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# Department of Defense Energy Management: Background and Issues for Congress

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SUMMARY

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# Department of Defense Energy Management: Background and Issues for Congress

The U.S. Department of Defense (DOD) consumes more energy than any other federal agency—77% of the entire federal government's energy consumption. Energy management is integral to DOD operations. From running bases and training facilities to powering jets and ships, DOD relies on energy to maintain readiness and resiliency for mission operations. Energy efficiency—providing the same or an improved level of service with less energy—over time can reduce agency expenses, particularly at an agency like DOD, where energy represents roughly 2% of the department's annual budget.

Since the 1970s, Congress mandated energy requirements for federal agencies. Legislation required reductions in fossil fuel consumption and increases in renewable energy use and efficiency targets for government fleets and buildings. The National Energy Conservation Policy Act (NECPA, P.L. 95-619) requires federal agencies to report annually on energy management activities. The Energy Policy Act of 2005 (EPAct05, P.L. 109-58) and the Energy Independence and Security Act of 2007 (EISA, P.L. 110-140) amended and addressed additional energy management targets for the federal government. As the largest energy consumer in the federal government, DOD drives total federal energy management goal achievements. The annual National Defense Authorization Act (NDAA) has included provisions related to DOD energy management and authorities. With one exception, the NDAA for FY2018 (P.L. 115-91), each NDAA since 1993 contains a section on "authorized energy conservation projects." Further, NDAAs have contributed to internal DOD energy management protocol. Throughout several administrations, Presidents have issued executive orders to establish energy management guidelines and targets for the federal government. The Trump Administration's Executive Order 13834, "Efficient Federal Operations" (E.O. 13834), directs the heads of agencies to maintain annual energy reductions and efficiency measures that reduce costs and meet statutory requirements for renewables, among other things, but does not set specific targets.

DOD categorizes energy into two types—*installation energy* and *operational energy*. DOD's installation energy (i.e., energy for fixed installations and non-tactical vehicles) is subject to federal energy management requirements. Although DOD energy use has trended downward since the 1970s, DOD has not met all federally mandated targets and reporting on progress has been challenging. DOD's operational energy (e.g., energy required for sustaining military forces and weapons platforms for military operations) is not subject to federal energy management requirements. This represents around 70% of total DOD energy use. Operational energy consists largely of petroleum products purchased on the open market by the Defense Logistics Agency. This leaves DOD and its spending susceptible to oil price volatility.

Reviewing how these federal energy management goals impact DOD's mission could be an overarching consideration for Congress. Making operational equipment more fuel efficient could increase range and decrease refueling convoys; however, the challenge is maintaining combat readiness and mission operations. Congress may consider legislation addressing operational energy, such as setting a standard fuel efficiency target or a requirement for alternative fuel use. Congress may also consider continuing to leave operational energy efficiency goals to be determined by DOD or each military branch.

In many cases, federal energy management goals in statute or executive order established targets for FY2015 (e.g., EISA petroleum and alternative fuel consumption targets were due no later than October 1, 2015). Several agencies, including DOD, did not reach the targeted goals. Congress may assess how and whether setting specific targets enhances the agency's mission and reduces costs for DOD. This approach may include addressing target dates or baselines. Congress may consider removing statutory targets altogether, and direct heads of federal agencies to establish protocols that foster efficiency and cost reductions that serve the mission of the agency.

Managing an organization as large and complex as DOD presents certain challenges. One of the challenges DOD faces in meeting these targets is implementing appropriate financing mechanisms. The Energy Policy Act of 1992 (EPAct92, P.L. 102-486) amended NECPA and authorized alternative financing methods for federal energy projects, including energy savings performance contracts (ESPCs) and utility energy service contracts (UESCs). ESPCs have become a preferred means of making energy efficiency improvements because, in part, funds do not have to be directly appropriated (or programmed). With $2.9 billion awarded in FY2017, these contracts can assist with increasing efficiency and meeting renewable energy management goals. Training and guidance for utilizing ESPCs and UESCs is provided to all federal agencies through the Federal Energy Management Program (FEMP). However, challenges remain, particularly in data collection and consistent measurements. One option may be to increase training and awareness of UESCs and ESPCs.

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# Introduction

The federal government is the largest energy consumer in the United States. Within the federal government, the U.S. Department of Defense (DOD) consumes more energy than any other agency. In FY2017, DOD consumed 707.9 trillion British thermal units (Btu) of energy—roughly 16 times that of the second largest consumer in the federal government, the U.S. Postal Service (**Figure 1**).[1] In FY2017, DOD spent approximately $11.9 billion on energy, roughly 76% of the entire federal government's energy expenditures, and roughly 2% of DOD's FY2017 budget.[2]

Energy efficiency—providing the same or an improved level of service with less energy—over time can lead to a reduction in agency expenses. DOD uses energy for a variety of purposes across the various services of the military. For example, DOD's efficient management of energy can also lead to less refueling and fewer fuel convoys. Reducing the frequency and duration of fueling in combat zones could reduce exposure and risk which could save lives.[3]

This report provides an introduction to federal energy management rules applicable to DOD. The report includes an overview of federal statutes and executive orders that govern DOD energy management, and presents data on the status and trends for DOD energy use. Further, the scope of this report excludes nuclear energy for the propulsion of aircraft carriers, submarines, and energy used for military space operations.[4] The report also references agency level guiding documents that provide the basis for how DOD implements these policies. Finally, this report identifies selected considerations for Congress.

[1] Federal Energy Management Program (FEMP), "All Agency Energy Consumption Data by End Use Sector in FY 2017 (Billion Btu)," *Comprehensive Annual Energy Data and Sustainability Performance,* online v1.1.9.0, 2019, http://ctsedwweb.ee.doe.gov/Annual/Report/TotalSiteDeliveredEnergyUseInAllEndUseSectorsByFederalAgencyBillionBtu.aspx. In general, site energy includes fuels consumed onsite (motor fuel, heating fuel, etc.), electricity produced elsewhere and distributed to the facility, and electricity produced onsite. Using site energy as a metric may be misleading in some cases as the efficiency of onsite electricity production and distribution is included in the metric, but not for delivered electricity. For additional information on reporting energy consumption measurements for the federal government, see Federal Energy Management Program, "Reporting Guidance for Federal Agency Annual Report on Energy Management (per 42 U.S.C. §8258)," October 2018, p. 11, available at https://www.energy.gov/eere/downloads/reporting-guidance-federal-agency-annual-report-energy-management-42-usc-8258.

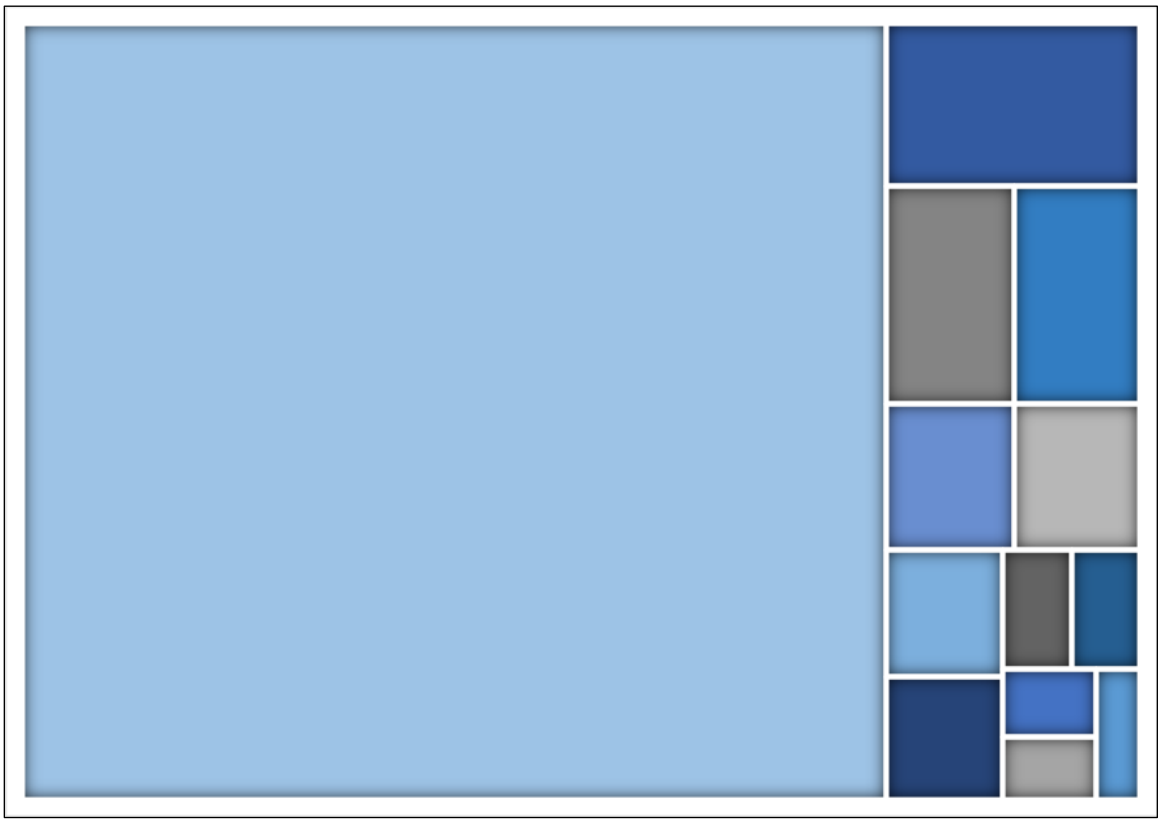
[2] Federal Energy Management Program (FEMP), "Government-Wide Site-Delivered Energy Use and Costs in All End-Use Sectors," Comprehensive Annual Energy Data and Sustainability Performance, online v1.1.9.1, 2019, https://ctsedwweb.ee.doe.gov/Annual/Report/GovernmentWideSiteDeliveredEnergyUseAndCostsInAllEndUseSectorsConstantDollarsCurrentYear.aspx. For more on DOD's FY2017 budget, see CRS Report R44454, Defense: FY2017 Budget Request, Authorization, and Appropriations, by Pat Towell and Lynn M. Williams.

[3] Army Environmental Policy Institute, *Sustain the Mission Project: Casualty Factors for Fuel and Water Resupply Convoys Final Technical Report,* September 2009.

[4] U.S. Department of Defense, Office of the Assistant Secretary of Defense for Energy, Installations and Environment., *2016 Operational Energy Strategy,* 2016, p. 3.

**Figure 1. U.S. Federal Agencies Energy Consumption in Fiscal Year 2017**

Trillion Btu



**Source:** Federal Energy Management Program (FEMP), "All Agency Energy Consumption Data by End Use Sector in FY 2017 (Trillion Btu)," *Comprehensive Annual Energy Data and Sustainability Performance,* online v1.1.9.0, 2019, http://ctsedwweb.ee.doe.gov/Annual/Report/TotalSiteDeliveredEnergyUseInAllEndUse SectorsByFederalAgencyBillionBtu.aspx.

**Notes:** DHS=Department of Homeland Security; GSA=General Services Administration; HHS=Health and Human Services; NASA=National Aeronautics and Space Administration; DOT=Department of Transportation; USDA=Department of Agriculture; DOI=Department of the Interior.

Energy consumption is measured in terms of total site-delivered energy, and measured in all end-use sectors. According to DOE, delivered energy, "is the amount of energy consumed at the point of sale (e.g., that enters the home, building, or establishment) without adjustment for any energy loss in the generation, transmission, and distribution of that energy.... Delivered energy is sometimes referred to as 'site' energy." End-use sectors are "the four sectors that consume primary energy and electricity: transportation, industry, residential and commercial." See DOE, "Energy Intensity Indicators: Terminology and Definitions," Office of Energy Efficiency and Renewable Energy, at https://www.energy.gov/eere/analysis/energy-intensity-indicators-terminology-and-definitions.

* Other: all agencies representing less than 5 trillion Btu each of total energy use.

# DOD Energy Management Requirements

Federal energy management requirements include reductions in fossil fuel consumption, increases in renewable energy use, and energy efficiency targets for government fleets and buildings. In addition to the energy management requirements that apply to federal agencies, DOD's energy policy is designed to ensure the readiness of U.S. armed forces through energy security and

resilience.[5] DOD, through statute (e.g., 10 U.S.C. §2922e), has authority to suspend certain requirements to meet established operational military demands.[6]

## Legislation

In the 1970s, Congress began mandating energy use reductions for federal agencies, directing agencies to improve the efficiency of buildings and facilities and reduce fossil fuel dependence. Legislation aimed at reducing federal agency energy consumption can be traced back to the Energy Policy and Conservation Act (EPCA, P.L. 94-163) as shown in **Table 1**. Among other provisions, EPCA directed the President to implement a 10-year plan for energy conservation and efficiency standards for government procurement. In 1977, Congress passed into law an act establishing the Department of Energy (P.L. 95-91). The following year, Congress enacted the National Energy Conservation Policy Act (NECPA, P.L. 95-619), which, among other actions, established a program to retrofit federal buildings to improve energy efficiency.

The Energy Policy Act of 1992 (EPAct92, P.L. 102-486) amended NECPA and authorized alternative financing methods for federal energy projects, including energy savings performance contracts (ESPCs) and utility energy service contracts (UESCs), among other provisions.[7] Since NECPA and EPAct92, two laws contain provisions that set energy management requirements for all federal agencies—the Energy Policy Act of 2005 (EPAct05, P.L. 109-58) and the Energy Independence and Security Act of 2007 (EISA, P.L. 110-140). EPAct05 and EISA amended and addressed additional energy management targets for the federal government, among other things.

Federal agencies report energy consumption annually to the Department of Energy's (DOE) Federal Energy Management Program (FEMP). EISA Section 527 (42 U.S.C. §17143), requires federal agencies to report to the Office of Management and Budget (OMB) on the status and implementation of energy efficiency improvements, energy reduction costs, and greenhouse gas (GHG) emissions. Subsequently, EISA Section 528 (42 U.S.C. §17144) directs OMB to provide a summary of this information and an evaluation of progress for the federal government to the Committee on Oversight and Government Reform of the House of Representatives and the

[5] Energy security, according 10 U.S.C. §101(e)(7), ensures reliable supplies and deliveries of energy to meet mission requirements. Energy resilience as defined by 10 U.S.C. §101(e)(6) is "the ability to avoid, prepare for, minimize, adapt to, and recover from anticipated and unanticipated energy disruptions in order to ensure energy availability and reliability sufficient to provide for mission assurance and readiness, including mission essential operations related to readiness, and to execute or rapidly reestablish mission essential requirements." U.S. Department of Defense, Office of the Assistant Secretary of Defense for Energy, Installations, and Environment, *Annual Energy Management and Resilience Report (AEMRR) Fiscal Year 2017*, July 2018, p. 1, https://www.acq.osd.mil/eie/Downloads/IE/FY%202017%20AEMR.pdf.

[6] For descriptions of selected statutes pertaining to the federal laws discussed in this report, see **Appendix A** for DOD specific regulations and **Appendix B** for government-wide regulations.

[7] A UESC is a contract between a federal agency and the serving utility. Under a UESC, the utility arranges financing for efficiency projects and renewable energy projects, and the costs are repaid by the agency over the length of the contract. An ESPC is a multiyear contract between a federal agency and an energy service company. In general, under an ESPC, a federal agency agrees to pay an amount not to exceed the current annual utility costs for a fixed period of time (up to 25 years) to an energy service company, which finances and installs facility improvements. In return, the contractor assumes the performance risks of energy conservation measures during the contract period and guarantees that the improvements will generate energy cost savings sufficient to pay for the improvements over the length of the contract, as well as providing the energy services company a return on the investment. After the end of the contract, the agency benefits from reduced energy costs as a result of the improvements. For more on these two alternative financing methods, see CRS Report R45411, *Energy Savings Performance Contracts (ESPCs) and Utility Energy Service Contracts (UESCs)*, by Corrie E. Clark.

Committee on Governmental Affairs of the Senate.[8] The Director of OMB compiles the compliance status of the EISA requirements and description of each into an agency scorecard.[9] **Appendix B** contains a selected compilation of federal energy management requirements for all agencies.

**Table 1. Selected Federal Energy Management Statutes**

| Year of Enactment | Title | Public Law |
|---|---|---|
| 1975 | Energy Policy and Conservation Act (EPCA) | P.L. 94-163 |
| 1977 | Department of Energy Organization Act | P.L. 95-91 |
| 1978 | National Energy Conservation Policy Act (NECPA) | P.L. 95-619 |
| 1992 | Energy Policy Act of 1992 (EPAct92) | P.L. 102-486 |
| 2005 | Energy Policy Act of 2005 (EPAct05) | P.L. 109-58 |
| 2007 | Energy Independence and Security Act of 2007 (EISA) | P.L. 110-140 |
| Annual | National Defense Authorization Acts (NDAAs) | Various |

**Notes:** With one exception (P.L. 102-190), every NDAA since the 99th Congress contains sections related to energy efficiency and/or energy conservation. P.L. 102-190 covered two fiscal years (FY1992 and FY1993). Congress passed another NDAA for FY1993, which did include sections on energy efficiency and conservation.

The annual National Defense Authorization Act (NDAA) has included provisions related to DOD energy management and authorities. For example, Congress, by enacting the Department of Defense Authorization Act for FY1985 (P.L. 98-525), granted the Secretary of Defense waiver authority for the acquisition of petroleum. NDAA for FY2000 Section 803 (P.L. 106-65) amended this waiver authority to extend beyond petroleum to "a defined fuel source."[10] This authority permits the Secretary of Defense to waive any provision that would otherwise prescribe terms and conditions of a defined fuel purchase contract if market conditions have affected or will adversely affect the acquisition of the fuel source; and if the waiver will expedite acquisition for government needs (10 U.S.C. §2922e).

With one exception, the NDAA for FY2018 (P.L. 115-91), every NDAA since 1993 contains a section on "authorized energy conservation projects." For instance, NDAA for FY2007 (P.L. 109-364) added a section regarding renewable energy production or procurement goals to 10 U.S.C. §2911. As amended by several NDAAs, this DOD specific goal requires DOD to consume 25% of total facility energy from renewable sources by FY2025 (**Appendix A**).

Further, NDAAs have contributed to a number of internal DOD energy management protocols. For instance, the NDAA for FY2011 Section 2832 (P.L. 111-383) directs the Secretary of Defense to develop an Energy Performance Master Plan (including metrics for measurement, use of a baseline standard, separate plans for each branch, etc.) to achieve performance goals set by law,

[8] Now known as the House Committee on Oversight and Reform and the Senate Committee on Homeland Security and Governmental Affairs, respectively.

[9] U.S. Department of Defense, *FY2017 OMB Scorecard for Efficient Federal Operations/Management*, accessed May 23, 2019, available at https://www.sustainability.gov/pdfs/dod_scorecard_fy2017.pdf.

[10] A "defined fuel source," as amended by NDAA for FY2012 (P.L. 112-81) includes petroleum, natural gas, coal, and coke.

executive orders, and DOD policies.[11] The NDAA for FY2015 requires an annual report that certifies whether or not the President's budget is adequate to meet objectives of the Operational Energy Strategy as outlined in 10 U.S.C. 2926.[12]

NDAAs continue to address energy security and resilience for DOD. In 2018, for example, Congress enacted the NDAA for FY2019 (P.L. 115-232), authorizing appropriations of $193 million for energy resilience and conservation investment programs. Multiple statutes, in addition to those above, establish the legislative authority for DOD energy management. Selected sections of the U.S. Code applicable to DOD energy management are delineated in **Appendix A**.

## Executive Orders

Over several administrations, Presidents have issued executive orders to establish energy management guidelines and targets for the federal government. Executive orders applied specifically to government vehicles, buildings, and computer equipment. Since 1991, 12 executive orders have been issued on federal energy management (**Appendix C**). Only Executive Order 13834, "Efficient Federal Operations" (E.O. 13834), is currently in effect. All the others have been revoked by subsequent orders.

On May 17, 2018, President Trump issued E.O. 13834, revoking E.O. 13693 and its specific targets for federal agencies. E.O. 13834 directs the heads of agencies to meet "statutory requirements in a manner that increases efficiency, optimizes performance, eliminates unnecessary use of resources, and protects the environment," but contains no specific targets. The White House Council on Environmental Quality Office of Federal Sustainability issued implementing instructions for E.O. 13834 in April 2019.[13]

The Office of Federal Sustainability's website provides resources, guidance documents, and reported energy performance data across federal agencies to support implementation of E.O. 13834. The Office of Federal Sustainability also lists other relevant U.S. code provisions, public laws, and other resources that federal agencies are required to follow.[14]

## Agency Policies and Procedures

DOD issues directives, memorandums, manuals, and guidance instructions to military departments and agencies on complying with statues and executive orders. For instance, DOD Instruction (DODI) 4170.11, *Installation Energy Management,* and DOD Directive (DODD) 4180.01, *DOD Energy Policy*, provide guidance for energy planning, use, implementation and

[11] The first Energy Performance Master Plan is in the U.S. Department of Defense, *FY2011 Annual Energy Management Report (AEMR)*, September 2012, p. C-3, https://www.acq.osd.mil/eie/Downloads/IE/FY%202011%20AEMR.pdf. DOD periodically updates the Master Plan in the *Annual Energy Management and Resilience Report* (formerly the AEMR).

[12] Operational energy (e.g., jet fuel) "means the energy required for training, moving, and sustaining military forces and weapons platforms for military operations. The term includes energy used by tactical power systems and generators and weapons platforms," 10 U.S.C. §2924(4).

[13] Office of Federal Sustainability, "Implementing Instructions for Executive Order 13834 Efficient Federal Operations," Council on Environmental Quality, April 2019, https://www.sustainability.gov/pdfs/eo13834_instructions.pdf.

[14] For information on these and other relevant laws, codes, and guiding documents, see Office of Federal Sustainability, Council on Environmental Quality Guidance, "Energy and Environmental Policies," https://www.sustainability.gov/resources.html.

management.[15] These and other guidance documents outline best practices to meet federal goals within the context of the agency's mission, while giving flexibility to military departments for achieving goals.[16]

Military departments within DOD are tasked with following agency policies and procedures to issue internal energy strategies to meet the specific needs of their mission. The Energy Performance Master Plan tasks each military department and defense agency to develop their own master plans toward meeting federal requirements. Military departments can have their own goals and guiding documents within the parameters of statute and executive order (e.g., the Army's Energy Security and Sustainability Strategy or the Secretary of the Navy's Energy Goals).

Further, 10 U.S.C. 2925 mandates DOD to submit to Congress two annual reports on the progress of meeting federal and executive energy targets: the Operational Energy Annual Report and the Annual Energy Management and Resilience Report (AEMRR), which includes the Energy Performance Master Plan.[17] These reports compile energy use information from the various DOD departments on their progress toward meeting federal requirements.

**Secretary of the Navy Energy Goals**

In 2009, then-Secretary of the Navy, Ray Mabus, announced five energy goals:

1. Alternative energy sources to reach 50% of total consumption by 2020;
2. Shore-based energy to produce 50% from alternative sources and 50% of Navy and Marine Corps installations net-zero by 2020;
3. Deploy a fleet of ships and aircraft (known as the Great Green Fleet) on alternative fuel blends in 2016;
4. Non-tactical petroleum reductions of 50% by 2015; and
5. Energy as a mandatory evaluation factor when awarding contracts for systems and buildings.[18]

Following the announcement of these goals, the Navy issued a number strategic planning documents for implementing energy management goes into mission operations. Such documents include the Department of the Navy Strategy for Renewable Energy, the Navy Energy Vision, and the Naval Energy Strategic Roadmap.[19]

For federal-wide requirements, implementing instructions and guidance documents are often issued by DOE. For instance, EPAct05 has a renewable electricity consumption requirement of 7.5% for the federal government by FY2013. The President, acting through the Secretary of DOE,

[15] U.S. Department of Defense, Directive 4180.01, DOD Energy Policy, April 16, 2014 Incorporating Change 2, August 31, 2018, https://www.esd.whs.mil/Portals/54/Documents/DD/issuances/dodd/418001.pdf?ver=2018-11-07-112520-837.

[16] For a selected list of relevant policies and guiding documents, see Office of the Assistant Secretary of Defense for Sustainment, "Installation Energy Policy and Program Guidance," accessed July 15, 2019, https://www.acq.osd.mil/eie/IE/FEP_Policy_Program_Guidance.html.

[17] While the report is submitted annually, the section on the Master Plan is updated as needed.

[18] Remarks by Secretary of the Navy, Ray Mabus, Naval Energy Forum, October 14, 2009, https://www.navy.mil/navydata/people/secnav/Mabus/Speech/SECNAV%20Energy%20Forum%2014%20Oct%2009%20Rel1.pdf.

[19] Department of the Navy, 1 Gigawatt Task Force, *Strategy for Renewable Energy*, October 2012, https://navysustainability.dodlive.mil/files/2013/01/DASN_EnergyStratPlan_Final_v3.pdf; Department of the Navy, *A Navy Energy Vision for the 21st Century*, October 2010, https://navysustainability.dodlive.mil/files/2010/10/Navy-Energy-Vision-Oct-2010.pdf; and Department of the Navy, *Energy Program for Security and Independence*, October 2010, https://navysustainability.dodlive.mil/files/2010/04/Naval_Energy_Strategic_Roadmap_100710.pdf.

under Section 203 of EPAct05, is to ensure that the federal government meets the requirement. In order to ensure this, DOE issued guidance to federal agencies on how to meet the requirement.[20]

# DOD Energy Status

DOD categorizes energy as either "installation" or "operational."[21] Installation energy refers to "energy needed to power fixed installations and enduring locations as well as non-tactical vehicles (NTVs)."[22] Installation energy historically represents roughly 30% of DOD total energy and is subject to federal energy efficiency and conservation requirements, as reported to Congress in the AEMRR. In FY2017, DOD spent $3.48 billion on installation energy and NTV fuels.[23] Operational energy (e.g., jet fuel) is "the energy required for training, moving, and sustaining military forces and weapons platforms for military operations and training—including energy used by tactical power systems and generators at non-enduring locations."[24] Federal energy management requirements outlined in **Appendix A** and **Appendix B** do not apply to operational energy. However, under 10 U.S.C. 2926, DOD does have an operational energy policy to promote readiness of military missions.

From FY2003 to FY2017 the federal government reduced total site-delivered energy use by 19.2% compared to the FY2003 baseline in all sectors. During the same time period, DOD reduced site-delivered energy use by 20.9%.[25] While overall, DOD has reduced energy use, its energy use has not necessarily been consistent from one year to the next. For example, during the War in Iraq (FY2003 to FY2004), energy use increased from 895 trillion Btu to 960 trillion Btu, as shown in **Figure 2**.

[20] U.S. Department of Energy, Office of Energy Efficiency and Renewable Energy, FEMP, *2007 Federal Energy Management Program (FEMP) Renewable Energy Requirement Guidance for EPAct 2005 and Executive Order 13423 Final*, January 28, 2008, p. 8.

[21] 10 U.S.C. § 2924(4).

[22] U.S. Department of Defense, *AEMRR FY2017*, p.1. NTVs, according to DOD Instruction, are defined as, "any commercial motor vehicle, trailer, material handling or engineering equipment that carries passengers or cargo acquired for administrative, direct mission, or operational support of military functions. All DOD sedans, station wagons, carryalls, vans, and buses are considered 'non-tactical.'" U.S. Department of Defense, *Acquisition, Management and Use of Non-Tactical Vehicles (NTVs)*, DODI 4500.36, December 11, 2012, Incorporating Change 3, August 31, 2018, https://www.esd.whs.mil/Portals/54/Documents/DD/issuances/dodi/450036p.pdf?ver=2017-09-19-115004-580.

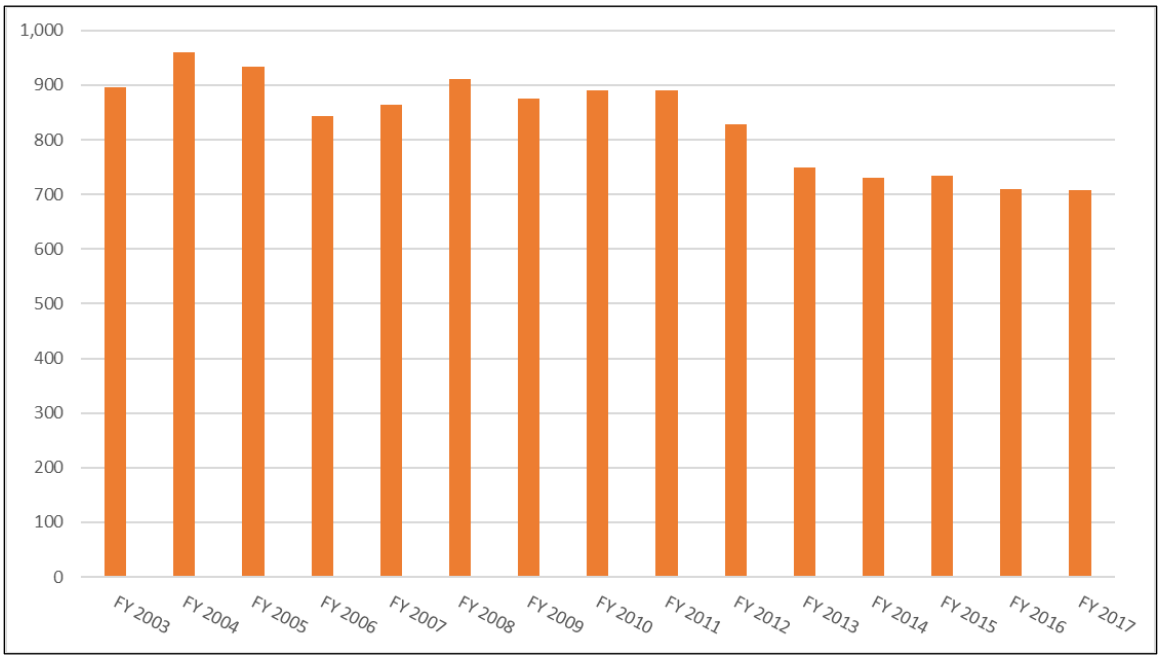
[23] U.S. Department of Defense, *AEMRR FY2017*, p. E-3.

[24] U.S. Department of Defense, *AEMRR FY2017*, p. 1.

[25] FEMP, "All Agency Energy Consumption Data by End Use Sector in FY 2017 (Billion Btu)," *Comprehensive Annual Energy Data and Sustainability Performance*, online v1.1.9.0, 2019, http://ctsedwweb.ee.doe.gov/Annual/Report/TotalSiteDeliveredEnergyUseInAllEndUseSectorsByFederalAgencyBillionBtu.aspx.

**Figure 2. Total Installation and Operational DOD Site-Delivered Energy Use**

Trillion British Thermal Units




**Source:** FEMP, "All Agency Energy Consumption Data by End Use Sector in FY 2017 (Billion Btu)," *Comprehensive Annual Energy Data and Sustainability Performance,* online v1.1.9.0, 2019, http://ctsedwweb.ee.doe.gov/Annual/Report/TotalSiteDeliveredEnergyUseInAll EndUseSectorsByFederalAgencyBillionBtu.aspx.

**Notes:** According to the DOE, delivered energy is "the amount of energy consumed at the point of sale (e.g., that enters the home, building, or establishment) without adjustment for any energy loss in the generation, transmission, and distribution of that energy.... Delivered energy is sometimes referred to as 'site' energy."

## Installation Energy

Representing roughly 30% of DOD total energy use, installation energy is subject to federal energy management requirements. Federal energy management requirements include energy efficiency targets for government buildings, renewable energy use goals, and fossil fuel reductions for the NTV fleet. According to the AEMRR FY2017, energy and cost savings compared to an FY2005 baseline resulted in $5.67 billion in total savings through FY2017.[26] The AEMRR also notes that the DOD increased installation energy consumption levels by 0.3% from FY2016 to FY2017.

### Building Efficiency

42 U.S.C. §8253(a) requires federal agencies to achieve a 30% reduction from FY2003 levels in energy consumption per gross square foot (GSF) for *goal* federal buildings by FY2015 (**Appendix B**). Goal buildings are federal buildings subject to federal energy performance requirements. DOD examples of goal buildings include the Army's Holston Ammunition Plant in

[26] U.S. Department of Defense, *AEMRR FY2017*, p. E-3.

Tennessee and the Navy's Camp Lemonnier in Djibouti.[27] Excluded facilities are federal buildings not required to meet the federal building energy performance requirement for the fiscal year according to the criteria under Section 543(c)(3) of NECPA. Federal agencies may typically *exclude* buildings that have a dedicated energy process that overwhelms other building consumption, such as one designed for a national security function or for the storage of historical artifacts.

DOD manages nearly 300,000 buildings, most of which are subject to federal energy management. In FY2015, DOD did not meet the 30% reduction target, as DOD reduced building energy intensity by 16.5% relative to FY2003 levels. In FY2017, DOD consumed 91,709 Btu/GSF, a 21.8% decrease from baseline FY2003.[28]

Increasing building efficiencies and reducing energy intensity can be supported through alternative funding mechanisms (e.g., ESPCs, UESCs, power purchase agreements).[29] In FY2017, the Army, for example, awarded $289.3 million in ESPC and UESC projects estimated to save 1,132 billion Btu annually. According to the AEMRR FY2017, these projects could avoid costs of $17.2 million annually from the project savings.[30]

In addition to the energy efficiency requirement, EISA Section 433 requires federal agencies to reduce fossil fuel consumption in *new* or *majorly renovated* buildings (**Table B-1**) by specified amounts.[31] By FY2020, these buildings are supposed to reduce fossil fuel consumption by 80% relative to a similar building's consumption levels in FY2003. DOE proposed a rulemaking for comment on this legislation on October 15, 2010.[32] However, the rulemaking was not finalized, and no further action has been taken since December 2014 when the comment period closed. DOD has not reported on this requirement.

## Renewables

EPAct05 requires federal agencies to reach 7.5% total renewable electricity consumption by FY2013. According to implementing instructions to comply with EPAct05, agencies must maintain ownership of renewable energy credits (RECs).[33] If DOD sells a REC to meet state requirements, and it is not replaced with another REC, then the renewable electricity DOD produced does not receive credit toward the EPAct05 goal. Within these reporting requirements,

[27] According to DOD's AEMRR FY2017, the Holston Ammunition Plant had the highest energy intensity of DOD goal buildings in the United States. Camp Lemonnier had the highest energy intensity for DOD goal buildings outside the United States. U.S. Department of Defense, *AEMRR FY2017*, pp. J-3 and J-16.

[28] FEMP, "All Agency Energy Consumption Data by End Use Sector in FY 2017 (Billion Btu)," *Comprehensive Annual Energy Data and Sustainability Performance*, online v1.1.9.0, 2019, http://ctsedwweb.ee.doe.gov/Annual/Report/SiteDeliveredEnergyUseInGoalSubjectBuildingsByFederalAgencyBillionBtu.aspx.

[29] For more on ESPCs and UESCs, see footnote 7. For further reference on authorizations, see **Appendix A** and **Appendix B**.

[30] U.S. Department of Defense, *AEMRR FY2017*, p. 14.

[31] 42 U.S.C. §6834(a)(3)(D)(i) applies only to new and majorly renovated buildings that are (1) "public buildings" *or* (2) those that cost at least $2,500,000 adjusted for inflation. As defined in 40 U.S.C. 3301(a)(5)(C)(vii): "military installations (including any fort, camp, post, naval training station, airfield, proving ground, military supply depot, military school, or any similar facility of the Department of Defense)" are not considered "public buildings."

[32] U.S. Department of Energy, "Fossil Fuel-Generated Energy Consumption Reduction for New Federal Buildings and Major Renovations of Federal Buildings, Proposed Rule," 79 *Federal Register*, October 14, 2014, pp. 61693-61735.

[33] U.S. Department of Energy, Office of Energy Efficiency and Renewable Energy, FEMP, *2007 Federal Energy Management Program (FEMP) Renewable Energy Requirement Guidance for EPAct 2005 and Executive Order 13423 Final*, January 28, 2008, p. 8.

in FY2013, DOD reached 5% renewable electricity consumption, and in FY2017, DOD reached nearly 6% of total electricity consumption from renewables.[34] Solar photovoltaic sources contributed to this increase reaching 627,783 megawatt-hours (MWh) up from 396,268 MWh in FY2016.[35]

RECs are created when a renewable source of energy generates a megawatt-hour of electricity. Each REC has a unique identification number and provides data (e.g., the resource type, service date, location, etc.) that is traceable and certifiable.[36] RECs can be traded and have monetary value. They are used by utilities to comply with state renewable electricity standards. Thus, RECs can help improve the return on investment for renewable projects. The ownership of these credits is often a contract stipulation associated with the project for the developer. State and/or local renewable requirements play a role in determining the contract stipulations for the credit ownership.

In addition to EPAct05 goal of 7.5% renewable electricity by FY2013, DOD in accordance with 10 U.S.C. §2911(g) is required to "produce or procure" 25% renewable energy (electrical and non-electrical) by FY2025. The purchasing of RECs is not mandatory for DOD to comply with this goal. DOD's 2011 Energy Performance Master Plan set an interim goal of 15% renewable energy consumption by FY2018. Under §2911(g), in FY2017 DOD's renewable energy consumption reached approximately 8.7% of total facility energy use.[37]

## Non-Tactical Vehicles Fleet

In FY2017, DOD consumed around 8,764 billion Btu of NTV fuel, roughly 4.3% of DOD installation energy.[38] EISA requires federal vehicle fleets to reduce petroleum consumption from the FY2005 baseline by 20% no later than October 1, 2015 (**Appendix B**). In FY2015, DOD complied with the EISA target with a reduction in NTV fleet petroleum consumption of 27% compared to FY2005 baseline. DOD has continued to reduce installation vehicle fleet petroleum consumption and reached a 34.5% reduction in FY2017. At the branch level, the FY2017 AEMRR states that the Air Force experienced an increase of 9.3% in consumption compared to the FY2005 baseline. Despite this increase, the Air Force, according to the AEMRR, does continue to implement programs to reduce consumption and increase alternative fuel use in research and development.

In addition to the petroleum consumption reduction goal, federal agencies under EISA are to increase alternative fuel consumption by 10% compared to a FY2005 baseline no later than October 1, 2015 (**Appendix B**). According to the Office of Federal Sustainability, DOD met the alternative fuel consumption target in FY2015 reaching 10.6% of total fuel consumption. However, in FY2017, DOD's alternative fuel consumption decreased to 9.4% of the total

[34] FEMP, "All Agency Energy Consumption Data by End Use Sector in FY 2017 (Billion Btu)," *Comprehensive Annual Energy Data and Sustainability Performance,* online v1.1.9.0, 2019, http://ctsedwweb.ee.doe.gov/Annual/Report/FederalAgencyUseRenewableElectricAsPercentageOfElectricityUse.aspx.

[35] FEMP, "All Agency Energy Consumption Data by End Use Sector in FY 2017 (Billion Btu)," *Comprehensive Annual Energy Data and Sustainability Performance,* online v1.1.9.0, 2019, http://ctsedwweb.ee.doe.gov/Annual/Report/RenewableEnergyElectricByType.aspx.

[36] Office of Federal Sustainability Council on Environmental Quality, *Federal Renewable Energy Certificate Guide,* June 16, 2016, p. 4.

[37] U.S. Department of Defense, *AEMRR FY2017,* p. 28.

[38] U.S. Department of Defense, *AEMRR FY2017,* p. E-3.

installation fleet fuel consumed.[39] These requirements apply only to installation energy and do not apply to operational energy.

## Operational Energy

Operational energy constitutes roughly 70% of DOD's total energy use. In FY2017, DOD spent $8.2 billion on operational energy expenditures.[40] The largest portion of this came from jet fuel at nearly 394 trillion Btu or roughly 56% of total DOD energy consumption for FY2017.[41] DOD depends on jet fuel and other petroleum products to perform mission operations. According to DOD's *FY2017 Operational Energy Annual Report*, from FY2013 to FY2017, total operational energy demand remained relatively stable, around 87 million barrels of fuel per year (roughly 500 trillion Btu), while the price of crude oil fluctuated. The price of oil declined by roughly 60% in 2014, which contributed to a decrease in fuel expenditures from $14.8 billion in FY2013 to $8.2 billion in FY2017, around a 45% reduction.[42]

DOD's efficient management of fuel can also lead fewer fuel convoys. Reducing the frequency and duration of fueling in combat zones could reduce exposure and risk which could save lives. According to a 2009 report by the Army Environmental Policy Institute, for every 24 fuel-related convoys in Afghanistan there was roughly one casualty.[43] A challenge is balancing mission operations (i.e., increasing weapons systems and combat performance) while also increasing efficiency.

**Department of Defense Fuel Procurement**

Fuel for DOD is procured through the Defense Logistics Agency (DLA). The price of refined petroleum products constitutes nearly 80% of what DLA charges to its DOD customers (the remaining 20% consists of transportation, maintenance, and other costs). DLA purchases fuel on the open market and is therefore subject to oil market price volatility. Around 18 months in advance, DOD sets a standard fuel price for a particular budget year, including the cost of the product and related expenses (e.g., transportation, maintenance) for their customers. The price is based on the Administration's projected price of refined petroleum products and DLA's projected operating costs. DOD attempts to balance the budget and fluctuating market prices through the use of defense working capital funds (DWCFs).

If market prices exceed what is available in the DWCF, DOD has two options. First, it can reprogram funds from other accounts, though this may have adverse effects on other DOD activities. Second, DOD can change the set standard price during the current year. Alternatively, if the market is below the set price for the year, DOD can accumulate resources in the DWCF.

# Considerations for Congress

Some questions Congress may be interested in considering include:

- What kind of federal energy efficiency requirements should DOD have for operational energy, if any?

[39] Office of Federal Sustainability, "Performance Data-DOD," online database, accessed March 14, 2019, https://www.sustainability.gov/dod.html.

[40] Expenditures are not adjusted for inflation, see U.S. Department of Defense, *Fiscal Year 2017 Operational Energy Annual Report*, Office of the Under Secretary of Defense for Acquisition and Sustainment, July 2018, p. 19.

[41] U.S. Department of Energy, Office of Energy Efficiency and Renewable Energy.

[42] U.S. Department of Defense, *Fiscal Year 2017 Operational Energy Annual Report*, Office of the Under Secretary of Defense for Acquisition and Sustainment, July 2018, p. 19.

[43] Army Environmental Policy Institute, *Sustain the Mission Project: Casualty Factors for Fuel and Water Resupply Convoys Final Technical Report*, September 2009, p. i.

- To what extent do federal energy management targets need to be updated?
- What role is there for Congress to clarify or provide oversight on implementing federal energy management goals?
- How are alternative financing mechanisms supporting DOD's attainment of federal energy management goals? To what extent should Congress support these mechanisms?

## Operational Energy

As noted, existing statutory energy management goals do not apply to operational energy, but DOD's operational energy policy is mandated by 10 U.S.C. 2926. As part of the operational energy policy, DOD establishes a strategy including plans and performance metrics. Further, DOD is mandated to submit to Congress both a report on the strategy (Operational Energy Strategy) and a report certifying that the proposed Presidential budget supports the implementation of the strategy (Operational Energy Budget Certification Report).

Operational energy comprises 70% of energy use within DOD, much of which consists of petroleum-based fuels. Federal energy management goals do not apply to most of DOD's energy use. Congress may consider setting mission priorities for DOD. Congress could also consider mandating whether or not DOD should prioritize energy access over energy conservation, or vice versa. While making operational equipment more fuel efficient could increase range and decrease refueling convoys, the challenge is how to prioritize maintaining combat readiness and mission operations. Congress may consider legislation addressing operational energy, such as setting a standard fuel efficiency target or a requirement for alternative fuel use.

Congress may also consider continuing to leave operational energy efficiency goals to be determined by DOD or each military branch. While this option could provide more flexibility, it could also lead to some challenges. For instance, in 2009, Navy Secretary Ray Mabus announced plans for the Navy to consume half of all fuel from alternative sources by 2020 (see textbox on Secretary of the Navy Energy Goals).[44] The announcement also included a 2016 goal to deploy a carrier strike group using alternative fuels (e.g., nuclear power, biofuels) and energy conservation measures, an initiative known as the Great Green Fleet. The Great Green Fleet deployed in 2016 and conducted operations using alternative fuels and energy-efficient technologies and operating procedures.[45]

Some critics of the Navy energy goals noted that the Navy implemented these energy targets based on limited analysis.[46] For instance, a House Armed Services Committee hearing in March 2012 inquired how the Navy determined the 50% goal for biofuel use, how it was determined that 50% was the amount the Navy should have, whether it could be attained by 2020, and what metrics were used to make this determination. A 2011 study by Logistics Management Institute (LMI) was referenced as a source that outlined the attainability of the goal; however, it had been released two years after the announcement of the energy plan.[47]

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[44] Remarks by Secretary of the Navy, Ray Mabus, Naval Energy Forum, October 14, 2009, https://www.navy.mil/navydata/people/secnav/Mabus/Speech/SECNAV%20Energy%20Forum%2014%20Oct%2009%20Rel1.pdf.

[45] U.S. Navy, Energy, Environment and Climate Change, "Energy," website, accessed July 1, 2019, available at https://navysustainability.dodlive.mil/energy/#GGF.

[46] Noah Shachtman, "How the Navy's Incompetence Sank the 'Green Fleet,' The Brookings Institution, July 17, 2012, https://www.brookings.edu/opinions/how-the-navys-incompetence-sank-the-green-fleet/.

[47] At the time of her testimony Assistant Secretary of the Navy, Energy, Installations, and Environment Jackalyne

Supporters of the Navy's energy goals noted the benefits of a more diverse fuel supply and utilizing domestically produced biofuels. DOD is subject to oil price volatility, as such a more diverse fuel supply could potentially reduce dependence on the volatile market (see textbox on Department of Defense Fuel Procurement). According to Assistant Secretary of the Navy, Energy, Installations, and Environment Jackalyne Pfannenstiel's 2012 testimony, "without more domestically produced fuels, the [Navy] will continue to be subjected to fuel price volatility and be compelled to trade training, facility sustainment, and needed programs to pay for unplanned bills."[48]

If Congress were to set a target, reporting data and status updates could also be included in legislation to provide increased accountability of these programs. According to a 2016 naval announcement, the alternative fuel used for the Great Green Fleet was cost competitive and was made from 10% beef tallow and 90% marine diesel.[49]

## Adjusting Targets

In many cases, federal energy management goals in statute or executive order established targets for FY2015 (e.g., EISA petroleum and alternative fuel consumption targets were due no later than October 1, 2015). Several agencies, including DOD, did not reach the targeted goals. Congress may consider establishing new targets. Alternatively, Congress may instead remove statutory targets altogether, instead directing heads of federal agencies to establish protocols that foster efficiency and cost reductions that serve the mission of the agency.

### Uniform Federal Energy Targets

If given the flexibility, agencies may opt to set more easily attainable targets based on budget and mission needs, which may not have as much of an impact on total federal energy use. In March 2015, then-Secretary of Energy Ernest Moniz convened a Task Force of members from the private sector, universities, and nonprofit organizations to review various components of E.O. 13693, including target setting. The Task Force argued that setting energy goals across all agencies "may drive some agencies to over-invest in the targeted area of energy-performance improvement to the detriment of other operational priorities. Conversely, uniform energy goals may understate the potential for cost-effective investments in energy efficiency for other agencies."[50] Primary agency concerns may include their potential cost and mission impact. Congress and agencies may have different perspectives regarding these concerns. Successful attainment of established targets have varied from agency to agency. Some agencies may inherently be more energy intensive than others and as such may face challenges financing projects to reach certain targets.

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Pfannenstiel noted she did not know the publication date of the study. U.S. Congress, House Committee on Armed Services, Subcommittee on Readiness, *What Is the Price of Energy Security: From Battlefields to Bases*, 112th Cong., 2nd sess., March 29, 2012, H.A.S.C. No. 112-128 (Washington: GPO, 2012), and U.S. Department of Defense, analytical support and principal drafting conducted by LMI, *Opportunities for DOD Use of Alternative and Renewable Fuels, FY10 NDAA Section 334 Congressional Study*, July 2011, https://www.acq.osd.mil/eie/Downloads/OE/20110718_Opportunities_DoD_Use_Alternative_Fuels.pdf.

[48] U.S. Congress, *What Is the Price of Energy Security: From Battlefields to Bases*, p. 135.

[49] John C. Stennis Strike Group Public Affairs, "The Great Green Fleet Explained," U.S. Navy, Story Number NNS160627-03, June 27, 2016, https://www.navy.mil/submit/display.asp?story_id=95398.

[50] U.S. Department of Energy, *Secretary of Energy Advisory Board Report of the Task Force on Federal Energy Management*, September 22, 2016, p. 24.

## Technology-Forcing Targets

Leaving targets to agencies may provide some flexibility, as not all agencies have the same energy needs. Agencies might choose to set ambitious targets that some may consider too costly and may not be based on consistent data. In some cases, meeting targets could come at a high cost, particularly in the early stages of development. Some may argue that the high cost for early research and development (R&D) may be acceptable, especially if in the long term it drives costs down. If Congress were to direct DOD to set a standard, DOD may set a goal that could require additional R&D to develop equipment that meets the standard, but also does not diminish combat readiness. For instance, a test of the Great Green Fleet in the summer of 2012 reportedly cost the Navy nearly $27 a gallon for 450,000 gallons of biofuel.[51] By 2016, the Navy achieved competitive prices with conventional fuels with a 90% diesel blend with 10% biofuel. The Navy reportedly contracted with a California firm to purchase 77 million gallons of biofuel from beef fat at $2.05, including a 15 cent per gallon subsidy.[52] The 2016 DOE Task Force report also noted the historical role of the federal government as an adopter of new technologies, providing a faster pathway toward commercial viability.[53] While this may not always be the most economic approach, it could provide a greater benefit to a technology's deployment into the commercial market.

## Baseline Modification

Further, Congress may consider readjusting the baselines, as some argue that the baselines may not have been properly informed using consistent data. For instance, according to a 2014 DOE report, "goals must be based on well-informed estimates of savings potential."[54] The 2014 DOE report recommended that several criteria should be taken into consideration when establishing a baseline, such as weather, data quality and availability, consistency of agency mission operations, and varying degrees of savings.[55] The report also noted that perhaps a three-year average should be taken to set a baseline, as this helps reduce abnormal factors experienced in any particular year. If Congress establishes a new baseline, agency reporting data and perceived progress could be affected. For example, the DOE report explains, "using a more recent baseline year—and setting a lower percent reduction goal—may give the impression that the federal government is not doing enough to reduce energy use, when in fact significant reductions have already been made."[56]

[51] David Alexander, "'Great Green Fleet' Using Biofuels Deployed by U.S. Navy," Reuters, January 20, 2016.

[52] David Alexander, "'Great Green Fleet' Using Biofuels Deployed by U.S. Navy," Reuters, January 20, 2016.

[53] DOE, *Secretary of Energy Advisory Board Report of the Task Force on Federal Energy Management*, p. 25.

[54] K.S. Judd, et. al, *Analysis of Federal Agency Facility Energy Reduction Potential and Goal Setting Approaches for 2025,* prepared for U.S. Department of Energy by Pacific Northwest National Laboratory, under Contract DE-AC05-76RL01830, May 2014, p. 48.

[55] K.S. Judd, et. al, *Analysis of Federal Agency Facility Energy Reduction Potential and Goal Setting Approaches for 2025,* p. 47.

[56] K.S. Judd, et. al, *Analysis of Federal Agency Facility Energy Reduction Potential and Goal Setting Approaches for 2025,* p. 47.

# Implementing Federal Requirements

## EISA Section 433

In regards to EISA Section 433, federal agencies are mandated to reduce fossil fuel consumption by 80% by FY2020, with an ultimate goal of 100% by FY2030. As noted, the rulemaking for this legislation has not been finalized. Without a finalized rule it is difficult to track and evaluate the progress toward this goal. DOD has not included this metric in annual reports. Congress may consider in its oversight role directing DOE to finalize this rule. Alternatively, Congress may consider updating the legislation, perhaps by either adjusting the targets, or removing the requirement entirely.

While tracking energy management compliance may come at a cost (e.g., labor, data collecting, etc.), the data can be used to indicate progress toward greater efficiency and could demonstrate whether or not a program has proven effective and provided cost savings. The 2016 DOE Task Force report notes that one of the major challenges in evaluating the energy efficiency of projects in the federal government is the lack of data concerning, "building profiles, energy usage, and energy spending over time."[57]

## Renewable Energy Credit Ownership

Additionally, Congress may consider clarifying REC ownership in legislation, instead of directing DOE to issue guidance on qualifications to meet federal targets. For instance, DOE's implementation guidance for EPAct05 requires DOD and all federal agencies to retain ownership of RECs to count toward the 7.5% renewable electricity consumption goal. However, 10 U.S.C. §2911(g), a 25% renewable energy production goal for DOD, does not make purchasing RECs mandatory.

Further, according to a 2016 Government Accountability Office (GAO) report, DOD project documentation of renewable energy goals was not always clear, especially when determining whether or not a project contributed toward a particular goal.[58] If Congress opts to require DOD to maintain ownership of RECs to meet all relevant energy goals, proper data and measurement collection may be a factor to consider. Additionally, if Congress were to require agency ownership of RECs, DOD's progress toward 10 U.S.C. §2911(g) may decline. For instance, the 2016 GAO report reviewed documentation of 17 DOD renewable energy projects. All 17 projects contributed to 10 U.S.C. §2911(g), but 8 of those projects did not contribute to EPAct05.[59]

[57] DOE, *Secretary of Energy Advisory Board Report of the Task Force on Federal Energy Management*, p. 28.

[58] U.S. Government Accountability Office, *DOD Renewable Energy Projects: Improved Guidance Needed for Analyzing and Documenting Costs and Benefits*, GAO-16-487, September 2016, https://www.gao.gov/assets/680/679620.pdf.

[59] U.S. Government Accountability Office, *DOD Renewable Energy Projects: Improved Guidance Needed for Analyzing and Documenting Costs and Benefits*, GAO-16-487, September 2016, p. 34, https://www.gao.gov/assets/680/679620.pdf.

In practice, military services may not necessarily retain ownership of RECs associated with all projects. Some DOD services may find that relinquishing REC ownership is within the best interest of the service and the particular contract, despite not qualifying for the EPAct05 requirement. The Navy, for instance, has had difficulty meeting renewable energy consumption targets under EPAct05, noting in the FY2017 *AEMRR*: "The Navy's performance regarding the renewable electricity goal is a function of the strategic decision to allow other parties to monetize the value of RECs associated with its financed energy projects."[60] In certain projects, military services might decide to relinquish REC ownership. In some instances of ESPC/UESC contracts, RECs can be leveraged to finance additional project improvements.

## Financing Mechanisms

DOD has steadily decreased its buildings' energy intensity in response to mandated energy reduction goals through investment in energy conservation projects. One of the challenges DOD faces in meeting these targets is implementing appropriate financing mechanisms. ESPCs have become a preferred means of making energy efficiency improvements because, in part, funds do not have to be directly appropriated (or programmed). However, as Energy Savings Contractors (ESCOs) assume a certain risk in guaranteeing savings through ESPCs, the risk is factored into their cost. DOD has been increasing reliance on UESCs and ESPCs.[61] With $2.9 billion awarded in FY2017, these contracts can assist with increasing efficiency and meeting renewable energy management goals without up-front appropriated funds for the investment.[62] Congress may consider options to increase the effectiveness of these mechanisms in attaining federal energy management goals.

### Training

One option may be to increase training and awareness of UESCs and ESPCs. A Senate Committee on Armed Services report (S.Rept. 115-125) accompanying NDAA FY2018 (S. 1519) directed the Secretary of Defense to assess ESPCs and the potential savings through increased training. DOD disagreed with the need for more training, noting in the AEMRR FY2017, "the financial risk is too high to implement these training improvements based on assumptions about future savings and therefore [DOD] will not commit limited resources to an assessment that would draw from efforts focused on energy resilience and mission assurance."[63] Further, DOD has stated that training improvements do not necessarily guarantee behavioral changes that would contribute to energy and costs savings.

It is difficult to determine project savings if data is not being collected appropriately and consistently. Eight reports since 2013 by GAO, DOD Inspector General (DOD IG), and U.S.

[60] U.S. Department of Defense, *AEMRR FY2017*, p. 30.

[61] A UESC is a contract between a federal agency and the serving utility. Under a UESC, the utility arranges financing for efficiency projects and renewable energy projects, and the costs are repaid by the agency over the length of the contract. An ESPC is a multiyear contract between a federal agency and an energy service company. In general, under an ESPC, a federal agency agrees to pay an amount not to exceed the current annual utility costs for a fixed period of time (up to 25 years) to an energy service company, which finances and installs facility improvements. In return, the contractor assumes the performance risks of energy conservation measures during the contract period and guarantees that the improvements will generate energy cost savings sufficient to pay for the improvements over the length of the contract, as well as providing the energy services company a return on the investment. After the end of the contract, the agency benefits from reduced energy costs as a result of the improvements.

[62] U.S. Department of Defense, AEMRR FY17, p. E-6.

[63] U.S. Department of Defense, AEMRR FY17, p. F-2.

Army Audit Agency evaluated challenges with DOD utilizing ESPCs.[64] The recommendations highlighted a lack of developed guidance for ESPC training, data management, and contract administration. According to a summary DOD IG report in February 2019, the Assistant Secretary of Defense for Energy, Installation, and Environment, as well as Navy, Air Force, and DLA ESPC program managers, did not collect ESPC project data due to decentralization and not requesting performance and savings data, despite DOD instruction.[65] Five reports noted that base contracting officials were not complying with the measurement and verification requirements under Section 432 of EISA for a number of reasons, including a lack of awareness of the requirements.[66]

Training and guidance for utilizing ESPCs and UESCs is provided to all federal agencies through FEMP. However, challenges remain. During a December 2018 House Committee on Energy and Commerce, Subcommittee on Energy hearing, Leslie Nicholls, Strategic Director for FEMP, noted that measurement and verification is "not necessarily consistently applied and utilized throughout the federal government."[67] She further noted that FEMP would like to continue training both at the technical level and for contracting officers. As noted in the February 2019 DOD IG report, DOD branches were implementing the IG recommendations regarding ESPC guidance. Congress may consider the value of training and guidance for proper measurement and data verification, and whether better data would demonstrate accurate cost savings of ESPCs and USECs relative to the cost of training.

[64] U.S. Department of Defense, Inspector General, *Summary and Follow-up Report on Audits of DOD Energy Savings Performance Contracts,* Report No. DODIG-2019-058, February 14, 2019, p. i.

[65] DODIG-2019-058, p. i.

[66] DODIG-2019-058, p. 11.

[67] U.S. Congress, House Committee on Energy and Commerce, Subcommittee on Energy, *Public Private Partnerships for Federal Energy Management*, 115th Cong., December 12, 2018, Preliminary Transcript, https://energycommerce.house.gov/sites/democrats.energycommerce.house.gov/files/documents/20181212%20EE-%20Public-Private%20Partnerships%20for%20Federal%20Emergency%20Management_0.pdf.

# Appendix A. Summary of DOD Energy Goals and Contracting Authority in 10 U.S.C.

*§2208. Working-capital funds*

*(t) Permits up to $1,000,000,000 in Working Capital Fund, Defense for petroleum market volatility.*

*§2410q. Multiyear Contracts: Purchase of Electricity from Renewable Energy Sources*

*(a) Multiyear Contracts Authorized:* Authorizes the use of multiyear contracts for the Secretary of Defense for a period of 10 years from a renewable energy source, as defined in 42 U.S.C. 15852(b)(2).

*(b) Limitations on Contracts for Periods in Excess of Five Years:* The Secretary of Defense may enter into a contract over five years on the basis that the contract is cost effective and purchasing electricity from the source would not be economic without a contract for over five years.

*(c) Relationship to Other Multiyear Contracting Authority:* this section does not preclude DOD "from using other multiyear contracting authority of the Department to purchase renewable energy."

*§2911. Energy Policy of the Department of Defense*

*(a) General Energy Policy:* directs the Secretary of Defense to "ensure the readiness of the armed forces for their military missions by pursuing energy security and energy resilience."

*(b) Authorities:* permits the Secretary of Defense to establish metrics and standards for measuring energy resilience; authorizes the selection of facility energy projects using renewables, as well as "giving favorable consideration to projects that provide power directly to a military facility or into the installation electrical distribution network."[68]

*(c) Energy Performance Goals:* directs the Secretary of Defense to "submit to congressional defense committees energy performance goals" for DOD annually.[69]

*(d) Energy Performance Master Plan:* directs the Secretary of Defense to develop a plan annually (including metrics for measurement, use of a baseline standard, separate plans for each branch, etc.) to achieve the performance goals set by law, executive orders, and DOD policies.[70]

*(e) Special Considerations:* directs the Secretary of Defense to consider a set of specified factors (e.g., energy resilience, economies of scale, conservation measures) when developing the Performance Goals and Master Plan.[71]

[68] See 10 U.S.C. §2911(b) for the full list of authorities.

[69] See 10 U.S.C. §2911(c) Energy Performance Goals and (d) Energy Performance Master Plan.

[70] The first Energy Performance Master Plan is in the U.S. Department of Defense, *FY2011 Annual Energy Management Report (AEMR)*, September 2012, p. C-3, https://www.acq.osd.mil/eie/Downloads/IE/FY%202011%20AEMR.pdf. DOD updates the Master Plan in the *Annual Energy Management and Resilience Report* (formerly the AEMR) on an as-needed basis.

[71] For the full list, see 10 U.S.C. §2911(e) Special Considerations.

*(f) Selection of Energy Conservation Measures:* the energy conservation measures are to be limited to ones that "are readily available; demonstrate an economic return on the investment; are consistent with the energy performance goals and energy performance master plan for the Department; and are supported by the special considerations specified in subsection (c)."

*(g) Goal Regarding Use of Renewable Energy to Meet Facility Energy Needs*: "to produce or procure not less than 25 percent of the total quantity of facility energy it consumes within its facilities during fiscal year 2025 and each fiscal year thereafter from renewable energy sources."[72]

*§2913. Energy Savings Contracts and Activities*

*(a) Shared Energy Savings Contracts:* directs the Secretary of Defense to develop a simple method to accelerate contracts for shared energy savings services.

*§§2922-2922h. Energy-Related Procurement:* outlines contracting and procurement specifications for various energy types (e.g., natural gas, renewables, fuel derived from coal).[73]

*§2922e. Acquisition of Certain Fuel Sources: Authority to Waive Contract Procedures; Acquisition by Exchange; Sales Authority:* permits the Secretary of Defense to waive any provision that would otherwise prescribe terms and conditions of a fuel purchase contract if market conditions have affected or will adversely affect the acquisition of the fuel source; and if the waiver will expedite the acquisition for government needs.

*§2926 Operational Energy Activities:* provides DOD with an operational energy policy; delineates authorities for operational energy procurement; establishes the role for the Assistant Secretary of Defense for Energy, Installations, and Environment (ASD EI&E); requires the ASD EI&E to establish an operational energy strategy and to review and make recommendations to the Secretary of Defense on budgetary operational energy matters, as well as grants access to records and studies on military initiatives related to operational energy.

[72] This goal is to be in agreement with the Energy Performance Goals and Energy Performance Master Plan supported by Special Considerations.

[73] See 10 U.S.C. §2922a-h for full details on procurement of various energy types.

# Appendix B. Summary of Federal Energy Goals and Contracting Authority in 42 U.S.C.[74]

*§6374e. Federal Fleet Conservation Requirements*: each federal agency is directed to increase alternative fuel use and decrease petroleum fuel consumption for federal fleets, with the goal of achieving a 10% increase in annual alternative fuels and a 20% reduction in annual petroleum consumption as compared to a FY2005 baseline by October 1, 2015.

*§6834. Federal Building Energy Efficiency Standards:* starting August 2006, if cost-effective over the life cycle, new federal buildings must be designed to achieve energy consumption levels at least 30% below ASHRAE Standard 90.1 (for commercial buildings) or the International Energy Conservation Code (for residential buildings).[75] In addition, starting December 2008, new federal buildings *and* those undergoing major renovations are to be designed so that fossil fuel consumption is reduced by 80% in 2020 compared to a similar building in FY2003, and 100% by 2030, as specified in **Table B-1**.[76]

**Table B-1. New or Majorly Renovated Federal Building Fossil Fuel Consumption Reduction**

Compared to FY2003 Baseline

| Fiscal Year | Percentage Reduction |
|---|---|
| 2010 | 55 |
| 2015 | 65 |
| 2020 | 80 |
| 2025 | 90 |
| 2030 | 100 |

**Source:** 42 U.S.C. §6834(a)(3)(D)(i)(I).

**Notes:** The FY2003 baseline for "similar building" measurements are established by Commercial Buildings Energy Consumption Survey or Residential Energy Consumption Survey data from the Energy Information Agency. Criteria for *major renovations* can be found at 42 U.S.C. §6834(a)(3)(D)(i)(III)(ii).

*§8253. Energy Management Requirements:* directs federal agencies to reduce building energy consumption per square foot by 30% compared to the FY2003 baseline by FY2015.

[74] The following provisions of law cited from this title are applicable to all federal agencies and are not specific to only DOD.

[75] ASHRAE was "formed as the American Society of Heating, Refrigerating and Air-Conditioning Engineers by the merger in 1959 of American Society of Heating and Air-Conditioning Engineers (ASHAE) founded in 1894 and The American Society of Refrigerating Engineers (ASRE) founded in 1904." ASHRAE, "About ASHRAE," https://www.ashrae.org/about. ASHRAE is responsible for maintaining standard 90.1, *Energy Standard for Buildings Except Low-Rise Residential Buildings*. The International Code Council is responsible for maintaining the *International Energy Conservation Code*, which contains separate provisions for commercial buildings and for low-rise residential buildings. Effective January 5, 2016, the current commercial federal building standard is ANSI/ASHRAE/IES Standard 90.1-2013. Effective March 13, 2017, the current federal residential building standard is 2015 IECC. For the most current standards, see U.S. Department of Energy, "Building Energy Codes Program," available at https://www.energycodes.gov/development/federal-buildings.

[76] See footnote 31 for applicability.

*§8256(c) Utility Incentive Program:* authorizes and encourages agency participation in programs (Utility Energy Savings Contracts, or UESCs) to "increase energy efficiency and for water conservation or the management of electricity demand conducted by gas, water, or electric utilities and generally available to customers of such utilities."[77]

*§8287. Authority to Enter into Contracts:* authorizes the head of a federal agency to enter Energy Savings Performance Contracts (ESPCs). Each contract may be for a period not to exceed 25 years. The contract directs the contractor to incur the costs of energy savings measures, in exchange for a share of the savings resulting from the measures taken.

*§13212. Minimum Federal Fleet Requirement:*[78] the total percentage of alternative-fueled or "low greenhouse gas emitting" light-duty vehicles acquired by a federal fleet annually are 75% in FY1999 and thereafter.[79]

*§15852. Federal Purchase Requirement*: the President, acting through the Secretary of Energy, is directed 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" not less than 7.5% is renewable energy in FY2013 and each fiscal year thereafter.

*§16122. Federal and State Procurement of Fuel Cell Vehicles and Hydrogen Energy Systems:* requires the federal government to adopt fuel cell vehicles and hydrogen energy systems as soon as practicable.

[77] For DOD, additional authority for UESCs is in 10 U.S.C. §2913.

[78] According to 42 U.S.C. §13212(b)(3), "the term 'Federal fleet' means 20 or more light duty motor vehicles, located in a metropolitan statistical area or consolidated metropolitan statistical area, as established by the Bureau of the Census, with a 1980 population of more than 250,000, that are centrally fueled or capable of being centrally fueled and are owned, operated, leased, or otherwise controlled by or assigned to any Federal executive department, military department, Government corporation, independent establishment, or executive agency, the United States Postal Service, the Congress, the courts of the United States, or the Executive Office of the President."

[79] According to 42 U.S.C. §13211,

> the term 'alternative fuel' means methanol, denatured ethanol, and other alcohols; mixtures containing 85 percent or more (or such other percentage, but not less than 70 percent, as determined by the Secretary, by rule, to provide for requirements relating to cold start, safety, or vehicle functions) by volume of methanol, denatured ethanol, and other alcohols with gasoline or other fuels; natural gas, including liquid fuels domestically produced from natural gas; liquefied petroleum gas; hydrogen; coal-derived liquid fuels; fuels (other than alcohol) derived from biological materials; electricity (including electricity from solar energy); and any other fuel the Secretary determines, by rule, is substantially not petroleum and would yield substantial energy security benefits and substantial environmental benefits.

However, exceptions to the requirement are if there are no low greenhouse gas emitting vehicles available or that if the vehicle cannot meet the functional needs of the agency; or if the agency has more cost-effective alternatives to reduce petroleum consumption. See 42 U.S.C. §13212(f)(2).

# Appendix C. Executive Orders

**Table C-1. Executive Orders on Federal Energy Management**

Across Five Presidential Administrations

| Date Issued | Order Name and Number | Status |
|---|---|---|
| May 17, 2018 | E.O. 13834 Efficient Federal Operations | Active |
| March 19, 2015 | E.O. 13693 Planning for Federal Sustainability in the Next Decade | Revoked May 17, 2018, by E.O. 13834 |
| November 1, 2013 | E.O. 13653 Preparing the United States for the Impacts of Climate Change | Revoked March 28, 2017, by E.O. 13783* |
| October 5, 2009 | E.O. 13514 Federal Leadership in Environmental Energy and Economic Performance | Revoked March 19, 2015, by E.O. 13693 |
| January 24, 2007 | E.O. 13423 Strengthening Federal Environmental, Energy, and Transportation Management | Revoked March 19, 2015, by E.O. 13693 |
| April 21, 2000 | E.O. 13149 Greening the Government Through Federal Fleet and Transportation Efficiency | Revoked January 24, 2007, by E.O. 13423 |
| June 3, 1999 | E.O. 13123 Greening the Government Through Efficient Energy Management | Revoked January 24, 2007, by E.O. 13423 |
| December 13, 1996 | E.O. 13031 Federal Alternative Fueled Vehicle Leadership | Revoked by April 21, 2000, E.O. 13149 |
| March 8, 1994 | E.O. 12902 Energy Efficiency and Water Conservation at Federal Facilities | Revoked June 3, 1999, by E.O. 13123 |
| April 21, 1993 | E.O. 12844 Federal Use of Alternative Fueled Vehicles | Revoked March September 29, 1995, in part, by E.O. 12974, superseded December 13, 1996, by E.O. 13031 |
| April 21, 1993 | E.O. 12845 Requiring Agencies to Purchase Energy Efficient Computer Equipment | Revoked by June 3, 1999, E.O. 13123 |
| April 17, 1991 | E.O. 12759 Federal Energy Management | Revoked by June 3, 1999, E.O. 13123 |

**Source:** The Federal Register and National Archives.

**Notes:** E.O. 13783 Presidential Executive Order on Promoting Energy Independence and Economic Growth, although energy related, does not direct federal energy management and is not included in this list.

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