Government Facility Sustainability Performance in FY 2016

Interagency Sustainability Working Group
July 20, 2017
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 MTCO2e

Consumption by Fuel Type

- Fuel Oil: 2%
- Natural Gas: 13%
- Electricity: 21%
- Coal and Purchased Steam: 2%
- Jet Fuel: 44%
- Diesel: 12%
- Other: 2%
- Gasoline: 5%

End-Use Sector

- Mobility: 62%
- Facilities: 38%
- Goal Facilities: 34%
- Excluded Facilities: 4%
- Excluded Mobility: 56%
- Fleet Vehicles: 5%

Scope 1 and 2 GHG Emissions

- Mobility Energy: 54%
- Facility Energy: 43%
- Target Facilities: 42%
- Non-Target Facilities: 1%
- Target Vehicles: 6%
- Non-Target Vehicles: 48%
- Other Target: 2%
- Other Non-Target: 1%
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 Compliance with Guiding Principles for Sustainable Buildings

<table>
<thead>
<tr>
<th>Year</th>
<th>Percent Compliance</th>
</tr>
</thead>
<tbody>
<tr>
<td>2009</td>
<td>Buildings: 0.5%</td>
</tr>
<tr>
<td></td>
<td>GSF: 1.7%</td>
</tr>
<tr>
<td>2010</td>
<td>Buildings: 1.0%</td>
</tr>
<tr>
<td></td>
<td>GSF: 3.5%</td>
</tr>
<tr>
<td>2011</td>
<td>Buildings: 1.8%</td>
</tr>
<tr>
<td></td>
<td>GSF: 4.5%</td>
</tr>
<tr>
<td>2012</td>
<td>Buildings: 2.3%</td>
</tr>
<tr>
<td></td>
<td>GSF: 5.7%</td>
</tr>
<tr>
<td>2013</td>
<td>Buildings: 3.7%</td>
</tr>
<tr>
<td></td>
<td>GSF: 7.3%</td>
</tr>
<tr>
<td>2014</td>
<td>Buildings: 3.7%</td>
</tr>
<tr>
<td></td>
<td>GSF: 8.3%</td>
</tr>
<tr>
<td>2015</td>
<td>Buildings: 4.6%</td>
</tr>
<tr>
<td></td>
<td>GSF: 9.7%</td>
</tr>
<tr>
<td>2016</td>
<td>Buildings: 5.5%</td>
</tr>
<tr>
<td></td>
<td>GSF: 11.4%</td>
</tr>
</tbody>
</table>
Overall Government Progress Toward Facility Energy Efficiency Goals
FY 2003 - FY 2016

- EISA/E.O. 13514 Goal: 89,163 Btu per GSF, 30% Reduction in 2015 vs 2003
- E.O. 13693 Goal: 75,522 Btu per GSF, 25% Reduction in 2025 vs 2015
- FY 2016 Progress: 95,394 Btu per GSF, 5.3% Reduction vs 2015
Energy Intensity Reduction Progress since 1975

- Federal Facility Energy Intensity
- Current Federal Goals
- Prior Federal Goals (EISA)

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

- USACE: -22.2%
- State Transportation: -12.6%
- NASA: -11.1%
- Interior SSA: -9.5% -9.4%
- Energy Archives Labor: -7.4% -7.1%
- HHS Smithsonian Federal Government: -6.5% -5.6% -5.3%
- Defense GSA TVA: -5.1% -5.0% -4.7%
- Justice Agriculture Postal Service: -4.2% -4.2% -4.1%
- Commerce Veterans Affairs: -4.1% -3.6%
- DHS* EPA HUD OPM: -3.2% -2.8% -2.6% -1.9%
- Treasury: 1.7%

BTU per GSF change from 2015
Federal Agency Progress in Potable Water Intensity FY 2007 to FY 2016

- Smithsonian: -53.4%
- Postal Service: -50.8%
- SSA: -49.0%
- OPM: -43.2%
- NASA: -40.6%
- EPA: -40.1%
- TVA: -39.9%
- Archives: -34.8%
- HUD: -32.1%
- Commerce: -30.5%
- Veterans Affairs: -30.0%
- Energy: -29.0%
- Transportation: -29.3%
- GSA: -26.3%
- Labor: -25.3%
- DHS: -25.1%
- Agriculture: -24.9%
- Treasury: -23.8%
- Federal Government: -23.6%
- Defense: -23.5%
- Interior: -18.7%
- State: -18.0%
- USACE: -15.8%
- HHS: -9.5%
- Justice: -6.9%
FY 2016 Renewable Electricity Use and Percentage of Electricity Consumption: 6.9 Million MWh

- DoD: 4.9%
- DOE: 24.1%
- GSA: 47.9%
- VA: 31.0%
- DOT: 37.9%
- NASA: 12.8%
- EPA: 121.2%
- HHS: 24.1%
- USDA: 35.0%
- NARA: 12.6%
- DOI: 17.9%
- DOJ: 8.6%
- Treasury: 19.5%
- HHS: 31.9%
- DOC: 14.7%
- SSA: 22.7%
- USPS: 0.1%
- RRB: 20.0%
FEMP Annual Performance Data Site: energy.gov/eere/femp/federal-facility-annual-energy-reports-and-performance

Comprehensive Annual Energy Data and Sustainability Performance

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 nuclear sources across all End-Use Sectors including:

- 313 trillion Btu in buildings subject to statutory energy reduction requirements (Goal Excluded Facilities)
- 36 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 (MMT CO2e) including emissions subject to reduction targets, excluded from reduction targets, and emissions from biogenic sources. Emissions subject to reduction goals totaled 36 million MMT CO2e, a reduction of almost 20 percent from fiscal year 2008.

Federal agency Water Use totaled 128 billion gallons, equivalent to 40.6 gallons per square foot of facilities which is a 24% decrease from 2007 potable water use intensity.

Information on $1.7 billion of investments in energy efficiency and renewable energy and agency progress in meeting all appropriate buildings for electricity, natural gas and steam.

Read more...
Direct Obligations include Recovery Act infrastructure funding, 2009 - 2012

- $6.5 billion (32%) was financed through performance contracts
  - $5.1 billion through Energy Savings Performance Contracts
  - $1.3 billion from Utility Energy Service Contracts
• Savings return of $46.5 billion by 2030, payback before 2020
• $20.3 billion investment equivalent to 162,000 job-years
• Approximately $10 billion of cost-effective investment potential available
Investment of $20.3B since 2007 is estimated to have avoided 95.9 trillion Btu of energy use in 2016

- 21.5% reduction from energy use without the investment
- Equivalent to annual energy used in more than 1,071,000 typical households
- Avoided cost of energy in 2016: $2.4 billion (at cost of electricity)
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

**Assumptions/Rules of Thumb for Savings Return**

**DOE IDIQ ESPC Awarded Projects Summary, May 2017**

<table>
<thead>
<tr>
<th>Project Count</th>
<th>Project Investment</th>
<th>Guaranteed Cost Savings</th>
<th>Annual Energy Savings (billion Btu x 10^6)</th>
<th>Cumulative Energy Savings (billion Btu x 10^6)</th>
<th>Annual-Btu saved/ $1 of investment</th>
<th>Cost of Cumulative Energy Saved (w/ O&amp;M, etc.) /$million Btu</th>
<th>Return on Investment</th>
</tr>
</thead>
<tbody>
<tr>
<td>Total for FY 1998</td>
<td>5</td>
<td>$6,575,201</td>
<td>$17,162,375</td>
<td>60,931</td>
<td>783,240</td>
<td>9,267</td>
<td>$21.91</td>
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<td>Total for FY 1999</td>
<td>15</td>
<td>$40,950,583</td>
<td>$94,265,528</td>
<td>340,539</td>
<td>5,660,293</td>
<td>8,316</td>
<td>$16.65</td>
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<td>Total for FY 2000</td>
<td>20</td>
<td>$62,161,736</td>
<td>$131,703,866</td>
<td>609,730</td>
<td>9,510,029</td>
<td>9,809</td>
<td>$13.85</td>
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<td>Total for FY 2001</td>
<td>31</td>
<td>$126,376,566</td>
<td>$273,213,735</td>
<td>869,148</td>
<td>13,374,390</td>
<td>6,877</td>
<td>$20.43</td>
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<td>Total for FY 2002</td>
<td>19</td>
<td>$112,866,816</td>
<td>$340,061,131</td>
<td>1,032,973</td>
<td>21,194,077</td>
<td>9,152</td>
<td>$16.05</td>
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<td>Total for FY 2003</td>
<td>39</td>
<td>$260,867,190</td>
<td>$541,848,764</td>
<td>2,543,263</td>
<td>35,515,859</td>
<td>9,749</td>
<td>$15.26</td>
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<td>Total for FY 2004</td>
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<td>$28,366,270</td>
<td>$66,492,625</td>
<td>310,836</td>
<td>5,496,755</td>
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<td>Total for FY 2005</td>
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<td>$75,391,097</td>
<td>$201,465,006</td>
<td>1,398,118</td>
<td>30,787,712</td>
<td>18,545</td>
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<td>Total for FY 2006</td>
<td>22</td>
<td>$163,960,554</td>
<td>$410,192,500</td>
<td>1,233,397</td>
<td>22,143,688</td>
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<td>Total for FY 2007</td>
<td>15</td>
<td>$149,177,735</td>
<td>$371,703,394</td>
<td>957,303</td>
<td>16,206,513</td>
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<td>Total for FY 2008</td>
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<td>$293,469,669</td>
<td>$756,653,562</td>
<td>1,805,188</td>
<td>34,187,748</td>
<td>6,151</td>
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<td>Total for FY 2010</td>
<td>37</td>
<td>$528,378,174</td>
<td>$1,162,276,810</td>
<td>2,598,197</td>
<td>42,882,708</td>
<td>4,917</td>
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<td>Total for FY 2011</td>
<td>7</td>
<td>$252,650,259</td>
<td>$916,419,640</td>
<td>418,087</td>
<td>7,952,004</td>
<td>1,655</td>
<td>$115.24</td>
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<td>Total for FY 2012</td>
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<td>$182,449,202</td>
<td>$340,520,991</td>
<td>768,505</td>
<td>14,757,644</td>
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<tr>
<td>Total for FY 2013</td>
<td>22</td>
<td>$278,140,200</td>
<td>$504,714,514</td>
<td>1,240,130</td>
<td>18,569,274</td>
<td>4,459</td>
<td>$27.18</td>
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<td>Total for FY 2014</td>
<td>25</td>
<td>$452,555,491</td>
<td>$907,464,001</td>
<td>1,696,051</td>
<td>32,393,260</td>
<td>3,748</td>
<td>$28.01</td>
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<tr>
<td>Total for FY 2016</td>
<td>21</td>
<td>$718,966,109</td>
<td>$1,429,751,381</td>
<td>1,894,441</td>
<td>38,144,627</td>
<td>2,635</td>
<td>$37.48</td>
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<tr>
<td>Total for FY 2017</td>
<td>16</td>
<td>$659,580,916</td>
<td>$1,512,823,080</td>
<td>2,079,747</td>
<td>45,863,451</td>
<td>3,153</td>
<td>$32.99</td>
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<tr>
<td>Grand Total</td>
<td>371</td>
<td>$4,978,201,071</td>
<td>$11,923,713,997</td>
<td>27,415,416</td>
<td>499,776,544</td>
<td>5,507</td>
<td>$23.86</td>
</tr>
</tbody>
</table>

FY 2007 - FY 2016: $3,441,104,142 / $8,334,485,387 / $16,936,734 / $309,477,050 / $4,922 / $26.93 / 2.42

1. **Step 1**: Assign Energy Managers
2. **Step 2**: Identify Covered Facilities
3. **Step 3**: Assign Energy Managers
4. **Step 4**: Disclose Results and Share

**Project Management Framework (4-Year Cycle)**
- Follow-up/M&V (audit and commissioning assessment)
- Solicit, Award and Implement Projects
- Prioritize ECMs and Bundle into Projects

**Performance Monitoring & Diagnosis Framework (Annual Cycle)**
- Install Meters
- Monitor Meter Data for Diagnosis
- Benchmark Building Performance
- Disclose Results and Share

**Continuous Improvement**
- Facility-Level Footprint Benchmarking
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

- 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

- Chris Tremper
  Program Analyst
  Federal Energy Management Program
  Office of Energy Efficiency & Renewable Energy
  202-586-7632
  chris.tremper@ee.doe.gov

- [https://energy.gov/eere/femp/building-life-cycle-cost-programs](https://energy.gov/eere/femp/building-life-cycle-cost-programs)