

Best Practices for Smart Grid-Interactive Efficient Building Ready Performance Contracts

Grid-interactive efficient building (GEB) measures reduce costs and optimize energy use for additional grid services by coordinating building energy loads and providing continuous demand management. Incorporating GEB energy conservation measures (ECMs) in performance contracts is reliant upon multiple factors. These factors include site selection with utility tariffs and incentives favorable to GEB, the identification of GEB as a priority in the initial stages of the contracting process, integration of GEB within comprehensive performance contracts with multiple other ECMs, and careful consideration of GEB measurement and verification (M&V) for energy savings performance contracts (ESPCs) and performance assurance for utility energy service contracts (UESCs).

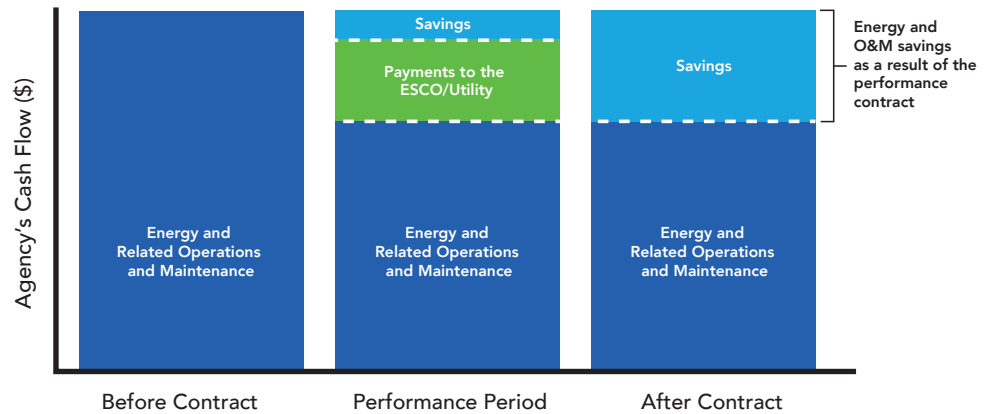


Figure 1. Performance contracts enable federal agencies to upgrade or install new equipment and make infrastructure improvements. Agencies can use the resulting energy cost savings to pay off the performance contract. *Illustration by NREL.*

Key Points for Incorporating GEB Into Performance Contracts

The first step in incorporating GEB measures into performance contracts is to coordinate with the site's serving utility, focusing on understanding the site's load shape/characteristics; accounting for consumption, time-of-use rates, and demand charges; and understanding the utility tariff. For GEB strategies, high demand charge and/or time-of-use rates are favorable and rates that do not reward load shifting are generally unfavorable. If the serving utility has a demand response program, learn more about how it functions and how cost savings may be achieved in the GEB calculations.

If the site is eligible for more than one tariff, a comparative tariff analysis within the performance contract financial model should be completed. This analysis should begin early in the development process to ensure maximum annual energy cost savings for all ECMs while incentivizing integration of GEB measures into the project.

Typically, early during project development and preferably in the preliminary assessment, the utility or energy service company (ESCO) will

need to obtain existing advanced meter or interval data to produce hourly end-use load profiles to determine load shed or shift potential.

Performance contracts must have either guaranteed savings (ESPCs) or performance assurance (UESCs) throughout the life of the contract. Short payback and high net present value are typical for GEB projects, making them attractive to the performance contracting domain.¹ This short payback period reduces utility rate escalation risk and can be leveraged to help longer payback ECMs get included in a comprehensive project.

Specific GEB Implementation Strategies

The U.S. Department of Energy has identified four GEB strategies² and their applicability to performance contracts:

- **Load shedding** can be realized by either reducing consumption or using energy storage systems and is typically an applicable GEB strategy.
- **Load shifting** is the planned shifting of energy use from on-peak to off-peak or lower-rate time periods that results in decreased demand and consumption during peak periods. This strategy will

¹ RMI. Value Potential for Grid-Interactive Efficient Buildings in the GSA Portfolio: A Cost-Benefit Analysis. <https://rmi.org/insight/value-potential-for-grid-interactive-efficient-buildings-in-the-gsa-portfolio-a-cost-benefit-analysis/>.

² Monica Neukomm, Valerie Nubbe, and Robert Fares. 2019. Grid-interactive Efficient Buildings: Overview. Washington, DC: U.S. Department of Energy. <https://www1.eere.energy.gov/buildings/pdfs/75470.pdf>.

Types of Performance Contracts

	DOE IDIQ Energy Savings Performance Contracts (ESPC)*	ESPC ENABLE	ESPC Energy Sales Agreements (ESA)	Utility Energy Service Contracts (UESC)
Contract Type	Task Orders (TO) under DOE IDIQ ESPC	General Services Administration (GSA) Multiple Award Schedule (MAS) (SIN 334512)	ECM in ESPC DOE IDIQ, ESPC ENABLE, or site-specific/stand-alone	GSA Area-wide Contracts; Basic Ordering Agreement or separate contract
Partner	Energy Services Company (ESCO)	ESCOs on both GSA MAS (SIN 334512) and DOE Qualified List of ESCOs	ESCO must be on DOE Qualified List and meet requirements of specific contract used	Serving distribution utility (electric, gas, or water)
Eligible Facilities	Federally owned or leased facilities worldwide	Federally owned or leased facilities worldwide	Federally owned or leased facilities or on federally owned land	Federally owned or leased facilities
Project Size	\$2 million or larger	No fixed size or \$ limits; suitable for smaller projects	Typically at least 1 MW	Any size
Savings Guarantee / Performance Assurance	Savings guarantee required	Savings guarantee required; simplified M&V	Savings guarantee required; metering (Option B) is recommended	Performance assurance plan required to verify performance and savings (may include M&V); Savings guarantee not required, negotiable

* Other agencies have ESPC contracts that may have different characteristics (e.g., Army MATOC, VA IDIQ)

Performance Contracting Services

Agencies should contact a Federal Energy Management Program (FEMP) Federal Project Executive with questions about performance contracting; they help agencies understand the process, get started with a project, and make connections with Project Facilitators and other FEMP resources. More information about Federal Project Executive and Project Facilitator services is available on the FEMP website:

Federal Project Executives for ESPC, UESC, and ESPC ENABLE Projects:
energy.gov/femp/federal-project-executives-escp-uesc-and-escp-enable-projects

Federal Project Facilitators:
energy.gov/femp/federal-project-facilitators

likely require some type of energy management control system.

- **Modulation** is the ability to modulate the electrical load at the sub seconds-to-seconds level and is not typically an applicable strategy; if applicable, ensure modulation solutions include fully functional microgrids that include power generation integrated with energy storage devices.
- **Energy efficiency** is the ongoing reduction in energy use while providing the same or improved level of building function and is typically an applicable strategy. GEB technologies can be combined with standard efficiency measures resulting in demand savings, including demand response programs, time variable pricing, and coincident peak demand charges.

The contractor should provide quantitative objectives for each chosen strategy to determine the predicted energy and cost savings for each

strategy. These objectives must be analyzed against the utility tariff(s) and may need to be validated by the serving utility. Savings from some GEB measures such as modulation or demand response may be highly variable when dependent on utility signals to reduce site usage at specific times. This makes calculating and guaranteeing a specific amount of savings difficult. An initial savings guarantee may be at a reduced level until the amount of savings from the GEB measure is proven in performance. A reserve account³ held by the contractor could be considered to capture indeterminate savings⁴ to further benefit the project.

Technology Considerations

It is important to understand what connected technologies should be investigated in the performance contract and how they will be integrated into existing networks, as the building or campus must be ready for energy

³ See Section C.15 of the DOE ESPC IDIQ contract: <https://www.energy.gov/sites/default/files/2023-08/2023-doe-idmq-escp-generic-contract.pdf>.

⁴ FEMP Indeterminate Savings ECMs: Get More Savings from Performance Contracts training: <https://wbdg.org/continuing-education/femp-courses/fempodw144>.

management information system (EMIS) and GEB technologies.

Consider upgrading existing building automation systems (BAS) as part of the performance contract, keeping in mind significant upgrades to the existing BAS needed to deploy GEB measures may require additional funding.

Cybersecurity

Discuss the following factors with the information technology and operational technology cybersecurity team at the preliminary assessment phase:

- **Authorization to operate (ATO)**—Start this process in the early planning stages, and plan for funds to support the cybersecurity needs of the project.
- **Risks**—Identify and document risks as a part of procurement, installation, and maintenance stages to meet adherence to various compliance and best practices.
- **Cybersecurity upgrades**—Consider that upgrades may be difficult to include within performance contracts and may require other appropriations because, in some instances, they don't save energy.
- **Data integrity**—Cybersecurity considerations are necessary to prevent manipulations to energy and performance savings.
- **Load modulation**—Activities that require direct communication with a grid signal from the utility can be a challenging strategy to implement due to cybersecurity requirements, and may need additional resources.

Risk, Responsibility, and Performance Matrix

Establishing a contractually binding risk, responsibility, and performance (RRP) matrix⁵ is a critical component of a successful performance contract,

especially when GEB measures are included. While contractually required for ESPC contracts, a similar matrix may be considered in UESCs. The three categories of risk addressed in the matrix are:

- **Financial**—Areas include energy prices and M&V confidence. Mitigate risk by ensuring National Institute of Standards and Technology energy escalation rates are used, and the appropriate level of M&V is incorporated into the contract.
- **Operational**—Areas include changes in load, building mission, or tenant activities. When integrating GEB and EMIS, ensure critical loads and operational constraints are accounted for.
- **Performance**—All equipment must perform reliably throughout the contract; clarify responsibilities in the RRP matrix.

Risk mitigation best practices ensure that operational and maintenance responsibilities are clearly defined for all ECMs in the performance contract.

In an ESPC, the ESCO is typically responsible for all maintenance and repair of installed equipment, although in many cases the agency will perform the work. Specific maintenance and repair responsibilities should be negotiated with the utility for UESCs.

All equipment that is inherently part of the GEB ECM should be maintained by the ESCO or utility.

If applicable, ensure current on-site staff are trained and capable of fulfilling their operational responsibilities of any new systems.

Applicable Incentives

Ensure the contract includes analysis of all applicable incentives, tax benefits (for ECMs that are privately owned), AFFECT grants, and utility rebates.⁶

To ensure financial benefits are understood and achievable, this analysis must be performed prior to completion of the investment grade audit, and as early as the notice of opportunity or sources sought notice if grant funding has already been received. The timing of any incentives, grants, or rebates should be addressed as early as possible to avoid impacting the timing of the contract award.

Learn More

Learn more about the following FEMP programs and initiatives:

Grid-Interactive Efficient Buildings: energy.gov/femp/grid-interactive-efficient-buildings-federal-agencies.

Demand Response and Time-Variable Pricing Programs: energy.gov/femp/demand-response-and-time-variable-pricing-programs.

Energy Savings Performance Contracts: energy.gov/femp/energy-savings-performance-contracts-federal-agencies.

Utility Program and Utility Energy Service Contracts: energy.gov/femp/utility-program-and-utility-energy-service-contracts-federal-agencies.

Further guidance on quantifying savings and ongoing M&V for GEB measures can be found in the NREL report, *Quantifying the Value of Grid-Interactive Efficient Buildings through Field Study*: <https://www.nrel.gov/docs/fy22osti/83075.pdf>.

Much of the information in this document is included in more detail in the NREL report, *Blueprint for Integrating Grid-Interactive Efficient Building (GEB) Technologies into U.S. General Services Administration Performance Contracts*: <https://www.nrel.gov/docs/fy21osti/78190.pdf>. ■



⁵ Department of Energy. Energy Savings Performance Contract Risk, Responsibility, and Performance Matrix. https://www.energy.gov/sites/default/files/2023-11/2023-doe-escp-idiq-rrp_matrix_gen4.docx.

⁶ Thomas et. al. 2020. "ASHRAE Smart Grid Application Guide: Integrating Facilities with the Electric Grid." <https://www.ashrae.org/about/news/2020/ashrae-releases-smart-grid-application-guide-integrating-facilities-with-the-electric-grid>.

For more information, visit:
energy.gov/femp

DOE/GO-102024-6422 • October 2024