

**GAO**

Testimony

Before the Committee on Government  
Reform, House of Representatives

---

Not to Be Released  
Before 10:00 a.m. EST  
Wednesday,  
March 12, 2003

**FEDERAL ENERGY  
MANAGEMENT**

**Facility and Vehicle Energy  
Efficiency Issues**

Statement for the Record by Bernard L. Ungar, Director,  
Physical Infrastructure Issues

James E. Wells, Director, Natural Resources and  
Environment Issues



---

Mr. Chairman and Members of the Committee:

We welcome the opportunity to provide testimony on energy conservation efforts in federal facilities and agencies' use of alternative fuel vehicles. According to the Department of Energy (DOE), the federal government's energy bills total approximately \$4 billion annually. Our testimony provides an overview of the vast federal facilities inventory, describes laws and other authorities that pertain to energy conservation in facilities and use of alternative fuel vehicles, highlights some of the key federal efforts to promote energy efficient practices and building designs, describes some things that can be done to improve energy efficiency in facilities and related cost implications, and identifies some of the obstacles agencies face in improving energy efficiency in federal facilities. Our testimony also provides an update on agencies' use of alternative fuel vehicles and is based on prior reports and ongoing work.

Constructing and operating buildings requires enormous amounts of energy, water, and materials and creates large amounts of waste. How agencies manage their facilities, along with the vehicles they use to accomplish their missions, has significant cost implications and greatly affects the environment. According to DOE, energy management is one of the most challenging tasks facing today's federal facilities manager, and sound energy management includes using energy efficiently, ensuring reliable supplies, and reducing costs whenever possible. The federal role in energy conservation was also highlighted in the President's National Energy Policy, in which the President directed heads of executive departments and agencies to "take appropriate actions to conserve energy use at their facilities to the maximum extent consistent with the effective discharge of public responsibilities."

---

## Summary

With approximately 3.3 billion feet of facility space and over one-half million automobiles, the federal government is the largest single energy consumer in the nation. Various laws, regulations, and executive memorandums direct federal facility managers to reduce energy consumption and environmental impacts of the buildings they manage. Agencies also must follow other requirements for the acquisition and use of alternative fuel vehicles, which use fuels like methanol, propane, and natural gas, to name a few. In constructing and renovating facilities, agencies have begun using "green" design approaches, which are intended to result in energy efficiency and minimal impact on the environment. Such approaches have been used at the White House, Pentagon, and the Zion National Park Visitor Center. Despite the possible benefits, some

---

agencies believe they face obstacles in employing green practices in construction and renovation projects. These include key stakeholders—architects, engineers, agency staff—who are not familiar with green approaches, higher initial costs of green projects, difficulty getting agency management buy-in, and difficulty quantifying the benefits of green facility designs. In addition to efforts to make federal facilities more energy efficient, the federal government has also attempted to reduce the nation’s consumption of petroleum fuels in transportation through the use of alternative fuel vehicles in the federal vehicle fleet.

---

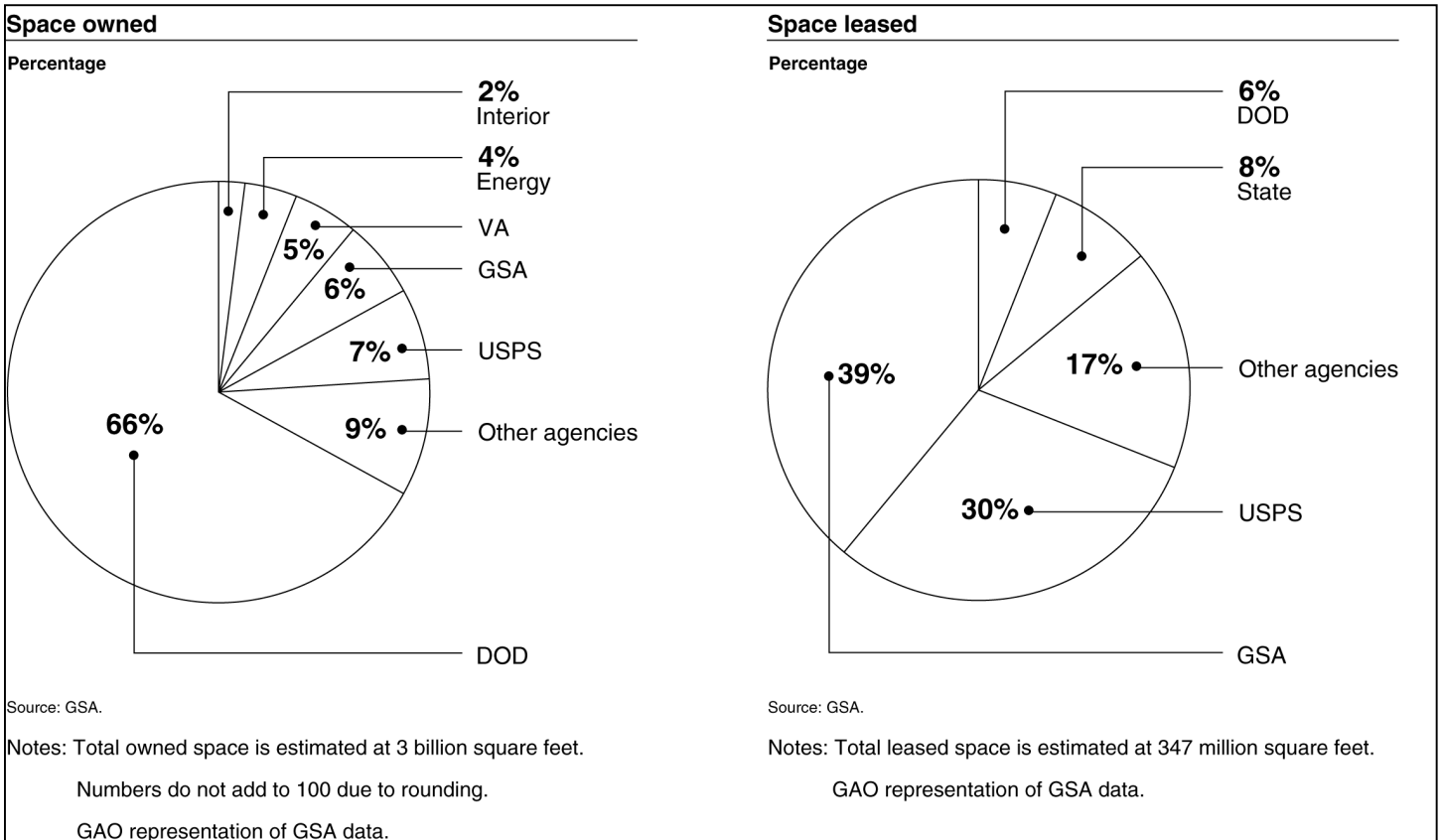
## Overview of Federal Facilities, Vehicles, and Related Energy Efficiency Requirements

The federal facilities inventory contains a diverse portfolio of assets that are used for a wide variety of missions. According to the fiscal year 2001 financial statements of the U.S. government, the federal government’s real property assets—including land—are worth about \$328 billion. In terms of facilities, the latest available governmentwide data from GSA indicated that as of September 30, 2000, the federal government owned and leased approximately 3.3 billion square feet of building floor area worldwide.<sup>1</sup> As shown in figure 1, the Department of Defense (DOD), U.S. Postal Service (USPS), General Services Administration (GSA), and Department of Veterans Affairs (VA) hold the majority of the owned facility space. Figure 1 also shows that DOD, the Department of State (State), GSA, and USPS lease the most space.

---

<sup>1</sup>U.S. General Services Administration, Summary Report of Real Property Owned by the United States Throughout the World (Washington, D.C.: June 2001); U.S. General Services Administration, Summary Report of Real Property Leased by the United States Throughout the World (Washington, D.C.: June 2001). We have reported that the governmentwide real property data that GSA compiles—often referred to as the worldwide inventory—have been unreliable and of limited usefulness. However, these data provide the only available indication of the size and characteristics of the federal real property inventory. For more information, see U.S. General Accounting Office, *Federal Real Property: Better Governmentwide Data Needed for Strategic Decisionmaking*, GAO-02-342 (Washington, D.C.: Apr. 16, 2002).

**Figure 1: Percentages of Federal Facility Space Owned and Leased Worldwide, by Agency**



A set of federal laws, regulations, executive orders, and executive memorandums direct federal facility managers to reduce the energy and environmental impacts of the buildings they manage. In enacting the Federal Energy Management Improvement Act of 1988 (FEMIA),<sup>2</sup> Congress recognized, among other things, that the federal government is the largest single energy consumer in the nation, and that the cost of meeting the federal government’s energy requirements is substantial. The purpose of FEMIA, as amended, is “to promote the conservation and the efficient use of energy and water and the use of renewable energy sources by the federal government.”<sup>3</sup> FEMIA, as amended, sets forth energy

<sup>2</sup>Pub. L. No. 100-615, 102 Stat. 3185 (1988).

<sup>3</sup>42 U.S.C. § 8252.

---

performance requirements for federal buildings, establishes the use of life cycle methods and procedures for application of energy conservation measures, and establishes an interagency energy management task force to coordinate the activities of the federal government in promoting energy conservation.

The Energy Policy Act of 1992 (EPACT) was intended to further enhance federal energy management practices.<sup>4</sup> In this regard, it requires the GSA Administrator to hold biennial conference workshops in each of the federal regions on energy management, conservation, efficiency, and planning strategy; requires agencies to conduct energy management training; requires the establishment of energy audit teams to perform energy audits of federal facilities; and requires agencies to identify energy efficient products in carrying out their procurement and supply functions. Several executive orders<sup>5</sup> direct agencies to employ green practices in facility and fleet management, and executive memorandums encourage agencies to use energy saving performance contracts and environmentally friendly landscaping practices.

In addition to facilities-related initiatives, EPACT establishes a minimum number of alternative fuel vehicles for federal agencies beginning in fiscal year 1993 and requires the Secretary of Energy to carry out an alternative fuel vehicle program. According to the most recently available data from GSA, the federal government operated 596,114 vehicles in fiscal year 2001. Alternative fuels include ethanol, methanol, natural gas, propane, and electricity. Alternative fuel vehicles operate on these fuels, although some of them can operate on gasoline. In total, the Energy Information Administration estimated that the federal government operated 68,890 alternative fuel vehicles in 2002.

---

<sup>4</sup>Pub. L. No. 102-486, 106 Stat. 2776 (1992).

<sup>5</sup>See Executive Orders 13148, 13149, 13123, and 13101.

---

## Federal Efforts to Promote Energy Conservation and Green Design Practices

The primary program for promoting energy efficiency in the federal government is DOE's Federal Energy Management Program (FEMP). Established in 1973, FEMP works to reduce the energy cost and environmental impact of federal government practices by advancing energy efficiency and water conservation, promoting the use of distributed and renewable energy, and improving utility management decisions at federal sites. FEMP provides a range of services to federal agencies aimed at helping facility managers achieve greater energy efficiency and cost-effectiveness in areas such as new construction, building retrofits, equipment procurement, and utility management. FEMP also advises agencies on establishing partnerships with the private sector to improve energy efficiency, using innovative technologies, and addressing energy-related policy matters as they pertain to federal facilities. For example, one way that FEMP helps agencies become more energy efficient is through utility energy services contracts. In these contracts, the utility company typically arranges financing and constructs the necessary capital improvements to the agencies' building systems. In return, the utility is repaid over the term of the contract from the cost savings generated by the newly installed, energy-efficient improvements. This allows agencies to become more energy efficient while minimizing the up-front costs of the capital improvements. According to DOE, since 1995 more than 45 electric and gas utilities have provided project financing for energy and water efficiency upgrades at federal facilities, investing more than \$600 million through these contracts.

As part of its central management responsibilities in federal real property, GSA encourages agencies to use green or sustainable design approaches in federal construction and renovation projects. The objectives of sustainability are to reduce consumption of nonrenewable resources, minimize waste and impact on the environment, optimize site potential, minimize nonrenewable energy consumption, use environmentally preferable products, protect and conserve water, enhance indoor environmental quality, and optimize operational and maintenance practices. The end result of a sustainable design is a healthier working environment that costs less to maintain over time than traditional methods and is better for the environment. To measure sustainability efforts, GSA and other agencies have begun using the Leadership in Energy and Environmental Design (LEED) rating system. The U.S. Green Building Council—a coalition of leaders from across the building industry working to promote buildings that are environmentally responsible, profitable and healthy places to live and work—developed LEED to help apply principles of sustainable design and development to facilities projects. According to

---

information from GSA, by using LEED, agencies can gauge the impact of design decisions on energy efficiency and other sustainability factors.

---

## Examples of Agency Efforts to Apply Green Principles

By using the principles of sustainable, green design, agencies are trying to improve energy efficiency, reduce life-cycle costs, and reduce environmental impacts in the design, construction, and operation of federal facilities. Some examples of facilities where these approaches have been applied are the White House, the Pentagon, and the Zion Canyon National Park Visitor Center.

- According to information from DOE, in 1993 a team of experts from several federal agencies and private organizations helped create a “greening plan” for the White House to be implemented as part of ongoing facility maintenance and operation. Measures taken included changes to the building envelope<sup>6</sup> to reduce energy loss through the roof, windows, and walls; and modifications to the lighting systems to increase efficiency and maximize natural lighting. In 1999, DOE estimated that these and other efforts resulted in cost savings of approximately \$300,000 annually through reductions in energy, water, landscaping, and waste removal costs. More recently, according to information from the Office of the Federal Environmental Executive,<sup>7</sup> the White House installed its first-ever solar electric system in late 2002. This included putting solar panels on the roof of the complex’s primary maintenance building and installing two solar thermal systems to heat the pool and spa and provide domestic hot water.
- According to information from DOE, DOD developed and implemented plans to reduce building energy use and incorporate environmentally sensitive materials, including materials that require the least energy to produce and that can be recycled after use, as part of an extensive \$1.1 billion renovation of the Pentagon. As part of these efforts, DOD constructed a new state-of-the-art heating and ventilation plant, modified and insulated the building envelope to increase energy efficiency, and built irrigation systems that use water from the nearby Potomac River to irrigate areas around the building. DOD also built two solar electric systems to demonstrate the reliability and feasibility of using solar energy.

---

<sup>6</sup>The term building envelope includes the walls, roof, and floors that enclose a heated or cooled space.

<sup>7</sup>Under Executive Order 13101, the Federal Environmental Executive chairs the White House Task Force on Waste Prevention and Recycling and seeks to promote sustainable environmental stewardship throughout the federal government.

---

One of the goals of the renovation project is to cut energy costs by up to 30 percent by fiscal year 2005, which according to DOD officials could save between \$4 million and \$5 million each year.

- Energy efficient design was used, according to information from DOE, in constructing the new Zion National Park Visitor Center and Transportation Center at Zion National Park in Utah that opened in May 2000. According to DOE, the National Park Service worked with DOE to create a design that preserves the natural beauty of the park while saving energy and money. Innovative features included systems that work to naturally cool or heat the facility, electricity producing solar panels, and efficient landscaping that complements the building and reduces the need for irrigation. Overall, DOE predicts that these features will save about \$14,000 a year. Figure 2 shows the new Zion National Park Center.



---

**Figure 2: Zion National Park Visitor Center, Utah**



Source: DOE/National Renewable Energy Laboratory; Robb Williamson photographer.

In addition to these examples, our work at the Government Printing Office (GPO) and GSA in recent years illustrated the potential cost benefits of investing in energy efficiency. For example:

- At GPO, the Potomac Electric Power Company (PEPCO) estimated that GPO could save over \$400,000 a year on energy and maintenance costs by replacing its outdated air conditioning chillers with new, more energy

---

efficient chillers.<sup>8</sup> We also reported that PEPCO had recommended that GPO consider upgrading its energy inefficient lighting at an estimated cost of \$1.6 million to achieve an estimated \$800,000 in annual energy savings. According to GPO, it plans to have the chiller project completed in April 2003 and the lighting upgrade completed by May 2003.

- In our work on the backlog of repair and alteration needs in GSA-controlled federal buildings, we found that 44 buildings in GSA's inventory each had \$20 million or more in repair and alteration backlogs.<sup>9</sup> Many of the repair and alteration needs in these buildings had a direct impact on the energy efficiency of the buildings, including aging and inefficient plumbing, heating, ventilation, and air conditioning systems. For example, the Dwight D. Eisenhower Building in Washington, D.C., had a repair and alteration backlog of \$216 million, which included the need to address the building's antiquated air conditioning system. GSA officials said that this system, which uses about 250 individual window units, is outdated and not efficient in cooling the building or conserving energy. Figure 3 shows an individual air-conditioning unit in a window in the Eisenhower building.

---

<sup>8</sup>U.S. General Accounting Office, *Government Printing Office: Space Utilization and Potential Opportunities for Savings on Facilities*, unnumbered correspondence (Washington, D.C.: July 24, 2000).

<sup>9</sup>U.S. General Accounting Office, *Federal Buildings: Funding Repairs and Alterations Has Been a Challenge—Expanded Financing Tools Needed*, [GAO-01-452](#) (Washington, D.C.: Apr. 12, 2001).

---

**Figure 3: One Of About 250 Inefficient Window Air Conditioning Units in the Dwight Eisenhower Building in Washington, D.C.**



Source: GAO.

Note: Photograph taken in August 2000.

---

## Some Agencies Have Identified Obstacles to Using Energy Efficient, Green Approaches

Despite the possible benefits of using energy efficient, green approaches in federal construction and renovation projects, available data indicate that some agencies believe they face significant obstacles in implementing these approaches. In April 2001, the U.S. Green Building Council surveyed 11 federal real-property-holding agencies about their green building activities.<sup>10</sup> Among other things, the survey asked the agencies to identify any obstacles they face in achieving green building goals and objectives. The obstacles identified by the agencies generally fell into the following areas:

- Many architects, engineers, agency stakeholders, contractors, and customers are not knowledgeable about green building practices and technology. The survey respondents generally said that this lack of knowledge and expertise made it difficult to design, build, and promote green buildings.
- Respondents noted that green projects might have higher initial costs, but actually can be more cost-effective over the life of the facility and have other benefits. The higher initial costs can be more difficult to justify to decisionmakers.
- Related to higher initial costs, respondents expressed concern that it can be difficult to get top agency leaders to make green buildings a management priority. Consequently, the respondents felt that funding decisions are sometimes made without adequate input from design and construction professionals.
- Some of the benefits of green buildings are difficult to quantify. For example, the respondents noted that good measures exist for energy and cost savings, but that many green projects also improve employee productivity and well-being. Further, they said that some higher-priced building materials are better for the environment, which is a benefit difficult to quantify.
- At a time when budget constraints will be pervasive, the higher up-front costs of energy efficient designs could prove to be an especially challenging obstacle. As a result, less costly approaches that are less energy efficient could “look cheaper” in a single year’s appropriation

---

<sup>10</sup>U.S. Green Building Council, *Federal Agency Survey 2001* (Washington, D.C.: Apr. 2001). The 11 agencies surveyed were the National Institute of Standards and Technologies; the National Park Service; the U.S. Air Force Center for Environmental Excellence, Design Group; U.S. Army Corps of Engineers; DOE, Office of Building Technology, State and Community Programs; U.S. Department of the Interior; U.S. Environmental Protection Agency; GSA; U.S. Department of Housing and Urban Development; U.S. Navy, Naval Facilities Engineering Command; and USPS.

---

because life cycle costs—including the savings that would result from energy efficient designs—generally occur in later years.

---

## Agencies' Use of Alternative Fuel Vehicles

In addition to efforts to make federal facilities more energy efficient, other initiatives have attempted to reduce the nation's consumption of petroleum fuels in transportation through the use of alternative fuels in the federal vehicle fleet. In particular, EPACT set broad goals for replacing the transportation sector's use of petroleum fuels by at least 10 percent by the year 2000 and at least 30 percent by the year 2010. To help meet these goals, this act required that the federal government, as well as state governments and certain other fleet operators, purchase vehicles that run on alternative fuels, such as ethanol, methanol, natural gas, propane, and electricity, among others. Further, the act specified that, in 1996, 25 percent of the new vehicles purchased by the federal government should operate on alternative fuels, with the target percentage increasing to 33 percent in 1997, 50 percent in 1998, and 75 percent in 1999 and beyond.

Based on our assessment in 2000, the federal government as a whole has made progress in acquiring alternative fuel vehicles, although it has not always met the act's annual targets, as shown in table 1 below.<sup>11</sup> Further, procurement of these vehicles has been inconsistent across federal agencies: Some agencies have exceeded their purchase mandates in a year when others acquired very few or no alternative fuel vehicles. For example, in 1998, USPS acquired 10,000 ethanol alternative fuel vehicles to deliver the mail. This purchase was the major reason why the federal government collectively met the mandated acquisition target of 50 percent (12,362 alternative fuel vehicles) for that year.

---

<sup>11</sup> U.S. General Accounting Office, *Energy Policy Act of 1992: Limited Progress in Acquiring Alternative Fuel Vehicles and Reaching Fuel Goals*, [GAO/RCED-00-59](#) (Washington, D.C.: Feb. 11, 2000).

---

---

**Table 1: Federal Acquisition of Alternative Fuel Vehicles**

<b>Year</b>	<b>Vehicles required to meet mandates</b>	<b>Reported acquisitions of vehicles</b>
1993	5,000	4,500
1994	7,500	8,000
1995	10,000	4,000
1996	Data not available	6,000
1997	5,000	3,624
1998	12,362	14,205
1999	19,593	18,345
2000	15,259	15,000

Source: DOE.

The federal fleet’s acquisition of alternative fuel vehicles has not reduced gasoline consumption as much as hoped for several reasons. For example, the act does not establish targets for use of alternative fuels—just the acquisition of vehicles that can run on them. However, some of the alternative fuel vehicles that federal agencies have purchased can also run on gasoline, and fleet officials told us individuals driving the vehicles often refuel with gasoline because it is much more convenient to find gasoline refueling stations than refueling stations that supply alternative fuels. In addition, some drivers have been reluctant to use alternative fuel vehicles because of safety concerns or a lack of familiarity with the vehicles’ technology and so choose to use the agencies’ gasoline powered vehicles.

According to officials at DOE, the act’s mandates for purchases of alternative fuel vehicles by federal and other fleets were designed to demonstrate the use of the vehicles and stimulate purchases of them by the general public. Some supporters of the mandates believed federal and other fleets would demand enough alternative fuel vehicles to create a general market for these vehicles. However, the vehicles in federal and other fleets represent a small proportion of the vehicles on the road. As a result, according to DOE, if all of these fleets met the act’s targets for alternative fuel vehicles, the use of alternative fuels by these vehicles would represent less than 1 percent of petroleum fuels used in 2010—far below the act’s goals of 10 and 30 percent replacement in 2000 and 2010, respectively. In addition, to reach the 10-percent goal, DOE estimates sales of alternative fuel vehicles nationwide would have to grow by about 1.5 to 1.9 million vehicles per year. By comparison, the entire production of Ford’s passenger cars in 1996 was slightly more than 1.4 million.

Federal acquisitions of alternative fuel vehicles and their use of alternative fuels have not met expectations because of the same economic

---

impediments that have discouraged the general public from buying these vehicles and thus abandoning conventional vehicles. These impediments include lack of refueling infrastructure, the relatively lower price of gasoline, limitations in vehicle performance, and higher purchase prices for some of the vehicles.

With regard to the overall goals set in the act, limited progress has been made in replacing petroleum fuels with alternative fuels. Based on our work in 2000, DOE estimated that alternative fuels used in alternative fuel vehicles replaced about 334 million gallons of gasoline in 1998, representing about 0.3 percent of total gasoline consumed during that year. In addition, about 3.9 billion gallons of alternative fuels (e.g., ethanol and methanol) were blended with gasoline and used in conventional gasoline vehicles in 1998. Thus, in total, about 4.23 billion gallons of gasoline were replaced by alternative fuels, which represent approximately 3.6 percent of all highway gasoline use—considerably less than the act’s goal of 10 percent in 2000.

As we noted in 2000,<sup>12</sup> as an alternative approach to meeting the act’s goals, federal fleets could increase efficiency and use less petroleum fuel if, in addition to using alternative fuel vehicles, federal efforts were focused on buying and using gasoline vehicles that are highly fuel-efficient, such as the hybrid gasoline-electric vehicles that have recently entered the market. Allowing federal agencies to acquire these vehicles would reduce the federal fleet’s consumption of gasoline while maintaining the conveniences in refueling and service available with conventional vehicles.

---

## Contacts and Acknowledgment

For questions regarding this testimony, please contact Bernard L. Ungar for facilities issues at (202) 512-2834 or at [ungarb@gao.gov](mailto:ungarb@gao.gov), or Jim Wells for alternative fuel vehicle issues at (202) 512-6877 or at [wellsj@gao.gov](mailto:wellsj@gao.gov). Individuals making key contributions to this testimony included Casey L. Brown, Daniel Haas, David E. Sausville, and Daren Sweeney.

---

<sup>12</sup>[GAO/RCED-00-59](#)