database, 3% of the property managers listed managed 35% of the Energy Star-labeled office buildings, or 44% of the Energy Star-labeled office square footage (Energy Star Database, 2010).

Combining resources, OTF consortium member utilities will leverage their outreach activities and begin to develop lasting relationships with a targeted group of committed CRE

firms and large tenants who are already beginning to explore how energy efficiency impacts the bottom line. OTF can help CRE firms interested in learning how to develop a comprehensive approach to energy efficiency using industry standard metrics like net present value and internal rate of return. Additionally, OTF will encourage them to clarify who accrues the costs and benefits associated with energy efficiency during the lease negotiation, thus addressing the split incentive.

The OTF technical approach is focused on commercial office retrofits, which are most likely to happen as part of a new lease. Influencing the design during the lease negotiation before the tenant improvement ("TI") begins minimizes the incremental costs associated with high performance, energy efficient design. Leveraging this TI market transaction minimizes costs; however, the technical solution set is also appropriate for straight corporate and/or government office retrofits, but costs will likely be higher if it is not incorporated as part of a customization for a new tenants needs.

The OTF consortium is considering a building prequalification process. Once their building is qualified, CRE firms can highlight the opportunity of the utility financial and technical support in their proposals to prospective tenants, thus encouraging energy efficiency to become a discussion topic in lease negotiation. If proven technical options are clearly understood before design begins, they are more likely to become the basis of design, included in the initial TI budget estimate. Then, if the appropriate technologies are selected, the spaces will automatically qualify for incentives.

The OTF program is responding directly to market realities by creating a dollar-per-square-foot incentive. This way, the incentive will fit into the existing framework of lease negotiations and can supplement the negotiated TI allowance, often financed by the landlord. The OTF consortium is considering a menu approach to incentives that will include integrated suites of energy conservation measures instead of a measure-by-measure approach. The first set of energy conservation measures is expected to save approximately 25% over ASHRAE 90.1-2004 or California Title 24 2008 and includes lighting, lighting controls, plug load controls, and advanced metering. Additionally, advanced HVAC systems, integrated controls and tenant feedback dashboards are being investigated to create future program offerings that result in even deeper energy savings.

OTF consortium members realize the complexities associated with moving beyond a widget-based approach to utility incentive programs. Therefore, the program is developing tools targeted at various audiences. For example, OTF pilot project information will be developed into case studies that appeal to various audiences. A one-page version for CRE executives will discuss Net Present Value or Savings per Square Foot, while designers will be more interested in detailed layout, product information and specifications for the technical solutions.

Besides case studies, other audience-specific tools and approaches either being developed or under consideration include:

For Owners and Property Managers:

- Net Present Value and Internal Rate of Return calculators plus real-world information to justify the assumptions used;
- Template tenant guidelines that meet program requirements;
- Suggested technical solutions and elaboration on their benefits to be use in "sale;" and

- Recognition in template competitions that can be provided locally by utilities to drive increased participation in energy efficiency programs.

For Tenants:

- Dashboard information to that provides feedback to encourage tenant behavior that saves energy, and
- Possible bulk purchasing of plug load control devices.

For Designers and Contractors:

- Training programs (to assist designers in navigating the OTF program requirements, especially for lighting and control options during this first phase of the program);
- Daylighting guide for interior designers; and
- Commercial Lighting Solutions ('CLS") Tool by Pacific Northwest National National Laboratory ("PNNL") and U.S. Department of Energy

The OTF Consortium has been working with PNNL since the inception of the CLS Office Tool. It "provides actionable how to guidance on ways to improve . . . building interior lighting efficiency and reduce . . . energy consumption without compromising quality design criteria"(CLS Online Tool). The OTF lighting options and control strategies are based on the vignettes described in the CLS Office Tool. It provides information to lighting decisionmakers about best practices for typical spaces within commercial offices, including: private office, open office, conference room, corridor and lobby spaces.

The CLS tool allows users to input information about their space and installed equipment and uses algorithms with proven assumptions to quantify energy savings from lighting and controls. Utilities are currently investigating whether the output from this tool can be used as the paperwork to justify utility incentives. This tool will be especially helpful for small TI projects that typically would not hire a lighting designer.

In order to create a defensible program, OTF program staff has outlined the following strategies. The first phase included energy modeling for the 25% solution in various climate zones. Then, OTF technical requirements were developed and used as specifications in on-the-ground pilot projects where cost and energy savings data is being collected. The data collected in the field will be normalized against the energy model results in order to create a defensible program incentive.

Energy Modeling

Initial projections of energy savings attainable from the OTF technical solution set were developed through a combination of engineering calculations and simulation modeling applied to large office and small office buildings. The prototypes selected were taken from the Database for Energy Efficient Resources (DEER) (2004-05, version 2.01), a California Energy Commission (CEC) and California Public Utilities Commission (CPUC) sponsored database designed to provide well-documented estimates of energy and peak demand savings values, measure costs and effective useful life (EUL). DEER has been designated by the CPUC as its source for deemed and impact costs for program planning (DEER 2004-2005).

Modeling runs were performed for four climate zones: Los Angeles, California; San Francisco (Bay Area), California; Lake Tahoe (Mountains), California; and Boston, Massachusetts. All California weather files were TMY2 files from California Climate Zones, Revision 2, 1992, Supplied by the California Energy Commission. Header identifications: Los Angeles (CZ06RV2 WYEC2); Bay Area, California (CZ03V2 WYEC2); Mountains, California (CZ16RV2 WYEC2). Boston TMY2 file was from www.doe2.com; identification name (bostonma.bin). This analysis also considered building characteristics (as defined by DEER 2004-5v2.1) by vintage (or by building age): Pre-1978; 1978-1991; 1991-2001; 2001-2005; and Post-2005.

The modeling process for the initial "25% solution" modeled only the directly installable measures including the lighting and plug load control. Performance review, advanced metering and demand response measures recommended as part of the 25% Solution were not modeled. Detailed results and discussion of the modeling can be in the Office of the Future Phase II report found at http://newbuildings.org/sites/default/files/OTF_Phase%20II%20Final_2-15-09.pdf.

The summary results are presented in Table 1 as a range of electrical and net site energy savings percentage and an electrical energy per square foot. Table 1 also reports the project annual demand peak reduction in demand intensity. Heating in both prototypes is provided by gas fired equipment, either boiler or furnace. The heating energy increase reported in Table 1 is reflected in the net total energy savings, on a site basis and source basis shown in Table 2.

Table 1. Electrical & Heating Energy Impacts for OTF Lighting & Plug Load Measures

City	Building Size (Small or Large)	Electrical Energy Savings Range From Model (%)	Annual Electrical Savings Range (kWh/ft2)	Annual Heating Energy Increase Range (kBTU/ft2)	Average Annual Peak Demand Reduction(W/ft2)
Boston, MA	S	24 – 28	2.7 – 2.8	5.5 – 6.0	0.9
	L	22 – 28	2.8 – 2.9	5.2 – 5.6	0.8
Los Angeles, CA	S	24 – 27	2.9 – 2.9	0.9 – 1.5	1.0
	L	18 – 25	2.8 – 2.8	2.7 – 5.1	0.8
San Francisco, CA	S	26 – 29	2.8 – 3.0	2.6 – 3.4	0.9
	L	20 – 27	2.8 – 3.0	2.9 – 4.3	0.8
Lake Tahoe, CA	S	23 – 26	2.7 – 2.7	4.3 – 5.5	0.8
	L	22 – 26	2.8 – 2.8	4.0 – 5.2	0.8

Source: Office of the Future Report 2008

The results in Table 2 demonstrate a need to address the heating and cooling systems of the target building via a Performance Review (the effects of which were not included in the model). Decreased lighting and plug loads resulted in decreased need for air-conditioning in the summer but an increased need for heating in the winter. Thus colder climates, like Boston, have lower net site total energy savings ratio. Addressing the performance deficiencies of the HVAC system should improve this ratio. Table 2 demonstrates that on a source basis[1] the net energy savings is between 14% and 25%, depending on climate zone and size. This again supports the need to provide a Performance Review to improve the net savings.

[1] The modeling determined both source energy and site total net energy savings. Source energy savings was calculated using a simplified ratio of 10,239 BTU/kWh rather than the more complex Time Dependent (TDV) method. The TDV method was considered too specific and complex for this model that was indented to vet the 25% Solution across a wide area.

Table 2. Net Site and Source Energy Savings for all Fuels for Lighting and Plug Load Measures from Model

City	Building Size	Net Site Energy Savings From Model	Net Source Energy Savings From Model
Boston, MA	Small	5 – 6 %	15 – 17 %
	Large	7 – 10 %	15 – 20 %
Los Angeles	Small	20 – 23 %	23 – 26 %
	Large	8 – 15 %	14 – 21 %
San Francisco	Small	14 – 18 %	22 – 25 %
	Large	8 – 15 %	15 – 22 %
Lake Tahoe, CA	Small	6 – 10 %	16 – 19 %
	Large	7 – 11 %	15 – 19 %

Source: Office of the Future Report 2008

Pilot Technical Requirements

The OTF "25% solution" is a suite of technical requirements covering lighting, lighting control, plug load control and metering and verification. Designed to work together, these conservation measures are expected to save at least 25% over ASHRAE 90.1-2004 and allow for consistent collection of energy use data in all pilot projects.

The OTF lighting options are intended to provide choices to address uniqueness of each space and tenant needs. OTF pilot program lighting options include: Workspace-Specific Intelligent Luminaires, Indirect/Direct with Task Luminaires, Non-Planar Lensed High Efficiency Recessed Luminaires, Non-Planar Lensed Recessed Relight Kit, Pendent Direct/Indirect Linear Low-Ceiling Applications and a Custom Lighting System Option. OTF strongly recommends dimming ballasts, daylighting controls where applicable, vacancy sensors, individual control where possible and demand-response/real-time price capability. Designers need to take into account considerations specific to their space, including: ceiling height, fixture look and cost, workstation density, interior finish colors, partition heights and/or shelves in workstations that may need additional task lighting to overcome shadows.

These lighting options offer a layered approach to lighting design that relies heavily on controls to adjust lights based on occupancy and availability of daylight. Minimum lighting control requirements include separately controlled zones that continuously dim or turn off lighting within 15 feet of windows or 7 feet of skylights. Lighting control zones shall not exceed 1,100 SF. Occupancy/vacancy sensors are required in most spaces.

OTF suggests various approaches to typical office plug load equipment control based on the type of plug load. Strategies for addressing plug load energy use for computers and monitors, printers, copiers, task lighting, vending machines and miscellaneous kitchen equipment range from implementation of computer power management software to controlled power strips that turn off noncritical loads when the occupant has vacated his or her desk for the requisite period of time.

Pilot Projects

After initial energy modeling, the utility sponsors initiated pilot projects in their service territories between the end of 2009 and early to mid-2010. These pilot projects are a combination of retrofits of existing office spaces and new tenant improvements. All projects used the OTF

technical requirements and are collecting costs and energy use information. Retrofit projects are collecting at least 30 days' pre-installation energy use data and at least 90-120 days of post-installation and system tuning energy use data.

The purpose of the pilot projects was to gather cost and savings data for projects in the field using the OTF technical requirements to guide the renovation process. Initial savings data was available from the modeling, and initial cost data was available through research and estimating work conducted in early 2009, but the pilot projects would add real-world clarification to these numbers and test the market reception of the integrated package of measures. While OTF Consortium members expect to complete at least 15 pilot projects in the next year, Table 3 shows some details of the pilot projects expected to be operating in August 2010.

Table 3. OTF Pilot Project Summary Information

Utility	Number	Location	Approximate Building Size (SF)	Approximate Office Size (SF)
SCE	1	Rosemead, CA	88,000	10,000
SCE	2	Rosemead, CA	16,500	16,500
SCE	3	Long Beach, CA	443,000	1,500
SCE	4	Los Angeles, CA	1,250,000	10,000
SCE	5	Irvine, CA	120,000	7,500
NSTAR/NGRID	6	Lexington, MA	121,425	6,762

Source: OTF Program Pre-Construction Data

Overall Measurement and Verification ("M&V") was accomplished using ASHRAE Guideline 14-2002 Method 4 for assessing lighting electrical savings at the office level. Meters were installed on panels serving the office space, with lighting and plug loads separately metered when possible. Energy and demand were monitored at 15-minute intervals and normalized for area, schedule, occupancy and weather (when applicable; most metered electrical service did not include HVAC system equipment).

Measure types (i.e. lighting, plug loads) were installed in a time-staggered fashion to establish a baseline and post-installation performance period for each measure class so the costs/benefits numbers for each class could be examined separately as well as bundled. Data acquisition for the pilot projects was coordinated through use of a single data acquisition platform which monitors whole-building and office-level electrical usage while relaying the data to a remote database via a cellular modem.

Office occupants were asked to complete a survey before and after the installation of the lighting and plug load measures. Results from the survey will show the increase in satisfaction with the look and feel of the new lighting system and any issues with the plug load measures.

Pilot Results

Savings from the pilots was projected using modeling, and data from the pilot project M&V is still incoming. The projection for savings for each pilot expected to have results by August 2010 is shown in Table 4.

Table 4. OTF Pilot Project Savings Results

Pilot Number	Building Size	Office Size	Projected Energy savings per SF of office space	Annual Energy Savings - Projected	Projected Demand Savings (W/SF)
1	88,000	10,000	2.8	28,000	0.9
2	16,500	16,500	2.8	67,200	0.9
3	443,000	1,500	2.8	4,200	0.9
4	1,250,000	10,000	2.8	28,000	0.9
5	120,000	7,500	2.8	21,000	0.9
6	121,425	6,762			

Source: Office of the Future Report and OTF Pilot Metering Results

Costs of energy conservation measures in the pilot projects are being carefully tracked so that costs for setup and administration of the pilots are separable from the cost of design, installation and materials.

Results Discussion

The savings projected from lighting and plug load measures provide an estimate to be compared with the estimate for cost increase over a code design. A savings of 2.8 kWh/SF represents a conservative savings estimate compared to the assumption of Title 24–2005 in California and ASHRAE 90.1–2004 baseline performance. The actual savings may be larger, and this will likely be seen in the pilot results when available.

With actual results from the pilot projects expected in early summer, cost premium for the OTF solution is projected to be $8/SF. The savings level can be used by sponsor utilities to set the incentive level for participating offices. The incentive need not cover the entire cost premium but should be large enough to incentivize the owner and tenant to leverage the OTF to assist in the tenant improvement. The cost premiums of the pilot projects represent design, installation and use of lighting controls that, though mature technologies, are not well established in the marketplace.

Lessons Learned from Pilot Projects

The pilot projects provide energy savings, cost and qualitative data regarding the application of the OTF measures to the commercial office market. Several other lessons regarding the interaction with facilities were learned over the course of the program:

- The HVAC performance review has been difficult to incorporate. The scope of work in the Performance Review clashed with established maintenance schedules and budgets within the building owner's organization, which is often handled in a different department than leasing, and created resistance to adoption. Direct piloting of the Performance Review would provide more detail to owners for cost/benefits.
- Attaining whole-building gas meter data is difficult. The gas company, even when the same corporate entity as the electric company, is not responsive to requests for a gas meter upgrade to pulse output to meet the whole-building requirements.

- The level of complexity of lighting design requires advanced tools and/or training.
- The integration of lighting, HVAC and plug load controls with feedback to the occupant provides the greatest level of savings and persistence.
- Pilots have provided sponsor utilities with a glimpse into the particulars and complexities of the tenant improvement process.

OTF Program Development

The OTF program incentive offering will be developed once results of the pilots can be normalized against the energy modeling results; this is expected to be done in Summer 2010. In the meantime, OTF program developers are actively investigating tools and strategies that can increase the participation in this new utility incentive program.

OTF program staff are beginning outreach to targeted CRE firms in an effort to solicit feedback in program design. This outreach serves as a way to identify tools and resources which will be most valued to targeted CRE firms and large tenants. But it also is a way to develop relationships, increasing eventual program participation. In regular meetings with CRE staff, OTF program staff explore the unique challenges of influencing design in buildings with multiple tenants, identifying opportunities for OTF to dovetail with the CRE firms' existing program offerings and uncovering key individuals to focus OTF marketing and training activities at the local level.

Conclusion

The OTF program aims to directly address the split incentive market barrier in multi-tenant leased office space. The strategy is to leverage the tenant negotiation process and encourage discussion and allocation of costs and benefits associated with energy efficiency in the lease document. The program will be formulated to influence the design before it has begun and at a time when renovations are most likely to occur. While influencing TI before it happens is a goal of the program, the OTF technical requirements are relevant to any office renovation.

OTF technical requirements stem from suites of integrated measures. Modeled in various climate zones, this initial suite of measures is estimated to save at least 25% over ASHRAE 90.1-2004 and includes lighting, lighting control and plug load control. These technical measures are currently being implemented in pilot projects throughout the U.S. and Canada where cost and energy savings data is carefully being collected. This information will be normalized versus energy modeling results to create a defensible program structure. At the same time, OTF program staff are investigating advanced solution sets, covering HVAC systems and targeting 50% energy savings.

In order to increase program utilization, the OTF program is working directly with corporate real estate firms and large tenants. Their feedback provides insights into program design, including:

- The need for simplicity in utility programs including a single application process across North America to reduce informational costs for CRE firms;
- A dollar-per-square-foot incentive to make the incentive more in line with the most common metric used in lease negotiations; and
- The need for clarity on the costs and benefits associated with OTF technical measures.

A complete analysis of OTF pilot program results and a program roll-out in eight utility service territories is expected in 2010.

References

[CEUS] Itron, 2010**, California End Use Survey Results** March 2006 prepared for the California Energy Commission retrieved 3/5/10 at http://capabilities.itron.com/CeusWeb/Chart.aspx.

[CLS Online Tool} **Commercial Lighting Solutions Online Tool,** https://www.lighting-solutions.org/comlighting/login.htm;jsessionid=E0C0135740F409FEF9E8DB8ABBEF8C0F.jvm3

Colliers International, 2010. **Office 4th Quarter Highlights**, at http://www.colliers.com/Content/Repositories/Base/Markets/USA/English/Market_Report/PDFs/officenahighlights4q2009.pdf

Corporate Realty Advisors. 2010. "**Commercial Office Space Construction: Tenant Improvement Allowance**" at http://www.guidancebrokers.com/knowledge_center/articles/commercial_office_space_construction_basics. Corporate Realty Advisors Guidance.

[DEER] Database for Energy Efficient Resources, 2004-2005 version 2.01, California Utilities Commission at http://www.deeresources.com/

[EIA CBECS 2003] Energy Information Administration. **Commercial Buildings Energy Consumption Survey 2003**. Retrieved on 2/3/2010 from http://www.eia.doe.gov/emeu/cbecs/

[EPA Overview] Environmental Protection Agency. **Commercial Real Estate: An Overview of Energy Use and Energy Efficiency Opportunities** at http://www.energystar.gov/ia/business/challenge/learn_more/CommercialRealEstate.pdf.

[EPA Energy Star Database] Environmental Protection Agency Energy Star Labeled Building Database. 2010. Retrieved 2/3/2010 from http://www.energystar.gov/index.cfm?fuseaction=labeled_buildings.locator.

LEED 2009 for Commercial Interiors at http://www.usgbc.org/ShowFile.aspx?DocumentID=5543

[Office of the Future Report] **Office of the Future, Phase II Report, the 25% Solution**, January 2008 at http://newbuildings.org/sites/default/files/OTF_Phase%20II%20Final_2-15-09.pdf

[OfficeSpace.com] Real Estate Frequently Asked Questions. 2010. "**What is the Difference Between a Large and Small Office Space?**" at http://www.officespace.com/FAQ.cfm#Nineteen

Perry, Phillip. 2009. "**How to Negotiate a Better Lease**" http://www.areadevelopment.com/AssetManagement/Oct09/negotiate-better-commercial-lease-rates02.shtml, Area Development Online.

Point 380, LLC. 2008. "**Customer Marketing Focus: A Workshop for the Office of the Future Project**" Summary of meeting at the Seaport Hotel, Boston, MA, September 9-10 at http://www.newbuildings.org/sites/default/files/NSTAR_Report_OTF_Workshop-Final.pdf

Prindle, Bill et al. 2007. "**Quantifying the Effects of Market Failures in the End-Use of Energy**" Final Draft Report Prepared for International Energy Agency at http://www.aceee.org/energy/IEAmarketbarriers.pdf .

Sinreich, Ellen, 2008. "**Increasing Energy Efficiency: What Does the Lease Say?**" *Real Estate Weekly*, October 15 at http://findarticles.com/p/articles/mi_m3601/is_8_55/ai_n30941311/.

Zimmerman Greg. 2009. **Tenant and Landlords: Piecing Together the Split Incentive**. Myfacilities.net. at http://my.facilitiesnet.com/blogs/choadie26/archive/2009/04/28/tenant-or-landlord-who-holds-the-cards.aspx