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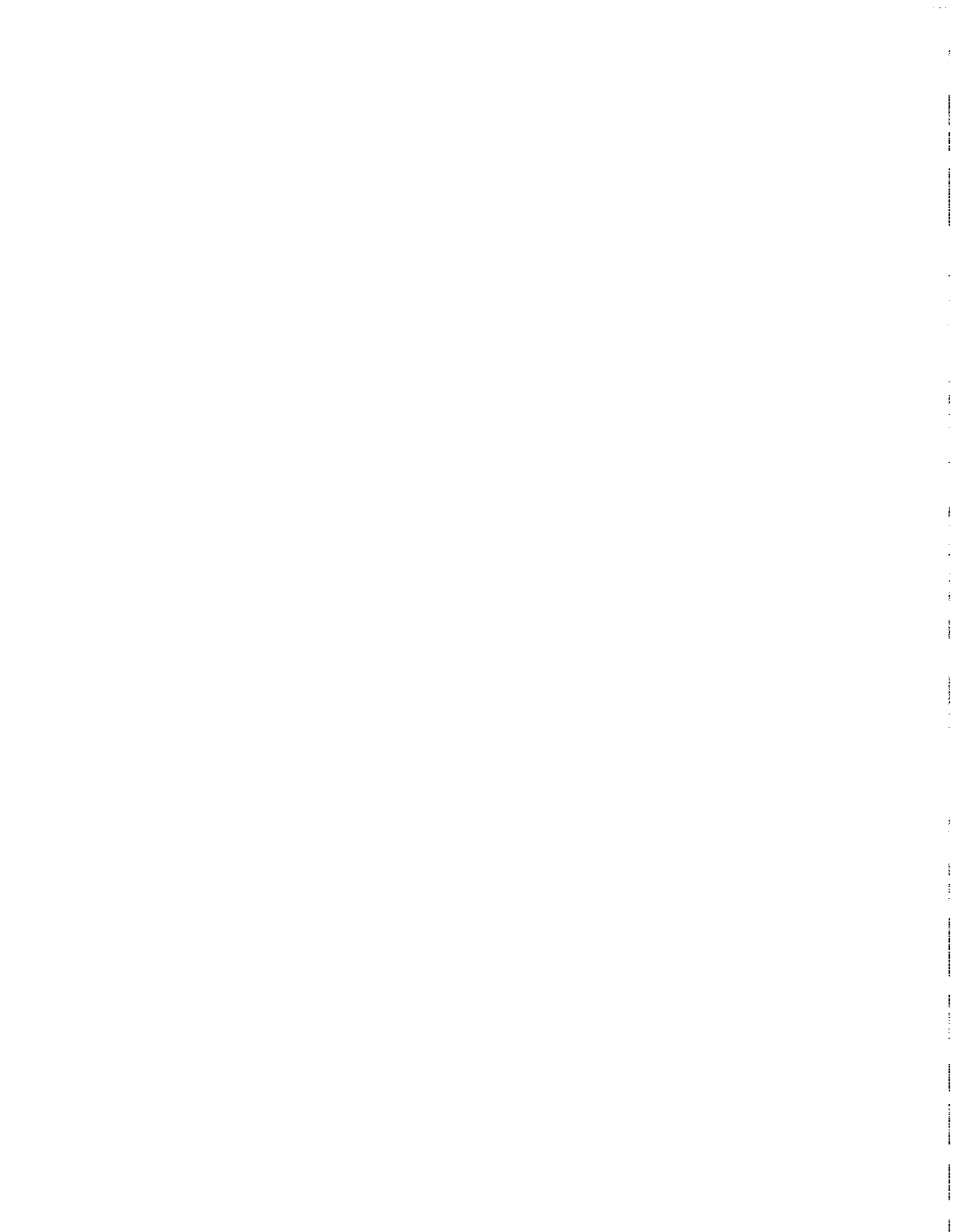
Report to the Chairman, Committee
on Governmental Affairs,
U.S. Senate

April 1994

ENERGY CONSERVATION

Contractors' Efforts at Federally Owned Sites







United States
General Accounting Office
Washington, D.C. 20548

Resources, Community, and
Economic Development Division

B-255932

April 29, 1994

The Honorable John Glenn
Chairman, Committee on
Governmental Affairs
United States Senate

Dear Mr. Chairman:

This report responds to your request that we evaluate the energy use and conservation measures employed at locations where contractors perform work for the federal government in government-owned buildings. Energy experts estimate that the federal government—the nation's largest energy consumer—could reduce annual energy consumption in its buildings by at least 25 percent.

As agreed with your office, this report focuses on the extent to which contractors managing and operating sites¹ owned by five agencies are achieving reductions in energy use. The five agencies are the Departments of the Air Force, Army, Navy, and Energy (DOE) and the National Aeronautics and Space Administration (NASA). We used a combination of a nationwide questionnaire and on-site visits to examine (1) energy consumption at government-owned sites that contractors operate in the United States, (2) incentives and funding sources available for contractors to use in reducing energy consumption, and (3) contractors' energy conservation efforts and the results these efforts have achieved. We sent our questionnaire to 111 contractor representatives and received 105 responses. Not all contractors responded to each question.

Results in Brief

As of December 31, 1993, the Air Force, Army, Navy, DOE, and NASA relied on contractors to operate 103 of their sites. These sites used a considerable amount of the total energy used in government buildings—over 4 percent of the federal government's total annual energy consumption during fiscal year 1992.² Total energy costs for these sites during fiscal year 1992 exceeded \$780 million.

¹For this report, we defined a site as a government-owned building, or group of buildings, for which a contractor was responsible. Sites varied from the one building at Air Force Plant #59 to the hundreds of buildings at DOE's Hanford Site.

²Total energy consumption is the energy used in "buildings and facilities" and that portion of general operations energy categorized as "exempted buildings/process operations" energy. App. I provides definitions for these terms.

Energy-reduction incentives available to contractors can include federal funding that is designated for energy conservation measures, rebates from utilities, and contracts between the government and an energy services company to share in dollars saved through energy conservation. Contractors used these incentives to a limited degree. For example, 26 of our questionnaire respondents reported receiving rebates from utilities totaling \$2 million from October 1, 1989, to July 1, 1993.

Contractors' energy-reduction efforts are showing positive results. For example, of 88 respondents, 33 contractors reported energy reductions of 1 to 5 percent and 43 reported reductions greater than 6 percent between October 1, 1989, and July 1, 1993.³ Our review indicated that future reductions in energy use at contractor-operated sites may depend on the willingness of contractors to use corporate funding to solicit energy savings performance contracts when feasible, their willingness to pursue utility rebates where available, and the availability of federal funding. However, spurring such efforts is a March 1994 executive order that expands the energy conservation requirements applicable to contractor-operated facilities.⁴ Based on agencies' estimates of potential future savings, we calculated that energy cost savings at federally owned, contractor-operated sites could exceed \$43 million annually from a one-time investment of \$216 million in energy efficiency improvements at these sites.⁵ These improvements could involve lighting, heating and air conditioning, and insulation.

Background

The federal government is the single largest energy user in the United States, consuming the equivalent of 222 million barrels of oil in fiscal year 1992—about 2.1 percent of all U.S. consumption.⁶ The Alliance to Save Energy—a nonprofit coalition of business, government, environmental, and consumer leaders dedicated to increasing the efficiency of energy

³Not all respondents answered all the questions. Among the reasons why some of the questions were not answered by all respondents are: the questionnaire instructions told the respondent to skip a question, the respondent chose not to answer a specific question, the questions did not apply or were not relevant to the respondent, or the respondent unintentionally neglected to provide an answer.

⁴On March 8, 1994, the President signed Executive Order 12902, which revises the energy conservation requirements that were in effect during our review. The new order establishes an energy-reduction goal of 30 percent for all federal buildings by 2005 and requires a reduction of at least 20 percent for industrial facilities. These requirements also apply to federally owned, contractor-operated sites.

⁵Energy in the categories of (1) buildings and facilities and (2) exempted buildings/process operations.

⁶Annual Report to Congress on Federal Government Energy Management and Conservation Programs, Fiscal Year 1992, U.S. Department of Energy (Draft, July 1993).

use—estimated in 1991⁷ that the federal government could reduce its energy use for buildings⁸ by 25 percent. The Office of Technology Assessment reported that the best information available indicated that a reduction in energy use of at least an additional 25 percent was technically feasible and economically attractive for federally owned buildings.⁹ Also, a January 1993 report by DOE's Office of Inspector General estimated that annual energy cost savings of \$14 million were available at the six sites it reviewed.¹⁰

Federal agencies have been directed since 1976 to reduce their energy use, pursuant to goals established in legislation and executive orders. For example, the Energy Policy and Conservation Act, as amended (P.L. 94-163), called for selected federal agencies to reduce their energy consumption by 10 percent as compared to 1972. The National Energy Conservation Policy Act, as amended (P.L. 95-619); Executive Order 12759, issued in April 1991; and the Energy Policy Act of 1992 (P.L. 102-486), which incorporated several of the executive order's goals and made them requirements, extended energy-reduction targets to all federal agencies. Energy consumption in buildings is to be reduced by 20 percent in fiscal year 2000 from fiscal year 1985 levels based on British thermal units (Btu)¹¹ per gross square foot. However, these requirements do not specifically address contractor-operated sites. A recent GAO report discusses several agencies' progress in meeting this 20-percent energy-reduction goal.¹²

The federal government's use of contractors to operate and manage sites dates back at least to World War II. At that time, the federal government sought to obtain private industry's participation in dangerous and uncertain activities—for example, to develop the atom bomb,

⁷Energy Use in Federal Facilities: Squandering Taxpayer Dollars and Needlessly Polluting Our Environment, The Alliance to Save Energy (Jan. 1991).

⁸The federal government classifies its energy use under two categories: (1) general operations and (2) buildings and facilities. (See app. I for a more detailed discussion of the types of energy in the general operations category as well as how we developed our savings estimates.)

⁹Energy Efficiency in the Federal Government: Government by Good Example?, OTA-E-492 (May 1991).

¹⁰Department of Energy's In-House Energy Management Program, DOE/IG-0317 (Jan. 6, 1993).

¹¹A British thermal unit is the quantity of heat required to raise the temperature of one pound of water one degree Fahrenheit. A gallon of oil is equivalent to about 139,000 Btu. A barrel of oil contains 42 gallons, or about 5,800,000 Btu.

¹²See our report entitled Energy Conservation: Federal Agencies' Funding Sources and Reporting Procedures (GAO/RCED-94-70, Mar. 30, 1994).

the government gave contractors wide latitude in operating its weapons research and production sites. DOE, which is now responsible for and relies on contractors to operate the government's nuclear weapons research and production sites, uses more energy than any other civilian agency in the federal government.¹³

The five agencies use contractual arrangements for managing and operating federal sites whereby utility bills are paid either by the contractor or the federal government. Any savings realized through energy conservation measures benefits the contractor or the federal government, depending on who pays the utility bill. For example, a DOE energy management official told us that DOE pays all utility bills for its contractors, and any savings will benefit DOE. Savings to the agencies represent savings to the federal taxpayers.

Contractor-Operated Sites Differ by Usage, Activity, and Age

As of October 31, 1993, the Air Force, Army, Navy, DOE, and NASA relied on contractors to operate and maintain 103 of their sites.¹⁴ The 83 contractors responding to our questionnaire concerning energy consumption reported using the equivalent of about 10 million barrels of oil during fiscal year 1992. (See table 1.) This amounted to over 4 percent of the federal government's total annual energy consumption for all of its buildings. For fiscal year 1992, 93 contractors reported total energy costs for their sites of over \$780 million.

¹³See DOE's Annual Report to the Congress, Fiscal Year 1992 (Draft, July 1993).

¹⁴App. II discusses how we identified the agencies that used contractors to operate their sites and how we determined the number of sites.

Table 1: Comparison by Agency of Energy Used by Contractors in Government-Owned Space

Agency	Energy used by contractors		Percent of government-owned space that is contractor-occupied
	Equivalent barrels of oil	Percent of agency total	
	Barrels in millions		
Air Force	0.9	4.9	0.6
Army	2.2	11.1	0.9
Navy	0.8	5.9	0.3
DOE	5.5	78.0	75.0
NASA	0.3	17.0	22.0
Total	9.7	a	a

Note: Energy used in the categories of (1) buildings and facilities and (2) exempted buildings/process operations. (See app. I for an explanation of the information used in table 1.)

^aNot applicable.

Of 83 respondents, over one-half (47) indicated that the sites they operated were inactive or operating at a significantly reduced level of activity, as of July 1, 1993. (See table 2.)

Table 2: Comparison of Contractor-Operated Sites by Activity and Energy Usage for Fiscal Year 1992

Agency	Contractor-operated sites				Total ^b
	Active		Inactive ^a		
	Number	Equivalent barrels of oil	Number	Equivalent barrels of oil	
Barrels in millions					
Air Force	4	0.4	9	0.4	13
Army	4	0.2	13	2.0	17
Navy	2	0.2	10	0.7	12
DOE ^c	25	2.9	11	2.6	36
NASA	1	0.1	4	0.2	5
Total^b	36	3.8	47	5.9	83

^aIncludes sites with significantly reduced missions or with excess capacity.

^bTotals are based on questionnaire responses regarding activity status.

^cThe determination of the number of DOE sites and the energy used at those sites are explained in app. I.

The activity level at some sites has been reduced for various reasons. For example, many buildings at DOE sites are awaiting decontamination and decommissioning because DOE's major mission has shifted from nuclear weapons production to environmental restoration and waste management.¹⁵ DOE headquarters officials pointed out that the buildings at such sites still consume a significant percentage of the energy that was consumed when the sites were fully operational. For example, the contractor's energy manager at one of these sites estimated that 60 to 80 percent of the contractor's total energy consumption was used to condition and control air to confine radioactive, hazardous, and biological contaminants at such buildings. One of the Army's contractor-operated, small-caliber ammunition manufacturing plants also operates at a significantly reduced level of capacity. According to contractor officials, the site is operating at 25 percent of capacity because the current level of demand does not merit a higher level of production. According to Army officials, the plant will remain in a reduced operation mode for the foreseeable future.

The phrase "the greying of America" may be applied to contractor-operated sites owned by the federal government.¹⁶ Of 97 respondents, 69, or 71 percent, indicated that the sites they operated were at least 30 years old.¹⁷ (See table 3.)

Table 3: Comparison of Contractor-Operated Sites by Age

Agency	Age of contractor-operated sites						Average age
	0-10	11-20	21-30	31-40	41-50	51-85	
Air Force	1	0	0	6	1	6	42
Army	0	1	0	1	1	16	51
Navy	0	0	1	3	3	6	44
DOE	6	10	7	8	14	1	29
NASA	0	0	2	0	3	0	40
Total	7	11	10	18	22	29	36

¹⁵See our report entitled Department of Energy: Cleaning Up Inactive Facilities Will Be Difficult (GAO/RCED-93-149, June 25, 1993).

¹⁶See our report entitled Federal Research: Aging Federal Laboratories Need Repairs and Upgrades (GAO/RCED-93-203, Sept. 20, 1993).

¹⁷For this report, the age of the site is based on contractors' estimates as to when the bulk of the sites they operate were constructed. Newer buildings have been constructed at some sites.

The age and associated deterioration of the sites forces contractors and agencies to focus more on plant maintenance than on energy conservation, according to agency and contractor officials. For example,

- At one Air Force site we visited, the wooden building was about 50 years old and had required repairs to the roof; the water system; and the heating, ventilating, and air conditioning system. None of those projects were justified on the basis of energy conservation alone, although the increased roof insulation and more efficient motors in the water system and the heating, ventilating, and air conditioning system all contributed to reductions in energy usage.
- According to contractor officials at one Navy site we visited, the Navy has not budgeted any money for energy conservation projects at this site. However, the age of the site has necessitated replacing old air conditioning units, which were installed in 1945. As in the previous example, the contractor justified replacing the equipment because of its age and poor condition, not because of the possible energy savings that would result.

The need to make such repairs, together with the frequent need to spend funds on cleaning up environmental pollution and correcting worker health and safety problems, redirects attention from activities such as energy conservation, according to contractor personnel. For example, contractor officials at one Air Force site told us that projects to maintain or enhance production, to address worker health or safety requirements, and to address environmental requirements take precedence over energy conservation projects because the company could be subject to production losses, regulatory fines, and personal lawsuits for failure to respond to those requirements. The officials said that while those requirements have redirected funds that could otherwise have been applied to energy conservation projects, some of the projects that were completed did have energy conservation benefits. However, according to these officials, the Air Force had not provided any dedicated funding for energy conservation projects at this site.

NASA's contractor-operated sites range in age from 28 to 50 years old. Although NASA had not dedicated any funds to energy conservation projects, it has used its capital maintenance and improvement funds for energy conservation projects. For example, contractor officials at the Slidell Computer Complex identified 18 energy conservation projects that had been implemented using \$1.4 million of NASA's funding for construction of facilities during the past 17 years.

Available Incentives Receive Limited Use

Three main energy-reduction incentives are available to contractors. These are rebates from utilities, federal funding designated for energy conservation measures, and contracts between the government and a company to share in dollars saved through energy conservation efforts. Among our questionnaire respondents, each of these incentives was in use to some degree.

Rebates From Utilities

Of 97 respondents, 42 responded that their local utilities offered one or more rebates under demand-side management (DSM) incentive programs, as of July 1, 1993. These programs typically consist of limiting energy demands on the utility system by both conservation and other techniques, such as the installation of controls and equipment to shift loads to off-peak demand periods. Utilities can offer rebates for items such as high-efficiency lighting fixtures or bulbs, high-efficiency windows, or energy management control systems. Cumulatively, 26 respondents reported receiving over \$2 million in rebates between October 1, 1989, and July 1, 1993.

Although such programs have been available for years, according to the Manager of the Energy Systems Modernization Office of DOE's Pacific Northwest Laboratories, testifying before the Senate Committee on Governmental Affairs, utilities initially designed the programs for their private-sector customers, and typically the customers had to spend operating or capital funds up front as well as assume responsibility for procuring all of the services and technologies for the retrofits. According to some agency officials we interviewed, they have had difficulty participating in utility rebate programs because they have not always met participation requirements. For example, the utilities' commitment to reimburse the upfront expenses may be available for only a short time, and at the end of that period, the rebate may no longer be available. If the contractor or the federal agency does not have funds available during that window of opportunity, the contractor or the agency may not be able to participate.

One of NASA's sites that has been relatively successful in participating in utilities' energy conservation programs also provides an illustration of the kinds of impediments to participating. For this site, as is typical in such arrangements, the utility allocated funds for energy conservation programs on an as-available basis and required the planning, design, and completion of projects in the same calendar year that it allocated the funds. No carryover was allowed. The impact of that restriction was that many

projects that otherwise qualified for utility-sponsored rebates could not take advantage because the projects' schedules extended beyond the utilities' rebate periods.

Energy Savings Performance Contracts

Contractors used shared energy savings contracts, which the Energy Policy Act of 1992 renamed energy savings performance contracts, sparingly.¹⁸ Of the 20 questionnaire respondents that had taken actions to determine whether such agreements were available and whether participation was feasible, 13 were operating DOE-owned sites. Only one respondent—operating a DOE site—reported signing an agreement, as of July 1, 1993.

Contractors have reported that they had encountered substantial difficulties in pursuing energy savings performance contracts because the complex, time-consuming process involved in negotiating such arrangements creates disincentives for small and mid-size contractors. A contractor told us that it is extremely difficult and costly to develop these contracts with federal agencies.

DOE's efforts at its Lawrence Berkeley Laboratory illustrate how a contractor and an agency can work together to implement an energy savings performance contract. In this instance, an energy services company spent an estimated \$328,000 on energy conservation projects that the company installed at no capital cost to either the contractor that operates the site or the government. In addition to the energy conservation measures valued at about \$328,000, DOE should also realize energy savings of about \$150,000.¹⁹ However, to achieve these benefits, DOE has invested or will invest about \$150,000 for activities, including (1) developing and awarding the contract, (2) developing a system for measuring energy savings, and (3) monitoring the energy savings during the contract period, according to DOE officials.

Although DOE headquarters officials recognize that energy savings performance contracts are an option, they cautioned that such contracts are typically a "last resort" means of financing energy conservation projects, which can best be used when federal funding is unavailable. DOE

¹⁸Typically, under such a contract, an energy services company installs the conservation measures it determines are most cost-effective and provides financing and maintenance services. In exchange, the company is repaid using a portion of the energy cost savings resulting from the more efficient measures.

¹⁹The DOE energy savings estimate is based on the net present value of savings over the expected term of the contract.

has about \$17 million available annually for energy conservation retrofit projects,²⁰ which DOE would prefer to use before entering into energy savings performance contracts. DOE headquarters officials told us that DOE would prefer to finance the entire project since all of the savings then accrue to the government.

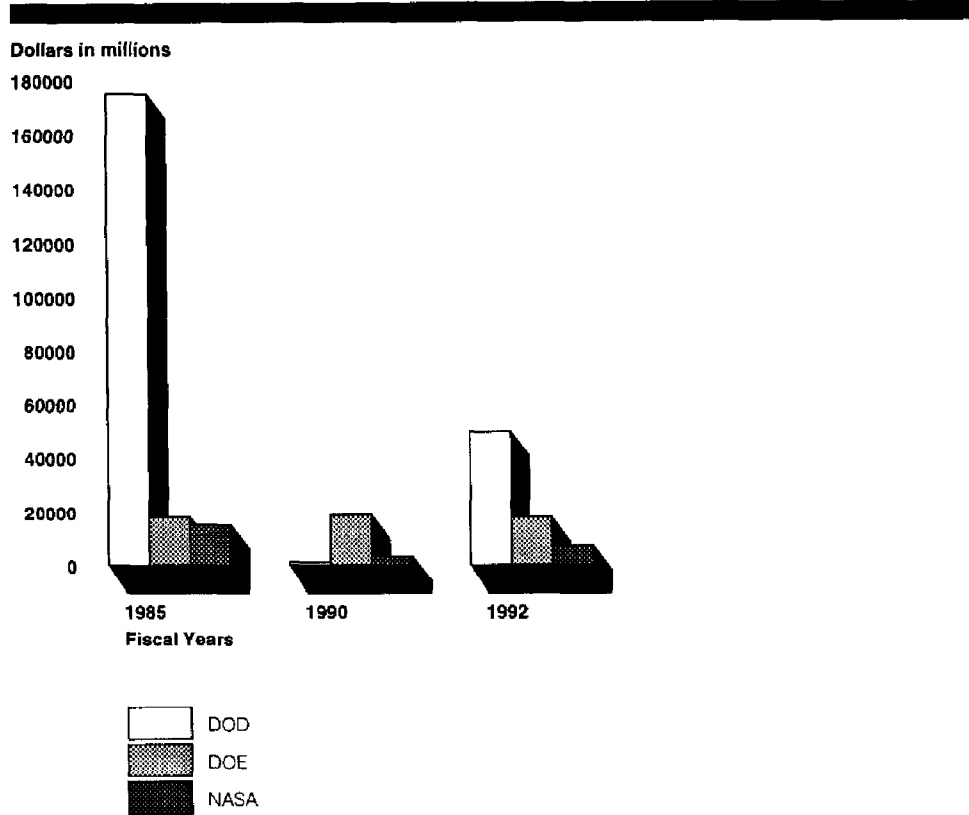
NASA provides a similar example of how an agency and a contractor can work together to overcome the obstacles to implementing energy conservation efforts at federal sites. NASA's Michoud Assembly Facility represented a situation in which NASA and the site operating contractor agreed to include energy conservation clauses in the production contract. In this instance, energy cost reduction program clauses, initially included in the fiscal year 1988 contract, allow the operating contractor an opportunity to share in savings achieved by implementing energy conservation projects at the site. Cumulative savings from fiscal year 1989 through fiscal year 1992 total over \$5.1 million, of which 16 percent, or \$820,000, was awarded to the contractor and the balance to the government.

Funding for Energy Conservation Measures

The government's funding for energy efficiency improvements has increased somewhat in recent years, though it still remains considerably below the levels reached during the 1980s. In fiscal year 1985, the Department of Defense (DOD), DOE, and NASA invested nearly \$208 million (using constant fiscal year 1992 dollars) in energy efficiency improvements at all of their sites, including those operated by contractors. By fiscal year 1990, the agencies' investment in energy efficiency improvement measures had dropped to less than \$23 million. From there, the investment increased to about \$74 million in fiscal year 1992. (See fig. 1.)

²⁰See DOE's Annual Report to the Congress, Fiscal Year 1992 (Draft, July 1993).

Figure 1: Funding Levels for Energy Efficiency Improvements



Note: All numbers are in fiscal year 1992 constant dollars.

Source: Developed by GAO from DOE data.

Responding to our questionnaire, 55, or 57 percent, of the 96 respondents believed that the amount of direct or indirect funding for improving the energy efficiency at their sites was less than adequate. Also, contractor representatives responding to our detailed questions about energy conservation at six of the sites we visited said that unless the federal agencies provided the funding for the more costly projects, such as replacing boilers, little was done. Officials at four of the five agencies, and some contractor officials, told us that because of limited funding, projects with relatively short payback periods had a better opportunity of being funded. As a practical matter, agencies were able to fund projects with payback periods of 3 years or less. In contrast, DOE headquarters officials

told us that DOE has had sufficient funding for all of its retrofit projects, including those with payback periods of up to 10 years. However, officials did say that funds for surveys and studies to identify potential retrofit projects had been limited in the past.

Contractors' Efforts Focus on Need to Reduce Their Own Costs and Complete Mission Work

One of the primary reasons contractors reported for implementing energy conservation measures was their own need to follow good business practices—that is, to save money and remain competitive. Respondents indicated that the incentives discussed earlier—such as rebates from utilities and shared energy savings contracts—played only a limited role in their decisions. Of 96 respondents, 75, or 78 percent, reported that energy efficiency was a moderate to very high priority, as of July 1, 1993. Of 97 respondents, 88, or 91 percent, had implemented at least one project with energy-saving consequences since October 1, 1989. Reflecting such efforts, of 88 respondents, 2 reported increases in energy usage that were not attributable to mission changes, 10 reported no change in energy usage, 33 reported energy reductions of 1 to 5 percent, and 43 reported energy reductions greater than 6 percent between October 1, 1989, and July 1, 1993. (See table 4.)

Table 4: Changes in Energy Usage by Agency Between October 1, 1989, and July 1, 1993

Change in energy usage	Respondents by agency					Total
	Air Force	Army	Navy	DOE	NASA	
Increase of any amount	2	0	0	0	0	2
No change	0	2	2	5	1	10
1-5 percent decrease	6	6	2	17	2	33
6-10 percent decrease	1	2	3	12	0	18
11-15 percent decrease	1	3	3	6	0	13
16-20 percent decrease	1	2	1	1	1	6
More than 20 percent decrease	0	2	1	2	1	6
Total	11	17	12	43	5	88

DOE headquarters officials said that DOE was funding all energy conservation retrofit projects that DOE contractors proposed. However, headquarters officials at the other agencies said that their agencies did not have dedicated energy conservation funds. Contractor officials at some of the sites we visited said that they undertook projects with energy conservation benefits primarily for other purposes. In these cases, contractors bought new equipment—such as replacement lighting fixtures

and bulbs—primarily to reduce costs or become more competitive, but the purchase also had energy reduction as a side benefit. Some contractors said that because of the uncertainty at these sites as to how long the site would be operating, the payback period for such investments had to be relatively short—generally 3 years or less.

We identified three key factors that will likely affect the degree to which future energy-reducing activity is pursued at contractor-operated sites. These factors are (1) contractors' willingness to use their own funds and existing incentives, (2) agencies' evaluations of whether energy conservation measures are warranted at sites that are experiencing excess capacity, and (3) the availability of federal funding.

Contractors' Willingness to Pursue Energy Savings Under Existing Incentives

Contractors have generally made limited use of existing incentives such as rebates or energy savings performance contracts. Until recently, the contractors generally were not faced with a requirement to reduce energy consumption. For instance, in September 1991 DOE directed that its sites (including all its contractor-operated sites) develop plans for increasing energy efficiency by 20 percent by fiscal year 2000. Furthermore, DOD officials told us that 1992 was the first year that DOD assigned a specific 20-percent reduction target for energy conservation to contractors operating its sites.

It is unclear whether contractors' use of incentives will increase. The picture appears equally uncertain about contractors' willingness to use their own funds to participate in incentive-based projects. For example, a contractor representative at one Navy site that manufactured aircraft components told us that the present uncertainty associated with ongoing cutbacks in defense spending has adversely affected the contractor's ability to plan projects to reduce energy consumption. The representative said that, in general, the contractor will not spend money to implement any energy conservation projects that will not recoup its investment within 24 months. At the same time, however, the contractor said that because of the age of the sites, it must continue to invest in short-term projects to lower operating costs and thus remain competitive when bidding for contract renewal or additional work.

Decisions About Undertaking Energy Reductions at Marginally Active Sites

The age, condition, and marginal activity status of some contractor-operated sites may cause agencies and contractors to determine that substantial energy-saving investments are unwise, particularly when energy-saving expenditures may divert funds from other objectives considered to be of a higher priority, such as environmental cleanup. Also, the Air Force has a long-standing policy of divesting itself of all of its 11 contractor-operated sites. Seven of these sites, according to the Air Force, are badly contaminated, making it difficult if not impossible to divest itself of ownership in the near future.

The combination of old buildings, environmental contamination, and an uncertain long-term future make it difficult for the contractors or the Air Force to justify large investments to make the buildings more energy efficient. For example, one contractor-operated site we visited manufactures avionics equipment for fighter planes. The site was rapidly constructed, primarily of wood, during the early days of World War II. Contractor officials told us that the highest funding priority is the myriad of local, state, and federal government requirements to protect the environment as well as worker health and safety. In addition, funding is diverted from energy conservation to emergency repairs required because of equipment breakdowns. The Air Force's policy of divesting itself of all contractor-operated sites makes long-term investment in energy conservation measures at this site unattractive.

Another instance of the difficulties that arise from the combination of old buildings and environmental contamination involved a Navy-owned site at which the contractor manufactures ship-based missile launch systems and advanced 5-inch guns. The site was built during the early days of World War II, and a contractor official told us that only about 20 percent of the site's space is currently used. A contractor official said that no Navy funds are dedicated to energy conservation, and any energy conservation improvement benefits are achieved as a by-product of projects to replace worn-out equipment, remedy environmental contamination problems, or resolve worker health and safety concerns.

Availability of Federal Funding

The availability of federal funding for energy conservation purposes will have a major impact on how many energy efficiency improvement projects are implemented at contractor-operated sites. The Energy Policy Act of 1992 requires federal agencies to implement, to the maximum practicable extent, energy-saving projects with a payback period of less than 10 years, in buildings owned by the federal government. Experts agree that the

potential exists for significant energy cost savings in government-owned buildings. To provide a conservative estimate of the magnitude of potential energy savings at contractor-operated sites, we used agency estimates and calculated that annual energy cost savings at federally owned, contractor-operated sites could exceed \$43 million. These savings, however, would require a one-time estimated \$216 million investment in energy efficiency improvements in federal buildings. Appendix I provides details on how we calculated potential energy cost savings.

By way of comparison, the amount of this one-time investment significantly exceeds the \$74 million in total funding available for energy-reduction measures at all DOD, DOE, and NASA facilities, including those operated by contractors, in fiscal year 1992. For example, as shown in table 1, contractor-operated sites represented less than 2 percent of DOD agencies' building space and about 5 to 11 percent of their energy consumption, and these sites must compete for funding with other facilities that are not contractor-operated. Consequently, the likelihood of limited funding appears to be the strongest motivation for (1) carefully planning how to spend existing funds in the most efficient manner and (2) ensuring that agencies and contractors take maximum advantage of the incentives already available to them.

New Executive Order Expands Energy Conservation Requirements

On March 8, 1994, the President signed Executive Order 12902, which establishes new requirements for federal energy managers and others regarding the federal government's energy conservation efforts. The new executive order, which revokes most of Executive Order 12759, requires a 30-percent energy use reduction in buildings by 2005, based on Btu-per-gross-square-foot measured from 1985 energy usage. The order also establishes a new requirement for federal industrial facilities. The order requires that such facilities, in the aggregate, increase energy efficiency by at least 20 percent by 2005 as compared to 1990 energy usage, using definitions and standards that are to be developed under the direction of DOE. Furthermore, the executive order specifically requires all government-owned, contractor-operated facilities to comply with the goals and requirements of this order and directs agencies to incorporate energy management goals into such facilities' management contracts.

Conclusions

Contractor-operated sites use a significant amount of the total energy used at government buildings. To date, energy conservation has been a moderate to very high priority among 75 of 96 respondents to our

questionnaire performing operations at government-owned sites. The contractors have emphasized implementing energy efficiency improvement projects that recoup the initial investment over a short time, while reducing the contractors' operating costs. Because federal agencies may not have the funding necessary to install all practicable energy efficiency improvements, the extent of further energy-reduction activities at contractor-operated sites is difficult to predict.

The agencies' major concerns at this time are cleaning up environmental contamination resulting from past operations and ensuring that employee health and safety is protected. However, funding is likely to be limited for these efforts, let alone for energy conservation. The competing priorities and limited funds highlight the need for agencies to ensure that existing incentives, such as rebates from utilities and energy savings performance contracts, are used to the maximum extent practicable. To date, usage of these incentives has been limited. In implementing the Energy Policy Act of 1992, with its requirement that agencies implement to the maximum extent practicable energy-saving projects with paybacks of less than 10 years, agencies will need to identify the energy conservation measures that are needed to make contractor-operated sites as energy efficient as practicable. Executive Order 12902 provides even more impetus to install conservation measures at contractor-operated sites. We believe that this new executive order, with its renewed emphasis, should, if accompanied by adequate funding, provide the means for contractor-operated sites to do their part in reducing the federal government's energy usage and energy costs.

Agency Comments

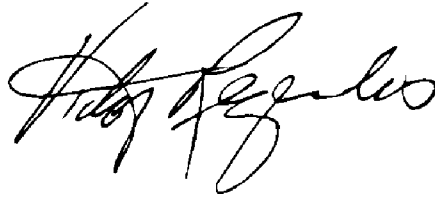
We discussed the factual information contained in this report with DOD, DOE, and NASA officials, who expressed general agreement with the information presented. However, they provided some clarifying comments that have been incorporated into the report as appropriate. For example, DOE and NASA officials noted discrepancies in how some contractors calculated and reported energy use statistics. We incorporated their concerns, as discussed in appendix I. DOE officials noted that some of the contractors who responded that they had no long-range energy management plan for their sites were included in other contractors' plans, and we revised the questionnaire response to reflect this clarification. DOE officials also said that energy savings performance contracting may not be the most advantageous method of financing energy conservation projects at contractor-operated sites, and we have included their comment. As

requested, we did not obtain written agency comments on a draft of this report.

As arranged with your office, unless you publicly announce its contents earlier, we plan no further distribution of this report until 30 days after the date of this letter. At that time, we will send copies to appropriate congressional committees, federal agencies, and other interested parties. We will also make copies available to others on request.

If you or your staff have any further questions, please contact me at (202) 512-3841. Major contributors to this report are listed in appendix IV.

Sincerely yours,

A handwritten signature in black ink, appearing to read "Victor S. Rezendes". The signature is fluid and cursive, with the first name being the most prominent.

Victor S. Rezendes
Director, Energy and
Science Issues

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Abbreviations

Btu	British thermal units
DOD	Department of Defense
DOE	Department of Energy
DSM	demand-side management
FEMP	Federal Energy Management Program
GAO	General Accounting Office
NASA	National Aeronautics and Space Administration

Energy Use Categories and Estimated Energy Cost Savings

Energy Use Categories

The federal government classifies its energy use under two categories: (1) general operations and (2) buildings and facilities. The general operations category covers energy used in vehicles and equipment and energy used in energy-intensive buildings. The energy used in energy-intensive buildings, which includes process energy, is exempt under section 543 of the National Energy Conservation Policy Act, as amended, from compliance with energy-reduction goals. Examples of general operations energy are aircraft and naval fuels; automotive gasoline used by federally owned and leased vehicles and privately owned vehicles used for official business; the energy used in federal construction, as well as the energy used in industrial operations; certain research and development activities; and in electronic intensive facilities.

Energy Usage Computations

Each year contractors report their energy usage by fuel type to the individual federal agencies. The agencies report that information to the Department of Energy's (DOE) Federal Energy Management Program (FEMP). FEMP converts agencies' actual energy usage (which is collected in units such as kilowatt hours of electricity and gallons of fuel oil) to British thermal units (Btu) when reporting federal agencies' energy usage to the Congress. A source-based conversion factor of 11,600 Btu per kilowatt hour for electricity is used to determine the Btu generated, while a site-based conversion factor of 3,412 Btu per kilowatt hour of electricity is used to determine Btu used by the customer.

When responding to our questionnaire, the contractor personnel made the conversion from actual energy usage to Btu equivalents. According to DOE and National Aeronautics and Space Administration (NASA) headquarters officials, however, the responses indicate that some respondents used the source conversion factors and others used the site conversion factors. Also, at least one other contractor included information which, according to DOE headquarters officials, typically is not provided in DOE reports of energy usage. For example, the total energy usage at one of DOE's sites during fiscal year 1992, including process energy to enrich uranium, was 50.845241 trillion (or 50845.241 billion) Btu. This site's energy usage, excluding process energy, was 275.633 billion Btu—a difference of over 50 trillion Btu. DOE headquarters officials said that the process energy used at uranium enrichment sites had been, as a matter of long-standing practice, excluded from reports of energy usage provided to FEMP.¹ As a result of these types of discrepancies, DOE contractors' responses to our question

¹Under the Energy Policy Act of 1992, on July 1, 1993, DOE's uranium enrichment operations were transferred to a government-owned corporation, the U.S. Enrichment Corporation; the enrichment operations are no longer a part of DOE.

concerning energy usage during fiscal year 1992 totaled 128,484 billion Btu while DOE's reported total was only 44,902 billion. DOE headquarters officials believe that the total energy used by DOE contractors during fiscal year 1992 cannot exceed about 91 percent of the agency's total, or about 40.810575 trillion Btu.

Determining how each respondent computed the amount of energy used that they reported to us would have been very time-consuming and, therefore, we chose to use DOE's approximation of energy used by its contractors as an upper limit for our calculation of the quantity of energy used by DOE's contractors. DOE officials based that estimate on information that DOE sites report in DOE's Energy Management System. However, neither DOE nor we were able to precisely identify which DOE reporting sites corresponded to our questionnaire respondents. We chose to use the energy usage data only from those sites that directly corresponded to our questionnaire respondents. As a result, our calculation of the contractors' energy usage totaled a conservative 78 percent of the agency's total rather than the estimated 91 percent.

A similar situation occurred with NASA's contractors. However, a NASA headquarters official identified the discrepancies associated with four of the five contractors' questionnaire responses and provided us with detailed information about the correct energy usage for each contractor, which we used in our calculations.

Potential Savings From Energy Conservation Measures

Our questionnaire respondents reported spending about \$783 million for energy used at their sites during fiscal year 1992. In 1991, the Alliance to Save Energy reported that the federal government could reduce its energy bill for buildings by an additional 25 percent. That estimate was based on data gathered concerning private sector office buildings and residential units and did not include any information on federal buildings.² The Alliance believed that because offices and residential units made up 46 percent of all federal buildings the estimate for the private sector provided a useful comparison. Given that over 70 percent of the government-owned buildings occupied by our questionnaire respondents are at least 30 years old, the savings associated with contractor operations in government-owned buildings may actually be higher than the 25 percent that the Alliance believed was possible.

²Energy Use in Federal Facilities: Squandering Taxpayer Dollars and Needlessly Polluting Our Environment, The Alliance to Save Energy (Jan. 1991).

We asked the energy officials at the five agencies if the Alliance estimate, and other higher estimates, were reasonable. Four of them believed that, given adequate funding to implement energy conservation measures, savings in a range from 20 to 30 percent from the fiscal year 1985 baseline were possible. Because of funding limitations, the significant number of energy conservation measures completed prior to the 1985 baseline, and the fact that some DOE sites are located in areas where public utilities charge low rates for energy, which makes identification of conservation projects with paybacks of less than 10 years more difficult, DOE officials believed that potential future savings of 5 percent were possible. We used 20 percent as a starting point and calculated annual energy cost savings of \$31.7 million for the contractor-operated sites owned by the Air Force, Army, Navy, and NASA. We used 5 percent for DOE and calculated \$11.6 million in future annual energy cost savings. The total estimated savings for all five agencies was, therefore, \$43.3 million.

We did not include the general operations energy in our calculations of potential energy cost savings because the Department of Defense's (DOD) jet fuel usage was such a large portion of general operation's energy usage. For instance, 68 percent of the total energy used by the federal government in fiscal year 1992 was used for general operations.³ However, DOD used 92 percent of the general operations energy, and fuels used by vehicles and equipment represented 89 percent of the general operations energy. Furthermore, DOD jet fuel usage was 86 percent of total vehicle and equipment energy.

Although the Energy Policy Act of 1992 requires agencies to implement all practicable projects with paybacks of less than 10 years, if we conservatively assume an average payback of 5 years, \$5 must be invested for each \$1 returned as energy savings. Therefore, to save \$43.3 million per year, an investment of about \$216 million in federal building energy efficiency improvements is needed. In fiscal year 1992, DOD, DOE, and NASA reported spending about \$74 million for projects that included energy efficiency improvement benefits at all sites, including those operated by contractors.⁴

³Annual Report to Congress on Federal Government Energy Management and Conservation Programs, Fiscal Year 1992, U.S. Department of Energy (Draft, July 1993).

⁴See DOE's Annual Report to the Congress, Fiscal Year 1992 (Draft, July 1993).

Objectives, Scope, and Methodology

Objectives

We focused our review on the extent to which contractors that were operating sites owned by five agencies are achieving energy reductions at the sites they manage. The five agencies were the Departments of the Air Force, Army, Navy, and Energy and the National Aeronautics and Space Administration. Specifically, our objectives were to examine (1) energy consumption at government-owned sites that contractors operate in the United States, (2) incentives available for contractors to use in reducing energy consumption, and (3) contractors' energy conservation efforts and the results these efforts have achieved.

Scope

We surveyed the 31 federal agencies that report their energy usage to DOE's Federal Energy Management Program Office to determine which agencies used contractors to operate their sites. Energy management officials at DOD (Air Force, Army, and Navy), DOE, and NASA readily identified a total of 111 contractors performing operations for them at sites that these agencies owned. The remaining agencies told us that they (1) did not use contractors, (2) were not sure if they used contractors, or (3) were sure they used contractors but were not sure how many they actually used. Since the energy used by the remaining agencies represented less than 11 percent of the federal government's total annual energy use in fiscal year 1992,¹ and since some had large numbers of field locations—for example, according to a headquarters official, the U.S. Postal Service has over 30,000 locations nationwide—which would have made determining the exact number of contractors very difficult and would have been very time-consuming, we limited our review to the Air Force, Army, Navy, DOE, and NASA.

We visited the Office of the Deputy Assistant Secretary for Defense (Production and Logistics), DOD; FEMP Office, DOE; the In-House Energy Management Program Branch, DOE; the Office of Energy Management, NASA; and the Facilities Management Division, Public Buildings Service, General Services Administration in Washington, D.C., and discussed with representatives of those offices their role in energy management.

We used a questionnaire that was mailed to 111 contractors identified as performing operations in government-owned space to elicit a wide range of information concerning contractors' energy management operations. (See app. III for the questionnaire that we used.) We visited selected field locations to pretest the questionnaire and/or to conduct more detailed interviews with the contractors concerning their energy conservation

¹See DOE's Annual Report to the Congress, Fiscal Year 1992 (Draft, July 1993).

efforts. We pretested our questionnaire only at the following sites: Naval Weapons Industrial Reserve Plant in Bethpage, New York; Radford Army Ammunition Plant in Radford, Virginia; and Brookhaven National Laboratory in Upton, New York. We visited the following sites to pretest our questionnaire and to conduct more detailed interviews concerning their energy conservation efforts: Air Force Plant #59 in Johnson City, New York; Hanford Site in Richland, Washington; and Slidell Computer Complex in Slidell, Louisiana. We visited the following sites to ask the contractors more detailed questions concerning their energy conservation efforts: Naval Weapons Industrial Reserve Plant in Dallas, Texas; Naval Industrial Reserve Ordnance Plant in Minneapolis, Minnesota; Army Ammunition Plant in Independence, Missouri; and Michoud Assembly Facility in New Orleans, Louisiana. We discussed with agency field location and/or contractor representatives their roles in energy management. We also contacted the Energy Systems Modernization Office of the Battelle Pacific Northwest Laboratory, and the Alliance to Save Energy to discuss specific aspects of energy conservation efforts. We reviewed the agencies' past, current, and proposed guidance for energy management.

Methodology

To determine the extent to which contractors, rather than federal agencies, control energy usage at government-owned sites, we surveyed the 31 federal agencies that reported their energy usage to DOE's FEMP Office from fiscal years 1985 to 1990. We asked either the facilities or energy officials, which we identified with FEMP's assistance, at the various agencies to provide listings of contractors that operated federally owned sites. Energy management officials at DOD (Air Force, Army, and Navy), DOE, and NASA identified a total of 111 contractors as operating federally owned sites for their agencies, as of October 1993.

The Department of Labor identified 39 contractors that operated Job Corps Centers nationwide. However, this information was not provided to us in time for those contractors to be included in our mailing. Furthermore, since the Department of Labor used less than 1 percent of the federal government's total annual energy in fiscal year 1992, we elected not to include the information relative to these contractors in our report.

Of the remaining 27 agencies, 13 told us that they did not use contractors to operate any of their facilities. Another five agencies, which accounted for about 5 percent of the federal government's total annual energy use in

fiscal year 1992,⁶ told us that they were not sure how many contractors they used. Because the amount of energy used by those agencies was relatively small and the large number of their field locations would have made determining the exact number of contractors very difficult and time-consuming, we chose not to include those agencies in our review. The remaining nine agencies, which accounted for less than 2 percent of the federal government's annual energy usage in fiscal year 1992,⁷ did not know how many, if any, contractor-operated facilities they owned.

Because we found that the 27 remaining agencies' total energy usage was relatively minor, and/or agencies' canvassing their sites to obtain precise counts of contractors would have been an extensive effort, we limited our mailing to the 111 contractors identified by energy management officials at DOD, DOE, and NASA.

We received 105 responses from our mailing to the 111 contractors. These respondents represented 103 valid sites. (See table II.1.) Responses varied by agency as discussed in the following paragraphs.

Table II.1: Schedule Showing Questionnaire Responses

Agency	Number				
	Mailed	Total responses	Non-responses	Valid responses	Valid sites
Air Force	15	14	1	11 ^a	11 ^a
Army	24	20	4	20	24
Navy	14	13	1	13	14
DOE	53	53	0	48 ^b	49
NASA	5	5	0	5	5
Total	111	105	6	97	103

^aAlthough we received a total of 14 responses, the Air Force considers these to be only 11 valid responses.

^bAlthough we received a total of 53 responses, 5 contractors responded that they did not belong in our universe. DOE agrees that the five contractors should not be included.

For DOD, we mailed questionnaires to 15 Air Force contractors located at 15 sites,⁸ and 1 contractor did not respond. We mailed questionnaires to 24 Army contractors located at 24 sites, and 4 contractors did not respond.

⁶See DOE's Annual Report to the Congress, Fiscal Year 1992 (Draft, July 1993).

⁷See DOE's Annual Report to the Congress, Fiscal Year 1992 (Draft, July 1993).

⁸The Air Force considers these to be only 11 valid sites because four of the contractors to which we mailed questionnaires subcontract with other contractors at these sites.

We mailed questionnaires to 14 Navy contractors located at 14 sites, and 1 contractor did not respond.

We mailed questionnaires to 53 DOE contractors and received responses from all of the contractors. We received 48 valid responses since one contractor who received two questionnaires sent us a combined response for operations at two locations. Another contractor who received one questionnaire sent us two responses because the firm operated federally owned sites in two states and believed that separate responses were warranted. Five of the respondents said that they did not belong in our universe.

We mailed questionnaires to five NASA contractors who operated five sites⁹ and received responses from all five contractors.

To determine the extent to which the federal agencies assure themselves that contractors are optimizing energy conservation opportunities, we examined the agencies' energy management orders and policy guidance (both current and proposed), the contract provisions concerning energy management (if any existed), the annual energy management plans, and the annual reports they submit to FEMP. To determine the extent to which the contractors are optimizing energy conservation opportunities, we examined their energy management orders and policy guidance (both current and proposed), annual energy management plans, and the annual reports they submit to their contracting agency.

We discussed the facts presented in this report with DOD, DOE, and NASA energy management officials. They generally agreed with the information but offered some clarifications, which we incorporated where appropriate. Our work was conducted during the period November 1992 through March 1994 in accordance with generally accepted government auditing standards.

⁹NASA and we count the Downey/Palmdale site as one site.

Questionnaire on Energy Efficiency at Contractor-Operated, Federally Owned Sites

U.S. General Accounting Office

GAO Energy Efficiency at Contractor-Operated, Federally Owned Sites

The United States General Accounting Office (GAO), an agency that examines issues for Congress, is conducting a review of the incentives for and actions taken to promote energy efficiency at locations where contractors perform operations in government-owned buildings. This review was requested by the Chairman, Senate Committee on Governmental Affairs.

As a part of our review we are sending a questionnaire to the management and operating (M&O) contractor's representative responsible for energy efficiency activities at federal sites. In this questionnaire we are asking specifically about the incentives targeted at increasing energy efficiency and actions that have been taken at this site to improve energy efficiency by contractors. We also want your opinions on how well these incentives have been received and what more could be done.

Please respond to this questionnaire within 10 days of receipt, if possible, in the enclosed self-addressed business-reply envelope. If the envelope is missing or has been misplaced, please return the questionnaire to the following address:

U.S. General Accounting Office
Attn: John Cass
Jackson Federal Building
Room 1992
915 Second Ave.
Seattle, WA 98174

If you have any questions please call John Cass at (206) 287-4807.

Thank you for your assistance.

NOTE: For the purposes of this questionnaire, site is defined as any building, structure, or system that is constructed, renovated, or purchased in whole or in part for use by the U.S. Government over which YOU, as the M&O contractor, have direct control.

Answer only in relation to the federally owned buildings that your company operates at this site.

- Q1. To the best of your knowledge, as of July 1, 1993, did your company have a long-range (5 years or longer) energy management plan for this site? (Check one)
- 69 Yes \Rightarrow Please enclose a copy of the plan when you return your completed questionnaire
 \Rightarrow Skip to Q3
 - 34 No
 - 2 Missing
- Q2. Why did your company not have a long-range energy management plan for this site? (Check all that apply)
- 14 There has not been a need for one
 - 6 Don't have time to produce one
 - 0 The plan wouldn't be followed anyway so why bother
 - 2 Haven't performed an energy audit so can't do anything further
 - 1 Energy is too minor a cost to be a concern
 - 25 Other (Please specify)

**Appendix III
Questionnaire on Energy Efficiency at
Contractor-Operated, Federally Owned Sites**

Q3. Which of the following measures were in effect or in operation on July 1, 1993, by your company at this site to reduce energy consumption and/or achieve energy cost savings? (Check all that apply)

- | | |
|---|--|
| 62 Ride sharing | 55 Water conservation |
| 96 Lights off during non-work hours | 4 Super efficient personal computers, monitors, or printers that automatically switch to an energy efficient standby mode when not in use (not a screen saver) |
| 64 Energy efficient lighting in operation (including occupancy sensors or high efficiency ballasts) | 43 Fuel switching capability |
| 74 Energy efficient heating, ventilating, and/or air conditioning (HVAC) equipment in operation | 8 Cogeneration |
| 75 Adjusting thermostats to more energy efficient temperatures | 9 Commodity trading or purchasing |
| 81 Recycling waste | 23 Other (Please specify) |

Q4. As of July 1, 1993, which of the following demand-side management (DSM) incentives, if any, were available to your company at this site from local utility companies? (Check all that apply)

- | | |
|--|--|
| 43 Energy efficiency surveys or audits | 24 Rebates for thermal storage projects |
| 40 Electrical load management agreements or rate structures | 20 Rebates for energy management control systems (EMCS) |
| 40 Rebates for high efficiency lighting fixtures and/or bulbs | 19 Rebates for energy efficient exit signs |
| 30 Rebates for high efficiency HVAC, including variable air volume (VAV) systems | 20 Rebates for other high efficiency equipment installations not already listed (Please specify) |
| 21 Rebates for high efficiency water heating equipment | 17 Other (Please specify) |
| 31 Rebates for variable speed drive (VSD) motors | |
| 17 Rebates for high efficiency windows | |

**Appendix III
Questionnaire on Energy Efficiency at
Contractor-Operated, Federally Owned Sites**

Q5. Between October 1, 1989 and July 1, 1993, has your company received any rebates from local utility companies for installing energy efficient equipment? (Check one)

- 27 Yes
 - 69 No
 - 3 Don't know
 - 6 Missing
- } Skip to Q7

Q6. How much money has your company received in energy rebates from local utilities between October 1, 1989 and July 1, 1993? Do not include any savings gained through electrical load management agreements or rate structures. (Enter amount)

Responses	Mean	Missing
26	\$77221	1

Q7. Realizing that your company may have taken substantial action to improve energy efficiency before this date, which of the following energy efficiency measures have been implemented by your company at this site since October 1, 1989? (Check all that apply)

- 9 None → Skip to Q10
- 43 Making the site's mission-related processes more energy efficient
- 66 HVAC upgrades
- 62 High efficiency lighting replacements
- 24 High efficiency window replacements
- 45 High efficiency roof, attic, or ceiling insulation or replacement
- 27 Adding insulation in areas other than the roof, attic, or ceiling
- 41 Occupancy/motion sensors for heat and/or lights
- 42 Energy efficient exit signs
- 46 Ride sharing
- 29 Other (Please specify)

Q8. Again recognizing that your company may have taken substantial action to improve energy efficiency before this date, what impact have any energy efficiency measures had on your company's energy usage at this site between October 1, 1989 and July 1, 1993? Do not include energy use changes that have resulted from mission changes. (Check one)

- 10 None → Skip to Q11
- 33 1 to 5 percent decrease
- 18 6 to 10 percent decrease
- 13 11 to 15 percent decrease
- 6 16 to 20 percent decrease
- 6 More than 20 percent decrease
- 2 Increase of any amount
- 8 Missing

Q9. Why were the energy efficiency measures taken between October 1, 1989 and July 1, 1993, implemented by your company at this site? (Check all that apply)

- 20 Specified in your operations contract
- 46 Encouraged by federal agency's headquarters staff
- 45 Encouraged by federal agency's local or regional staff
- 63 Encouraged by staff or representatives of this firm at this location
- 14 Encouraged by staff or representatives of this firm in other locations
- 72 Desire to save money
- 59 Desire to stay competitive or become more competitive
- 39 To allow more money to be used for mission-related activities
- 23 Rebates from utilities
- 10 Other (Please specify)

**Appendix III
Questionnaire on Energy Efficiency at
Contractor-Operated, Federally Owned Sites**

Q10. To what extent, if any, were each of the following factors acting as a barrier to energy efficiency for your company at this site on July 1, 1993? (Circle the number for each that best represents your answer)

	Very great extent	Great extent	Moderate extent	Some extent	Little or no extent	Missing responses
1. Low federal agency priority	4	14	12	20	41	14
2. Low level of federal funding	15	15	16	16	29	14
3. Slowness of federal funding	15	13	16	14	32	15
4. Excessive federal regulations	3	4	15	22	47	14
5. Excessive state/local regulations	0	2	6	17	66	14
6. Lack of incentives in federal contract	6	7	18	18	41	15
7. Too few energy management staff at site	12	13	22	21	24	13
8. Lack of continuing training for energy management staff	4	9	17	14	47	14
9. Poor quality of continuing training for energy management staff	2	3	10	13	63	14
10. Poor recognition for energy management staff	2	7	14	23	45	14
11. Cannot retain dollars saved for additional energy efficiency projects	6	13	16	15	39	16
12. Uncertainty over using DSM programs	2	7	13	15	52	16
13. Uncertainty of future mission or use of this site	15	11	11	11	43	14
14. Other (Please specify)	8	1	3	0	8	85

**Appendix III
Questionnaire on Energy Efficiency at
Contractor-Operated, Federally Owned Sites**

Q11. If any of the following factors were barriers, how difficult, if at all, have they been to overcome in efforts to improve energy efficiency for your company at this site as of July 1, 1993? (Circle the number for each that best represents your answer)

	Extremely difficult	Very difficult	Moderately difficult	Somewhat difficult	Little or no difficulty	Not applicable	Missing Responses
1. Low federal agency priority	4	15	14	11	17	27	17
2. Low level of federal funding	18	15	17	7	14	22	12
3. Slowness of federal funding	17	14	12	16	12	20	14
4. Excessive federal regulations	6	6	13	16	18	31	15
5. Excessive state/local regulations	0	7	8	1	22	49	18
6. Lack of incentives in federal contract	7	8	8	12	24	27	19
7. Too few energy management staff at site	8	14	18	22	17	12	14
8. Lack of continuing training for energy management staff	4	7	16	5	31	26	16
9. Poor quality of continuing training for energy management staff	2	4	7	5	30	41	16
10. Poor recognition for energy management staff	1	10	7	15	29	26	17
11. Cannot retain dollars saved for additional energy efficiency projects	7	12	8	12	18	29	19
12. Uncertainty over using DSM programs	1	6	10	9	18	41	20
13. Uncertainty of future mission or use of this site	16	11	10	8	16	29	15
14. Other (Please specify)	4	1	0	1	0	16	83

**Appendix III
Questionnaire on Energy Efficiency at
Contractor-Operated, Federally Owned Sites**

Q12. Has the energy management staff at this site actively pursued shared energy savings (SES)/Energy Savings Performance contracts where energy services companies bear the cost of installing, operating, and maintaining efficiency measures in exchange for a share of any energy cost savings? (Check one)

20 Yes

69 No

10 Don't know } Skip to Q14

6 Missing

Q13. As of July 1, 1993, what is the status of the SES contracts at this site? (Check all that apply)

1 Completed and signed

5 Still under negotiation or awaiting signature

8 No viable projects identified

5 Negotiation failed, no current negotiations

Q14. In your opinion, how high or low a priority was energy efficiency for your company at this site as of July 1, 1993? (Check one)

16 Very high priority

28 High priority

33 Moderate priority

15 Low priority

7 Very low or no priority

6 Missing

Q15. Have funds been set aside or budgeted by the federal government or your company for energy efficiency improvements for your company's operations at this site since October 1, 1989? (Check one)

67 Yes

31 No → Skip to Q17

7 Missing

Q16. In fiscal years 1990 through 1994, how much money has been budgeted for energy efficiency improvements by your company at this site? (Enter amount)

<u>Responses</u>	<u>Mean</u>	<u>Missing</u>
66	\$2,008,986	1

Q17. In your opinion, has the direct or indirect funding for improving the energy efficiency of this site been adequate in the current fiscal year? (Check one)

0 Much more than adequate

2 Somewhat more than adequate

39 Adequate

29 Somewhat less than adequate

26 Much less than adequate

9 Missing

Q18. In the current fiscal year, has direct or indirect funding reached your company at this site soon enough in the fiscal year to perform energy efficiency projects in an efficient or effective manner? (Check one)

9 Always yes

27 Usually yes

13 As often yes as no

14 Usually no

5 Always no

3 None needed

25 None received

9 Missing

**Appendix III
Questionnaire on Energy Efficiency at
Contractor-Operated, Federally Owned Sites**

Q19. In your opinion, have federal regulations acted as a help or a hindrance in this site's efforts to improve energy efficiency since October 1, 1989? (Check one)

- 5 Great help
- 21 Some help
- 52 Neither help nor hindrance
- 18 Some hindrance
- 2 Great hindrance
- 7 Missing

Q20. Which particular regulations have acted as a hindrance to your company's efforts to improve energy efficiency at this site since October 1, 1989? (Check all that apply)

- 58 None
- 9 Reporting
- 16 Procurement
- 9 Accounting
- 19 Environmental
- 5 Other (Please specify)

Q21. Please give very specific examples of the regulations that have acted as hindrances and explain how they have done so.

No Comments 67
Comments 38

Q22. In your opinion, was the number of staff assigned to energy management by your company at this site adequate as of July 1, 1993? (Check one)

- 0 Much more than adequate
- 1 Somewhat more than adequate
- 43 Adequate
- 33 Somewhat less than adequate
- 20 Much less than adequate
- 8 Missing

Q23. In your opinion, was the continuing or ongoing training for your company's energy management staff at this site adequate as of July 1, 1993? (Check one)

- 0 Much more than adequate
- 4 Somewhat more than adequate
- 43 Adequate
- 37 Somewhat less than adequate
- 14 Much less than adequate
- 7 Missing

Q24. As of July 1, 1993, how many certified energy managers were employed by your company at this site? Certified energy managers are defined as persons, certified by the federal agency, to be trained in each of the following six areas: fundamentals of building energy systems, building energy codes and applicable professional standards, energy accounting and analysis, life-cycle cost methodology, fuel supply and pricing, and instrumentation for energy surveys and audits. (Enter number)

None 80
1 10
2 5
3 3
Missing 7

**Appendix III
Questionnaire on Energy Efficiency at
Contractor-Operated, Federally Owned Sites**

Q25. Does your current contract(s) for the operation of this site provide for energy efficiency measures taken by your company at this site? (Check one)

32 Yes \Rightarrow Please attach a copy of those specific provisions when you return this questionnaire

66 No \Rightarrow Skip to Q27

7 Missing

Q26. In your opinion, how much of an incentive, if at all, are the provisions of the operation contract(s) to pursue energy efficiency by your company at this site? (Check one)

4 Very great incentive

8 Great incentive

7 Moderate incentive

8 Some incentive

3 Little or no incentive

2 Missing

Q27. In your opinion, since October 1, 1989, how much recognition for their accomplishments, if any, have your company's energy management staff received from the federal owners of this site? (Check one)

4 Very great amount of recognition

6 Great amount of recognition

22 Moderate amount of recognition

29 Some recognition

37 Little or no recognition

7 Missing

Q28. In your opinion, how much of an incentive to pursue energy efficiency at this site, if at all, are federal regulations that allow reinvestment of a portion of dollars saved through energy efficiency in additional projects? (Check one)

5 Very great incentive

4 Great incentive

12 Moderate incentive

6 Some incentive

19 Little or no incentive

52 Not available at this site

7 Missing

Q29. In your opinion, how much of an incentive to pursue energy efficiency at this site, if at all, are the personal job performance standards of the energy management staff? (Check one)

9 Very great incentive

22 Great incentive

26 Moderate incentive

17 Some incentive

22 Little or no incentive

9 Missing

Q30. In your opinion, how much of an incentive to pursue energy efficiency at this site, if at all, is the desire to maintain or increase the competitiveness of your company? (Check one)

19 Very great incentive

26 Great incentive

27 Moderate incentive

13 Some incentive

12 Little or no incentive

8 Missing

**Appendix III
Questionnaire on Energy Efficiency at
Contractor-Operated, Federally Owned Sites**

Q31. In your opinion, how much of an incentive to pursue energy efficiency at this site, if at all, is the goal of cost avoidance for your company? (Check one)

- 25 Very great incentive
- 33 Great incentive
- 22 Moderate incentive
- 16 Some incentive
- 3 Little or no incentive
- 6 Missing

Q32. Are there any other factors that, in your opinion, have encouraged your company to pursue energy efficiency at this site since October 1, 1989? (Check one)

- 60 No ⇒ Skip to Q34
- 39 Yes ⇒ Please specify these factors below
- 6 Missing

Q33. Overall, how much of an incentive have these other factors you mentioned in question 32 been for your company's pursuit of energy efficiency at this site since October 1, 1989? (Check one)

- 6 Very great incentive
- 22 Great incentive
- 7 Moderate incentive
- 5 Some incentive
- 1 Little or no incentive
- 64 Missing

Q34. In fiscal year 1992, how much energy, in millions of BTUs, was consumed by your company at this site? (Enter number)

Q35. In fiscal year 1992, what percent of the total BTUs consumed by your company at this site was from each of the following? (Enter percentage for each to add to 100%)

<u>Replies</u>	<u>Mean</u>	<u>Missing</u>	
93	64.5 %	12	Buildings and facilities (excluding buildings that are exempted from federal conservation goals for buildings)
88	9.0 %	17	Vehicles and equipment
84	30.7 %	21	Buildings that are exempted from the federal energy conservation goals for buildings (including process energy)

Q36. How many square feet of nonexempt building space was operated by your company on this site as of July 1, 1993? (Enter number)

<u>Responses</u>	<u>Mean</u>	<u>Missing</u>
91	1,468,856	14

Q37. How many square feet of exempt building space was operated by your company on this site as of July 1, 1993? (Enter number)

<u>Responses</u>	<u>Mean</u>	<u>Missing</u>
89	621,641	16

Q38. What percent of energy use by your company at this site has had an energy efficiency survey or energy audit since October 1, 1989, performed by any organization? (Enter percentage; if not known, give best estimate)

<u>Responses</u>	<u>Mean</u>	<u>Missing</u>
95	35.5 %	10

**Appendix III
Questionnaire on Energy Efficiency at
Contractor-Operated, Federally Owned Sites**

Q39. Since October 1, 1989, what percent of the potential energy efficiency projects identified with a positive savings to investment ratio have been initiated at this site? (Enter percentage; if not known, give best estimate)

<u>Responses</u>	<u>Mean</u>	<u>Missing</u>
93	38.0 %	12

Q40. How are potential energy savings projects identified by your company at this site? (Check all that apply)

- 67 Proposals solicited from staff
- 61 Brainstorming sessions
- 70 Energy surveys/audits
- 32 Budget development
- 66 Employee suggestion program
- 32 Utilities or energy services companies
- 44 Manufacturers of energy efficient equipment
- 13 Other (Please specify)

Q41. Currently, is reduced energy consumption verified by your company at this site after energy efficiency projects are implemented? (Check one)

- 56 Yes
- 41 No → Skip to Q43
- 8 Missing

Q42. How is reduced energy consumption verified by your company at this site? (Check all that apply)

- 39 Metering before and after any changes
- 38 Rely on engineering estimates
- 41 Periodic monitoring or inspections
- 5 Other (Please specify)

Q43. To the best of your knowledge, what was the cost, or what do you estimate the cost to have been, for energy consumed, including process energy, by your company at this site in fiscal year 1992? (Enter amount as accurate as possible)

<u>Responses</u>	<u>Mean</u>	<u>Missing</u>
93	\$8,417,294.23	12

Q44. How accurate do you feel your entry in question 43 for the costs of energy consumed in FY 1992 to be? (Check one)

- 72 Actual amount, based on utility billings
 - 4 Extremely accurate estimate
 - 14 Fairly accurate estimate
 - 4 Not accurate estimate
 - 11 Missing
- } Skip to Q46

Q45. Which of the following factors, if any, affect the accuracy of your estimate of energy costs? (Check all that apply)

- 4 Utility or utilities do not provide sufficient information
- 11 Lack of site metering
- 0 Too small a budget item
- 8 Other (Please specify)

**Appendix III
Questionnaire on Energy Efficiency at
Contractor-Operated, Federally Owned Sites**

Q46. How are energy costs paid by your company at this site? (Check all that apply)

- 9 Utility bills are sent to the federal agency for payment
- 39 Contractor pays for utilities and is directly reimbursed by the federal agency
- 48 Energy costs are part of the overhead in the production contract(s)
- 15 Other (Please specify)

Q47. To the best of your knowledge, what was the total operating budget, or what do you estimate the total operating budget to have been, excluding any costs of raw materials, for your company at this site in fiscal year 1992? (Enter amount)

<u>Responses</u>	<u>Mean</u>	<u>Missing</u>
81	\$240896860	24

Q48. What is your company's primary mission at this site? (Check all that apply)

- 35 Research
- 29 Weapon/ammunition production
- 23 Aerospace production
- 19 Environmental remediation
- 14 Support for other contractor(s)
- 22 Other (Please specify)

Q49. Which of the following best describes the status or level of activity at this site as of July 1, 1993? (Check one)

- 42 Active: operating at a similar or increased level relative to October 1, 1989
- 43 Active: operating at a significantly reduced level relative to October 1, 1989
- 4 Inactive: not operating but expecting reactivation or a new mission
- 0 Closed: not operating and awaiting sale, transfer, or other deactivation
- 8 Other (Please specify)
- 8 Missing

Q50. To the best of your knowledge, when was the bulk of this site constructed? (Enter year)

<u>Responses</u>	<u>Mean</u>	<u>Missing</u>
97	1956	8

Q51. Please provide the following information about the person who was most responsible for completing this questionnaire.

Name: Responses - 97

No Name: Responses - 8

Q52. If you have any other comments you would like to make about energy efficiency at this site, or federal efforts, or the lack thereof, to improve energy efficiency in general, please add them below, on the back, or on a separate sheet.

Comments Provided: 30

No Comments: 75

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Related GAO Products

Energy Conservation: Federal Agencies' Funding Sources and Reporting Procedures (GAO/RCED-94-70, Mar. 30, 1994).

DOE's National Laboratories: Adopting New Missions and Managing Effectively Pose Significant Challenges (GAO/T-RCED-94-113, Feb. 13, 1994).

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Energy and Science Reports and Testimony: 1992 (Apr. 1993).

Nuclear Weapons Complex: Weaknesses in DOE's Nonnuclear Consolidation Plan (GAO/RCED-93-56, Nov. 19, 1992).

Federal Buildings: Actions Needed to Prevent Further Deterioration and Obsolescence (GAO/GGD-91-57, May 13, 1991).

NASA Maintenance: Stronger Commitment Needed to Curb Facility Deterioration (GAO/NSIAD-91-34, Dec. 14, 1990).

Barriers to Installing Energy-Efficient Lighting in Federal Buildings (GAO/T-GGD-90-54, July 11, 1990).

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