# ENERGY MANAGEMENT PROGRAM PROPOSAL FOR THE GENERAL SERVICES ADMINISTRATION

*TEAM 2030 CONSULTING*

## EXECUTIVE SUMMARY

Team 2030 Consulting is pleased to present this Energy Management Program Proposal to the General Services Administration (GSA). Its goal is to present and evaluate solutions for how GSA can measure, report, and reduce its energy consumption.

To best meet and exceed federal energy measurement, reporting, and reduction mandates, now and in the future, GSA must take a more holistic view of its own portfolio, while recognizing that each part of the portfolio plays a unique role. Our two key recommendations are:
1. Gain a more holistic view of GSA's current portfolio by expanding development of the **Energy Management Software (EMS)** platform currently being developed with IBM.
2. Refine the role that each building plays in the portfolio by exploring different **leasing options** for different types of spaces.

By expanding development of IBM's EMS platform, GSA can gain a better overview of its portfolio and better collect, organize, and share data, enabling better decision-making. GSA can then explore and leverage various **leasing strategies** to better the energy performance of its portfolio, including exploring other lease structure options, expanding current "green lease" language, and developing utility contracts. Through this integrated approach, GSA can capture additional cost savings and benefits.

All recommended programs with their energy and cost savings are as follows:

| | | Recommended | | | |
|---|---|---|---|---|---|
| | | Additional Buildings Benchmarked | Projected Energy Savings | Initial Investment | NPV |
| Energy Management System | Develop EMS | | | | |
| | Link lease data to EMS | | | | |
| | Set granular energy goals | N/A | | | |
| | Acquire benchmarking results | 468 | 169,234,965 | $ 636,000 | $4,576,781 |
| | Develop and implement a submetering plan | 357 | 30,703,645 | $ - | $0 |
| | "Nudging" energy efficiency | 0 | 136,088,477 | $ 1,196,558 | $ 9,919,699 |
| | Energy efficiency challenge for owned buildings | | 211,543,706 | $ 165,000 | $ 17,114,744 |
| | Energy efficiency challenge for leased buildings | 100 | 12,900,676 | $ - | 0 |
| Utilizing Leases | Strengthen green lease requirements | | | | |
| | Change lease structure | 534 | 832,553,910 | $ 68,872,156 | $ 7,457,895.00 |
| | **Total** | 1459 | 1,393,025,380 | $ 70,869,714 | $ 39,069,119 |

## INTRODUCTION

GSA is currently equipped to meet the sustainability challenges of today -- it meets the Federal mandate to report all Scope 1 and 2 emissions in GSA-owned properties. However, the future points to more stringent measurement and reporting guidelines for GSA-leased spaces. GSA only currently has data for approximately 6% of leased properties (of a total of 7,661 leased spaces). Furthermore, at least 18% of existing buildings above 5,000 gross square feet (GSF) and 18% of leases above 5,000 GSF must meet Guiding Principles for Federal Leadership in High Performance and Sustainable Buildings by 2015. But by FY2010, only 5% of each met the Guiding Principles.

To meet the goals set out in the Guiding Principles, we recommend that GSA follow two broad recommendations: (1) gain a more holistic view of its portfolio through development of an energy management system (EMS); and (2) explore leasing and contract options available to the different types of buildings contained in the portfolio. Within each recommendation is a suite of programs that can be adopted either separately or in tandem to achieve energy measurement, reporting, and reduction goals.

## HOLISTIC PORTFOLIO MANAGEMENT

By gaining a more holistic view of its portfolio, GSA can better inform its decision-making regarding energy management. Currently, energy data and lease data are silo-ed in two separate Excel-based databases, thereby limiting the full analytical potential of energy management across its entire portfolio. Therefore, if GSA assimilates all energy and lease data in one, advanced energy management system (EMS), GSA can more efficiently organize data and identify energy management projects. Furthermore, it will increase not only the quality and quantity of data, but also the availability and transparency of these data. The ability to both share data and view data will be integral to engaging stakeholders in the measurement, reporting, and reduction processes that will enable GSA to meet its goals.

### STORE DATA: DEVELOP THE IBM ENERGY MANAGEMENT SOFTWARE SYSTEM

GSA can use its existing contract with IBM to upload building energy data into IBM's Tririga Building Optimization system. Although the existing contract focuses on installing smart meters in the 50 most energy-intensive GSA buildings and connecting them to the Tririga system, there is an option to add other buildings to the system (Green Tech Media, 2012). GSA should work with IBM to expedite uploading at least the building and utility data for the rest of the portfolio without waiting for the full submetering systems. Even if the current contract doesn't include this additional upload, GSA could expand access to the system for a subscription fee of $212,000 annually, which could be easily recovered with even a minimal 1% energy reduction in the buildings for which GSA pays the energy bills (IBM, n.d.). Furthermore, while GSA is working with IBM to upload this building data, GSA's project lead can ask IBM to build an automated ENERGY STAR® benchmarking integration into their software to enable tracking of energy performance goals. GSA is an important customer for IBM, so IBM would most likely undertake the integration on their own without additional cost; it would also help IBM with their energy management system competitors, as much of the industry is integrating ENERGY STAR.

### COLLECT DATA: DEVELOP A HOLISTIC VIEW OF THE PORTFOLIO

Another issue GSA faces is that energy management goals and leased building data currently seem disconnected. It is critical that GSA connects their database of leased information with reported energy performance data, preferably further segmented by building profile. This will enable them to see information about how and when leases expire alongside information about which buildings have green leases and other energy performance measures in place. In turn, this will make it easier to set and meet energy performance goals and to follow up with building owners who may not be adhering to green lease requirements. Connecting these two goals into one streamlined information system will help GSA to develop a more holistic view of its portfolio, enable better energy management, and create greater accountability.

### COLLECT DATA: BENCHMARK LEASED PROPERTIES THROUGH TARGETED OUTREACH

For GSA to meet federal mandates, it is essential for the agency to acquire energy data for leased spaces to track energy consumption and to benchmark properties in Portfolio Manager. GSA can increase the number of leased spaces with access to metered energy data by targeting leases in cities with benchmarking disclosure laws and leases in buildings with owners who have made public commitments to benchmarking and reducing energy use.

To date, seven cities (Austin, District of Columbia, Minneapolis, New York City, Philadelphia, San Francisco, and Seattle) and two states (California and Washington) have passed laws requiring commercial and institutional buildings benchmark their buildings in EPA's Portfolio Manager. Building owners must then report the ENERGY STAR score either in a real estate transaction or to the city for posting in a public listing. Some cities, such as Minneapolis, San Francisco, and Seattle, also require direct reporting to the tenants. Therefore, GSA should be able to access most of the whole-building ENERGY STAR scores and energy consumption data for the 468 full-serviced leased properties in these cities. (Note: this excludes properties in California and Washington, where utilities must provide the benchmarking results, as full-serviced leases without utility accounts might have more trouble acquiring data).

At a minimum, GSA can obtain whole-building data for leases in cities where data will be publically available, including the District of Columbia, Minneapolis, New York City, Philadelphia, and San Francisco, which would represent an additional 4.6% of their leased portfolio having access to energy data. If facility managers in the remaining cities acquire the benchmarking results from building owners through signing or renewing a lease, GSA can have energy data for up to 5.3% of their leased portfolio. This increase represents a near doubling of the current leases with energy data. The table below provides a schedule for the number of buildings with GSA leases that must benchmark and report by given deadlines.

| Year | Number of GSA Properties | Total Square Footage | % of Leased Portfolio |
|---|---|---|---|
| 2013 | 169 | 7,471,452 | 1.9% |
| 2014 | 279 | 20,871,509 | 3.1% |
| 2015 | 20 | 328,207 | 0.2% |
| **Total** | **468** | **28,671,168** | **5.3%** |

Furthermore, GSA can work with building owners from companies with stated public ENERGY STAR benchmarking and energy reduction goals to acquire benchmarking results. Several leading property owners and managers have made these public commitments and been recognized as ENERGY STAR Partners of the Year, including Bentall Kennedy, CBRE, Hines, Jones Lang LaSalle, TIAA-CREF, Transwestern, USAA Real Estate Company, Beacon Capital Partners, and Liberty Property Trust (Energy Star, 2012). These building owners will probably be more willing to help tenants understand and reduce their energy use in order to meet their own corporate goals. GSA can identify their leased offices in buildings owned or managed by these firms. Then, the facility energy managers of these properties can begin a dialogue with each building owner about the mutually beneficial potential of installing tenant submetering and identifying and implementing energy management projects.

By working with leased properties in buildings located in cities with benchmarking legislation or in buildings with owners actively benchmarking, GSA will at least have whole-building energy usage and performance metrics. For buildings in which GSA is the sole-tenant, these data can easily be associated with the entire tenant space. For buildings in which GSA or a federal agency is one of multiple tenants, the reported energy intensity (energy use per square foot) can be applied to GSA's leased space, assuming there aren't any other spaces in the building that would clearly skew the average intensity, such as another tenant's data center. With this data, GSA will have at least 5.3% more of its leased portfolio with energy data, which will help more properties meet the Guiding Principles.

### COLLECT DATA: DEVELOP AND IMPLEMENT A SUBMETERING PLAN

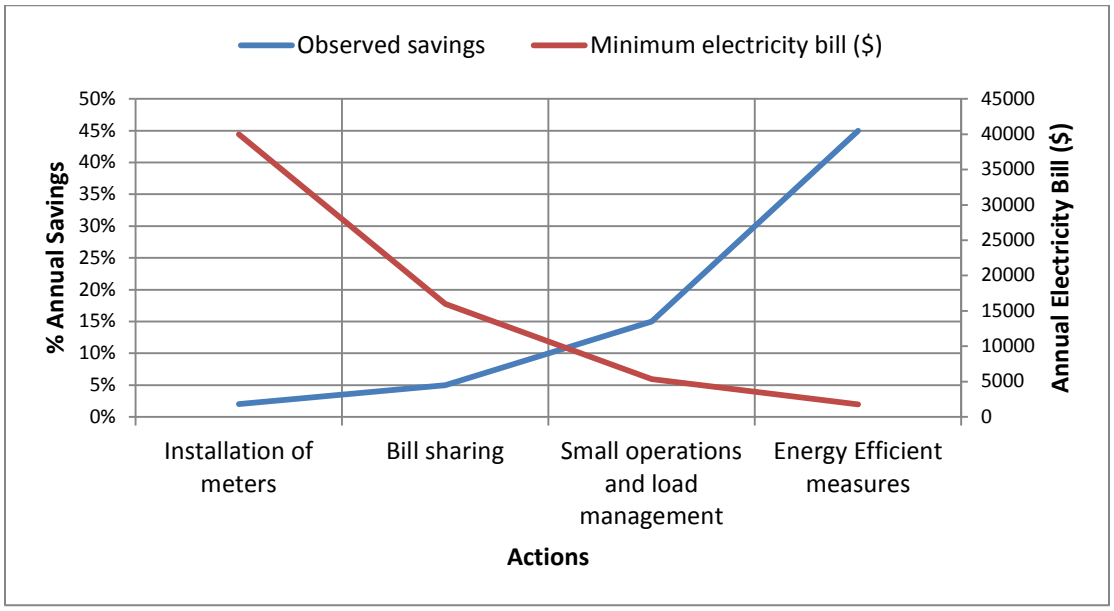
The metering technology should be chosen based on the functional requirements and estimated benefits. The cost effectiveness of the advanced meters depend on several factors:

- **Annual energy use**: The buildings with high energy consumption will benefit more from advanced metering investments. Spaces with low energy intensity (e.g. unconditioned warehouses etc.) are not good choices for metering because the energy savings will not exceed the installation costs.
- **Cost of metering**: The total installation costs, which include the meter, associated devices (such as transformers, safety switches, etc.), dashboard, and communication devices, range from $1,500 to $5,400 (DOE 2011). The operational costs include cost of data analysis, communication and data storage, ranging from $120 to $600 a year (DOE 2011). GSA should gradually develop in-house capacity for the installation and maintenance of meters and energy information systems (EIS) to greatly reduce the installation and maintenance costs.
- **Expected savings**: The savings vary with how the energy data is used. The awareness among building occupants and minimal operational changes can lead to 2% to 20% savings, while deeper retrofits can result in savings of 45% to 50%.
- **Payback period**: The payback period of the meter should ideally be less than 10 years.

The following formula presented to DOE can be used to determine cost-effectiveness of metering:

$$\frac{\left(\frac{\text{Installation Cost of Meter}}{\text{Payback Period}} + \text{Operational Cost of Meter}\right)}{\text{\% Annual Savings}} = \text{Average Electricity Bill}$$

For example, if the installation cost is $5000, operational Cost is $300, payback period is 10 years, and estimated savings due to metering are 2%, then those buildings with annual electricity bill greater than $40,000 will benefit from metering. As depicted in graph below, in order to achieve 2% savings owing to installation of meters, the electricity bill of the building should be equal to or greater than $40,000.




Source: Analysis based on savings estimations by Pacific Northwest National Laboratory for US Department of Energy

Based on available energy data for GSA buildings, buildings with electricity bills over $40,000 have a minimum gross floor area of 25,000 SF. Adding in a buffer of an additional 25,000 GSF and extrapolating this minimum to the inventory of leased buildings show that 357 leased buildings will have electricity bills over $40,000 and thus qualify for advanced metering installations.

In order to meet energy reporting requirements for leased buildings, GSA should identify building owners of GSA-leased spaces with full-serviced leases over 50,000 SF and begin developing a plan for advanced metering. GSA can share the estimations as presented above, where building owners can achieve 2% savings for buildings having electricity consumption greater than $40,000 within 10 years payback period. The building owners can achieve even greater cost savings: around 5% by sharing the bills with tenants, around 15% by deploying small operations and load management and around 45% by deploying energy efficient upgrades. GSA can develop a basic calculator with these savings and estimated payback periods to share with the building owners as a way to illustrate the value proposition for sub-metering.

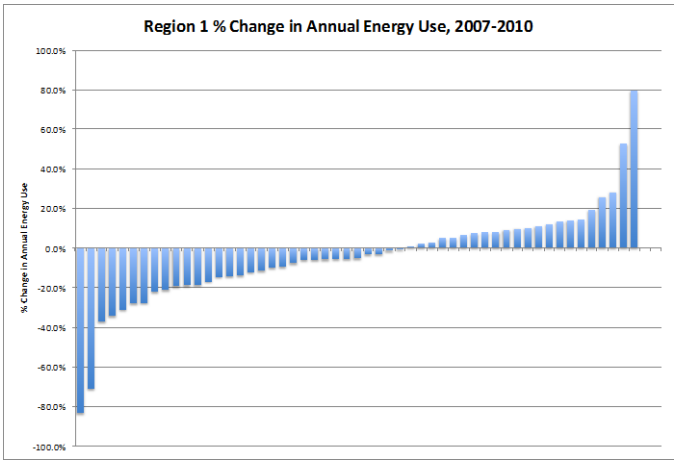
Furthermore, GSA can work with the building owners to identify energy service companies (ESCOs) or utility energy service contracts (UESC) that have worked with GSA on energy management projects before. Under the guidance of the building owner, the ESCO or UESC can provide the financing for the upfront investment. The building owner and GSA can work

together to identify occupant-based energy savings practices (such as shutting off equipment) that can provide the energy savings to payback the initial investment, while the building owner agrees to provide the energy consumption data to GSA.

Finally, GSA should plan to include a requirement for submetering in all new construction contracts to ensure that they can provide detailed submetered data to all tenants.

### ORGANIZE DATA: IMPROVE ENERGY TRACKING AND GOAL SETTING

GSA has established regional energy use intensity (EUI) targets as a mechanism to drive energy reductions across each region. While these targets are aggressive, it can be difficult to track progress when looking at an average EUI across hundreds of buildings, especially with some non-office buildings that might be more energy intensive. For example, even though Region 1 is currently above their energy intensity target, a variety of buildings have already been reducing their energy and making progress toward that goal. However, about half of the buildings in that region have increased energy use, and therefore, these should be the focus for energy management efforts. GSA could more effectively identify the buildings to focus on and drive greater reductions by setting more granular goals.




GSA should develop "profiles" for its most common spaces within each region and set a reduction target for each profile. Categories can be organized by building type (office, warehouse, lab, other), owned or leased (full-service, net lease), sole-tenant or multi-tenant, and size (small, medium, large, or an agency headquarters). The regional energy coordinators can establish profiles based on the existing energy data they have for owned and some leased properties (Data Gov, 2012). A sampling of energy profiles for various office sizes within Region 1 below illustrates the need for more granular goals to determine which buildings to focus on. In this example, the larger buildings are outperforming the smaller buildings. GSA could develop energy management projects, such as lighting retrofits, that are replicable across these smaller buildings to drive reductions. Additionally, these profiles could be used to prioritize submetering needs and incorporated into leases by associating energy management requirements with particular profiles. Using these profiles until there is enough energy data for the majority of leased tenant spaces should provide GSA with more granular data for tracking progress toward goals and for bundling energy efficiency projects across similar spaces.

| | All Buildings (2010) | Building Size (SF) | | |
|---|---|---|---|---|
| | | 1,000-49,999 | 50,000-149,000 | 150,000+ |
| **Current Average EUI (kBtu/SF)** | 83.4 | 88.0 | 88.4 | 57.7 |

| | | | | |
|---|---|---|---|---|
| **Total Annual Energy Use (kBtu)** | 462,211,499 | 28,735,956 | 132,001,607 | 301,473,936 |
| **Number of Buildings** | 56 | 29 | 15 | 12 |
| **Reduction Goal (%)** | 6.7% | 10% | 10% | 3% |
| **Proposed Target EUI (kBtu/SF)** | 74.1 | 79.2 | 79.5 | 54.9 |
| **Resulting Energy Savings (kBtu)** | 31,147,453 | 2,873,596 | 13,200,161 | 15,073,697 |

### SHARE DATA: EMPLOY EMS TO ENGAGE BUILDING OWNERS, TENANTS, AND OCCUPANTS

Data transparency and sharing will engage various stakeholders in both owned and leased spaces.

**"Nudging" Energy Efficiency in GSA-Owned and Leased Buildings**

Many organizations have begun to apply theories of behavioral economics – the study of how cognitive, emotional, and social factors influence economic decision-making – to today's most pressing societal problems. The United Kingdom has even designated a Cabinet Department, the UK Behavioural Insights Team, to harness the power of this growing field of thought and apply the concepts to public policy design and implementation. The Team has employed behavioral measures for three reasons: (1) they are fast; (2) they are cost-effective; and (3) they can provide savings directly to citizens (UK Gov, 2012).

One behavioral measure is the use of social norms to impact energy consumption through "nudging". (UK Gov, 2) This practice is based on the success of the collaboration between ideas42, a behavioral economics think tank, and Opower, a Software as a Service company who partners with utilities in both the US and the UK to promote energy efficiency. The idea is simple: use social norms to encourage energy reduction by telling people how their energy consumption compares with their neighbors. There's one small twist, though: Opower pairs this information with a face – one which shows a smile if the customer is performing well, a neutral face if s/he is average, and a frown if the customer is below average in energy savings. The company now reaches 15 million homes around the world and has helped to save over 2B kWh since its inception in 2007. (Opower, n.d.)

GSA can take a page from the Opower playbook and apply this same thought process to its owned spaces. The agency can designate an Energy Efficiency Captain for each space, who will send a monthly email including: monthly energy use; translation to cost; a link to the web portal which contains more detailed information; and a happy, neutral, or sad Earth face, based on energy reductions compared with other GSA tenants. The data can be acquired from the EMS, and eventually, IBM might be able to build in this labeling feature to their software platform. GSA will apply this technique to half its spaces in the first year as a pilot to gauge success, treating the other half as a "control" group.

Though there is no definite way to calculate potential benefit, we can use Opower's success to project energy savings over the next year for GSA. Opower has a cost effectiveness of $0.03 per kWh saved, with average energy savings around 1.5% to 3.5%. Based on these OPower numbers, GSA can achieve energy savings of 136,088,477 kBtu and NPV savings of $9.9 million across its owned and leased portfolio that currently pays for energy data. These savings

will increase as GSA acquires more energy data across its leased portfolio.

**The GSA Energy Efficiency Challenge (GSA-Owned)**
To incentivize energy reductions in GSA-owned properties, we recommend that GSA design and implement the GSA Energy Efficiency Challenge, a competition among GSA-owned properties for achieving energy reductions. A competition is the ideal form of incentive for these spaces because it can leverage many motivators: social norms and peer influence, personal image, incentives, care for the environment, and desire to work in a healthy environment.

Furthermore, EPA's ENERGY STAR Challenge has already shown the positive results that can come from a competition. These include not only benefits from energy reductions but also improved performance related to building camaraderie in a shared effort and improving morale. The infrastructure and protocol of the ENERGY STAR competition are already in place: GSA can leverage Portfolio Manager to examine the portfolio holistically and understand which underperforming buildings it ought to target for energy reduction. GSA will first appoint an administrator within the agency to manage all pieces of the Challenge. It will then create the promotional materials for the Challenge, including advertising the award: national, public recognition for the building within each region that achieves the greatest energy reduction, combined with a visit to the Building by the newly-appointed Energy Secretary.

To be successful, the GSA administrator must develop initial buy-in with building participants by establishing a Captain for each department or building who will send targeted communications to employees, hold a launch, and spotlight the Challenge publicly. Buildings will receive monthly reports of how their performance stacks up against the competition. During the competition, the GSA administrator will also enable the sharing of best practices through use of the EMS.

Participants in the ENERGY STAR Challenge identified an average energy reduction of 3% per building. Averaging this out across the GSA owned portfolio results in annual energy savings of 211,543,706 kBtu and NPV savings of $17 million. (These savings account of the expected cost of $55,000 a year to administer the competition for a full-time employee, marketing and training, and the awards.)

**The GSA Energy Efficiency Challenge (for Building Owners of GSA-Leased Properties)**
Competitions have also seen success in leased spaces. Vornado enlisted the use of a competition in many of its New York City properties through the use of two key pieces of technology: submetering and an online web portal (Baruch College, 2010). GSA could implement a similar challenge to the building owners of its leased spaces as a way to collect energy data from leased spaces, get building owners engaged in the energy management process, and build partnership with the building owners to implement energy projects.

Infrastructure for the Challenge will include (1) the formation of EE Award Committee - assisted by Technical Sub Committee to evaluate awards; (2) creation of a standard application using developed criteria and divided by building type; (3) designation of an Award, which could include honorable mention at an award ceremony and highlighted at the Building Owners and Managers Association International (BOMA) conference each June.

At a minimum, GSA should aim to enroll approximately 100 building owners of full-serviced leased spaces in the competition, utilizing the same organizational structure and administration from their own competition. The number of participants should double by the second year.

### EMPLOY VARIOUS LEASING AND CONTRACTING OPTIONS

One of the major challenges faced by GSA in leased properties is the mismatch between its interests and that of the building owners under the current lease structures. Currently, a vast majority of GSA's leased properties are under the full service structure. Under this lease structure, GSA pays the landlord a fixed rent which encompasses all operation costs, including energy costs. As a result, even if GSA only leases part of the building, there is usually no separate metering system in these facilities, since the landlord is responsible for the utility as part of their lease obligations. This poses significant physical challenges for GSA to achieve its monitoring and reporting goals under the guideline.

It is thus recognized there is potential for GSA to reach its reporting goals, and at the same time engage tenant agencies to reduce energy consumption, through changes in the lease structure to either incorporate additional green lease language, or to split the incentive of metering with the building owners.

### Lease Expiration and Re-Negotiation

While it is difficult to amend leases currently in force, the terms of these leases can be re-negotiated once they expire. The number of leases due to expire by 2015, according to the GSA Lease Inventory (GSA, 2012), is 3,326.

<u>Renegotiation</u>

Given that on average, more than 98% of the leases are either extended, renewed, or replaced while they expire, the considerable number of properties with expiring leases represent potential for GSA to achieve its goal under the guideline. In many cases, GSA has significant bargaining power over the building owner due to factors such as percentage of space occupied, stability of finance, and the highly specific nature of special buildings. Thus, GSA might be able to leverage its position during lease negotiations towards achieving its goals. A few avenues of how this could be achieved are discussed in details below:

### Green Leases

One way that GSA can work towards its goals is by incorporating energy management language into its leases. While there are many elements that can be included in green leases, below are some suggestions for items specific to energy management. Language should be adjusted accordingly depending on whether GSA is the building owner or tenant and the type of lease.

<u>Reporting and tracking</u>

- Landlord/ tenant will be required to monitor and report base building energy use and GHGs
- Landlord/ tenant will be required to monitor and report energy use by tenant
    - Whenever possible, this will be done by installation of on-site tenant submeters or through building automation systems that track energy use
- Landlord/ tenant will have access to energy use data

- Landlord/ tenant will disclose Energy Star rating annually

<u>Energy efficiency and conservation measures</u>

- Landlord/ tenant will obtain and maintain ENERGY STAR certification
    - For pre-existing leases, this certification will be obtained within 1 year
- Landlord/ tenant will regularly maintain and recalibrate base building services
    - Building will be recommissioned a minimum of every 3 years
- Landlord/ tenant will set and adhere to annual goals for reducing energy use
- Landlord/ tenant will purchase energy-efficient lighting and office equipment (ie. ENERGY STAR certified)
- Landlord/ tenant will ensure checks are in place so that energy-efficient settings are enabled on all equipment
- Landlord/ tenant will promptly act in response to performance issues

<u>Other ideas to consider</u>

- Energy management guarantee for tenants: Tenants will not be responsible for energy costs unless they exceed their agreed upon allowance.
    - Coupled with a cap on energy use and/ or GHGs
- Reduce the specific electricity requirement (in watts per $ft^2$) required by GSA in leases
- Landlord/ tenant will be required to procure a certain percentage of electricity from certified green power contracts

**Change Lease Structures to Overcome Split Incentive**

In addition to adding green lease languages, the structure of the leases could also be changed from the current full service structure to alternative options to provide incentive for the building owner.

*Net Lease*

Under this structure, the rent paid to the landlords is net of all operational costs, and GSA will pay the cost of utility directly to providers. As per the language of GSA's Standard Leasing, the landlord is required to install separate metering systems to single out the governmental electricity uses, and each tenant agency will be billed directly for their energy uses. Currently, net leases constitute approximately 7% of the total GSA leases.

Compared with a full service lease, net lease solves the measuring and reporting problem at no capital cost to GSA, and also provides direct financial incentive for the tenants to reduce energy consumptions.

*Expense Stop Lease*

This type of lease is more similar to the full-service lease. A maximum level of operation cost is pre-defined, which if exceeded, would require the tenants to pay the portion exceeding the "stop". Like the net lease structure, the expense stop lease would also enable a separate metering system to be installed, and there will also be a level of incentive for the tenant agencies to conserve, in order to avoid paying the "escalation". This type of lease is more favorable for GSA, as on average the portion of utility that GSA will be responsible will be much less.

Costs and Benefits Associated with Changing the Lease

Two scenarios were constructed for lease modification: (1) combined minimum and recommended scenario, and (2) energy saving maximization scenario. For both scenarios, it was assumed that 73% of the total expiring lease could be negotiated for lease change (80% of the full service lease not terminated). The first scenario, it was assumed that all the negotiable leases in which GSA is the sole tenant (534 buildings - 22% of all negotiable leases) is converted to the expense stop lease type, with the implementation of green lease languages. Over the next three years (2013 through to 2015), this number of lease conversion, combined with other measures, is just enough to help GSA to comply with the 18% reporting guideline. The energy saving maximization scenario assumes that, in addition to all the full service to expense stop lease switches that takes places in all the sole tenant leases, all the negotiable leases where GSA is a majority tenant (194 buildings - 8% of all negotiable leases) are switched into the less favorable net leases (as GSA has less bargaining power). The green lease languages are assumed to cover both types of leases.

The major cost associated with lease conversion is one time switching cost ($10,000 per lease), utility cost (100% of energy in net lease and 50% in expense stop lease), and recomissioning cost ($0.3 per SF). The benefits for lease switching and greening include rent reduction of 5%, and energy savings (16% from efficiency improvements associated with green lease, and 5% from behavioral changes as the tenant is now responsible for the utility).

It was found that over 2013 to 2015, the net saving (saving minus cost) for the min & recommended scenario is $9M, and the net saving for the energy saving maximization scenario is -$17M.

## CONCLUSION

As demonstrated above, there are a variety of opportunities for GSA to take a more holistic approach to its portfolio management and to better measure, report, and reduce its energy consumption. By expanding development of IBM's EMS platform, GSA can better collect, organize, and share data. By exploring different leasing and contracting options for different types of spaces, GSA can modify lease structure options, expand current green lease language, and develop utility contracts, while reducing energy consumption. Through this integrated approach, GSA can meet or exceed federal energy measurement, reporting, and reduction mandates, improve its energy performance, and capture additional cost savings and benefits.

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