Chapter 6

Constraints on Increased Federal Energy Efficiency

(or . . . If there's such great potential, why is it not being captured?)

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Chapter 6

Constraints on Increased Federal Energy Efficiency (or . . . If there's such great potential, why is it not being captured?)

INTRODUCTION

The preceding chapters have suggested that a large fraction of the energy paid for by the Federal Government is wasted. How is that possible? There is no single, simple explanation for all the missed opportunities. There are many reasons, each a constraint to more effective energy efficiency efforts. If left unaddressed, each can inhibit some of the gains which appear technically feasible and economically desirable. OTA identified eight common constraints which can be loosely grouped into three types: 1) constraints on the resources (e.g., funding and personnel) needed to implement energy efficiency measures, 2) a lack of information about the available opportunities, and 3) incentives which do not encourage efficient energy management.[1]

Over the past 15 years, both Congress and the Federal agencies developed several programs which helped ease constraints on increased efficiency in the Federal Government, as described in chapter 2. Implementation efforts have varied over time, however, and general conditions such as the cost of energy and the performance of efficient technologies have also changed. As a result, the constraints on increased efficiency have changed over time, as well. The following sections describe the constraints listed in table 6-1.

Table 6-l—Constraints on Improved Federal Energy Efficiency

Resource constraints
Priorities favor other agency needs.
Energy efficiency is not central to most agencies' missions.
Energy is a small component of most agencies' expenditures.
Little senior management interest.
Many measures require initial capital spending.
Many measures require personnel.
Many facilities have no energy coordinator.
Information constraints
Opportunities have not been systematically assessed.
No governmentwide estimates of potential.
Little analysis of results of different measures.
Agencies are uncertain of technical and economic performance.
Does this technology really work?
Lack of detailed energy use metering.
Would the facility be better off waiting for next year's model?
Too few demonstration programs.
Too little information sharing between agencies.
Energy-use decisions are dispersed, made by thousands of individuals.
Implementation requires coordinated effort from diverse parties.
Too little training and education for diverse parties.
Lack of incentives
Dollar savings often do not accrue to energy savers.
Energy costs are readily passed through budgets.
Cost savings are often not retained at facility.
incentives for facility staffs are often indirect.
Federal procurement policies often favor status quo.
Procurement practices are complex, often restrictive.

SOURCE: Office of Technology Assessment, 1991.

RESOURCE CONSTRAINTS

Resource Priorities Favor Other Needs

Energy efficiency projects often receive relatively low priority for funding and personnel, even those with rapid paybacks. Because of the general constraints on funding and manpower that all institutions face (including Federal agencies), this low priority results in foregone opportunities.

An example of low priority can be seen in low attendance rates at the Federal Interagency Energy Policy Committee (the 656 Committee[2]), which is composed of assistant secretaries and assistant administrators of several agencies. As shown in table 6-2, the 656 Committee has had very low turnout of the actual members at its mandatory annual meeting, although lower level substitutes are usually present. Another example of the low priority energy receives can be seen in agency capital budgets dedicated to energy efficiency improve-

[1]Despite the constraints there are many examples of highly motivated Federal employees who find ways to save energy and money for the government, and take advantage of whatever energy efficiency opportunities they can. See, for example, U.S. Department of Energy, Federal Energy Management Program, "Annual Report to Congress on Federal Government Energy Management and Conservation Programs Fiscal Year 1989,' October 1990, App. H. This appendix describes winners of the annual Federal Energy Efficiency Awards for 1990.

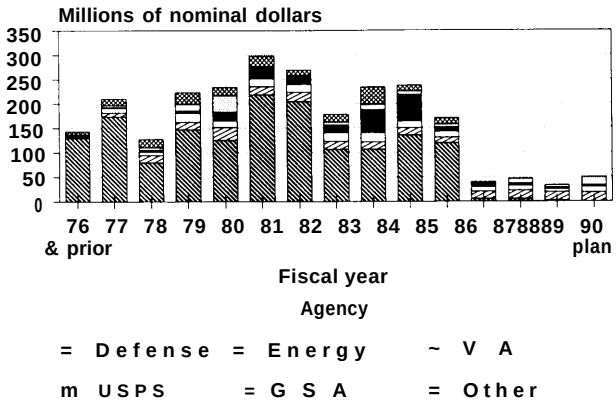
[2]Called the 656 Committee since it is established under Section 656 of the Department of Energy Organization Act of 1977 (see ch. 2).

Table 6-2—Attendance at 656 Committee Meetings

Agency	1988	1989	1990
Department of Energy	A	A	A
Department of Defense Assistant Secretary of Defense (Production & Logistics)	sub	sub	sub
VA Principal Deputy Assistant Secretary Acquisition & Facilities	sub	sub	sub
GSA Commissioner of Public Buildings Service	sub	sub	sub
DOC Assistant Secretary for Administration	sub	sub	sub
HUD Assistant Secretary for Administration	sub	sub	sub
Department of Treasury Assistant Secretary for Administration	sub	sub	sub
USDA Assistant Secretary for Administration	sub	sub	sub
Department of the Interior Assistant Secretary for Policy, Budget & Administration	sub	sub	sub
NASA Assistant Administrator for Management	sub	sub	sub
USPS Assistant Postmaster General for Engineering & Technical Support	sub	sub	sub

KEY: A-attended by assistant secretary/administrator; sub-Attended by substitute.
SOURCE: "656 Committee" Meeting Minutes, 1988-1990.

Figure 6-l—Direct Federal Energy Efficiency Funding, Fiscal Years 1976-90



SOURCE: U.S. Department of Energy, Federal Energy Management Program, Report on Federal Government Energy Management and Conservation Programs, Fiscal Years 1987-89; and "Federal Ten-Year Building Plan," DOE-CE-0047, September 1983.

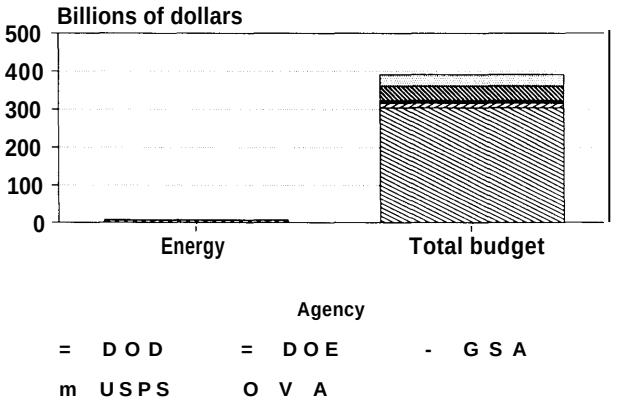
ments over the past decade, as shown in figure 6-1. Notably, the Department of Defense's (DOD's) budget request reached zero for fiscal year 1990 although more funding for 1991 and beyond is planned. A third example of the low priority can be seen in the lapsing in 1985 of the energy conservation goals set forth by the Executive order (see ch. 2). The delay in issuing a follow-on order with revised goals reflected a lack of priority set on energy efficiency in the executive branch.

Two reasons help explain energy efficiency's low priority. First, with the notable exception of the Department of Energy (DOE), energy efficiency is **not** fundamental to the mission of **most agencies.** For example, the mission of the Department of Veterans Affairs (VA) is to promote the health and well-being of veterans, through such means as the VA hospitals and clinics and through support programs for housing and education. Similarly, the mission of the U.S. Postal Service (USPS) is to deliver mail speedily and accurately. At the Department of Housing and Urban Development (HUD), priorities such as safety- and health-related rehabilitation compete for scarce HUD funds. For example, HUD was directed by the House and Senate Appropriations Committees to reprogram funds in fiscal year 1989 giving a high priority for a lead testing and abatement program.[3] For these agencies and all other agencies, energy is only one required input in performing their mission, and plays only an indirect role.

Secondly, even energy efficiency's indirect role **in the mission of most agencies is generally small, reflecting the small amount that energy costs constitute.** Reducing energy costs could free up funds for use in better performing an agency's mission. However, **energy typically warrants relatively little time and-attention from senior management based on its small contribution to total agency** costs (see figure 6-2). For example, assume that the USPS was able to eliminate energy spending entirely. Even in that extreme and impossible case, the price of a first-class stamp would merely drop from 29 to 28 cents. Labor spending in the USPS far

[3]U.S. House of Representatives, Conference *Report to Accompany H.R.* 4800, Report 100-817, 100th Cong., 2d sess., p. 10.

Figure 6-2—Energy Spending Compared to Total Budget for Selected Agencies, Fiscal Year 1989



SOURCE: Federal Energy Management Progam data and fiscal year 1991 Federal budget.

exceeds energy costs, making labor far more important. In fact, reducing postal costs through automation actually increases energy use, as energy and capital substitute for labor.

A new Executive order on Federal energy management signed on April 17, 1991 (see ch. 2) should bean important component of a program to place a higher priority on energy- and cost-saving opportunities throughout the government. Similarly, renewed support at high levels can be seen in a memorandum setting goals and guidance for facility energy management sent by the Deputy Secretary of Defense on March 13, 1991.[4] While an Executive order in itself is not enough to ensure energy efficiency, together with a dedicated implementation campaign, including appropriate budget and staffing requests, it will demonstrate a high priority.

Most Energy Efficiency Options Require Scarce Initial Funding

Most energy- and cost-saving projects such as replacing lamps and fixtures require a commitment of funding, including annual operating and maintenance costs or initial capital costs, or both. However, funding, particularly for initial investment, is typically in short supply.

Many energy efficiency projects have rapid paybacks of 3 years or less, representing a return on investment far greater than the Treasury's cost of funds. Despite these opportunities, Federal agencies have not sought and have not received a stable source of funding for even their most productive energy efficiency projects over the past decade. For example, total capital spending earmarked specifically for energy efficiency projects dropped from a high of $297 million in 1981 to under $50 million in 1990, a decline of 80 percent in nominal dollars, or 90 percent in inflation-adjusted dollars (see figure 6-1).[5]

That trend appears to be reversing partly. For example, DOD's fiscal year 1991 energy efficiency capital investment funding has been raised to $10 million, up from zero in fiscal year 1990 with a target of $50 million annual funding starting in 1993.[6] Similarly, the General Service Administration's (GSA) planned energy investments have increased from $5 million in fiscal year 1989 to $30 million in fiscal year 1991. Just how much capital investment is needed to minimize the Federal Government's long-term energy costs is speculative, but it appears that a return to at least the level of the early 1980s could be productively used.

For assisted households, funding is a similarly large problem (see ch. 3). For example, a 1988 study sponsored by HUD found a backlog of more than $10 billion in safety, health, and efficiency-related maintenance projects in public housing. Against that need, HUD provided public housing authorities with $1.5 billion in fiscal year 1989.

Similarly, the number of low-income households eligible for the Department of Health and Human Service's (HHS) energy assistance program far exceed the availability of funds for weatherization. In fiscal year 1989, about 20 million households met Federal eligibility requirements. However, only 6 million have been weatherized under both DOE's weatherization program and the Low Income Home Energy Assistance Program's (LIHEAP's) weatherization funding even after nearly a decade of those programs. The cost to weatherize the remaining

[4]D.J. Atwood, Deputy Secretary of Defense, U.S. Department of Defense, memorandum to Secretaries of the Military Departments and Directors of Defense Agencies, Mar. 13, 1991.

[5]Note that some energy efficiency projects are often combined with major maintenance, so total efficiency Spending is higher than this indicates. For example, when a roof needs repair, adding insulation is often part of the project, although the project is not labeled as an energy efficiency effort. Similarly, when a boiler fails and is replaced, use of a high efficiency unit may be considered normal maintenance and not an efficiency investment.

[6]Millard E. Carr, office of the Secretary of Defense, personal communication Dec. 19, 1990.

eligible homes can be roughly approximated at $1,500 X 14 million = $20 billion. At current appropriations rates, it would take decades to reach this total. Furthermore, some of the measures performed in weatherization, such as caulking and weatherstripping, have limited (although long) lives and will need to be repeated.

Shared energy savings (SES) and utility rebate programs are possible private sector supplements to the direct financing of Federal energy efficiency measures.[7] So far, both together have contributed only a small fraction of the direct Federal capital investment in energy efficiency of the early 1980s. Federal agencies are becoming increasingly familiar with the SES approach, but implementation problems remain, and there have been few projects during the past 5 years since authorization by Congress. For example, even DOE still has not had a SES project brought to completion, although several DOE facilities have made attempts. In total, only four projects had been implemented by the end of 1990, representing a small fraction of the 6,000 major Federal facilities.

Where available, utility rebate programs can be a useful supplement to Federal funds.[8] The main obstacle to use of utility rebate programs is the time and availability of agency facility managers to learn about and participate in the programs. Not all utilities have programs, and for those that do, there is a wide range of programs reflecting the capacity and energy needs of the utility.

Virtually All Energy Efficiency Measures Require Personnel

In addition to capital investment, most energy-and cost-saving projects require a commitment of well-trained personnel.[9] Personnel familiar with energy efficiency opportunities are needed at all levels, from the operations and maintenance staff at a facility to the decisionmaking management of the agency. As is the case with funding, personnel are often in short supply.

Some opportunities such as performing regular, high-quality maintenance of heating, ventilation, and air-conditioning (HVAC) equipment cost little more than a careful attention to detail. However, attention to detail is not the default, but rather requires vigilance and follow-through in design of a program and in implementation. As noted in one National Research Council report, "[i]n some Federal facilities, as in some private buildings, systems receive almost no maintenance until something serious goes wrong. In Federal agencies, inadequate maintenance can be traced primarily to tight budgets and unrealistic personnel ceilings."[10]

A related issue is that increasingly over the past decade, maintenance functions in Federal facilities have been delegated to private contractors. In itself, that poses no inherent problem. According to the National Research Council, "most agencies have found that maintenance contractors generally give equal or better service than the government organizations they replace."[11] While that shift reduces the number of Federal operating and maintenance personnel needed, it does not eliminate them. For example, ensuring that private contractors perform high-quality, energy efficient operations and maintenance work on HVAC requires: 1) Federal HVAC experts at facilities to design (e.g., write energy efficient contract clauses), manage, and audit the performnanceofwork;1213 and 2) sufficient operating budgets to cover the costs of high-quality work.

Similarly, taking advantage of utility rebate programs for energy efficiency measures also requires sufficient facility personnel to identify projects, negotiate the rebates, follow through on implementation, and monitor results. This is true even for those utility programs which provide engineering and implementation support, although those require less Federal staffing.

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[7] See ch. 2 for a discussion of the shared energy savings and utility rebate programs.

[8] For a discussion of utility rebate programs, see ch. 2.

[9] Building Research Board, National Research Council, *Policies and Criteria for Heating, Ventilating, and Air-Conditioning Systems in Federal Buildings* (Washington, DC: National Academy Press, 1990), pp. 31,33-35.

[10] Ibid., p. 31

[11] Ibid.

[12] Ronald Smith, "Inspecting Maintenance Contractors, " in Federal Construction Council, *Technical Report No. 95: Maintenance of Mechanical Systems in Buildings* (Washington, DC: National Academy Press, 1990), pp. 29-31.

[13] Building Research Board, National Research Council, op. cit., footnote 9, pp. 32-33.

Photo credit: Robin Roy

Despite constraints, many energy efficiency measures have been implemented in Federal facilities over the past 15 years. At the National Records Center at GSA's Suitland Complex, reflective window film both reduced cooling loads and improved occupant comfort.

Many Federal Facilities Have No Energy Coordinator. Among the most important personnel for identifying, implementing, and following through on energy efficiency measures are energy coordinators at individual facilities or in regional offices. As noted in chapter 3, the economic and technical performance of most measures is site-specific. Minimizing the risk while benefiting from available commercial technologies requires a well-trained, competent energy staff to determine which measures are most likely to succeed. This staff expertise is essential given that some poorly performing products are always bound to be available along with the good.

A comprehensive, systematic approach to minimizing energy use and spending requires personnel dedicated to identifying, evaluating, and overseeing the implementation of efficiency projects at each major facility and monitoring performance. Energy management is an area of expertise involving a considerable degree of specialization in such fields as mechanical and electrical engineering and economic and budgetary analysis. Several colleges and professional associations have developed training and certification programs for energy management professionals (see ch. 2) which address these interdisciplinary issues.

Many Federal facilities have no explicit, trained energy coordinator. This is another reflection of the low priority placed on energy. Energy efficiency projects, to the extent they are developed, are often pursued in the spare time of facility staff. Typically, this staff is charged with other critical missions, such as maintaining and operating existing equipment. Often, they have many additional projects which they could pursue depending on priorities, ranging from addressing environmental and safety hazards such as transformers laden with PCBs and asbestos floor tiles to planning for new facilities.

Further reflecting the low priority placed on energy efficiency in recent years, the support for energy coordinators has declined. For example, in a 1989 reorganization, the USPS eliminated its division and regional energy coordinators, rolling those functions into other positions. The energy coordinator positions had been established in 1974, authorizing one energy coordinator for each USPS division and two for each region.[14] Another example of a shortage of Federal energy coordinators is at the Army's Fort Belvoir. That 3,000-building facility has an authorized energy coordinator position, but has had difficulty attracting and retaining candidates. At one point, the position was advertised as available for 18 months before being filled, and one coordinator remained on the job for only 1 year.[15] In part, that may be a result of the relatively low civil service rating offered for this highly technical engineering position. Private-sector energy managers are typically highly compensated engineers, earning over $55,000 annually on average including salary and bonuses according to the Association of Energy Engineers' 1990 salary survey.[16] That exceeds the Federal Government's GS-12 general pay schedule which is common for energy coordinators. In 1990, GS-12 pay ranged from under $36,000 to under $46,571.

INFORMATION CONSTRAINTS

Prospects for Federal Energy Efficiency Have Not Been Systematically Assessed

Information about potential and costs is basic for determining the extent to which additional energy efficiency efforts are worthwhile and for program

[14]William Eschmann, U.S. Postal Service, personal communication Sept. 12, 1990 and Jan. 30, 1991.

[15]Patrick McLaughlin, personal communication, U.S. Army, Fort Belvoir, Oct. 24, 1990.

[16]Association of Energy Engineers, "AEE Releases Results of 1990 Salary Survey," Atlanta, GA, 1990.

planning. However, the Federal Energy Management Program has developed estimates of neither the potential **energy- and cost-savings nor the capital and other resources required to attain those savings in federally owned facilities. Similarly,** none of the individual energy-using Federal agencies contacted by OTA have produced such estimates for their own facilities. The absence of basic, governmentwide information of this type is a serious shortcoming in current Federal energy management efforts.

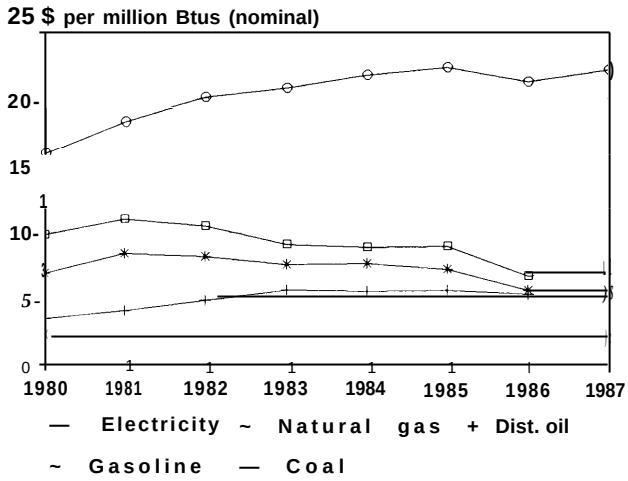
Although building audits mandated under the Energy Conservation Policy Act were conducted at most major facilities in the past decade, the results apparently were neither compiled nor analyzed, much less kept current. The same is true of the facility energy surveys mandated under the Federal Energy Management Improvement Act of 1988.

In contrast to the lack of information for federally owned facilities, HUD has produced estimates of the potential energy- and cost-savings as well as the investment required in HUD-assisted housing.[17] HUD's study provides a basis for internal HUD planning as well as for congressional budget requests.

The information collection and analyses required in developing approximate estimates should not pose too difficult a problem. However, analytically accurate estimates are a moving target; as new energy efficient technologies are developed, facilities are altered and their missions change, and prices of energy go through often surprising gyrations. For example, during the course of OTA's study (July 1990 to April 1991), oil prices shot from $22 per barrel to over $40 then fell below to $20. Any estimates of the economic characteristics of an oil-saving efficiency measure is highly dependent on such price changes. Other energy prices have had less drastic price changes over the past decade, although forecasts have often been inaccurate (see figure 6-3). Notably, electricity, the primary source used in commercial buildings, has had relatively minor cost variations.

The prospect of military base closures creates some uncertainty about the opportunities for long-term energy conservation investments in facilities which may close.[18] For example, an SES project planned for Norton Air Force Base was canceled following proposed closure of the base.[19] In such cases, total prospects for efficiency gains must reflect both rapid payback opportunities and the likelihood of continued facility operation.

Figure 6-3-Historical Energy Price Trends



SOURCE: U.S. Department or Energy, Energy Information Administration, *Household Energy Consumption 1987, DOE/EIA41321/1 (87)* (Washington, DC: U.S. Government Printing Office, October 1989).

Detailed energy audits of each of the Federal Government's 500,000 buildings and of all operations are not needed for program planning (although audits of major facilities will be needed for comprehensive implementation). While the variety of facilities is great, a survey of a sample of them should serve adequately for program planning and support.

Many Measures Have Uncertain Technical and Economic Performance

Does this technology really work? Would the facility be better off waiting for next year's model, which may have fewer bugs, cost less, and perform better? Since many energy efficiency measures are relatively new and not industry standard practice, these are eminently reasonable questions. Using any new technology entails some risk. No facility

[17] Abt Associates, Inc., ''Study of the Modernization Needs of the Public and Indian Housing Stock, National, Regional and Field Office Estimates: Backlog of Modernization Needs," U.S. Department of Housing and Urban Development, HUD-1130-PD~ March 1988.

[18] Millard Carr, U.S. Department of Defense, personal communication, December 1990. Military base closures are conducted Waler the Defense Authorization Amendments and Base Closure and Realignment Act, Public Law 100-526, Title II, Oct. 24, 1988.

[19] U.S. Department of Energy, "Annual Report to Congress on Federal Government Energy Management and Conservation Programs Fiscal Year 1989," Oct. 3, 1990, p. 28.

engineer wants complaints of inadequate lighting, or of buildings too hot in summer and too cold in winter. Nor do facility staff want to spend money and time unnecessarily on unproductive measures.

There is no lack of technologies which fail to perform as promised. It is likely that there will always be some. Some measures merely provide less energy and cost savings than anticipated, perhaps not justifying the capital and manpower costs for installation. For example, at least two of the Federal facilities in OTA's case studies had energy management and control systems (EMCS) which were largely disabled and clearly not performing as originally expected. The cost savings anticipated when these systems were installed were not being realized. On the other hand, the EMCS at one facility, the Richmond Redevelopment and Housing Authority, is performing better than planned in saving energy, in part due to dedicated and innovative staff effort. In addition, through innovative use of the monitoring capabilities, that system is also providing unexpected benefits such reduced maintenance and repair workloads.

Even when technologies do perform as anticipated, it is often difficult **to be sure of that due to the lack of individual metering.** For example, a savings of 3 percent in a facility's overall electric bills can be difficult to distinguish from normal month-to-month fluctuations in energy use, leading to doubts about performance. This can be a particularly serious problem given the lack of detailed metering at most facilities. Engineering estimates of savings potential can be used in lieu of detailed, metered data on energy use. However, calibrating engineering models to actual performance is generally very difficult.

Potentially worse than either poor or uncertain economic performance is actual product failure. Some products have failed to perform their basic function, not only wasting installation costs but creating indirect costs as well. For example some of the early electronic ballasts had a high failure rate, burning out soon after installation. The result, for those facility engineers who took the leap into the technology, was a burden on maintenance crews and lighting problems which could interfere with office work. While the current generation of electronic ballasts has proven itself in commercial application, some facility managers have a lingering skepticism and resistance to using them.

Apart from questions of risk in using new products, the question remains of whether future models will perform better and cost less, and if so should equipment replacement be delayed. For example, should a public housing authority undertake a program of early retirement for its oldest and least efficient refrigerators? The best mass-produced models now available use only about half the electricity of older models and may appear cost-effective as early replacements. However, refrigerator efficiencies are expected to increase substantially over the next few years. Under DOE's proposed appliance efficiency standards for 1993, refrigerators will be at least 25 percent more efficient than today's best mass-produced units. If performance really does improve that rapidly (or if costs decline as well), it may be best to continue using an old inefficient refrigerator for another few years before replacing it with an even better model. Choosing the option with the least life-cycle cost requires careful analysis and forecasting of current and future energy prices, and equipment price and performance.

Despite the wealth of diverse experiences with energy management techniques in Federal facilities, there appear to be relatively few formal demonstration programs to help sort out those programs which work from the rest. Different agencies and individual facilities have tried a wide variety of energy efficient measures, providing a potential wealth of information. These experiences could help reduce risk and improve the likelihood of success for further Federal efforts. For example, what were the critical features that allowed the USPS's San Diego Division to successfully complete one of the few SES contracts in the Federal Government, rather than spending months on an unproductive effort? (See ch. 5.) Taking full advantage of the experiences provided by these efforts requires greater information sharing and could also benefit from additional analysis of existing Federal efforts. For example, the quarterly FEMP *Update* is a useful interagency information-sharing forum which could be expanded and made more frequent.

Federal Energy-Use Decisions Are Made by Many Thousands of Individuals With Diverse Perspectives and Responsibilities

Efforts to reduce Federal energy use and spending have to address a wide and diverse group of Federal employees and households receiving Federal energy assistance, a challenging

task. An energy- and cost-saving effort requires coordinating diverse information about engineering, economics, and funding among a wide range of personnel.

Nearly every Federal employee has some input into energy-use decisions. Similarly, the millions of people residing in assisted households have considerable influence over energy use. These individuals decide when to turn on and off lights and office equipment, whether to open windows, and how to set the thermostat. For the vast majority of individuals, their energy-use decisions are small and individually insignificant, mattering only in the aggregate. These employees and households use energy in performing their jobs or in daily residential life. New technologies such as lights controlled by motion detectors in conference rooms and restrooms can further reduce the importance of most individuals' efforts. Often, these Federal employees have little information about the aggregate impact of their individual actions. One example of a dedicated effort to raise energy awareness among all Federal energy users is that of the U.S. Army in Europe. There, innovative information campaigns are coupled with awards and other activities to inform energy users in military housing as well as in offices (see box 6-A).

A far smaller but still large number of Federal employees have jobs more closely related to energy use. There are three main groups:

- facilities engineers and their staffs;
- central and regional office energy offices; and
- field, regional, and central office management.

Typically, facility engineering personnel are responsible for operation and maintenance of one or more buildings. Facility engineering personnel include operation and maintenance staffs, which may include contractors as well as government employees. Efficient operation and maintenance of the main energy uses of lighting and HVAC depended largely on the performance of these personnel. Often, the facility engineering staff is also responsible for devising and implementing some energy efficiency measures, particularly no, low, and moderate cost projects.

All major Federal agencies have an energy office of some type located in the central office or headquarters. Regional offices also may have an energy office. Some individual facilities also have energy coordinators with the explicit function of implementing energy efficiency measures, although that appears not to be the norm. These energy offices have explicit responsibility for disseminating information about energy- and cost-saving opportunities and encouraging implementation of projects. Central and regional office staffs may also have responsibility for approving and prioritizing projects requested by field offices.

Once an energy- and cost-saving project has been identified, decisions about whether or when to fund it may involve many individuals in the agency's management. Often there is a complicated chain of command between the facility engineers and the agency management including facility directors, budgeting and finance departments, policy offices, up through political appointees who determine funding and support for energy projects. This management function requires balancing and trading off between a host of often conflicting demands for scarce resources facing the agency.

Figure 6-4 depicts the decisionmaking steps for implementing energy projects at the Department of Veterans Affairs. Note that line-item congressional approval is necessary for high cost projects (i.e., over $3 million).

Two main challenges are raised by the large number and diversity of parties involved in energy-use decisions. First, for many energy efficiency projects, the activities of the diverse parties need to be carefully coordinated to ensure that project conception, design, budgeting, and implementation all take place. Second, education and training about the opportunities and performance of energy efficiency measures must be diverse, reflecting the diverse information needs and perspectives. For example, boiler operators and mechanics need to be aware of the importance of maintenance programs, as well as the specific mechanical steps required for their boilers. Facility managers and agency management, on the other hand, need not know how boilers and other equipment work. However, to make appropriate manpower and budgeting decisions, they need to be aware of the importance of energy-related maintenance programs in minimizing operating costs of a facility.

Box 6-A—Energy Program of the U.S. Army in Europe[1]

The U.S. Army in Europe (USAREUR) has had an energy program since 1975. With over 25 percent of the Army's personnel stationed across Europe, the energy bill is significant. Thirty-one percent of USAREUR's energy consumption is in mobility operations and the remaining 69 percent in fixed facilities. Through an aggressive energy program USAREUR has reduced its facility energy consumption 46 percent on a Btu/square feet basis since 1975. In dollar terms, this amounts to cumulative cost avoidance of $934 million since 1980.

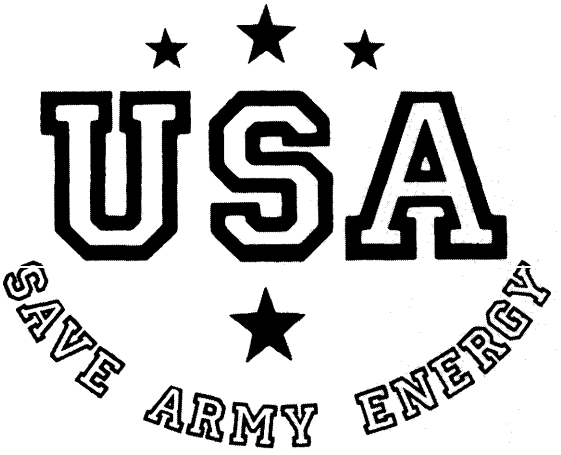
The energy program is comprehensive, establishing an energy chain of command. Goals are set for energy components, such as lighting and heating and cooling; awards are presented; monthly energy letters are widely distributed, and a biannual publication of "Good Ideas," containing all efforts implemented around the communities, is also distributed.

The energy awards program recognizes both small and large communities for saving energy in a variety of categories, The strenuous review of the nominees includes scoring on elements like efficiency measures, short-term measures, long-term plans, numeric performance, mobility fuel savings, special considerations, and a day-long site visit of the finalists. The value of the awards program is multifold It shows interest and commitment of USAREUR, creates interest and publicity for the energy program, recognizes deserving communities, and reduces energy use. Prior to fiscal year 1991, the recognition included a monetary award, $500,000 for first place and a total of $1.2 million in cash awards to be used on a welfare, morale, and recreation item for the communities' benefits.

The ' 'Good Ideas" energy guide contains measures that were implemented at all levels of the community. Schoolchildren participated in an adopt-a-lightswitch program, one community sponsored an energy rapper contest to involve young soldiers, numerous communities implemented retrofits on their lighting system, and at Heidelburg the batallion has 1 hour of mandatory energy training monthly. In all there were over 400 ideas implemented by the engineering department, the community, and the command,

The energy program in USAREUR is a model to be replicated throughout the armed services. During congressional hearings in the summer of 1990, Jeffrey Jones, Director for Energy Policy, stated:

In *1989*, the Deputy Secretary of Defense requested that the Defense components take a closer look at such incentives and suggested that the concept be applied Department-wide. Unfortunately this coincided with a reduction in operations and maintenance funds which would be used to provide such incentives. We are currently reviewing the Department's overall conservation program and the methods for instituting tangible incentive programs.[2]



USAREUR ENERGY PROGRAM

Raising awareness of energy use is one facet of the comprehensive energy conservation program for the U.S. Army—Europe.

[1]Information based on Col. Robert Fear, U.S. Army, letter to OTA and attachments, Dec. 5, 1990.
[2]Jeffrey A. Jones, Director for Energy Policy, Office of Secretary of Defense, testimony at joint hearing on Federal Energy Use in Federal Facilities, before the House Subcommittee on Energy and Power of the Committee on Energy and Commerce and the House Subcommittee on Environment, Energy and Natural Resources of the Committee on Government Operations, July 11, 1990, p. 5.

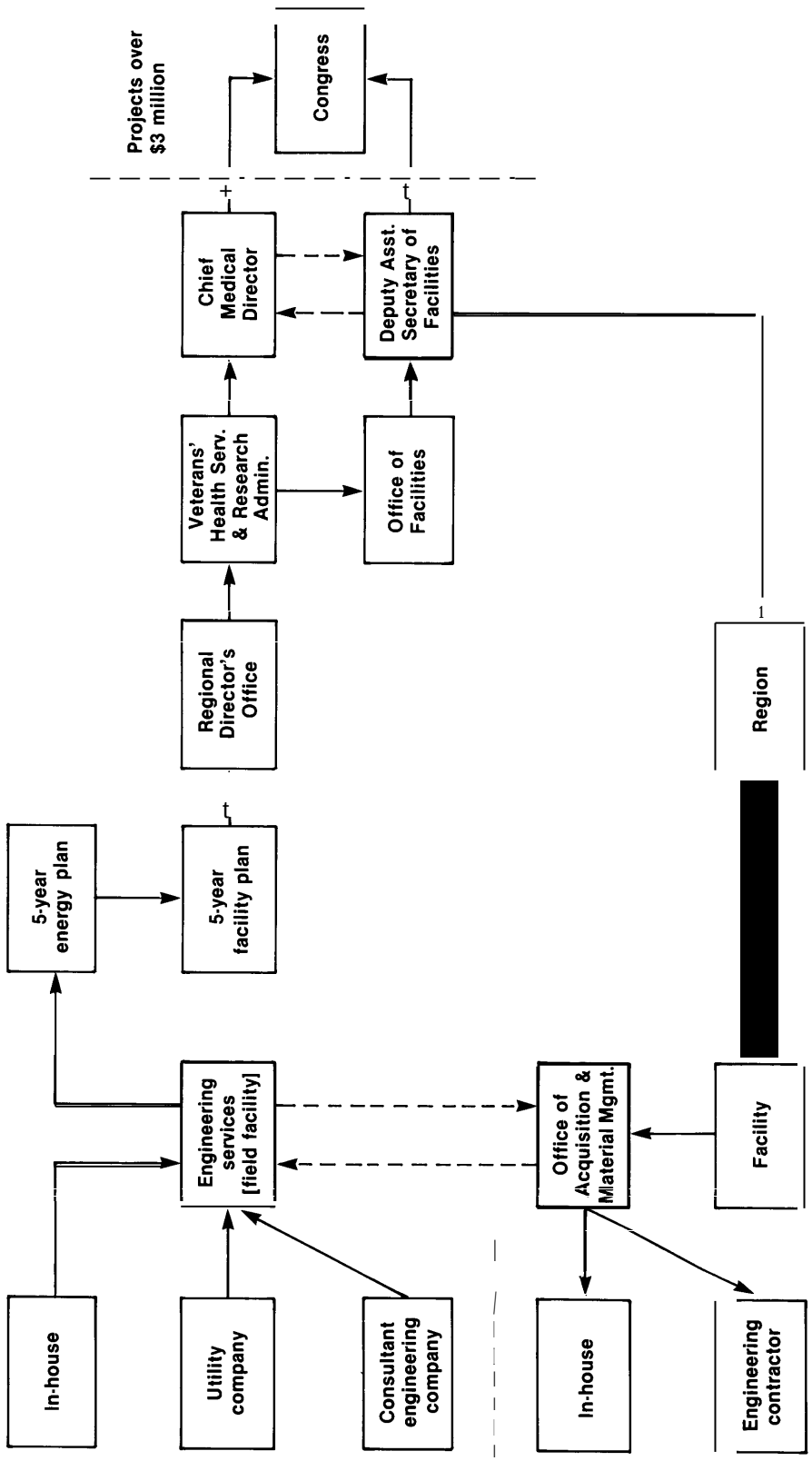


Figure 6-4—Simplified VA Energy Investment Decision Pro

SOURCE: OTA, 1991, adapted from Charles Likel, U.S. Department of Veteran's Affairs, letter to Helene Kirwan-Taylor on Energy Conservation Projects, OTA, October 990.

LACK OF INCENTIVES

There Have Been Few Rewards for Efficiency and Penalties for Waste

Incentives can either reward desired behavior or penalize undesired behavior. Neither carrots nor sticks have been widely and systematically used in the Federal Government to promote energy efficiency. There are notable exceptions, but generally, facility managers have neither rewarded nor penalized staffs for their energy efficiency performance; regional and headquarters offices neither rewarded nor penalized facilities; and Congress neither rewarded nor penalized agencies.

What happens if an individual facility does not pursue efficient measures for energy and cost savings? Usually, not much. Energy budgets are generally based on previous years' expenditures. That is necessary since, with existing information, it is difficult for budget analysts in an agency's headquarters to know whether energy use and spending is wasteful (see ''Prospects for Federal Energy Efficiency Have Not Been Systematically Assessed," above). Even if energy bills increase dramatically, central offices often have little choice but to allow the additional funds given their lack of detailed information. Dramatic but apparently reasonable increases in spending do occur. For example, the Washington, DC, VA Hospital had a more than fivefold increase in spending on purchased steam in the late 1980s. This increase resulted from a new pricing and accounting method used by the neighboring hospital, seller of the steam.[20] While entirely unanticipated, the VA had no real choice but to provide additional needed funds to the facility. Determining g whether the new higher prices justify substantial improvements in the efficiency of the VA Hospital's steam use is largely beyond the resources of the central office staff. Again, the lack of detailed central office attention reflects the understandably low priority of energy efficiency. A penalty, particularly one which is misapplied, is likely to restrict a facility's ability to perform its basic mission, an intolerable outcome.

Many agencies' headquarters or regional energy offices set targets for energy use at facilities to promote the long-term, energy-reduction goal required by the Federal Energy Management Improvement Act (see ch. 2). But again, since there is no systematic auditing of facilities' spending on energy nor the opportunities for savings, these goals are somewhat arbitrary and not backed up by penalties. Similarly, when the 20-percent reduction goal from Executive Order 12003 lapsed unmet in 1985, there were no apparent penalties.

What are the penalties if an agency overall does not pursue efficient measures? The answer is much the same as for the individual facility. Congressional committees have neither the information nor the time to determine in detail the specific wasteful uses of energy by Federal agencies, and are not likely to tolerate restricting a agency's ability to perform its basic mission.

What are the rewards for agencies and personnel that aggressively attain energy- and cost-savings? The National Defense Authorization Act for fiscal year 1991 allowing military base commanders to retain two-thirds of the savings generated from shared energy savings programs are a notable example of an explicit, direct incentive (see ch. 2). The U.S. Army in Europe has had a several-year effort to create energy conservation incentives for the military families housed there (see box 6-A). Another example is the monetary incentive program developed by the National Capital Region of the General Services Administration for its facility personnel (see box 6-B).[21]

More typical, however, has been a lack of direct incentives. Utility accounts are separate items in facility budgets: any savings in utility spending is realized by the regional or central office rather than the facility manager. Similarly, field personnel (e.g., boiler operators and maintenance crews) do not typically receive awards based on energy savings. There may be some indirect incentive at all levels expressed through performance reviews and promotion opportunities. For example, minimizing energy costs is one way a facility manager can meet overall budget goals, which may be part of the incentive

[20] Mark Butcher, Assistant Chief of Engineering, Washington VA Hospital, personal communication, Sept. 19, 1990.

[21] The GSA award program is one part of an intensive campaign which includes access to funding for efficiency measures and training and education about new energy efficient products.

Box 6-B--General Services Administration Memorandum Sent to All District and Buildings Managers in the National Capital Region

Fiscal Year 89 Energy Efficiency Awards

Continued efforts to save energy in Federal buildings is a top priority for the Buildings Management Division (BMD) in fiscal year 1989 and through 1995 in order to meet the 10-percent energy reduction goal, as mandated by the Federal Energy Management Improvement Act of 1988.

As in fiscal year 1988, BMD will recognize accomplishments of increased energy conservation for fiscal year 1989 through the Energy Efficiency Award Program to the field offices which demonstrate the greatest progress in conserving energy. Similar to last year, a field office must conserve at least 2 percent in energy consumption, over the previous year, to be considered for the award.

For the fiscal year 1989 awards, cost savings of at least $1 million, by the Region, will warrant a 5 percent distribution to the winning field offices. Therefore, the maximum cash disbursement for the region would be $50,000. A minimum savings of $200,000 is required in order for the Region to provide Energy Efficiency Awards, with a cash disbursement of $10,000 to the winning field offices.

Hopefully, this will challenge each and every manager to achieve as much energy savings as possible and partake in the $50,000 maximum disbursement for this fiscal year.

SOURCE: Jack E. Babcock, Director, Buildings Management Division, Gene@ Services Administration National Capital Region, memorandum to District and Building Managers on Fiscal Year 89 Energy Efficiency Awards, Mar, 30, 1989.

package. These incentives, while potentially valuable, are indirect and diluted.

Procurement Policies Are Challenging[22]

Federal procurement policies are often cumbersome and confusing when applied to energy efficiency measures.[23] Difficulties of identifying novel energy-efficient products and services are a built-in disincentive to change. The Federal Government procures a great variety of energy-related goods and services, and procurement policies are correspondingly diverse. For example, procurement policy determines how gas and electric utility service is obtained, whether and how facilities contract out their HVAC system operating and maintenance services, which commonly used items such as lamps and refrigerators are available through the Federal Supply System, and what economic analysis methods are used to trade off long-term savings against initial costs for a new refrigeration unit.

Two main challenges are raised by procurement policy. First, **for some commonly used items available through Federal Supply System, there is little information comparing their life-cycle energy and economic characteristics.** For example, the GSA-authorized contract schedules for emergency exit signs do not give a clear, unbiased assessment of the performance and savings to be expected when using light-emitting diode signs instead of standard incandescent signs, both of which are available.[24] Similarly, facility engineers are given little information about the performance of lamps, which are supplied by DOD's Defense Logistics Agency. In contrast, GSA's Household Appliances Schedule, which includes products such as refrigerators, water heaters, and room air conditioners, lists only the lowest life-cycle cost items.

Often, the only information on product performance is that provided by the vendors. A purchaser must be previously aware of the opportunities for energy savings, and be willing to dedicate time and effort to learning about the alternative products. In absence of awareness, time, and effort, purchasers may be expected to continue to use standard replacement products. **This challenge is particularly important since the supply system includes many inefficient products.**

Second, **Federal procurement methods are complex, potentially resulting in a cumbersome or confusing process which can impede use of novel goods and service contracts.** Federal procurement is naturally complex, reflecting the diverse

[22]See ch. 2 for **an overview of procurement.**

[23]At least, that **is how it is described by** many of the Federal workers **with whom** OTA staff met.

resee box 3-A in ch. 3 on exit signs.

goals of the process. While the foremost goals are "economy, efficiency and effectiveness,' also included are socioeconomic development (e.g., for small, disadvantaged businesses),[25] and efforts to promote competition and to protect against fraud and abuse. Together with the diversity of products and services noted above, the result is a complex system. The small number of Federal SES contracts to date is one example of contracting difficulties raised by procurement policies. As noted in chapter 2, SES has been slow to develop in part due to the challenge of developing an acceptable contract and due to the lack of service companies willing to respond to complex Federal proposals.

Complex procurement policies may even have hindered Federal facilities from participating in utility rebate and incentive programs which encourage use of high efficiency equipment and methods (see ch. 2). While Federal acquisition regulations appear to include no specific Prohibitions against participation in such utility programs, there are no specific allowances either to accept what might be construed as a gift. To clarify that Federal participation in utility programs is indeed legal and in the national interest, in 1990 Congress specifically included language to that effect for GSA[26] and DOD.[27]

[25]See 48 CFR 19 (Oct. 1, 1983).

[26]Treasury, Postal Service and General Appropriations Act, 1991, Public Law 101-509, Sec. 15.

[27]National Defense Authorization Act for FY 1991 (NDAA), Public Law 101-510, Sec. 2851.