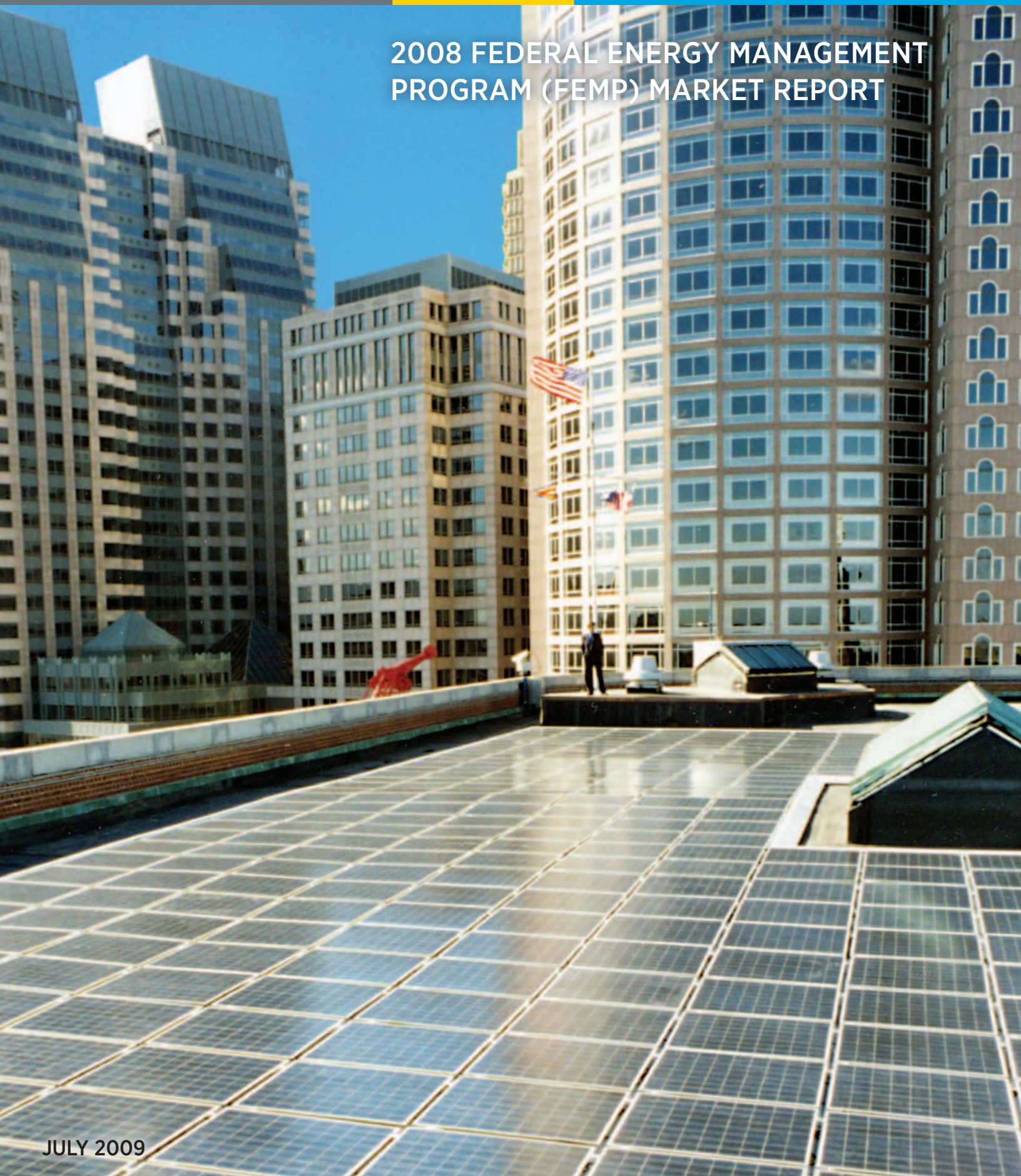


2008 FEDERAL ENERGY MANAGEMENT PROGRAM (FEMP) MARKET REPORT

JULY 2009



The Market Environment for Federal Government Energy Management and Conservation

Report Purpose

This report assesses the market for Federal Energy Management Program (FEMP) services as it existed in FY 2008. It discusses Federal energy management goal progress in FY 2008, and examines the environment in which agencies implemented energy management projects over the last three years. The report also discusses some recent events that will increase the market for FEMP services, and outlines FEMP's major strategies to address these changes in FY 2009 and beyond.

Acronyms and Abbreviations

AFV	alternative fuel vehicle	GGE	gallons of gasoline equivalent
ARRA	American Recovery and Reinvestment Act	GHG	greenhouse gas
Btu	British thermal unit	GSA	General Services Administration
CFR	Code of Federal Regulations	ISWG	Interagency Sustainability Workgroup
CHP	combined heat and power	IDIQ	indefinite-delivery, indefinite-quantity
DOD	U.S. Department of Defense	ITP	Industrial Technologies Program
DLA	U.S. Defense Logistics Agency	LBNL	Lawrence Berkeley National Laboratory
DOE	U.S. Department of Energy	M&V	measurement and verification
DOJ	U.S. Department of Justice	MW	megawatt
ECM	energy conservation measures	NASA	National Aeronautics and Space Administration
EERE	(Office of) Energy Efficiency and Renewable Energy	NREL	National Renewable Energy Laboratory
EISA	Energy Independence and Security Act of 2007	O&M	operations and maintenance
EMCS	energy management and control systems	OMB	Office of Management and Budget
EO	Executive Order	ORNL	Oak Ridge National Laboratory
EPA	Environmental Protection Agency	PPA	Power Purchase Agreement
EPACT	Energy Policy Act	PV	photovoltaic
ESCO	energy service company	REC	Renewable Energy Certificate
ESPC	energy savings performance contract	TA	Technical Assistance (Program)
ET	Emerging Technologies (Matrix)	UESC	utility energy service contracts
EUL	enhanced use leasing	USPS	U.S. Postal Service
FEMP	Federal Energy Management Program	VA	Veterans Administration
		WAPA	Western Area Power Administration
		WFO	Work for Others

Executive Summary

During 2008, it became clear that Federal agencies were unlikely to meet their current, or future, Federal energy management goals without significant increases in both financial investment and management attention. Agencies have responded to this challenge in a variety of ways, including seeking to increase levels of the services and support received from the Department of Energy's (DOE) Federal Energy Management Program (FEMP). Due to the increased level of Federal project investment required to meet the goals, the demand for FEMP services over the next few years will likely exceed the program's capacity to deliver. The subsequent challenge for FEMP will be to prioritize services, staff, and resources in order to maximize the Program's contribution to overall Federal success.

A number of Federal laws and regulations set energy management requirements for Federal agencies spanning energy efficiency, renewable energy, water conservation, and petroleum reduction. Executive Order 13423, the Energy Independence and Security Act of 2007, and the Energy Policy Act of 2005 each established or expanded one or more of the Federal requirements in these areas. More aggressive goals are expected to result from the change in administration, and these new goals will in all likelihood establish Federal agency greenhouse gas (GHG) accounting and reduction requirements. Additionally, agencies must begin reporting on comprehensive energy and water evaluations for the first 25 percent of their covered facilities (constituting at least 75 percent of energy use) in FY 2009. This requirement is a major impetus behind the need for an increased level of auditing and commissioning service options for Federal agencies, since very few agencies have the ability to take on the increased workload in-house.

By statute, FEMP tracks agency performance towards these goals. Despite some progress made by Federal agencies in meeting mandated energy management goals during FY 2008, the overall pace of progress for the Federal Government as a whole is decreasing and attainment of long-term goals is in jeopardy. While the level of Federal investment in energy efficiency and renewable energy projects increased from all funding sources in FY 2008, the rate of increase is not enough to ensure goal compliance, especially if performance targets are revised upwards. Federal agencies will only succeed in meeting their current goals in the coming years by significantly increasing their investments in energy efficiency and renewable energy projects. FEMP estimates that the Federal Government must invest at least \$16 billion between now and 2015 to meet the current energy and water intensity reduction, renewable energy, and petroleum and alternative fuel goals—more than \$2.6 billion per year. This is more than twice the projected investment of \$1.2 billion for FY 2009.

To successfully accomplish projects, agencies must increase their effective use of available resources including appropriations through normal budget processes, funds provided through the American Recovery and Reinvestment Act (ARRA), and private sector financing approaches such as energy savings performance contracts (ESPC), utility energy services contracts (UESC), and power purchase agreements (PPA).

Regardless of the funding source, it is clear that as agencies increase their level of investment, the demand for FEMP services will correspondingly increase as FEMP executes its mission: *To facilitate the Federal Government's implementation of sound, cost-effective energy management and investment practices to*

enhance the nation's energy security and environmental stewardship. Specifically, FEMP anticipates a significant increase in requests for assistance in the areas of alternative finance of major projects, building auditing and commissioning services, the deployment of renewable energy technologies, integrated “whole systems” design services, and planning.

FEMP’s ability to meet these demands is a function of both structure and resources. During 2008, FEMP reorganized around three product delivery lines: transaction support services, technical support services, and decision support services. Additionally, FEMP instituted a “customer service matrix” whereby each Federal agency now has a designated customer service representative within FEMP. The customer service representatives will assist agencies in identifying and prioritizing project and investment opportunities and facilitate access to FEMP and private sector resources to help achieve their energy management goals. FEMP is working with agencies to increase their use of technical services provided by DOE’s national laboratories and to enhance the data management and Web-based tracking support that FEMP provides to all agencies. These investments in data management are expected to allow for better reporting of market trends in the future.

Perhaps the best tool available to FEMP to meet interagency needs comes in the form of the newly awarded DOE indefinite-delivery, indefinite-quantity ESPC. This contract vehicle, awarded to 16 new energy service companies in 2008 with capacity for \$80 billion (including financing costs) for energy efficiency, renewable energy, and water conservation projects at Federal facilities, is an excellent option for agencies as they consider ways to fund energy investments. For this contract to reach its full potential, FEMP will have to increase the support it provides in terms of training, project facilitation, and oversight. For example, FEMP plans to initiate a full “life of contract” support mechanism to ensure persistence of savings.

In 2008, FEMP’s budget increased slightly from the prior year, from \$19.48 million to \$19.82 million, reversing a 12.5 percent decline in funding from 2004 to 2006. Even with this increase in 2008, a greater proportion of FEMP funds were allocated towards DOE internal energy management efforts, diluting FEMP’s ability to support its Federal customers, particularly in the technical assistance area. FEMP budgets are expected to increase by 50 percent in out-years, but it is not certain if these increases, even combined with FEMP’s process and structure improvements, will be sufficient to meet the increasing demand of services by agencies.

Table of Contents

Report Purpose.....	i
Acronyms and Abbreviations	ii
Executive Summary	iii
Table of Contents	v
List of Tables	vi
List of Figures	vi
Introduction.....	1
Mandated Energy Management Goals and Federal Government Performance	3
Energy intensity reduction	3
Renewable electric energy use	5
Water intensity reduction	8
Fleet petroleum reduction and alternative fuel use	10
Additional requirements.....	12
Greenhouse gas reductions.....	15
FEMP Products and Services.....	16
Project Transaction Services	16
Applied Technology Services	17
Decision Support Services	24
Impact of FEMP services on government performance.....	24
Federal Agency Project Investment	27
Energy Savings Performance Contracting	31
Utility Energy Service Contracts.....	40
Enhanced Use Leases.....	41
Power Purchase Agreements.....	41
Private Sector Partner Market Environment	43
Energy Service Companies	43
ESPC finance providers	46
Utility-provided energy services	48
Energy-efficient product manufacturers.....	50
Emerging technologies.....	54
Government vehicles and alternative fuels	60
Projected Market for Federal Energy Management	62
Demand for FEMP services	62
FEMP services and strategies looking forward.....	65
Appendix.....	68
References.....	73

List of Tables

Table 1. FEMP’s Major Federal Agency Customers	1
Table 2. Federal Energy Intensity Reduction Goals	3
Table 3. Fossil Fuel Consumption Reduction Requirements for New Buildings	14
Table 4. FEMP Audits and Technical Assistance by Agency (FY 2003 - FY 2008)	19
Table 5. Top Agency Workshop Participation (FY 2003 - FY 2008) and Energy Use	22
Table 6. DOE IDIQ ESPC Project Investment and Energy Savings by Agency (FY 2003 - FY 2008)	35
Table 7. FY 2008 DOE IDIQ ESPC Projects Awarded by Agency	36
Table 8. Types of ECMs	37
Table 9. FY 2008 UESC Projects	41
Table 10. DOE IDIQ ESPC Project Investment and Energy Savings by ESCO (FY 2003 - FY 2008)	44
Table 11. Major Companies Financing ESCOs and ESPCs	47
Table 12. Major Providers of UESCs	48
Table 13. Industry Leaders of Energy-Efficient Products	52
Table 14. ET Matrix	55
Table 15. CHP Costs, Savings, and Paybacks	59
Table 16. Light Duty AFV Models Available for Procurement through GSA (FY 2008)	61
Table A. ESCOs Awarded IDIQ ESPCs in December 2008	68

List of Figures

Figure 1. Federal Energy Management Program Organization and Service Areas	2
Figure 2. Progress Towards Energy Intensity Reduction Goals in Goal-Subject Buildings (FY 2008)	4
Figure 3. Reduction in Goal-Subject Building Energy Intensity (FY 2003-FY 2008)	5
Figure 4. Federal Government Renewable Energy Use as a Percentage of Facility Electricity Use (FY2000 - FY 2008)	7
Figure 5. Renewable Electric Energy as a Percentage of Electricity Use by Agency (FY 2008)	7
Figure 6. FY 2008 Agency Reductions in Water Intensity in Gallons per Square Foot (from FY 2007)	8
Figure 7. FY 2008 Agency Water Intensity	9
Figure 8. Federal Fleet Fuel Use FY 2008 (Million GGE)	10
Figure 9. Federal Fleet Alternative Fuel Use and Targets	11
Figure 10. Federal Fleet Alternative Fuel Use (FY 2003 - FY 2008)	12
Figure 11. Number of Technical Assistance Projects by Year (FY 2003 – FY 2008)	18
Figure 12. Technical Assistance Projects Supported by DOE National Labs (FY 2003 - FY 2008)	20
Figure 13. Federal Agency Participation in FEMP Workshops (FY 2003 - FY 2008)	21
Figure 14. Impact of FEMP Activities on Government Energy Intensity (FY 2008)	26
Figure 15. Federal Energy Efficiency Project Investment (FY 2003 - FY 2008)	27
Figure 16. FY 2008 Energy Efficiency Project Investment by Agency (in Millions of \$)	29
Figure 17. FY 2008 Total Investment as a Percentage of Facility Energy Costs by Agency	30
Figure 18. DOE IDIQ ESPC Projects and Investments (FY 2003 – FY 2008)	32

Figure 19. DOE IDIQ ESPC Projects Annual and Cumulative Energy Savings (FY 2003 – FY 2008).....	33
Figure 20. DOE IDIQ ESPC Projects by State (FY 2003 - FY 2008).....	34
Figure 21. Number of ECMs Implemented through DOE IDIQ ESPCs	38
Figure 22. Energy Conservation Measure Median Payback Periods.....	39
Figure 23. Potential CHP Capacity for Major Federal Agencies in MW	59

Introduction

The mission of the Department of Energy's (DOE) Federal Energy Management Program (FEMP) is to *facilitate the Federal Government's implementation of sound, cost-effective energy management and investment practices to enhance the nation's energy security and environmental stewardship.*

FEMP's primary customers are the 22 Federal agencies (Table 1) subject to legislative and Executive Order (EO) mandates in support of the following activities:

- Reducing the energy intensity in existing buildings
- Increasing the use of renewable energy technologies
- Reducing water consumption
- Reducing petroleum use in Federal fleets and increasing use of alternative fuels
- Metering electricity use in facilities
- Assuring that all new buildings designs are 30 percent more efficient than relevant code
- Using sustainable design when constructing new buildings and using sustainable environmental practices
- Procuring energy-efficient products that are in the top 25 percent of their class

FEMP assists its Federal customers in meeting their energy management goals by delivering an array of products organized into three distinct service lines (Figure 1):

- ***Project transaction services*** facilitate the use of alternative finance mechanisms across the Federal Government by helping to identify financing opportunities, providing alternative finance training, assisting with baseline audits, providing project facilitation, assisting in project evaluation and selection, providing full project life-cycle support, and sharing lessons learned.
- ***Applied technology services*** provide technical assistance and training services across the Federal Government, enabling agencies to meet their energy efficiency and renewable energy goals in the areas of sustainable design, water conservation, fleet management, operations and maintenance best practices, metering and energy-efficient products.
- ***Decision support services*** assist with the coordination of DOE and inter-agency planning, reporting, and communication processes supporting legislative and other initiatives; publication of rules and guidance; energy awareness; and customer service support.

Table 1. FEMP's Major Federal Agency Customers

- Department of Agriculture
- Department of Commerce
- Department of Defense
- Department of Energy
- Department of Health and Human Services
- Department of Homeland Security
- Department of Housing and Urban Development
- Department of the Interior
- Department of Justice
- Department of Labor
- Department of State
- Department of Transportation
- Department of the Treasury
- Department of Veterans Affairs
- Environmental Protection Agency
- General Services Administration
- National Aeronautics and Space Administration
- National Archives and Records Administration
- Railroad Retirement Board
- Social Security Administration
- Tennessee Valley Authority
- U.S. Postal Service

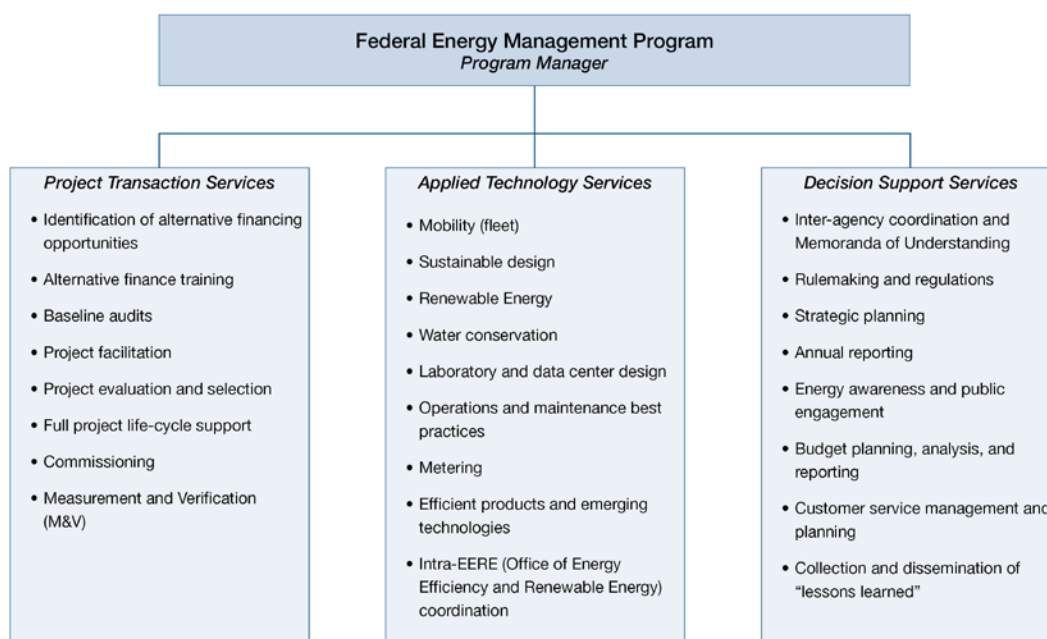


Figure 1. Federal Energy Management Program Organization and Service Areas

This report outlines the policies and Federal mandates driving the market for FEMP’s services, how FEMP’s customers use these services, and the impact of FEMP’s activity on Federal energy management. It discusses the state of the market in FY 2008, including current Federal agency performance toward the goals, and highlights areas where FEMP and agency attention is required to ensure goal compliance.

Declining funding of FEMP’s technical assistance and training programs from FY 2005 through FY 2007 have adversely impacted the dissemination of information and services to agencies. However, data shows that agency demand for FEMP services continue to increase. In turn, FEMP has focused its resources on more economical and efficient delivery methods, such as webinars and the annual GovEnergy conference.

FEMP’s data also tracks how Federal agencies are using financing mechanisms to invest in energy projects. Agency investment activity between FY 2003 and FY 2008 is discussed, along with projections of investment levels required to meet EO 13423 and Energy Independence and Security Act of 2007 (EISA) goals regarding energy and water intensity, renewable energy, and petroleum reduction and alternative fuel use.

Additionally, the report provides a general overview of FEMP’s private sector partner activity in FY 2008 including some major providers and the availability of the various products and services for which FEMP facilitates information, guidance, and delivery.

The anticipated increase in demand for FEMP’s services is also outlined in this report as Federal agencies attempt to compensate for past underinvestment while adjusting to a new administration and an environment of heightened attention to all matters related to energy.

Mandated Energy Management Goals and Federal Government Performance

A number of Federal laws and regulations set energy management requirements for Federal agencies spanning energy efficiency, renewable energy, water conservation, petroleum reduction, and alternative fuel use. EO 13423, EISA, and the Energy Policy Act (EPACT) of 2005 each established or expanded one or more of the Federal requirements in these areas. More aggressive goals are expected to result from the change in administration, and Federal accounting of greenhouse gas (GHG) inventories and reduction efforts is anticipated.

By statute, FEMP tracks agency performance toward these goals, and Federal agencies are required to submit annual reports to FEMP on energy consumption and management efforts within their facilities. Preliminary data for FY 2008 indicates that agencies are unlikely to meet current, or future, Federal energy management goals without significant increases in financial investment, especially since the overall Federal pace in decreasing energy intensity and increasing renewable energy use declined from FY 2007.

While progress has been made in increasing Federal energy efficiency, there remain opportunities for greater efficiency and cost reduction that are increasing demand for FEMP services. In addition to assisting its customers in meeting these requirements, FEMP has key responsibilities for implementing Federal requirements through rulemakings, guidance, and toolset development.

Energy intensity reduction

EO 13423, *Strengthening Federal Environmental, Energy and Transportation Management*, signed on January 24, 2007, and EISA, signed into law on December 19, 2007, both call on the Federal Government to reduce its energy intensity (Btu/ft²) by 3 percent per year, resulting in a 30 percent reduction in 2015 compared to FY 2003. This compares with the prior requirement of 2 percent per year and 20 percent overall from EPACT 2005, Public Law 109-58, August 2005.

Section 431 of EISA amends Section 543(a)(1) of the National Energy Conservation Policy Act (42 U.S.C. 8253(a)(1)) and adopts the energy intensity reduction goals of EO 13423 beginning in the year 2008, as shown in Table 2.

Table 2. Federal Energy Intensity Reduction Goals

Reduce Btu per gross square foot:	
9% in 2008	21% in 2012
12% in 2009	24% in 2013
15% in 2010	27% in 2012
18% in 2011	30% in 2015
<i>Compared to fiscal year (FY) 2003 base year</i>	

Figure 2 shows that the Federal Government, as a whole, was on track to meet its energy intensity targets of 9 percent for 2008. Collectively, all Federal agencies reduced their energy intensity by 9.3 percent—just barely exceeding the 9 percent goal. Including the credits for renewable purchases and improved efficiency from on-site generation (source energy savings), the Government achieved a 12.3 percent reduction in facility energy intensity. Overall Government performance improved only 1.2 percent from the prior year, less than half of the EO- and EISA-prescribed pace of 3 percent per year. Additionally, the credits that were allowed under EO 13123 are being phased out by 2012 under DOE’s renewable energy guidance. Credits for cogeneration and other projects where source energy use declines while site energy use increases will continue to be included, but these credits have a far less significant impact on goal performance.

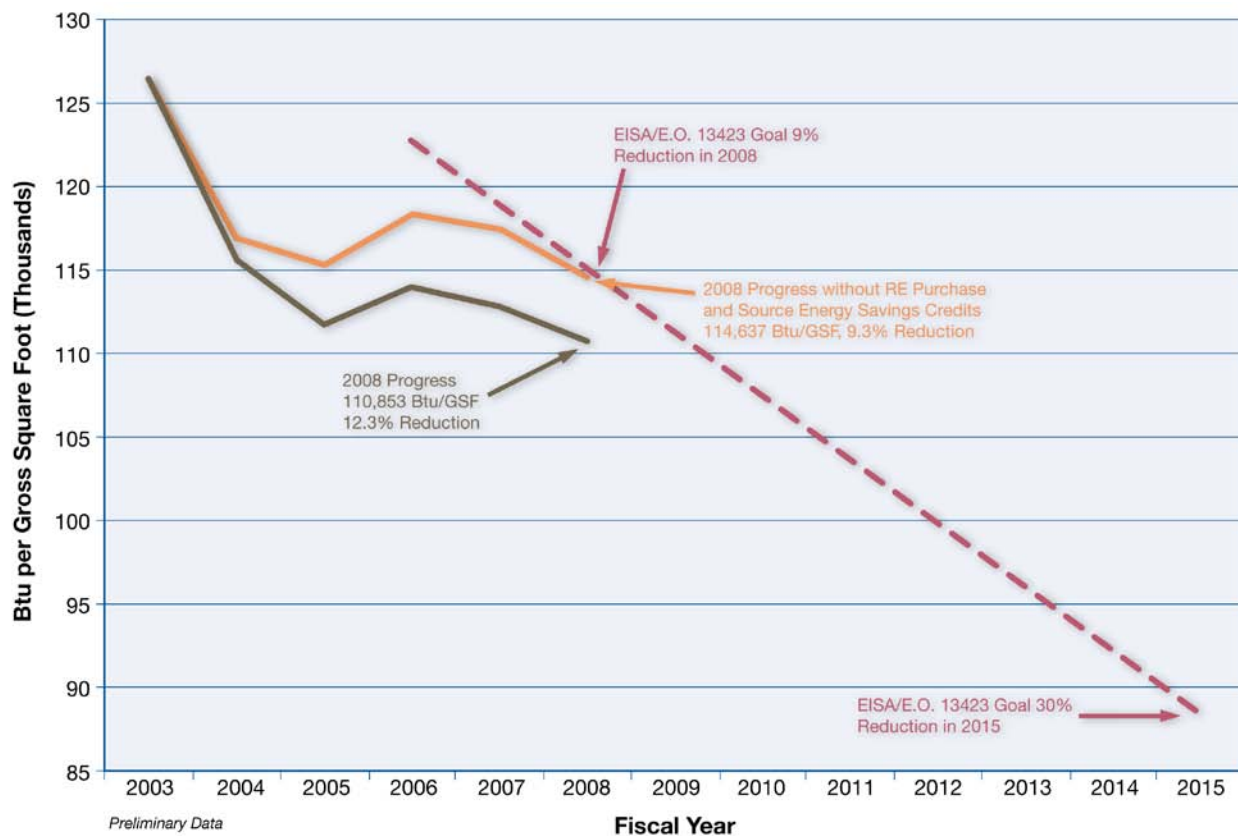


Figure 2. Progress Towards Energy Intensity Reduction Goals in Goal-Subject Buildings (FY 2008)

Figure 3 shows that, excluding renewable purchases, 13 individual agencies succeeded in meeting the 2008 targets, another 3 were within 1 percent of meeting the target, and the remaining 7 still needed to make substantial progress. It is important to note that many factors affect an individual agency’s energy use intensity including weather, mission tempo, and changes to building inventory functions and

personnel consolidation. Any one of these factors, alone or in combination, can affect energy intensity (Btu/ft²) by up to 10 percent for a given year.

The Federal Government is not likely to meet its goals in the coming years using a business-as-usual approach. As the goals become more challenging in future years, agencies will have an increased need for FEMP services to facilitate project development and financing.

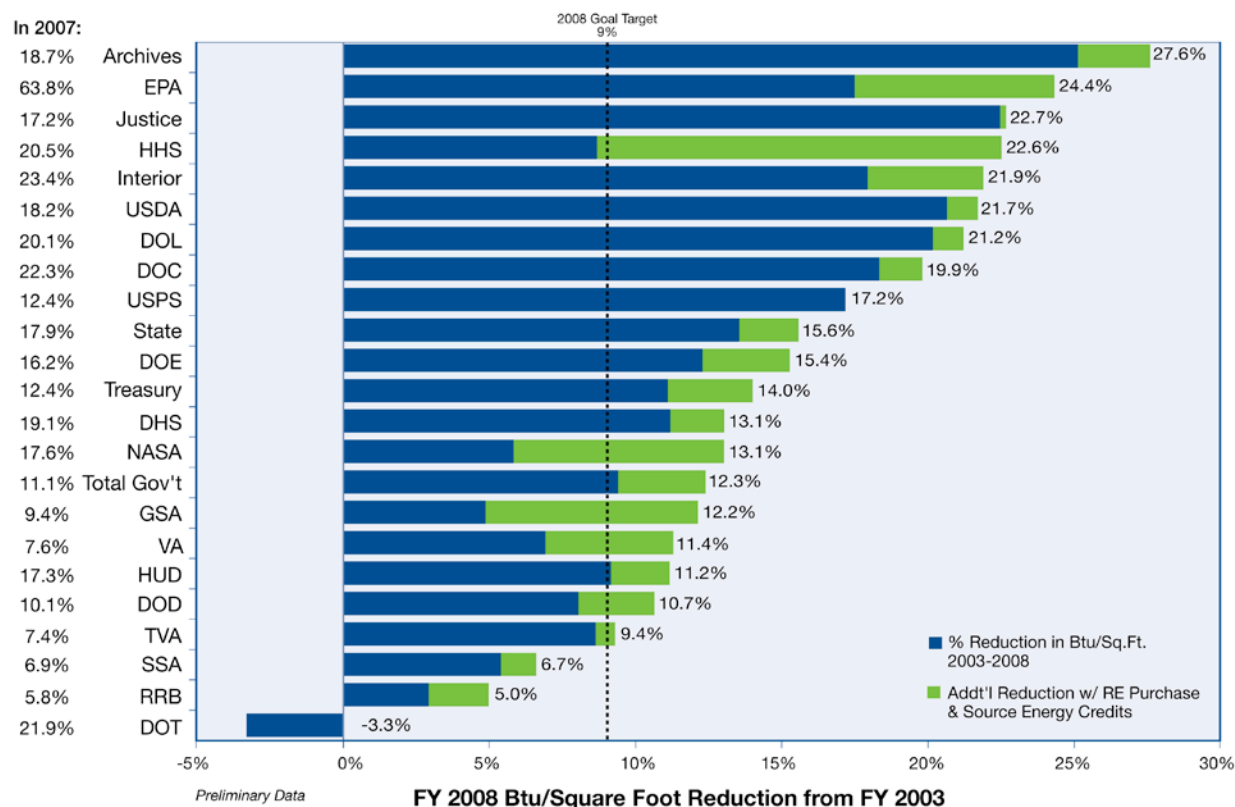


Figure 3. Reduction in Goal-Subject Building Energy Intensity (FY 2003-FY 2008)

Renewable electric energy use

EPACT 2005 put the force of law behind a Federal renewable energy goal whereas previous renewable energy goals were incorporated into executive orders. Its definition limits "renewable energy" to *electric* energy generated from solar, wind, biomass, landfill gas, ocean (including tidal, wave, current, and thermal), geothermal, municipal solid waste, or new hydroelectric generation capacity achieved from increased efficiency or additions of new capacity at an existing hydroelectric project. Non-electric renewable energy such as thermal energy or landfill gas used directly does not count toward the goal under the statute.

Per EPACT 2005, the President, acting through the Secretary of Energy, shall seek to ensure that, to the extent economically feasible and technically practicable, of the total amount of electric energy the Federal Government consumes during any fiscal year, the following amounts shall be renewable energy:

- Not less than 3 percent in fiscal years 2007 through 2009
- Not less than 5 percent in fiscal years 2010 through 2012
- Not less than 7.5 percent by 2013

EO 13423 reinforces the legislative renewable goals and adds the mandate that at least half of the annual requirement must be met with energy from renewable sources placed in service after January 1, 1999. Although some, or all, of this requirement may be met through non-electric renewable generation, any non-electric generation used to meet the EO 13423 requirement will not count towards EPACT 2005 target levels.

Figure 4 illustrates the changes in renewable energy accounting for the period from FY 2000 to FY 2008. Prior to FY 2007, non-electric renewable energy was counted toward the goal, and there was no distinction between old and new renewable energy. (Only renewable energy developed after 1990 was reported prior to FY 2007.)

In FY 2008 the combined Federal agency performance easily surpassed their EPACT 2005 target of 3.0 percent, while also greatly exceeding the 1.5 percent new renewable requirement as set by EO 13423. However, it is important to note that the Federal Government's momentum has slowed, as this total is significantly less than the 4.9 percent reported in FY 2007. This may be attributable to increases in the price of renewable energy certificates (REC), as well as reduced motivation to purchase RECs as a way to meet the energy reduction goal. (As noted above, FY 2008 is the first year of the renewable credit phase out.) However, agency feedback indicates there may be significant project activity in the field that is not being reported to agency headquarters and therefore is not being reflected in the data.

As shown in Figure 5, 16 agencies obtained the equivalent of more than 3.0 percent of total electricity consumption from renewable sources in FY 2008. In total, Federal agencies reported purchasing or producing 1,895.1 gigawatt-hours of renewable electric energy in FY 2008, equivalent to 3.4 percent of the Federal Government's electricity use.

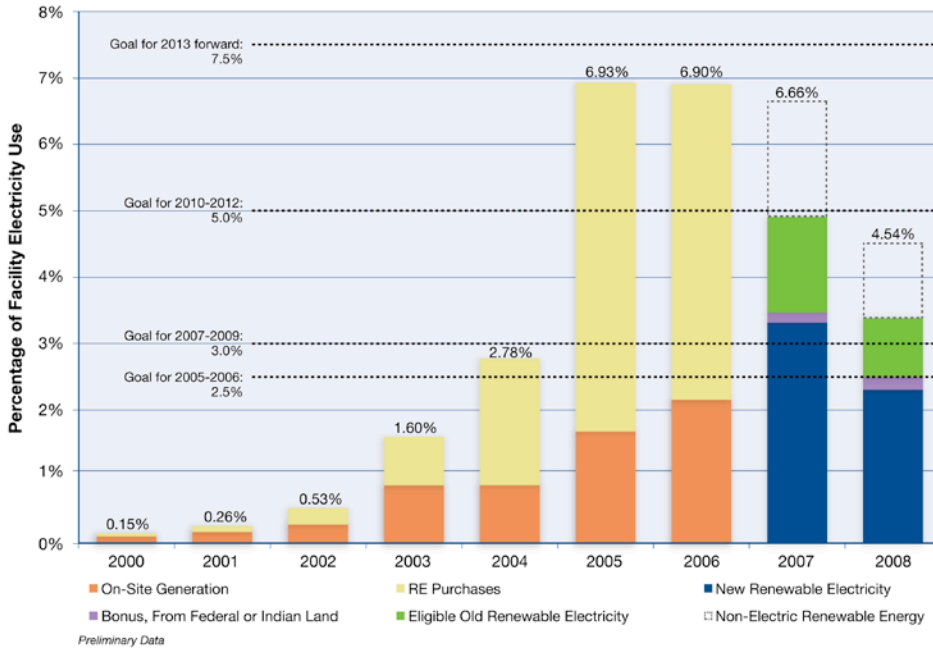


Figure 4. Federal Government Renewable Energy Use as a Percentage of Facility Electricity Use (FY2000 - FY 2008)

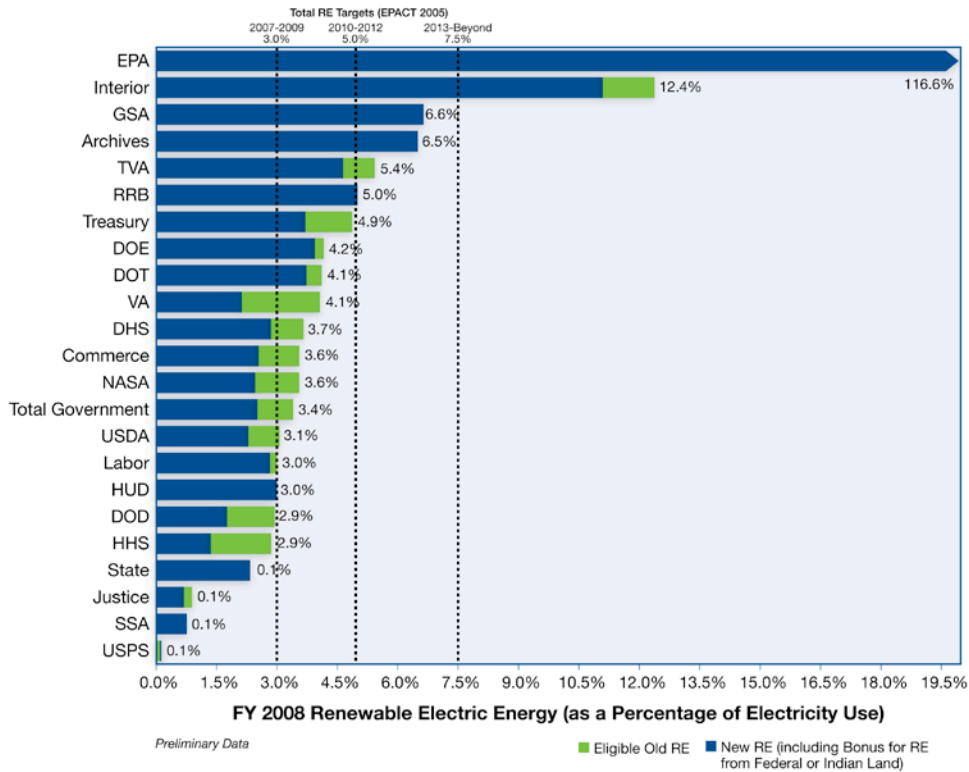


Figure 5. Renewable Electric Energy as a Percentage of Electricity Use by Agency (FY 2008)

Water intensity reduction

EO 13423, Section 2(c) directs each Federal agency, beginning in FY 2008, to reduce water intensity (gallon per square foot) relative to the baseline of the agency's water intensity in FY 2007. Agencies must reduce water intensity through life-cycle cost-effective measures by 2 percent annually through the end of the FY 2015, or by 16 percent by the end of FY 2015. The EO 13423 Implementing Instructions also direct Federal sites to conduct water audits for at least 10 percent of facility square footage annually and to conduct audits at least every 10 years. EISA Section 432 requires that 25 percent of covered facilities receive energy and water audits each year.

FY 2007 saw the establishment of Federal agency baselines averaging 52.4 gallons per gross square foot (g/gsf). Based on this baseline, the aggregate 2015 target would be 44 g/gsf. FY 2008 goals for improving water intensity required each agency to reduce its water intensity by 2 percent from the FY 2007 baseline. Figure 6 illustrates each agency's progress toward the goal in FY 2008; eighteen agencies successfully met this goal. The Department of Commerce, with the largest reduction in water intensity, attributes its success to a project that reclaims ground water and redirects this water as make-up water at the Central Plant's cooling towers at the National Institute of Standards and Technology's Advanced Measurement Laboratory complex in Gaithersburg, Maryland. This effort resulted in a 56.7 percent reduction in water usage at the site when compared to 2007.

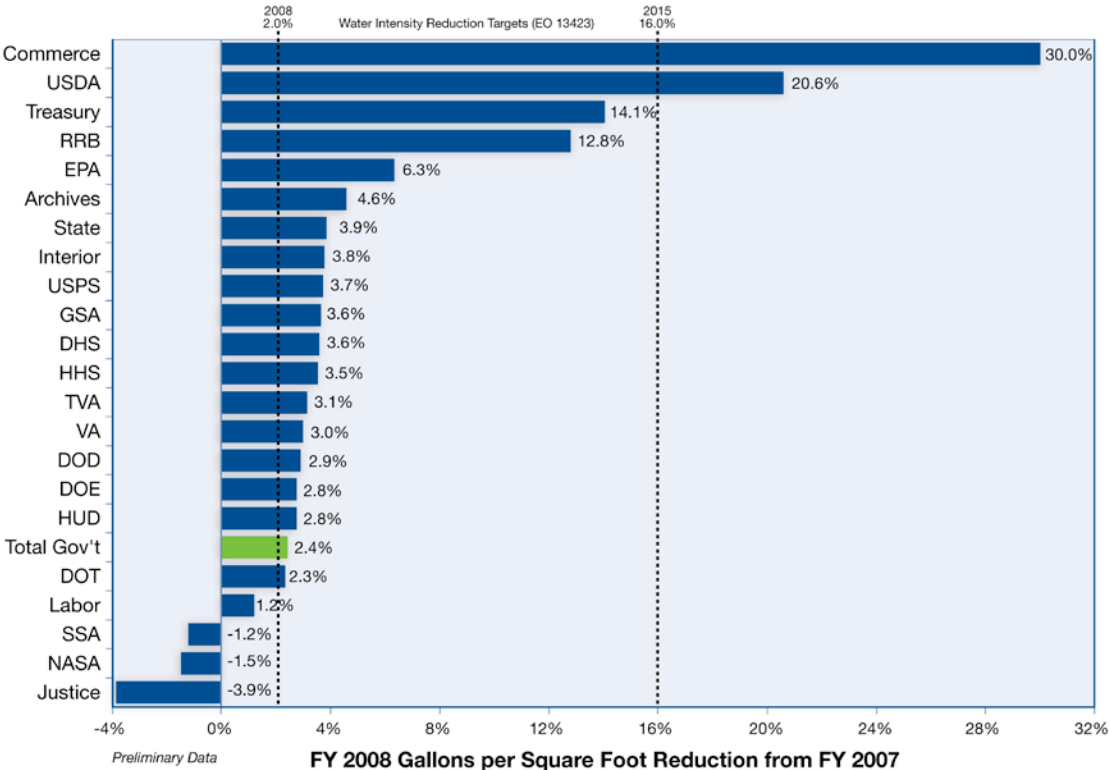


Figure 6. FY 2008 Agency Reductions in Water Intensity in Gallons per Square Foot (from FY 2007)

FEMP performed an initial assessment of Federal sector water consumption according to FY 2007 baseline water consumption data reported by the agencies. Three example agencies were evaluated: the U.S. Department of Defense (DOD), DOE, and the Department of Veterans Affairs (VA). The key findings were as follows:

- For DOD, the major water use and biggest potential for savings were in housing and barracks; key water use in the housing and barracks was in domestic water fixtures. (The reduction potential in water use intensity was preliminary estimated at 28 percent.)
- For DOE, the major water use and biggest potential for savings occurred in research and development buildings with high process water use. (The reduction potential in water use intensity was preliminary estimated at 28 percent.)
- For VA, the major water use and biggest potential for savings occurred in hospitals; key water use in hospitals was in domestic fixtures and laboratory equipment. (The reduction potential in water use intensity was preliminary estimated at 29 percent.)¹

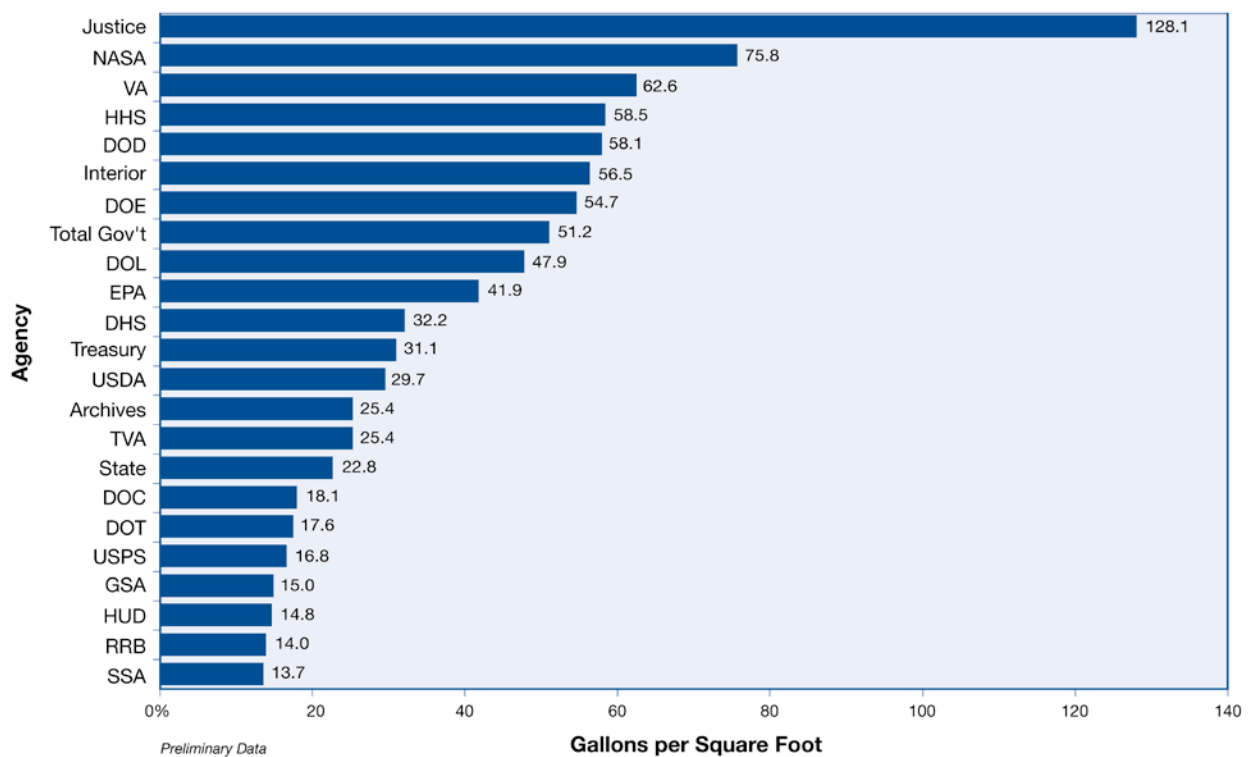


Figure 7. FY 2008 Agency Water Intensity

¹ The analysis was performed for FEMP by Pacific Northwest National Laboratory. Results are based on data submitted to FEMP in their Annual Energy Management Data Reports.

As shown in Figure 7, the Department of Justice (DOJ), National Aeronautics and Space Administration (NASA), and VA used the greatest amount of water per square foot in FY 2008. The prisons operated by DOJ and hospitals operated by VA account for significant levels of water usage in those agencies. Although DOD has slightly lower water intensity, this agency is by far the largest user of water with more than 110 billion gallons used in FY 2008. The VA and DOJ are the next highest consumers, with both agencies using a little more than 9 billion gallons.

Fleet petroleum reduction and alternative fuel use

EO 13423 requires agencies with 20 or more vehicles in the United States to reduce the consumption of covered petroleum by 2 percent annually from a FY 2005 baseline, or 20 percent by the end of FY 2015. The FY 2005 petroleum baseline was roughly 285 million gasoline gallon equivalents (GGE). The FY 2008 target was just under 268 million GGE, which is 6 percent below the 2005 baseline. Total Federal agency petroleum use in FY 2008 totaled just over 272 million GGE—only 4.5 percent below FY 2005 levels. Increases in mission tempo make it difficult for agencies to achieve petroleum reduction goals framed in absolute terms (rather than miles traveled), requiring more creative options for success.

As Figure 8 shows, in FY 2008 gasoline and diesel were the most utilized fleet fuels, with approximately 227 million GGE of gasoline and 45 million gallons of diesel used by Federal fleets. Alternative fuel use totaled 8.8 million GGE, including 6.3 million GGE of ethanol.

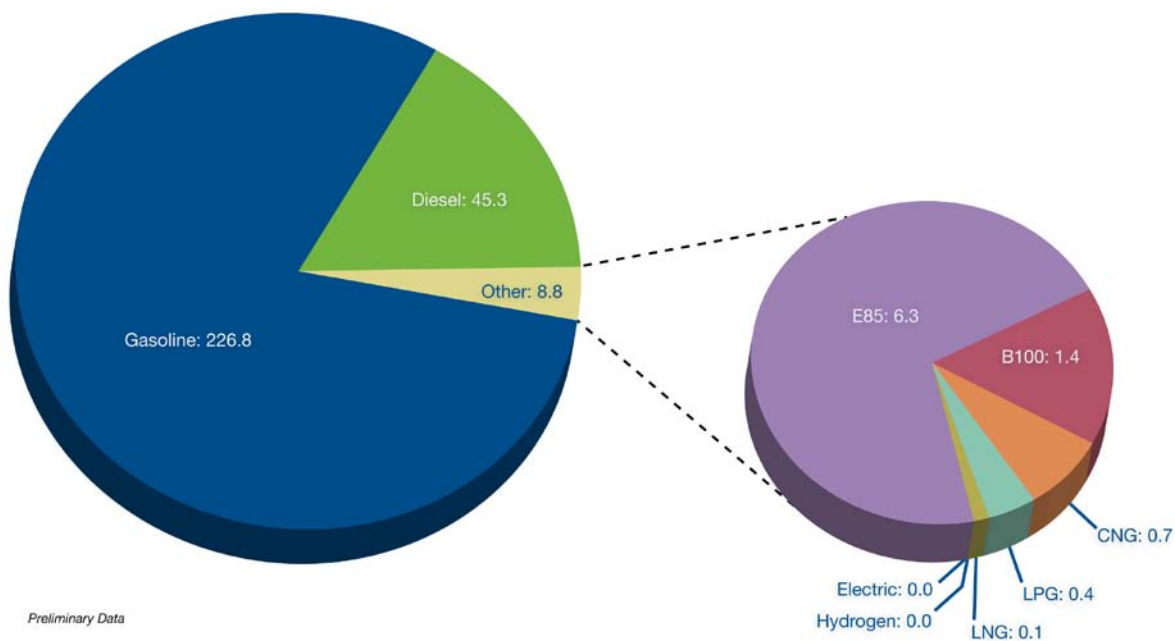


Figure 8. Federal Fleet Fuel Use FY 2008 (Million GGE)

In addition to targeted petroleum reductions, EO 13423 also requires agencies to increase alternative fuel consumption by 10 percent (compounded annually) from a FY 2005 baseline. The FY 2008 target is

7.2 million gallons—a 33 percent increase over FY 2005 use of 5.4 million gallons. Although a number of agencies failed to meet individual agency targets, the collective Federal alternative fuel use goal was still met. In aggregate, the Federal agencies easily surpassed the FY 2008 target of 7.2 million GGE, utilizing 8.8 million GGE, or a 63.1 percent increase from the FY 2005 baseline (Figure 9).

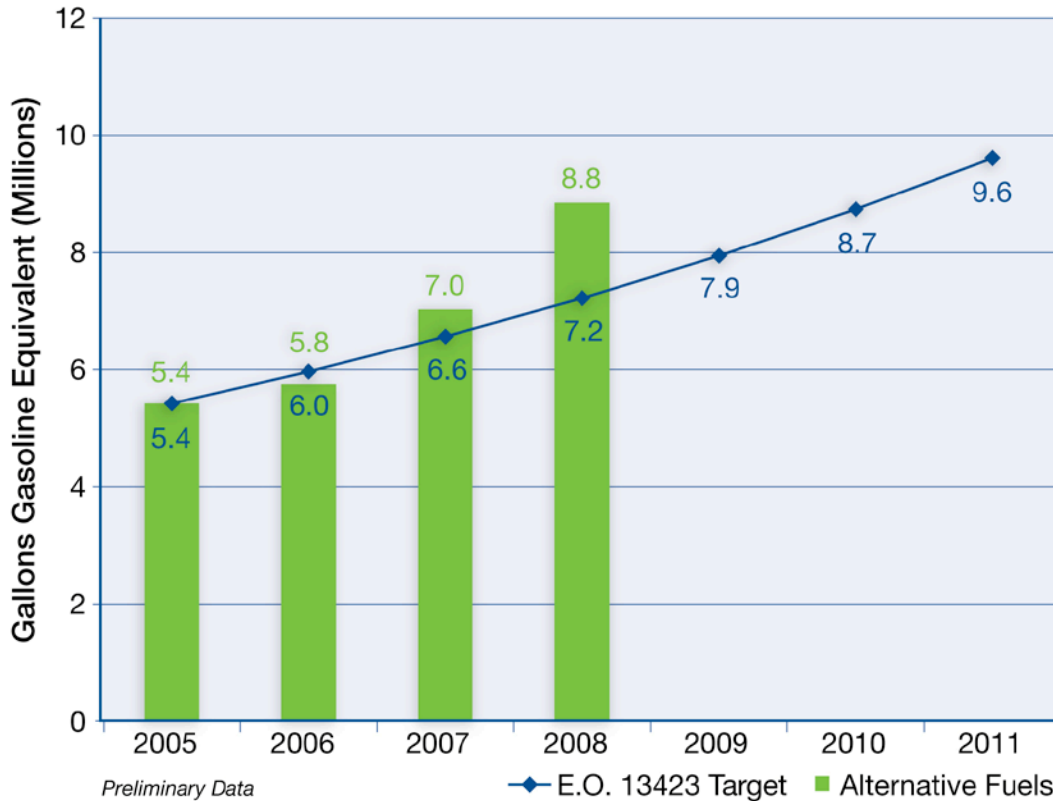


Figure 9. Federal Fleet Alternative Fuel Use and Targets

The breakdown of alternative fleet fuel use by agency is detailed in Figure 10. DOD has shown the greatest utilization of alternative fuels with 0.9 million GGE in FY 2003, rising to 2.8 million GGE in FY 2008. Other leaders in alternative fuel use for FY 2008 include the Department of Homeland Security (1.6 million GGE), DOE (1.2 million GGE) and the U.S. Postal Service (USPS) (0.8 million GGE).

It is important to note, while the overall increase in Federal alternative fuel use seems impressive, the FY 2005 baseline is small when compared to overall fuel consumption in Federal fleets. Although Federal agencies increased alternative fuel use by 63.1 percent from FY 2005 to FY 2008, these fuels only represent 3.1 percent of the fuel used in these covered fleets. In order to substantially increase alternative fuels as a percentage of total fuel use, Federal agencies need to concentrate alternative fuel vehicles (AFV) in areas where alternative fuels are available and ensure that AFVs use those fuels.

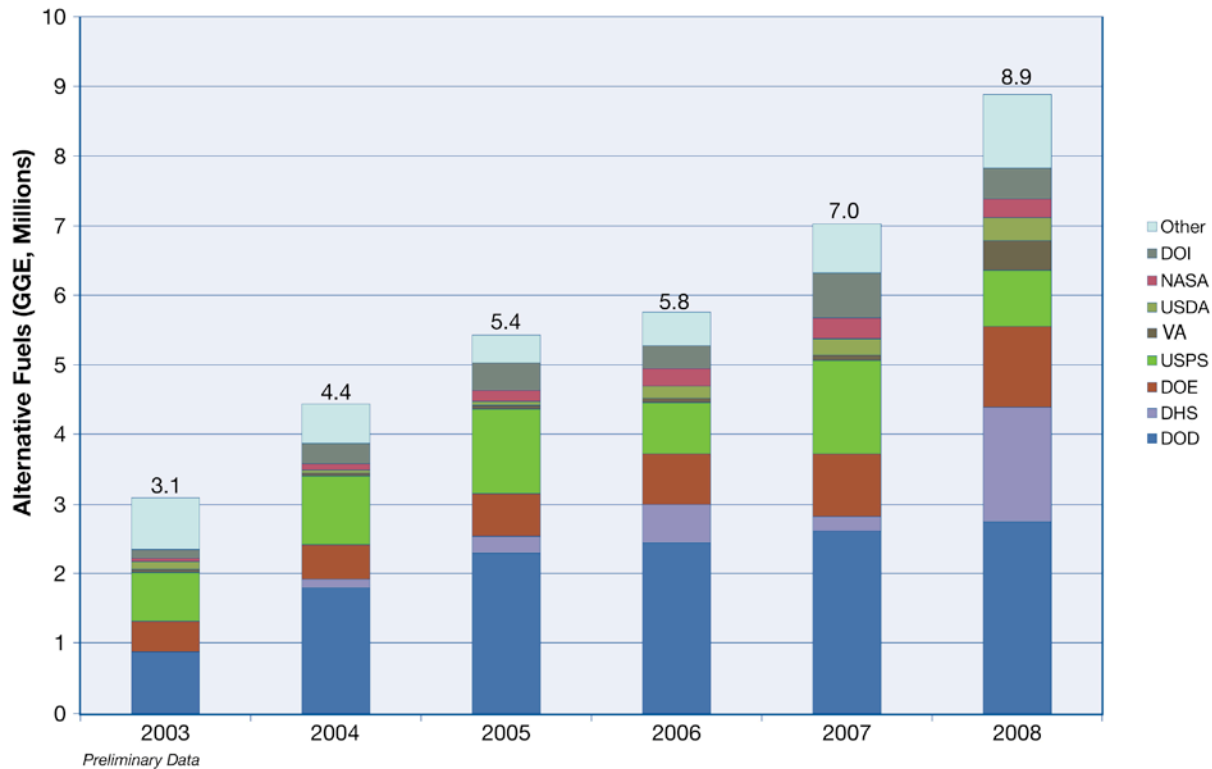


Figure 10. Federal Fleet Alternative Fuel Use (FY 2003 - FY 2008)

Additional requirements

Federal agencies are subject to a number of other mandates that drive the market for FEMP services.

Advanced metering and measurement

EPACT 2005 requires all Federal buildings to be metered by October 1, 2012 in order to help ensure efficient energy use and reduce the cost of electricity used in Federal facilities. This requirement targets facilities located on campuses or other installations that are not separately metered. Advanced meters or metering devices must provide data at least daily and measure the consumption of electricity at least hourly. These devices must be used to the maximum extent practicable. EISA expanded this requirement to include natural gas and steam/chilled water by October 1, 2016.

New building efficiency standards

As mandated by EPACT 2005, DOE established regulations in 2007 requiring new Federal buildings to achieve at least 30 percent greater energy efficiency over prevailing building codes, if life-cycle cost-effective. These standards apply to new Federal low-rise residential buildings and commercial and multi-family high-rise residential buildings for which design or construction began on or after January 3, 2007.

These standards are about 40 percent more efficient than the old Code of Federal Regulations (CFR), and replace existing standards found in 10 CFR Part 434 (for commercial and high-rise multi-family residential buildings) and 10 CFR Part 435 Subpart C (for low-rise residential buildings). The new Federal standards are in 10 CFR Part 433 (for commercial and high-rise multi-family residential buildings) and 10 CFR Subpart A (for low-rise residential buildings).

Three key features of these new standards differentiate them from previous Federal building energy efficiency standards. First, the new Federal standards are based directly upon the updated and prevailing voluntary sector standards in effort to maximize resources and take advantage of improvements in those voluntary sector standards. Second, the new Federal standards seek improvements above and beyond those of the voluntary sector standards through consideration of an entire building's performance rather than meeting prescriptive requirements for individual building components and systems. This approach provides the maximum amount of flexibility to Federal agencies and their design teams as they address the new requirements. Third, the new Federal standards require at least 30 percent energy savings over the prevailing voluntary sector standard. Achieving this level of savings will require Federal agencies and their design teams to use an integrated design approach for new buildings.

Energy-Efficient product procurement

As the world's largest volume-buyer of energy-related products, the Federal Government can reduce energy consumption and achieve enormous cost savings by purchasing energy-efficient products. EPACT 2005 and EISA set several mandates for Federal facilities surrounding the procurement of energy-efficient products:

- Encouraging Federal agencies to minimize standby energy use in purchases of energy-using equipment
- Requiring Federal procurement to focus on ENERGY STAR[®]-qualified and FEMP-designated products, which are in the upper 25 percent of energy efficiency in their class
- Prohibiting Federal agencies from procuring alternative or synthetic fuel unless its life-cycle GHGs are less than those for conventional petroleum sources
- Prohibiting, except under certain circumstances, the purchase of incandescent light bulbs for use in Coast Guard office buildings

Project identification and tracking

EISA Section 432 establishes a framework for facility project management and benchmarking. Under this new requirement, agencies must identify "covered facilities" that constitute at least 75 percent of the agency's facility energy use. An energy manager must be designated for each of these covered facilities. Each facility energy manager will be responsible for the following:

- Completion of comprehensive energy and water evaluations of 25 percent of covered facilities each year, so that an evaluation of each such facility is completed at least once every four years (This is a more aggressive requirement than the prior Executive Order 13123, which was 10 percent of agency facilities to be audited per year.)

- Follow-up on any implemented energy and water efficiency measures, including fully commissioning equipment, putting operation and maintenance (O&M) plans in place, and measuring and verifying energy and water savings
- Use of a Web-based tracking system deployed by DOE to certify compliance for energy and water evaluations, project implementation and follow-up measures, and estimated cost and savings (The Web-based tracking system will be available to Congress, other Federal agencies, and the public, with some specific data exempted from disclosure for national security purposes.)
- Entering of energy use data for each metered building identified as a covered facility into a benchmarking system, such as the ENERGY STAR Portfolio Manager

Fossil fuel reduction in new facility construction and major renovations

Section 433 of EISA, Federal Building Energy Efficiency Performance Standards, directs DOE to further revise Federal building energy efficiency performance standards. The revised standards would specify that “. . . [t]he buildings shall be designed so that the fossil-fuel-generated energy consumption of the buildings is reduced, as compared with such energy consumption by a similar building in fiscal year 2003 [as measured by Commercial Buildings Energy Consumption Survey or Residential Energy Consumption Survey data from the Energy Information Administration].” The new percentages are specified in Table 3.

Table 3. Fossil Fuel Consumption Reduction Requirements for New Buildings

Percentage	Year
55%	2010
65%	2015
80%	2020
90%	2025
100%	2030

Additional requirements also include:

- Section 433 requires that sustainable design principles be applied to the siting, design, and construction of buildings subject to the standards
- Section 434 requires that each Federal agency ensure that major replacements of installed equipment (such as heating and cooling systems) or renovation or expansion of existing space employ the most energy-efficient designs, systems, equipment, and controls that are life-cycle cost effective
- Section 523 requires 30 percent of the hot water demand in new Federal buildings (and major renovations) to be met with solar hot water equipment, provided it is life-cycle cost-effective

EO 13423 requires Federal agencies to ensure that new construction and major renovations comply with the *Guiding Principles for Federal Leadership in High Performance and Sustainable Buildings* set forth in the 2006 Federal Leadership in High Performance and Sustainable Buildings Memorandum of Understanding (2006)², which was signed at the White House Summit on Federal Sustainable Buildings. Additionally, 15 percent of an agency's existing Federal capital asset building inventory (as of the end of FY 2015) must incorporate the sustainable practices in the *Guiding Principles*. As of FY 2008, a "sustainability" data element is to be reported on all building assets to capture agency progress toward meeting these goals. The Office of Management and Budget (OMB) issued guidance in December 2008 with regard to these requirements.

Greenhouse gas reductions

Increased concern over climate change has led states and the Federal Government to begin addressing emissions of carbon dioxide (CO₂) and other GHGs. Currently, there is no actual quantitative Federal goal for GHG reduction, nor is there an official standard for Federal agencies to estimate and certify their facility emissions. GHG reduction is mentioned as an intention of the EO 13423 goal to decrease energy intensity of Federal operations, and Section 527 of EISA directs each Federal agency subject to Title V of EISA to submit an annual report that describes the status of initiatives to improve energy efficiency, reduce energy costs, and reduce GHG emissions.

According to the LMI Research Institute, several states have already passed legislation that regulates GHG emissions for some industry sectors, and a number of bills have been introduced in Congress to do the same on a national level. It seems imminent that Government agencies will be asked to report on GHG inventories and management, as evidenced by the recently introduced House Bill (HR 232) calling on the Environmental Protection Agency (EPA) to establish a national GHG reporting registry (LMI 2009).

In anticipation of an Executive Order requiring Federal GHG accounting, LMI Research Institute has adapted existing protocols currently in use by the private sector to develop guidance relevant for public sector application. A preliminary set of standards, *Recommended Public Sector GHG Accounting and Reporting Protocol*, was released in February 2009 and presented to the Interagency Energy Management Task Force. The document establishes a standard for GHG estimation to simplify the GHG accounting process and support consistent reporting across government entities.

² In 2006, the Federal Leadership in High Performance and Sustainable Buildings Memorandum of Understanding outlined *Guiding Principles for Federal Leadership in High Performance and Sustainable Buildings* (http://www.wbdg.org/pdfs/sustainable_mou.pdf).

FEMP Products and Services

FEMP helps agencies find innovative solutions to their most difficult energy challenges and address their full range of energy management responsibilities. To better assist its Federal agency customers, FEMP simplified its organizational structure in FY 2008 into three new service areas: Project Transaction Services, Applied Technology Services, and Decision Support Services. FEMP also developed a new customer service representative matrix that supplements this structure. A FEMP staff member serves as the dedicated FEMP representative and primary contact for each Federal agency.

FEMP representatives will cultivate an in-depth understanding of their agency's aims and objectives regarding energy management and investment. They will work to identify ways FEMP can facilitate the achievement of the agency's energy management goals in response to relevant Executive Order and legislative requirements by helping to plan and prioritize projects and by identifying appropriate resources. These resources may be provided by FEMP, EERE, DOE's national laboratories, private sector partners, and others. FEMP's customer service representatives will also work closely with agency contacts to conduct joint analysis of data and prioritization of agency needs.

Project Transaction Services

Due to insufficient appropriated funds, Federal agencies will need to consider alternative financing options (e.g., ESPCs, utility energy services contracts (UESC), and power purchase agreements (PPAs) to implement energy efficiency, renewable energy, and water conservation projects. FEMP supports all stages of these contracts, from project identification to measurement and verification (M&V) of savings. FEMP also assists agencies in obtaining state- or utility-sponsored rebates for energy-efficient improvements, and in applying for public benefits funds set aside to promote energy efficiency. Tools, resources, and data related to energy markets, utility restructuring, renewable power purchasing, demand response, and state energy efficiency funding opportunities help Federal energy managers minimize costs, improve reliability, and reduce environmental impact.

FEMP's expert and objective technical support includes legal and financing guidance, assistance from project facilitators and advanced technology experts, and training for Federal agency project staff. Proven ESPC project management offers these benefits:

- Building efficiency improvements and new equipment without upfront capital costs
- Finance of energy improvements without relying on special Congressional appropriations
- Guarantee of energy and related operation and maintenance cost savings
- Enhanced ability to plan and budget energy, operation, and maintenance accounts
- Minimized vulnerability to budget impacts due to volatile energy prices, weather, and equipment failure

With leadership from FEMP, the Federal government's commitment to improving agency energy efficiency has increased during recent years. ESPC projects currently in development total more than \$1 billion in investment value for the first time in the program's history. The current value of the ESPC

project pipeline is more than 3 times its size in February 2007, and it continues to grow due, in part, to FEMP's communication, support, and technical initiatives.

Applied Technology Services

Technical Guidance and Assistance

FEMP's technical guidance and assistance advises Federal agencies on how to take advantage of innovative technologies, tools, and technical guidance that help reduce energy bills, improve air quality, and promote the use of water conservation, energy efficiency, and renewable energy. The Technical Assistance program (TA) supports Federal energy managers in their efforts to identify, design, and implement new construction and facility improvement projects. FEMP provides unbiased, expert technical assistance in areas including audits for buildings and industrial facilities, peak load management, and new technology deployment (including combined heat and power [CHP] and distributed energy technologies). In addition, FEMP continues to update its specifications for highly energy-efficient products.

Technical assistance for Federal agencies facilitated through FEMP resources is illustrated in the figures and tables below. Figure 11 represents more than 300 audits and technical assistance projects supported by FEMP representatives (including DOE's national laboratories and other DOE contractors supporting FEMP missions) between FY 2003 and FY 2008.

The funding line shows that FEMP's funding for direct technical assistance increased each year between FY 2003 and FY 2005, followed by a 9 percent decrease in FY 2006 due to fewer anticipated projects and assessments and the discontinuation of FEMP's SAVEnergy audits program. FEMP's budget for technical guidance and assistance began to rise again in FY 2007 and in FY 2008 due to an increasing emphasis on technology transfer activities and analysis.

FEMP data shows that the number of technical assistance requests by agencies has declined over the years (from almost 200 in FY 2003 to 34 in FY 2007) which contributed to a decline in the actual number of FEMP-supported technical assistance projects in FY 2007 and FY 2008. However, while the number of projects may have decreased, the average funding for a typical project increased.



Figure 11. Number of Technical Assistance Projects by Year (FY 2003 – FY 2008)

Table 4 represents the number of audits and TA projects (listed by agency and sub-agency) supported by FEMP representatives between FY 2003 and FY 2008. The U.S. Army, General Services Administration (GSA), and Department of the Interior received the most FEMP-supported assistance according to the number of discreet projects. DOD collectively received assistance on more than one third of the technical assistance projects supported by FEMP, which appropriately reflects DOD's relative size.

Table 4. FEMP Audits and Technical Assistance by Agency (FY 2003 - FY 2008)

Agency	Quantity
Department of Defense - Army	51
General Services Administration	47
Department of Interior	38
Department of Defense - Navy	21
Department of Energy	20
Department of Defense - Air Force	18
Department of Health and Human Services	11
Department of the Treasury	9
Department of Veterans Affairs	9
National Aeronautics and Space Administration	8
Department of Transportation	7
Department of Agriculture	6
Department of Defense - Marine Corps	6
Smithsonian Institution	6
Postal Service	6
Department of Defense	5
Social Security Administration	5
Department of Homeland Security	4
Department of Defense - Air National Guard	4
Department of Defense - National Guard	4
Department of Commerce	3
Department of Defense - Army Corps of Engineers	3
Department of Defense - Defense Commissary Agency	2
Department of Justice	2
National Science Foundation	2
Department of State	2
Architect of the Capitol	1
Environmental Protection Agency	1
Department of Defense - National Geospatial Intelligence Agency	1
Department of Defense - Defense Logistics Agency	1
Grand Total	303

More than half of the TA projects implemented between FY 2003 and FY 2008 were supported by the DOE national laboratories including Oak Ridge National Laboratory (ORNL), National Renewable Energy Laboratory (NREL), Pacific Northwest National Laboratory, Lawrence Berkeley National Laboratory (LBNL), and Sandia National Laboratory. Figure 12 represents each laboratory's level of support for TA projects, with the majority of FEMP support coming through ORNL and NREL.

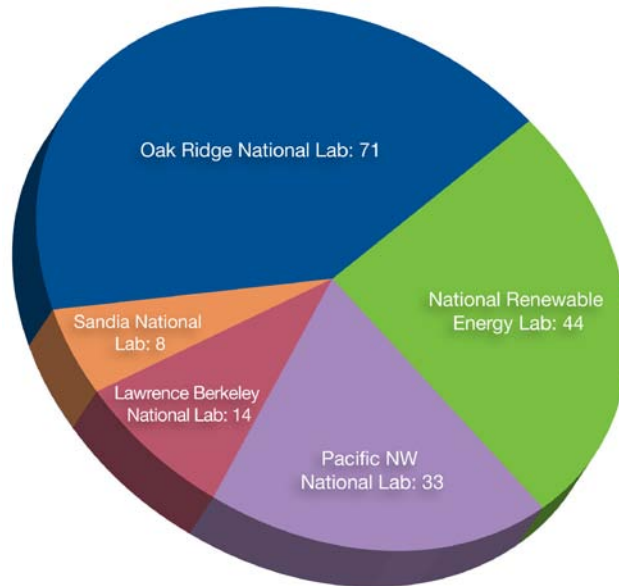


Figure 12. Technical Assistance Projects Supported by DOE National Labs (FY 2003 - FY 2008)

Training

Many agency representatives participate in training offered by FEMP, including seminars related to UESC, ESPC, and technical assistance. UESC seminars between FY 2003 and FY 2008 included meetings of the Federal Utility Partnership Working Group (supported by FEMP) and training on UESC contracts and evolving energy markets. ESPC training covered topics such as an introduction to ESPC, DOE's indefinite-delivery, indefinite-quantity (IDIQ) ESPC, ESPC pricing and financing, and measurement and verification for ESPC. TA training included topics such as Labs21, advanced metering, lighting, distributed generation and CHP, building operator certification, life cycle costing, operation and maintenance, energy and water conservation, implementing renewable energy projects, and greening the Federal Government. Approximately 85 percent of the seminars since FY 2003 were in-person workshops or classes, with the remaining classes conducted through the webinar format.

FEMP's annual budget for general training activities decreased between FY 2003 and FY 2006 by about \$1.1 million. Furthermore, after FY 2006, FEMP eliminated its separate budget for general training due to its success with Web-based training, information dissemination, and increasing attendance at the

GovEnergy annual conference. Funding for all remaining in-person and online training courses offered for TA, ESPC, and UESC topics after FY 2006 came directly from program area budgets.

Figure 13 shows that, despite this ultimate elimination of the training budget line item, agency participation generally increased through the years due to increased participation in the GovEnergy annual conference and ESPC webinars.³ Federal agency attendance at the GovEnergy conference has more than doubled since FY 2003 as agencies began to take advantage of increased course offerings and the cost efficiencies of training a larger number of staff on more topics using fewer travel dollars. Additionally, in FY 2006, FEMP began to vastly increase its ESPC course offerings via webinar, leveraging the scarce training resources of FEMP and other Federal agencies. Data shows that the number of agency staff trained in ESPC more than doubled from FY 2007, and was more than 6 times higher than in FY 2003.

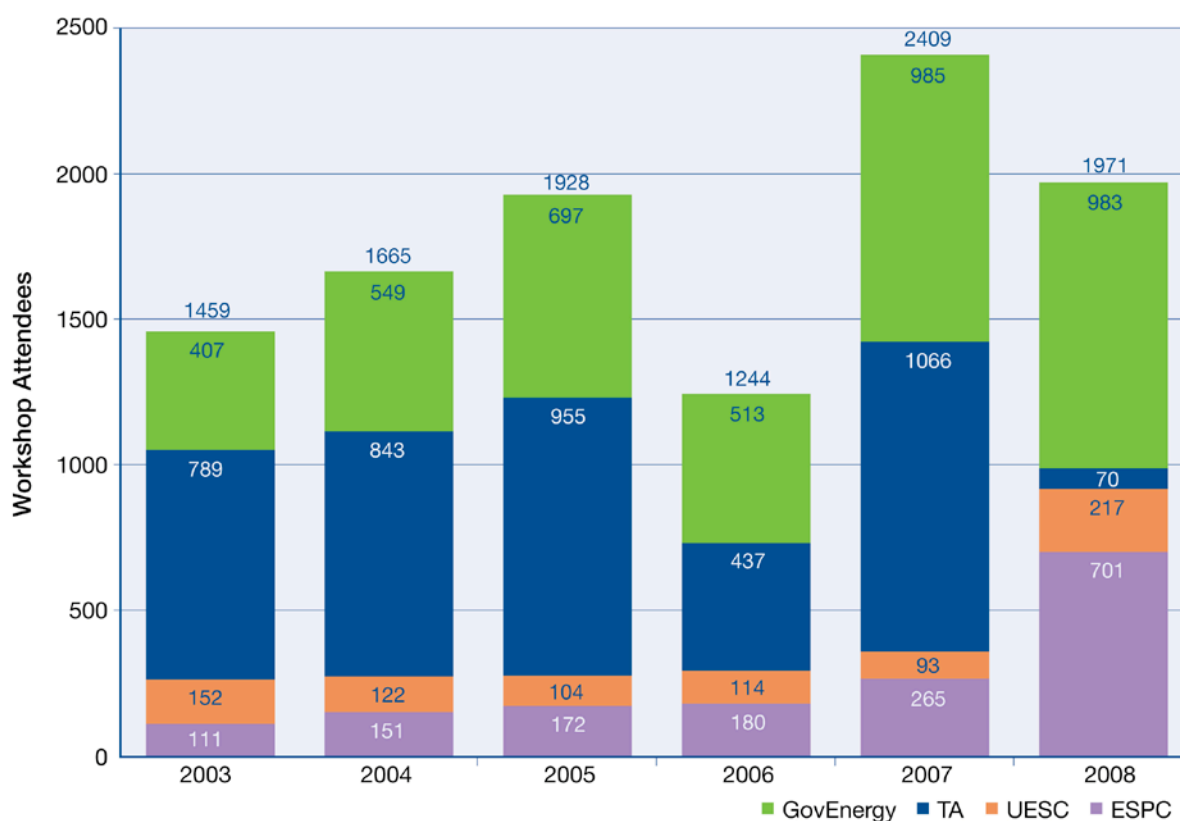


Figure 13. Federal Agency Participation in FEMP Workshops (FY 2003 - FY 2008)

³ FEMP training workshop data reflects Federal agency staff participation as reported to FEMP by workshop instructors. Due to some inconsistencies in reporting, this data is only an estimate and participation by agency personnel is likely higher. The spike in TA workshop participation in FY 2007 is explained by a suite of metering, evolving energy markets, and distributed energy Webinars not offered in other years.

Table 5 provides a snapshot of six Federal agencies with the greatest participation in FEMP-sponsored workshops between FY 2003 and FY 2008 (exclusive of the annual GovEnergy conference). These six agencies represent 78 percent of goal building energy use and 89 percent of total energy use, indicating that FEMP’s training is targeting the right groups.

While DOD clearly has the greatest energy use and the greatest participation overall, DOE shows the strongest participation in ESPC courses. This participation is directly related to a recent DOE initiative to significantly increase ESPC investment, also evidenced by the large percentage of DOE investment funding by ESPCs (also noted in a later section of this report discussing Federal project investment). In support of this initiative, FEMP held several DOE-specific ESPC courses in FY 2007 and FY 2008, also contributing to this high level of DOE attendance in ESPC training.

Table 5. Top Agency Workshop Participation (FY 2003 - FY 2008) and Energy Use

Agency	ESPC	TA	UESC	TOTAL	Energy Use (Billion Btu)	
					Goal Buildings	Total
Department of Defense (Total)	470	1,339	277	2086	206,999	889,875
<i>DOD Army</i>	117	530	49	696	<i>na</i>	<i>na</i>
<i>DOD Navy (including USMC)</i>	155	442	127	724	<i>na</i>	<i>na</i>
<i>DOD Air Force</i>	112	292	80	484	<i>na</i>	<i>na</i>
<i>DOD Other</i>	86	75	21	182	<i>na</i>	<i>na</i>
Department of Energy	512	644	227	1383	19,079	30,884
General Services Administration	87	482	98	667	13,123	18,426
Department of Veterans Affairs	97	406	19	522	28,290	29,468
Department of the Interior	75	267	21	363	4,545	7,469
Department of Agriculture	100	184	27	311	4,029	6,613
Total					351,861	1,108,235
Top 6 as % of total					78%	89%

High-Performance Building Design, Operation, and Maintenance

FEMP’s resources provide guidance for Federal agencies to develop and implement sustainable design, operation, and maintenance practices that incorporate energy efficiency, renewable energy, and water conservation technologies. These practices span new construction, renovation, and commissioning projects. FEMP services in this area include energy audits, operations and maintenance assessments, laboratory design protocols, new technology reports, advanced metering, guidance for purchasing energy-efficient products and renewable energy technologies, and facilitating the Interagency Sustainability Working Group (ISWG).

Renewable Energy Technology Deployment

Renewable energy from solar, wind, biomass, and geothermal sources can offset Federal energy consumption for heating, cooling, and electricity. FEMP chairs the Renewable Energy Working Group and helps agencies develop and implement clean, secure energy resources to meet energy management regulations and goals.

FEMP (along with the Defense Energy Support Center, the GSA, and EPA) has already identified and removed many obstacles to renewable energy purchasing. As early renewable energy purchasing markets developed, FEMP and its partners created a framework for agencies to specify and buy renewable energy and renewable energy certificates in compliance with the Federal Acquisition Regulation. After precedents were established, Federal renewable energy consumption expanded significantly.

Federal Fleets

As detailed earlier in this report, the Federal Government is a significant consumer of fleet fuels. FEMP provides guidance and assistance for the efficient use of the Federal Government's vehicles, including support of efforts to reduce petroleum consumption and increase alternative fuel use. FEMP encourages and facilitates Federal use of AFVs and alternative fuels by chairing the INTERFUELS monthly interagency working group, and sponsoring other interagency and industry collaborations. FEMP assists Federal agencies with the development of their fleet compliance strategies and works with industry to provide petroleum reduction and alternative fuel solutions.

Water Management

FEMP's mission includes water management, and considers water efficiency to be an integral part of every comprehensive energy and resource management program. FEMP de-emphasized its water program in past years due to budget restrictions, but is now increasing its attention on water management to address increasingly aggressive Federal mandates and agency need.

New and Emerging Technologies

For continued success in containing energy costs and addressing new and more demanding Federal energy reduction goals, under-utilized new and emerging technologies will have to be deployed. FEMP assists in increasing the penetration and implementation of new and emerging technologies within Federal agencies by strategically assessing new technologies, their applications within Federal facilities, and their cost effectiveness at producing energy savings.

Energy-Efficient Product Procurement

FEMP provides energy efficiency requirements, guidance, and cost calculators that help Federal agencies offset energy consumption costs through energy-efficient product implementation.

Decision Support Services

Articulating and measuring progress toward a variety of energy management goals in legislation and assessing compliance with regulatory requirements is a challenging task. FEMP assists Federal agencies with guidance, outreach, and by convening interagency working groups.

FEMP works closely with the OMB, the Office of the Federal Environmental Executive (OFEE), and other agencies to develop, disseminate, and refine policy related to Federal energy management. FEMP analyzes Federal legislation and develops guidance materials to assist Federal agencies in meeting legislative and Executive Order requirements. For example, FEMP issues guidance to agencies for providing information included in the *Annual Report to Congress on Federal Government Energy Management*. Federal agencies that control their facilities are required to submit annual fiscal year reports describing their energy management efforts to FEMP, including the following data that establishes Federal Government progress toward mandated goals:

- Reduction in energy intensity in facilities subject to the EPACK 2005 and EO 13423 goals
- Eligible renewable electricity use as a percentage of total electricity use
- Reduction in potable water consumption intensity
- Standard and advanced metering of electricity use
- New building designs that are 30 percent more energy efficient than relevant code
- Investment in energy and water management by funding source

FEMP chairs the Interagency Federal Energy Management Task Force, as well as a number of interagency sub-groups and working groups that meet on a regular basis to discuss various techniques, best practices, and strategies as they relate to Federal energy management.

FEMP also promotes energy efficiency, renewable energy, and water saving strategies through a wide variety of publications, online resources, recognition, and award programs. FEMP's communications and recognition programs help to heighten Federal employees' awareness of the benefits of energy efficiency, while rewarding exemplary energy leadership.

More information about FEMP's service areas and programs may be found on the FEMP Web site at <http://www.femp.energy.gov>.

Impact of FEMP services on government performance

Many of FEMP's activities have led to significant lifecycle energy savings. The estimated life-cycle energy savings for all FEMP-facilitated activities for FY 2008 was more than 52 trillion Btu. This includes 32 trillion Btu from ESPC projects, approximately 9 trillion Btu from UESC projects, more than 10 trillion Btu from technical assistance efforts, and almost 1 trillion Btu in one-year savings from renewable energy purchases.

Figure 14 uses the accrual of annual savings to illustrate the impact of FEMP activities on the overall Government's energy intensity for FY 2003 through FY 2008, as well as expected savings in FY 2009 from projects initiated in FY 2008. All FEMP-facilitated projects assume 1 year for accrual of energy savings; therefore, in this analysis, FY 2002 FEMP project savings of 1.3 trillion Btu begin accruing in

FY 2003. Combined with the FEMP-facilitated renewable energy purchases of 590 billion Btu in FY 2003, FEMP activities contributed to lowering the Government's Btu/ft² by 0.5 percent. From the FY 2003 base year forward, the cumulative effect of each year's FEMP project savings, combined with FEMP-facilitated renewable energy purchases, are added to the Government's overall energy intensity to provide a picture of the Government's performance without FEMP's activities.

Based on preliminary data for FY 2008, the Government's energy intensity in its goal-subject buildings was 110,853 Btu/ft², or 12.3 percent lower than the FY 2003 base year energy intensity of 126,453 Btu/ft². Without the contribution of FEMP activities during the period, the Government's energy intensity would have only fallen 9.4 percent in FY 2008, barely meeting the 9 percent reduction goal for the year. Therefore, FEMP activities contributed an estimated 2.9 percent toward the overall reduction of 12.3 percent.

If the same overall energy intensity is assumed for FY 2009, the Government would still meet the 12 percent reduction goal for that year; however, it would only do so with the help of FEMP activities contributing the expected 3.5 percent toward that reduction. Further illustrating this remarkable leveraging of FEMP's modest budget is the consideration that FEMP's FY 2008 budget of \$19.8 million is a mere 0.3 percent of the \$6.5 billion spent by the Government for the energy used in these buildings in FY 2008.

Through FY 2009, FEMP projects facilitated over the prior six years are expected to continue accruing annually-recurring savings of approximately 13.6 trillion Btu. Of this, more than 10.4 trillion Btu is the result of facilitating financed projects through ESPCs (8.4 trillion Btu) and UESCs (2.0 trillion Btu). The remaining 3.1 trillion Btu in annually recurring savings is from FEMP technical assistance activities which ultimately resulted in implemented energy efficiency and renewable energy projects at Federal agencies.

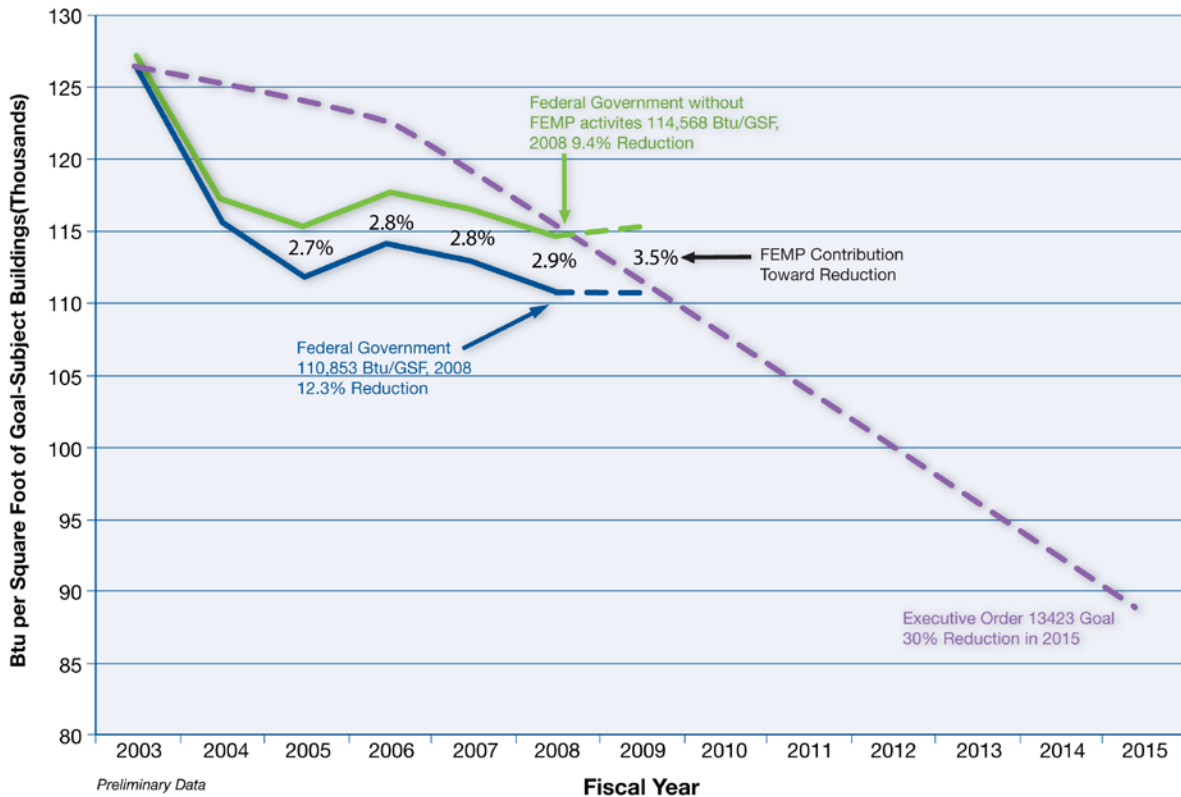


Figure 14. Impact of FEMP Activities on Government Energy Intensity (FY 2008)

Also during the period from 2003 to 2008, FEMP facilitated renewable energy purchases for agencies that contributed one-year savings toward the reduction goal by displacing conventional energy use. These purchases reached a peak of 5.4 trillion Btu in FY 2005, but have declined steadily since then to 1.0 trillion Btu in FY 2008. It is important to note that in projecting forward to FY 2009, renewable energy purchases are not included in FEMP’s estimated contribution. The 3.5 percent contribution toward the Government’s reduction projected for that year is based solely on the annually recurring savings of FEMP projects facilitated through FY 2008.

Federal Agency Project Investment

To help Federal agencies achieve their energy management goals, agencies have two main funding sources to implement energy efficiency and renewable energy projects: direct Congressional appropriations and privately financed investment. Private financing includes ESPC and UESC. Other emerging private funding approaches applied in the Federal sector include enhanced use leasing (EUL) and PPAs.

From FY 2003 through FY 2008, the Federal Government invested more than \$3.74 billion in energy efficiency improvement projects. During this period, direct appropriations for Federal energy efficiency projects total \$1.73 billion and privately financed energy efficiency investments total \$2.01 billion. DOE IDIQ ESPC investment totals more than \$955 million, and other Federal ESPC investments total \$471 million. UESC investments total \$588 million. From FY 2003 through FY 2008, 54 percent of Federal investment in energy efficiency and renewable energy projects was financed over time, indicating how essential ESPC and UESC financing are for agencies to achieve their energy use reduction goals.

Total investment in energy efficiency has risen 30 percent from \$720 million in FY 2003 to \$935 million in FY 2008 (Figure 15). Total project investment increased 46 percent from FY 2007 to FY 2008. Total private investment in Federal energy efficiency projects during FY 2008 was \$466 million and total direct investment of \$469 million.

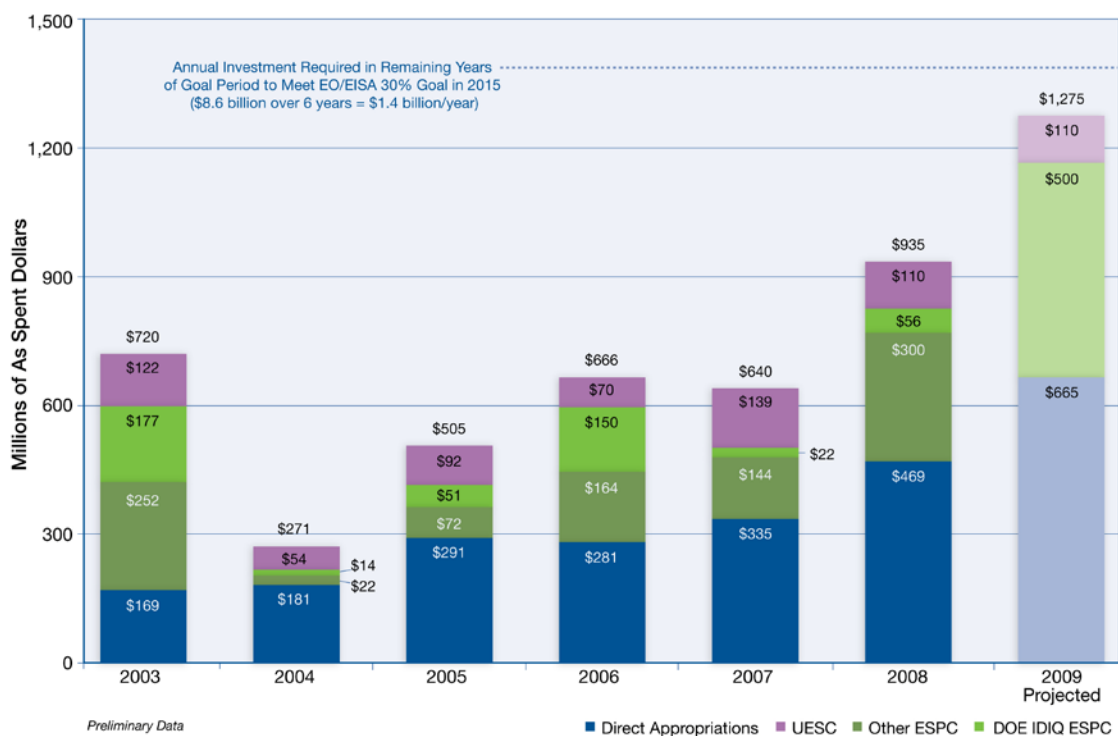


Figure 15. Federal Energy Efficiency Project Investment (FY 2003 - FY 2008)

The projected total investment in energy efficiency for FY 2009—without the American Recovery and Reinvestment Act (ARRA)—is nearly \$1.3 billion. This projected total investment is based on ESPC projects scheduled to be awarded under the DOE’s legacy IDIQ ESPC contract that expires December 31, 2009⁴, assumes relatively flat UESC investment, and uses direct spending projections as reported by Federal agencies. The impact of the ARRA will be whatever funding can be awarded by the end of FY 2009, which is not known.

To meet the EO 13423 and EISA energy intensity reduction goal of 30 percent by 2015, the annual investment required in the remaining years of the goal period is estimated to be \$1.4 billion, or almost \$9 billion over a 6-year period (which allows 1 year for FY 2014 project savings to accrue). This estimate uses a factor of 8,000 Btu annual savings per \$1 of project investment derived from FEMP project data and is based on reaching the target 2015 annual savings from 2008 levels, after subtracting 69 trillion Btu (5 percent) for low-cost, no-cost O&M-type savings. The annual energy efficiency investment required is equivalent to 22 percent of the annual Federal facility energy costs. Notably, the FY 2009 \$1.3 billion projection is at least \$100 million less than the \$1.4 billion annual estimated, as required to meet the 2015 goal.

The total cost of implementing all potential life-cycle cost-effective investment in Federal facility improvements is not known. More information will be obtained as agencies begin evaluating their facilities as per the requirements of EISA Section 432 and identifying projects.

As shown in Figure 16, for FY 2008, DOD made the largest total investment in energy efficiency projects, including the largest direct investment, largest ESPC project investment, and largest UESC project investment.

The DOD \$454 million total investment is 49 percent of the total Federal investment in energy efficiency for FY 2008. The USPS \$150 million total investment is 16 percent of total investment. The DOE \$141.3 million total investment is 15 percent of the total. All other Federal agencies combined invested \$188 million in energy efficiency projects, representing 20 percent of the total investment.

During FY 2008, DOD received \$198.3 million (42 percent of the total) in Congressional appropriations for energy efficiency projects, USPS directly funded \$150 million (32 percent of the total), and VA received \$40 million from appropriations (9 percent). These three agencies combined comprised 83 percent of the direct obligations for efficiency projects. All other Federal agencies shared \$80 million in appropriations, representing 17 percent of the total.

⁴ DOE’s legacy IDIQ ESPC was comprised of six regional and four technology-specific contracts. This contract will expire December 31, 2009. DOE awarded a new IDIQ ESPC contract in December 2008. See http://www.femp.energy.gov/news/news_detail.html?news_id=12150.

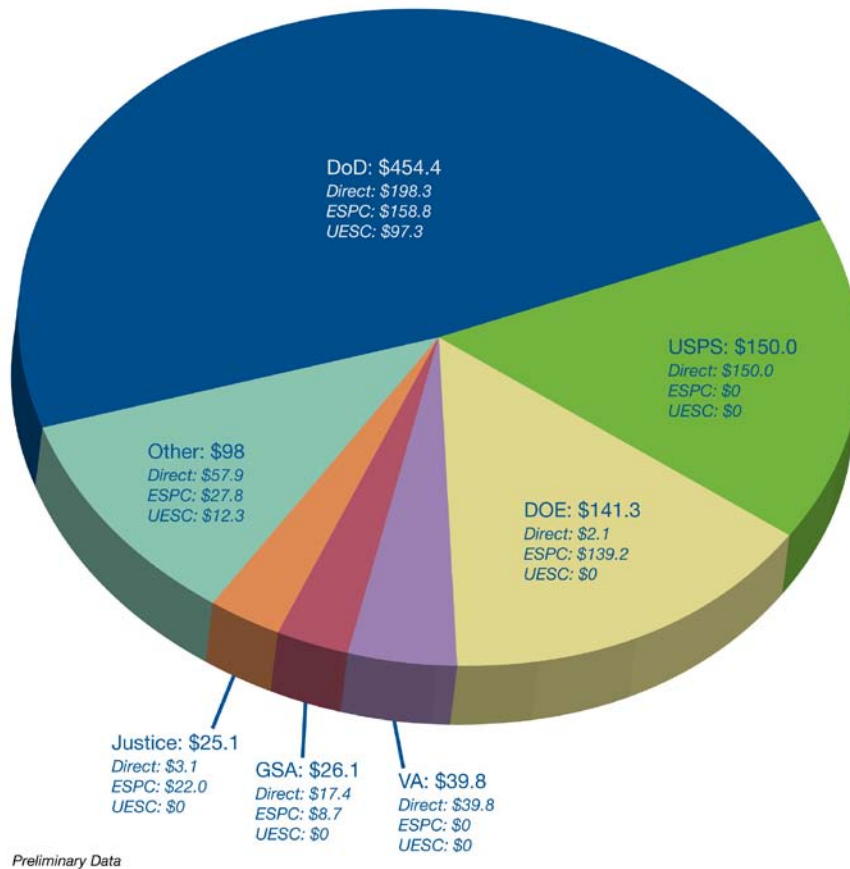


Figure 16. FY 2008 Energy Efficiency Project Investment by Agency (in Millions of \$)

DOD's \$159 million in ESPC project investment is 45 percent of the total ESPC investment for FY 2008. DOE invested \$139 million (39 percent of the total) in ESPC projects, and DOJ invested \$22 million (6 percent of the total) in ESPC projects. All other Federal agencies combined invested \$36 million (10 percent of the total) in ESPC projects. DOD's \$97.3 million in UESC project investment is 89 percent of the total UESC investment for FY 2008.

A useful measure of agencies' commitment to energy efficiency is their total investment in energy efficiency projects as a percentage of their facility energy costs, which allows for meaningful comparison of agency investment depending on their size. For all Federal agencies, project investment was only 12.9 percent of the facility energy costs for FY 2008 (Figure 17).

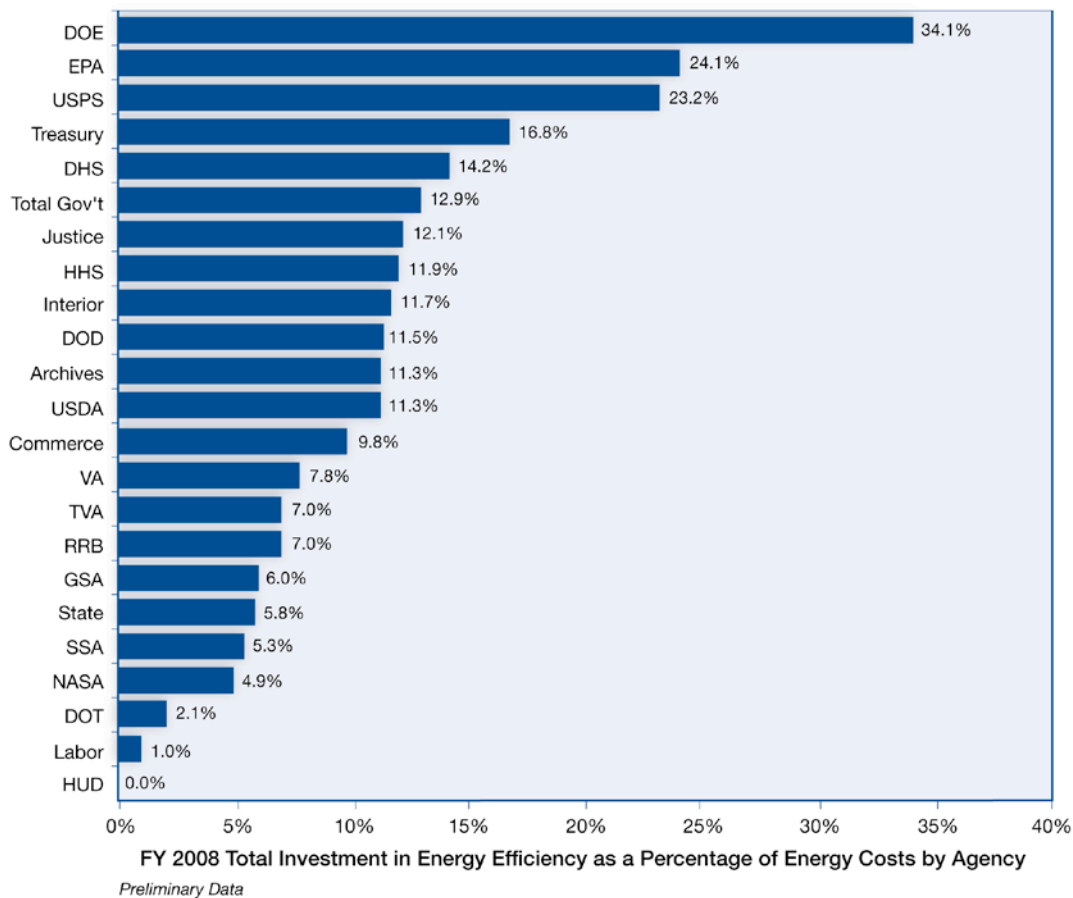


Figure 17. FY 2008 Total Investment as a Percentage of Facility Energy Costs by Agency

As noted above, achieving the EISA reduction goal of 30 percent will require investments totaling approximately 22 percent of annual facility energy costs, due to past under investment. One half of the project investment, 6.5 percent of facility energy costs, was financed through private investments (i.e., ESPC and UESC). For 2008, 3 agencies had investments totaling more than 20 percent of their energy costs, and 8 more agencies invested at least 10 percent of their energy costs.

DOE's investment in energy efficiency projects was equal to 34 percent of its facility energy costs, the largest percentage of any agency. More than 98 percent of DOE's total investment was financed through DOE IDIQ ESPC projects, emphasizing the importance of private financing as a means for many agencies to meet their energy efficiency goals. EPA invested \$5 million and USPS invested \$150 million in energy efficiency projects. These amounts are equal to 24 percent and 23 percent, respectively, of their FY 2008 facility energy costs. The EPA and USPS investments consisted entirely of direct investment. Agencies must use private financing mechanisms more aggressively in order for the Federal Government to meet its collective goals, but direct appropriations will continue to be an important source of funding for energy efficiency projects.

In addition to the \$9 billion required to meet the facility energy intensity reduction goal, an estimated \$7.2 billion is required to meet renewable energy goals, petroleum reduction and alternative fuel use goals, and water use reduction goals, for a total of \$16.2 billion in Federal investment.⁵

- 30 percent reduction in energy intensity by 2015 - \$9,000M
- 7.5 percent renewable power by 2013 - \$2,400M
- Petroleum reduction and alternative fuel use goals - \$850M
- 16 percent reduction in water intensity by 2015 - \$3,970M

Energy Savings Performance Contracting

An ESPC is a partnership between a Federal agency and an energy service company (ESCO) in which an ESCO conducts an assessment for the Federal facility and identifies improvements to save energy. In consultation with the Federal agency, the ESCO designs and constructs a project that meets the agency's needs and arranges the necessary financing. The ESCO guarantees that the improvements will generate energy cost savings sufficient to pay for the project over the term of the contract, which can be up to 25 years, but typically averages around 16 years. After the contract ends, all additional cost savings accrue to the agency.

DOE's IDIQ contracts are intended to make ESPCs as practical and cost-effective as possible for Federal agencies and help them meet their goals by providing multiple benefits, including increased quality and value in the following ways:

- Access to private-sector expertise in energy efficiency, renewable energy, water conservation, and reduced emissions
- Built-in incentives for ESCOs to provide high-quality equipment, timely services, and thorough project commissioning
- Infrastructure improvements to enhance mission support
- Healthier and safer working and living environments

Federal agencies and ESCOs implement energy savings projects by executing delivery orders through the DOE's IDIQ ESPC contract.

EPACT 1992 authorized Federal agencies to execute guaranteed-savings ESPCs. On October 1, 2003, Federal authority for ESPCs expired due to a "sunset" provision of the authorizing legislation. During November 2004, Congress restored Federal ESPC authority for one year. ESPC authority was restored retroactively and delivery order modifications were permitted during the interim. Subsequent legislation extended Federal ESPC authority for 10 years, and EISA 2007 made Federal ESPC authority permanent.

⁵ Cost projections are preliminary forecasts. Investment projections to reach water and petroleum goals are extrapolated from project proposals in DOE site executable plans. Renewable energy investment projections are based on a mix of technologies and estimated capital costs based on estimates of possible development.

As shown in Figure 18, during FY 2003 through FY 2008 there were 112 DOE IDIQ ESPC projects awarded by 17 different Federal agencies under DOE’s legacy IDIQ contracts. The historic peak of 39 projects awarded during FY 2003 was due to extraordinary effort by the agencies in anticipation of the sunset provision of Federal ESPC authority. The relatively low number of projects during FY 2004 and FY 2005, 6 and 9, respectively, was due to the uncertainties regarding reauthorization of Federal ESPC contracts. The 22 projects awarded during FY 2006 demonstrate the re-establishment of confidence in the ESPC program.

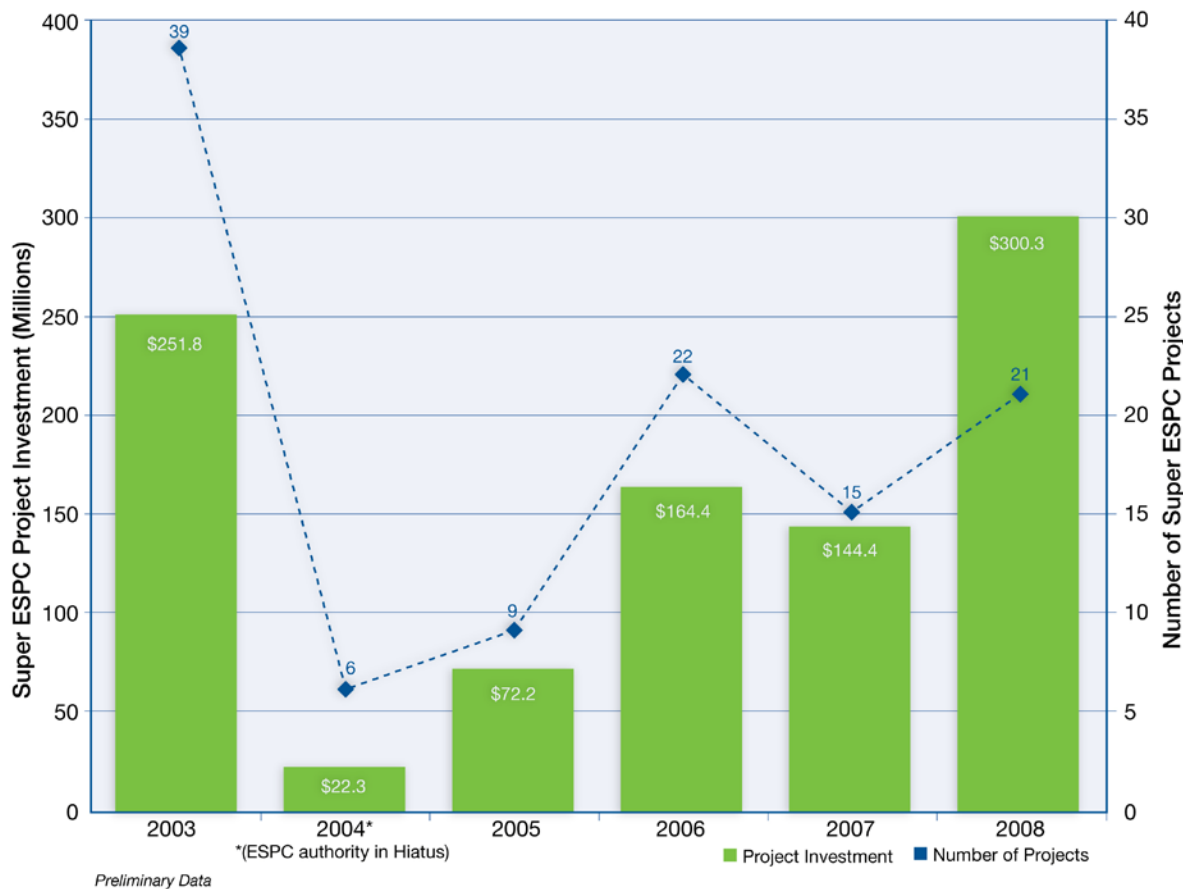


Figure 18. DOE IDIQ ESPC Projects and Investments (FY 2003 – FY 2008)

The 112 DOE IDIQ ESPC delivery orders awarded during the period of FY 2003 through FY 2008 invested more than \$955 million in energy efficiency projects. Annual DOE IDIQ ESPC project investment increased to the historic high of \$300 million during FY 2008. Even more significantly, the average investment per project more than doubled from \$6.5 million in FY 2003 to \$14.3 million during FY 2008. This increase is directly attributable to Federal initiatives to implement larger, more comprehensive projects to assist agencies in achieving their energy efficiency goals.

Energy savings for DOE IDIQ ESPC projects are calculated on an annual basis. These annual savings reoccur for each year of the period of performance. Cumulative energy savings for DOE IDIQ ESPC

projects are calculated by multiplying the annual energy savings by the number of years in the period of performance.

Project investment through DOE’s legacy IDIQ ESPC has resulted in total energy savings of 131.2 trillion Btu. Figure 19 shows that FY 2008 total energy savings of 32 trillion Btu is nearly as much the total energy savings for FY 2003. The average cumulative energy savings per project has increased from nearly 1 trillion Btu during FY 2003 to 1.5 trillion Btu during FY 2008. This increase of more than 500 billion Btu is due to the increased emphasis on implementing larger projects. The FY 2008 total is 350 billion Btu greater than the annual average of 1.2 trillion Btu.

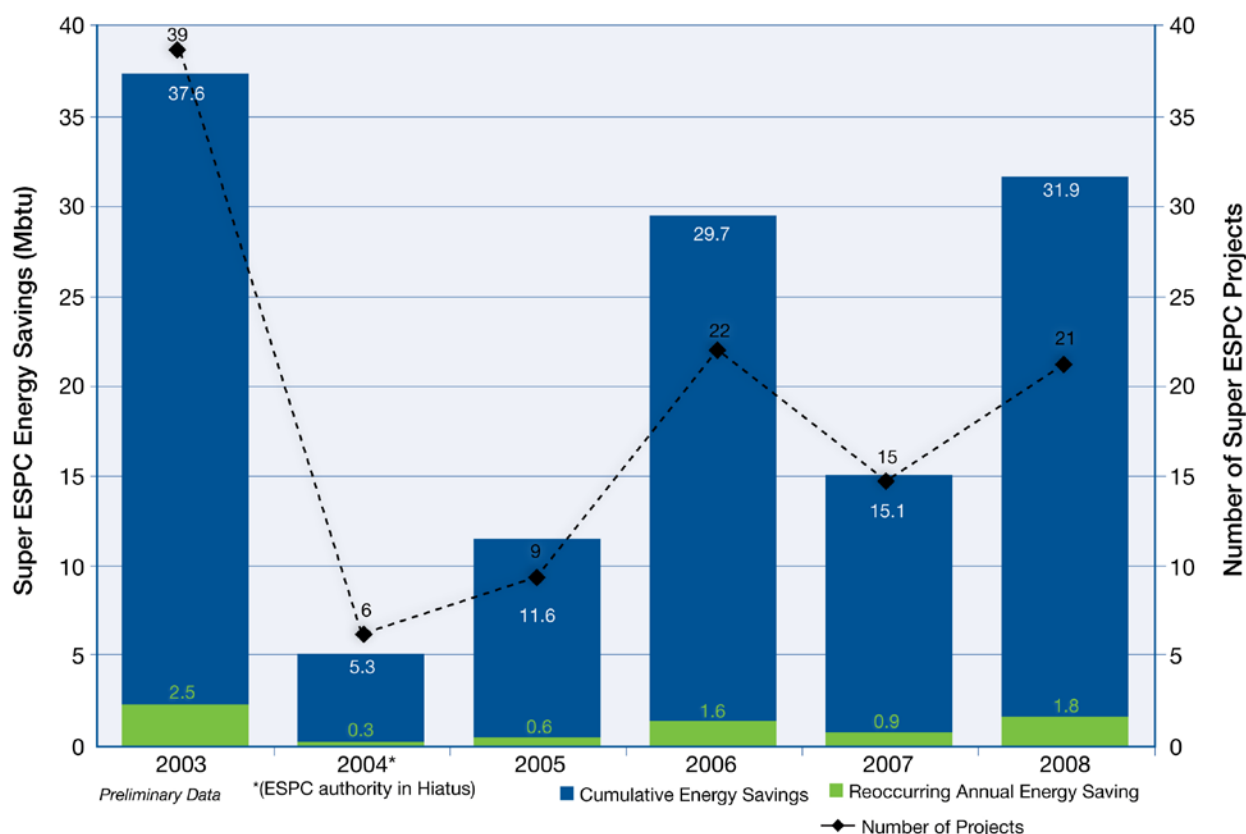


Figure 19. DOE IDIQ ESPC Projects Annual and Cumulative Energy Savings (FY 2003 – FY 2008)

Figure 20 shows that during FY 2003 through FY 2008 DOE IDIQ ESPC projects were implemented in 36 States and the District of Columbia (DC). The largest number of legacy DOE IDIQ ESPC projects have been done in California (14 projects), Maryland (10 projects), Virginia (9 projects), Texas (8 projects), Utah (7), and Massachusetts (5). The higher number of projects in California and Texas is attributable to the large geographical size of those states and the commensurate number of Federal facilities. The number of projects in Maryland and Virginia is due to these States’ proximity to Washington, DC and the high concentration of Federal facilities in Maryland and Virginia.

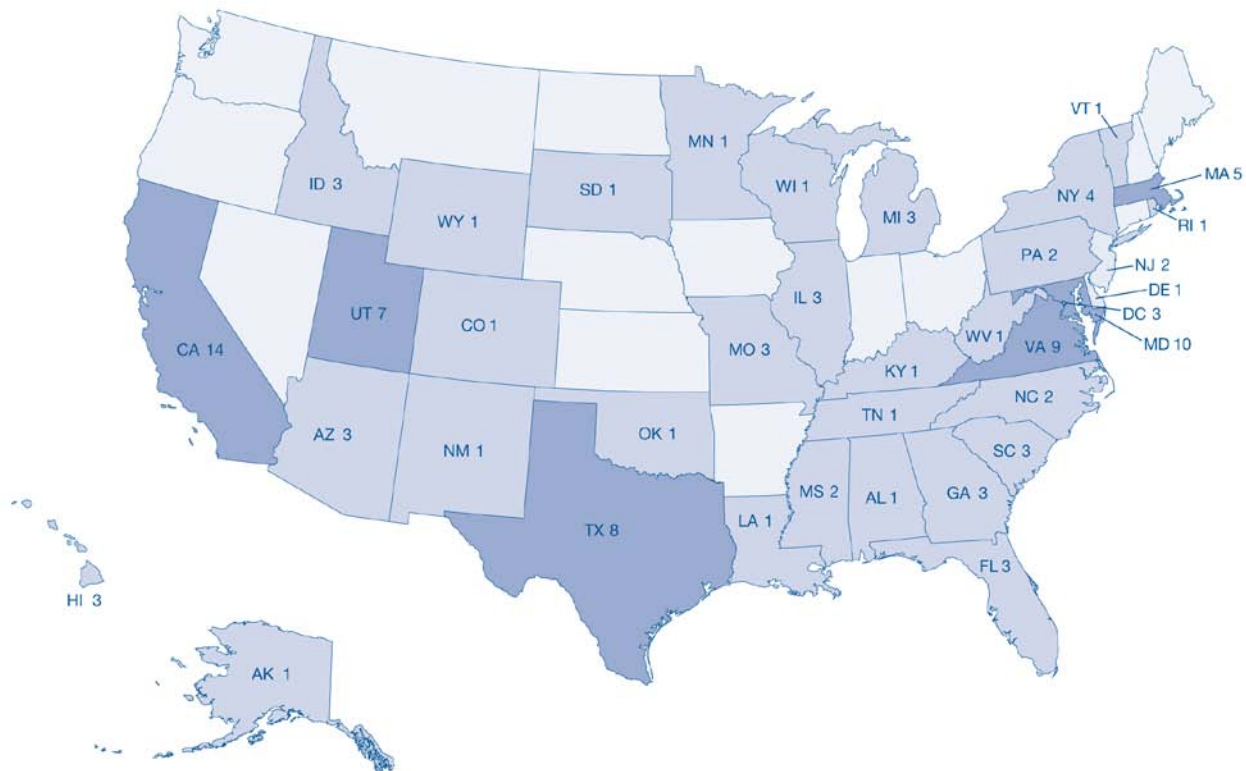


Figure 20. DOE IDIQ ESPC Projects by State (FY 2003 - FY 2008)

Table 6 shows that between FY 2003 and FY 2008, DOD awarded 47 DOE IDIQ ESPC projects under DOE’s IDIQ, representing 42 percent of the total. This includes 17 projects for the U.S. Air Force, 17 projects for the U.S. Navy, 12 projects for the U.S. Army, and one project for DOD at the Pentagon. GSA has awarded 17 DOE IDIQ ESPC projects, representing 15 percent of the total. DOE awarded 8 projects for 7 percent of the total.

The total DOE IDIQ ESPC investment value for FY 2003 through FY 2008 is \$955 million. DOD’s 47 DOE IDIQ ESPC projects total \$420 million in investment value, representing 44 percent of the total investment value. These totals include \$183 million for the U.S. Navy (20 percent), \$119 million (12.5 percent) for the U.S. Air Force, \$114 million (12 percent) for the U.S. Army, and \$3 million (0.3 percent) for the DOD-Pentagon. DOE awarded 8 projects with a total investment value of \$174 million (18 percent). GSA awarded 17 DOE IDIQ ESPC projects with a total investment value of \$116 million (12 percent). The other 11 agencies combined invested \$245 million in DOE IDIQ ESPC projects.

The average DOE IDIQ ESPC project investment value for all agencies during FY 2003 through FY 2008 was \$8.5 million. DOE had the largest average project investment of \$22 million. The Smithsonian

Institution's one project was a \$20 million investment.⁶ The average investment value for all DOD projects was \$9 million, including \$11 million for the U.S. Navy and \$9.5 million for the U.S. Army. The average project investment value for other agencies was less than the average project investment for all agencies.

The total cumulative energy savings for DOE IDIQ ESPC projects during FY 2003 to FY 2008 was 131.2 trillion Btu. The energy savings from DOD projects were 54.3 trillion Btu, representing 41.4 percent of the total energy savings. The DOD energy savings include 19.5 trillion Btu for U.S. Air Force projects (15 percent), 18 trillion Btu for U.S. Navy projects (13.7 percent), 16 trillion Btu for U.S. Army projects (12 percent), and 1 trillion Btu for the DOD-Pentagon project (.77 percent).

Table 6. DOE IDIQ ESPC Project Investment and Energy Savings by Agency (FY 2003 - FY 2008)

Agency	Number of Projects	Total Project Investment	Reoccurring Annual Energy Savings (Mbtu)	Cumulative Energy Savings (Mbtu)
DOD-Navy	17	\$183,233,393	1,265,530	17,905,894
DOE	8	\$173,524,587	1,303,989	23,328,273
DOD-Air Force	17	\$119,089,107	1,047,455	19,513,121
GSA	17	\$115,697,857	1,546,355	29,626,091
DOD-Army	12	\$114,482,865	798,649	15,864,152
VA	7	\$51,764,288	393,515	4,568,466
DHS	7	\$50,439,975	333,766	4,573,783
DOJ	5	\$48,434,775	240,212	4,335,740
HHS	3	\$23,352,965	168,157	1,761,911
SI	1	\$19,908,524	42,121	842,420
NARA	5	\$18,026,951	134,510	1,903,349
USDA	2	\$9,714,552	142,182	2,963,442
DOI	3	\$6,889,103	30,495	635,225
DOT	3	\$6,540,770	82,586	1,453,683
DOC	1	\$5,085,245	40,682	406,820
DOL	2	\$4,125,673	27,026	378,366
DOD-Other	1	\$3,013,135	59,368	1,009,256
SSA	1	\$1,959,642	13,671	136,710
Totals	112	\$955,283,407	7,670,268	131,206,703

⁶ Smithsonian Institution is not a Federal agency and is not required to report its energy management data to FEMP, but does so voluntarily.

Table 7 shows that during FY 2008, agencies implemented 21 DOE IDIQ ESPC projects, including 9 DOD projects and 4 DOE projects. The total \$300 million investment in these projects will result in 32 trillion Btu in energy savings. An additional \$56 million in investment was awarded by DOD under its own contract vehicles.

Table 7. FY 2008 DOE IDIQ ESPC Projects Awarded by Agency

Project Title	Agency	ESCO	Project Investment	Cumulative Energy Savings (Mbtu)
U.S. Coast Guard Baltimore Yard BAMF Project	DHS	Ameresco Solutions, Inc.	\$13,721,536	2,079,840
Tinker Air Force Base	DOD-AF	Honeywell International	\$9,128,208	763,531
Lackland Air Force Base	DOD-AF	Johnson Controls Government Systems, LLC	\$5,877,660	799,425
Fort Stewart #3	DOD-AR	Johnson Controls Government Systems, LLC	\$17,512,625	1,638,054
Fort Dix	DOD-AR	Honeywell Building Solutions SES	\$17,568,974	4,138,260
Sierra Army Depot	DOD-AR	Trane, a Division of American Standard Companies, Inc.	\$7,484,402	474,880
Marine Corps Base Hawaii (Kaneoho Bay), DO1	DOD-MC	NORESKO, LLC	\$12,846,880	477,309
Naval Support Activity Philadelphia	DOD-NV	Constellation Energy Projects and Services Group, Inc.	\$2,990,743	224,910
Naval Station Newport	DOD-NV	Honeywell Building Solutions SES	\$8,943,477	535,600
Naval Air Station Key West	DOD-NV	NORESKO, LLC	\$20,276,255	451,290
National Energy Technology Laboratory Pittsburgh/Morgantown/Albany	DOE	Constellation Energy Projects and Services Group, Inc.	\$6,370,493	334,068
Idaho National Laboratory* (phase 1)	DOE	NORESKO, LLC	\$33,580,692	854,320
Lawrence Livermore (phase 1)	DOE	Johnson Controls Government Systems, LLC	\$11,140,075	1,855,350
Oak Ridge National Laboratory	DOE	Johnson Controls Government Systems, LLC	\$88,110,334	13,825,098
US Geological Survey, Great Lakes Science Center, Ann Arbor, MI	DOI	Trane, a Division of American Standard Companies, Inc.	\$1,467,819	101,703
Arizona Multiple Prisons	DOJ	Johnson Controls Government Systems, LLC	\$6,963,417	431,300
Federal Corrections Institution Big Spring Texas DO#1	DOJ	NORESKO, LLC	\$4,430,528	384,920
Federal Correction Complex Petersburg	DOJ	Constellation Energy Projects and Services Group, Inc.	\$10,597,656	1,552,352
Prince Jonah Kuhio Kalaniana'ole Federal Building DO#1, Hawaii	GSA	Johnson Controls Government Systems, LLC	\$8,654,477	75,879
National Institutes of Health #3	HHS	NORESKO, LLC	\$11,701,483	883,751
Forest Service Region 2 Phase 1	USDA	Energy Systems Group, LLC	\$909,666	55,950
			\$300,277,400	31,937,790

Energy Conservation Measures Used in DOE IDIQ ESPCs

The most common types of ECMs in active use today include energy management and control systems (EMCS); lighting; heating, ventilation, and air conditioning (HVAC); motor variable frequency drives; renewable energy systems; water systems; chillers; piping distribution; process; building environment; cogeneration; plug load; refrigeration; electricity distribution; rate adjustments; advanced metering; survey; operations and maintenance; and new capacity. Table 8 lists and describes the primary ECMs implemented by agencies through DOE ESPCs. Renewable ECMs are subdivided into electric, thermal,

and ground source heat pump. Since 2005, data reported to FEMP show that renewables currently make up about 20 percent of Federal agency investment in ECMs.

Table 8. Types of ECMs

ECM Abbreviation	Brief Description of ECM
CoGen DG	Installation of cogeneration systems, microturbines, or fuel cells
Bldg. Env.	Installation of insulation; weatherization; window replacement; reflective solar window tinting
Refrigeration	Replacement of ice/refrigeration equipment with high-efficiency units
Peak/Load	Thermal energy storage; gas cooling
Rate Adjust	Rate Schedule Change; lower energy cost supplier; building auditing
Process Improve	Improvements in production/manufacturing, industrial process; recycling/waste reduction (includes air compressor optimization)
Adv Meter	Advanced metering
Plug Load	Appliance/plug load reduction: ENERGY STAR, replace ice/refrigeration equipment, delamp, vending machines, plug timers
Future ECM	Non-building applications
Surveys	Energy surveys
Other	Air compressor optimization; ozone laundry system; hot tub cover
New Capacity	New equipment or expansion that result in increased energy consumption (e.g. new CoGen) but provide energy savings (e.g. reduced electrical costs)
EMCS	Energy Monitoring & Control Systems (EMCS) including: HVAC upgrades to digital controls; upgrade or replacement of existing EMCS
Lighting	Lighting retrofits/replacements; intelligent lighting controls; occupancy sensors; LED technologies; day-lighting; spectrally enhanced lighting; fiber optic lighting
Chiller	Chiller retrofits/replacements; chiller plant pumping, piping and control retrofit/replacement
HVAC	Packaged AC unit replacement; damper & controller repair/replacement; window AC unit replacement; cooling tower retrofit/replacement; economizer installation; fan/pump replacement or impeller trimming; thermal energy storage; variable air volume retrofit
Renewables	Installation of PV, solar hot water, solar ventilation preheating, wind energy, or passive solar systems; landfill gas, digester gas, or coal bed methane power plants; wood organic waste heating or power plant; or replacement of HVAC system with ground source heat pump system
Piping Distribution	Installation of piping insulation of new condensate return systems; repair/replacement of hot water heaters, steam traps, or condensate return systems
Water Systems	Low-flow faucets, shower heads, or plumbing equipment; water efficient irrigation; on site sewage treatment systems
Motor/VFD	Replace motors with high efficiency motors or variable speed motors or drives
Boiler	Install boiler controls; replace motors with high efficiency boilers
Comm. RCx	Retro-commissioning; continuous commissioning
Elec. Dist.	Installations of transformers or gas distribution systems; power quality upgrade; power factor correction

Figure 21 is based on data collected from FEMP’s ESPC contract database.⁷ Past DOE IDIQ Super ESPC projects indicate that, of the various ECMs available, improvements to lighting, EMCS, and HVAC are

⁷ Data used to estimate energy conservation measures used in DOE ESPCs comes from delivery order schedules reported to FEMP. Each ESPC may have multiple ECMs, along with multiple instances of the same ECM within

implemented most frequently. EMCS and lighting also are two of four ECMs that provide the greatest annual energy savings according to the data.

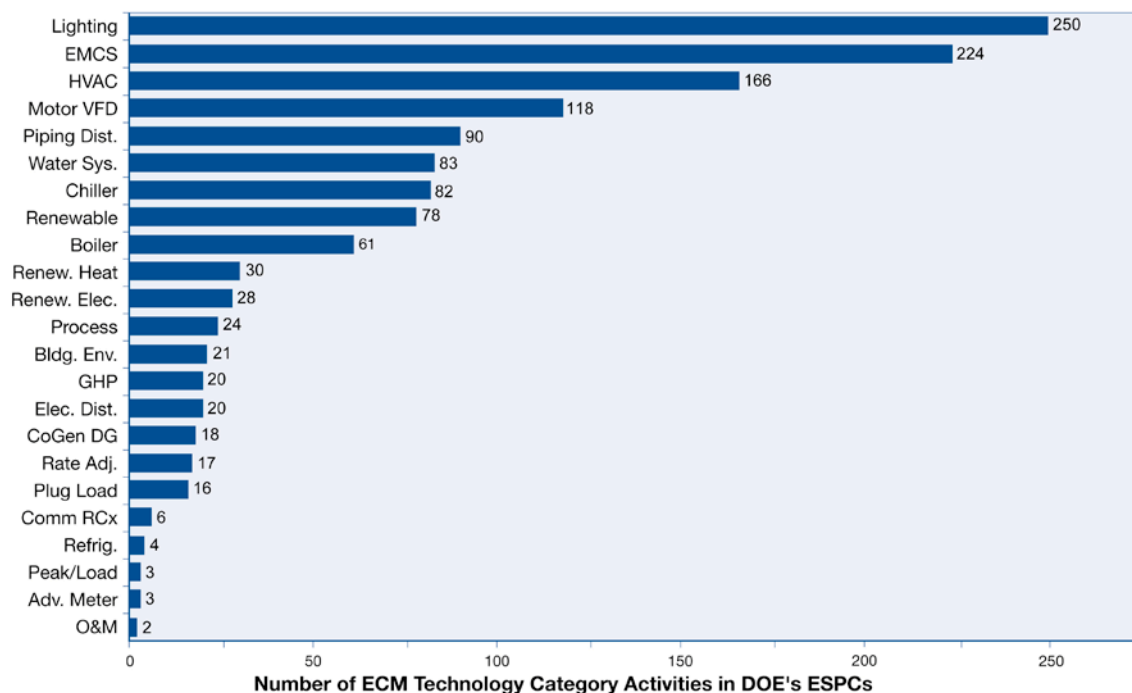


Figure 21. Number of ECMs Implemented through DOE IDIQ ESPCs

The data were also used to determine average investment payback periods for the implemented ECMs.⁸ Figure 22 shows that renewable technologies have the longest average payback period of just over 18 years, while advanced metering and rate schedule changes have the smallest average payback periods. However, the ECMs implemented most frequently seem to fall in the middle range with payback periods being between 6 to 7 years on average. There is not necessarily a direct correlation between payback period and the frequency of ECM implementation. In fact, many DOE IDIQ ESPC ESCOs have comprehensive expertise with the full range of ECMs and often will offer a combination of technologies most likely to produce optimal savings results. This approach is more likely to be self-funding and more cost-effective than piecemeal installation of ECMs. In particular, including ECMs with longer payback

the greater project. Hence, the total number of ECMs implemented by ESCOs through DOE's Super ESPC exceeds the number of ESPCs according to the data.

⁸ The average percent variation in ECM standard deviations was determined for the entire ESPC contract database. New ECM averages and ranges were calculated from the smaller data sets. Wide variations in the results suggest potential issues with data quality and reporting.

periods (i.e., renewables) at the outset of projects is much easier than attempting to bring them in much later when there may not be other improvements available to help the project economics.

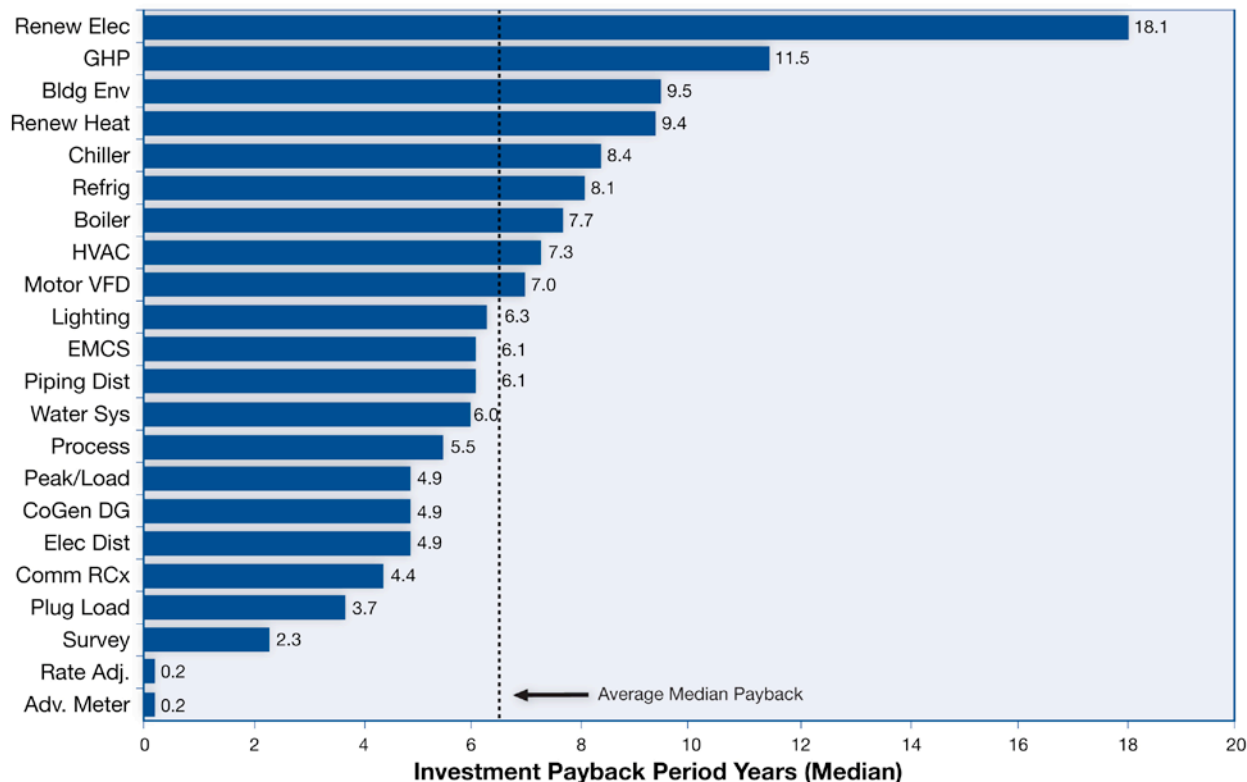


Figure 22. Energy Conservation Measure Median Payback Periods

DOE IDIQ ESPC Projections

There are more than 100 DOE IDIQ ESPC projects in development with a planned total investment value of more than \$1.2 billion. The majority of these projects are scheduled to be awarded during FY 2009. The remaining projects are planned to be awarded during FY 2010 and FY 2011.

As a result of the increased use of ESPC contracting in the Federal Government to meet energy efficiency goals, there is a significant increase in the number of DOE IDIQ ESPC projects in their performance period—currently more than 160 projects. A DOE IDIQ ESPC project initiates a long-term relationship between a Federal agency and an ESCO. The average performance period (weighted by investment amount) for ESPC projects is more than 17 years. Over this length of time, there are likely to be a number of changes at ESPC project sites including mission, personnel, and buildings. Some agencies are now managing scores of projects in the performance period, and there will likely be more agencies with more projects in the future. Managing large numbers of ongoing ESPC projects raises the following types of concerns:

- How to ensure project quality during a long performance period

- How to ensure the integrity of M&V process
- How to ensure continuity at sites given frequent personnel changes

In 2008, the Federal ESPC Steering Group chartered the Working Group on Performance Period Administration to examine these issues and develop consensus recommendations for agency-level organizations involved in day-to-day management and oversight of ESPC projects. The overall goal of an agency in managing its ESPC projects is to ensure that its portfolio of projects meets performance objectives and delivers energy savings and guaranteed cost savings throughout the entire performance period. The Working Group developed specific policies that allow agencies to meet those goals. Implementing these procedures for data collection and storage, project documentation, and the annual M&V process will help ensure that Federal contracting centers have the information and expertise needed to effectively develop and monitor their ESPC projects.

DOE continues to develop guidance for the new DOE IDIQ ESPC contract. One recommendation is the implementation of Performance Period Facilitators, who would provide support during the performance period of the projects and supplement the support provided by the current DOE Project Facilitators during the project development period up to the project award.

Utility Energy Service Contracts

Federal agencies may also contract for efficiency and renewable energy projects through partnerships with their franchised or serving utilities. UESC is a contracting mechanism that allows Federal agencies to procure specified energy-saving or renewable energy projects for their facilities through a utility company. The utility typically arranges financing to cover the capital costs of the project and is repaid over the contract term from the cost savings generated by the energy efficiency measures. With this arrangement, agencies can implement energy improvements with no initial capital investment, the net cost to the Federal agency is minimal, and the agency saves time and resources by using the one-stop shopping provided by the utility. UESCs may be offered as part of an area-wide agreement to serve its Federal customers.

EPACT 1992 authorizes and encourages Federal agencies to participate in utility energy efficiency programs offered by electric and gas utilities and by other program administrators (e.g., state agencies). These programs range from equipment rebates (i.e., utility incentives) to delivery of complete turnkey projects. Federal legislation and numerous legal opinions demonstrate that agencies have full authority to enter into utility energy service contracts as well as take advantage of utility incentive programs.

UESCs represent one of the quickest ways for many Federal facilities to contract for energy services (Table 9). The speed and flexibility of UESC contracts make them popular among Federal agencies. Local utility companies are leaders in the deployment of advanced EERE technologies and are capable of designing and implementing projects using the latest technology. In fact, utilities spend billions of dollars each year deploying these technologies and additional millions of dollars researching and testing them. In many regions of the country, local utility companies are the leaders in the implementation EERE projects. Utility companies already have existing capacity through an established network of subcontractors to implement EERE projects.

Historically, more than 45 electric and gas utilities have provided project financing for energy and water efficiency upgrades at Federal facilities. The Edison Electric Institute has committed to encouraging \$2 billion in private investment funding by 2010 for life-cycle cost-effective Federal facility improvement projects.

As shown in Table 9, during FY 2008 DOD implemented 18 (60 percent) of the 30 total UESC projects. These 18 DOD projects invested \$97.3 million in energy efficiency, representing 89 percent of the total project investment. This project investment resulted in energy savings of 596,000 MBtu, representing 91 percent of the total.

Table 9. FY 2008 UESC Projects

Agency	Projects	Percentage of Projects	Total Project Investment	Percentage of Total Project Investment	Average Project Investment	Annual Energy Savings (MBtu)
DOD	18	60%	\$97,312,400	89%	\$5,406,244	595,586
Treasury	2	7%	\$4,725,000	4%	\$2,362,500	28,690
HHS	5	17%	\$4,563,700	4%	\$912,740	18,396
USDA	2	7%	\$2,523,000	2%	\$1,261,500	6,482
Interior	3	10%	\$507,200	1%	\$169,067	4,131
Total	30	100%	\$109,631,300	100%	\$3,654,377	653,285

Preliminary Data

Enhanced Use Leases

EULs leverage underutilized assets through outleasing in order to allow for construction and renovation projects provided by public or private entities on non-excess military land that is not being used for mission purposes. This mechanism frees up payroll since construction and services are provided in lieu of rent and enhancements do not need to be directly tied to “programmatic” requirements of the installation; this allows alterations, repairs, new construction, or improvements to be fast-tracked. When using an enhanced use lease, a private developer is selected and given full responsibility to design, finance, permit and own energy systems such as cogeneration or solar facilities on Government property. Currently, DOD, VA, and NASA are the only agencies using EULs under various constitutional authorities. FEMP does not support EULs and does not track data for Federal EUL projects.

Power Purchase Agreements

A PPA is a financing mechanism for on-site renewable energy projects. The major advantage to Federal agencies is that they incur no up-front capital costs. A renewable developer installs a renewable system on agency property in exchange for an agreement that the agency will purchase the power generated by the system. The agency pays for the system through these payments over the life of the contract. The developer installs the system and continues to own, operate, and maintain the system for the duration of the contract.

PPAs are relatively new within the Federal sector, but they are quickly becoming more common. FEMP provides technical assistance to Federal agencies for PPAs through renewable energy experts at NREL and DOE's other national laboratories. For contracting assistance, FEMP often facilitates cooperation between a Federal agency and the Western Area Power Administration (WAPA) or the Defense Energy Support Center; these organizations may have authority to sign longer-term contracts or have specialized knowledge of the utility industry and renewable energy projects.

The most significant obstacle to wider use of PPAs in the Federal sector is a term limitation of 10 years for Federal PPA contracts. The short contract term makes it more difficult for renewable power developers to secure financing for new renewable power generation projects. The short contract term also means that the upfront capital costs of the project cannot be spread over a longer contract life to make renewable projects more cost-competitive with existing sources of energy generated from fossil fuels.

FEMP does not currently track every PPA executed by the Federal Government, but the agency is aware of several projects at other Federal agencies that began operation in FY 2008. The 15 megawatt (MW) photovoltaic (PV) array on Nellis Air Force Base was financed through a PPA and is the largest PV system in North America. The Army utilized a PPA to finance a 2 MW PV system at Fort Carson. NREL began operation of a 750 kilowatt PV system through a PPA, and GSA utilized a PPA for a 1MW PV system on the roof of Sacramento's Federal Building. Specific descriptions of these projects and some private entities involved in PPAs are provided in the Private Sector Partner Market Environment section of this report.

Private Sector Partner Market Environment

Energy Service Companies

ESCOs develop, install, and maintain energy efficiency projects that otherwise would not be developed due to market barriers. The ESCO industry has the ability to arrange for and obtain market-rate, private sector financing for energy efficiency projects on a large scale. Smaller projects generally must be aggregated in order to be viable due to the high transaction costs of developing and implementing performance contracts. In the United States, the ESCO customer base is dominated by the public sector, with about 22 percent from Federal markets according to a 2007 survey conducted by LBNL (LBNL 2007).

An ESCO's composition and ownership may affect service offerings, project types, and potentially the brands of equipment supplied. ESCOs may be independent companies or companies owned by electric or gas utilities, large engineering firms, or building equipment manufacturers. According to the 2007 LBNL survey, independent ESCOs represented 61 percent of ESCO companies, but the smaller portion of ESCOs owned by building equipment manufacturers (15 percent of ESCOs) generated 59 percent of total ESCO revenue (across all market sectors) in 2006 (LBNL 2007).

ESCO Activity Under DOE's Legacy IDIQ ESPC Contract

Details by ESCO on project volume, investment, and energy savings generated by the projects follow in Table 10 below. From FY 2003 through FY 2008, 14 ESCOs were awarded 112 DOE IDIQ ESPC projects with a total investment value of \$955 million (Figure 23). These projects will generate 131 trillion Btu in energy savings over the life of the contracts. During FY 2003 through FY 2008, there were several DOE IDIQ ESPC ESCO corporate mergers and acquisitions. Data for Ameresco, Inc. includes Ameresco Federal Solutions and Ameresco Solutions, Inc.; data for Honeywell International, Inc. includes Honeywell Building Solutions SES and Honeywell International, Inc.

Johnson Controls Government Systems, LLC was awarded 32 DOE IDIQ ESPC projects, representing 29 percent of the total DOE IDIQ ESPC projects. NORESKO, LLC was awarded 23 projects, representing 21 percent of the total DOE IDIQ ESPC projects. Honeywell International, Inc. was awarded 14 DOE IDIQ ESPC projects, representing 13 percent of the total DOE IDIQ ESPC projects. Collectively, these three ESCOs implemented 63 percent of DOE IDIQ ESPC projects.

Ameresco, Inc. (8 projects; 7 percent), Trane, a Division of American Standard Companies, Inc. (7 projects; 6 percent), and Consolidated Edison Solutions, Inc. (6 projects; 5 percent) constitute the next tier of project implementation. The remaining eight ESCOs average about three projects each, which represents about 3 percent of the total projects implemented.

NORESKO's 23 projects total \$279 million of investment value, representing 29 percent of the total DOE IDIQ ESPC investment value. Johnson Controls' 32 projects total \$270 million of investment value, representing 28 percent of the total DOE IDIQ ESPC investment value. Honeywell's 14 projects total \$113 million of investment value, representing 12 percent of the total DOE IDIQ ESPC investment value. Collectively, these three ESCOs represent 69 percent of DOE IDIQ ESPC investment value.

Trane (\$87 million; 9 percent), Ameresco, (\$73 million; 8 percent), and Sempra Energy Services Company (\$37 million; 4 percent) comprise the next tier of project implementation. The remaining eight ESCOs total \$97 million investment value, representing about 10 percent of the DOE IDIQ ESPC investment value.

The overall average DOE IDIQ ESPC project investment value is \$8.5 million. There are five ESCOs with average project investment values that are higher than the overall average DOE IDIQ ESPC project investment value:

- Trane - \$12.4 million
- NORESKO - \$12.1 million
- Ameresco - \$9.2 million
- Johnson Controls- \$8.4 million
- Honeywell - \$8.0 million

The average investment value for the remaining nine ESCOs totals \$4.1 million.

Johnson Controls projects will save 35.1 trillion Btu during the term of the contracts, representing 27 percent of the total cumulative energy savings. Honeywell projects will save 25.0 trillion Btu (19 percent), and NORESKO projects will save 22.0 trillion Btu (17 percent). These three ESCOs combined will save 63 percent of the total energy savings. Trane projects will save 11.6 trillion Btu (8.9 percent), Select Energy Services, Inc. projects will save 10.5 trillion Btu (8.0 percent), and Sempra Energy Services Company projects will save 9.8 trillion Btu (7.4 percent). DOE IDIQ ESPC projects for the remaining eight ESCOs will save 17.3 trillion Btu (13 percent).

Table 10. DOE IDIQ ESPC Project Investment and Energy Savings by ESCO (FY 2003 - FY 2008)

ESCO	Number of Projects	Total Project Investment	Reoccurring Annual Energy Savings (Mbtu)	Cumulative Energy Savings (Mbtu)
NORESKO, LLC	23	\$279,070,409	1,341,528	21,980,279
Johnson Controls Government Systems, LLC	32	\$269,675,129	1,991,928	35,111,588
Honeywell International, Inc.	14	\$112,521,953	1,227,628	24,933,832
Trane, a Division of American Standard Companies, Inc.	7	\$86,842,067	852,621	11,618,381
Ameresco, Inc.	8	\$73,389,039	512,181	8,002,097
Sempra Energy Services Company	5	\$37,093,226	516,075	9,768,151
Select Energy Services, Inc.	5	\$30,920,138	688,534	10,540,493
Constellation Energy Projects and Services Group, Inc.	4	\$21,918,534	147,050	2,248,040
Chevron Energy Solutions Company	2	\$15,209,701	175,608	3,802,203
Consolidated Edison Solutions, Inc.	6	\$14,502,297	77,249	1,297,265
EUA Cogenex Corporation	3	\$9,077,069	101,137	1,415,443
XENERGY, Inc.	1	\$2,154,657	19,003	209,033
Northwest Energy Services, Inc.	1	\$1,999,522	15,996	223,946
Energy Systems Group, LLC	1	\$909,666	3,730	55,950
Totals	112	\$955,283,407	7,670,268	131,206,703

Using the DOE IDIQ ESPC project metrics discussed above—number of projects, project investment, and total energy savings—Johnson Controls, NORESKO, and Honeywell have been the most active DOE IDIQ ESPC ESCOs. Trane, Ameresco, Sempra, and Select have also been active DOE IDIQ ESPC project implementers.

Procurement Action to Award new DOE IDIQ ESPC contracts

In 2007, DOE initiated a procurement action for IDIQ ESPCs. This process included a request for proposal and a site visit. ESCOs' proposals were due in December 2007. On December 18, 2008 DOE announced the award of 16 ESPC contracts, each with a \$5 billion ceiling for a total contract ceiling of \$80 billion. The 16 ESCOs were evaluated based on demonstrated capabilities to manage the development and implementation of multiple ESPC projects worldwide. Eight of the ESCOs were incumbent DOE IDIQ ESPC awardees, and eight ESCOs were new to DOE ESPC contracting.

The award of these new contracts is expected to provide valuable additional resources to the Federal ESPC market. Information on the ESCOs that were awarded these contracts in FY 2009 and a discussion on how the award affects FEMP's services looking forward can be found in the Projected Market for Federal Energy Management section of this report.

Other ESCO Activity

ESCOs supply project services to agencies under agency contract vehicles other than DOE's IDIQ ESPC. For example, the Army Corps of Engineers has its own IDIQ contract, and the USPS awards projects to ESCOs under their Shared Energy Savings Program. FEMP is aware of these other contract vehicles that provide additional options to some agencies for financing ESPCs. However, project investment data for these contracts are not formally reported to FEMP, and therefore this information is currently unavailable. Some ESCOs are also involved in EULs with agencies such as DOD, VA, and NASA. FEMP does not track information or data about ESCOs involved in EUL projects, and estimates of EUL activity were not able to be obtained for this report.

ESPC finance providers

Financiers that provide capital funding for ESPC projects work directly with the ESCOs and do not have a direct relationship with Federal Government agencies. The private financier provides project funding to ESCOs after award of an ESPC delivery order. During the construction period, the financier receives interest-only payments; upon project acceptance, in addition to the performance-period service payments to ESCOs, Government payments include debt service (principal and interest) to repay the financier for the up-front money used by the ESCO to develop and implement the project. A fiduciary administers the payments to the financier on the entire principal balance during the escrow period. Should the Government reduce payments based on a savings shortfall, the financier is generally in a superior position to the ESCO. The ESCO is contractually obligated to send money to keep up debt service and prevent default, as well as to take action to resolve project performance issues and restore full Government payments.

The lender's perception of risk is influenced by a number of factors, including the ESCO's credit rating, the ESCO's track record, technical risk of the project, and even payment history of the Federal agency. These large institutional firms generally prefer to invest in larger projects that have a quicker return on investment. To invest in smaller projects, financiers must be able to price the risk quickly, which is a formidable task.

Since 2005, DOE IDIQ ESPC ESCOs are required to solicit competitive financing offers. The selection of the financier is still the responsibility of the ESCO, but these requirements are intended to bring transparency to the process to ensure the ESPC represents the best value to the Government.

FY 2008 was a difficult year for the financing community, including a tight credit market, historic correction in housing prices, a tumbling stock market, and a 50 percent loss in equity market value (nearly \$30 trillion). Financiers became less willing to take speculative risk, and this general and widespread caution decreased financing and increased interest rates to mitigate risks, making ESPCs less attractive to financiers (Flynn 2009). There was a shift away from long-term investments, and FY 2008 saw several major financiers of ESPCs leave the market. Based on recent information reported by DOE IDIQ ESPC ESCOs to FEMP, GE Capital Solutions, Guggenheim Capital Markets, Government Capital Corporation, and National City Energy Capital, who had once been active players in the ESPC market, no longer seem to be buying these long-term investments. Table 11 lists current major financiers of ESPCs as reported by DOE ESCOs.

Table 11. Major Companies Financing ESCOs and ESPCs

<p>Bank of America Leasing & Capital</p> <p>Bank of America Leasing serves more than 50,000 clients worldwide. They provide leasing solutions to small business, middle market, and large corporations in the U.S. and internationally. They provide financing for all types of energy service projects, serving both for-profit and not-for-profit markets, working closely with both ESCOs and end-user clients.</p> <p>Contract structures include:</p> <ul style="list-style-type: none"> • Energy savings performance contracts with guaranteed savings • Central plant construction contracts with or without operations and maintenance (O&M) agreements • Energy Services, Utility Services and Power Purchase Agreements 	<p>Hannon Armstrong</p> <p>Hannon Armstrong, headquartered in Annapolis, Maryland, has been one of the most active investors in energy efficiency since the mid-90's, providing energy users, ESCOs and equipment suppliers critical financing for accelerating energy efficiency in markets where financing is a key enabler.</p> <p>Hannon Armstrong finances contractors who serve the Federal government for several major contract vehicles, including:</p> <ul style="list-style-type: none"> • Federal Service Contracts • Energy Savings Performance Contracts (ESPC) • Utility Energy Savings Contracts (UESC) • Federal Leasing <p>Hannon Armstrong has more than \$2 billion currently invested in Federal assets.</p>
<p>Bostonia Partners, LLC</p> <p>Bostonia is an investment bank and securities broker-deal headquartered in Boston, Massachusetts. Bostonia Partners, LLC has structured more than \$3.5 billion in capital markets financings in the real estate, contract financing, and energy markets. Bostonia is involved in raising capital for a range of municipal, commercial, and institutional energy projects. They have provided an extensive array of unique ESPC financings since 1998, including:</p> <ul style="list-style-type: none"> • Financing an ESPC for the Navy valued at more than \$100 million—one of the largest financings ever done in the ESPC sector and partly denominated in foreign currency. • The first securitization of an ESPC for an Army facility. • The first rated securitization of a pool of ESPCs for various Federal agencies. 	<p>United Financial Inc. (UFI)</p> <p>United Financial of Illinois, Inc. is a privately held financial services company established and incorporated in Naperville, Illinois in 1986 to provide competitive, innovative, and responsive secured equipment financing services to its vendor and end user customers. United Financial's Energy Management Market provides Federal, municipal, and commercial industrial customers with the ability to install energy efficient equipment through custom financing programs that match cash flows needed to service debt with energy savings.</p> <p>Structured financing programs include:</p> <ul style="list-style-type: none"> • Energy Savings Performance Contracts (ESPCs) • Utility Energy Service Contracts (UESCs) • Enhanced Use Leases (EULs) • Performance Based Contracts (PBCs) • GSA Schedules (Federal Governments)

*The companies profiled here were noted by ESCO representatives (at the Agency-ESCO Forum hosted by FEMP on March 11-13, 2009) as primary active financiers. Other current and past financiers of federal energy projects may include, but are not limited to:

- FMI Investment Bank
- GE Capital Solutions
- Government Capital Corporation
- Guggenheim Capital Markets
- MMA Renewable Ventures
- National City Energy Capital
- New Resource Bank
- Pataki-Cahill Group
- SunTrust Banks
- Transcend Equity Development

A current major financier to ESCOs reported that rates will continue to be higher in FY 2009 over FY 2007 levels, and it will be problematic for financiers to hold rates for extended periods. As in FY 2008, investors are looking for tighter structures with less flexibility in terms. Despite the suffering economy, the ESPC market is still more attractive than some other long-term investments. ESPC projects generally provide returns above traditional U.S. Government obligations due to the lower client risk profile, availability of a large and diverse project pipeline with wide geographic and agency distribution, rigorous technical energy engineering reviews prior to project acceptance, and measurement and verification guarantees to help ensure project performance and reduce the risk of default. These projects are therefore viewed by the finance community as a high-quality opportunity with a strong track record (Flynn 2009).

Utility-provided energy services

Local utility companies are leaders in the deployment of advanced renewable and energy-efficient technologies, and they are capable of designing and implementing projects using the latest technologies. Utilities spend billions of dollars each year deploying these technologies and additional millions of dollars researching and testing them.

Utility companies work with Federal agencies to implement UESC contracts. Unlike the DOE IDIQ ESPC financing tool, where a specific, limited number of ESCOs are awarded contracts, the list of the most active utilities implementing UESCs is not static. Depending on project timing, a utility may be a top provider for one or more fiscal years and then provide far fewer contracts in the following year(s). In any given year, there are many utilities implementing a small number of contracts within the Federal sector, making it impossible to rank one utility over another according to the number of contracts.

FEMP is currently limited to reporting such activity by the number of projects since utility project investment data is not available. It is therefore difficult and misleading to provide data on the “most active providers” of UESCs by fiscal year. Table 12 lists only the top 10 UESC providers to Federal agencies between FY 2003 and FY 2008 according to the number of UESCs executed, as reported to FEMP. The numbers of contracts for each provider are aggregated over the 6-year timeframe. This table should not be interpreted to limit UESC providers to these 10 companies, as a vast number of utilities provide these services.

Table 12. Major Providers of UESCs

Utility Provider	Number of Projects (2003-2008)
Bonneville Power Administration	150
Baltimore Gas & Electric Company (BGE)	83
Southern Company	52
Nolin Rural Electric Cooperative (Nolin RECC)	27
Progress Energy	24
San Diego Gas & Electric	16
Florida Power and Light	14
Tacoma Power	10
Consolidated Edison	9
Mississippi Power	8

According to the data, Bonneville Power Administration leads the way in implementing UESCs, with 150 contracts with Federal agencies over 6 years. Bonneville was the top provider by the number of contracts four out of the six years, including in FY 2008, and was among the top three providers each year. Baltimore Gas and Electric Company, with 83 Federal contracts in six years, was among the top three

providers prior to FY 2007, after which the number of UESCs dropped significantly. Southern Company, with 52 contracts, also provided many more UESCs per year prior to FY 2006.

FEMP brings UESC providers and Federal customers together via its Federal Utility Partnership Working Group. The group meets biannually to enhance partnerships between Federal agencies and their servicing utilities; identify, develop, and implement cost-effective energy efficiency, water conservation, and renewable projects at Federal sites; and expand the communication infrastructure between Federal agencies, sites, and utilities regarding all aspects of Federal energy management. For a listing of Federal and private participants, visit http://www.femp.energy.gov/financing/uescs_fupwgpart.html.

Power purchase agreements

As noted above in the Federal Agency Project Investment section of this report, several Federal agencies are in the process of developing projects utilizing an innovative business model under which a private entity finances the renewable energy project installation and provides O&M for the term of the contract. The project is privately owned, and the Federal site purchases the electricity through a long-term PPA. FEMP does not have a comprehensive list of vendors that have executed projects for Federal agencies using PPAs; the following case studies provide just a few recent examples. Although all the examples involve PV systems, PPA contractual arrangements may also be used for other types of renewable projects.

In April 2007, SunPower Corporation began work on a 15 MW PV project at Nellis Air Force Base that is currently the largest PV system in North America. Nellis purchases electricity from SunPower Corporation using a FAR 41 (Acquisition of Utility Services) utility contract with an indefinite term and a 12-month termination provision. SunPower Corporation was granted access to the land through a 20-year ground lease, in conjunction with an operating agreement with security and other site access provisions. The PV project supplies more than 25 percent of Nellis' electricity requirements and saves approximately \$1 million per year, even after accounting for standby charges. The RECs are being sold to Nevada Power for the state renewable portfolio standard solar set-aside requirement.

In November 2006, GSA awarded a 10-year contract for electricity from a 1 MW PV project to Deliddo & Associates dba DEERS, from Ripon, California. The PV system was installed on the roof of the Federal Building in Sacramento. GSA utilized modified FAR Part 41 clauses, as well as Part 12 (Acquisition of Commercial Items), for the contract. DEERS was granted a license for use of the roof for the PV system. A utility rebate and Federal incentives (30 percent investment tax credit and accelerated depreciation) offset approximately half the cost of the system. Electricity production is approximately 1,350 megawatt-hours per year (MWh/year), supplying an estimated one-third of the building's annual power use. DEERS retains rights to the RECs.

A 2 MW PV project was developed by 3-Phases Energy Services on Fort Carson land. WAPA is the contracting agent and purchases about 3,200 MWh/year of electricity on behalf of Fort Carson through a 17-year contract (this is the remaining time under the current Western-Fort Carson power allocation contract). The RECs are sold to Xcel Energy and used to meet the solar requirement of the state renewable energy standard. The ground-mounted, thin film PV system covers nearly 15 acres on an old Fort Carson landfill. SunTechnics Inc. designed and constructed the project.

Energy-efficient product manufacturers

There are 72 “covered” energy-efficient products that are recognized by FEMP and the ENERGY STAR program collectively. Covered products are those products for which Federal agencies are required to buy energy-efficient versions. Of these, 55 are ENERGY STAR-qualified products and 17 are FEMP-designated products.⁹ Both FEMP and ENERGY STAR have programs to develop purchasing specifications that help Federal buyers and consumers identify these types of energy-efficient products. While Federal agencies are required to buy ENERGY STAR-qualified products, there are some products covered by ENERGY STAR that do not have significant penetration in the Federal market. Examples include room air cleaners, home electronics, and decorative light strings. FEMP’s Buying Energy Efficient Products program efforts concentrate on providing information of targeted value to Federal buyers. This information is provided in the form of *Purchasing Specifications* documents. Currently, FEMP’s program provides *Purchasing Specifications* for 44 types of products commonly purchased by Federal agencies.¹⁰ These *Purchasing Specifications* cover both ENERGY STAR-qualified and FEMP-designated products. Each *Purchasing Specification* provides a summary with buyer tips, cost-effectiveness examples, and additional product information resources. ENERGY STAR provides guidance for additional products that FEMP does not support such as TVs, VCRs, and home audio equipment. Neither program represents or recommends any specific manufacturer.

The market for such products is a robust and mature; a large number of manufacturers exist for these products across the board. Some products such as roofing and window products are manufactured in decentralized markets by thousands of small companies. Table 13 provides a short list of manufacturers for products commonly purchased by Federal agencies for which FEMP develops *Purchasing Specifications*.¹¹ Because market information is not readily available for most of these products, this list is only an approximation of major providers. Due to the large number of manufacturers for some products, the list does not cover every type of product FEMP supports.

From a Federal perspective, it is far more important to focus on the ability of Federal agencies to identify and access compliant products that exist in the market rather than on the market players. Products are available to Federal buyers through GSA Advantage and the Defense Logistics Agency’s (DLA) eMail purchasing Web sites; there are more than 300,000 purchasing card holders making more than 26 million transactions each year.

⁹ Both FEMP and ENERGY STAR currently have products in the process of revision and/or addition, which may change the list of covered products.

¹⁰ FEMP’s 44 *Purchasing Specifications* include both FEMP-designated and ENERGY STAR-qualified products. FEMP has developed specifications for some ENERGY STAR-qualified products where ENERGY STAR did not develop specifications, and has developed separate specifications from ENERGY STAR where there is Federal widespread use of products not covered by the ENERGY STAR specifications.

¹¹ FEMP used data gathered for production of *Purchasing Specifications* to create this manufacturer’s list. The list is an approximation only, and does not represent a recommendation of any manufacturer or brand by DOE FEMP.

In FY 2008, FEMP presented results of a study on Federal compliance with the EPACT 2005 purchasing requirements. The research suggested that compliance with these requirements is low, due largely to the difficulty in identifying and purchasing compliant products on the DLA and GSA Web sites. Section 104 of EPACT 2005 requires GSA and DLA to supply and list only compliant products. However, the study found that, out of all product categories on these sites for which there are FEMP-designated or ENERGY STAR-qualified products available in the market, the majority list no options that are labeled as FEMP-designated or ENERGY STAR-qualified. Only a small number of product categories have more than half the available models labeled as compliant, and only one category lists compliant products almost exclusively. Many categories that do contain labeled products have many more non-compliant products. Additionally, the non-compliant products are often more prominently listed within the search results. In some cases, compliant products were not labeled as compliant, and non-compliant products were mislabeled as compliant.

Federal compliance would likely improve if energy-efficient products were identified properly and easier to locate in the systems. It is up to the vendor to properly label the products in the GSA and DLA Web sites, and it is difficult for Government entities to ensure vendor compliance. However, GSA and ENERGY STAR are currently working to educate vendors, increase compliance, and improve the systems to achieve more accurate designations. This may, in turn, lead to increased compliance by Federal agencies.

Table 13. Industry Leaders of Energy-Efficient Products

Product Type	Product	Manufacturer
Lighting	Compact Fluorescent Lamps	<ul style="list-style-type: none"> • Felt Electric • General Electric • Globe Electric
	Fluorescent Tube Lamps	<ul style="list-style-type: none"> • General Electric • Maxlite • Osram-Sylvania
	Fluorescent Ballasts	<ul style="list-style-type: none"> • General Electric • Maxlite • Osram-Sylvania
	Downlight Luminaires	<ul style="list-style-type: none"> • Cooper Lighting • Hubbell • Lightolier
	Industrial HID Luminaires	<ul style="list-style-type: none"> • Cooper Lighting • Lithonia • Widelite
Commercial & Industrial Equipment	Commercial Unitary Air Conditioners	<ul style="list-style-type: none"> • Carrier • Lennox • Rheem
	Air- & Water-Cooled Chillers	<ul style="list-style-type: none"> • Carrier • Trane • York
	Commercial Heat Pumps	<ul style="list-style-type: none"> • Coleman • Evcon • Frasier-Johnston
	Ground-Source Heat Pumps	<ul style="list-style-type: none"> • Carrier • Trane • Heat Controller
	Boilers	<ul style="list-style-type: none"> • Buderus • Burnham • Dunkirk • Weil-McLain
	Distribution Transformers	<ul style="list-style-type: none"> • ABB • General Electric • Schneider Electric
	Electric Motors	<ul style="list-style-type: none"> • Baldor Electric • Emerson • General Electric
Food Service Equipment	Refrigerators & Freezers	<ul style="list-style-type: none"> • Beverage-Air • Delfield • McCall
	Fryers	<ul style="list-style-type: none"> • Frymaster • Henny Penny • Pitco Frialator
	Hot Food Holding Cabinets	<ul style="list-style-type: none"> • InterMetro Industries • Traulsen & Co. • Witco Foodservice
	Pressureless Steamers	<ul style="list-style-type: none"> • AccuTemp • Intek • Market Forge
	Beverage Vending Machines	<ul style="list-style-type: none"> • Dixie-Narco • Royal • Sanden Vendo
	Ice Machines	<ul style="list-style-type: none"> • Hoshizaki • Scotsman • Manitowoc
	Pre-Rinse Spray Valves	<ul style="list-style-type: none"> • T&S Brass • Fisher • Krowne

Product Type	Product	Manufacturer	
Office Equipment	Computers	<ul style="list-style-type: none"> • Dell • Lenovo Group Limited • HCL Infosystems, Ltd 	
	Monitors	<ul style="list-style-type: none"> • LG Electronics • Samsung Electronics Co., Ltd. • Acer Incorporated 	
	Printers	<ul style="list-style-type: none"> • Hewlett Packard Company • Ricoh Corporation • Canon U.S.A., Inc. 	
	Fax Machines	<ul style="list-style-type: none"> • Panasonic • Ricoh Corporation 	
	Copiers	<ul style="list-style-type: none"> • Ricoh Corporation • Xerox Corporation • Canon U.S.A., Inc. 	
Appliances	Refrigerators	<ul style="list-style-type: none"> • General Electric • Whirlpool • Frigidaire 	
	Freezers	<ul style="list-style-type: none"> • Kenmore • Frigidaire • Hotpoint 	
	Dishwashers	<ul style="list-style-type: none"> • Bosch • General Electric • Whirlpool 	
	Clothes Washers	<ul style="list-style-type: none"> • Amana • Maytag • Speed Queen 	
	Room Air Conditioners	<ul style="list-style-type: none"> • Freidrich • General Electric • Sharp 	
	Residential Equipment	Central Air Conditioners	<ul style="list-style-type: none"> • York • Goodman • Carrier
		Air-Source Heat Pumps	<ul style="list-style-type: none"> • York • Lennox • Bryant
Ground-Source Heat Pumps		<ul style="list-style-type: none"> • Carrier • Trane • Heat Controller 	
Gas Furnaces		<ul style="list-style-type: none"> • Trane • Rudd • Lennox 	
Electric & Gas Water Heaters		<ul style="list-style-type: none"> • A.O. Smith • Bradford White • Rheem 	
Plumbing	Faucets	<ul style="list-style-type: none"> • American Standard • Kohler • Moen 	

Emerging technologies

For continued success in containing energy costs and addressing new and more demanding Federal energy reduction goals, underutilized new and emerging technologies will have to be deployed more aggressively in the Federal sector. New and emerging technologies are defined by FEMP's Emerging Technology Program as being applicable to existing buildings, developed beyond bench-test status, ready for beta-testing at a minimum, commercially available through a private-sector partner, or already in the commercial market but with minimal market penetration in the Federal building sector. The program is working to select promising technologies to target for quick deployment into Federal agencies with a high probability of significant savings. Technologies are selected based on potential savings, cost feasibility, and overall agency interest.

Federal market barriers to the increasing use of these technologies include limited experience with and lack of information about the technologies, as well as perceived increased risks of investing in new technologies. This results in higher costs for capital in alternative financing contracts and limited availability of capital investment funding. The Emerging Technology Program is currently working on ways to gain and disseminate information on new and emerging technologies in order to help manage the inherent risks and increase access to capital financing.

For example, agency requests to include emerging technologies would most likely be eligible for UESC financing, as long as the agency is willing to assume the performance risk and to repay the utility investment. In some cases (e.g., California), regulatory agencies have directed utilities to help accelerate market introduction of energy-saving, emerging technologies. So there may be a natural partnership with the Federal Government commitment to emerging technologies.

The Emerging Technology (ET) Matrix was completed in FY 2008 by the Alliance to Save Energy, with assistance from LBNL. The ET Matrix is an Excel spreadsheet tool developed to help agencies and ESCOs identify emerging technologies that can be incorporated into Federal ESPC and UESC projects. The ET Matrix provides references for additional information about each technology, points of contact, and resources. The matrix will help agencies save research time and provide them with better direction in making energy conservation measure decisions (Table 14).

In developing the matrix, FEMP looked at technologies across the DOE programs, including EERE and the DOE national laboratories, to see what technologies were promising for ESPCs and UESCs. FEMP included technologies that could be implemented in a relatively short time frame, and evaluated each technology based on market leverage for the Federal Government, the potential savings for the Federal and U.S. economy, cost effectiveness, and retrofit applicability. The matrix indicates those technologies more applicable to new construction and others more applicable to retrofits.

The complete matrix can be found at http://www1.eere.energy.gov/femp/docs/emerging_tech_matrix.xls.

Table 14. ET Matrix

The ET Matrix examines and identifies a technology and rates the total potential for savings, cost effectiveness, and its application towards retrofits.

Lighting							
Technology	Federal (Market) Leverage	Savings Potential		Cost Effectiveness	Retrofit Applicability	Special Benefits	Retrofit Applicability
		Federal	U.S. Economy				
Scotopic Lighting	▲	▲	▶	▲	▲		
Addressable Dimming Fluorescent Ballasts	▲	▲	▶	▶	▲		
Daylighting Systems and Integrated Daylighting Controls	▲	▲	▲	▶	▶	Occupant comfort and performance	1) Hybrid solar lighting 2) Daylight harvesting and controls
CFL Adapter for Recessed Downlights	▶	▶	▲	▲	▲		
LED Lighting for Niche Applications	▲	▼	▶	▶	▲	Low maintenance	
High Output T5 High Bay Lighting	▼	▶	▶	▲	▲		
HVAC							
Technology	Federal (Market) Leverage	Savings Potential		Cost Effectiveness	Retrofit Applicability	Special Benefits	Retrofit Applicability
		Federal	U.S. Economy				
Aerosol-Based Duct Sealing for Commercial Buildings	▶	▲	▲	▲	▲	Unique solution	
Advanced Rooftop Air Conditioning	▶	▲	▶	▲	▲		1) Automated fault detection and diagnosis 2) High-efficiency units
High-Efficiency Heat Pump Systems	▲	▶	▶	▶	▶		1) Geothermal and hybrid geothermal HP 2) Low-temperature HP
Demand-Controlled Ventilation with Advanced Controls	▶	▶	▶	▲	▶		
Air Conditioning for Climates with High or Low Sensible Heat Ratios	▶	▼	▶	▲	▶		1) Two-stage evaporative cooling, 2) Hybrid desiccant cooling
Thermal Destratifiers	▲	▶	▼	▶	▲	Occupant comfort	
Condensing Fuel-Fired Hydronic Boilers	▶	▶	▼	▲	▶		

Water Heating							
Technology	Federal (Market) Leverage	Savings Potential		Cost Effectiveness	Retrofit Applicability	Special Benefits	Retrofit Applicability
		Federal	U.S. Economy				
Heat Pump Water Heaters	▲	▼	▶	▲	▲		
Solar Water Heaters	▶	▶	▶	▶	▲		
Condensing Fuel-Fired Water Heaters	▶	▶	▲	▶	▲		
Building Envelope							
Technology	Federal (Market) Leverage	Savings Potential		Cost Effectiveness	Retrofit Applicability	Special Benefits	Retrofit Applicability
		Federal	U.S. Economy				
Highly Insulating Windows	▲	▼	▶	▶	▶	Occupant comfort	
Passive Solar Ventilation Preheating	▶	▼	▼	▲	▶		
Cool Roofs	▶	▶	▲	▲	▼		
Power Generation							
Technology	Federal (Market) Leverage	Savings Potential		Cost Effectiveness	Retrofit Applicability	Special Benefits	Retrofit Applicability
		Federal	U.S. Economy				
Combined Heat and Power	▲	▲	▲	▶	▶	Reliable electricity supply	1) Microturbines 2) Efficient gas-fired reciprocating engines 3) Stationary fuel cells
Biomass	▶	▶	▶	▶	▶		
Fuel Cells	▲	▶	▶	▼	▶	Reliable electricity supply	
Distributed Wind Power	▶	▶	▶	▶	▶		
Photovoltaic Systems	▶	▲	▶	▼	▶		
Sanitation							
Technology	Federal (Market) Leverage	Savings Potential		Cost Effectiveness	Retrofit Applicability	Special Benefits	Retrofit Applicability
		Federal	U.S. Economy				
Low-Flush (Pressure-Assisted) Toilets	▶	▲	▶	▲	▶	Water savings	
Special							
Technology	Federal (Market) Leverage	Savings Potential		Cost Effectiveness	Retrofit Applicability	Special Benefits	Retrofit Applicability
		Federal	U.S. Economy				
Advanced Metering	▶	▲	▲	▶	▲		1) Remote read 2) Interval meters 3) Submetering
Best-in-Class Equipment	▲	▲	▲	▶	▶		Several

▲ High Applicability ▶ Medium Applicability ▼ LowApplicability

Manufacturers of new and emerging technologies are not provided to ESCOs and agencies since DOE cannot promote or recommend a specific vendor. Unlike the mature energy-efficient products market for which FEMP develops *Product Specifications*, there are by definition comparatively few (sometimes only one) manufacturer(s) of emerging technologies. At this time, a list of the primary manufacturers of these new and emerging technologies is not readily available to FEMP.

Innovative Technologies Studies

New innovative technologies are helping the U.S. industrial manufacturing sector reduce carbon emissions and save energy and money. These same resources and technologies can also provide cost and energy-saving solutions for the nation's Federal complex. This is the idea behind FEMP's Industrial Facilities Initiative—a joint effort of the DOE Industrial Technologies Program (ITP) and FEMP. ITP and FEMP are looking at ways to make many of these technologies (including “Super Boilers”, wireless sensors, and CHP) available to Federal facilities. Results of some recent studies are summarized below.

Super Boilers

Today, nearly 80 percent of U.S. industrial boilers are more than 25 years old, and steam accounts for 31 percent of U.S. manufacturing energy consumption. The potential for the new, energy-efficient Super Boiler technology in facilities that use steam is considerable, and researchers are working to develop new steam generation technologies that could potentially save U.S. Federal facilities billions of dollars annually in operating costs with a much lower environmental impact.

A Super Boiler bundles new innovations in combustion, heat transfer and recovery, emissions reduction, vessel engineering, and controls into a highly efficient interconnected steam generation system. Statistics to be compiled on this emerging technology include the number and location of Federal sites that could take advantage of this technology, the total number and total capacity of Super Boilers that could be placed at Federal sites, and the energy savings that could be achieved nationally. In the initial field study demonstration, the Super Boiler maintained a fuel-to-steam efficiency of more than 94 percent, much higher than today's best 85 percent. By 2020, Super Boilers could result in annual U.S. manufacturing energy cost savings of \$1 billion and dramatically cut NO_x and GHG emissions. A 300-horse-power Super Boiler to be installed at ORNL under an ESPC provides a valuable opportunity to characterize the technology's performance and compare its energy use, pollutant emissions, maintenance requirements and life-cycle cost with those of conventional boilers. The Super Boiler is expected to have broad applicability in the Federal sector, and rigorous performance data from the ORNL project will provide Federal sites with the confidence they need to proceed with similar projects at their sites.

Wireless Technologies

Advanced wireless technologies could help Federal facilities meet national energy targets by ensuring that equipment operates at peak performance levels and functions efficiently. This is a practical and cost-effective method of applying emerging, energy-efficient technologies. Relying on core wireless systems created under ITP sponsorship, facilities operators can now determine in real time if systems are functioning properly and efficiently. For example, facility personnel can monitor compressor motors and solar panels to verify that they are performing and producing electricity according to specifications. With supplemental software, facility operators can project which component will fail and when.

Knowing the condition of equipment can drastically reduce the need for and cost of preventative maintenance; this enables facilities operators to meet increasingly tight budgets while satisfying essential operability requirements. By implementing wireless systems, Federal facilities can achieve reduced costs, increased productivity, and improved data management capabilities.

A variety of research and development wireless installations are also in the active stages of implementation at industrial facilities around the country. The application of wireless technologies can make the collection of important information needed for the reliable functioning of Government installations economically practical.

Combined Heat and Power Systems¹²

CHP and other distributed energy systems can meet increased energy needs, reduce transmission costs, cut emissions, and increase power, quality, reliability and overall energy security in Federal facilities by utilizing energy normally lost in the production of electricity. CHP can provide cooling, heating, humidity control, energy storage, and other process functions. CHP systems provide thermal energy for buildings or processes while at the same time generating a portion of electricity needs.

There has been a recent upsurge in interest in fuel-efficient distributed energy resources such as CHP because of their potential to address key power sector constraints. CHP is commercially available and offers extraordinary efficiency and environmental benefits. When CHP replaces central-station power generation, carbon emissions are typically reduced by 30 percent. CHP systems, on average, can be about twice as efficient as central-station power plants and on-site boilers. Currently, CHP generates about 7 percent of the total electrical power in the United States.

FEMP completed a market assessment of the national potential for CHP applications at Federal facilities and the associated costs and benefits, including energy and emission savings. This market assessment concluded that total potential CHP capacity across 28 Federal agencies was estimated to be between 1,500 and 1,600 MW. Electricity produced with this potential capacity would represent approximately 13 percent of all electric use in the Federal sector. As shown in Figure 24, the Air Force, VA, Army, Navy, and DOE have the most potential CHP capacity (ORNL 2002).

¹² CHP data contained in this section is from the 2002 Market Study *CHP Potential at Federal Sites*, produced for FEMP by Oak Ridge National Laboratory.

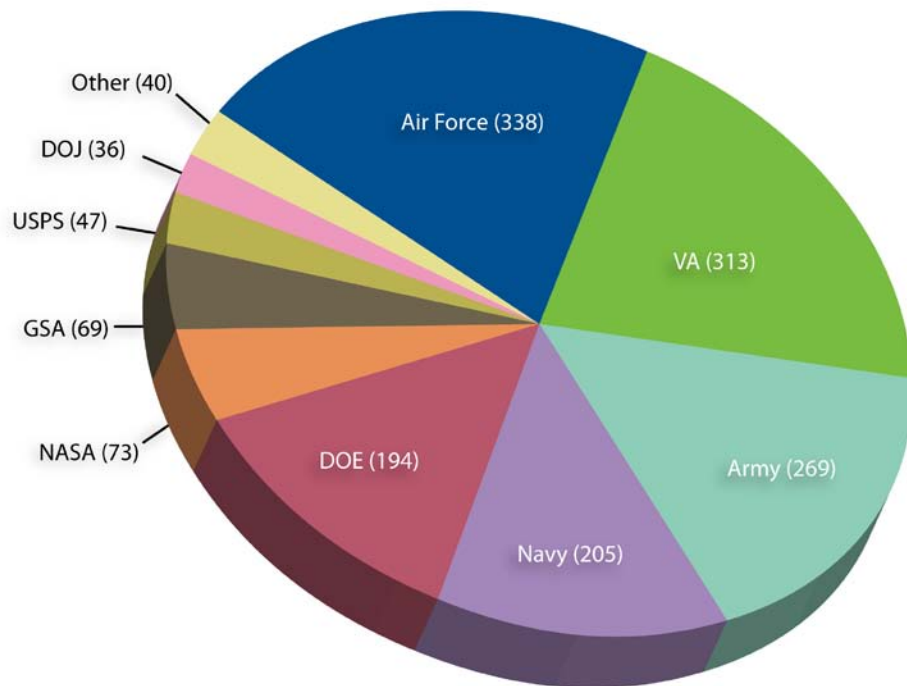


Figure 23. Potential CHP Capacity for Major Federal Agencies in MW

Table 15 shows the average costs, paybacks, and annual savings expected if all the CHP identified in the base case were implemented at Federal sites. The market assessment suggests that CHP could be successfully applied in 9 percent of large Federal facilities, annually conserve 50 trillion Btu of primary energy, reduce CO₂ emissions by 2.7 million metric tons, and cut utility bills by \$170 million. This level of CHP deployment would require a capital investment of \$1.5 to 2 billion, funded by special appropriations and/or financing from private partners (ORNL 2002).

Table 15. CHP Costs, Savings, and Paybacks

	Hospital	Industrial	Office	Prison	R&D	School	Service	Total
Capacity, MW	446	342	248	36	265	18	211	1567
Operating cost, M\$	23	17	6	2	6	0	5	59
Gas costs, M\$	55	42	15	4	16	1	12	145
Electricity savings, M\$	138	100	44	11	44	3	35	375
Net annual savings, M\$	60	41	23	5	22	2	18	171
Average payback, years	5.3	5.5	7.5	5.8	7.4	7.5	7.4	6.2
Source energy savings	19.3	14.8	5.0	1.5	5.4	0.4	4.3	50.7

Although CHP clearly has great potential in the Federal market, many facilities have not installed this technology for several key reasons. The initial cost of installation remains very high with little incentive due to historically low tariffs for electricity. CHP systems are also extremely complex with a need for custom engineering and component design for each site. Finally, obstacles related to local regulations and policies for interconnection, siting, and emissions still exist.

Government vehicles and alternative fuels

Acquiring AFVs, using alternative fuels, and expanding fuel access are steps toward the fundamental Federal goal of reducing petroleum consumption. There are currently about 137,000 AFVs in the combined Federal fleet, most (94 percent) of which are E85 flexible-fuel vehicles that can operate on either E85 or gasoline. However, the Government's rate in acquiring AFVs (or acquisition credits) is currently outpacing alternative fuel infrastructure development. In FY 2008, more than half of Federal agency AFVs received waivers exempting them from the requirement to use alternative fuel, primarily because the fleets do not have access to the fuel. On any given day, only 20 percent of the E85 flexible-fuel vehicles currently available in the Federal fleet operate on E85.

In June of 2008, FEMP hosted an Alternative Fuel Industry Forum where alternative fuel providers met with Federal fleet representatives. One important outcome of this conference was a publicly accessible list of Federal fleet E85 flexible-fuel vehicles that do not have access to E85, which resulted in the opening of 3 new alternative-fueling stations, as well as 32 additional fueling facilities at some stage of project development. All of these facilities are located near major Federal fleets; in some cases, the nearby Federal fleet provided the economic rationale for the facility's development.

GSA is a mandatory source for vehicles under Federal Procurement Management Regulations 101-26.501. GSA purchases about 60,000 new model year non-tactical vehicles for Federal executive agencies and DOD annually. In FY 2008, GSA offered more than 50 different AFV and hybrid electric vehicle options for leasing to Federal agencies.¹³ Agencies wishing to purchase vehicles outside of GSA may request a waiver from GSA's Federal Acquisition Center. All manufacturers are able to compete for GSA contracts, and GSA uses its buying power to negotiate low prices. Traditionally, American manufacturers have negotiated low prices for Federal purchase and many non-American manufacturers have chosen not to compete. Listings of light-duty AVF models (including hybrids) available for purchase through GSA are detailed in Table 16.

¹³ Note that as of FY 2009, the National Defense Authorization Act of 2008 included hybrid electric vehicles within the definition AFVs for EPACT 2005 vehicle acquisition purposes.

Table 16. Light Duty AFV Models Available for Procurement through GSA (FY 2008)

Model	Type	Fuel	EPA Fuel Economy Rating (City/Highway)	Greenhouse Gas Score
Chevrolet Avalanche	LD 4x2 Pickup	E85 FFV	15/20	6/4
Chevrolet Avalanche	LD 4x4 Pickup	E85 FFV	14/19	6/4
Chevrolet G1300	Passenger Van	E85 FFV	12/16	4/2
Chevrolet G1300	Cargo Van (AWD)	E85 FFV	12/16	4/2
Chevrolet G1300	Cargo Van	E85 FFV	14/18	4/2
Chevrolet Impala	Midsized car	E85 FFV	18/29	8/6
Chevrolet Impala	Midsized car, police pursuit	E85 FFV	18/28	8/6
Chevrolet Malibu	Compact car	Hybrid	24/32	8
Chevrolet Silverado K1500	LD 4x4 Pickup	E85 FFV	14/19	6/4
Chevrolet Silverado/C1500	LD 4x2 Pickup	E85 FFV	15/20	6/4
Chevrolet Suburban	LD SUV 4x2	E85 FFV	14/20	6/4
Chevrolet Suburban	LD SUV 4x4	E85 FFV	14/19	6/4
Chevrolet Tahoe	LD SUV 4x2	E85 FFV	14/20	6/4
Chevrolet Tahoe	LD SUV 4x2, police pursuit	E85 FFV	15/20	6/4
Chevrolet Tahoe	LD SUV 4x4	E85 FFV	14/19	6/4
Chevrolet Uplander	Minivan	E85 FFV	16/23	7/5
Chevrolet Uplander	Minivan	E85 FFV	16/23	7/5
Chevrolet Uplander	Cargo Van	E85 FFV	16/23	7/5
Dodge Avenger	Compact car	E85 FFV	19/27	8/6
Dodge Dakota (Crew Cab)	LD 4x2 Pickup	E85 FFV	16/22	4/3
Dodge Dakota (Crew Cab)	LD 4x4 Pickup	E85 FFV	15/19	4/3
Dodge Dakota (Extended Cab)	LD 4x2 Pickup	E85 FFV	14/19	4/3
Dodge Dakota (Extended Cab)	LD 4x4 Pickup	E85 FFV	14/19	4/3
Dodge Durango	LD SUV 4x2	E85 FFV	14/19	4/3
Dodge Durango	LD SUV 4x4	E85 FFV	13/17	4/3
Dodge Grand Caravan	Minivan	E85 FFV	17/24	6/5
Dodge Grand Caravan	Cargo Van	E85 FFV	17/24	6/5
Dodge Ram 1500	LD 4x2 Pickup	E85 FFV	13/18	4/3
Dodge Ram 1500	LD 4x4 Pickup	E85 FFV	13/17	4/3
Ford Crown Victoria	Large car, police pursuit	E85 FFV	15/23	6/5
Ford E150	Passenger Van	E85 FFV	N/A	N/A
Ford E150	Cargo Van	E85 FFV	N/A	N/A
Ford Escape	LD SUV 4x2	Hybrid	34/30	8
Ford Escape	LD SUV 4x4	Hybrid	29/27	9
Ford F150	LD 4x2 Pickup	E85 FFV	13/18	5/3
Ford F150	LD 4x4 Pickup	E85 FFV	13/17	4/3
Jeep Grand Cherokee	LD SUV 4x2	E85 FFV	14/20	4/3
Jeep Grand Cherokee	LD SUV 4x4	E85 FFV	12/17	4/3
Saturn VUE	LD SUV 4x2	Hybrid	25/32	8

Projected Market for Federal Energy Management

This section discusses how recent and upcoming changes to Federal policy and private-sector partner markets will increase the demand for FEMP products and services over the next several years. FEMP is developing specific strategies to meet the growing needs of its customers and to facilitate their access to high quality products and services that will help them achieve their goals.

Demand for FEMP services

The demand for FEMP services has increased steadily over the past several years as a result of the renewed focus on Federal energy management and its corresponding challenges. This demand will continue to expand based on the following interconnected factors:

- Approaching and anticipated energy management performance milestones
- Increasing investment levels across the Federal Government
- Heightened focus at Federal agencies on all aspects of energy management

Approaching and anticipated requirements

Government-wide project identification and tracking

Starting in 2009, agencies must begin to meet a number of requirements set forth in EISA Section 432, including: completion of comprehensive energy and water evaluations of covered facilities, follow-up on any implemented energy and water efficiency measures, and reporting of compliance measures using a Web-based tracking system on an annual basis. Assuming that 25 percent of Federal buildings account for 75 percent of Federal facility energy use, there could be approximately 30,000 Federal buildings that require energy audits and retro-commissioning each year, identifying hundreds of thousands of potential individual ECMs. This requirement directly impacts the need for an increased level of auditing and commissioning services, as well as integrated design and delivery and ESPC contract support to get projects implemented. Several reporting agencies are ramping up internal resources to meet these requirements, hiring additional energy managers to oversee the buildings; however, many agencies will not have the ability to take on the increased workload in-house. Federal staff will require increased guidance, training, and other support from FEMP to access the resources necessary to meet these requirements.

Fossil fuel reduction and sustainability

Section 433 of EISA directs DOE to further revise Federal building energy efficiency performance standards for new buildings to phase out the use of fossil fuels by 2030. EO 13423 requires Federal agencies to ensure that new construction and major renovations comply with the *Guiding Principles for Federal Leadership in High Performance and Sustainable Buildings*. Additionally, 15 percent of an agency's existing Federal capital asset building inventory as of the end of FY 2015 must incorporate the sustainable practices in the *Guiding Principles*. Here again, agencies are turning to FEMP for guidance to meet these goals, as well as for project facilitation and implementation support for new sustainable construction and renovation projects.

Greenhouse gas emissions accounting

In the effort to mitigate climate change, numerous GHG policies and regulations are being implemented across the U.S., including the introduction of emissions trading programs, voluntary programs, carbon or energy taxes, and regulations and standards on energy efficiency and emissions. It seems imminent that the Federal Government will eventually be required by law or by Executive Order to develop GHG inventories of their facilities (LMI 2009).

As discussed earlier, LMI Research Institute has released the *Recommended Public Sector GHG Accounting and Reporting Protocol*, which establishes a standard for GHG accounting and supports consistent reporting across government entities. FEMP already estimates GHG emissions based on agency-reported energy consumption, and it is likely that this practice will play a major role in assisting agencies in the development of GHG inventories as part of this annual reporting process.

Increasing energy efficiency investment

While agencies made significant progress toward meeting Federal energy management goals in FY 2008, performance data indicate that the rate of progress for the Federal Government as a whole is decreasing and attainment of long-term goals may be in jeopardy. While the level of Federal investment in energy efficiency and renewable energy projects increased from all funding sources in FY 2008 by 46 percent from the previous year, underinvestment from past years may prevent the Federal Government from reaching its goals—especially if performance targets are revised upwards. FEMP estimates that the Federal Government must invest at least \$16 billion from 2009 through 2014, regardless of funding source, to meet the energy efficiency, renewable energy, water efficiency, and petroleum reduction goals. Therefore, to be successful in meeting Federal goals in the coming years, agencies must now significantly increase their investments in energy efficiency and renewable energy projects using every available resource, including appropriations through normal budget processes, sound utilization of ARRA funds, and private sector financing approaches. This increase in investment will in turn lead to increased demand for the kinds of services that FEMP provides whether in the form of assistance in accessing and leveraging various alternate funding mechanisms or increased demand for technical assistance. .

FEMP and OMB have encouraged agencies to consider leveraging appropriated funds with third-party financing, such as ESPCs or UESCs, to increase a project's scope and economic impact. However, some agencies plan to use ARRA funding only for projects that cannot be financed, such as for new building construction. There is some concern that agencies will use ARRA monies for projects that can be funded quickly with short payback periods, potentially limiting the ability for ESCOs to bundle ECMs to achieve larger, more comprehensive financed projects later. Based on the level of investment required to meet Federal goals over the next several years, ARRA funds will not be sufficient to cover every potential ECM throughout the Federal complex.

It is expected that, given the level of ARRA funds provided for direct-funded projects, technical and procurement support required by agencies will significantly increase. It is also important to note that three of the Federal Government's biggest energy users, USPS, DOE, and DOJ did not receive significant facility energy efficiency funding under ARRA. These agencies will be more dependent on FEMP-

supported financing mechanisms, such as UESCs and DOE's IDIQ ESPC contract, to help them meet energy management goals over the next few years.

Supporting ESPC investments through the DOE IDIQ contract

Perhaps the best tool available to FEMP in meeting interagency needs (as well as an excellent option for agencies as they consider ways to fund energy investments) is the newly awarded DOE IDIQ ESPC to 16 ESCOs (see Appendix for company profiles). Each new contract provides for a maximum value of \$5 billion for task orders issued over the life of the contract – resulting in a potential of up to \$80 billion in energy efficiency, renewable energy, and water conservation projects at Federally-owned buildings and facilities. In addition to the significantly higher contract ceilings, the following changes from the previous IDIQ contracts are included:

- Greater focus on the use of renewable energy technologies and water conservation projects
- Elimination of geographic and technology-specific restrictions, allowing agencies to use these contracts in Federal buildings worldwide
- Greater focus on M&V of savings, as well as greater accountability and documentation requirements of savings
- Enhanced competition in contractor selection

These changes from the legacy DOE IDIQ ESPC, as well as an increasing number of DOE IDIQ ESPC projects in their performance period combined with the increased focus on performance period management, will significantly increase the demand for FEMP resources. For the new DOE IDIQ contract to reach its full potential, FEMP will have to increase the support it provides in terms of training, project facilitation, and oversight. To this end, FEMP plans to initiate a full “life of contract” support mechanism. New Performance Period Facilitators will provide support during projects. In addition, there will be an increased demand for technical support services from the national laboratories, for M&V support, and services in general. These factors will all contribute to increased requirements for FEMP that will include the need for more program management, training, intra-agency communication, and outreach and communications. As DOE's IDIQ ESPC program develops over the years, there will be a concurrent increase in overall scope with significant implications for FEMP staff and resources.

Heightened emphasis on energy management by agencies

Increasing the energy efficiency of the Federal Government is a major focus of the new Administration and the ARRA and Federal agencies are responding by placing greater organizational emphasis on internal energy management. A number of agencies are either creating or expanding dedicated internal energy management structures while raising the profile and stature of their Senior Agency Official. Additionally agencies are turning to FEMP for assistance in the design, development and execution of projects that they are undertaking using ARRA funds.

Several agencies have already demonstrated their commitment in FY 2008 by developing comprehensive strategies to meet their energy reduction goals. The USPS appointed its first Corporate Vice President of Sustainability that would manage all of its energy and environmental programs. The Secretary of the Air Force signed the Air Force Energy Program Policy that is a blueprint for Air Force officials as they continue their goal to keep energy initiatives in the forefront. The Air Force's strategic plan will enhance

current and future infrastructure, increase use of renewable energy and manage costs. GSA established an Office of High-Performance Green Buildings that would work closely with DOE to ensure all Federal buildings are meeting sustainable design and energy-reduction targets required by EISA. This office was created to provide high-performance green building information and disseminate practices, technologies and research results through outreach, education, and technical assistance government-wide.

In the future, all agencies will likely be expected to develop strategic plans for the management and implementation of their sustainable practices, including: energy efficiency; renewable energy; transportation management; water conservation; design and construction; operation and maintenance; and greenhouse gas emissions reduction. These efforts will lead to a corresponding increase in FEMP technical assistance and decision support services. FEMP will have a key role in providing guidance to the agencies in developing meaningful, executable plans.

FEMP services and strategies looking forward

FEMP response to changing market

As noted above, Government-wide project identification, implementation, and tracking required by Section 432, along with the recent passage of the ARRA providing funds to Federal agencies for energy management projects, will result in increasing requests for FEMP services in FY 2009 and over the next several years. Specifically, FEMP anticipates a significant increase in requests for assistance in the areas of alternative finance of major projects, building auditing and commissioning services, the deployment of renewable energy technologies, integrated “whole systems” design services, and planning. In fact, the demand for FEMP services will likely exceed the program’s capacity to deliver. The corresponding challenge for FEMP will be to prioritize services, staff, and resources to make the greatest contribution to overall Federal success.

FEMP’s ability to meet these demands is a function of both structure and resources, and FEMP has already taken steps to prepare for the increasing demand. During FY 2008, FEMP revisited and reworded its mission statement – a small, but critical step for any program reorganization. Building on the revised mission statement, the program restructured around three product delivery lines to better meet customer needs. The program also established customer service representatives for each Federal agency.

In addition to changing its operational structure, the program identified new positions required to support increased program activity. Specifically, the program will hire five additional staff members to support the fleet initiative, utility finance, technology assistance, product specification, and ESPC finance areas.

Finally, the program has developed the following approach for using its \$23 million in ARRA funds:

- Investment in FEMP’s data management system
- Enhancement and acceleration of FEMP’s services to agencies through project financing, technical guidance and assistance, and planning and reporting
- Development of GHG planning processes for Federal accounting tools

FEMP's Web-based reporting system is currently being brought up to date and redesigned to meet changing requirements that will become effective in FY 2009. In particular, the new system will facilitate agency reporting of the new, more challenging requirements set by forth by EISA, as well as FEMP's consolidation and evaluation of the data to allow for enhanced reporting. The new level of reporting and tracking of agency projects should result in a clearer picture of the level of Federal cost-effective investment in energy efficiency and renewable energy over the next several years, as well as a better estimate of potential savings. As discussed in earlier sections of this report, agencies clearly will need to consider an increased level of private financing approaches to stay on track in meeting their goals.

FEMP does not have the necessary resources to facilitate audits for these facilities and is therefore encouraging and assisting agencies in the use of DOE's national laboratories through work-for-others (WFO) interagency agreements. DOE's WFO program furnishes reimbursable support to Federal agencies as part of the services rendered to and for U.S. Government activities under various laws and regulations. WFO agreements allow DOE to provide research and technical assistance to Federal agencies, fully funded by the non-DOE agency. FEMP assists agency customers in setting up agreements as needed. FEMP has developed a Resource Guide on working with DOE's national laboratories. The guide includes instructions for agencies to initiate a request for assistance to FEMP, as well as capabilities of the national laboratories supporting FEMP missions. This guide can be accessed at http://www.femp.energy.gov/pdfs/working_with_doelabs.pdf.

FEMP will also use its ARRA funding to assist agencies in expanding and strengthening collaboration with DOE's national laboratories by facilitating access to lab assistance where labs have demonstrated a unique expertise. Agencies cannot use ARRA funding to fund WFO projects with laboratories at this time. However, FEMP can use its own limited ARRA funding to assist agencies in jump-starting projects by providing funding to the labs that allows them to respond quickly to agency requests. FEMP's resources likely will not be sufficient to cover the full scope of agency demand. The intention is to provide immediate, time-sensitive assistance, after which agencies would transition to WFO agreements to pay for further support using agency appropriations, if necessary.

Through the ISWG, FEMP will be working closely with EPA and other agencies in the following ways to consolidate agency GHG reporting from energy use and stay ahead of pending GHG legislation:

- Providing Federal agencies with information that can be used to build an effective strategy to manage and reduce GHG emissions
- Helping Federal agencies prepare GHG inventories through the use of standardized approaches and principles

FEMP continues to estimate emissions based on agency-reported energy consumption. FEMP's approach for estimating emissions of carbon dioxide, methane, and nitrous oxide from Federal facility energy use is detailed in Appendix B of the *FY 2007 Annual Report to Congress on Federal Government Energy Management*.

Need for a growing FEMP response

As a result of its planning efforts and increased funding, FEMP is in an excellent position to support the growing demand of its customers' energy management activities in the years to come. However, in order for the Federal Government to successfully meet the expanding challenges outlined above, FEMP will need to make maximum use of available resources to continue to increase its delivery of services in all program areas.

In 2008, FEMP's budget increased slightly from the prior year, from \$19.48 million to \$19.82 million, reversing a 12.5 percent decline in funding from 2004 to 2006. Even with this increase in 2008, a greater proportion of FEMP funds were allocated towards DOE internal energy management efforts, diluting FEMP's ability to support its Federal customers, particularly in the technical assistance area. FEMP budgets are expected to increase by 50 percent in out-years, but it is not certain if these increases, even combined with FEMP's process and structure improvements, will be sufficient to meet the increasing demand of services by agencies.

As noted earlier, FEMP's services have had a tremendous impact on the Federal Government's success in meeting its energy management goals to date. The estimated additional impact, had FEMP been allotted more resources over the years, remains unknown; however, it is reasonable to conclude that past decreases in allocated resources of FEMP services is linked to the slowed Government momentum in implementing energy efficiency projects.

In conclusion, without a properly funded FEMP program, the growing Federal demand for these services is likely to remain unmet. Federal agencies will either fail to meet their goals, or be required to internalize those functions that should be provided by FEMP, creating redundancy in these functions across the Federal Government at a loss to taxpayers. Furthermore, this would eliminate or reduce FEMP's ability to facilitate deployment of DOE's new and emerging EERE technologies to help Federal agencies meet their goals.

Appendix

Energy service companies under the new DOE IDIQ

Table A. ESCOs Awarded IDIQ ESPCs in December 2008

ESCO	Parent Company	Type	Location	Market Cap (Billions)	Revenue (Billions)	Estimated Revenue Attributed to Energy Products and Services (Billions)	Year of Reporting
Automation and Control Solutions	Honeywell International	Integrated Industrial	Golden Valley, MN	\$23.4	\$34.6	\$9.0	2007
Lockheed Martin Services, Inc.	Lockheed Martin	Integrated Industrial	Cherry Hill, NJ	\$32	\$42.7	Unknown	2008
Johnson Controls Government Systems, LLC	Johnson Controls	Integrated Industrial	Milwaukee, WI	\$8.1	\$38	\$14.1	2008
Siemens Government Systems, LLC	Siemens AG	Integrated Industrial	Reston, VA	\$48.4	\$116	\$6.0	2008
TAC Energy Solutions	Schneider Electric	Integrated Industrial	Seattle, WA	\$16	\$23.7	\$3.4	2007
Trane U.S. Inc	Ingersoll Rand	Integrated Industrial	McEwen, TN	\$5.3 (IR)	\$8.8 (IR)	\$7.4 (Trane)	2007
Pepco Energy Services	Pepco Holdings	Oil/Gas/Utilities	Arlington, VA	\$3.8	\$9.4	\$2.3	2007
Chevron Energy Solutions	Chevron Corporation	Oil/Gas/Utilities	Eagan, MN	\$146	\$204	Unknown	2007
Consolidated Edison Solutions, Inc.	Consolidated Edison	Oil/Gas/Utilities	White Plains, NY	\$11.1	\$13.6	\$1.4	2007
Constellation Energy Projects & Services Group, Inc.	Constellation Energy Group	Oil/Gas/Utilities	Baltimore, MD	\$5.40	\$21.2	\$.848 (renewables)	2007
FPL Energy Service, Inc.	FPL Company	Oil/Gas/Utilities	North Palm Beach, FL	\$19.8	\$15.2	Unknown	2007
Ameresco Solutions	Ameresco	Private	Framingham, MA	N/A*	N/A*	N/A*	N/A*
Clark Realty Builders	Clark Energy Group, LLC	Private	Arlington, VA	N/A*	N/A*	N/A*	N/A*
Noresco, LLC	Equitable Resources	Private	Westborough, MA	N/A*	N/A*	N/A*	N/A*
The Benham Companies	Science Applications International Corporation (SAIC)	Private	Oklahoma City, OK	N/A*	N/A*	N/A*	N/A*
McKinstry Essention, Inc.	McKinstry Co.	Private	Seattle, WA	N/A*	N/A*	N/A*	N/A*

*Data not available for privately held companies

Ameresco, Inc.

Ameresco is an independent energy solutions company delivering long-term customer value through innovative systems, strategies, and technologies. Based in Framingham, Massachusetts, Ameresco specializes in demand-side management, energy savings performance contracts, cogeneration facilities, renewable energy sources, energy procurement, risk management, power plant development, financing, construction and building operations. With a collective 30 years of experience in energy services, Ameresco has constructed over \$1 billion in energy projects which include innovative design, development, implementation, and management – increasing energy reliability and enhancing the environment. Ameresco is an incumbent on DOE’s IDIQ ESPC, and is an awardee for old and new DOD contracts and GSA schedules.

The Benham Companies

The Benham Companies, LLC, out of Oklahoma City, Oklahoma operates as an engineering and life-cycle technology implementation company. It offers architectural services, including architectural design, building systems engineering, interior design, landscape architecture, lighting design, planning, programming, and sustainable design services. In addition, it offers design/build services, including specialized expertise in energy management, alternative fuels, process engineering, industrial manufacturing, facilities, software development and integration, and advanced visualization and communication systems. The Benham Companies, LLC operates as a subsidiary of Science Applications International Corporation (SAIC), Inc. Benham has 30 years experience as a commercial ESCO, but is a new contractor on DOE’s IDIQ ESPC contract.

Chevron Energy Solutions

As a subsidiary of the Chevron Corporation, Chevron Energy Solutions’ mission is to help clients use less energy, pay less for energy, and ensure reliable, high-quality power for critical operations. Chevron Energy Solutions is a full-service, single-source contractor providing and installing highly efficient equipment that guarantees energy and operational savings each year – typically between 15-30 percent – which enables customers to finance improvements with little or no cost up front. Chevron Energy Solutions delivers energy efficiency, conservation, and renewable technology projects that benefit the Federal Government, the public, and the environment. Chevron Energy Solutions is an incumbent on DOE’s IDIQ ESPC contract.

Clark Realty Builders, L.L.C. dba Clark Energy Group

Clark Realty Builders, based in Arlington, Virginia, is a construction and real estate development company. They specialize in the development and implementation of ESPC projects using services that include comprehensive renewable energy solutions utilizing solar PV, thermal, wind, biomass, and geothermal energy. Clark Realty Builders also works to improve the energy efficiency of existing buildings, with expertise in labs, data centers, hospitals, industrial, and complex campuses. Clark Energy has over \$30 billion of collective energy conservation management audits, financing, services, engineering, and construction, including \$500 million in joint ventures with the Government. Clark Energy is a new contractor on DOE’s IDIQ ESPC contract.

Consolidated Edison Solutions

Consolidated Edison Solutions is a leading energy services company that provides competitive power supply, renewable energy, sustainability services, and cost-effective energy solutions for commercial, industrial, residential, and Government customers. The company is based in White Plains, New York with service ranging from Vermont, Florida, and across to Kansas, and has a 180-year company history. Consolidated Edison Solutions is a team comprised of dedicated energy professionals delivering a broad range of commodity, consulting, demand-side management, and performance contracting services. Consolidated Edison Solutions offers programs and services designed to help customers achieve their individual energy objectives in an efficient, cost-effective and sustainable manner. Consolidated Edison Solutions is an incumbent on DOE's IDIQ ESPC contract.

Constellation Energy Projects and Services Group, Inc.

Constellation Energy Projects & Services Group is a full-service energy company, providing customized energy solutions that can significantly reduce energy consumption and costs to Government. With more than a century in the energy business, Constellation is a leading supplier of energy products and services and is a major generator of electricity in the United States. Offering an extensive array of products and services, Constellation provides clients with increased energy efficiency, improved reliability, more efficient use of capital, and lower operating costs. Specializing in large-scale energy projects with a focus on solar, biomass, and geothermal projects and on- or off-site power generation systems, the company also designs and implements full energy system retrofits that save energy and reduce harmful emissions. Constellation Energy is an incumbent on DOE's IDIQ ESPC contract.

FPL Energy Services, Inc.

FPL Energy Services, Inc. is a subsidiary of FPL Group, Inc. and an affiliate of Florida Power & Light Company. Over the last 20 years, FPL Energy Services has provided energy-related products and solutions of superior quality and value to Government agencies by becoming a leading provider of natural gas, wind, solar, hydroelectric, and nuclear power across the nation. FPL Energy Services, Inc. provides innovative energy efficiency, renewable energy, and water conservation solutions to Government, education, healthcare, commercial, and industrial customers. FPL Energy Services helps clients save energy and money by increasing overall productivity, identifying energy saving opportunities through a guaranteed savings stream. FPL Energy Services is a new contractor on DOE's IDIQ ESPC contract.

Honeywell (automation and control solutions)

Honeywell's Automation and Control Solutions, located in Golden Valley, Minnesota, specializes in energy efficiency products and services that provide sensing and control measures to monitor building energy usage. Honeywell has more than 100 years in the energy business and more than 30 years of experience providing strategic and effective energy solutions for the Federal Government. Honeywell's Automation and Control Solutions have successfully implemented measures at Federal sites, including more than 150 ESPC projects that include a wide variety of technologies. These ESPC projects are expected to deliver \$1.6 billion in guaranteed savings. Honeywell is a member of the Federal ESPC coalition and an incumbent on DOE's IDIQ ESPC contract.

Johnson Controls Government Systems, LLC

Johnson Controls Government Systems, LLC, a division of Johnson Controls, is a global company with 120 local offices and a national Federal team. Johnson Controls Government Systems focuses on building a more sustainable world using integrated HVAC systems, building management services, lighting security, fire safety, technical building services, and commercial and industrial refrigeration. Johnson Controls engineers total building upgrades, mixing ingenuity with innovative technologies that provide measurable energy improvements and GHG emissions reductions. The company implemented one of the first ESPC projects, and currently has \$2 billion in performance guarantees. Johnson Controls Government Systems is an incumbent on DOE's IDIQ ESPC contract.

Lockheed Martin Services, Inc.

Lockheed Martin Services, operating out of Cherry Hill, New Jersey, is a \$43 billion dollar company with more than 100 years of contracting experience. They have been involved with energy efficiency since 1974, providing a full range of energy solutions with expertise in utility energy services contracts, advanced metering, system savings, and measurement and verification. Lockheed Martin Services is one of the nation's largest implementers of energy efficiency programs, providing advanced solutions to Government and regulated industry including utilities, businesses, as well as Federal, state and regional energy organizations. From energy efficiency and facility to large-scale process and plant development, Lockheed Martin Services provides technical expertise, experience in reducing cost, and efficient operations. Lockheed Martin Services is a new contractor on DOE's IDIQ ESPC contract.

McKinstry/Essention, Inc.

McKinstry/Essention, Inc. is a Seattle-based facility management company helping customers better-manage their buildings assets through detailed usage reporting. The company's products and services are designed to improve efficiency and cut agency's operational costs through a combination of technologies and customer service desk support. McKinstry/Essention facility management expertise derives from over 45 years supporting the operation of facilities with a variety of sustainable solutions based on customer's needs, including energy and operating cost reductions over the life of the building. McKinstry provides a full range of design/build, operate/maintain, and ESPC services. McKinstry/Essention, Inc. is a new contractor on DOE's IDIQ ESPC contract.

NORESCO, LLC

NORESCO, based in Westborough, Massachusetts, designs, builds, finances, owns, manages, and operates energy facilities. Since 1984, NORESCO has focused on delivering energy solutions to Federal, state and municipal institutions including electric peaking and base load generating plants, CHP plants, steam plants, chilled water plants, campus energy facilities, as well as renewable energy facilities, which include PV and biomass. For more than two decades, NORESCO has partnered with Government customers to deliver energy savings through comprehensive, customized, and cost-effective energy efficiency and infrastructure services. NORESCO completed one of the first Federal ESPC projects and recently implemented the largest Federal ESPC project to date--a 39 MW cogeneration project. NORESCO, LLC is an incumbent on DOE's IDIQ ESPC contract.

Pepco Energy Services

Pepco Energy Services of Arlington, Virginia is a leading provider of commercial, institutional, Government and industrial electricity, natural gas, and energy efficiency services. These services include energy assessments, Internet-based energy information systems, heating, ventilation and cooling systems, lighting, project financing, gas and electricity, and energy operations and maintenance services. Pepco Energy Services has the industry-leading energy experience to provide the Federal Government with services and solutions that improve efficiency, increase reliability, and enhance the performance of buildings and critical systems. Since being founded in 1995, Pepco Energy Services has served over 30 Federal agencies. Notable projects include a Military District of Washington ESPC project, a large PV rooftop project, and large landfill gas project. Pepco Energy Services is a new contractor on DOE's IDIQ ESPC contract.

Siemens Government Services, Inc.

Formed in 2001 as a subsidiary of Siemens AG, Siemens Government Services (SGS) provides resources, advanced technologies, and a client focus to manage Government infrastructure, provide security, and improve energy efficiency for the Federal Government. Focusing on tasks associated with energy audits, full program design and financing costs SGS provides essential expertise for meeting Federal energy goals and optimizing energy management. With over 5,000 energy savings projects completed to date totaling a combined \$ 1.8 billion in energy savings, Siemens's 150 years of experience has made them a national leader in energy efficiency. Siemens Government Services, Inc. is a new contractor on DOE's IDIQ ESPC contract.

TAC Energy Solutions

TAC Energy Solutions is a subsidiary of Schneider Electric, a global electronic products company with 100,000 employees. Based in Seattle, Washington, TAC is a national ESCO with 18 years of contracting experience. TAC combines proven energy saving practices with the newest industry innovations to upgrade aging equipment, lower energy costs, improve building efficiency and reduce maintenance expenses. TAC is a world leader in building automation solutions, using open integrated systems for building IT. TAC has implemented more than 300 projects that include work with renewable energy, indoor environmental quality improvements, and sustainable design. TAC Energy Solutions is a new contractor on DOE's IDIQ ESPC contract.

Trane U.S.

Trane, recently acquired by Ingersoll Rand in June of 2008, is a world leader in air conditioning systems, services and solutions, applying expertise in environmental technology and energy conservation to make a difference in energy efficiency. Trane offers reliable, state-of-the-art, energy-efficient systems that deliver comfort for buildings. Trane also has experience with utility energy services contracts. Trane is an incumbent on DOE's IDIQ ESPC contract.

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Federal Energy Management Program (FEMP) Web Sites

U.S. Department of Energy Federal Energy Management Program (FEMP)

www.eere.energy.gov/femp/

Transformational Energy Action Management (TEAM) Initiative

www.eere.energy.gov/team/

Laboratories for the 21st Century (Labs21)

www.labs21century.gov/

DOE National Laboratories

Argonne National Laboratory

www.anl.gov

Idaho National Laboratory

www.inl.gov

Lawrence Berkeley National Laboratory

www.lbl.gov/

National Energy Technology Laboratory

www.netl.doe.gov/

National Renewable Energy Laboratory

www.nrel.gov

Oak Ridge National Laboratory

<http://www.ornl.gov/>

Pacific Northwest National Laboratory

www.pnl.gov/

Sandia National Laboratories

www.sandia.gov/

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On the Cover

A photovoltaics (PV) system of 372 panels is an energy source for the Williams Building, which houses the General Services Administration in Boston, Massachusetts.

Roman Piaskoski/PIX 07172

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