NRDC CENTER FOR MARKET INNOVATION:
HIGH PERFORMANCE TENANT DEMONSTRATION PROJECT

Energy Performance Opportunities in Commercial Office Buildings



A collaborative approach between building owners and occupants is essential to optimizing the performance of commercial office buildings, and tenant demand will be a critical factor in driving the market toward optimizing commercial building performance. The Natural Resources Defense Council's Center for Market Innovation (CMI) has established a High Performance Tenant Demonstration Project (the "Project") aimed at accelerating demand for high performance tenant spaces in the commercial office market by demonstrating their economic benefits.

The Project aims to promote the compounding effect of owner/tenant collaboration, as tenants who value high performance spaces choose to locate or remain in buildings with highly efficient central systems and transparent energy management practices. As a result, building owners investing in central system energy efficiency improvements will not only garner operating savings, but will also gain competitive advantage in attracting and retaining these high value tenants.

> ***"Energy efficiency opportunities and green fit-outs in tenant spaces often go hand in hand with improved work environment and employee productivity. Coupled with tangible bottom line improvement, which CMI's first set of projects are demonstrating, there's a compelling business case for incorporating energy efficiency measures in commercial buildings."***
>
> — Kyung-Ah Park, Managing Director, Goldman Sachs

CMI's Project team is modeling, quantifying, documenting, and publishing the energy savings generated by a series of high efficiency tenant build-outs, and the corresponding return on the tenants' respective incremental investments in the installed energy performance measures (EPMs). The Project case studies will also note the value placed by tenants on various other advantages to these build-outs, including furthering corporate social responsibility goals, and increasing employee attraction, retention, and productivity.

CMI has engaged several industry leaders as technical advisors for the Project, including Goldman Sachs, Johnson Controls, Jones Lang LaSalle, Malkin Holdings, SKANSKA, and ULI/ Greenprint. This work is made possible by the generous support of Goldman Sachs and the Rockefeller Foundation.

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The core mission of the Center for Market Innovation (CMI) is to expand the impact of the Natural Resources Defense Council (NRDC) by creating market conditions that will redirect capital flows toward sustainable uses. We believe that engaging mainstream capital is a critical component in achieving our common goals. We do so by engaging with the business community to articulate and implement sustainable value propositions, with a current focus on energy efficiency, water management, and regenerative agriculture.

CMI's internal team of experts engages directly with tenant build-out projects, helping to deliver a high performance workplace, and documenting actual space performance results. The CMI team is versed in real estate, engineering, financial analysis, construction, and building efficiency. This multi-disciplinary approach serves to bring a more comprehensive perspective to projects. Utilizing the Project's grant funding, our experts assist the tenant's design team in completing a thorough evaluation and financial analysis of opportunities to integrate energy efficiency into their existing design.

CMI's process looks to present an optimal set of energy performance measures that will provide 30 to 50 percent energy use savings compared to a standard code-compliant build out, with a payback between three to five years. By providing projected energy use through energy modeling, incremental costing, and financial analysis during the design and decision making phase, the CMI process equips the tenant and its existing facilities/design team with the right information to determine tiers of "good," "better," and "best" packages of energy measures to incorporate into the design of the space. The CMI team also works with each participating tenant to develop and execute a protocol to measure and verify the actual energy performance of the new space for 12 to 15 months after occupancy.

CMI's High Performance Tenant Demonstration Project portfolio is comprised of several high-impact tenants, including Bloomberg LP;[1] a number of major tenants at the Empire State Building; and Reed Smith in Philadelphia. CMI will prepare a case study for each project documenting the value analysis process, the tenant's selection of performance measures, and the economic return on the tenant's investment in those measures. We expect to add a few other select tenant build-out projects to the portfolio.

By broadly publicizing this portfolio of case studies, a How-to-Guide detailing the entire process, and the tools we develop to help analyze the value of energy performance measures, CMI's goal is to make high performance tenant build-outs standard practice for the commercial real estate industry.

The CMI team will continue to refine the process to address building industry feedback as we complete additional tenant demonstration projects in the upcoming year. CMI looks forward to hearing from those in the field, and is thankful for those who are helping transform the energy efficiency market and accelerate demand for higher performing and more comfortable commercial office spaces and buildings.

Find out more about the High Performance Tenant Demonstration Project at:
http://www.nrdc.org/greenbusiness/cmi/high-performance-buildings.asp

In major urban areas like New York, buildings account for 80 percent of the city's total energy consumption. Tenant spaces account for more than half of a commercial office building's total energy use, and building owners are starting to pay attention, particularly in light of energy benchmarking and disclosure regulations being adopted in cities across the country.[2] If all commercial office real estate owners and tenants in the United States reduced energy consumption by 30 percent, it would translate into more than $6 billion in energy cost savings a year.[3] That kind of impact is hard to ignore. Yet energy efficiency opportunities in tenant spaces remain largely untapped, due in part to the split incentive challenge,[4] missing economic and performance data, and also to a lack of understanding of the high-performance design, development, and value analysis process.

How a tenant selects, designs, builds, and occupies space has the potential to make a big difference in their energy usage and operating costs. Timing energy efficiency work is critical to improving the cost effectiveness of energy solutions within tenant spaces. A tenant's relocation into a new space likely means that improvement work to the space will already be taking place. Incorporating the installation of energy performance measures into the tenant's existing build-out plan minimizes the incremental cost and future construction disruption to the tenant.

HIGH PERFORMANCE TENANT SPACE OPTIMIZATION PROCESS:

The projections from the Center for Market Innovation's (CMI) first set of tenant projects show that an optimized package of energy performance measures—which are interactive, and ordered to reduce loads, install efficient equipment, and manage occupant behavior—can provide 30 to 50 percent energy use savings—compared to a standard code compliant space—with a payback period of three to five years. By addressing the high performance opportunities during the early stages of the build-out design process, the project team is able to evaluate potential energy performance measures (EPMs) and present projected energy and financial performance data to tenant's design team in alignment with their standard decision making process and schedule.

> ***"The greatest value added to the client is that they literally save money. There's no question. In addition, they're saving energy for our planet. Who doesn't want to do that? Going forward, I will speak to all my clients about it now that I understand the process. It's going to become easier and easier and I think it will become the new industry standard."***
>
> — Tamela Johnson, *Director of Project Management, Gardiner & Theobald*

The energy opportunity exists throughout a tenant's entire lease cycle, and a clear process streamlines the coordination needed to identify the economic case for energy performance optimization. This process, outlined below, provides actionable steps for both tenants and building owners in a collaborative effort to capture the shared financial and competitive advantage benefits during the pre-lease, design, construction, and post occupancy phases of the relationship:

1. Select an Office Space:

- Consider spaces that are separately sub-metered for their energy usage, with good access to daylight and views, healthy indoor-air quality, and up-to-date control systems.
- Review the building's EnergyStar rating or other energy benchmarking data and past energy related capital improvements or planned upgrades.
- Review the lease for central building system operating expense pass-through provisions, energy aligned clauses, utility billing structures, and efficiency design criteria.
- Utilize resources made available by the landlord, including experts dedicated to helping facilitate tenant's energy management goals.
- Ask if a whole building energy model is available to share with tenants, especially for buildings that have recently been completed or have undergone an energy retrofit.

Buildings with an energy management program and tenant energy platform in place emphasize the landlord's commitment to managing energy performance.

2. Select the Project Team:

- Send a request for qualification (RFQ) for architects, engineers, and contractors with expertise in energy modeling and value analysis. The right technical expertise on your team is needed to calculate baseline energy usage and projected energy savings to make informed investment decisions and to measure actual energy performance after the EPMs are in place.

Project managers versed in energy performance will be able to integrate the energy value analysis into the normal design and construction process and keep the project team focused on communicating the energy and financial implications of energy performance decisions.

ENERGY ALIGNED LEASE PRINCIPLES:

- The building owner's base building central systems and common areas (lobbies, hallways, elevators, service areas, etc.) and the tenant's leased premises should operate as energy efficiently as feasible.
- For installed energy performance measures, the beneficiary of the energy cost savings should be the party who pays for the installed EPM. If the building owner installs EPMs that provide cost savings to the tenant, the resulting energy cost savings should be allocated to pay for the cost of the EPM through a pass through clause to the tenant.
- Energy use and demand data should be quantifiable and transparent to both building owner and tenant. Sub-metering tenant spaces and total building energy consumption information promotes energy performance benchmarking and ongoing energy management.

For additional information see: Energy Efficiency Lease Guidance, NRDC CMI, November 2011: **http://www.nrdc.org/greenbusiness/cmi/files/CMI-FSEnergy.pdf**

3. Set Energy Performance Goals/Develop Menu of Measures:

- Determine appropriate energy usage baseline against which to measure potential high performance designs. The baseline may reflect a code compliant and/or business-as-usual design and operational assumptions.
- Define energy performance targets and have top leadership emphasize it as a priority along with program and aesthetic needs.
- Work with the building owner to obtain existing conditions information and utility data on the building and leased space.
- Review potential EPMs from the project team's early design discussions and define a Menu of Measures.

4. Model Projected Energy Performance:

- Perform energy modeling at 50 percent Design Development.
- Evaluate individual EPMs against energy baseline.
- Order EPMs to i) reduce loads, ii) install efficient equipment, and iii) manage behavior.
- Create several sets of measures ("packages") that account for the interactive effects of various EPMs and finalize the feasible packages.
- Determine projected energy use savings impact of the EPM packages to both the tenant space and base building.

The energy model is a tool that can be used in design evaluation, Leadership in Energy and Environmental Design (LEED) Energy and Atmosphere (EAc) submittals, incentive and tax deduction filings, and ongoing energy performance measurement and verification. The model allows a quicker, iterative, and more transparent evaluation of energy measures. Modeling costs depend on the space, the final scope of work, and the specific building site.

5. Review Incremental Costs and Available Incentives:

- The project engineer, energy consultant, or construction manager has the ability to determine incremental costs for the modeled energy performance measures. Incremental costs are additional sums, net of cost avoidance amounts, compared to what was already budgeted for the planned system or equipment.
- Coordinate registration and filing for potential energy incentives and review potential tax deductions to assess amounts that may be available to offset green building and energy design and equipment costs. The project manager or architect can streamline the project budgeting process by include the tenant's accounting representative in energy budgeting discussions.

6. Perform Value Analysis:

- Conduct a financial analysis to determine annual and lease term cost impact, taking into account potential incentives and tax deductions. The financial scorecard should include the payback period of each individual measure and an optimal package of EPMs, together with

Net Present Value (NPV) and Return on Investment (ROI) calculations for the optimal EPM package.

- Request a report from the design team (a "Value Analysis Report") that: (i) documents the EPM evaluation process and the outcomes of the energy modeling, costing, and financial analyses; and (ii) recommends "good," "better," and "best" tiers of EPM packages that could be incorporated into tenant's build-out design, taking into account the project's program needs. The project's design, facilities, construction, accounting, and management teams review and discuss the Value Analysis Report.

7. Review Energy Performance Measures Budget and Make Final Decisions:

- Review financial resources available to cover incremental first cost of energy performance measures, including allocation of tenant improvement allowances, potential local, state, and federal energy incentives, possible external financing sources, and tenant's internal capital resources.
- Decide which tier of energy performance makes sense over the lease term based on financial, energy performance, and sustainability criteria.
- Direct the design team to incorporate selected EPMs, sub-metering, and commissioning into the construction set.

8. Build Out the Space:

- Select a contractor who is experienced in installing high performance measures.
- Coordinate operations training for any specialty technologies after installation.
- Ensure meters are readable in electronic format and connected to an energy management platform.

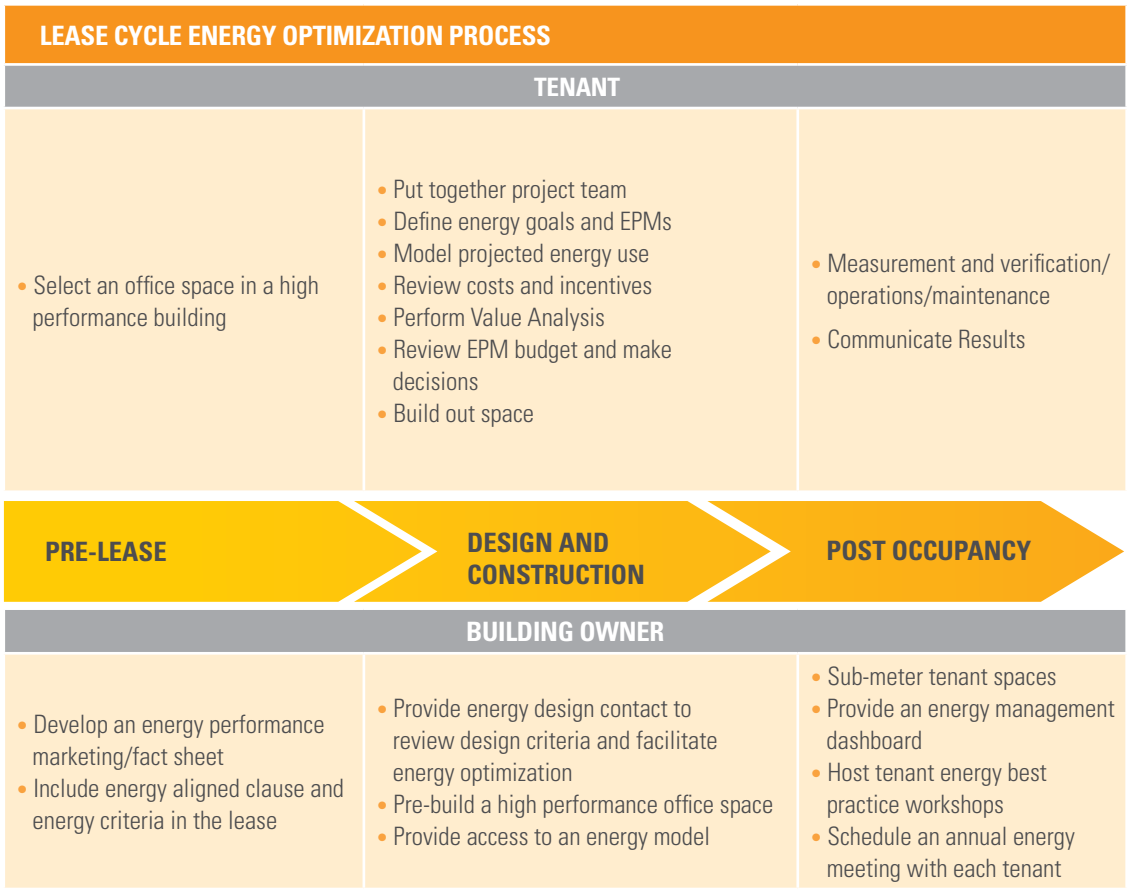
9. Develop a Post Occupancy Plan:

- Designate an energy manager to monitor and adjust equipment to maintain operating efficiency.
- Define and execute a protocol (based on IVMVP) to measure and verify the actual energy performance of the new space after occupancy.
- Collect electronic meter data by space/floor at a minimum, and end use if possible including:
  - Monthly kilowatt hour (kWh) consumed for every sub-meter
  - One-hour trend data of kWh consumed for every sub-meter available for a two-week period in the heating season, cooling season, and shoulder season (six weeks total over the year)
  - Ten-minute trend of all heating, ventilation, and air conditioning (HVAC) fan speed commands/power over such two-week periods
- Develop an occupant behavior plan to reduce equipment plug loads.

It is nearly impossible to manage energy use without knowing exactly how much, where, and when energy is being used. Sub-metering and energy management systems help tenants watch out for energy waste after moving in, keep equipment running more effectively through informed maintenance, and keep both energy and operations costs down.

10. Communicate Results:

- Expand the value of a high performance build-out beyond the quantifiable economic benefits by promoting the evaluation process and results through corporate sustainability reports, trade publications, videos and social media.
- Highlight the high performance space while recruiting talent.
- Write a project case study and document the energy value analysis process to maximize innovation credits if LEED for Commercial Interiors (LEED-CI) certification is being sought.
- Motivate occupants to reduce energy use daily through incentives and tools using tenant energy dashboards on the organization's intranet and website.



The timeframe for each lease cycle phase will vary. A general estimate for pre-lease is one year or less, design and construction one to two years, and tenant lease terms ranging between 5 and 15 years. The value proposition to the tenant and building owner increases as the lease term increases.

In a recent global study by Johnson Controls' Institute for Building Efficiency, 25 percent of 3,500 facility, real estate, and energy management executives said they were willing to pay a premium for space in a certified green building, and 24 percent planned to build out tenant space to high performance standards. Project stakeholders need to address the energy efficiency market opportunity by gathering the right information and putting it in front of the right people at the right time during the tenant engagement and decision making process.

Energy performance is important to both sides of the real estate equation. By working together, tenants and building owners have the opportunity to save energy costs, create more comfortable interior spaces, and gain a competitive advantage, whether seeking and retaining talented employees or high quality tenants, through promotion and recognition of a high performance tenant space and building.

> ***"Greater energy efficiency means higher profits, greater competitiveness, and a better result for the bottom line for everyone involved,"***
>
> — Anthony Malkin, owner of the Empire State Building

TENANT ENERGY PERFORMANCE MENU OF MEASURES
STRATEGIES PROVIDED BY BUILDING OWNER
Sub-metering by space/floor/net lease
Building envelope (windows, window film, radiative barrier)
STRATEGIES WITH NO OR LOW ADDITIONAL INCREMENTAL FIRST COST
Select building with natural daylight access
Design open office layout
Paint walls white or light colors to reflect light
Seal perimeter walls/openings
Occupancy based lighting sensors (required by code)
HIGH PAYBACK MEASURES
High Efficiency Lighting: 1) Design for task appropriate illuminance, 2) utilize high efficiency light luminaires and lamps, and 3) design for lower lighting power density watts per square foot (W/SF) than ASHRAE 90.1 baseline. Target 0.7 W/SF or below. (Two to three years)
HVAC Optimization: 1) Right sized high efficiency units, 2) use variable air volume (VAV) units, 3) low velocity/pressure drop air handling units to reduce fan power, and 4) eliminate noise traps. (Three to five years)
Plug Load Management: 1) Controlled plug outlets powered off/ on by wall switch (two to three years); or 2) occupancy sensor power strips (five to seven years); 3) computer management software (one to two years).
Information Technology (IT)/ server room Load Management: Combination of Energy Star servers, right sizing server equipment, virtualization and data distribution technologies such as a passive optical network (PON). The reduction in electrical use would result in savings from the equipment power load and as well as reduced computer room supplemental air conditioning and cooling load. (Less than 3 years)
MEDIUM PAYBACK MEASURES
Daylight Harvesting Lighting Controls: Utilize luminaires with built in photosensors and controls to dim the luminaire when ambient daylight lights the space. (Three to seven years)
Demand Control Ventilation: Add carbon sensors and logic to control outdoor air damper. (Three to seven years)
ONGOING MANAGEMENT
Sub-metering: Ensure energy use is well managed throughout occupancy term. Separate end use sub-metering for lighting, plug, IT room, and HVAC loads, and a tenant energy management platform will help keep the energy savings in line and provide feedback for ongoing commissioning and maintenance of the systems.
Energy Modeling: Use energy predictive analysis during design, incentive filing, and ongoing measurement and verification.

EVALUATING ENERGY REDUCTION OPPORTUNITIES

Though one size does not fit all in tenant spaces, a common menu of measures can be a starting point to evaluate lighting, HVAC, and plug load energy reduction opportunities. The following set of measures has been identified through the Project as those that have strong potential across a wide range of tenant types.

1 Bloomberg LP is located at 120 Park Avenue in New York, New York.

2 New York City, Washington DC, Philadelphia, and San Francisco have adopted benchmarking and public disclosure regulations. Austin and Seattle require benchmarking and disclosure at time of property sales transaction.

3 Based on commercial office energy expenditures noted in 'United States Energy Efficiency Retrofit Report', DB Climate Change Advisors, March 2012.

4 Split incentives are a result of a lease structure that shares operating and capital costs, and divides energy savings returns between building owner and tenants. This structure significantly reduces the economic benefit of installed energy performance measures to the building owner.

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