

## Government Facility Sustainability Performance in FY 2016

Interagency Sustainability Working Group  
July 20, 2017

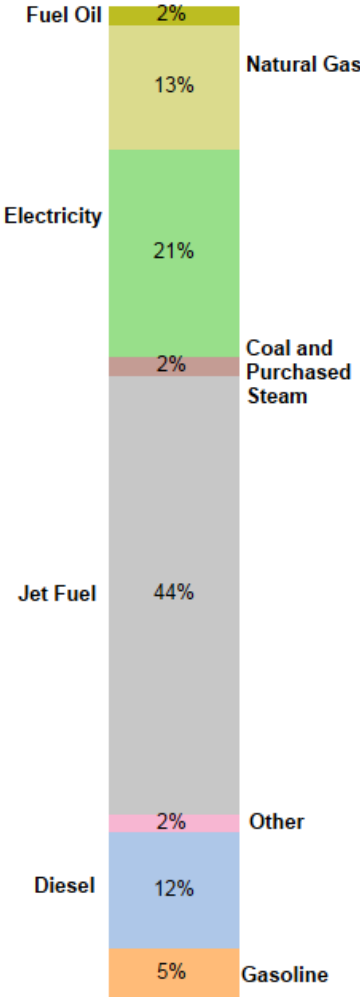
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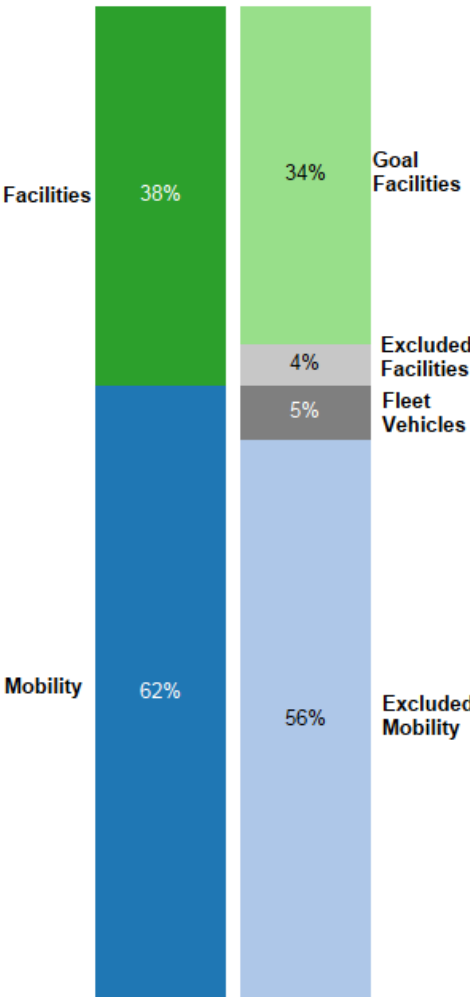
# Overview of Federal Energy Consumption by Fuel Type, End Use, & GHG Emissions

Fiscal Year 2016 Federal Energy Consumption and GHG Emissions:  
0.92 Quadrillion Btu, \$16 Billion, 77 Million MTCO<sub>2</sub>e

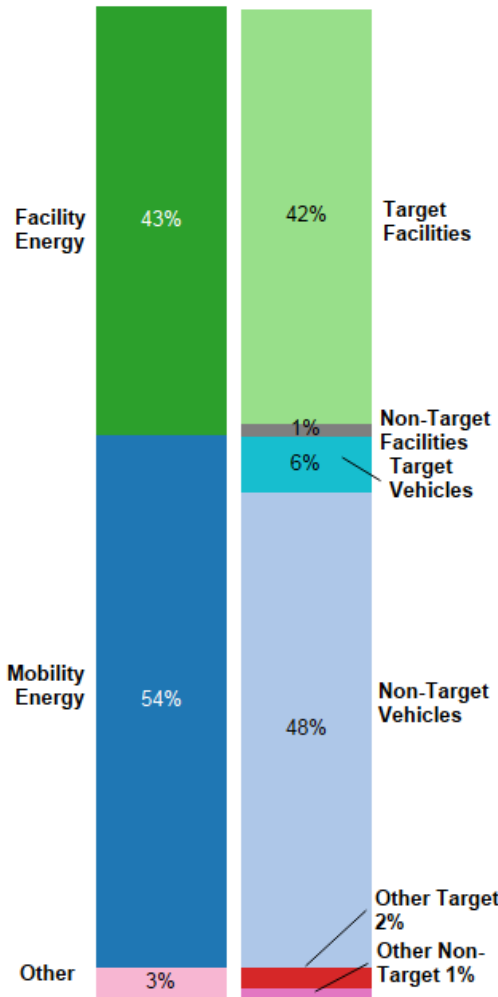
Consumption by Fuel Type



End-Use Sector



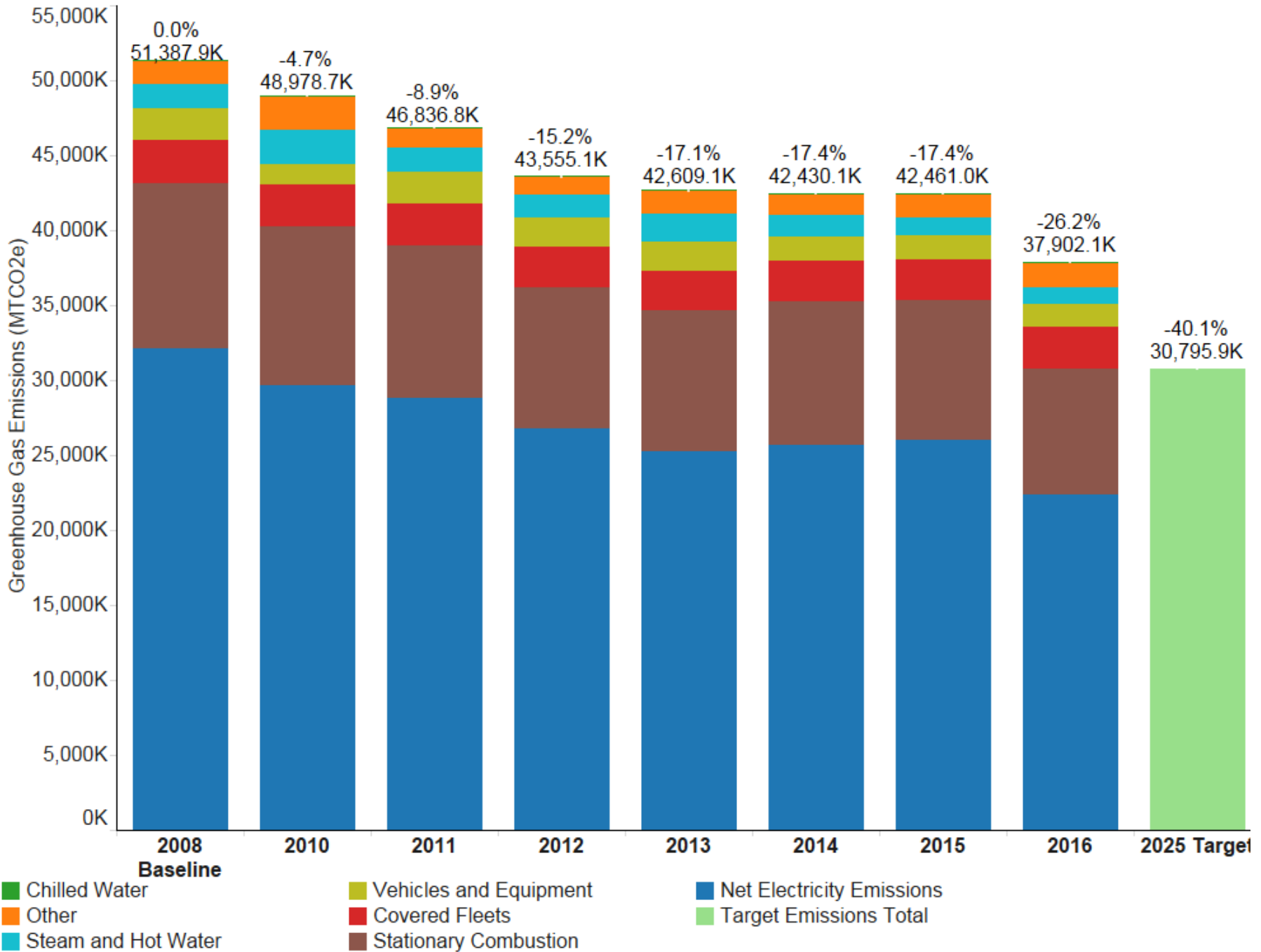
Scope 1 and 2 GHG Emissions



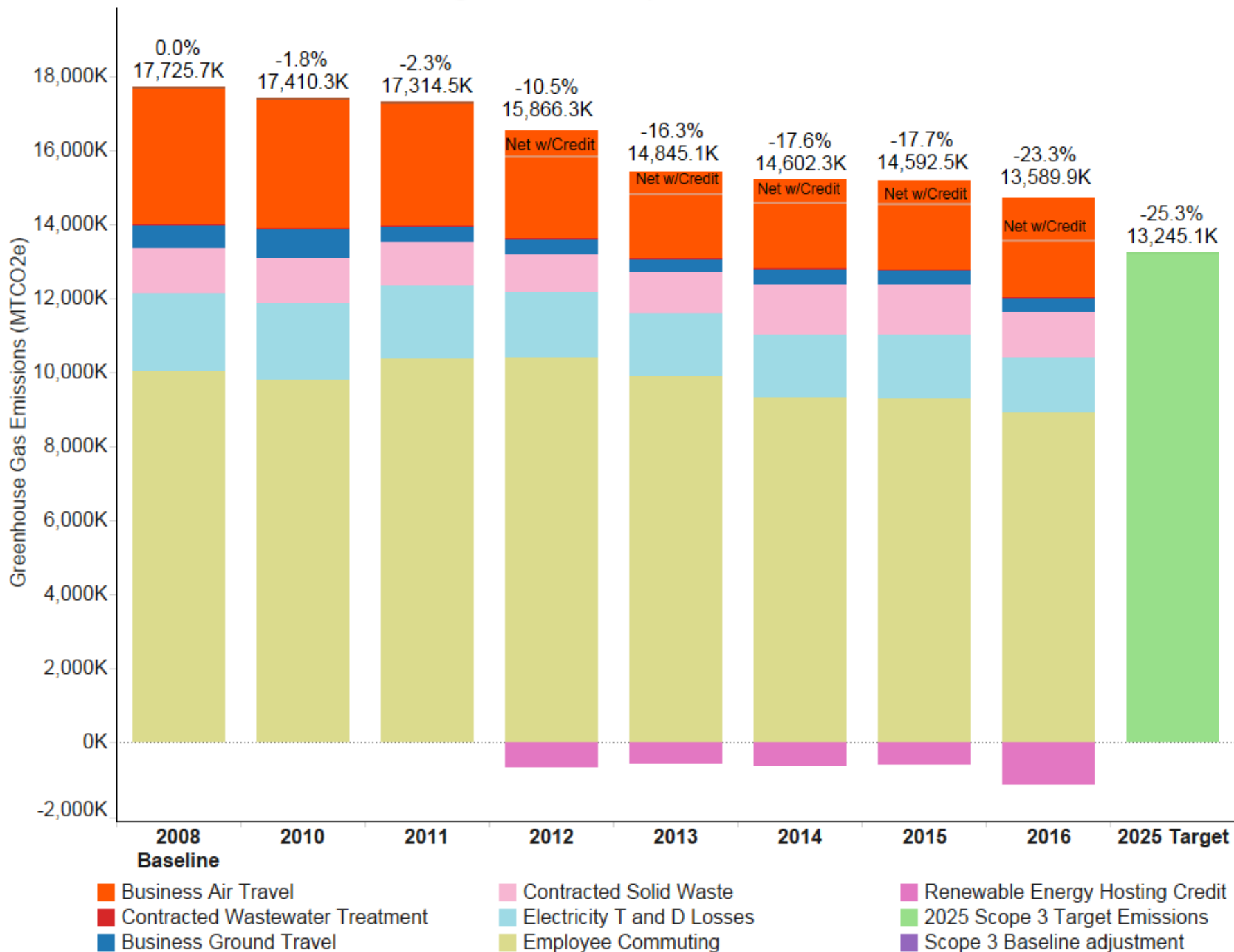
# Key Findings for FY 2016

- Scope 1&2 GHG emissions declined 26.2% from FY08
- Scope 3 indirect GHG emissions decreased 23.3% from FY08
- Facility energy intensity reductions exceeded the 2.5% goal with a 5.3% reduction from 2015
- Clean energy goal of 10% was exceeded (14.2% of facility energy use)
- Renewable electricity goal of 10% was exceeded (12.4% of electricity use)
- Potable water intensity reduction goal of 18% was exceeded (23.6% reduction vs. 2007)
- Industrial/Landscaping/Agricultural (non-potable) water use was reduced 32.2% vs. 2010 (Goals: 20% in 2020, 30% in 2025)
- In FY2016, 11.4% of eligible square footage met the Guiding Principles for Sustainable Buildings (Goal: 15% in 2025)
- Efficiency investment in Federal facilities decreased 12.4% from FY15
  - Direct funding investment: \$614 million
  - ESPC investment: \$914 million in FY16
  - UESC Investment: \$207 million in FY16

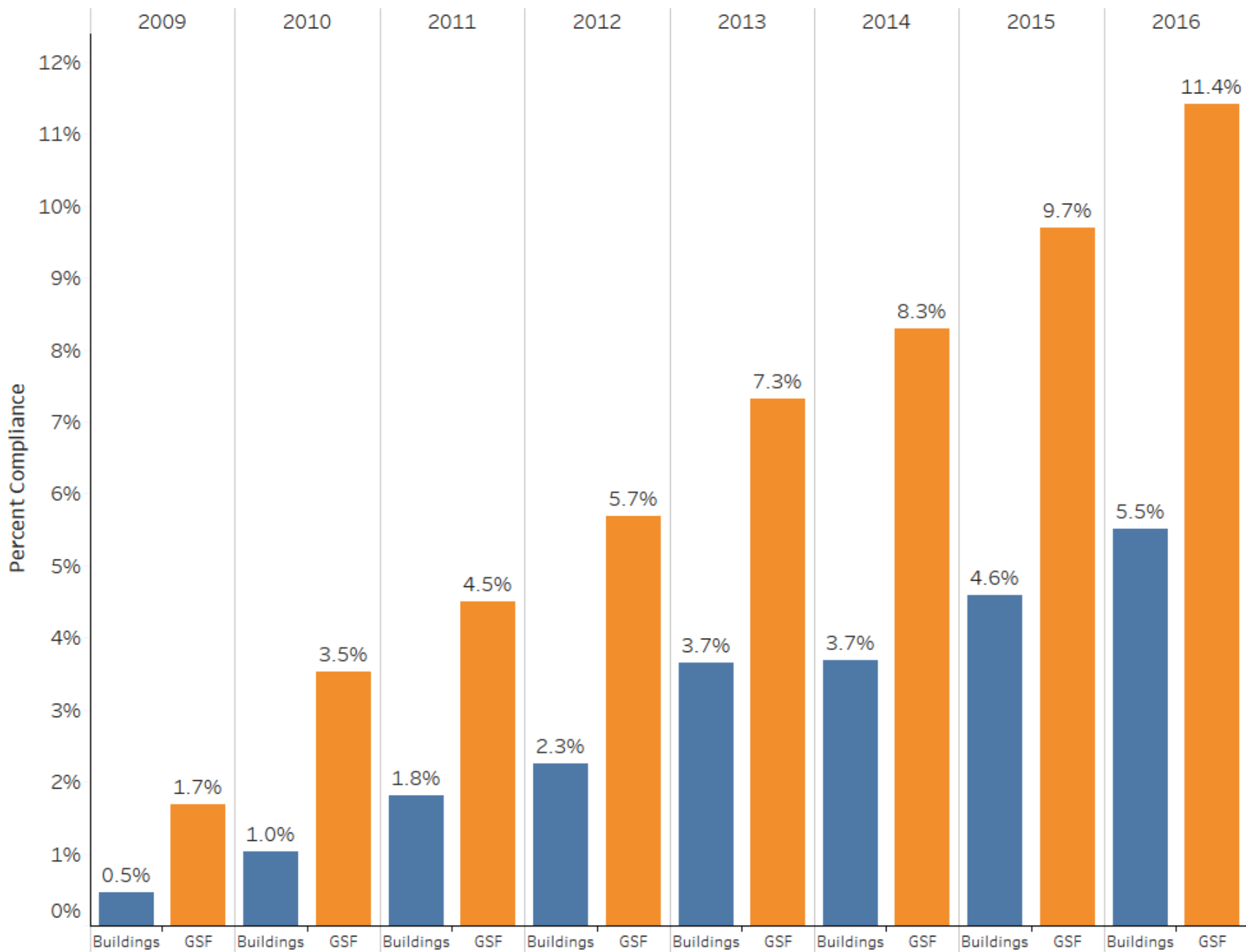
# Federal Government Progress Toward Scope 1 and 2 Greenhouse Gas Reduction Goal



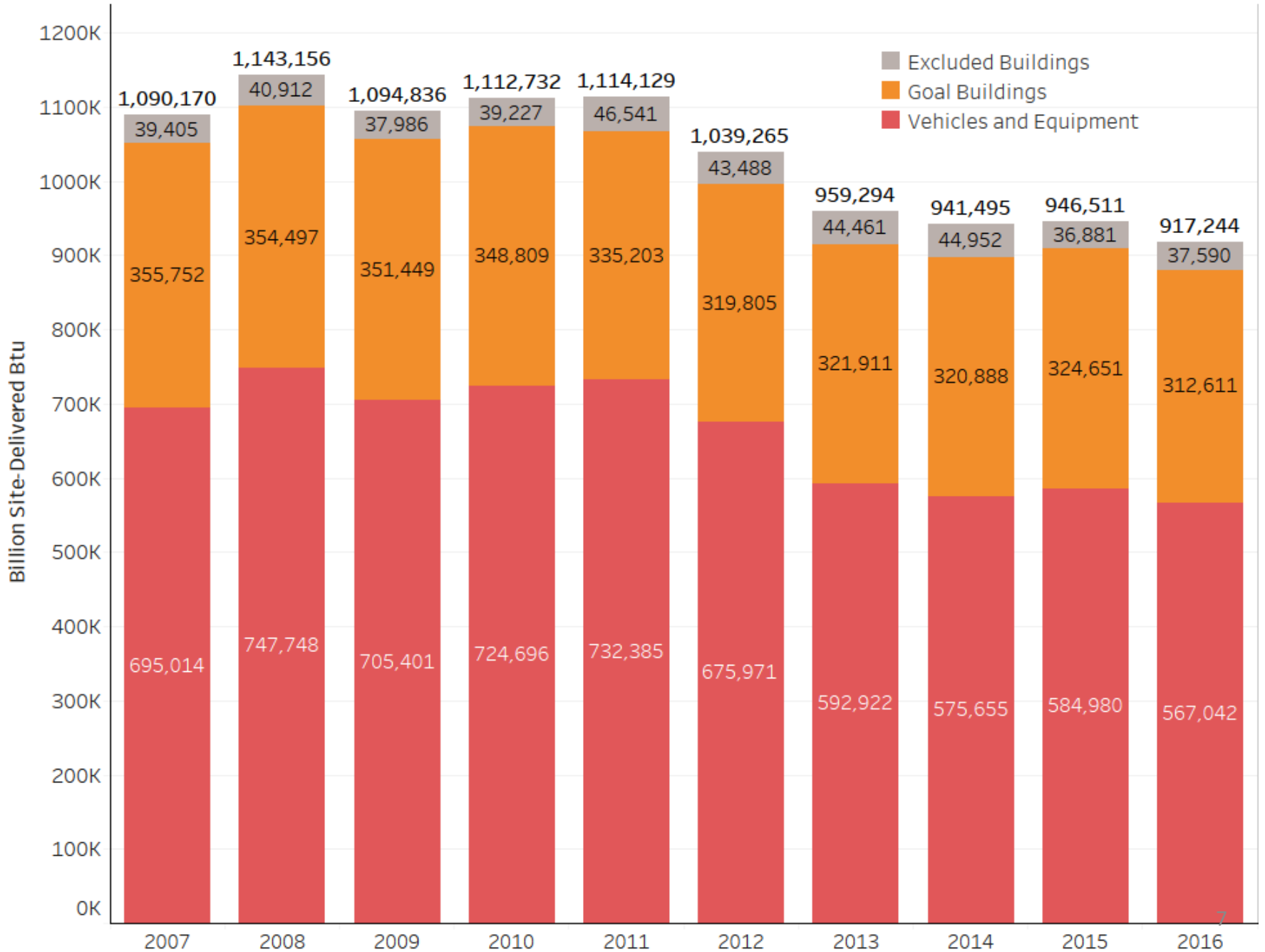
# Federal Government Progress Toward Scope 3 Greenhouse Gas Reduction Goal



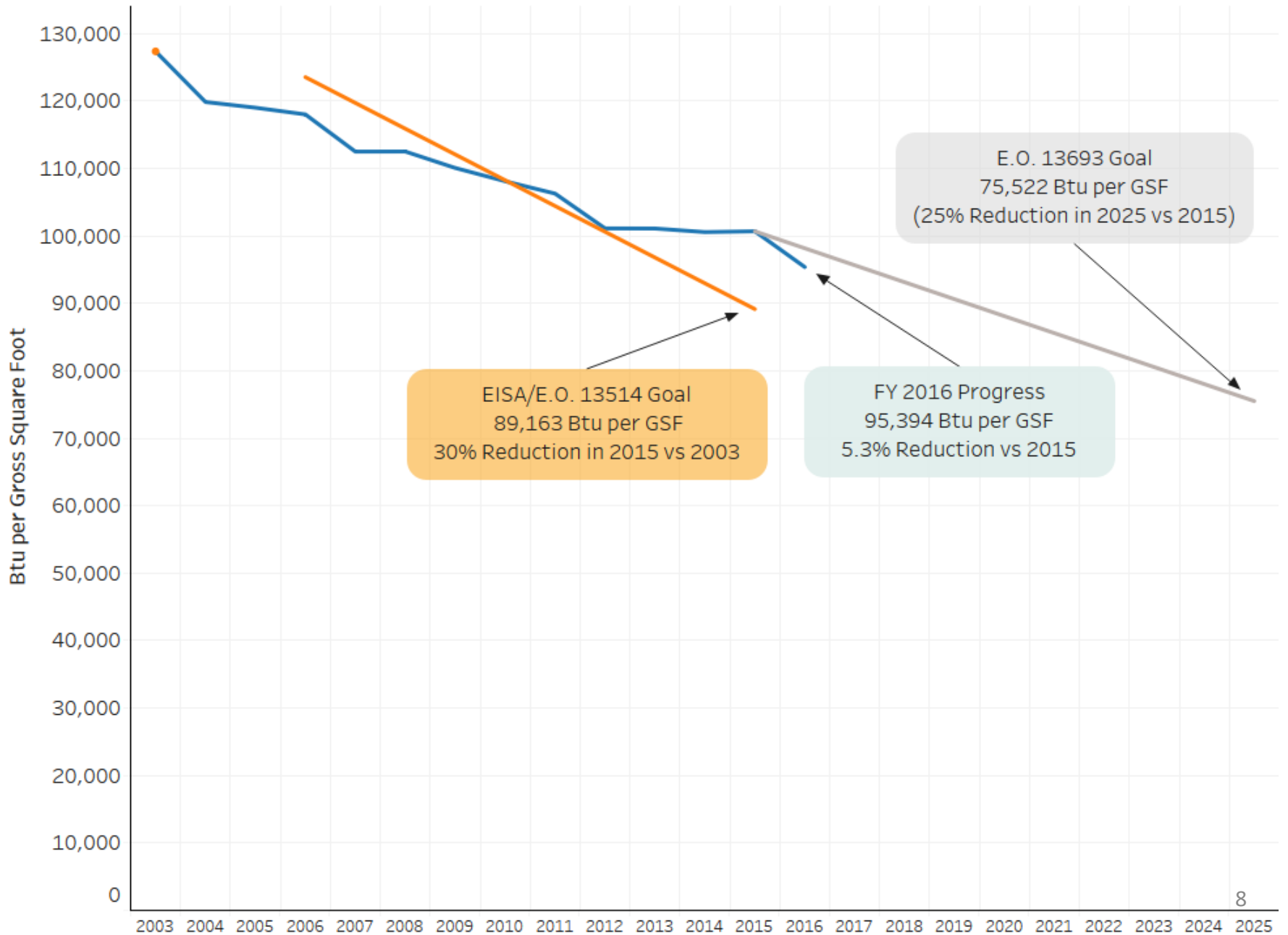
# Federal Government Compliance with Guiding Principles for Sustainable Buildings



Federal Government Energy Use by Sector (FY 2007 - FY 2016)

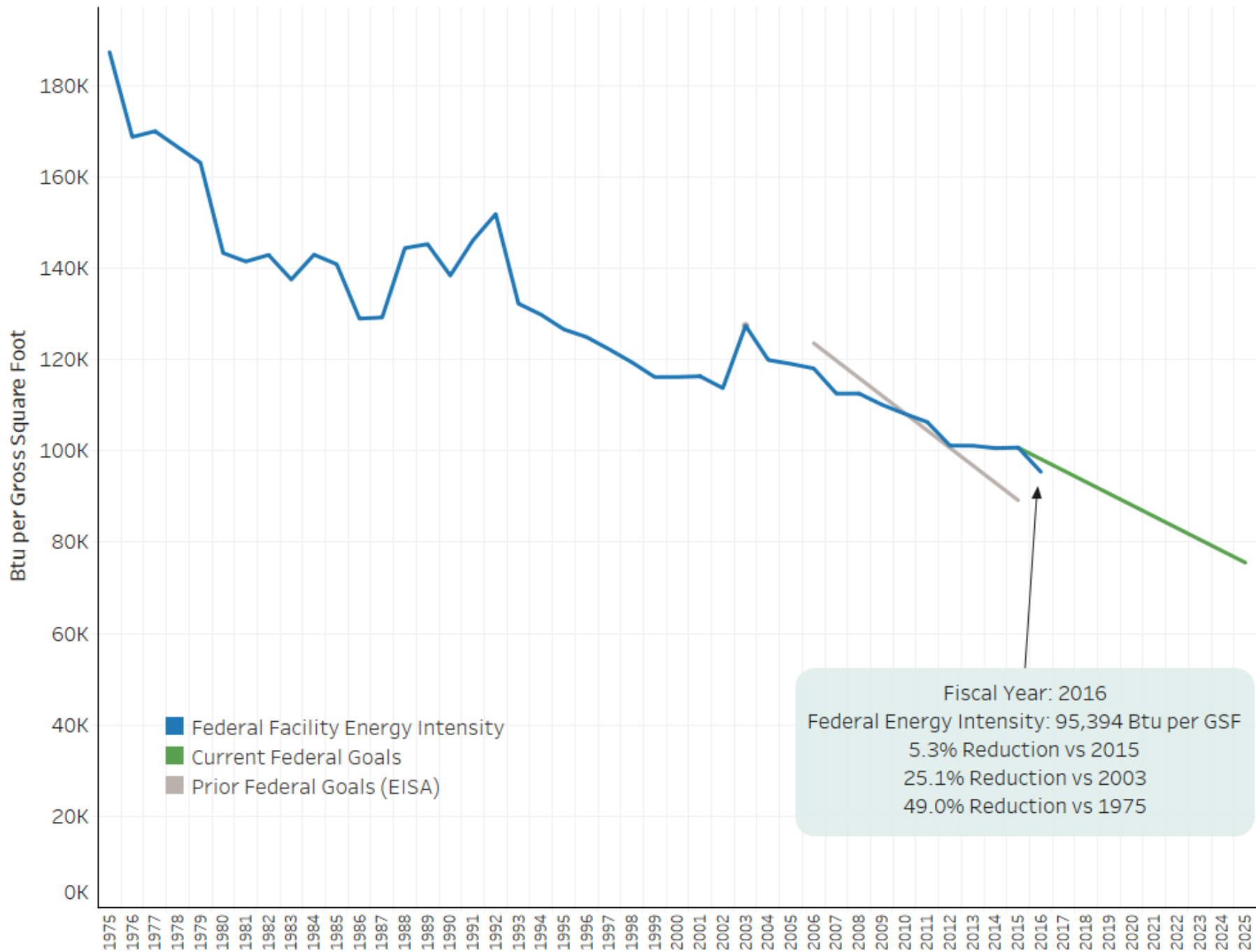


# Overall Government Progress Toward Facility Energy Efficiency Goals FY 2003 - FY 2016



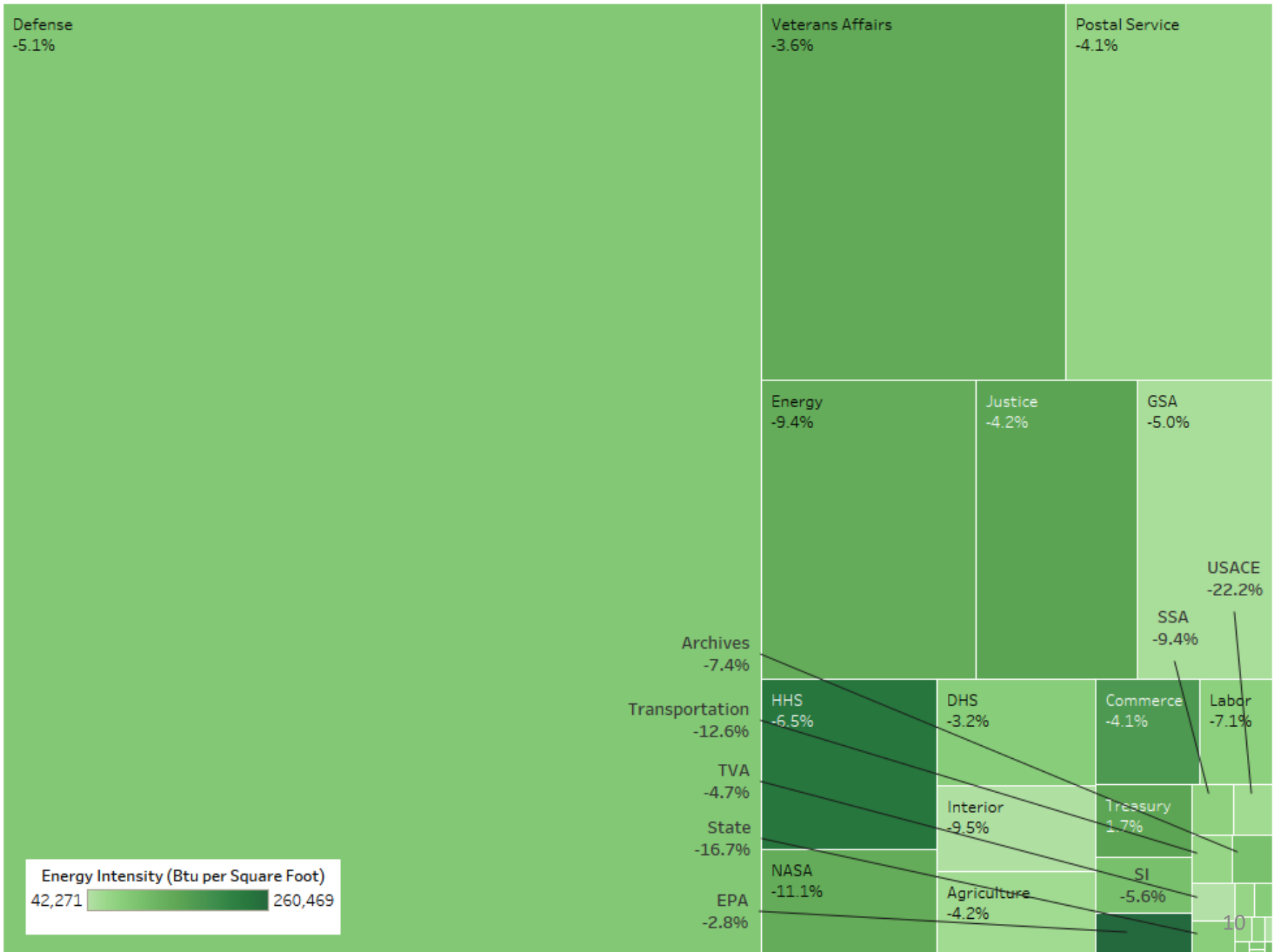


# Energy Intensity Reduction Progress since 1975

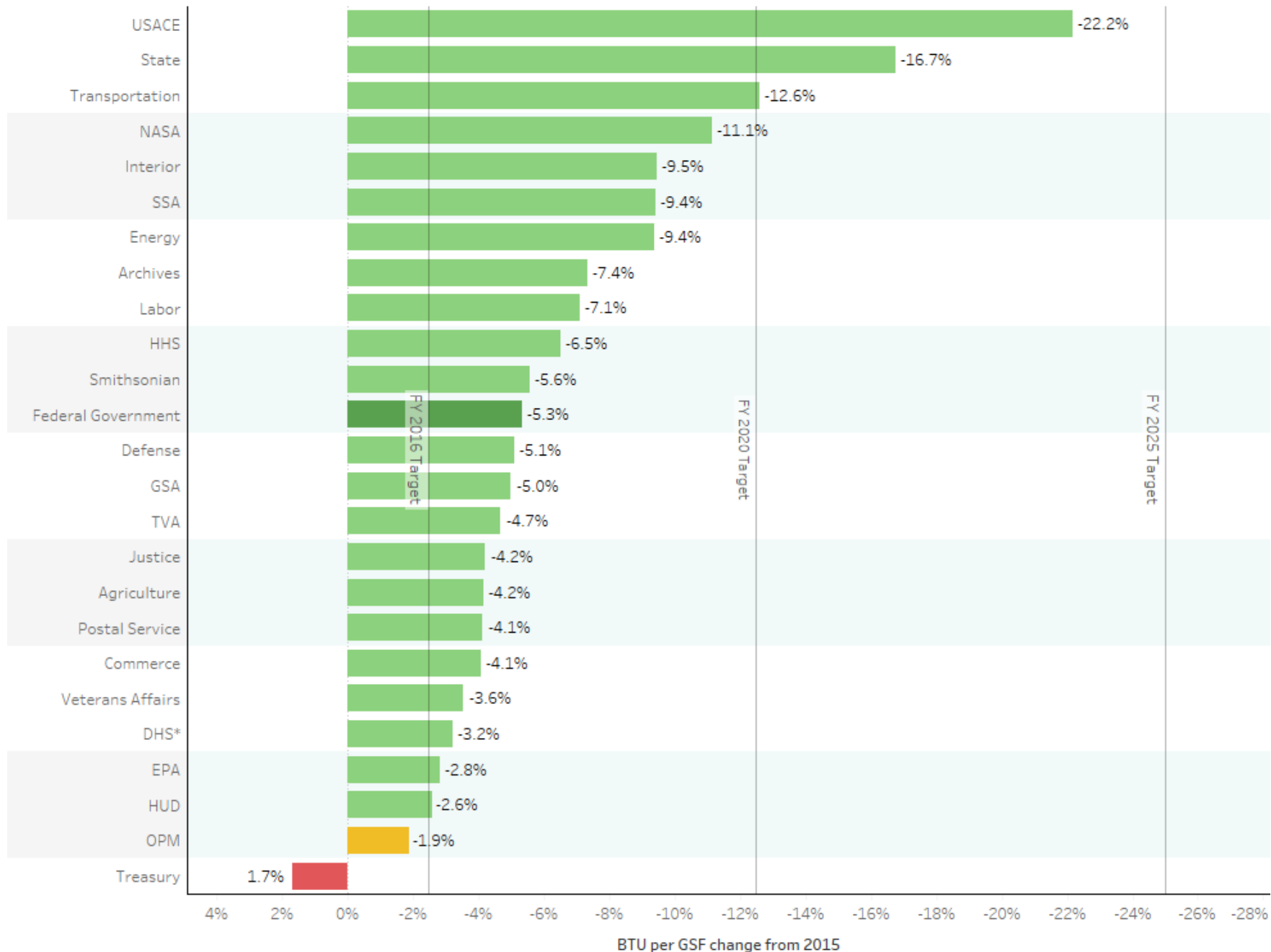


Fiscal Year: 2016  
Federal Energy Intensity: 95,394 Btu per GSF  
5.3% Reduction vs 2015  
25.1% Reduction vs 2003  
49.0% Reduction vs 1975

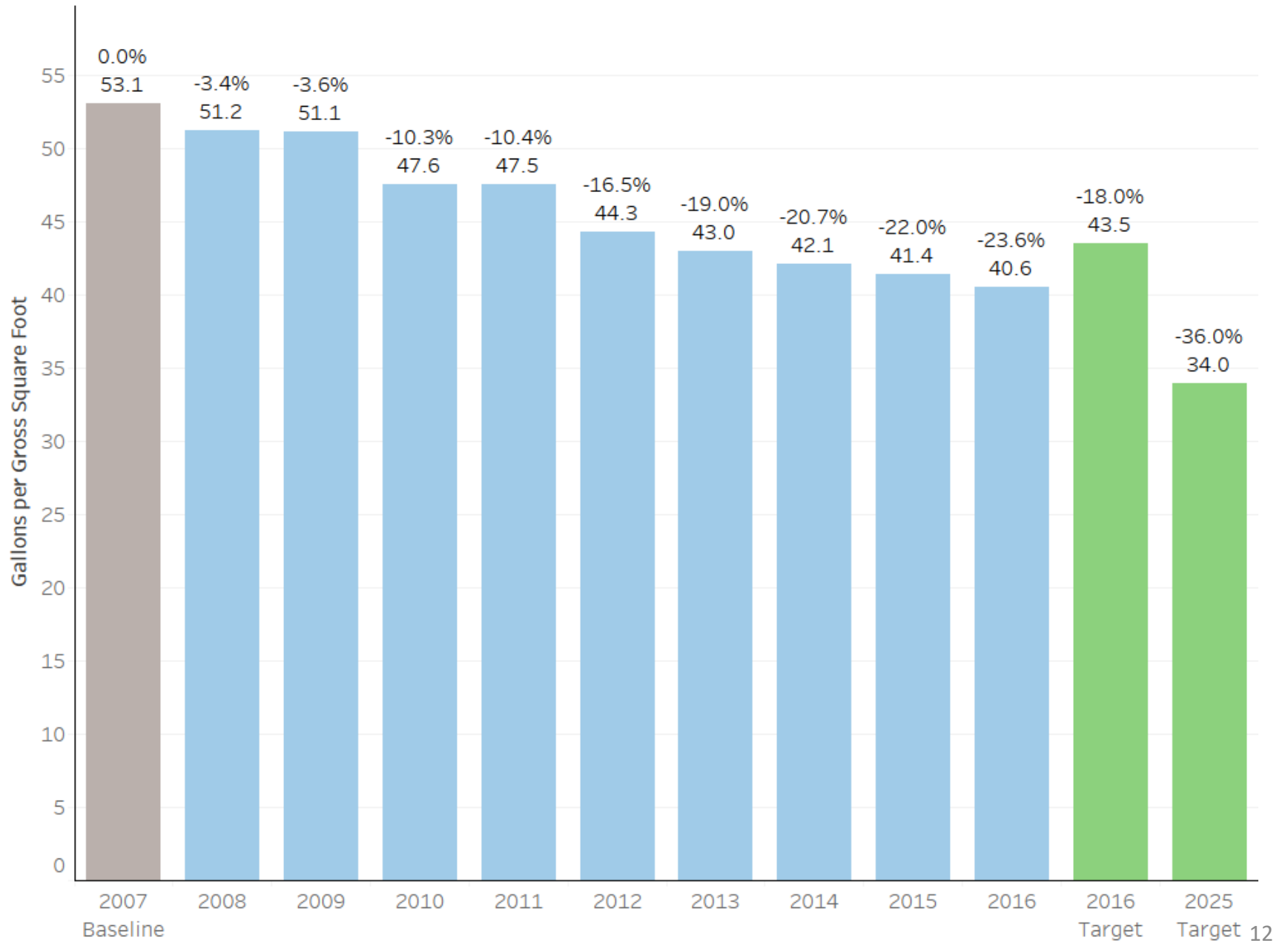
# Goal Building Energy Use, Intensity and Reduction Progress 2016 vs 2015: 290 Trillion Btu



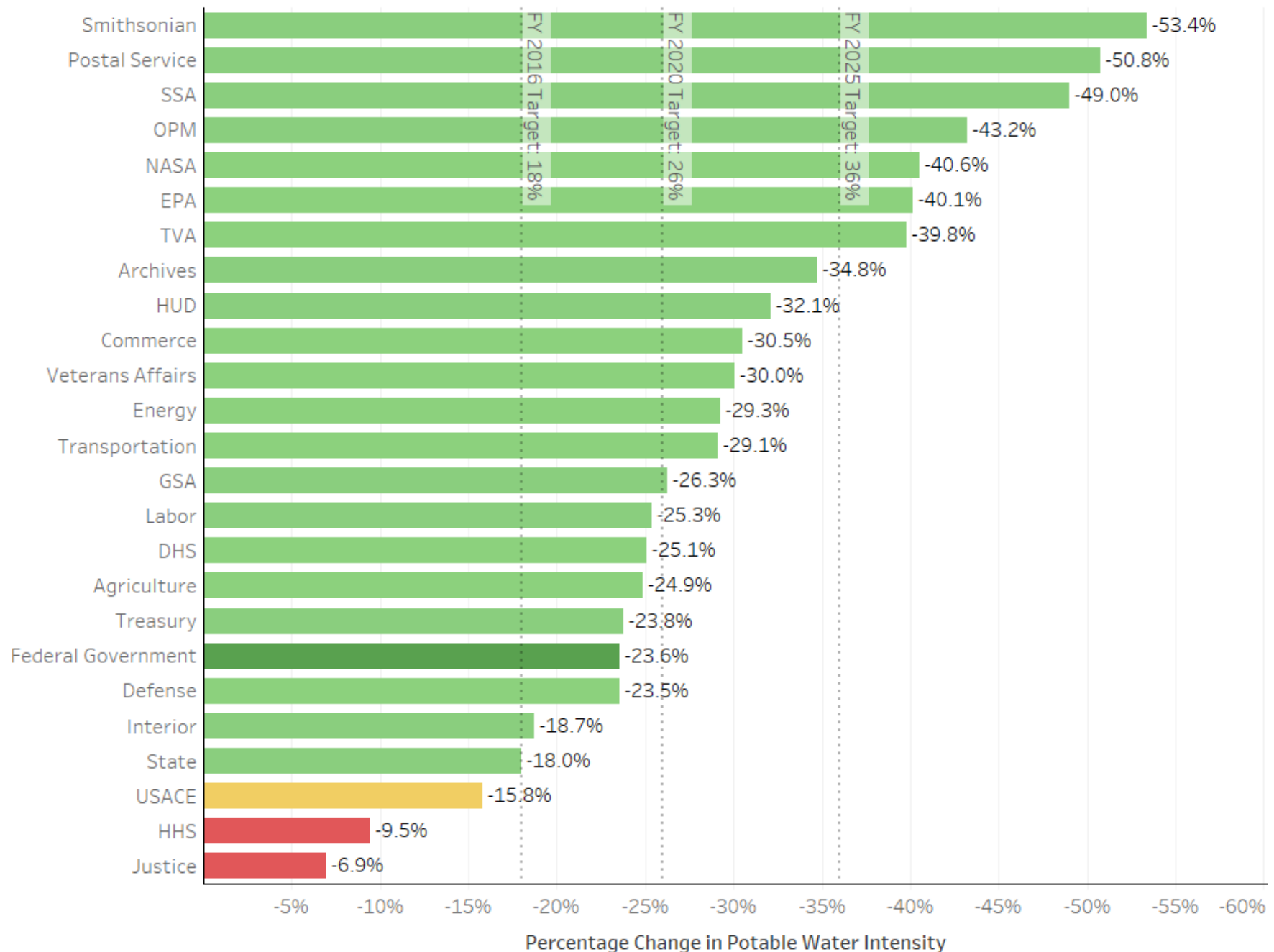
## Federal Facilities: FY 2016 Agency Progress Toward Energy Intensity Reduction Goal



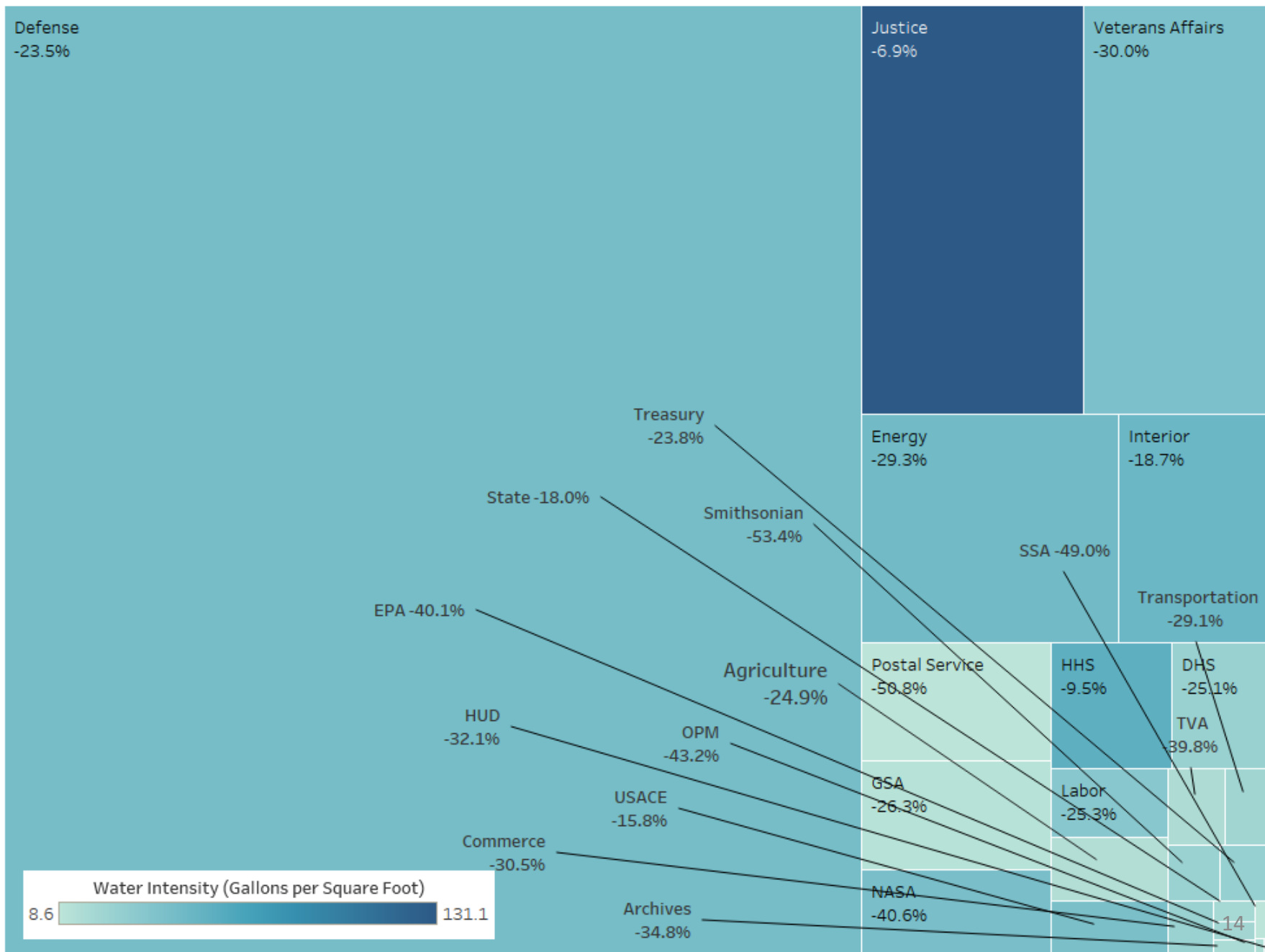
# Federal Government Progress Toward the Potable Water Intensity Reduction Goal



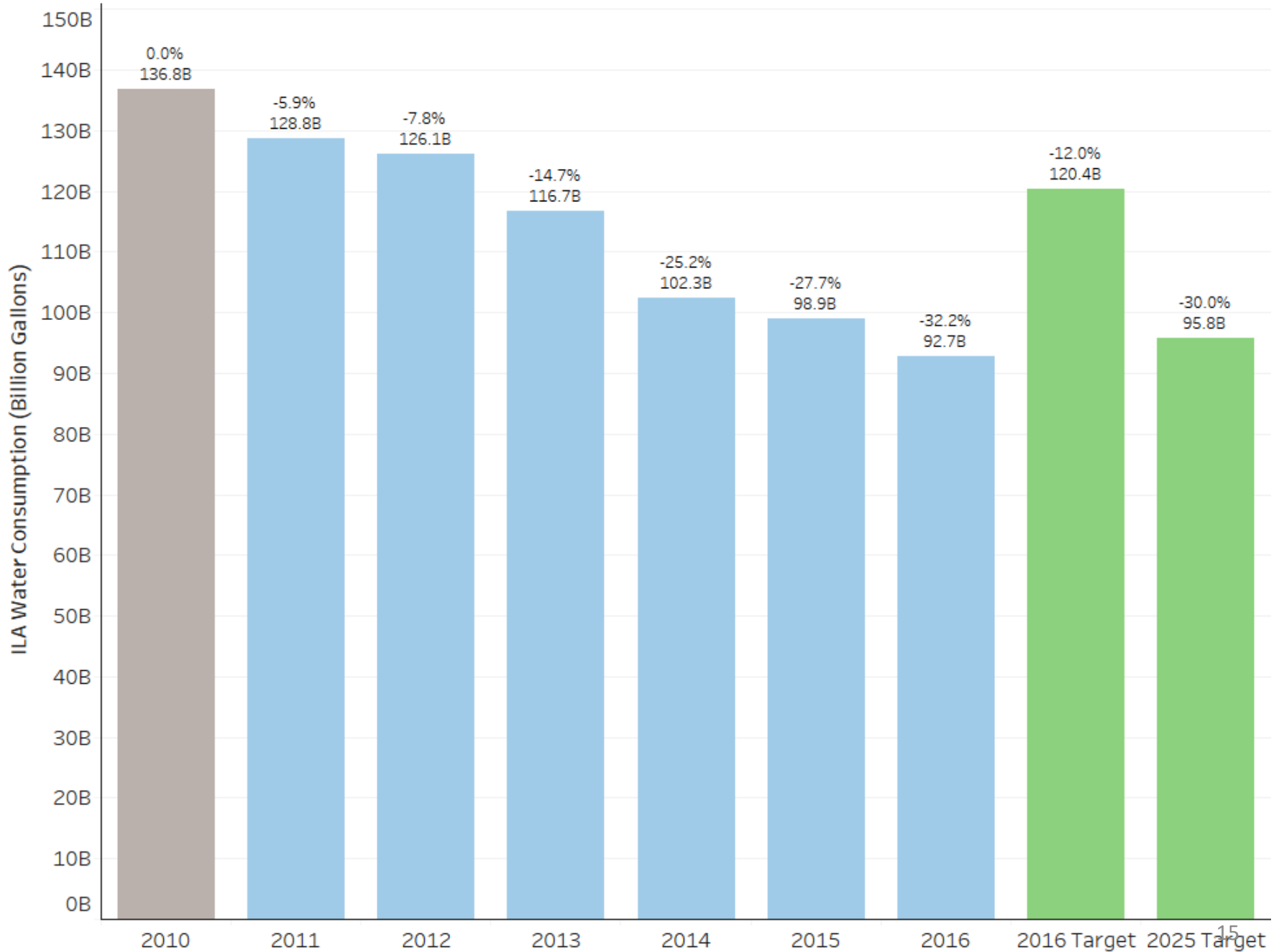
## Federal Agency Progress in Potable Water Intensity FY 2007 to FY 2016



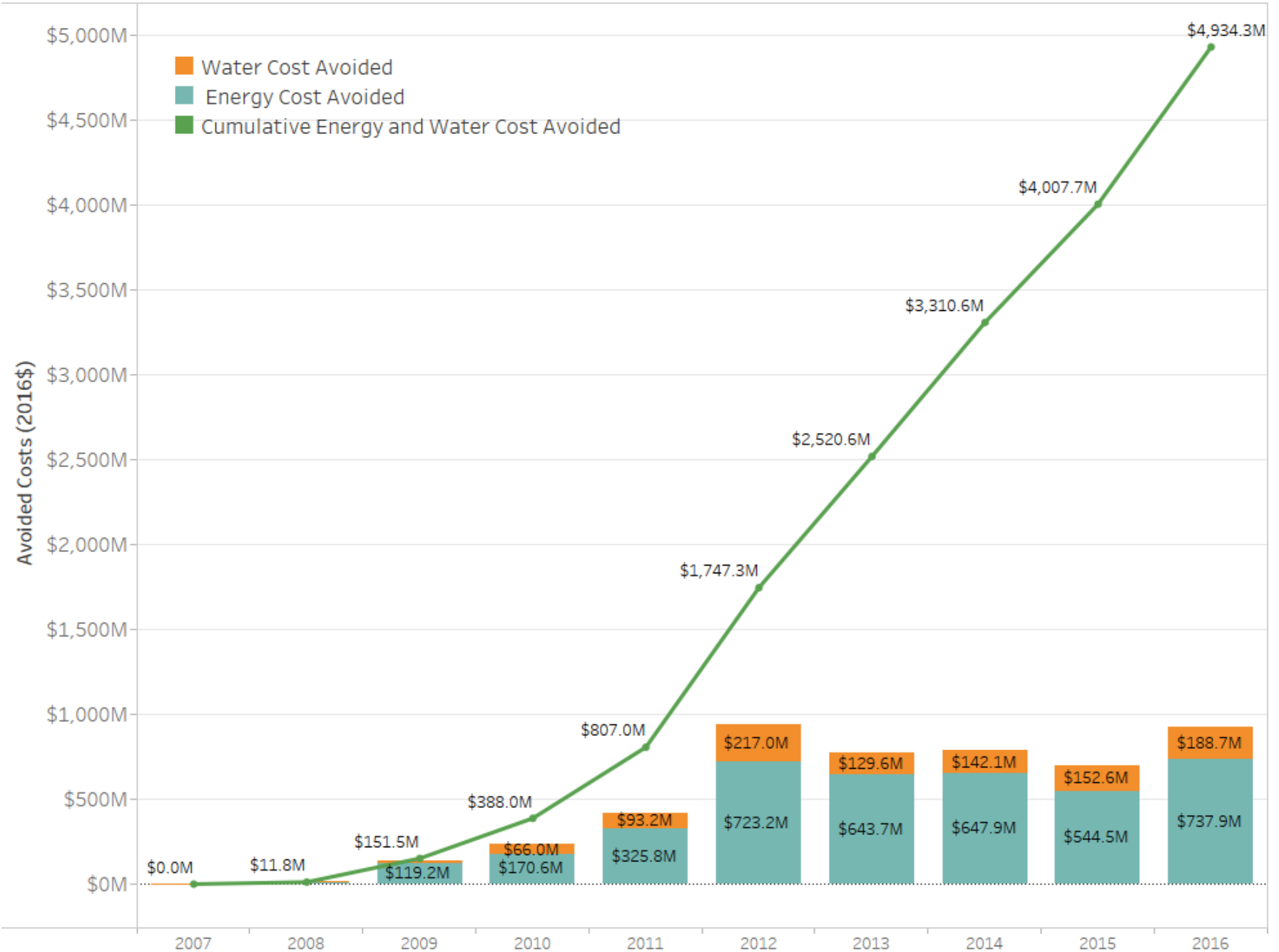
# Potable Water Use, Intensity and Reduction Percentage 2016 vs. 2007: 126 Billion Gallons



Federal Government Industrial, Landscaping and Agricultural (ILA) Water Consumption and Reductions from FY 2010

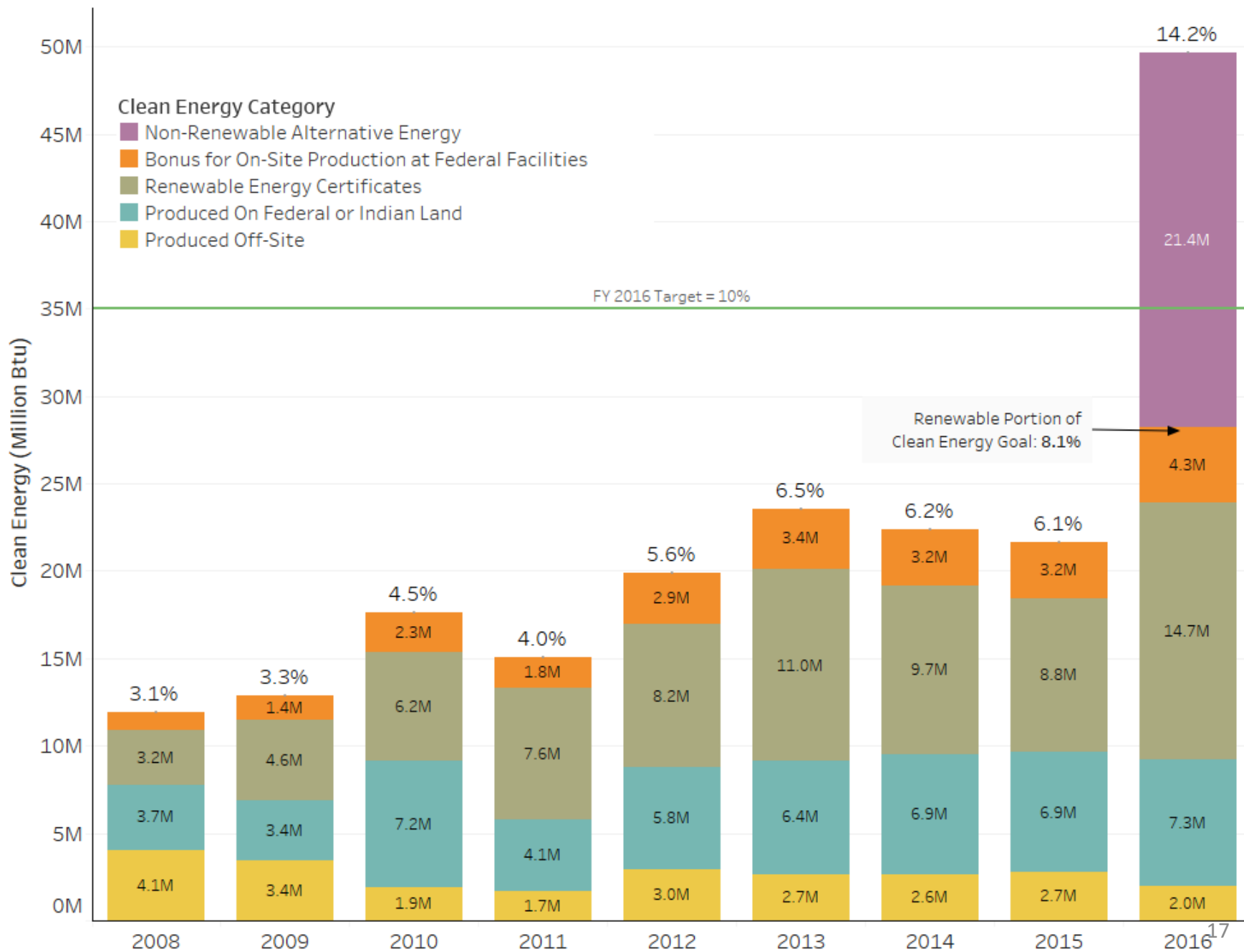


Cost Avoided from Reduced Energy and Water Use in Buildings (2016\$)

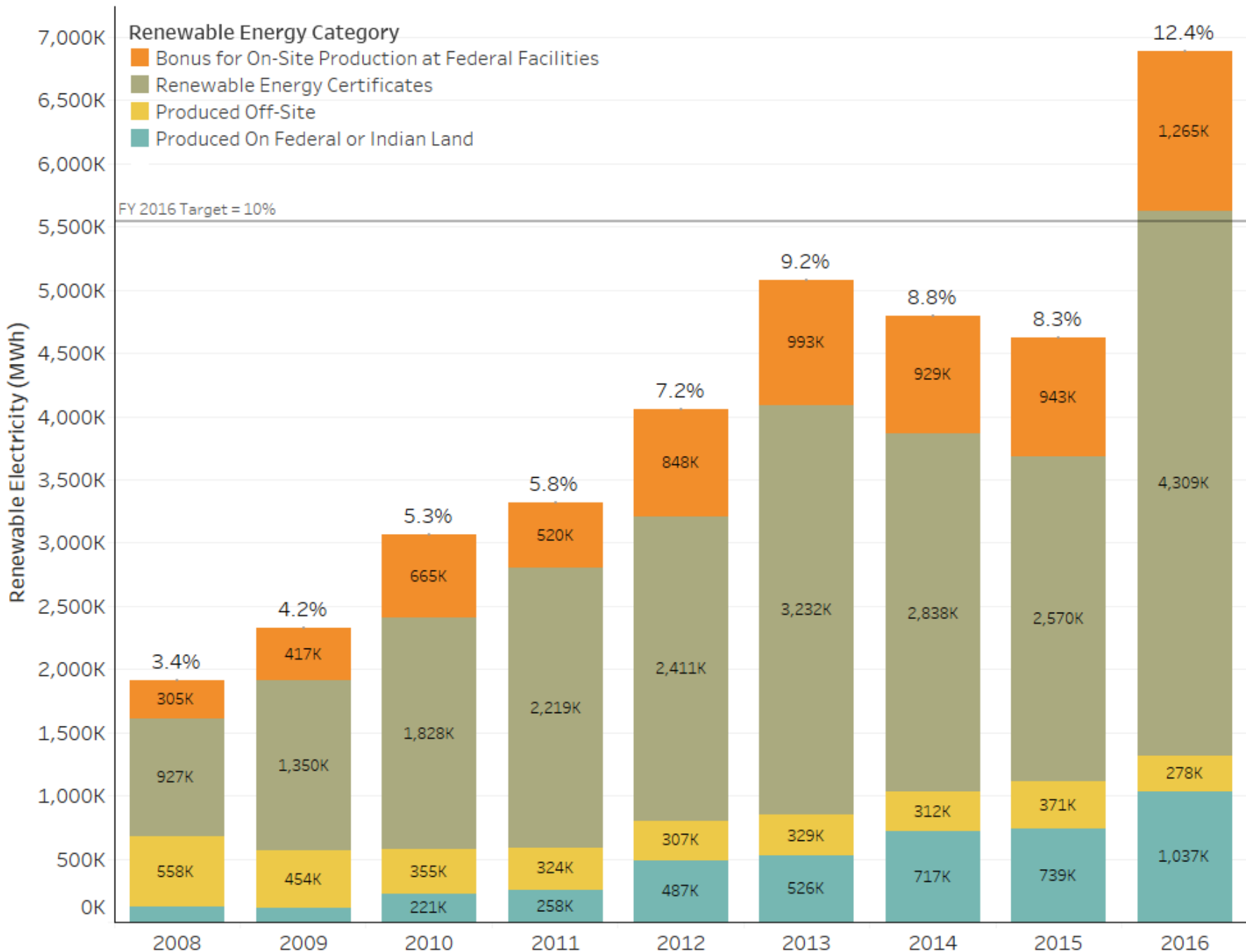




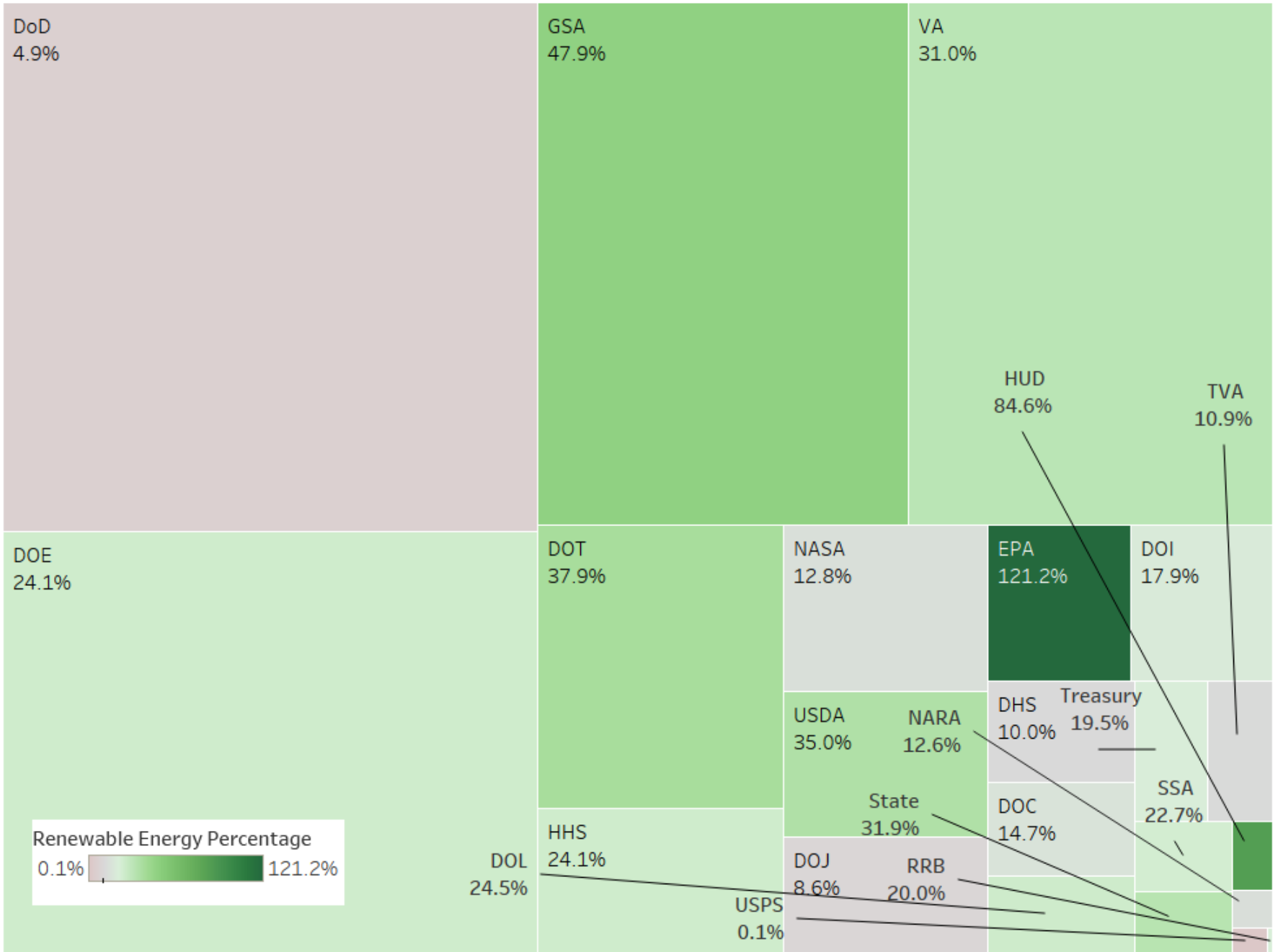
# Federal Government Clean Energy Use as a Percentage of Federal Facility Energy Consumption



# Federal Government Renewable Electricity Use as a Percentage of Facility Electricity Consumption



# FY 2016 Renewable Electricity Use and Percentage of Electricity Consumption: 6.9 Million MWh



# FEMP Annual Performance Data Site:

energy.gov/eere/femp/federal-facility-annual-energy-reports-and-performance

## Comprehensive Annual Energy Data and Sustainability Performance

v1.1.7.0

Federal Facility Reporting and Data » Comprehensive Annual Energy Data and Sustainability Performance » Annual Data

### FEDERAL GOVERNMENT ENERGY/WATER USE AND EMISSIONS IN 2016

In fiscal year 2016 Federal agencies used 917 trillion British thermal units (Btu) of delivered electric and thermal energy from fossil and Renewable sources across All End-Use Sectors including:

- 313 trillion Btu in buildings subject to statutory energy reduction requirements ([Goal Subject Buildings](#))
- 38 trillion Btu in facilities excluded from statutory energy reduction requirements ([Goal Excluded Facilities](#))
- 567 trillion Btu in [Vehicles and Equipment](#) including aircraft, ships, and on-road vehicle fleets.

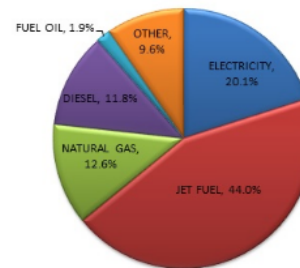
Direct (scope 1 and 2) [Greenhouse Gas \(GHG\) Emissions](#) mostly from energy use, totaled 84 million metric tons of carbon dioxide equivalent (MTCO<sub>2e</sub>) including emissions subject to reduction targets, excluded from reduction targets, and emissions from biogenic sources. Emissions subject to reduction goals totaled 38 million MTCO<sub>2e</sub>, a reduction of almost 26 percent from fiscal year 2008.

Federal agency [Water Use](#) totaled 126 billion gallons, equivalent to 40.6 gallons/square foot of facilities which is a 24% decrease from 2007 potable water use intensity.

[Facility Investment, Gross Square Footage and Other Metrics](#) reported by agencies include information on \$1.7 billion of investments in energy efficiency and renewable energy and agency progress in metering all appropriate buildings for electricity, natural gas and steam.

[Read more...](#)

### Total Energy Consumption by Fuel Type: 917 Trillion Btu



### ENERGY USE AND COST

#### End-Use Sectors

[Read more...](#)

- [A-1 Total Site-Delivered Energy Use in All End-Use Sectors, by Federal Agency \(Billion Btu\)](#)
- [A-2 Government-Wide Site-Delivered Energy Use and Costs in All End-Use Sectors \(Constant Dollars\)](#)
- [A-3 Site-Delivered Energy Use, Costs, and Gross Square Footage of Federal Facilities by Agency](#)
- [A-4 Total Primary \(Source\) Energy Use in All End-Use Sectors, by Federal Agencies \(Billion Btu\)](#)
- [A-5 Historical Federal Energy Consumption and Cost Data by Agency and Energy Type \(FY 1975 to Present\)](#)
- [A-6 Site-Delivered Energy Use and Costs by End-Use Sector and Energy Type, by Federal Agency \(Native Units and Billion Btu\)](#)
- [A-7 Energy Cost Metrics for Federal Facilities by Agency](#)
- [A-8 Site Delivered Energy Use and Costs by End-Use and Energy Type By Fiscal Year](#)

#### Renewable Energy (All End-Use Sectors)

#### Goal Subject Buildings

#### Goal Excluded Facilities

#### Vehicles and Equipment

### OTHER METRICS

#### Greenhouse Gas Emissions

[Read more...](#)

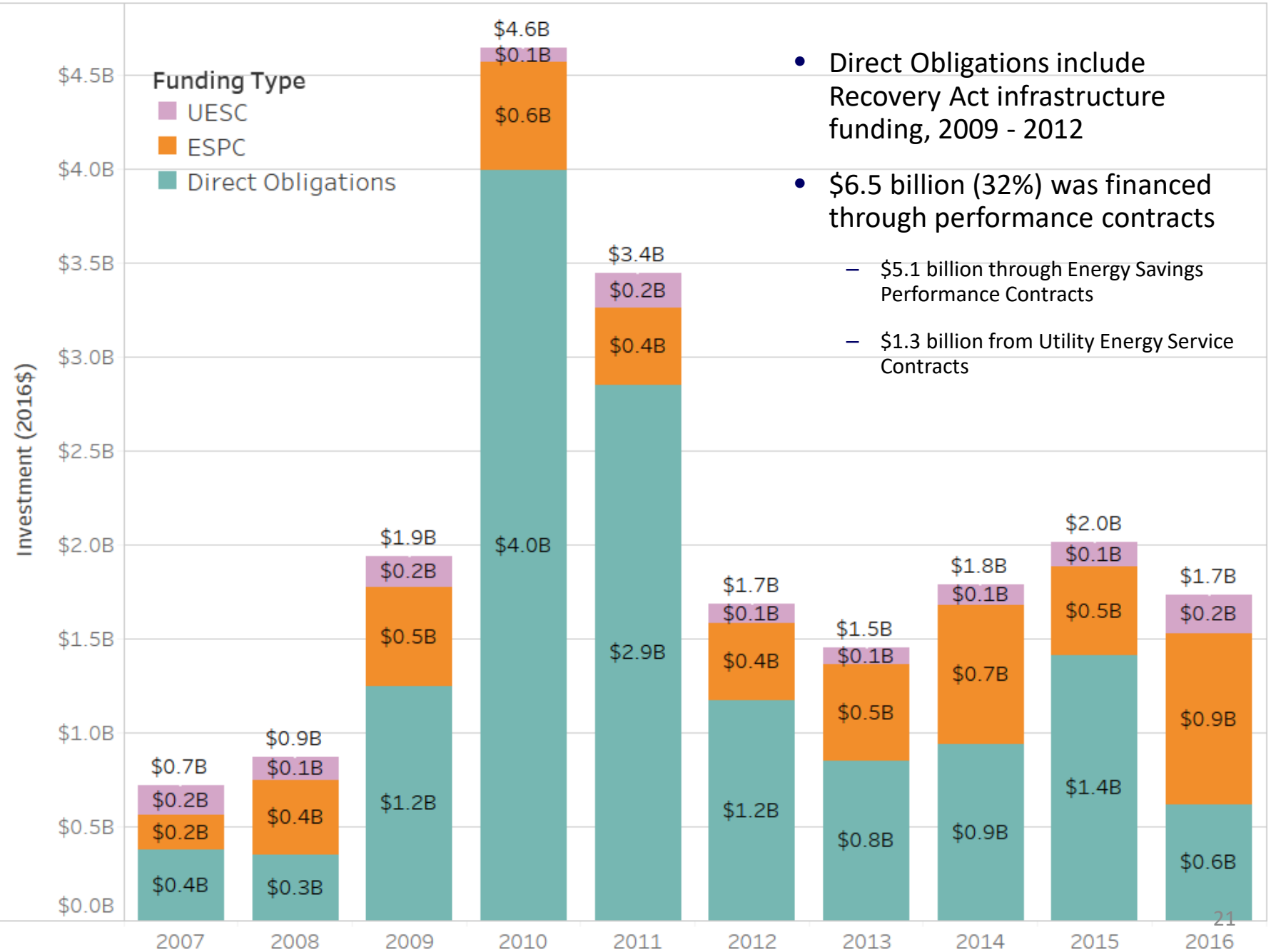
- [E-1 Comprehensive Greenhouse Gas \(GHG\) Inventories by Agency and Fiscal Year](#)
- [E-2 Total Scope 1 & 2 GHG Emissions Subject to Reduction Targets \(Compared to FY 2008\)](#)
- [E-3 Scope 1 & 2 GHG Emissions Subject to Reduction Targets by Category \(Compared to FY 2008\)](#)
- [E-4 Scope 3 GHG Emissions Subject to Reduction Targets by Category \(Compared to FY 2008\)](#)

#### Water Use

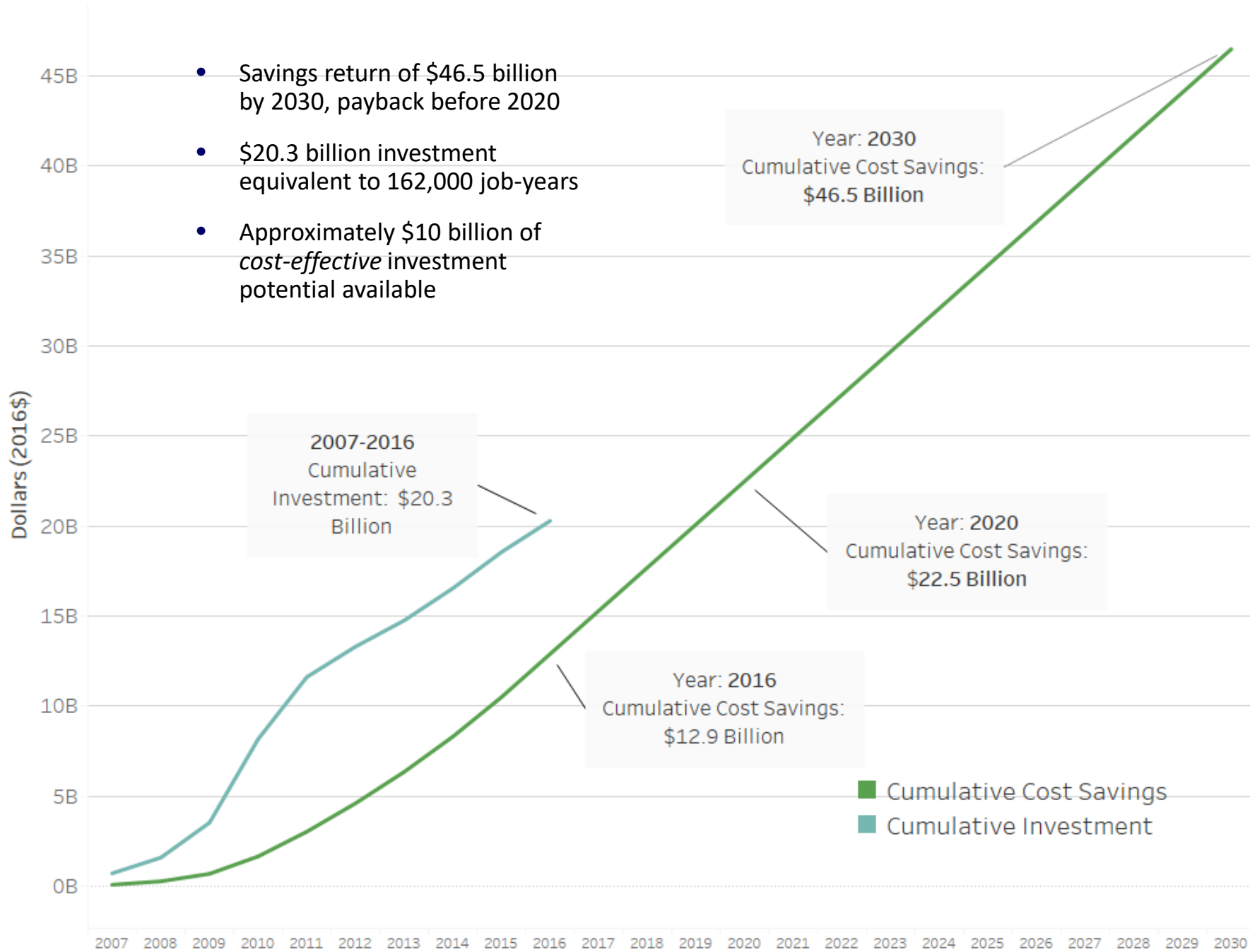
#### Facility Investment, Gross Square Footage, Other Metrics

#### References

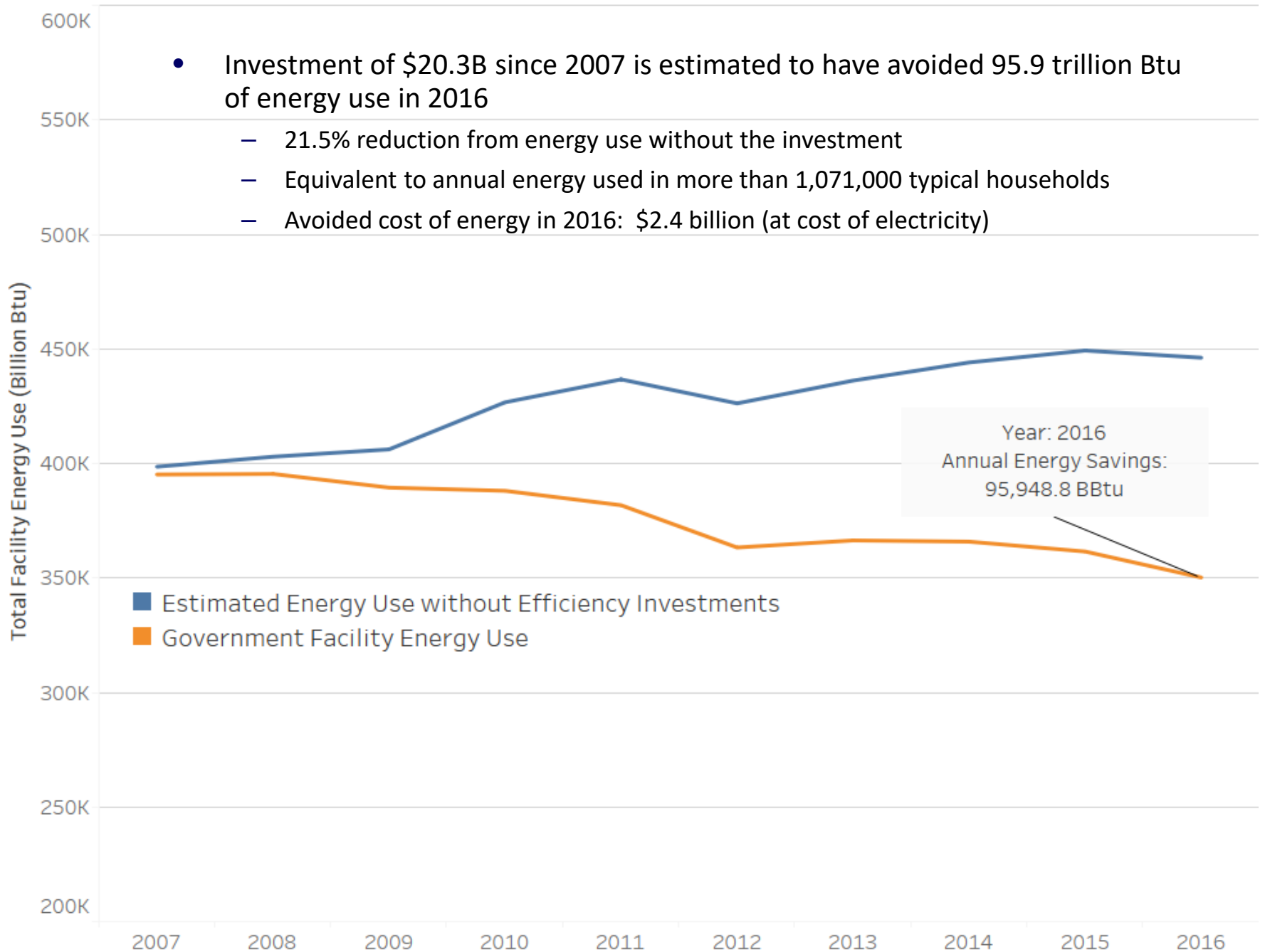
# Federal Government Invested \$20.3 Billion in Facility Efficiency from 2007 through 2016 (2016\$)



# Savings Return on Federal Facility Energy Efficiency Investment of \$20.3 Billion (2016\$)



# Impact of Federal Facility Energy Efficiency Investments on Energy Use



# Assumptions/Rules of Thumb for Savings Return

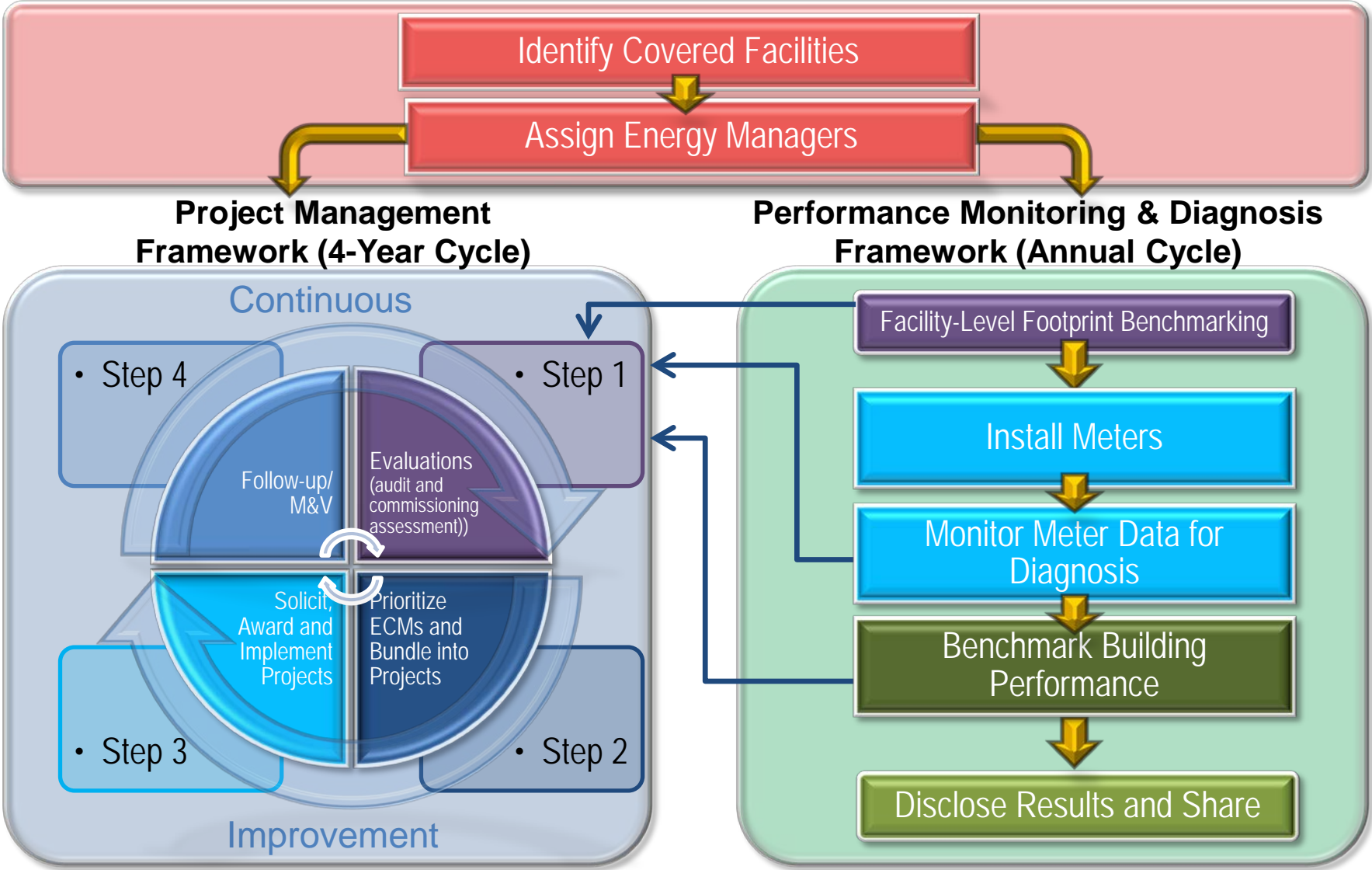
- 4,730 site-delivered Btu saved annually / \$1 of investment
  - DOE IDIQ ESPCs, 2007-2016: 4,922 Btu/\$1 invested
  - EISA 432 CTS Reported Projects (all funding types): 4,463 Btu/\$1 invested
- Cost of energy saved: \$25 / million Btu
- Return on Investment 2007-2030 (23 years): 2.3

*DOE IDIQ ESPC Awarded Projects Summary, May 2017*

|                          | Project Count | Project Investment     | Guaranteed Cost Savings | Annual Energy Savings (btu x 10 <sup>6</sup> ) | Cumulative Energy Savings (btu x 10 <sup>6</sup> ) | Annual-Btu-saved/<br>\$1-of-investment | Cost of Cumulative Energy Saved (w/ O&M, etc.)<br>\$/million Btu | Return on Investment |
|--------------------------|---------------|------------------------|-------------------------|--|--|--|--|----------------------|
| Total for FY 1998        | 5             | \$ 6,575,201           | \$ 17,162,375           | 60,931   | 783,240  | 9,267                                  | \$21.91  | 2.61                 |
| Total for FY 1999        | 15            | \$ 40,950,583          | \$ 94,265,528           | 340,539  | 5,660,293  | 8,316                                  | \$16.65  | 2.30                 |
| Total for FY 2000        | 20            | \$ 62,161,736          | \$ 131,703,866          | 609,730  | 9,510,029  | 9,809                                  | \$13.85  | 2.12                 |
| Total for FY 2001        | 31            | \$ 126,376,566         | \$ 273,213,735          | 869,148  | 13,374,390   | 6,877                                  | \$20.43  | 2.16                 |
| Total for FY 2002        | 19            | \$ 112,866,816         | \$ 340,061,131          | 1,032,973                                      | 21,194,077   | 9,152                                  | \$16.05  | 3.01                 |
| Total for FY 2003        | 39            | \$ 260,867,190         | \$ 541,848,764          | 2,543,263                                      | 35,515,859   | 9,749                                  | \$15.26  | 2.08                 |
| Total for FY 2004        | 6             | \$ 28,366,270          | \$ 66,492,625           | 310,836  | 5,496,755  | 10,958                                 | \$12.10  | 2.34                 |
| Total for FY 2005        | 9             | \$ 75,391,097          | \$ 201,465,006          | 1,398,118                                      | 30,787,712   | 18,545                                 | \$6.54   | 2.67                 |
| Total for FY 2006        | 22            | \$ 163,960,554         | \$ 410,192,500          | 1,233,397                                      | 22,143,688   | 7,523                                  | \$18.52  | 2.50                 |
| Total for FY 2007        | 15            | \$ 149,177,735         | \$ 371,703,394          | 957,303  | 16,206,513   | 6,417                                  | \$22.94  | 2.49                 |
| Total for FY 2008        | 21            | \$ 293,469,669         | \$ 756,653,562          | 1,805,188                                      | 34,187,748   | 6,151                                  | \$22.13  | 2.58                 |
| Total for FY 2009        | 23            | \$ 397,338,861         | \$ 1,493,828,946        | 4,681,992                                      | 86,523,921   | 11,783                                 | \$17.26  | 3.76                 |
| Total for FY 2010        | 37            | \$ 528,378,174         | \$ 1,162,276,810        | 2,598,197                                      | 42,882,708   | 4,917                                  | \$27.10  | 2.20                 |
| Total for FY 2011        | 7             | \$ 252,650,259         | \$ 916,419,640          | 418,087  | 7,952,004  | 1,655                                  | \$115.24   | 3.63                 |
| Total for FY 2012        | 9             | \$ 182,449,202         | \$ 340,520,991          | 768,505  | 14,757,644   | 4,212                                  | \$23.07  | 1.87                 |
| Total for FY 2013        | 22            | \$ 278,140,200         | \$ 504,714,514          | 1,240,130                                      | 18,569,274   | 4,459                                  | \$27.18  | 1.81                 |
| Total for FY 2014        | 25            | \$ 452,555,491         | \$ 907,464,001          | 1,696,051                                      | 32,393,260   | 3,748                                  | \$28.01  | 2.01                 |
| Total for FY 2015        | 9             | \$ 187,978,442         | \$ 451,152,148          | 876,840  | 17,829,351   | 4,665                                  | \$25.30  | 2.40                 |
| Total for FY 2016        | 21            | \$ 718,966,109         | \$ 1,429,751,381        | 1,894,441                                      | 38,144,627   | 2,635                                  | \$37.48  | 1.99                 |
| Total for FY 2017        | 16            | \$ 659,580,916         | \$ 1,512,823,080        | 2,079,747                                      | 45,863,451   | 3,153                                  | \$32.99  | 2.29                 |
| <b>Grand Total</b>       | <b>371</b>    | <b>\$4,978,201,071</b> | <b>\$11,923,713,997</b> | <b>27,415,416</b>                              | <b>499,776,544</b>                                 | <b>5,507</b>                           | <b>\$23.86</b>   | <b>2.40</b>          |
| <b>FY 2007 - FY 2016</b> |               | <b>\$3,441,104,142</b> | <b>\$8,334,485,387</b>  | <b>16,936,734</b>                              | <b>309,447,050</b>                                 | <b>4,922</b>                           | <b>\$26.93</b>   | <b>2.42</b>          |

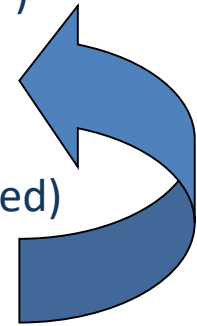


# Energy Independence and Security Act of 2007 (EISA), Sect. 432, Approach to Facility Resource Management



# EISA's Framework for Federal Facility Management

- Agencies must identify “covered facilities” that constitute **at least 75% of energy use**
- Each facility must have a designated energy manager responsible for:
  - Benchmarking metered buildings (that are, or part of, “facilities”)
  - Completing comprehensive energy/water evaluations (audits) (each facility at least once every 4 years)
  - Implementing identified ECMs and reporting; (bundling permitted)
  - Follow-up M&V on implemented ECMs (as part of quadrennial evaluation)
- Web-based Compliance Tracking System (CTS) to certify compliance, track agency progress in implementing the mandates
  - Agencies tailor reporting into CTS according to their management approach
    - Upload from centrally-managed systems or entered by regional/facility managers bottom-up
  - Reports available to Congress, industry, and the public
    - Agencies may exempt facility-level data from disclosure for national security purposes



# Benefits of Collecting & Reporting Data

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- Can't manage resources that aren't measured; focuses senior management attention on efficiency/investment and on life-cycle cost-effective opportunities.
- Avoids embarrassing ignorance of agency operations; historical record of Government operations
- Transparency promotes accountability for efficient operations; complying with statutes insures against potential lawsuits
- Leadership by example from promoting efficient technology, savings to taxpayer
- A record of success (or lessons learned) to defend past investment or future budget requests
- EISA audit findings: pipeline of potential cost-effective efficiency measures for infrastructure programs and performance contracting
- EISA project reporting demonstrates results and ensures persistence of savings (get what you paid for)
- Building benchmarking tracks performance over time and diagnoses potential problems, instills motivating competition with similar buildings

# Contact and Links

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- <http://energy.gov/eere/femp/federal-facility-annual-energy-reports-and-performance>
- <http://ctsedweb.ee.doe.gov/Annual/2016/Report/Report.aspx> (direct link and archive for FY 2016 data)
- <http://energy.gov/eere/femp/eisa-federal-covered-facility-management-and-benchmarking-data>
- <https://energy.gov/eere/femp/downloads/doe-idiq-energy-savings-performance-contract-awarded-projects>
- <https://energy.gov/eere/femp/building-life-cycle-cost-programs>