Deep Energy Savings Using ESPCs

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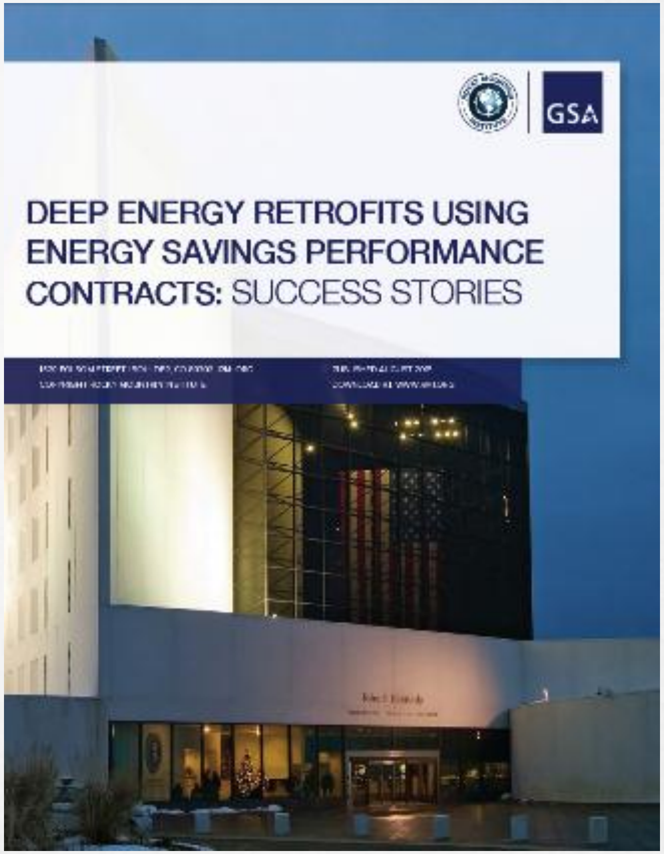
Introduction and Context

RMI and GSA co-released *Deep Energy Retrofits Using Energy Savings Performance Contracts: Success Stories* in July 2015

- Borne out of GSA-RMI collaboration on National Deep Energy Retrofit (NDER) program
- Features 7 federal ESPCs
- Identifies 6 key success factors
- Addresses an industry need for case studies showing that deep ESPCs are possible



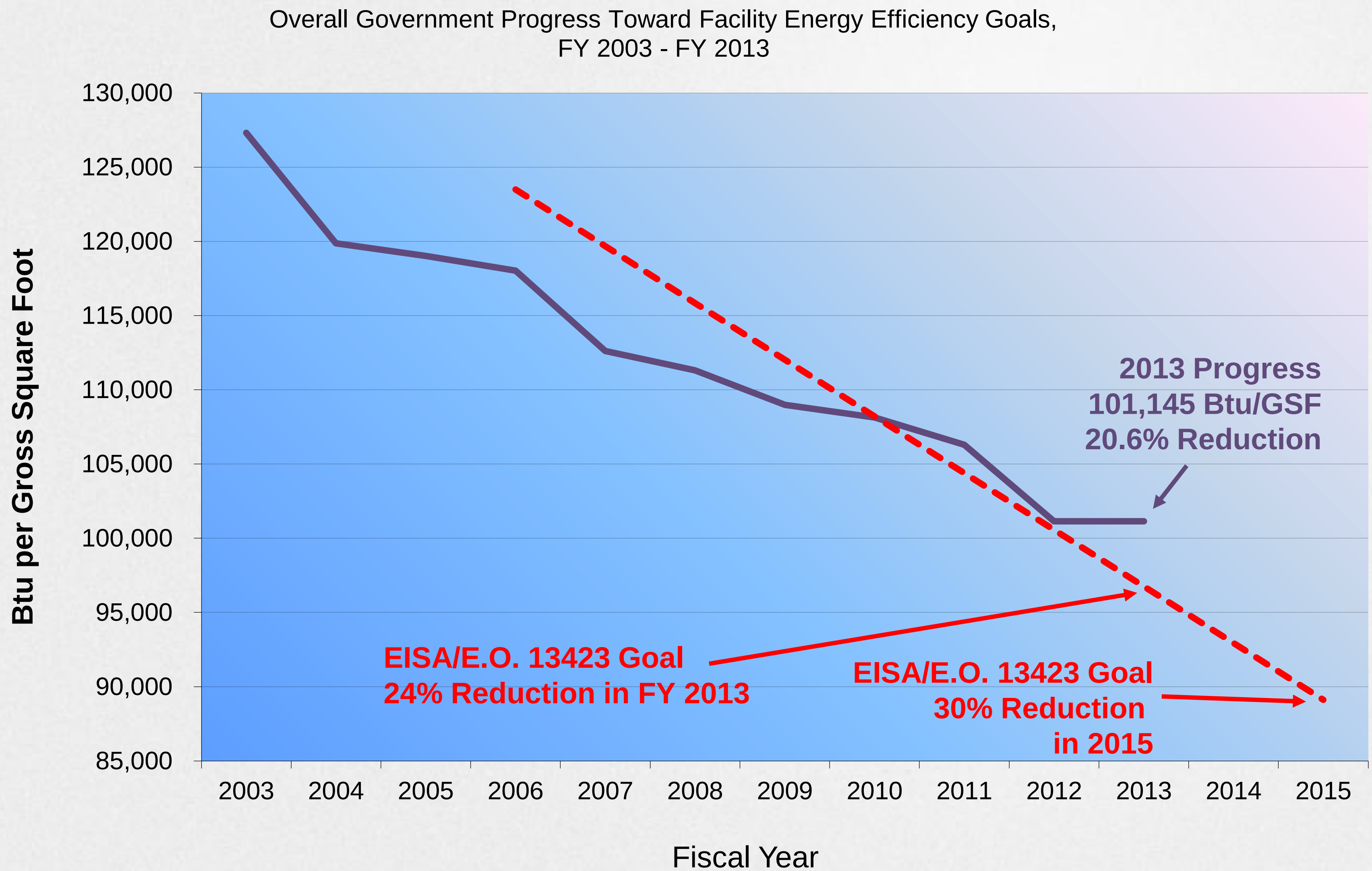
What is a Deep Energy Retrofit?

Deep Energy Retrofit (noun): A whole-building analysis and construction process that achieves much larger energy cost savings than those of simpler energy retrofits while fundamentally enhancing a building's value.

A deep energy retrofit typically:

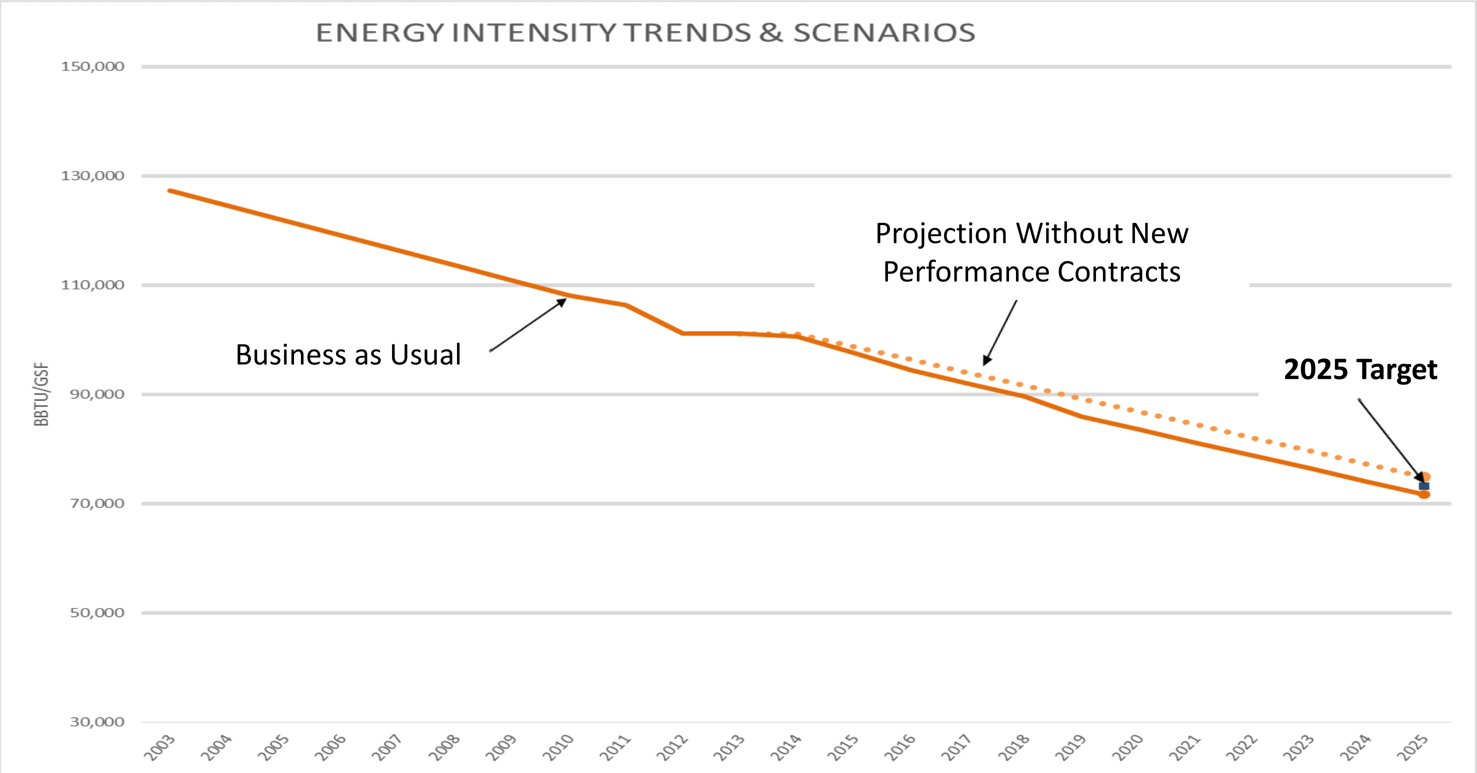
- Achieves at least 40% energy savings
- Includes elements of integrative design
- Provides multiple values beyond energy cost savings

Government Progress toward Goals



Energy Efficiency Target

2.5% annual BTU/GSF reduction through 2025 (from 2015 baseline)



Source: CEQ Projections Based on DOE Federal Energy Management Program Data

National Deep Energy Retrofit Program

- 23 facilities, 14.7 million square feet
- 10 task orders awarded in 2014
- 38% average energy reduction
- $172 million implementation cost
- $10.6 million annual savings
- 365 billion Btus annual energy
- Goals:
  - Retrofit plans that move a building towards net-zero energy use
  - Use of innovative technologies
  - Use of renewable energy technologies
  - Unstated Objective: Achieve deep(er) energy savings than in past projects

GSA Success

- ✓ Emphasis on deep retrofits in the notice of opportunity
- ✓ Design charrettes reinforced the need for ESCOs to dig deeper and propose ECMs with longer simple paybacks
- ✓ Central Program Management Office provided central source of information for GSA regional managers

GSA

Conclusions

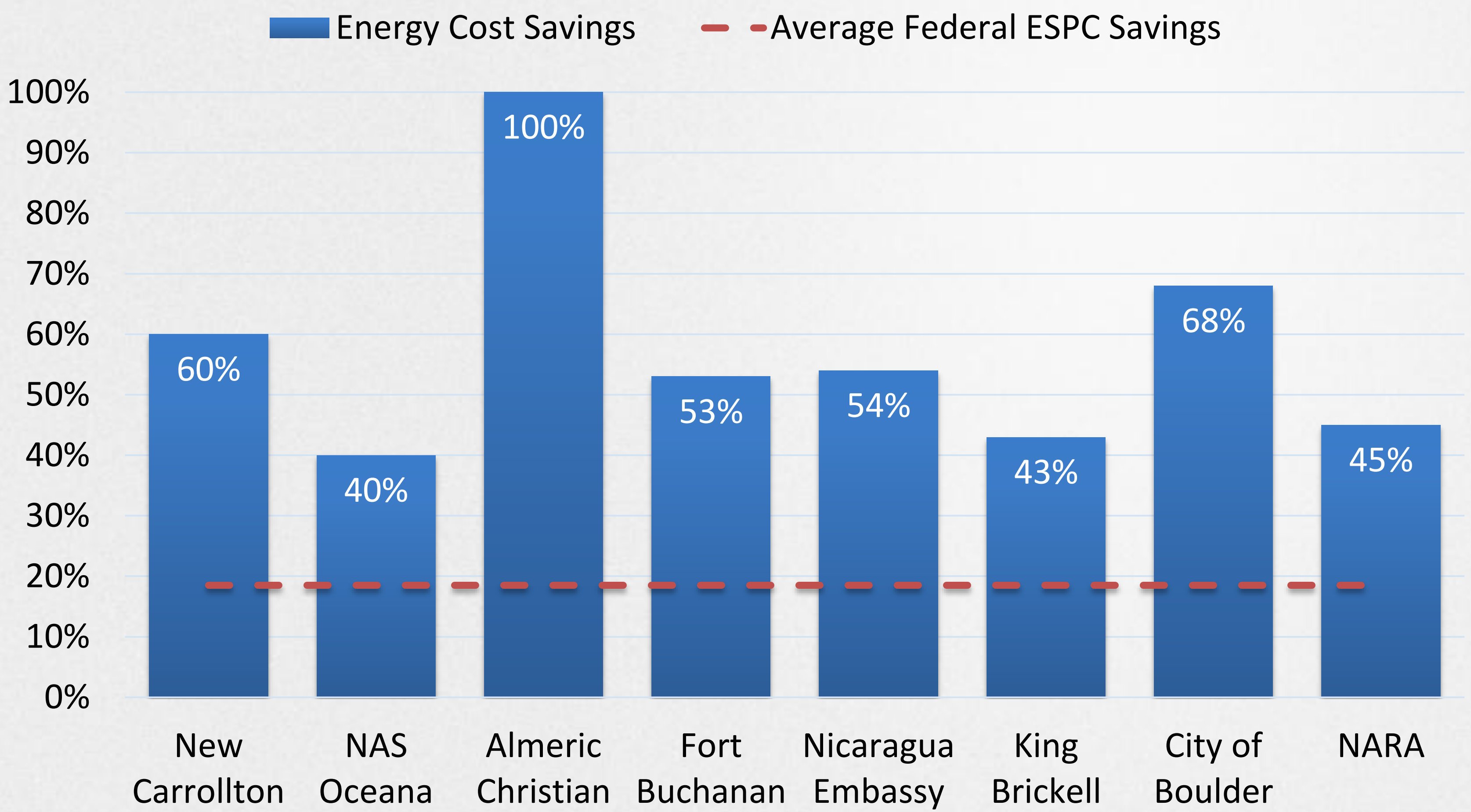
- Deep retrofits can be implemented across a wide spectrum of buildings/conditions
- The following are not (necessarily) required to achieve deeper energy savings in ESPC:
  - High energy prices
  - High energy consumption
  - Advanced ECMs
  - Large payments from savings in implementation period
  - O&M savings

What is Required to Achieve Deep Retrofits

- Buildings that have not undergone recent energy retrofit projects
- Emphasis from agency
- Thorough audit process to identify ECMs
- Integrated design approach
- Realization that deep retrofits cost more

  (in terms of energy savings per dollar invested)

GSA-RMI Report: Summary of Deep ESPC Savings



Note that City of Boulder and NARA projects use best-building savings, as these were large portfolio projects with a high percentage of lighter-touch (“shallow”) retrofits. Portfolio-wide savings were 25% and 27%, respectively.

Case Study Overview

Project Name	Location	ESCO	Energy Savings	Investment Value and % Appropriated	Contract Term
New Carrollton Federal Building	New Carrollton, MD	Ameresco, Inc.	60%	$44.6M (1%)	22 years
NAS Oceana	Virginia Beach, VA	Trane U.S., Inc.	40%	$89.6M (0%)	17 years
Almeric Christian	Saint Croix, USVI	Schneider Electric	100%	$6.4M (0%)	19 years
Fort Buchanan	San Juan, Puerto Rico	Johnson Controls, Inc.	53%	$71.1M (0%)	18.5 years
Nicaragua Embassy	Managua, Nicaragua	Lockheed Martin	54%	$15.0M (0%)	25 years
King Brickell	Miami, FL	FPL Energy Services, Inc.	43%	$4.4M (51%)	15 years
City of Boulder	Boulder, CO	McKinstry Essention, LLC	68%	$16.2M (29%)	15 years
NARA	(Multiple)	Honeywell ESG	45%	$11.1M (0%)	16 years

Note that City of Boulder and NARA projects use best-building savings, as these were large portfolio projects with a high percentage of lighter-touch ("shallow") retrofits. Portfolio-wide savings were 25% and 27%, respectively.

Best Practices

- Establish a Support System
- Incorporate Ongoing Involvement
- Collaborate with Diverse Stakeholders
- Start with a Clean Sheet
- Use Iterative, Holistic Design Processes
- Set Aggressive Long-Term Goals

Set Aggressive Long-Term Goals

Keys to Success

1. Establish long-term goals and build a roadmap
2. Clearly state desired outcomes and constraints
3. Quantify the benefits beyond energy cost savings
4. Push for longer contract terms to achieve deep, bundled savings

Success Factors in Practice

The Fort Buchanan ESPC

- Stemmed from Army's Net Zero Initiative
- Utilized comprehensive, long-payback measures balanced by shorter-term ECMs
- Helped the base achieve 53% energy and 70% water savings

Collaborate with Diverse Stakeholders

Keys to Success

1. Kick off projects with a design charrette
2. Maintain stakeholder engagement
3. Mitigate the effects of personnel turnover
4. Incorporate non-energy upgrades

Success Factors in Practice

The Nicaragua Embassy project team

Drafted a Memorandum of Agreement to maintain understanding and engagement throughout the project despite regularly-scheduled personnel turnover.

Establish a Support System

Keys to Success

1. Foster internal project champions
2. Use a central PMO to route logistics
3. Make use of federal and local resources
4. Support the federal policies and programs that benefit deep retrofits

Success Factors in Practice

The King Brickell project team

- Benefitted from the support of the GSA's national PMO and NDER program
- Enabled an agency team unfamiliar with ESPCs to achieve 43% energy and 40% water savings.

Start with a Clean Sheet

Keys to Success

1. Focus on efficiently providing end-uses
2. Evaluate the impact of developments in technology
3. Make space for creative design

Success Factors in Practice

The New Carrolton ESPC

- Hinged upon a complete re-design of the existing HVAC system to reduce chiller tonnage by 40%
- 11,000 LEDs, 808 kW solar PV, window glazing, and "rain gardens" installed

Use Iterative, Holistic Design Processes

Keys to Success

1. Use design-build contracts that span multiple phases
2. Require a presence on-site
3. Master integrative design
4. Consider non-energy benefits

Success Factors in Practice

The NAS Oceana project

- Includes wastewater effluent heat rejection loop, incorporated after on-site meeting uncovered the resource
- Four-phase, 15-yr project will save Navy $6m in annual energy and O&M costs

Incorporate Ongoing Involvement

Keys to Success

1. Include BAS installation or upgrades
2. Use targeted audits to inform future projects
3. Incorporate an occupant engagement program

Success Factors in Practice

The Almeric Christian project

- Included $500,000 in BAS upgrades to safeguard against efficiency degradation
- Uses Option C M&V to verify performance
- First-known federal ESPC project expected to achieve net-zero energy

Parting Comments

- The keys to successful deep ESPC projects are **well-understood** and **achievable** strategies
- **Communication**, deliberate **goal setting**, and **holistic design** are key to deep ESPCs
- Deep ESPCs are a **responsible investment** of taxpayer money
- Investing in efficiency today prepares our buildings to become **resilient grid assets** and supports goals like **net-zero energy**

Questions?

Download the Report: http://www.rmi.org/gsaretrofits

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Additional Resources

- Deep Retrofit Value Guide: http://www.rmi.org/retrofit_depot_deepretrofitvalue
- Deep Retrofit ESPC Owner's Practice Guide:
  http://www.rmi.org/Knowledge-Center/Library/2015-02_Path_to_DR_using_ESPC
- Factor 10 Engineering and Design Principles: http://www.rmi.org/10xE
- Deep Retrofit Triggers: http://www.rmi.org/retrofit_depot_101_specifying_triggers
- Additional resources provided in the report conclusion