360° PERSPECTIVE ON FEDERAL DEEP ENERGY RETROFITS

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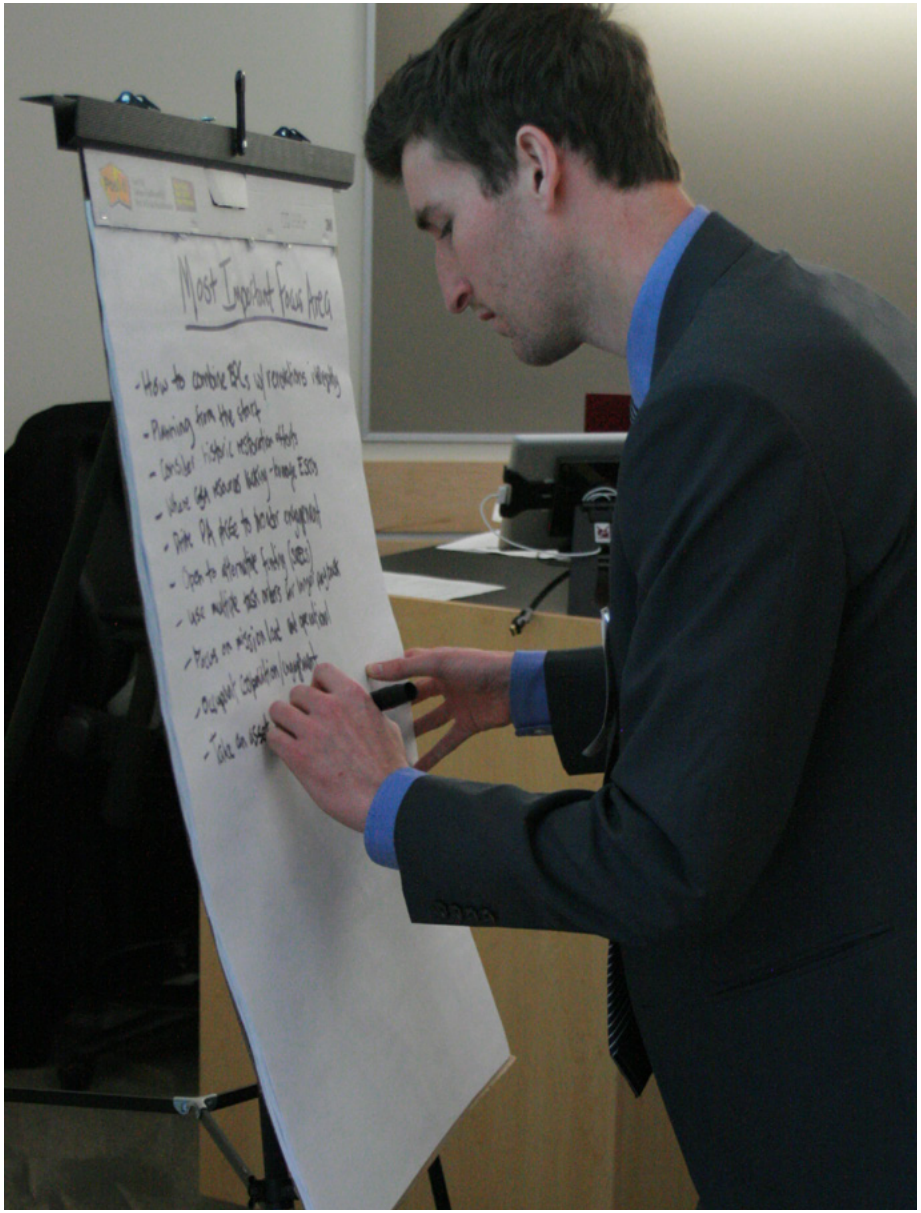

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EXECUTIVE SUMMARY

Deep energy retrofits, which can save upwards of 50 percent or more of a building's energy consumption, hold the key to enabling significant building energy use reductions and operational cost savings. They could also bring federal agencies into compliance with federal energy efficiency mandates. While this opportunity has long been recognized by energy service companies (ESCOs) and the General Services Administration (GSA), deep energy retrofits are still uncommon. There are several challenges, big and small, that have been explored over the past four years as part of the GSA's National Deep Energy Retrofit (NDER) program. And as proof of concept, the GSA has anted up with a group of buildings and has demonstrated the power deep energy retrofits hold. However, there is still more work to be done.

The GSA, the Federal Energy Management Program (FEMP), Oak Ridge National Laboratory (ORNL), and Rocky Mountain Institute (RMI) convened a workshop to review the NDER program at the National Renewable Energy Laboratory (NREL) in Golden, Colorado, on April 2, 2014. The goal of the workshop was to build upon previous collaborative efforts between the federal government and ESCOs and increase energy savings in federal buildings. Meeting attendees included the GSA, FEMP, NREL, equipment manufacturers, U.S. Army Corps of Engineers ESCOs, and 15 of the 16 ESCOs qualified under FEMP's ESPC Indefinite Delivery, Indefinite Quantity (IDIQ) contract. This was the third such meeting focused on increasing stakeholder collaboration.

The meeting aimed to provide a 360-degree perspective on recent projects—reflecting on successes and lessons learned from current deep retrofit projects, and more importantly, looking forward to what all ESPC stakeholders can do better in the next round of NDER projects to achieve deeper energy savings.

GSA nearly doubles typical energy savings

THE 10 GSA ESPC PROJECTS REACHED AN AVERAGE 38% SAVINGS, COMPARED TO 21% SAVINGS IN 33 PROJECTS BY OTHER FEDERAL GOVERNMENT AGENCIES.

Specific objectives were to:

1. provide an opportunity for open discussion among key stakeholders, continuing the collaborative process begun at the 2011 and 2013 meetings;
2. discuss barriers, solutions, and lessons learned to "raise the bar" on energy savings provided through ESPCs; and
3. provide an update on the GSA energy saving performance contract (ESPC) and the NDER program.

The meeting fostered a collaborative and transparent environment that enabled candid discussions between all stakeholders and further built relationships between the federal government and ESCOs to help streamline ESPC projects, motivated by a vision of eventual net-zero-energy buildings.

At the meeting, the GSA shared best practices to streamline the process and enable projects to achieve greater energy savings than those seen by other government agencies. Similarly, the GSA leadership shared several lessons learned that should continue to help achieve greater savings, such as the use of centralized contracting reviews resulting in more consistent approaches and faster review time frames.

BEST PRACTICES AND LESSONS LEARNED

Many of these best practices impact current GSA processes, including: limiting task orders to match available human resources, keeping a comprehensive comment form throughout all reviews, and setting an agenda prior to weekly meetings. Other best practices surrounded project specifics, including: providing more information (e.g., utility escalation rates) at the preliminary assessment (PA) kickoff, scheduling baseline and measurement and verification (M&V) meetings separately from regular meetings, using an independent cost estimator, and adding appropriated funds into the planning process if possible. Lastly, for larger retrofits, using FEMP M&V Option C for three years during the M&V stage, then dropping back down to FEMP M&V Option A or Option B would be beneficial to verify the energy savings to the myriad stakeholders.[1] Combining these methods provides more initial feedback and accuracy of savings without compromising the economics of the project, thus giving stakeholders tangible data to become more comfortable with the ESPC results and stream of payments. Gaining credibility with the stakeholders was an objective to achieve long-term viability for the program.

BREAKOUT GROUP FINDINGS

Five breakout groups focused on barriers and solutions to specific aspects of the ESPC and project engagement process:

1. Project delivery
2. Transitions/Team dynamics
3. Integrative design and innovative technologies
4. Operations and maintenance
5. Project economics

The breakout groups provided an opportunity for participants to openly discuss barriers, creatively brainstorm ideas, and collaboratively develop solutions, the key outcomes of which are summarized below.

"WE NEED TO UNLEARN THE TRADITIONAL WAY OF ECM THINKING AND CHANGE TO A WHOLE-BUILDING INTEGRATIVE APPROACH."

–KEVIN KAMPSHROER,
Director, Office of Federal High-Performance Green Buildings, U.S. GSA

[1] FEMP M&V Options are described as follows: *Option A—Retrofit isolation with key parameter measurement; Option B—Retrofit isolation with all parameter measurement; Option C—Utility data analysis.* For a full description of the four general categories of M&V methodologies, see the latest U.S. Department of Energy Federal Energy Management Program measurement and verification guidelines. Those in use at the time of this report: U.S. Department of Energy Federal Energy Management Program, "M&V Guidelines: Measurement and Verification for Federal Energy Projects, Version 3.0", Section 4.1, http://www1.eere.energy.gov/femp/pdfs/mv_guidelines.pdf

01: Project Delivery

The project delivery group focused on the desired expectations of the preliminary assessment (PA) phase that had the potential to create problems downstream in the ESPC process. A major concern was trying to find the balance between a faster and yet more accurate PA submission. The group agreed that providing ranges of cost and savings estimates, receiving more transparent guidance from the GSA on how to present savings, and using a matrix based on building size and system complexity to direct PA timing could all lead to a more manageable PA delivery process.

The group also discussed how FirstFuel or other similar analysis tools might impact the PA phase and requested clarity on the GSA's preferred method of using analysis tools to inform the PA phase through the notice of intent to award (NOITA).

02: Transitions/Team Dynamics

Maintaining team consistency and continuity is a critical element for any successful ESPC project and even more important on deep energy retrofit projects where new processes (e.g., integrative design) and technical innovation require full buy-in and understanding from start to finish. Best practices to help ensure continuity include:

1. ensuring clear communication of staff and information during transitions,
2. maintaining ESCO and GSA staff continuity from project development through construction (and ideally into the performance period), and
3. providing a one-page summary quarterly during construction and through the first year of the performance period that informs all levels of the GSA on the project status.

03: Integrative Design and Innovative Technologies

This group discussed successful integrative design strategies and innovative approaches to energy savings and identified underutilized technologies. The participants highlighted technologies they sought to use in non-GSA projects, and explored barriers to employing these technologies. ESCOs are hesitant to submit new technology solutions out of concerns of delaying the project, despite the GSA's requests for these innovative approaches. Lastly, the ESCOs discussed ways to identify "triggers" that might get customers to identify parts of their buildings needing retrofit that are ripe for new technology approaches.

The participants identified potential solutions to these issues that involved change both to ESCO operations and the GSA ESPC process. Solutions varied from holding collaborative workshops, to modifying traditional operational rules of thumb, to creating mock-ups to test new technologies.

04: Operations and Maintenance

Today, GSA buildings typically contract operations and maintenance (O&M) services on a per-equipment or per-system basis through a performance-based contract to small businesses. While the GSA and ESCOs both see the value of transitioning operations and maintenance into whole-building performance contracts, O&M provisions were only included on certain new systems in NDER projects. Reasons for this center largely around competing internal goals and the small business contracting requirement. While this remains unaddressed, the GSA is potentially missing out on a key opportunity to achieve deeper savings in its NDER projects, since O&M savings can sometimes be as large (or larger than) energy cost savings and in many cases enable project teams to afford a greater number of building efficiency measures.

Breakout group participants identified immediate trends that make the next couple of years an opportune time to address O&M contracting issues. The GSA is undergoing a Building Maintenance and Operations Federal Strategic Sourcing process to centralize decision making and standardize processes around O&M. Emerging efficient building technologies are increasingly requiring O&M expertise that many local contractors do not have, which ESCOs are well positioned to fill.

Breakout group participants brainstormed a range of strategies that allow GSA to begin quickly assimilating O&M into performance contracts. Given pressure to demonstrate upwards of 50 percent energy savings and a limited window to impact the federal strategic sourcing process, participants recommended opening existing NDER task orders to incorporate O&M in one or two current projects this year, so lessons and benefits can be extracted and documented in time to establish clear O&M protocol in the next wave of NDER projects.

05: Project Economics

This breakout session brainstormed how ESPCs could be combined with appropriated renovation funds. The group discussed the difficulties associated with combining these two types of contracts, including:

- coordinating and communicating between both contractors,
- developing an appropriate building application for this combined process,
- determining ownership of risk, and
- reconciling the existing contract procurement process with the GSA.

The group then brainstormed possible solutions to address these barriers, many of which stemmed from past or existing projects with which the GSA and ESCOs were involved. Two of the most discussed solutions were the creation of a project manager role that would coordinate between the ESCO and renovation contractors, and the possibility of combining the energy efficiency and renovation contracts through a partnership agreement.

This dual contract process could incentivize both contractors to help each other reach the guaranteed energy savings embedded in their combined contract. The group also discussed the ability of the GSA to contribute in this joint contract process. The GSA could preselect projects within its portfolio that would be conducive to this dual-contract process. The GSA could also create guidelines for combined renovation and ESCO contracts to help spark this process. While these ideas can start the conversation, there are regulatory and contractual issues that need to be further explored.

NEXT STEPS

In May 2014, GSA released a notice of opportunity for GSA/PBS Nationwide Deep Retrofits Round 2 Program (NDER 2 Program). This included 49 buildings spanning 5 different regions with a total of over 19.6 M square feet. Preliminary Assessments are currently underway and contracts are expected in the next year.

MOTIVATION

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MOTIVATION

Buildings consume 42 percent of the nation's primary energy and 72 percent of its electricity—more than any other sector. At current trend and performance levels, fossil fuel use in commercial buildings will *increase* by 2050, when 65 percent of today's commercial square footage is predicted to be still standing. These facts motivated President Obama to enact the Presidential Performance Contracting Challenge (PPCC) in 2011 instructing the federal government to enter into at least $2 billion in energy saving performance contracts to achieve deep energy savings at no net cost to taxpayers. The importance of the PPCC was underscored when it was renewed in May 2014, announcing an additional $2 billion goal in federal energy efficiency upgrades.[2] In response, the General Services Administration, the Office of Federal High-Performance Green Buildings, and the Federal Energy Management Program launched the National Deep Energy Retrofit Program. Agencies are currently working with DOE's Federal Energy Management Program to identify a pipeline of additional project commitments to further reduce energy use through 2016.[3]

WHAT IS THE GSA NATIONAL DEEP ENERGY RETROFIT PROGRAM?

The NDER Program's goal is to demonstrate best practices to achieve deep energy retrofits through self-financing projects within the federally accepted financing term of 25 years or less. The ultimate vision of the NDER project is to create buildings that achieve net-zero energy consumption. The NDER also aims to facilitate the use of innovative technologies including aggressive load reduction measures, increase occupant engagement, include operations and maintenance measures, and increase the use of renewable energy. Round 1 of the NDER program included 20 facilities representing more than 20 million square feet throughout six regions. Round 1 kicked off in March 2012 and projects were awarded in late 2013/early 2014. Round 2 kicked off in May 2014.

DEEP RETROFIT POTENTIAL

The goal of deep retrofits is to reach greater than 50 percent energy savings using an integrative design and analysis process. Beyond just the energy savings, deep retrofits can reduce absenteeism, positively impact employee health, raise occupancy rates, increase building rental and sales value, decrease financial and regulatory risk, and provide value to the electricity system.[4]

Importantly, these factors can help align potentially differing priorities between investors, building managers, ESCOs, and building occupants. RMI labels these often-overlooked factors "deep retrofit value," which goes beyond a traditional emphasis on energy cost savings alone.

[2] "FACT SHEET: President Obama Announces Commitments and Executive Actions to Advance Solar Deployment and Energy Efficiency." The White House, Office of the Press Secretary, May 9, 2014. http://www.whitehouse.gov/the-press-office/2014/05/09/fact-sheet-president-obama-announces-commitments-and-executive-actions-a

[3] "Obama Administration Expands Better Buildings Challenge to Multifamily Houses, Launches New Programs to Boost U.S. Energy Efficiency," U.S. Department of Energy Efficiency & Renewable Energy, Federal Energy Management Program, News & Events, December 3, 2013. http://www1.eere.energy.gov/femp/news/news_detail.html?news_id=21106

[4] *How to Calculate and Present Deep Retrofit Value*, Rocky Mountain Institute, 2013 http://www.rmi.org/retrofit_depot_deepretrofitvalue

The top success factors to achieve deep energy retrofits include:

- pursuing the right steps in the right order by first working to reduce building loads, thus allowing major systems to be downsized;
- piggybacking on other planned building upgrades, such as mechanical system upgrades or change of use, to capitalize on synergistic savings;
- using focused analysis techniques such as the technical potential exercise and integrative design to evaluate the life-cycle cost analysis of bundled measures;[5]
- engaging occupants; and
- quantifying the deep retrofit value.

For free downloadable guides and more information on deep energy retrofits, please refer to rmi.org/retrofit_depot.[6]

OVERVIEW OF THE WORKSHOP

To build upon the collaborative efforts between the federal government and the ESCOs thus far, the GSA hosted a meeting on April 2, 2014 in Golden, Colorado. This meeting provided a 360-degree perspective to reflect on past successes of the NDER Program and, more importantly, to look forward to future improvements—including process changes, new technologies, innovative financing approaches, or a completely new approach—to get closer to consistently achieving deep retrofit projects.

The day opened with audience feedback on the most important areas both the GSA and the ESCOs should focus on in the ESPC process to achieve deep energy savings. A summary of responses is provided below. Next, the GSA and FEMP representatives presented the overarching vision of the NDER program, and the GSA shared lessons learned from the first round of ESPC projects (the presentations are available in Appendix 3). Then, each attendee participated in two of five breakout groups focused on barriers and solutions to specific aspects of the ESPC and project engagement process. The breakout groups were the primary opportunity for participants to openly discuss barriers, creatively brainstorm ideas, and collaboratively develop solutions. The day concluded with a presentation from each breakout session group followed by a recap of the day from the GSA leadership along with goals for future progress.

[5] The technical potential is the building's lowest possible energy use given today's technology before laying in constraints such as cost, constructability, and time. It gives the engineering/implementation team a far-reaching target and drives at integrative design.
[6] Free guides are titled: *Managing Deep Retrofits, Identifying Design Opportunities, and Building the Business Case*. They are available from: http://www.rmi.org/retrofit_depot_download_the_guides

MOST IMPORTANT IMPROVEMENT AREAS

To facilitate an open discussion and encourage bold improvement of the ESPC process, participants were posed the following question:

"Recognizing that deep retrofits will be a joint effort between the GSA and ESCOs, identify the most important area for both organizations to improve to make deep federal ESPCs successful."

While the responses varied, the following three key themes emerged surrounding engagement, planning, and operations.

Management and Engagement

- Engage building occupants early and often to educate, train, and foster buy-in
- Engage all stakeholders throughout the process via continuous communication and collaboration
- Improve management of timelines to hold all sides accountable
- Know the end goal and work to get there from the initial baseline
- Lengthen timeframes and simplify processes
- Make more case studies and lessons learned available

Planning

- Combine ESCO and the GSA human capital to overcome constraints or lack of knowledge enabling projects to move forward
- Consider capital planning across the board including retrofit and renovations to find potential triggers to enable deep retrofit savings
- Understand the risk to ESCOs and their underlying economic metrics
- Develop and accept alternative funding streams
- Plan from the start to get the right people on board and make the project a priority

Operations

- Think of projects as a long-term engagement rather than a single task
- Retain bundles of energy conservation measures versus singling them out
- Expand beyond a single building as a stand-alone system; instead consider a portfolio to consolidate impacts
- Embrace flexibility to allow for new approaches and technologies
- Accept longer paybacks

Armed with the overarching goal of attaining deep energy retrofits and an overview of potential barriers and process improvements, the meeting dove more deeply into key contributing issues.

NDER ROUND 1 PROJECT RESULTS

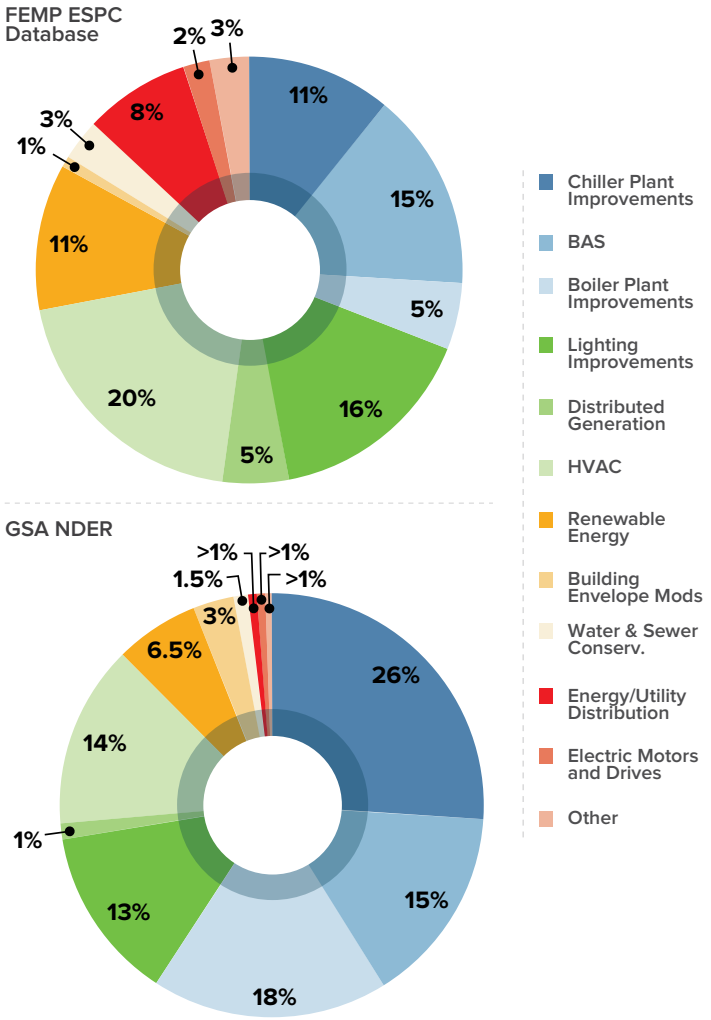
John Shonder of the Oak Ridge National Laboratory shared an overview of the results from $1 billion in projects awarded as part of the GSA's most recent round of NDER projects. His data highlighted that projects within the GSA's NDER program achieved statistically significant higher energy savings than those reported by other agencies, 38 percent on average compared to 21 percent.

His study showed that utility costs, baseline energy use intensity, amount of "one-time savings," and age of the building/equipment did not relate in a statistically significant manner to the percent energy savings achieved over the baseline.

However, several other factors were necessary to achieve deeper energy savings including selecting buildings that have not undergone recent energy retrofit projects, emphasis from the federal government agency involved, a thorough audit process to identify ECMs, and an integrated design approach.

Sharon Conger from the GSA shared her perspective on the NDER process, findings, and lessons learned. GSA awarded 10 task orders under the NDER program, valued at $172 million, with expected energy savings ranging from 16–100 percent, averaging 38 percent.

Figure 1: **Energy Conservation Measures Used in ESPC and NDER**



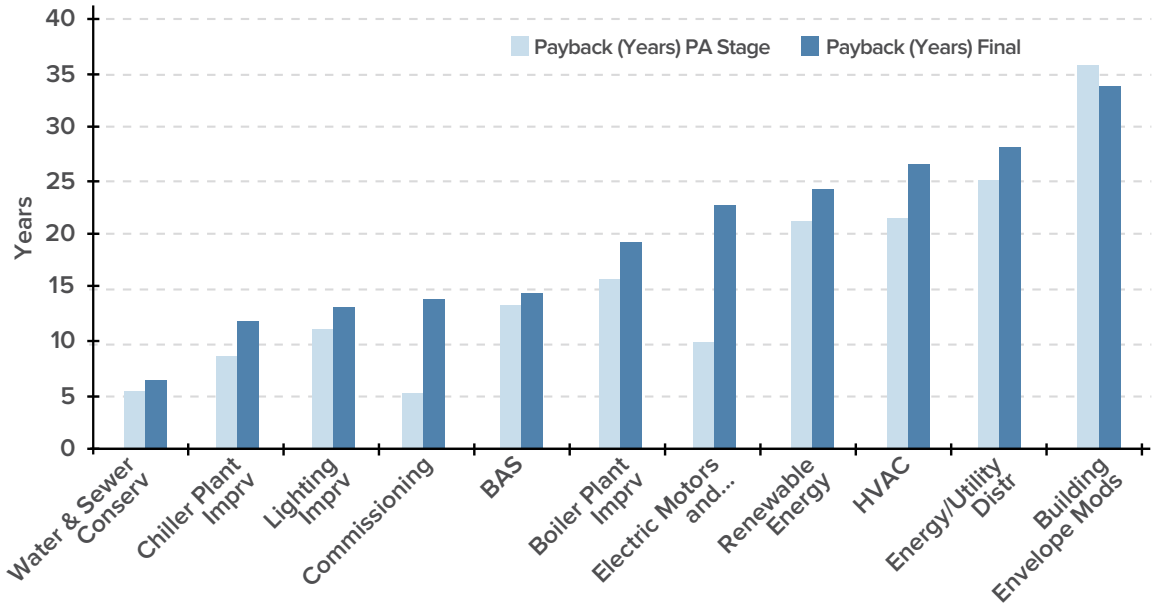
ECMs used by past ESPC projects (top chart) from the FEMP ESPC Database compared to those used in NDER projects. The percentages show the distribution of investment by ECM. (e.g., 28% of the total investment for the NDER projects was spent on Chiller Plant Improvements). Building envelope modifications and boiler plant improvements were the two ECM's that increased the most (3x increase for both).

One of the biggest developments included the creation of a project management office comprised of portfolio, budget, finance, energy, contracting, and regional representatives to:

- provide consistent guidance and capture best practices,
- provide subject matter experts to support regions during ESPC development,
- centralize contracting and executive project management for NDER,
- provide quality assurance to regional ESPC contracting, and
- develop systems to ensure essential ESPC administration during contract performance periods.

Sharon then shared specific statistics and lessons learned from each stage of the project award process. Details of timing and lessons learned are presented in Table 1. A detailed comparison of ECM paybacks in the PA and final phases are shown in Figure 2.

Figure 2: **Projected payback in the PA phase versus final payback**



This chart illustrates the (sometimes) wide discrepancy between the estimated savings provided during the PA phase of projects and the actual payback of those measures. Almost unanimously, the payback was longer in the final results, indicating savings projections in the PA phase are overestimated.

Table 1: **Statistics and lessons learned from the project award process**

PHASE	AVERAGE LENGTH (DAYS)	ISSUES AFFECTING LENGTH OF PHASE	LESSONS LEARNED
Project Selection	128	• Confusion on the Notice of Opportunity	
Preliminary Assessment (PA)	73	• Cost estimates and paybacks were significantly different than actual • Calls were spent talking about logistics rather than project specifics	• Have a preset agenda on what to discuss weekly • Provide more information and determine utility escalation rates at PA kickoff
PA to Notice of Intent to Award (NOITA)	82	• The time needed to review the PA and complete multiple rounds of agency questions and ESCO answers • Significant concerns about the commitment of NOITAs • Concerns about the reality of the cost and savings projected • Cost of project development causing concern with moving forward	• Limit questions and responses • Ensure there is buy-in for the deep retrofit goal before receiving PAs • Do not allow the ESCO's project development fee to drive the ECMs selected • GSA should balance available resources with the timing and quantity of ESPC projects in development or construction
NOITA to Investment Grade Audit (IGA) Kick Off	21	• Incomplete work remaining on issuing NOITAs or cancellations	• The GSA should balance available resources with the timing and quantity of ESPC projects in development or construction • Not enough time was planned for the GSA logistics
IGA Kick Off to 90% IGA Receipt	159	• Requesting a 50 percent IGA with a set and agreed upon baseline • Requesting measurement and verification (M&V) set by 90 percent • Moving half the contracts to different Contracting Officers between 50 percent and 90 percent IGA • Bringing the GSA cost estimators on board after receipt of the 50 percent IGA	• Security clearances need to be started early in the PA • Tenant coordination time should be built in to the schedule • Baseline and M&V meetings should be scheduled outside of regular meetings • A cohesive comment form should be kept throughout all the reviews • There is need to hire a dedicated Contracting Officer with contracting support • There will be significant price and payback changes at the 90 percent IGA • The GSA needs the interim IGA document as the 50 percent IGA showed some surprises in ECMs that are needed to start cost estimator work
90% IGA to Final Proposal	79	• Finalizing the M&V • Using the 90 percent IGA during price negotiations • Reviewing the comment sheet to ensure all comments were closed out • Shifting focus to contracts needing award near the beginning of this phase causing others to not move as fast • Internal GSA legal reviews of proposed task orders	• Hard deadlines are effective at motivating the government and ESCOs • The GSA independent cost estimates are critical • Comment sheets help keep the GSA on track and focused • Rebates and incentives must be paid to the GSA • Renewable energy certificates are no longer viable due to the Armed Services Board of Contract Appeals decision
Final Proposal to Award	25	• Legal review of the financing terms and conditions • Contracting reviews and documents • Final coordination between contracting, finance, and legal in each region	• Add appropriated funds to make deals more attractive • Legal is not familiar with the financing terms and conditions used • Centralized contracting reviews equate to quicker reviews • Better define roles and responsibilities for this stage

BARRIERS & SOLUTIONS

B&S

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BARRIERS & SOLUTIONS

Over the course of the day, each attendee participated in two breakout groups to tackle the underlying issues posed by the challenge raised at the start of the workshop. The overarching objective of each group is presented below, followed by a detailed summary of what each group accomplished during the workshop.

01: Project Delivery brainstormed specific and actionable strategies to accelerate the PA phase and increase its accuracy.

02: Transitions/Team Dynamics discussed the transitions between the different phases of a project, particularly as a project goes from project development to implementation/construction and from commissioning/acceptance to the performance period.

03: Integrative Design and Innovative Technologies examined and brainstormed effective integrative design process strategies and innovative ECM technologies.

04: Operations and Maintenance helped develop a strong rationale for including building O&M savings within more ESPCs.

05: Project Economics explored the viability of combining renovation and energy efficiency upgrades while obtaining appropriated funds for non-energy related improvements. The group also brainstormed approaches to these types of arrangements that would minimize risk to the federal government.

01: PROJECT DELIVERY

In efforts to provide more time for integrative design during the IGA phase, the GSA requested the PA occur in 30 days, yet the actual PAs from NDER projects averaged 70 days. Since the PA information provided by the ESCO often varied, sometimes significantly, from the results presented to GSA in the IGA, it caused delays in the overall process.

The purpose of the PA is to provide GSA a rough idea of the savings potential. It also allows the ESCO to determine if a project is viable, roughly assess potential project costs and savings, and begin creating effective team processes with building managers. Differences between the PA data and the IGA data surprised the GSA regions and building managers, and generated concerns on overall accuracy.[7]

A major concern was trying to weigh the balance between a faster and yet more accurate PA submission. The group agreed that incorporating ranges of savings (rather than specified savings numbers), receiving more transparent guidance from the GSA on how to present savings,[8] and helping guide PA duration using a matrix based on building size and system complexity could all lead to a manageable and effective project delivery process.

[7] Given the preliminary nature of the PA, inaccuracy can be expected. A possible solution to this dilemma is to recast the function of the PA by eliminating most or all of the scheduled content and instead focus on answering the question: "Does it appear viable?" This approach would shift the risk of failing to produce a viable project to the ESCO.

[8] The GSA is still exploring the preferred approach to resolve this issue. Possibilities include incorporating more ECMs in the PA while narrowing the IGA, including less ECMs in the PA and expanding the IGA as a result, or an entirely different approach.

The group also discussed how FirstFuel or other similar analysis tools might impact the PA phase. ESCOs generally agree that these could help, but don't believe they can replace ESCO data collection, analysis, and team-building activities with the client agency. They also requested clarity on the GSA's preferred method of using analysis tools to inform the PA phase through the NOITA. They wanted to be sure that if they provided estimates using these tools, the ESCO would still retain the ability to decline the project.

The group came away with the following questions:

1. Can analysis by virtual audit software tools accurately examine energy conservation measures and lead to ESCO selection? Conversely, will it give ESCOs enough confidence in a project's potential?
2. What level of asset detail would virtual audit software provide?
3. Does an analysis by virtual audit software provide enough information to lead to a notice of intent to award?
4. Will there be an ability to update the recommended ECM list and associated development costs following a virtual energy audit?

Table 2: **Summary of Findings**

ISSUES/BARRIERS	SOLUTIONS/BEST PRACTICES	KEY PARTIES
Differing expectations of PA (time/outputs)	• Educate the GSA regions that PA document is not a proposal. • GSA/FEMP to produce a matrix of project size/complexity to guide PA report length and duration of PA phase. • Define whether the PA should include a wider range of ECM's to be narrowed in the IGA phase or include a narrow range to be expanded in the IGA phase.	GSA ESCO
Loss of confidence because of inaccuracy	• Estimate a range of savings for each bundle. • Use both project level economics, instead of by individual ECM.	GSA/FEMP to define procedures
Uncertainty of future ancillary cash flows (i.e., will GSA let ESCO's claim cashflows such as avoided costs)	• Improve transparency of expectations during PA phase. • Build in assumptions of cost avoidance early.	GSA
PA Phase working with virtual audit software	• Key elements of the PA phase must be maintained (e.g., qualify and strategize projects over time). • Integrate with asset management.	GSA

02: TRANSITIONS/TEAM DYNAMICS

Maintaining team consistency and continuity is a critical element for any successful ESPC project and even more important for deep energy retrofit projects where new processes (e.g., integrative design) and technical innovation require full buy-in and understanding from start to finish. This consistency needs to occur on multiple levels including:

- Consistency of staff within an ESCO's team from project development to implementation and even into the performance period.
- Consistency of staff, data, and messaging from the GSA when bridging from its central office staff to its regional office decision makers and contracting officers. The central Project Management Office (PMO) has had success in overcoming this gap and continues to work at improving communication.
- Continuity of information sharing. At project inception, the information that comes from within the GSA and externally from the ESCO about what an ESPC is and how it works needs to be consistent to give prospective agencies and new stakeholders within those agencies confidence.

Consistency can be challenging due to the long life cycle of ESPC projects. To help overcome this challenge, all stakeholders should strive for continuity of staff and information, but when turnover is unavoidable, they need to design comprehensive project handoffs. A more prescriptive idea was to add staff consistency as a requirement in the ESPC contract.

Communication throughout the project will also aid the team dynamics. The ESCO needs to make sure the intent of the project and big wins get continually communicated throughout the performance period. A best practice that the U.S. Department of Veteran's Affairs uses is requesting the ESCO to issue a quarterly newsletter during construction to keep all parties informed of project progress. Post construction, the ESCO provides a M&V report—the Annual Verification Report—that illuminates high-level successes. These could be further improved by adding a concise executive summary of the project that discusses additional successes (e.g., more savings achieved than were initially guaranteed). Another recommended best practice was to have monthly, high level briefings during the PA, IGA, and construction phases with all stakeholders including brief reports to ensure all parties align with stated expectations.

A final idea to increase communication of information is to have the GSA semi-annually publish a list of all ESPC projects showcasing big project highlights and updating readers on general ESPC information.

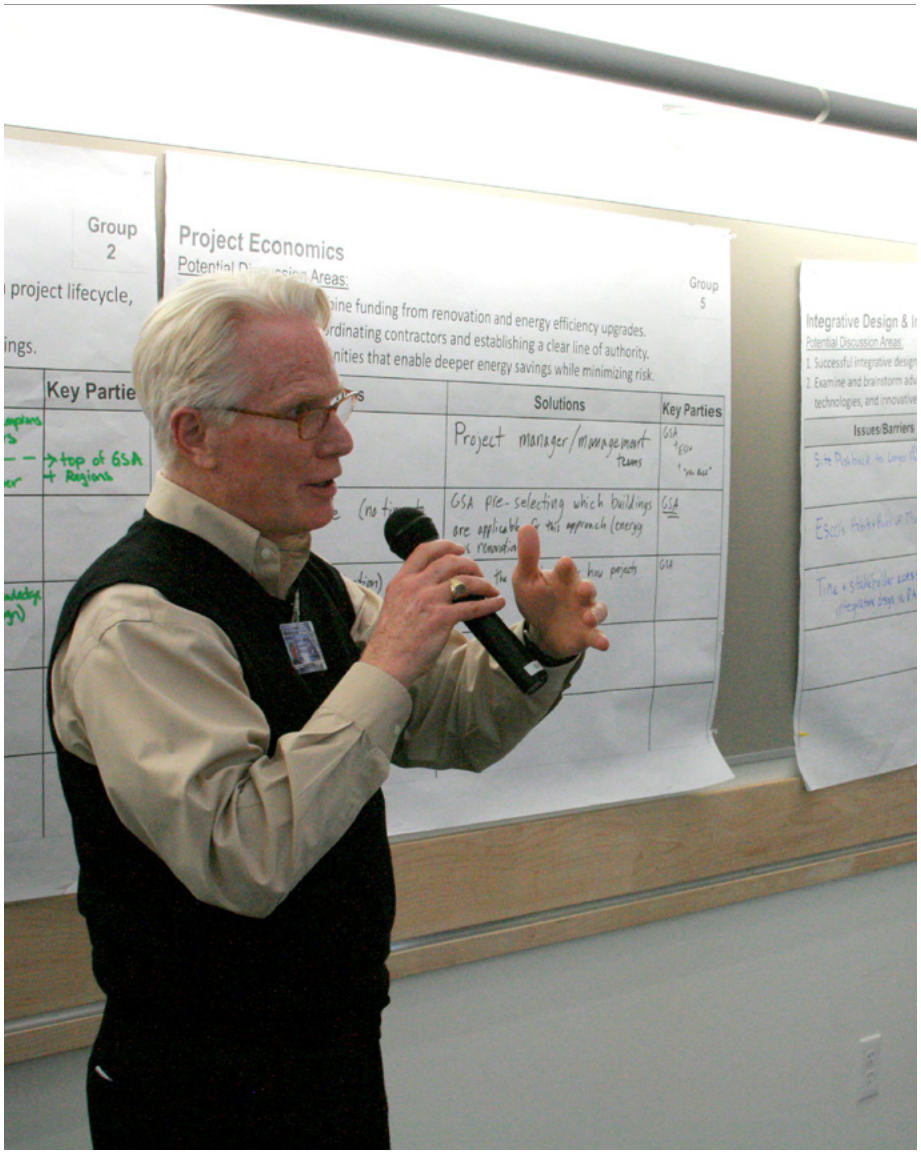

Table 3: **Summary of Findings**

ISSUES/BARRIERS	SOLUTIONS/BEST PRACTICES	KEY PARTIES
Lack of continuity of core team, both from the GSA and ESCO	• Communicate transitions (staffing changes, building changes, and organization mission changes) for agency or ESCO. • Provide thorough institutional knowledge transfer during transitions (and potentially require sign off). • Maintain ESCO staff continuity from project development through design, construction, and the performance period. • Outline project schedule early (the GSA) so the ESCO and GSA staff from the region can allocate resources to stay with the project throughout. • Stagger projects to balance PMO resources.	Project Management Office GSA ESCO
Change management framework for the GSA	Key aspects of the framework: • Maintain consistent resourcing standards. • Ensure good communication within all levels of the GSA (national, regional, contracting officers, PMO, agencies). • Create champions and early adopters. • ESCO to provide a one-page summary that is delivered quarterly during construction and for at least the first year of the performance period.	GSA ESCO

03: INTEGRATIVE DESIGN AND INNOVATIVE TECHNOLOGIES

Deep retrofit projects require a high level of integrative design, and where appropriate, should use advanced conservation measures and increase the use of innovative technologies not often used in GSA projects (see Table 4).

Table 4: **Brainstormed list of innovative technologies**

Chiller optimization	Desktop notifications for energy use updates	Transpired solar collector	Web-based enterprise controls and monitoring
Thermochromic windows	Smart power strips	Combined-heat and power	Green gas microturbines
Individually addressable lighting/ controls	Low voltage DC grids	Daylight ducts	Phase change materials
Building integrated photovoltaics	Grid-connected distributed generation	Load metering and smart meters	Energy storage

As the group discussed these technologies, participants began exploring the barriers to employing them in the context of the GSA process.

- Many of the barriers examined were inherent to the nuances of the current PA process.
- Another barrier was rooted in the requirement to show energy savings. Some technology may generate other savings or enable more advanced technology deployments or capabilities downstream. Therefore, allowing technology-generated cost offsets could enable more innovative technology deployment.
- The ESCOs discussed ways to help customers identify "triggers" or indicators that a building is at a good point for a deep retrofit.

The participants identified potential solutions to these issues that involved change to both ESCO operations and the GSA ESPC process.

The ESCOs agreed that it would be important to hold collaborative workshops with all stakeholders, including the GSA, building occupants, and potentially equipment vendors to brainstorm ideas and outline goals that might benefit from innovative approaches. This might require changes to the current PA and IGA process since it is fairly competitive, which does not allow ESCOs to meet with individual stakeholders. Rather, the current process results in stripping out individual ECMs, which stifles innovation. In addition, the customer does not typically share the final picture of its building dynamics until the final ESCO selection has been made—again stifling innovative approaches.

Possible approaches to address these PA phase nuances include skipping the PA phase and going right to a NOITA,[9] or finding technologies that meet the specific customer goals, and then moving to the IGA phase to prove the solutions and concepts. Another approach is to simply redefine the PA by doing a 30%-50%-90% IGA, in other words submit the IGA report when it is 30 percent, 50 percent, and 90 percent complete (where the 30 percent IGA replaces the PA). This frees up the PA expenses to be used for a more detailed IGA.

Participants discussed that it might be necessary for the GSA and ESCOs to identify creative funding opportunities and to educate customers on the merits of accepting new technologies despite potentially longer paybacks. The ESCOs have begun to see bottom-line value from advanced technology approaches. However, there is a lack of expertise on these technologies among the GSA customers. It was suggested that the NDER projects could benefit from the GSA assisting the ESCOs by informing the GSA building customers on the longer-term promise of new technology approaches rather than simply focusing on a short payback period. Another route could be to allow bundling of long payback items to shorten their overall payback.

Finally, the ESCOs recognized that their traditional rules-of-thumb design guidance methods need modification through culture change, training, and new partnerships to use these new approaches. Rather than relying on a standard toolkit, an embrace of integrative design and more frequent customer workshops could unlock new approaches that deliver greater energy savings. Similarly, federal government agencies seeking ESPCs could benefit from greater interagency communication on successes of incorporating alternate design strategies.

Table 5: **Summary of Findings**

ISSUES/BARRIERS	SOLUTIONS/BEST PRACTICES	KEY PARTIES
Site pushback to longer energy payback and new technology	• The GSA and ESCOs to create demand, educate clients on value. • Early identification of asset valuation/creative funding approaches. • Install mockups or phase in demonstration areas of technology options during IGA phase.	GSA ESCO Client
ESCO habits and rules of thumb	• Culture change • Training • Partnerships and high performance design stakeholders. • Work with manufacturers to learn new applications, savings potential.	ESCO
Time and stakeholder access for integrative design planning in PA phase	• Redefine the PA phase (or remove). • Allow access and additional time for onsite meetings/workshops with stakeholders.	GSA ESCO FEMP

[9] If a better way to establish a common understanding and expectations between ESCOs and the GSA is found, eliminating the PA phase could become an eventual goal. If not eliminated, the process could be reengineered to shorten it to less than 20 pages. Its sole focus then is on determining whether it appears to be a viable project that would warrant the full IGA.

04: OPERATIONS & MAINTENANCE

Including operations and maintenance measures within ESPCs can currently only be executed in a few specific instances. However, O&M savings are a significant opportunity to enable deep energy savings, particularly if O&M contracts can be adjusted to include the ESPC project or awarded for the whole building.

Today, GSA buildings typically contract O&M services on a per-equipment or per-system basis. Yet, both the GSA and the ESCOs see the value of evolving away from this system-by-system approach and instead incorporating O&M into whole-building ESPCs.

Table 6: **Anticipated benifits from incorporating O&M into whole-building ESPC's**

POTENTIAL BENEFIT OF INCLUDING O&M	DESCRIPTION
Cost-effective deep savings	• Represents an opportunity to achieve great returns on investment, in many cases through low-level everyday practices or remote monitoring. • Allows the project to afford more efficiency measures and further increase energy cost savings.
Streamlined (and less expensive) contract negotiation and management	• Results in improved and more efficient management of O&M contracts.
Comprehensive O&M coverage	• Ensures there are no forgotten components or systems, and achieves greater building performance by addressing overlaps between systems. This in turn could lead to greater savings from avoided expenditures in operations, maintenance, and emergency equipment repair and replacement.
Seamless integration between O&M and M&V	• Contributes to improved long-term building performance. • Reinforces successful existing ESPC delivery on retro-commissioning and M&V plans. • Reduces risks to both the GSA and ESCOs.
Non-energy savings	• Serves as a test case for monetizing non-energy savings in ESPCs.

While the GSA and ESCOs both see the value of transitioning O&M into whole-building performance contracts, no NDER ESPCs to date have included O&M provisions for building efficiency. Reasons for this include:

- The GSA currently uses its O&M contracts to fulfill a considerable portion of its required small business utilization. Even though an ESCO may, in turn, subcontract a small business and meet the intent of the law, this wouldn't meet regulatory statutory requirements.
- Disparate existing O&M contract durations are not necessarily synced up with ESPC timelines, which presents an additional complication for coordinating new contracts.
- Longevity of savings is hard to guarantee in ESPCs when ESCOs have limited control over ongoing maintenance and operations, building usage patterns, or future evolution in building uses.

While this and other issues remain unaddressed, the GSA continues to miss out on a key opportunity to achieve deeper savings in their NDER projects. O&M savings can sometimes dwarf energy cost savings, enabling project teams to afford a greater number of building efficiency measures.

Group participants identified some immediate trends that make the next few years an opportune time to address these issues. First, NDER's current emphasis on deep retrofits makes a strong case for incorporating O&M sooner rather than later. Besides freeing up capital to pay for more ECMs, the GSA is currently undergoing a Building Maintenance and Operations Federal Strategic Sourcing reform process to centralize decision making and standardize processes concerning O&M. Any solutions identified at this time could be codified through the strategic sourcing process to incorporate them into future project processes. In addition, controls equipment and building data collection software are technically mature enough today to enable effective remote diagnostics, and to some extent, remote control. Good maintenance is no longer solely dependent on local operators. ESCO expertise is especially welcome in the operations and maintenance of new and emerging efficiency technologies that require expertise that existing O&M contractors may not possess.

Breakout group participants brainstormed a range of strategies for the GSA to begin quickly assimilating O&M into performance contracts. Possible strategies include:

1. Retain small business contracts through multi-party agreements:
   - Incorporate ESCO services by creating two- or three-party contracts that effectively distinguish the O&M scope and role of ESCOs from that of local contractors. ESCOs should be assigned quality control and review responsibilities over local contractor work, and the GSA should act as adjudicator when necessary. Equipment and systems with simple maintenance needs should be retained under local contractor purview, while O&M for more complicated building systems should be assigned to the ESCO.

OR

2. Amend scope of ESPCs to use ESCOs as turnkey O&M providers:
   - Where applicable, allow current O&M contracts to expire and contract ESCOs as turnkey O&M providers. In these instances, O&M could be treated as a continual improvement service, much like M&V is often currently scoped in ESPCs. Smaller O&M contractors will still be able to work with the GSA as subcontractors to the ESCOs, however there are benefits to having the ESCOs manage O&M and own any O&M risk related to the ESPC project. There are also risks that come along with this approach.

3. Make the case with near-term demonstration projects:
   - Expand one or two of the existing NDER project task orders to include whole-building O&M as part of the ESPC. Existing NDER projects are a good place to test pilot ESPC O&M contracts since ESCOs are already familiar with the building systems, decreasing the cost of transferring building O&M knowledge.
   - Provide practical "proofs of concept" for accelerating whole-building ESPC practices.

Table 7: **Summary of Findings**

ISSUES/BARRIERS	SOLUTIONS/BEST PRACTICES
Conflicts with use of dedicated O&M contractors to fulfill small business utilization requirements	• Create 2- or 3-party agreements that incorporate O&M into ESPCs, but define ESCO role and responsibilities as distinct from those of dedicated O&M contractors. *or* • As existing O&M contracts to expire, draft ESPCs to incorporate ESCO as the turnkey building O&M provider. This leaves the option open for the ESCO to subcontract the existing O&M provider to perform all or part of the building's O&M.
Longevity of savings difficult to guarantee with limited ESCO control over daily O&M	• Grant ESCO control over O&M or define criteria under which ESCO would take over O&M. • Clearly establish shared risks between the GSA and ESCOs (and potentially local O&M contractors); define responsibilities of all parties. • Establish clear protocol for performance verification, including defining performance criteria and establishing how compliance with these standards will be enforced.

05: PROJECT ECONOMICS

Combining renovation and energy efficiency upgrades—and coordinating their respective contractors—are strategies that allow ESPCs to help improve the energy savings of a building renovation while obtaining appropriated funds for the non-energy related improvements.

The Project Economics group focused on three main subjects: best practices for coordinating contractors and establishing a clear line of authority, collaboration opportunities that enable deeper energy savings while minimizing risk, and ideas for combining renovation and energy efficiency upgrades.

The discussion began with a contracting approach being explored by the U.S. Army Corps of Engineers (the Corps) that highlighted the imperative of strong project management to successfully combine renovations and energy efficiency upgrades. Under this approach, the Corps would act as a contracting agent that resolves disputes, gives stakeholders direction, and leads a joint-occupancy agreement between the ESCO and a separate renovation contractor. The Corps would work with the ESCO upfront to design the energy and renovation portion of the project, eliminating the need for the ESCO and renovation contractor to coordinate designs (a bid-build for the design contractor). This example continued to be referred to over the course of both sessions.

Participants shared the importance of determining responsibility upfront—especially in terms of design liability. This is especially evident in coordination and scheduling because stakeholders often cannot proceed with their component(s) of a project until another stakeholder completes a portion of his or her work, introducing financial risk for late project completion.

Participants recommended the GSA clarify whether the energy baseline should be based on pre- or post-design. They agreed that the pre-design baseline makes the most sense to incentivize higher performance. ESCOs suggested that if post-design baselines were used, they would be less inclined to be involved since they would have little to gain from the project.

An issue that ESCOs consistently raised was their desire to work with contractors of their choosing. Perhaps even more importantly, they do not want to be forced to work with contractors with whom they have had poor prior experiences. This discussion centered on the risk presented by incompetent low bids and firms with histories of subpar performance.

The notion of contractor-ESCO shared risk emerged from the perspective of deadline completion: ESCOs suggested that the GSA partner with them to assume some of this risk so that if the renovation contractor were to prevent an ESCO from achieving its work on time, the GSA would have to absorb the related financial losses.

Participants identified options to remove potential sources of conflict from contractual arrangements and create greater alignment of incentives and transparency. By the end of the session, the group came to agreement that the best option is to pursue a dual contract process with an incentive that follows the guidelines set forth by the GSA.

Table 8: **Summary of Findings**

ISSUES/BARRIERS	SOLUTIONS/BEST PRACTICES	KEY PARTIES
Coordination	• Create a project coordinator role that coordinates between the ESPC and renovation contractors.	GSA ESCO (ESPC Contractor) Renovation Contractor New Project Coordinator
Uncertainty of Project Suitability	• Determine which projects have the opportunity to implement an ESPC and renovation contract. • Pre-select projects within the GSA's portfolio that would be conducive to a joint contract process.	GSA
Responsibility and Risk Mitigation	• At the onset of the process, clarify contractor roles and liabilities. • Identify contractor design responsibility for each aspect of the project. • Create an organizing entity providing design assistance and scheduling coordination.	GSA ESCO (ESPC Contractor) Renovation Contractor
Existing Contracting Process	• Combine ESPC and renovation contracts into a joint contract. • Incentivize both contractors to achieve the guaranteed savings embedded in their joint contract. • Define project acceptance criteria so all parties understand the joint procurement process. • Establish guidelines for a successful joint contract.	ESCO (ESPC Contractor) Renovation Contractor GSA

APPENDIX 1

ACRONYM LIST

A1

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ACRONYM LIST

ECM	Energy conservation measure
ESCO	Energy service company
ESPC	Energy saving performance contract
FEMP	Federal Energy Management Program
GSA	General Services Administration
IGA	Investment grade audit
M&V	Measurement and verification
NDER	National Deep Energy Retrofit
NOITA	Notice of intent to award
NREL	National Renewable Energy Laboratory
O&M	Operations and maintenance
ORNL	Oak Ridge National Laboratory
PA	Preliminary assessment
PMO	Project management office
PPCC	Presidential Performance Contracting Challenge
RMI	Rocky Mountain Institute

APPENDIX 2

CASE STUDIES

A2

Image courtesy of shutterstock.

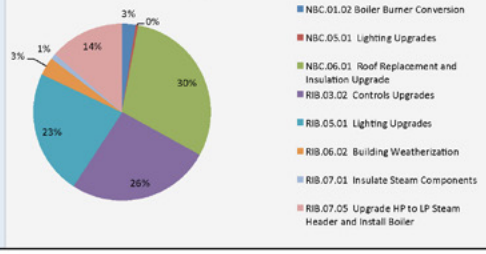
Region 1, NDER ESPC

- **Square Footage:** 399,976
- **Investment Value:** $3,470,114
- **Annual Energy Cost Reduction:** $164,936
- **Payback Period:** 20 Years, plus 1 year for construction
- **M/BTUs/year:** 4,330
- **Energy Reduction Percentage:** 16%
- **Appropriated Funds included:** $990,694
- **ESCO:** Siemens Government

Buildings Included:

- U.S. Custom House (MA0076ZZ)
- Abraham Ribicoff Building (CT0053ZZ) (pictured)

Investment Value, by Detailed ECM Category



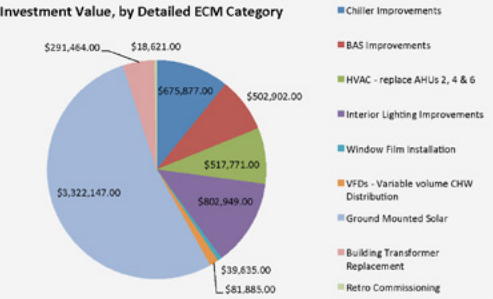
Region 2, St. Croix NDER ESPC

- **Square Footage:** 76,227
- **Investment Value:** $6,372,000
- **Annual Energy Cost Reduction:** $509,777
- **Payback Period:** 19 Years plus, 13 months construction
- **M/BTUs/year:**3,286
- **Energy Reduction Percentage:** 100%
- **Appropriated Funds included:** $118,750
- **ESCO:** Schneider Electric

Buildings Included:

- Almeric Christian Federal Building

Investment Value, by Detailed ECM Category



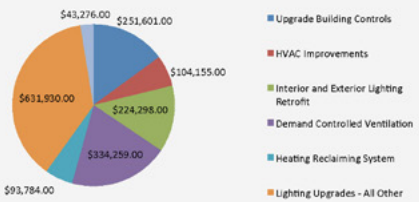
Region 2, NDER ESPC

- **Square Footage:** 487,557
- **Investment Value:** $1,853,067
- **Annual Energy Cost Reduction:** $164,936
- **Payback Period:** 19 Years, plus 1 year for construction
- **M/BTUs/year:** 3,258
- **Energy Reduction Percentage:** 29%
- **Appropriated Funds included:** $0
- **ESCO:** Siemens Government

Buildings Included:

- Alexander Pirnie FB (NY0218ZZ)
- Martin Luther King Courthouse (NJ0144ZZ) (pictured)

Investment Value, by Detailed ECM Category



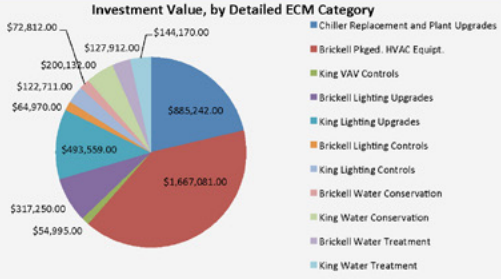
Region 4, Miami NDER ESPC

- **Square Footage:** 581,000
- **Investment Value:** 4,358,579
- **Annual Energy Cost Reduction:** $209,555
- **Payback Period:** 12 years w/15 month construction schedule
- **M/BTUs/year:** 13,317
- **Energy Reduction Percentage:** 40%
- **Water Reduction Percentage:** 40%
- **Appropriated Funds included:** $2,222,106
- **ESCO:** Florida Power and Light Energy Services

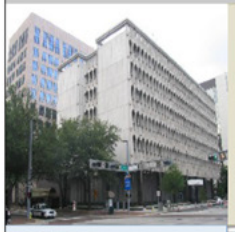
Buildings Included:

- JL King Federal Building
- (FL1021ZZ)
- Brickell Federal Building
- (FL0079ZZ) (pictured)

Investment Value, by Detailed ECM Category



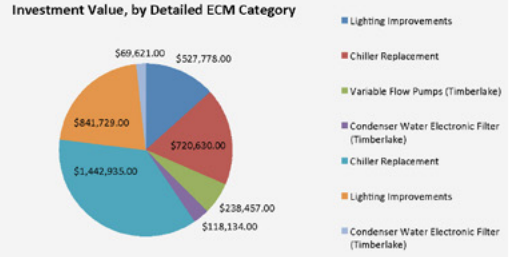
Region 4, Tampa/Kentucky NDER ESPC



- **Square Footage:** 719,000
- **Investment Value:** 4,251,738
- **Annual Energy Cost Reduction:**
- **Payback Period:** 15 years plus 8 month for construction
- **M/BTUs/year:** 6,460
- **Energy Reduction Percentage:** 26%
- **Water Reduction Percentage:** 14%
- **Appropriated Funds included:** $2,399,713
- **ESCO:** Constellation Energy Services

Buildings Included:

- Timberlake FB Complex , Tampa, FL (FL0000AE) (Pictured)
- Gene Snyder Courthouse, Louisville, KY (KY0045ZZ)

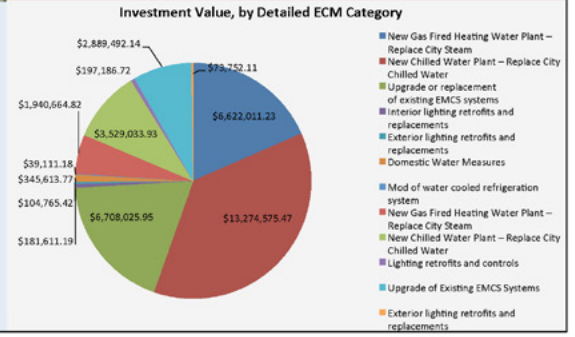


Region 5, Cleveland NDER ESPC

- **Square Footage:** 2,544,356
- **Investment Value:** $37,219,112
- **Annual Energy Cost Reduction:** $2,427,748 (Year 1)
- **Payback Period:** 20 years + construction of 1 year
- **M/BTUs/year:** 49,876
- **Energy Reduction Percentage:** 29%
- **Appropriated Funds included:** $1,313,268
- **ESCO:** Siemens Government Services

Buildings Included:

- Metzenbaum Courthouse (OH0033ZZ)
- Stokes Courthouse (OH0301ZZ)
- A.J. Celebrezze Federal Building
- (OH0192ZZ) (pictured)

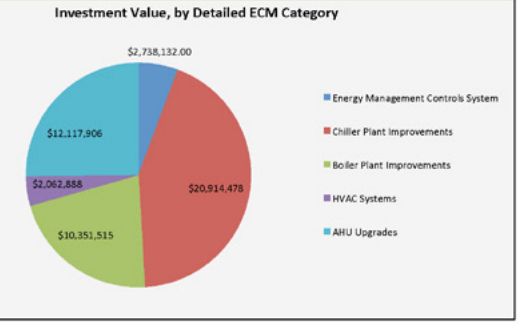


Region 5, Chicago NDER ESPC

- **Square Footage:** 5,113,176
- **Investment Value:** $52,956330
- **Annual Energy Cost Reduction:** $2,554,571 (Year 1)
- **Payback Period:** 23 years + construction of 2 years
- **M/BTUs/year:** 62,541
- **Energy Reduction Percentage:** 16%
- **Appropriated Funds included:** $16.1M
- **ESCO:** Noresco

Buildings Included:

- Metcalfe Federal Bldg (IL0303ZZ)
- 536 S. Clark Federal Bldg (IL0054ZZ)
- 610 S. Canal Customhouse (IL0032ZZ)
- Federal Archives and Records Center
- (IL0209CF)
- Everett Dirksen Bldg (IL0205ZZ) (pictured),
- Kluczynski FG (IL0235FC),
- USPO Loop Station (IL0236FC)

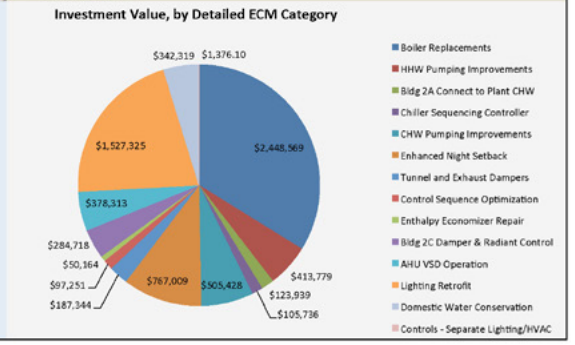


Region 5, HDI NDER ESPC

- **Square Footage:** 928,644
- **Investment Value:** $7,487,165
- **Annual Energy Cost Reduction:** $255,271 (Year 1)
- **Payback Period:** 20 years plus 15 month construction period
- **M/BTUs/year:** 23,007
- **Energy Reduction Percentage:** 38%
- **Appropriated Funds included:** $255,271
- **ESCO:** Trane

Buildings Included:

- HART-DOLE-INOUYE - 21 Building COMPLEX (MI0000BC)

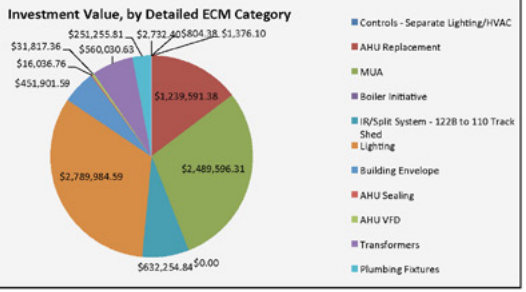


Region 6, Goodfellows NDER ESPC

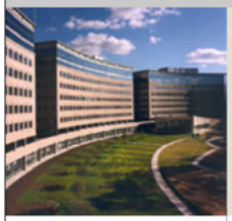
- **Square Footage**: 1,800,154
- **Investment Value**: $ 9,121,413
- **Annual Energy Cost Reduction**: $ 509,862
- **Payback Period:** 22 years plus 16 months for construction
- **M/BTUs/year**: 38,889
- **Energy Reduction Percentage**: 28%
- **Water Reduction Percentage:** 6%
- **Appropriated Funds included**: $869,265
- **ESCO:** Trane

Buildings Included:

- Goodfellow Federal Center (MO000AF)



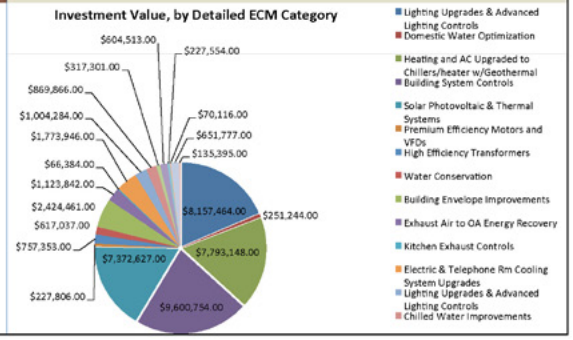
Region 11, NCR NDER ESPC



- **Square Footage**: 2,112,664
- **Investment Value**: $44,633,045
- **Annual Energy Cost Reduction**:
- **Payback Period:** 22 years, with 2 year construction period
- **M/BTUs/year**: 94,588
- **Energy Reduction Percentage**: 60%
- **Water Reduction Percentage**: 56%
- **Appropriated Funds included**: $586,172
- **ESCO:** Ameresco

Buildings Included:

- Silver Spring Metro Center 1 (MD0205ZZ)
- New Carrollton FB (MD0278ZZ) (pictured)



APPENDIX 3

PRESENTATIONS

A3

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PRESENTATIONS FROM MEETING

360 PERSPECTIVE WORKSHOP

AGENDA

8:00am	**Welcome and agenda** (Kinga Porst, GSA and Skye Schell, DOE)
8:15	**Around the room - Initial Input** (RMI to moderate) *Around the room introductions – name and firm* *Ask all participants to respond:* • What is the most important area for both GSA and the ESCOs to focus on in the ESPC process to achieve deeper energy savings?
9:00	**GSA and FEMP Recap of NDER Vision** (Kevin Kampschroer, GSA and Tim Unruh, FEMP) Discuss overarching vision, lessons learned, and progress made by the GSA PMO/FEMP.
9:30	**Deep Energy Retrofit Best Practices** – Sharon Conger, GSA, John Shonder, ORNL, Donald Gilligan, NAESCO. Presentation on the lessons learned from the first round of projects including the types of ECMs, escalation rates and process successes.
10:45	**Breakout Groups: Focused on Barriers and Solutions** (GSA/RMI to moderate) 1. Project Delivery 2. Transitions/team dynamics 3. Integrative Design and Innovative Technologies 4. Operations & Maintenance 5. Project Economics
12:00pm	**Reconvene and brief report-out**
12:30	**Lunch** (box lunch brought in)
1:00	**Lunchtime Presentation: GSA Building Energy Analytics Panel presentation** FirstFuel, GSALink, Intelligent buildings.
1:45	**Breakout groups continued** (GSA/RMI to moderate) Same topics.
3:00	**Break**
3:15	**Breakout groups report-out** (RMI to moderate)
4:45	**Vision and Dream – Looking forward** (Kevin Kampschroer, Kinga Porst, GSA) Brief recap, next
5:00	**Adjourn**

2

DEEP ENERGY RETROFITS…


Achieve ≥ 50% energy savings


Integrative design and analysis process


Improved project economics


Provide value beyond energy cost savings (VBECS)


Positive electricity system impacts

DEEP ENERGY RETROFITS SUCCESS FACTORS

1. Pursue the right steps in the right order
2. Deep Triggers
3. Focused analysis:
   Technical Potential & Bundling measures
4. Engage occupants
5. Quantify the value beyond energy cost savings

AROUND THE ROOM

1. Name
2. Firm

3. Answer the following:

Recognizing that going deep will be a joint effort between GSA and ESCO's, please identify the most important area for both GSA and ESCO's to improve to make deep federal ESPCs successful.

FEMP RECAP – DR. TIM UNRUH

- Presidential Performance Contracting Challenge
- GSA Institutional and organizational changes
- GSA's NDER as a model for other agencies
- Deep energy retrofit projects combining renovations and energy efficiency

6

PRESENTATIONS FROM MEETING

360 PERSPECTIVE WORKSHOP

GSA RECAP – KEVIN KAMPSCHROER

High Priority Solutions from Boulder Charrette:

- Reduce time to contract award
- Redefine eligible savings
- Share risk
- Combine funding
- Multi-building projects, bundling
- Consider occupant behavior programs

Strategies from Charrette #2:

- Integrative design charrettes
- Shorten PA phase
- Tenant engagement
- Use M&V Option C for whole building solutions
- Standardize building data provided to ESCOs
- Dedicated project resources

PBS Commissioner's memo on financing energy conservation measures

7

KEY TOPICS FROM DOE FEMP DISCUSSION

- Building selection, building data – Project delivery
- Project champion ESCO & GSA – Transition/Team dynamics
- PA – risk and responsibility matrix – Project delivery
- Deep retrofit, long term ECMs - Integrative Design and Innovative Technologies
- M&V reports - Project delivery
- Renewables – Project economics

8

PRESENTATIONS FROM MEETING

NATIONAL DEEP ENERGY RETROFIT PROGRAM (NDER) - PROCESS FINDINGS LESSONS LEARNED

National Deep Energy Retrofit Program (NDER)

PROCESS
FINDINGS
LESSONS LEARNED

Sharon Conger, GSA

RESULTS

- How did we do?
  - Awarded 10 Task Orders
  - GSA Awarded $191M in improvement value task orders. ($172M from NDER)
  - Average NDER task order anticipated energy savings: 38%
    - Anticipated energy savings range from 16% – 100%

GSA-PBS PMO

- Created a PMO to:
  - Provide Consistent Guidance and Capture Best Practices
  - Provide Subject Matter Experts to support regions during ESPC development
  - Centralized Contracting and Executive Project Management for NDER
  - Provides quality assurance to regional ESPC contracting
  - Develop system to ensure essential EPSC administration during contract performance period
- PMO membership includes Portfolio, budget, finance, energy team, contracting, and regional representatives and subject matter experts

Down Select Process

- NOO Released 3/20/12
- ESCOs selected 6/25/12
- Building Selections Determined 7/26/12
- Total Time 128 calendar days (4.27 months)
- What was happening:
  - Confusion on the NOO caused a lot of questions and clarifications causing delays.
- What did we learn:
  - Don't discuss upcoming projects at the Charrette

Preliminary Assessment (PAs)

- Kick offs Occurred between 8/8 – 8/22/12
- Expected: 30 day turn around on the PAs
- Actual Average: 73 days Range of 50 – 78 days
- PAs received from 9/28/12 – 11/19/12
- Expected weekly conference calls
- What was happening:
  - Weekly calls about logistics
  - Little Info provided on what ECMs we would see in PA

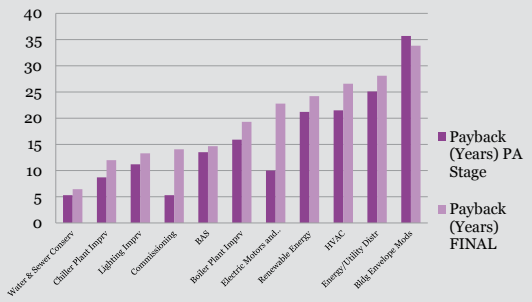
PRESENTATIONS FROM MEETING

NATIONAL DEEP ENERGY RETROFIT PROGRAM (NDER) - PROCESS FINDINGS LESSONS LEARNED

Preliminary Assessments (PAs)

- What did we learn:
  - A preset agenda on what should be discussed weekly
  - More information provided at the PA kick off would reduce this time frame
  - Determine the utility escalators at PA kick off
  - Cost estimates, paybacks, etc. were significantly off

Projected Payback PA phase vs. Final



PA Receipt to NOITA

- PAs received from 9/28/12 – 11/19/12
- Average time for ESCO to receive NOITA – 82 days
- Ranged from 77 – 110 days.
- NOITAs were issued between 12/18/12 – 1/30/13
- What was happening:
  - Review of the PAs, set of questions and ESCO responses sometimes multiple rounds questions
  - Holidays
  - Significant concern about the commitment of NOITAs and the reality of the cost and savings projected
  - Cost of the Project Development causing concern with moving forward
  - NOITAs contained a list of ECMs to proceed with or not to proceed with.

PA Receipt to NOITA

- What did we learn:
  - 17 is too many task orders at once with current resources
  - One round of questions and responses
  - Cost of the Project Development fee should not drive the ECMs selected
  - Deep Retrofit goal buy in needed before we receive PAs.

NOITA to IGA Kick Off

- NOITA to IGA Kick-off – 21 day average
- Ranged from 10 days – 37 days
- Occurred between 1/14/13 – 2/21/13
- What was happening:
  - Still working on issuing some NOITAs or Cancellations
  - What We Learned:
    - 17 is too many
    - Logistics takes time

IGA Kick off to 90% IGA Receipt

- Kick Offs occurred between 1/14/13 – 2/21/13
- 90% IGA received between 6/19/13 – 8/13/13
- Expected: 120 days for 100% IGA
- Average time to 90% IGA – 159 Days
- Range from 150 - 191 days
  - For projects Less than $10M – 147 day average
  - For projects over $10M – 187 day average

PRESENTATIONS FROM MEETING

NATIONAL DEEP ENERGY RETROFIT PROGRAM (NDER) - PROCESS FINDINGS LESSONS LEARNED

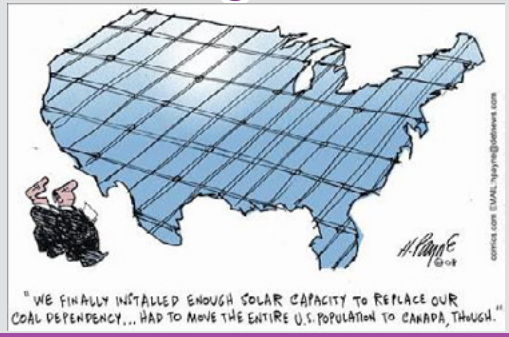
IGA Kick off to 90% IGA Receipt

- What was happening:
  - Requested a 50% IGA with baseline set and agreed upon
  - Requested M&V set by 90%
  - Weekly calls but turned out to be largely logistical
  - Draft TO-RFP issued
  - Comment Review sheet - Kept a cohesive comment form throughout all reviews.
  - Between 50% and 90% IGA half the contracts were moved to different Contracting Officers
  - GSA Cost Estimators brought on board after receipt of the 50%

IGA Kick off to 90% IGA Receipt

- What did we learn:
  - Security clearances take time, get them started early in the PA
  - Tenant coordination takes time, build it into the schedule
  - Schedule a baseline and M&V Meeting outside of regular meetings
  - Keep a cohesive comment form throughout all reviews
  - We need a dedicated Contracting Officer with some contracting support
  - Significant Price and Payback changes happened at the 90% IGA
  - GSA needs this interim IGA document, the 50% showed some surprises in ECMs, needed to start cost estimator work

50% IGA



90% IGA to Final Proposal

- Final Proposal received between 9/10/13 – 12/6/13
- Average from the 90% IGA to the Final Proposal was 79 days
- What was happening:
  - 90% IGA was used for Price Negotiations
  - Negotiations on TO-RFP language and other business terms in IGA
  - Finalizing M&V
  - Review Comment sheet – Ensuring all comments were closed out
  - Focus shifted to those contracts we needed to award by 9/30/13 which caused others to not move as fast
  - GSA Internal Legal Reviews of our proposed task orders

90% IGA to Final Proposal

- What did we learn:
  - Real Deadlines motivate the Government and ESCOs
  - Without our independent cost estimates, we would not have reached award
  - Comment sheets kept us on track and focused
  - Rebates/incentives must be paid to GSA
  - RECs were no longer viable due to the ASBCA decision

Final Proposal to Award

- Final proposals received between 9/10/13 – 12/6/13
- Awards occurred between 9/26/13 – 1/3/14
- Average from the Final Proposal IGA to award 25 days
  - Range from 7 - 77 days
- What was happening:
  - Financing terms and conditions – Needed legal review
  - Contracting Reviews
  - Appropriated funds finalized by Govt – Paid for the IGA upfront at award+
  - Final TO schedules
  - Contract documents - Form 300
  - Final coordination between contracting, finance and legal in each region

PRESENTATIONS FROM MEETING

NATIONAL DEEP ENERGY RETROFIT PROGRAM (NDER) - PROCESS FINDINGS LESSONS LEARNED

Final Proposal to Award

- What did we learn:
  - Adding appropriated funds make deals far more attractive
  - Legal is uncomfortable with financing terms and conditions
  - Centralized contracting reviews equate to quicker reviews
  - Internally, GSA needs to do a better job defining roles and responsibilities for this stage

Summary of Time Spent

- Acquisition Time: 128 days (Approx. 4.25 months)
- PA Kick off to PA receipt 82 days average (2.4 months)
- PA to NOITA – 82 days average (2.73 months)
- NOITA to IGA Kick Off – 21 day average
- IGA Kick Off to 90% IGA – 159 days average (5.3 months)
- 90% to Final Proposal IGA – 79 days average (2.6 months)
- Final proposal to award – 25 day average (.83 months)

Summary of Time Spent

- Total IGA to final proposal– Average days – 238 (8 months)
  - Under $10M – 225 days (7.5 months)
  - Over $10 M – 267 days (9 months)

From Down Select to Award – 526 days (17.5 months)

From NOO issuance to Award - Range (555 days 18.5 months – 654 days (21.8 months)

Summary of Best Practices

- PMO/dedicated contracting personnel
- Don't discuss upcoming projects at the Charrette!
- A preset agenda for weekly meetings
- Provided more information at the PA kick off
- Provide the utility escalators at PA kick off
- Reasonable number of task orders to match resources
- Schedule a Baseline and M&V Meeting outside of regular meetings
- Keep a cohesive comment form throughout all reviews.
- Independent cost estimator
- Centralized contracting reviews equate to quicker reviews
- Adding appropriated funds, if possible, into the planning process
- M&V – If a larger retrofit, utilize 3-year Option C M&V

Disclaimer for the Rest of the Day

- *In the event that there is a conflict between the NOO or TO-RFP terms and conditions and the information that is disseminated during today's conference, the NOO and TO-RFP terms and conditions shall control. The formal NOO and TO-RFP are the only document that should be relied upon in determining the Government's requirements.*

PRESENTATIONS FROM MEETING

GSA NATIONAL DEEP ENERGY RETROFIT (NDER) PROJECT OVERVIEW

GSA National Deep Energy Retrofit (NDER) Project Overview

GSA Design Charette #3
April 2, 2014

John Shonder
Oak Ridge National Laboratory

U.S. DEPARTMENT OF ENERGY

OAK RIDGE NATIONAL LABORATORY
MANAGED BY UT-BATTELLE FOR THE DEPARTMENT OF ENERGY

GSA's Stated Objectives for NDER Project

- Retrofit plans that move a building towards net zero energy consumption
- Use of innovative technologies
- Use of renewable energy technologies
- Unstated objective: achieve deep(er) energy savings than in past projects

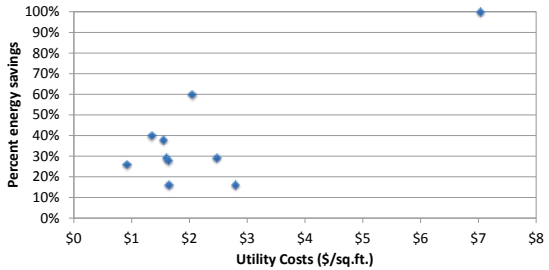
GSA did achieve deeper retrofits

- Statistics from $1 billion in projects awarded as part of the President's Performance Contracting Challenge
- Agencies were asked to report percent energy savings reduction to OMB. Many did.
- 33 projects by agencies other than GSA achieved an average of 21% savings
- 10 GSA projects achieved an average of 38% savings
- The difference in means is statistically significant at the p=0.017 level

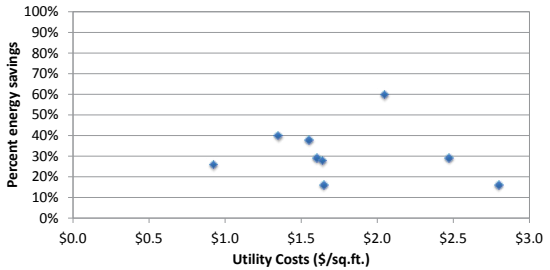
What are some potential drivers for deeper energy savings?

- Energy prices
- Baseline energy use index (EUI)
- Amount of "one-time savings"
- Age of building/equipment
- Climate
- Quality of proposal
- Comfort level of building owner

Percent savings is related to baseline utility costs, but figure is misleading



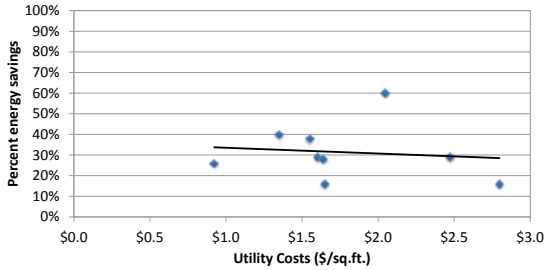
For normal energy prices, percent savings appears unrelated to baseline utility costs



PRESENTATIONS FROM MEETING

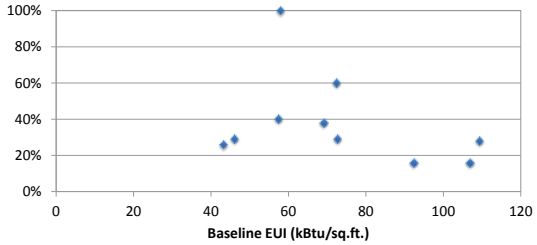
GSA NATIONAL DEEP ENERGY RETROFIT (NDER) PROJECT OVERVIEW

The relation is opposite to what we expect (though effect is not statistically significant)



7 Managed by UT-Battelle for the U.S. Department of Energy

Percent savings appears unrelated to EUI as well



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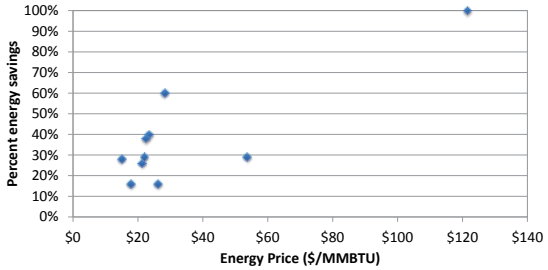
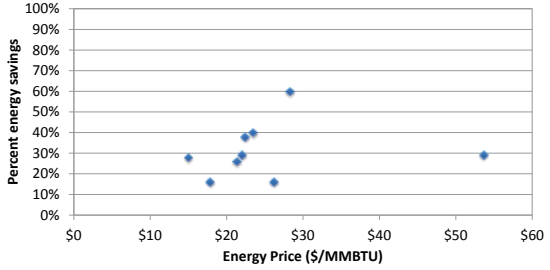
Percent savings appears related to baseline energy unit price, with outlier



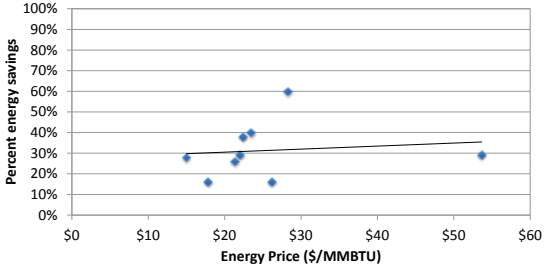
9 Managed by UT-Battelle for the U.S. Department of Energy

With outlier removed savings appears unrelated to baseline energy unit price



10 Managed by UT-Battelle for the U.S. Department of Energy

Percent savings increases with increasing energy prices, but regression not significant



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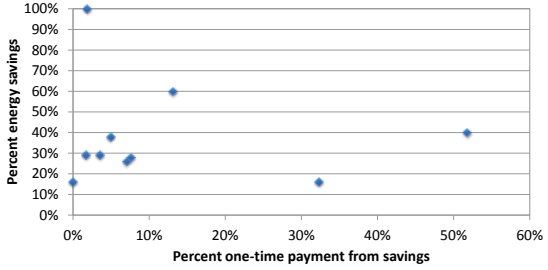
Amount of one-time payment also unrelated to percent savings achieved



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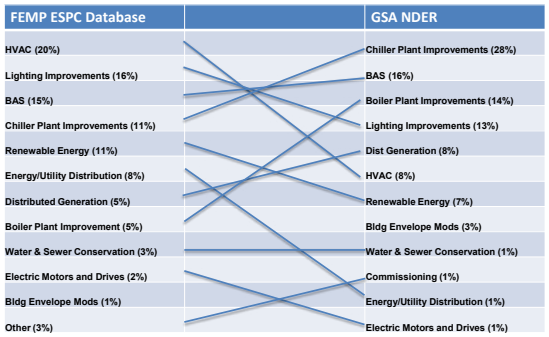
PRESENTATIONS FROM MEETING

GSA NATIONAL DEEP ENERGY RETROFIT (NDER) PROJECT OVERVIEW

ECMs – FEMP History vs. GSA NDER



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Deep retrofits can be implemented across a wide spectrum of buildings/conditions

- What is not (necessarily) required to achieve deeper energy savings in ESPC
  - High energy prices
  - High energy consumption
  - Advanced ECMs
  - Large implementation period payments from savings
- What is required
  - Buildings that have not undergone recent energy retrofit projects
  - Emphasis from agency
  - Thorough audit process to identify ECMs
  - Integrated design approach

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PRESENTATIONS FROM MEETING

WAYNE N. ASPINALL FEDERAL BUILDING & US COURTHOUSE PARTIAL MODERNIZATION

GSA

GSA Rocky Mountain Region

Wayne N. Aspinall Federal Building & US Courthouse Partial Modernization

April 2, 2014

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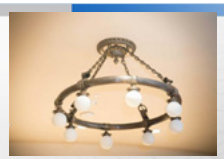
1. Optimize Building Envelope
2. Reduce Internal Loads
3. Design Highly Efficient Systems
4. Match Load with On-site Renewable Energy



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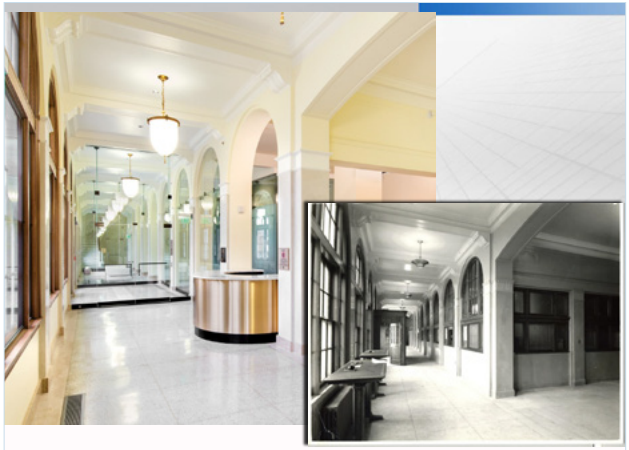
PRESENTATIONS FROM MEETING

WAYNE N. ASPINALL FEDERAL BUILDING & US COURTHOUSE PARTIAL MODERNIZATION



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Sub-Metering & the M&V Process:

2 kW excess identified
- ❑ related to lighting systems which were not going into nighttime mode

5 kW excess identified
- ❑ related to agency equipment not shutting down

10 kW excess identified
- ❑ related to condenser water pumps running in constant rather than variable
- ❑ thermostat settings not optimized by season
- ❑ heating plant staging not tuned by season

Note: 1 kW of extra demand equates to 8,760 kWh or, 5% of the building's total energy budget annually.

March 2013 Net = 16,924 kWh
March 2013 Gross = 27,995 kWh
8,573 kWh Improvement for March

March 2014 Net = 2,545 kWh
March 2014 Gross = 19,422 kWh

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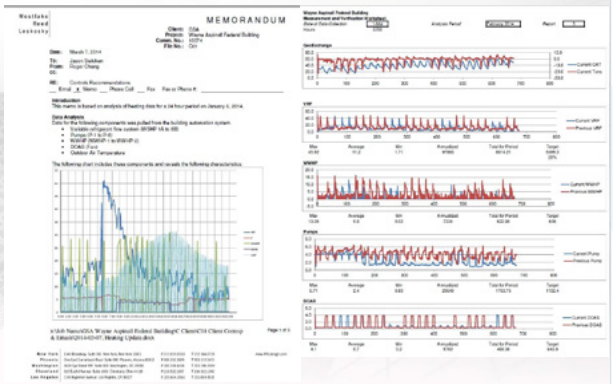

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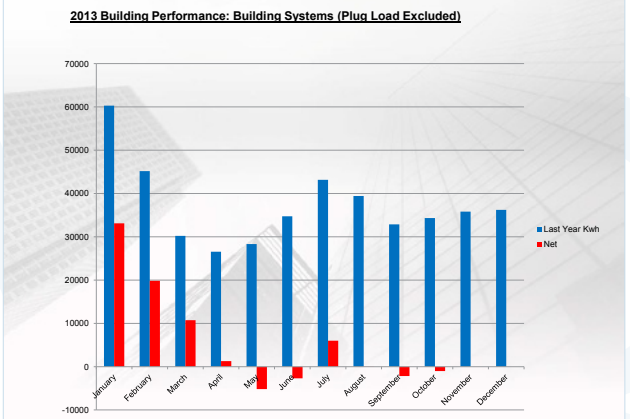

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PRESENTATIONS FROM MEETING

WAYNE N. ASPINALL FEDERAL BUILDING & US COURTHOUSE PARTIAL MODERNIZATION

Sub-Metering & the Occupant Behavior Process:

40,000 kWh of use at the plug level was identified post occupancy – 2 times the targeted amount.

- ❑ Sub-metering has allowed the team to break-out plug load use at the circuit level throughout the building
- ❑ Aggressive energy targets for each agency were established in the design phase of the project to meet our PV production limits within the building's footprint
- ❑ Sub-metering at the circuit level has provided a unique opportunity for GSA to pilot financial incentives for the agencies to meet established energy targets and further incentives to improve upon those targets
- ❑ Occupant behavior will be tracked during FY14 for Class A ZNE
- ❑ Incentive rolled out to agencies in February 2014, and at the end of the month 5 / 9 agencies reduced energy use from January figures and 2 / 9 are below their target

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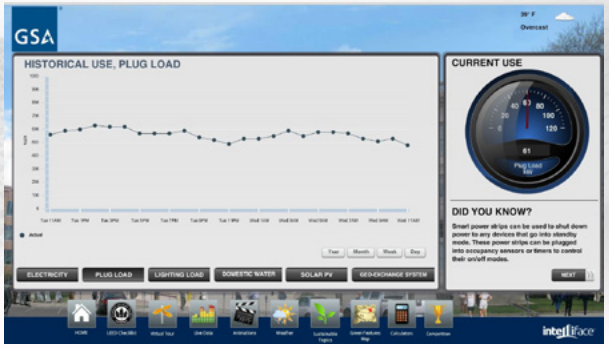

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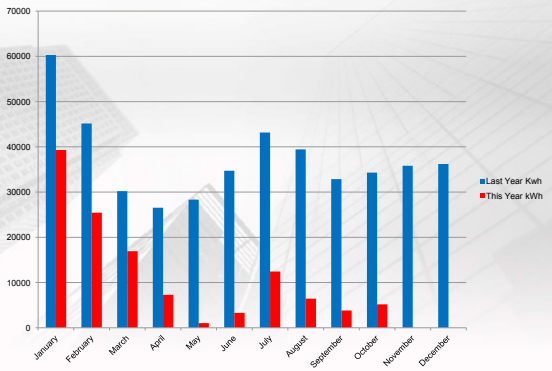
2013 Building Performance: Systems & Plug Load:



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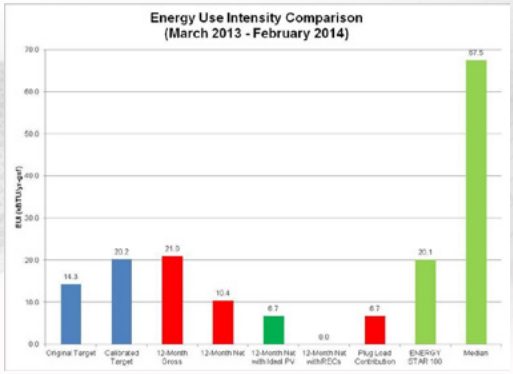
1st Year EUI COMPARISONS:



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Wayne N. Aspinall Federal Building & US Courthouse Modernization

DISCUSSION

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PRESENTATIONS FROM MEETING

ESCO FEEDBACK ON NDER PROCESS

ESCO Feedback on NDER Process

GSA-RMI Charrette

April 2, 2014

Overview

- Purpose: Provide ESCO feedback to FEMP
- Method: 4 sets of interviews and 4 reports
  - Report 1: Boulder Charrette
  - Report 2: Notice of Opportunity
  - Report 3: ESCO Selection and PAs
  - Report 4: IGA and Negotiations (pending)
- Conclusions

2

NAESCO National Association of Energy Service Companies

Conclusions

- Reasonably successful first step – glass half full
- PMO is a huge improvement
  - Process speed and consistency
- GSA should better pre-qualify buildings
  - Technical opportunity and willingness of local staff
  - Is DER GSA policy or dependent on ESCO salesmanship?
- Re-think the PA and IGA processes
  - Value and consistency

3

NAESCO National Association of Energy Service Companies

Questions?

Donald Gilligan
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4

NAESCO National Association of Energy Service Companies

PRESENTATIONS FROM MEETING

GSALINK AND ESPC

GSALink and ESPCs

GSALink
A GSA Smart Buildings Initiative

April 2nd, 20134

1

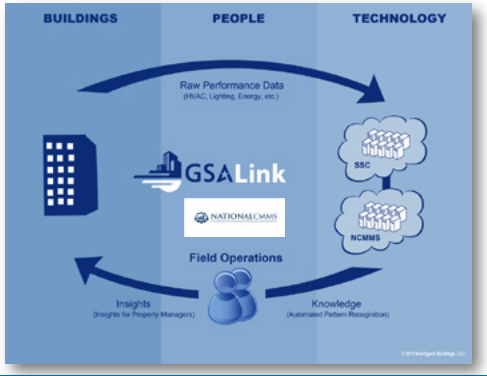
Initially about costing savings and sustainability..

- EPAct 2005: 30% more efficient than ASHRAE 90.1
- EO 13423: Energy Use 30% below 2003 baseline by 2015
- EISA 2007: Zero fossil fuel use by 2030; 65% cut by 2015; 80% cut by 2020
- EO 13514: Federal Leadership in Environmental, Energy, and Economic Performance.
- "… provide superior workplaces for federal customer agencies at good economies for the American taxpayer."

2

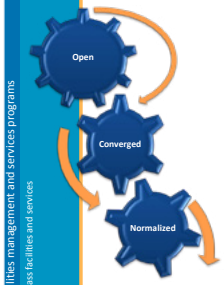
Service Delivery Model

National/Regional Visibility, Building Level Tools



3

Smart Building Technology Standards



Open
Non-proprietary building controls that give operators greater flexibility to manage systems and reduce service costs.

Converged
Common sense elimination of overlapping controls infrastructure, such as conduit, closets, cabling and networking.

Normalized
Different controls manufacturers, or even disparate systems, can "talk" to each other, allowing for more flexibility and management control

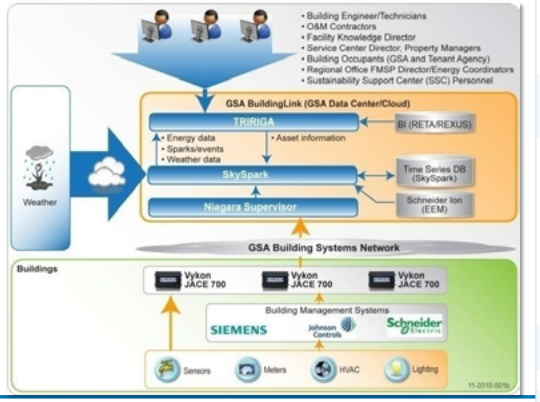
4

Smart Buildings and GSALink

- Targets 50+ highest energy-consuming buildings (goal is 200 buildings)
- Technology platform for making data driven decisions
  - Vendor Independent Architecture
- Adds analytics "engine" on top which aggregates, normalizes and analyzes millions of data points , and generates actionable insights at the level of the individual piece of equipment (e.g., AHU or chiller)
- Identifies **"avoided cost"** potential related to
  - Energy
  - Operational
  - Capital Improvements

5

Concept Diagram



6

PRESENTATIONS FROM MEETING

GSALINK AND ESPC

GSA Public Buildings Service

the office of facilities management and services programs
sustaining world-class facilities and services

Data Integration

- Building Automation Systems
  - Source of building equipment point data
- Schneider ION Enterprise Energy Management (EEM) System
  - Used to normalize, view, and manage GSA energy data
  - Provides a single source for current and historical energy data
- GSA Business Intelligence Framework
  - RETA - stores R-Type RWA (Overtime Work Authorization)
  - REXUS - Provides building square footage data
- Weather Data
  - SkySpark imports and stores time-series weather data
  - Used for normalization

7

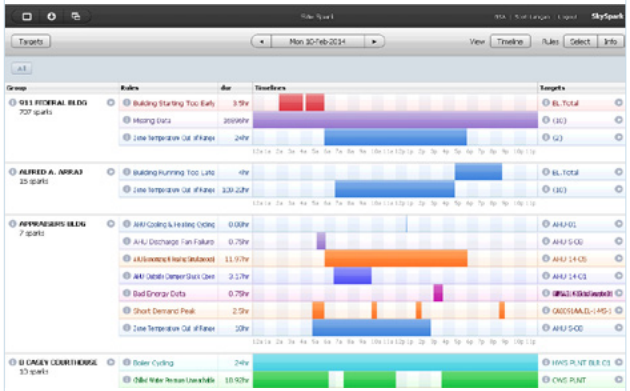
GSA Public Buildings Service

the office of facilities management and services programs
sustaining world-class facilities and services

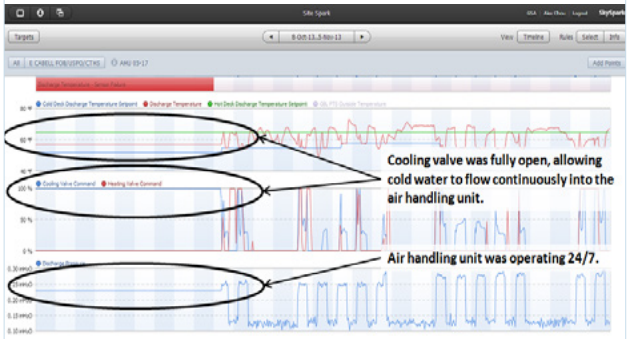
Analytic Examples

- Air System Rules
  - Cooling/Heating/Damper Failure
  - Sensor Failure
  - Simultaneous Heating/Cooling
  - Economizing and Heating/Cooling Simultaneously
- Central Plant Rules
  - Chilled Water/Hot Water System
  - Chiller/Boiler Cycling
- Energy Profiling
  - Excessive usage during unoccupied periods
- More in development
  - Energy Code Compliance, etc.

8



Earle Cabell FOB/CH (Dallas) – Failed sensors in six air handling units (AHUs)



10

GSA Public Buildings Service

the office of facilities management and services programs
sustaining world-class facilities and services

GSALink Fast Facts

- Base – 50 buildings representing 30 million square feet connected now
- Option – 26 buildings representing 12.7 million square feet
- Total of almost **45 million GSF**
- 403 total users
- **15,000,000 data points** gathered per day
- TECI to date is $2.7 million

11

GSA Public Buildings Service

the office of facilities management and services programs
sustaining world-class facilities and services

GSALink ESPC Implications- Why should we care?

- Reduce time in the Preliminary Assessment
  - Enhanced trending and data collection
  - **"Deferred" sparks (147)**
  - Total Estimated Cost Impact (TECI)
- Commissioning / **Measurement and Verification**
  - Can set performance baselines to determine if savings have been achieved
  - Can be used as a commissioning tool after ECMs are implemented

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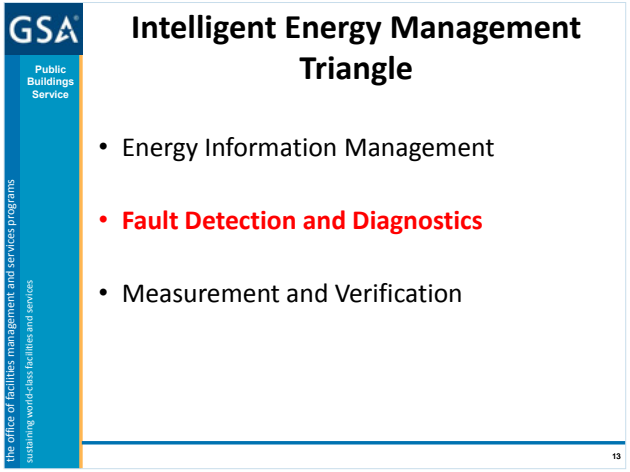
PRESENTATIONS FROM MEETING

GSALINK AND ESPC



APPENDIX 4

LIST OF ATTENDEES

A4

Image courtesy of shutterstock.

LIST OF ATTENDEES

Chris Abbuehl,
Constellation

Joan Amend
GSA

Brian Bash
Schneider Electric

Ryan Beard
GSA

Diane Beauchamp
Honeywell International

Barbara Bird
NORESCO

Morgan Blackwood
Clark Energy Group

Andrew Bond
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