U.S. DEPARTMENT OF ENERGY

Office of ENERGY EFFICIENCY & RENEWABLE ENERGY

Energy Savings Performance Contracts (ESPCs) Drive Efficiency-Enabled New Infrastructure

Leslie Nicholls
Acting Director, Federal Energy Management Program

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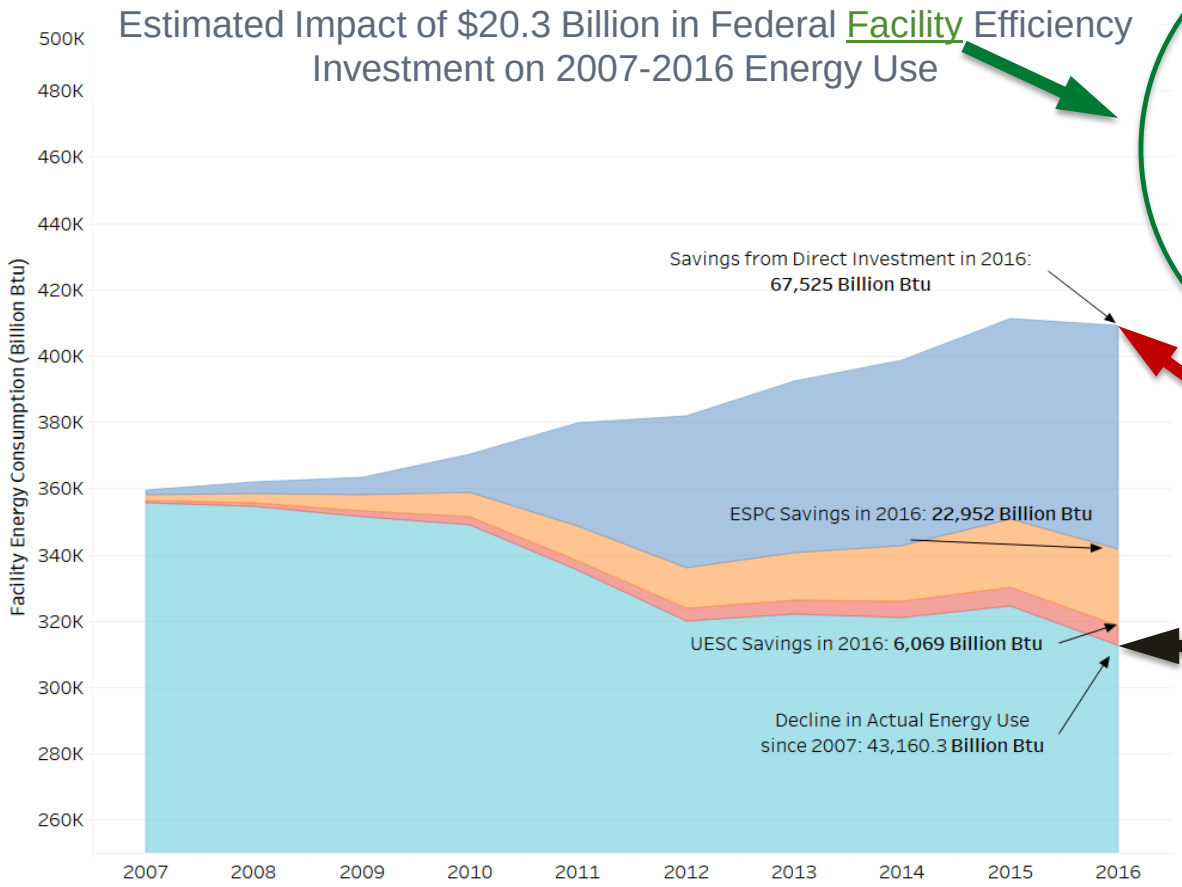
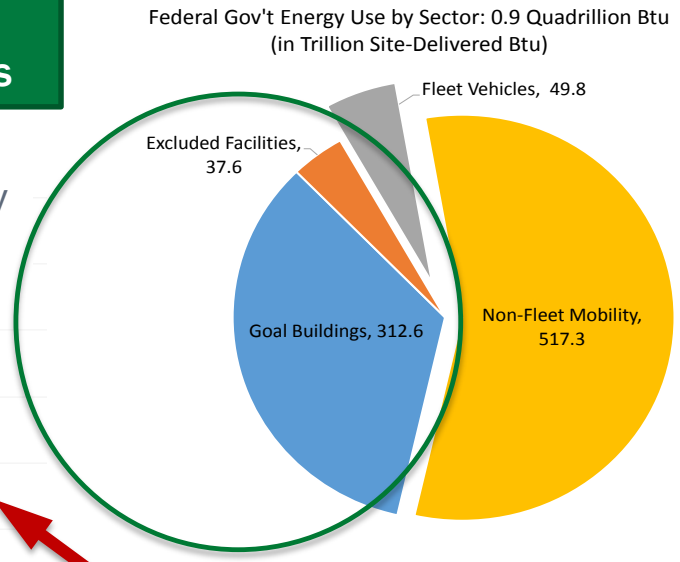
FEMP Federal Energy Management Program

Federal Energy Efficiency: *Accomplishments*

$2.4* billion of avoided costs in 2016

$20.3 billion of investment is equivalent to 162,000 job-years



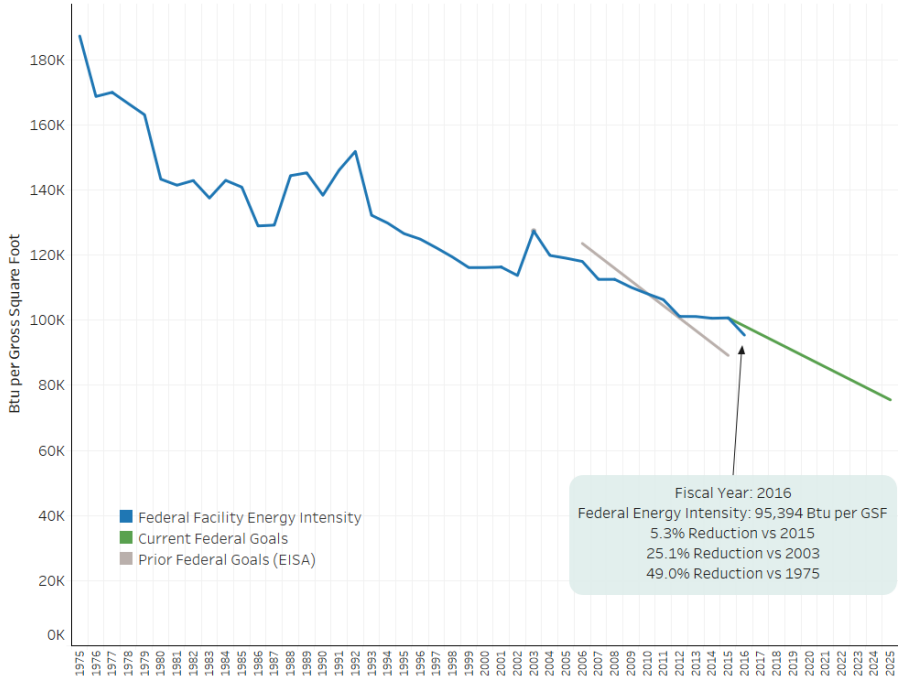


Where we would be without previous 10 years EE investment

Energy consumption today

*at cost of electricity

Federal Energy Efficiency: *The Long Road of Progress*



With assistance from FEMP-supported initiatives and partnerships, the Federal Government has reduced its facility energy intensity by **49** percent since 1975 and **25** percent since 2003.

Comparison

Federal Office Buildings

GSA facilities

51,273 Btu per gsf

U.S Average

77,800 Btu per gsf

52 percent lower than U.S Average

Federal Healthcare Facilities

VA facilities

145,142 Btu per gsf

U.S Average

172,700 Btu per gsf

19 percent lower than U.S Average

Federal Energy Investments: *The Potential*

While there has been great progress, additional opportunities exist for further energy cost reduction and energy conservation.

- Between ***$9 billion*** and ***$15 billion*** of potential self-financing efficiency measures is estimated to exist in Federal buildings.

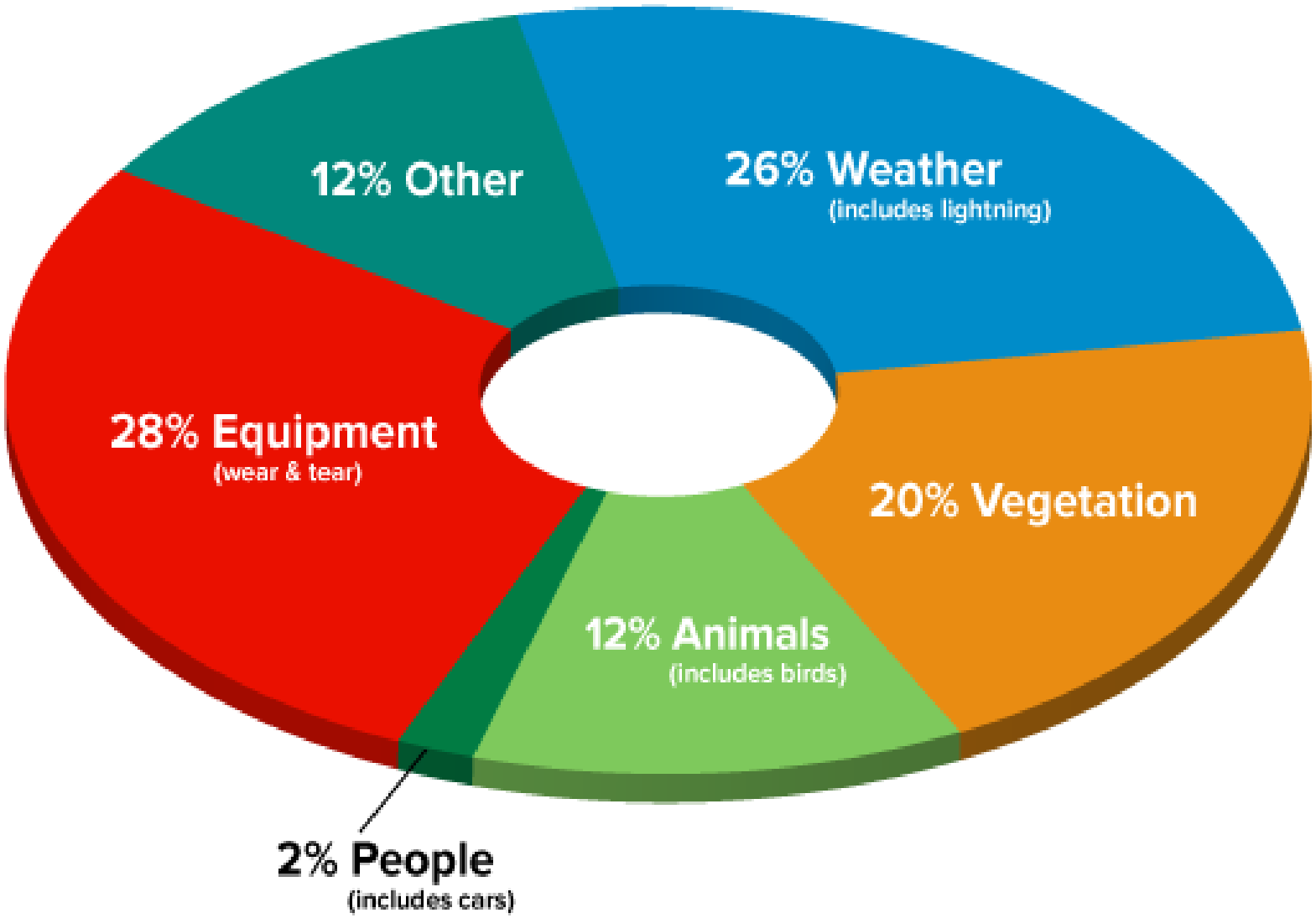
- The level of deferred maintenance and repairs is also increasing, with approximately ***$165 billion*** required to bring government owned property, plant and equipment to an acceptable condition.

Growing Opportunities for Cost Savings at Federal Facilities

Fortunately, new technology continues to provide opportunities to mine efficiency

- Lighting: LED lighting offers efficiency improvements of 50-80% over incandescent and earlier generation fluorescent lighting
- Boilers: Modern condensing boilers can now operate with combustion efficiencies in excess of 90% vs. 75% from a typical boiler installed in the 1980's
- Chillers: Current centrifugal chiller technologies can offer cooling solutions that use approximately half the energy of those installed just three decades ago

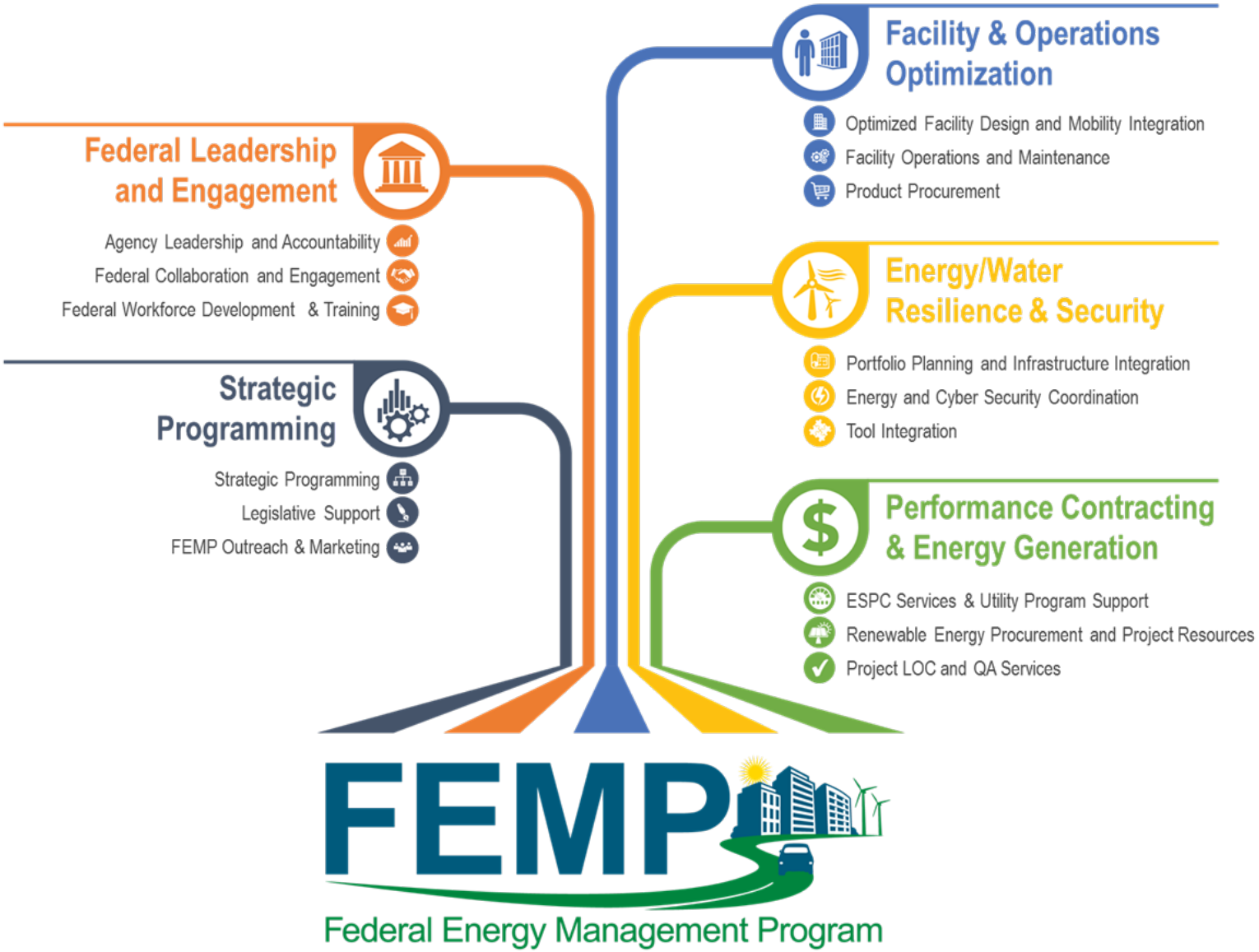
Impacts Re: Mission Assurance



ESPCs Improve Resilience at Federal Facilities

- **Protections against aging infrastructure and equipment failure**
  - Comprehensive, fence to fence ESPCs can include a focus on aging equipment with a high probability of failure
- **Protections against weather and environment related events**
  - CHP
  - Micro-grids/controls
  - Diesel Generator O&M
  - Renewable generation
  - Battery storage
  - Fuel and water storage and efficiency

Federal Energy Management Program: *FY18 Activities*



Agency Priorities

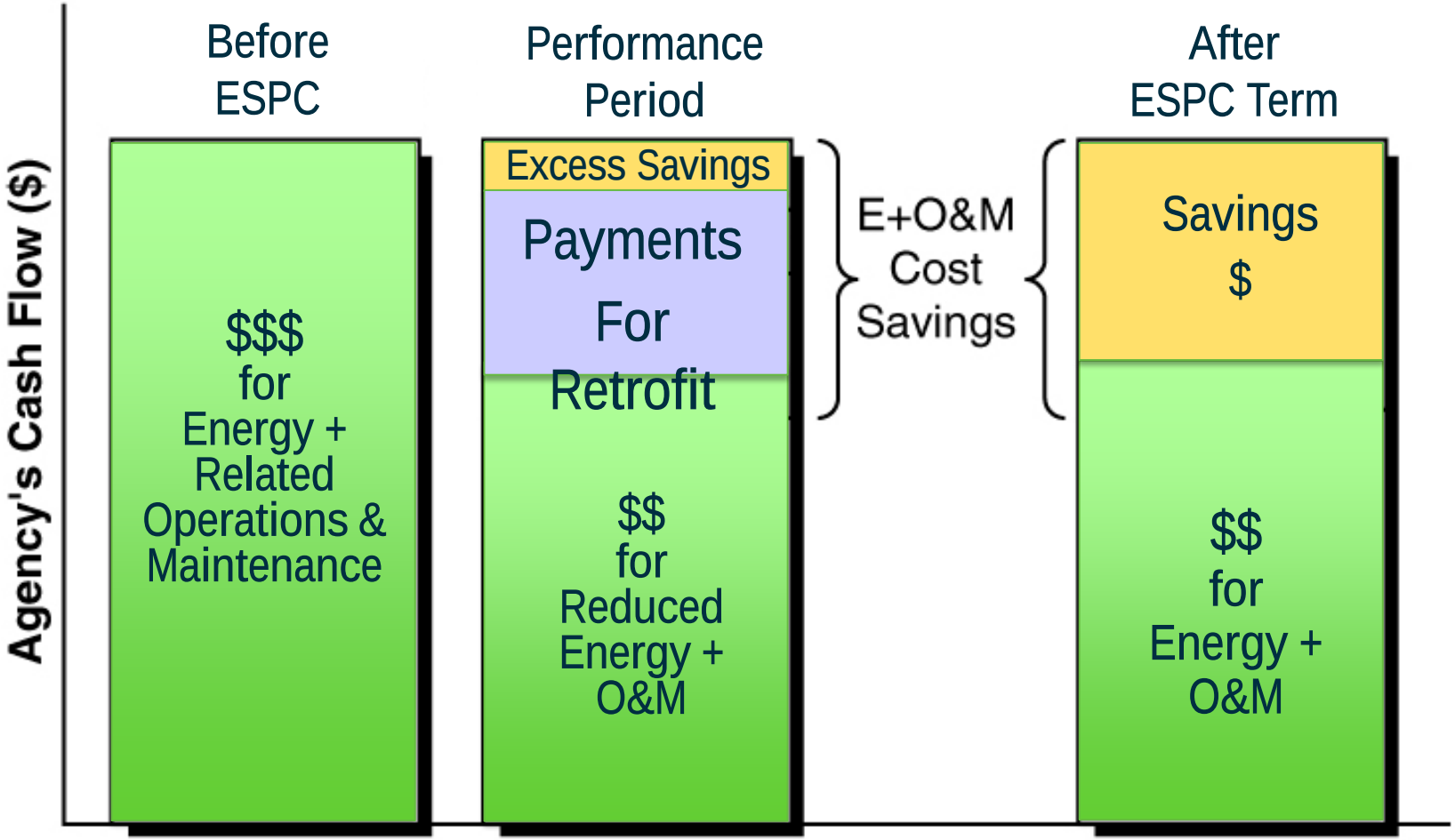
Agency requirements addressed by ESPCs

- Repair or modernization of infrastructure
- Reduce maintenance headaches
- Increase reliability, capacity, functionality
- Improve occupant work environment
- Provide critical facility data for operations and benchmarking
- Reduce utility bills
- Reduce O&M responsibility and expense; avoid deferred maintenance problems
- Improve Agency energy security and resiliency

ESPCs: Budget-neutral Tool to Improve Infrastructure

The Government's Utility Bill with an ESPC:

- Retrofit enables energy, water, O&M savings
  - Savings pay for the retrofit



Key Features of ESPCs

- Legislated purpose: achieve energy savings and ancillary benefits for facility energy (about 40% of total USG energy use is facility energy)
- Savings guarantees and measurement and verification (M&V) are mandatory
- Savings must exceed payments for each year
- Contract term cannot exceed 25 years (starting with award of the task order)
- Combining financing and appropriations for biggest impact

ESCOs and Agencies: A public/private partnership

These contracts allow energy service companies (ESCOs) to identify and implement energy efficiency upgrades paid for by energy savings without additional appropriations.

Energy Services Company (ESCO)

- Provides development and installation of energy and water conservation measures
- Guarantees resulting cost savings sufficient to cover project cost

Agency

- Requests/reviews ESCO proposals
- Pays ESCO over term of contract from guaranteed cost savings
- Monitors annual Measurement and Verification protocol to ensure savings

ESPCs IDIQ Process, in Brief:

- Agency issues a Notice of Opportunity to all IDIQ ESCOs, reviews responses, and eventually selects an ESCO to perform a Preliminary Assessment.
- ESCO does a Preliminary Assessment to determine likely viability and, after agency authorizes, completes an Investment Grade Audit and Proposal of energy saving measures
- Agency reviews, negotiates, and approves
- ESCO and subcontractors (many are small businesses) install project
- Commissioning to ensure equipment performance, then acceptance
- Measurement and Verification (M&V) is performed thereafter, yielding savings information
- Results: energy efficient infrastructure upgrades for the federal agency; jobs (manufacturing, electricians, plumbers, truckers, building trades, HVAC, solar installers, etc.); and energy savings.

21 DOE ESPC IDIQ 3 ESCOs: New Awards

- ABM Government Services, LLC of Hopkinsville, KY
- AECOM Technical Services, Inc. of San Diego, CA
- Ameresco, Inc. of Framingham, MA
- The Brewer-Garrett Company of Middleburg Heights, OH
- CEG LLC of Arlington, VA
- Consolidated Edison Solutions Inc. of Valhalla, NY
- Constellation NewEnergy, Inc. of Baltimore, MD
- EDF Renewable Energy of San Diego, CA
- Energy Solutions Professionals, LLC of Overland Park, KS
- Energy Systems Group, LLC of Newburg, IN
- Honeywell of Golden Valley, MN
- Leidos Engineering, LLC of Oklahoma City, OK
- Lockheed Martin Corporation of Rockville, MD
- Noresco United Technologies of Westborough, MA
- OpTerra Energy Services of Overland Park, KS
- Schneider Electric of Austin, TX
- Siemens Government Technologies, Inc. of Arlington, VA
- SmartWatt Energy of Ballston Lake, NY
- Southland Energy of Dulles, VA
- Trane U.S. Inc. of St. Paul, MN
- WGL of McLean, VA

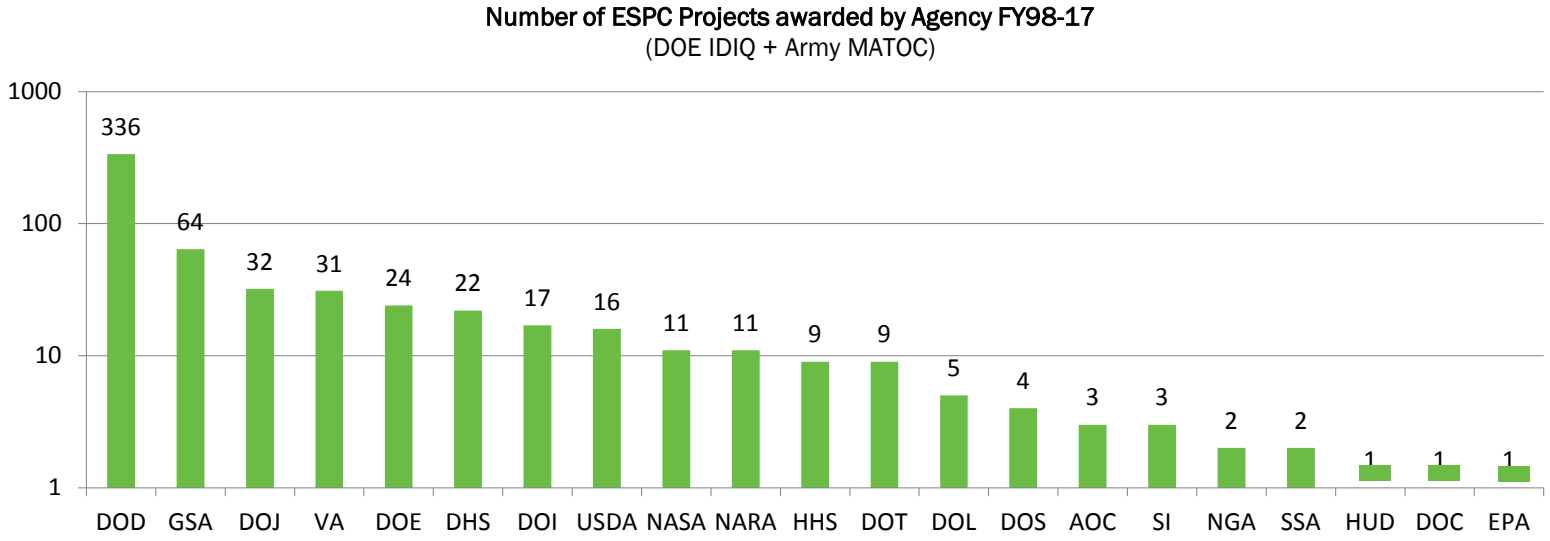
20 ESPC ENABLE ESCOs: New Awards

ABM Government Services, LLC, Hopkinsville, KY		Honeywell International, Inc., Oak Creek, WI	*
AMEC Foster Wheeler Environment & Infrastructure, Inc., Blue Bell, PA		Johnson Controls, Inc., Milwaukee, WI	*
AMERESCO Federal Solutions, Inc., Knoxville, TN	*	Legatus6, LLC, Chevy Chase, MD	**
American Development Institute, LLC, Smithfield, RI	**	Pacific Lighting Management, Inc., Santa Ana, CA	**
The Brewer-Garrett Co., Cleveland, OH		Siemens Industry, Inc., Buffalo Grove, IL	*
Constellation NewEnergy, Inc., Baltimore, MD	*	Southland Industries, Garden Grove, CA	
CTI Energy Services, LLC, Amherst, MA	**	Trane U.S., Inc., La Crosse, WI	*
Dominion Energy Management, Inc., Ashland, VA	**	Utility Systems Solutions, Inc., Dallas, TX	**
The Efficiency Network, Inc., Pittsburgh, PA	**	Williams Electric Co., Inc., Fort Walton Beach, FL	**
Green Generation Solutions, LLC, Bethesda, MD	**	Woodstone Energy, LLC, Madison, TN	**

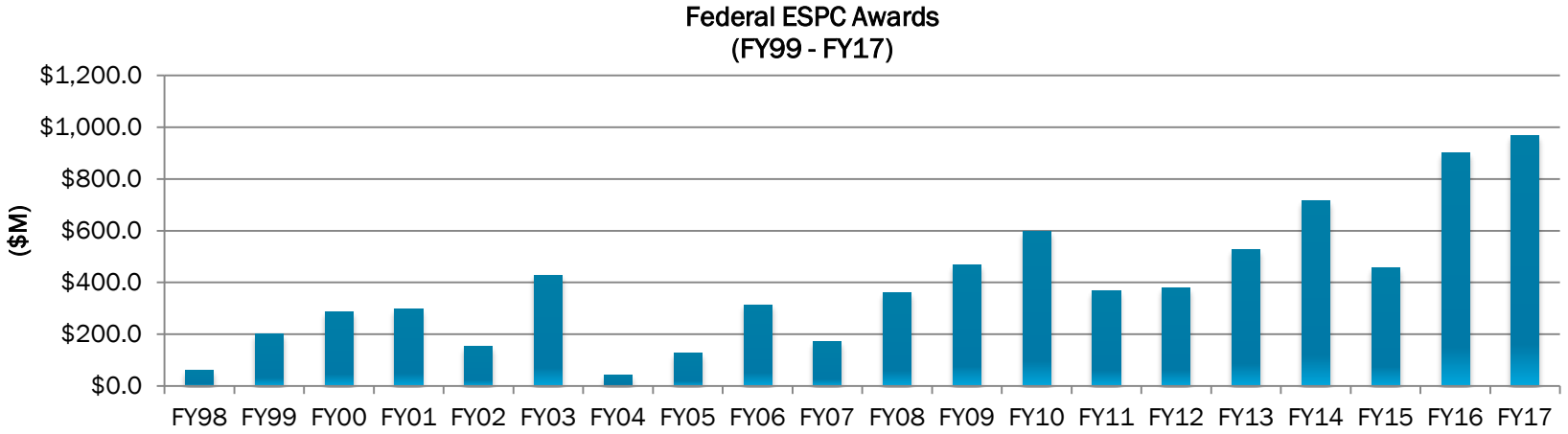
* = DOE IDIQ ESPC ESCO
** = Small Business

Agency use of ESPCs

Broad Agency Use



Investment Growth Over Time



ESPC Project Example: Energy Resiliency

GSA: FDA White Oak Campus, Maryland

- 3 phase project to develop onsite electrical generation and micro-grid
- Combined Heat and Power system capable of off-grid operation (utilized 47 times over 18 month period, operations uninterrupted)
- System redundancies, dual fuel capabilities
- Improved uptime >99.999%

Campus size	3.9 million sq-ft
Investment value	$280 million
Utility/Operations Cost savings	$43.6 million/year
Energy savings	915 MMBtu/year (30%)

KEY ENERGY CONSERVATION MEASURES (ECMs):

- Combined Heat and Power (CHP), 26MW of power generation
- Absorption Chillers – operate on waste heat.
- Thermal Energy Storage
- Back-up Steam Boilers (dual fuel)

ESPC Project Example: Deep Retrofit Re-design

Building size	1.2 million sq-ft
Original construction	1994
Investment value	$40 million
Utility Cost savings	$2.5 million/year
Energy savings	95,588 MMBtu/year (60%)

The New Carrolton Federal Building, MD Deep-Retrofit ESPC

- Hinged on 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

KEY ENERGY CONSERVATION MEASURES (ECMs):

- Central chilled-water plant
- Integrative building controls and sensors
- 11,000+ LED replacements
- 808 kW solar PV
- Geothermal heat rejection
- Exhaust-to-Outdoor-Air heat-recovery loop

Performance Contracts Perform Well

Annual measurement of savings verifies that performance contracting generates persistent savings

- **Reliable Cost Savings[1]**
  - ESPC savings achievement: 103+% of guaranteed savings (reported annually on FEMP's webpage)
- **Actual savings to agency budgets over time: 174% to 197% of contract savings[2]**
  - Savings beyond term
  - Under-estimate of equipment performance
  - Under-estimate of utility escalation
- **How do appropriations-funded projects compare in savings?**
  - Largely unknown: lack savings guarantee and not monitored annually on a widespread basis.

[1]Coleman, Earni, and Williams (PNNL, 2014)

[2]Shonder (ORNL, 2013)

DOE/FEMP Performance Contracting Support

- FEMP's federal team provides program oversight
- DOE's Golden Field Office issues IDIQ, contract oversight.
- FEMP Federal Project Executives help agencies chose the best performance contract to meet their needs
- Experienced Project Facilitators and uniform project development guide support project dev'l.
- Training, contracting resources, templates, and tools (such as REopt and cost benchmarks).
- Application of lessons learned to guidance and process improvement (e.g., revised M&V Guidelines)

DOE/FEMP Performance Contracting Support

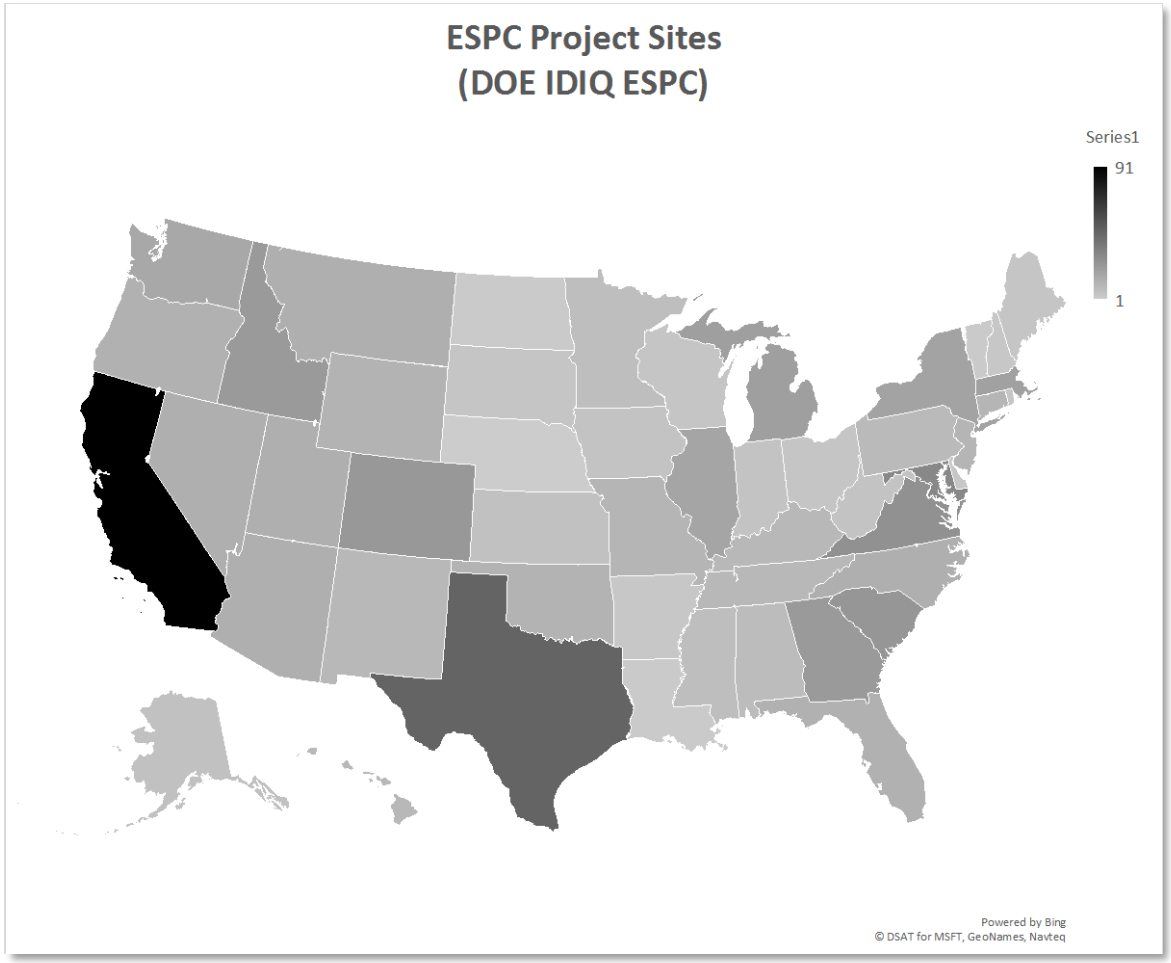
- Provision of eProject Builder tool to support key contract documents and as one stop data resource on project performance of its life.
- FEMP technical and DOE IDIQ ESPC Contracting Officer task order reviews
- Life-of-Contract Services (e.g. Contract Administration training for staff turn-over)
- Agency level ESPC portfolio analysis
- Analysis of program effectiveness (e.g. Annual Savings Report)

ESPCs Create Highly Skilled Jobs

- **ESPCs generate a range of highly skilled, good paying jobs:**
  - Engineering: electrical, mechanical, building operations
  - Construction: building trades (replacing windows, adding insulation, sealing ductwork and buildings…), HVAC, Electricians, Plumbers;
  - Installation of generation assets, such as solar arrays.
  - IT and controls in construction and operations
  - Manufacturing jobs, Transportation, and other jobs
- **Job creation estimate:**
  - Over 35,000 job-years over the last 5 years

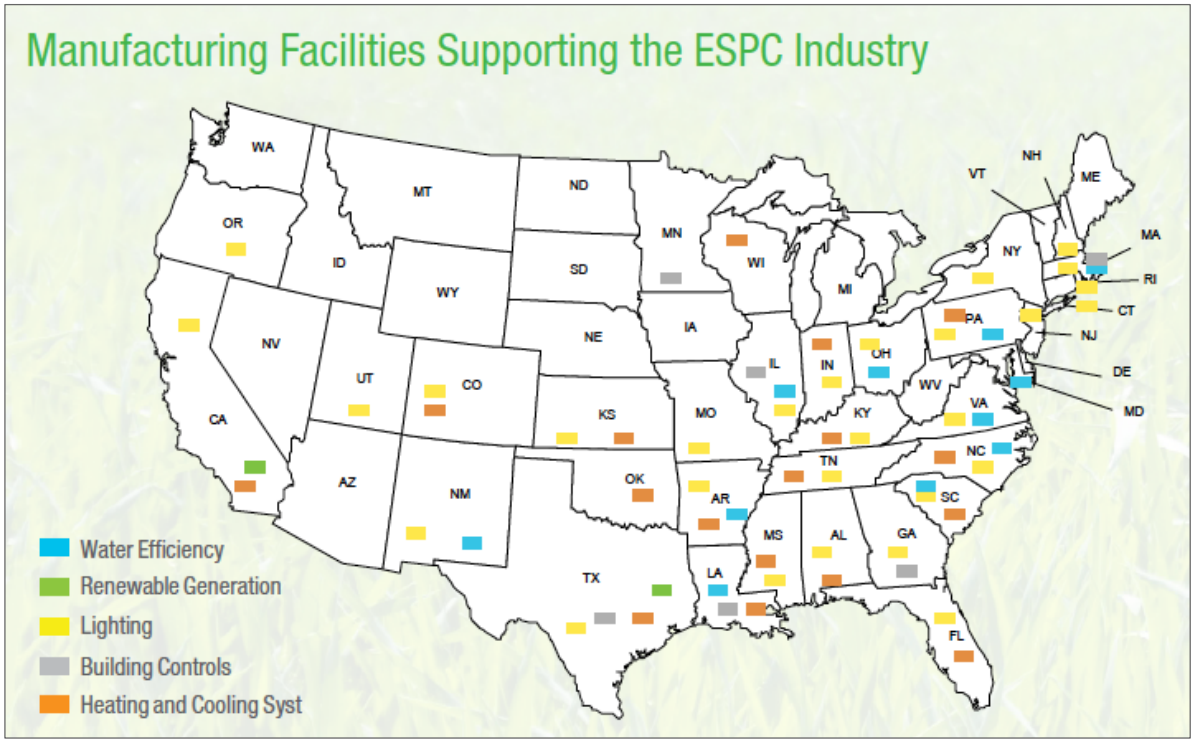
ESPCs: Most Agencies, All States

- ESPCs utilized by 21 federal agencies
- ESPC projects across all 50 States, D.C., Puerto Rico, Guam, Virgin Islands
- USG facilities abroad:
  - South Korea
  - Germany
  - Spain
  - Nicaragua



Federal ESPC Benefits

- **Infrastructure:** $7.7 B in investment since 1998 addresses a portion of the backlog in federal buildings and maintenance needs
- **Jobs & Economic Impact** of $7.7 billion investment created 77,000 jobs (job-years)
- **Support for U.S. manufacturing**



Typical trades supported through ESPC investment:

- HVAC Technicians
- Electricians
- Plumbers
- Construction Labor
- Construction Management
- Manufacturing Labor
- Engineers
- Project Managers

*** http://www.nam.org/Issues/Energy-and-Environment/Affordable-Energy/Domestic-Energy/Improving-Federal-Energy-Savings-Through-Performance-Contracting--Full-Report/**

Widely Used—but used Enough?

- Lack of Federal goals that make Energy Savings Projects a top priority.
- Appropriations may be most commonly used on “low hanging fruit” instead of achieving maximum impact leveraging ESPCs.
- O&M savings can enable more comprehensive projects, but are underutilized: budget uncertainty for those accounts vs long term contractual obligations.
- O&M and Resilience funding is limited: required to enable savings.
- Authority for ESPCs is limited to facilities, 2009 Report to Congress indicates great opportunity for expansion to mobility energy using assets.

Performance Contracting Delivers Results

3rd Generation DOE IDIQ Contract Awarded

$55 billion contract ceiling available

***$10-15 billion of federal cost-effective investment potential available**

"This program highlights how the public and private sector partnerships can align with the Administration's objectives for increased energy efficiency and job creation without burdensome regulations"
- U.S. Secretary of Energy Rick Perry

ESPC IDIQ Contract Accomplishments
1997-2017

*Estimate is based on data from the Federal Energy Management Program's Compliance Tracking System Database and Lawrence Berkeley National Laboratory's "Updated Estimates of the Remaining Market Potential of the U.S. ESCO Industry," April 2017

QUESTIONS?

Leslie.Nicholls@ee.doe.gov