Chapter 7

Policy Issues and Options for Improving Federal Energy Efficiency

Contents

Box

Table

Chapter 7

Policy Issues and Options for Improving Federal Energy Efficiency

Despite the wide array of programs which have been developed over the past 15 years, the Federal Government still has many opportunities to improve energy efficiency in its facilities and operations using commercially available, cost-effective measures. Just as there is no single constraint explaining the failure to harness many opportunities, there is no single, simple policy that will ensure the greatest use of energy efficiency measures in the Federal Government. Fortunately, none of the constraints are fundamental obstacles; rather, all can be addressed by a variety of new and existing initiatives. In fact, many new initiatives may involve simply making widespread use of the best practices already found in some Federal facilities and operations today. Still, taking full advantage of existing opportunities will require a higher priority for energy efficiency as reflected in adequate investment funding and staffing.

This chapter frost summarizes the variety of benefits that improved Federal energy efficiency could bring to the government and to the Nation as a whole. The second part describes a range of policy options which Congress could consider for enhancing current efforts if it views the benefits of improving Federal energy efficiency as worth pursuing more completely.

CONGRESSIONAL INTERESTS IN FEDERAL ENERGY EFFICIENCY

There are good reasons for Congress' continuing interest in Federal energy efficiency. The potential benefits of improved efficiency include:

1. demonstrating energy efficient measures useful throughout the economy, not just in the Federal Government;
2. supporting markets for suppliers of efficient products and services;
3. learning firsthand which approaches work as a basis for national policy (e.g., while the Federal Government is not entirely analogous to the private sector, many of the constraints on Federal energy efficiency and their solutions may pertain to the private sector);
4. reducing Federal spending without reducing services; and
5. reducing energy-related environmental and security problems.

While the benefits of improved Federal energy efficiency can be great, there are costs as well. The effort involved can be considerable, in particular requiring initial capital investment and staffing and the attention of Congress and senior executive branch personnel.

Demonstrating Efficient Measures Useful in the Private Sector

Federal demonstration can bean effective tool for promoting energy efficiency in the private sector. The Federal Government has broad experience using electricity, natural gas, petroleum products, and other energy sources in housing, office buildings, hospitals, transport, and other facilities and operations. From lighting to heating, ventilation and air-conditioning (HVAC) equipment to automobiles, the Federal Government has an opportunity to set a good example for energy efficiency while demonstrating the use of a wide range of measures. By demonstrating the cost and performance of energy efficient technologies and operating strategies in its own facilities and operations, the Federal Government could help reduce the risk and uncertainty that private-sector managers perceive when considering these measures for their own facilities. This demonstration should encourage greater private-sector adoption, as noted by several respondents to one survey on Department of Energy (DOE) conservation research and development (R&D) programs.[1]

Supporting Markets for Suppliers of Efficient Products and Services

A second way that Federal use of efficient goods and services can spill over into the private sector is by accelerating development of more efficient prod-

[1]The Alliance to Save Energy, "The Department of Energy's Conservation R&D Programs: Results of a Survey of Industry Leaders," Washington DC, March 1989, pp. 5,7, 9-11.

ucts by manufacturers. By virtue of being such a large consumer of energy-using goods and services, the Federal Government helps define the market which manufacturers aim to serve. For example, about 1 percent of new domestic automobiles and light trucks are purchased by the Federal Government. Similarly, around 10 percent of residential appliances are used in federally assisted or owned households (although nearly all are purchased privately, not by the government). By supporting the use of the most cost-effective energy efficient products, Federal purchasing power can promote earlier introduction of high efficiency technologies. Some utilities are working on a similar approach (sometimes called the "golden carrot"), which would be aided by Federal procurement. For example, Pacific Gas & Electric Co. and other utilities will offer $300 rebates for refrigerators which exceed the National Appliance Energy Conservation Act standards for 1993 by at least 25 percent. The aim is to ''accelerate introduction of such refrigerators by several years. "[2]

Providing a Firsthand Basis for National Energy Policy

There is a clear government interest in promoting energy efficiency throughout the economy reflected in a wide range of both legislation and executive agency activities (e.g., DOE's Office of Conservation and Renewable Energy). Federal experiences with in-house energy management can provide useful policy insights into energy efficiency policies for the private sector since many of the constraints on Federal energy efficiency also apply in the private sector. For example, many private-sector institutions have funding and staffing constraints which effect their energy efficiency prospects. Similarly, a lack of information on the technical and economic performance of energy efficiency measures exists in the private sector as well as in the Federal Government. While the Federal Government is not completely analogous to the private sector, Federal experiences may be useful in developing broader national energy efficiency policies.

Reducing Federal Spending

There is a clear Federal interest in ensuring that government services are performed efficiently to minimize spending. Many energy efficiency measures are available which, if employed, would reduce the cost of government. There are no comprehensive analyses of the potential for savings, but as described in chapter 3, highly cost-effective opportunities in federally owned facilities could total on the order of at least $1 billion annually. These total potential savings dwarf in comparison with the total Federal spending (which for fiscal year 1989 was $1.1 trillion), but are a larger fraction of discretionary spending (about $300 billion)[3] and of the deficit (about $160 billion in fiscal year 1989).[4] While not a panacea for eliminating the Federal deficit, energy efficiency measures can produce considerable savings while requiring no reductions in government programs. Also, many measures are well-understood and relatively risk-free methods of reducing spending.

On the negative side, most energy- and cost-saving measures require an investment of capital or personnel. Although for many efficiency measures, cost savings within the first 3 years (and in some cases, within the first year) more than recover any initial investment, funding and personnel resources are essential. These resources are typically scarce in Federal agencies. The return on investment of many measures is excellent, far higher than the Treasury's cost of funds, but that does not ensure availability of Federal funding. Besides requiring initial funding and personnel, pursuing fuller implementation of efficiency measures requires the time and attention of agency management, which is also typically scarce.

Reducing Energy-Related Environmental, Health, and Security Costs

In addition to the direct economic savings, increased energy efficiency has indirect environmental, health, and security benefits. This is true of federally purchased energy as well as energy used in the private sector. Energy production and use are leading factors in many environmental issues facing

[2]Letter from Mason Willrich, Pacific Gas & Electric Enterprises, Mar. 25, 1991.

[3]U.S. Bureau of the Census, *Statistical Abstract of the United States: 1990*, 110th ed. (Washington, DC: 1990), table 502. This includes outlays which can be increased or decreased by Presidential decisions, and require no change in existing Federal laws. For example, this list does not include Social Security, Medicare, and prior year contracts and obligations.

[4]Ibid., table 497. Includes off-budget receipts, outlays, and transactions as defined by Office of Management and Budget.

the Nation such as urban ozone, acid rain, and potential climate changes Similarly, energy production and use are contributors to some health problems ranging from respiratory disease related to particulate and sulfur oxides[6] to still speculative concerns such as the biological effects of electric and magnetic fields.[7] While the actual health and welfare costs to society are not fully understood for these environmental impacts, Congress devotes considerable effort to addressing them. Dependence on foreign fuels also raises concerns about energy security which may have profound policy implications.[8] Increased Federal energy efficiency and the spillover into improved private-sector efficiency can help reduce these indirect costs.[9]

POLICY OPTIONS

Ongoing support for existing Federal programs is essential in promoting Federal energy efficiency. These programs provide the framework for future energy-and cost-savings efforts, even though today they are not implemented thoroughly. The current level of support may be sufficient to maintain the framework but is inadequate for realizing the full potential of cost-effective, energy-saving measures and for setting an example for supporting private-sector efforts.

There are several options Congress could consider if it views improved Federal energy efficiency as worth pursuing more vigorously (see table 7-l). All could help improve Federal energy efficiency. Some measures, such as revising procurement policies and creating monetary incentives for agency personnel, require modest or negligible initial costs. However, realizing the full potential will require the investment of funds and staffing.

Table 7-l—Policy Options for Federal Energy Efficiency

Maintaining the status quo
Dedicating resources
Increasing funds for investment
Supporting an adequate staff
Encouraging agency efforts
Setting standards for performance
Rewarding agencies and individuals for energy and cost savings
Revising procurement: information, life-cycle costing, and simplification
Following through and enforcing
Promoting research, development, and demonstration

SOURCE: Office of Technology Assessment, 1991.

Maintaining the Status Quo: Present Trends in Federal Energy Management

Over the past 16 years, Congress and the executive branch have developed a wide range of programs promoting energy efficiency within the Federal Government, as described in chapter 2. These programs have been effective to some degree, helping to save a total of about $7 billion (about 5 percent of Federal energy spending) in Federal buildings and operations between 1975 and 1989.[10] However, implementation efforts for Federal energy management waned during the 1980s, as indicated by an 80-percent drop in capital investment for conservation measures between fiscal year 1981 and 1989. (Adjusting for inflation, $300 million in 1981 would be over $450 million in 1991 dollars.) That declining trend has reversed beginning in fiscal year 1990, although funding levels are still low. In fiscal year 1990, funding has increased slightly to about $50 million, which is still far less than the $300 million invested in 1981. For fiscal year 1991, DOD and GSA alone have increased planned energy efficiency investments to $40 million.

[5]See, for example, U.S. Congress, Office of Technology Assessment, *Catching Our Breath: Next Steps for Reducing Urban Ozone*, OTA-O-412 (Washington, DC: U.S. Government Printing Office, June 1989); and U.S. Congress, Office of Technology Assessment, *Changing by Degrees: Steps To Reduce Greenhouse Gases, OTA-()-482* (Washington, DC: U.S. Government Printing Office, February 1991).

[6]See U.S. Environmental Protection Agency, Office Of Air and Radiation, "Regulatory Impact Analysis on the National Ambient Air Quality Standards for Sulfur Oxides (Sulfur Dioxide)," draft, May *1987*, ch. 6 and 7.

[7]For example, see U.S. Congress, Office of Technology Assessment, *Biological Effects of Power Frequency Electric and Magnetic Fields—Background Paper, OTA-BP-E-53* (Washington, DC: U.S. Government Printing Office, May 1989).

[8]See U.S. Congress, Office of Technology Assessment, *Oil Replacement Capability*, forthcoming, 1991.

[9]For example, as part of a pollution prevention strategy to reduce emissions of SO_2, the Clean Air Act Amendments of 1990 specifically encourages utilities to use conservation and renewable energy. Public Law 101-549, Title IV, Section 404F, Nov. 15, 1990.

[10]In addition to Federal programs, an overall improvement in the efficiency of appliances and equipment being manufactured today contributes to Federal energy savings. For example, even an average new refrigerator or air conditioner is far more efficient than the average 15-year-old model it replaces.

In addition to funds for capital investment, funding for interagency coordination, training, information sharing, and analysis of governmentwide opportunities has been increased by over two-thirds in fiscal year 1991 to $3 million. These activities, which are performed by the Federal Energy Management Program (FEMP), are useful for improving Federal energy efficiency at as low a cost as possible (see ch. 2). The higher level of funding is intended to support increased governmentwide coordination and analysis. OTA did not analyze how effectively FEMP uses its current funding for interagency coordination and analysis of, and support for, governmentwide opportunities. Therefore, it intends n. suggestion as to whether the FEMP budget would benefit from further increases, or whether less important activities could be cut back, or whether useful activities could be absorbed within the existing budget by simply increasing managerial efficiency.

Current Federal efforts together with a general improvement in the efficiency of HVAC and lighting equipment on the market should help to gradually improve Federal energy efficiency. However, the improvements will be far smaller than is economically attractive. For example, there are probably a few billion dollars worth of highly cost-effective energy efficiency investment opportunities (e.g., with returns on investment of 25 percent or more) in federally owned buildings alone, and another few billion dollars worth in federally assisted housing (see ch. 3). At the current low level of energy efficiency funding and staffing for individual agencies, it would take several decades to make all the economically attractive investments. During that time, tens of billions of dollars would be unnecessarily spent to buy inefficiently used energy.

Dedicating Funds and Staff

Increasing Funds for Investment

Funding for conservation investments is essential for many energy- and cost-saving opportunities. There are several billion dollars worth of highly cost-effective energy-efficiency investment opportunities in federally owned and assisted buildings, as noted above. Many of these measures have very high returns on investment, several times higher than the Treasury's cost of funds. For example, an investment replacing existing low-efficiency magnetic ballasts and fluorescent tubes with high-efficiency tubes and perhaps electronic ballasts may produce an annual return on investment of 30 percent or more (one utility-assisted lighting retrofit at the U.S. Postal Service San Diego Division has an annual return on investment of over 380 percent). (See ch. 2.) In comparison, the Treasury's current cost of funds is nominally about 6 to 8 percent.[11] Thus, if new Treasury obligations were used to fund efficiency investments, savings in energy costs could greatly exceed interest on the new debt.

Precisely how much additional investment would be productive and over what time frame? It appears that an increase in Federal investment at least to the level of the early 1980s, during which a few hundred million dollars were available annually, could produce **very high returns for the foreseeable future.** Even greater funding may also be useful, although Federal agencies have not comprehensively assessed the extent of existing opportunities, and the precise amount is uncertain (see ch. 3). As one step to ensuring appropriate funding, FEMP could be required to provide estimates of the governmentwide potential energy and cost savings and the capital investment required to attain those savings in its annual report to Congress.

The source of energy investment funds and the best way to administer them are critical issues. As an alternative to having each agency obtain its investment funds through its budget requests and appropriations, Congress could consider establishing a governmentwide revolving fund for Federal energy efficiency projects. The LoanSTAR program in the State of Texas provides one example of how such a governmental energy efficiency fund can work (see box 7-A). Based on the high returns on investment for many efficiency measures, a fund based on new Treasury obligations could be entirely self-supporting. As another alternative, a fund could be raised by placing a surcharge on energy spending in federally owned buildings. For example, a surcharge of under 3 percent would generate a $100 million fired in 1 year.

[11] As of Feb. 20, 1991, 30-day Treasury bills have a nominal interest rate of about 6 percent; 30-year Treasury bonds currently yield about 8 percent.

Box 7-A—The Texas LoanSTAR Program: A $98-Million Conservation Fund for Government Buildings[1]

The Texas LoanSTAR program is a $98.6-million, 8-year, statewide energy conservation program established in 1988. It offers loans of up to 4 years in length to public-sector institutions in Texas, including State agencies, local governments, universities, and schools. Initial capital for the program came from oil overcharge funds.

To secure a loan, a building is first given an energy audit to identify potential retrofit projects. Projects compete for funds on the following criteria: estimated payback, ability to repay the loan through energy savings, engineering assessment of the project, and the feasibility of effectively metering the project. The maximum loan for a State agency or university is $4.8 million, while the maximum for a local government or school district is $1.2 million. Repayments are made semiannually at a 4.04-percent interest rate.

A monitoring and analysis program (MAP) is a central component of LoanSTAR. Monitoring and analysis of energy usage patterns helps identify changes in operation and maintenance that may result in substantial savings. Also, MAP compares the actual savings of completed retrofits to the estimated savings to help program managers determine which measures to weed out so that unsuccessful ones will not be repeated elsewhere.

[1]Texas Governor's Energy Management Center, "Texas State Energy Conservation Plan and Energy Extension Service Combined Grant Application" June W%), pp. 72-91; and Malcolm Verdict et al., ''Monitoring $98 Million in Energy Efficient Retrofits, the Texas LoanSTAR Program,'' paper presented at the American Council for an Energy-Efficient Economy 1990 Summer Study on Energy Efficiency in Buildings, Asilomar, CA, Aug. 26-Sept. 1, 1990.

Supporting an Adequate Staff

Adequate funding alone is not enough to produce the greatest energy and cost savings for the Federal Government. **It is at least as important to have a trained, competent, and motivated staff at individual Federal facilities, and in central and regional offices, dedicated to successful implementation of energy saving measures.** Minimizing risks while benefiting from commercial or forthcoming technologies requires a well-trained, competent energy staff including engineers to determine which measures are most likely to succeed. Staff expertise is essential given that the applicability of many measures is site-specific and that some poorly performing products are always bound to be available along with the good.

Many energy efficiency opportunities require qualified facility personnel but not Federal investment funds. For example, a program such as shared energy savings (SES) contracting (see ch. 2) which relies on private-sector funds requires staff with expertise in energy-related engineering, finance, economics, and contracting, not Federal funds for investment. Similarly, participation in utility programs, even those which provide technical and implementation assistance, requires the dedicated attention of facility personnel familiar with the facility's needs and opportunities. As another example, efficient operation and maintenance of HVAC equipment requires professional, trained technicians (whether Federal employees or through contractors), not capital investment.

Agencywide or governmentwide support programs can also effectively supplement special or occasional needs of facility personnel. For example, the technical expertise provided by the mobil energy laboratories (MELs) sponsored by FEMP (see ch. 2) can work with facility personnel to identify energy efficiency measures, perform technical and eco*nomic* analyses, and assist with implementation. Similarly, the facility energy surveys performed by the Army Corps of Engineers and the efficiency programs developed by the Naval Facilities Engineering Command are but two examples of important regional and central office supplements to the efforts of personnel at individual facilities. These, too, require adequate staffing. For example, there are only four MELs, a small number considering the thousands of Federal facilities.

As one step to ensuring that appropriate staffing is receiving adequate priority at individual agencies, **Congress could require the agencies, the Office of Personnel Management, and FEMP to report on agency staffing issues in FEMP's annual report on Federal energy management.** This discussion could include basic information on the qualifications and number of energy-related staff (particularly energy coordinators at facilities), an analysis of the

adequacy of current staffing to the broad range of efficiency programs currently being pursued, and an analysis of the ability to recruit and retain staff that considers factors such as pay differentials between the private sector and the Federal Government.

DOE's experience in applying energy efficiency measures outside the Federal Government could also supplement agency efforts. For example, DOE's Institutional Conservation Program has assisted energy efficiency efforts in public and nonprofit hospitals and schools for over a decade. Some of the lessons learned by headquarters and field office personnel could be useful in implementing energy efficiency programs in Federal hospitals and schools.

Encouraging Agency Efforts

Setting Standards for Performance

Some existing standards for energy efficiency could be expanded. Federal agencies currently face at least four standards for energy efficiency (these are described in ch. 2). One standard is the use of life-cycle costs in designing new Federal buildings and in comparing investments in alternative building systems, described in the previous section. A second standard is a mandatory design criterion for new Federal buildings. This state-of-the-art standard was developed over the past decade by DOE, the American Society of Heating, Refrigerating and Air-Conditioning Engineers, and the Illumination Engineering Society.

Third, nationwide standards specifying minimum efficiencies for household appliances and ballasts indirectly benefit Federal facilities as they purchase new equipment, just as national standards for automobile efficiency effect the Federal fleet. New national standards, for example for lamps, could be considered which would indirectly result in further efficiency improvements at Federal facilities.

Similarly, the Federal vehicle fleet is required to meet the corporate average fleet economy (CAFE) standard. Currently, the Federal fleet outperforms that standard by 7 percent. Still, Congress could consider strengthening the Federal fleet standard to require outperforming the CAFE requirement by a larger amount.

A fourth standard facing Federal agencies for their existing buildings is a requirement that energy consumption be reduced by 10 percent by 1995 relative to 1985.[12] That requirement, enacted by Congress in 1988, filled the void left when the energy-saving goals set forth in Executive Order 12003 lapsed in 1985. Extending this requirement beyond 1995 together with anew minimum savings target could help promote greater continuity in Federal energy efforts. Also, the standard could be expanded to include energy used in operations. This type of standard based on a percentage reduction goal is relatively simple to understand and to keep track of, making it a useful tool.[13] A key issue is the appropriate targets to set.

The Executive Order signed on April 17, 1991 sets a reduction target for Federal buildings of 20 percent by the year 2000 relative to 1985. It also specifies a target of reducing 10 percent of the gasoline and diesel fuel used in certain Federal passenger vehicle and light truck fleets. These targets provide valuable guidance to the agencies. However, they are not based on an analysis of existing opportunities and could potentially be strengthened. Congress could direct DOE to perform a life-cycle cost analysis of energy efficiency opportunities for a sample of Federal facilities and operations as a basis for setting a target.[14] The number of facilities surveyed and the acceptable level of detail and accuracy need to be balanced against the cost and time required.

Revising Procurement: Information, Life-Cycle Costing, and Simplification

Some Federal procurement policies could be revised to encourage greater use of energy efficient products and services. One possible procurement change is to improve information on energy-using goods provided to agencies through the Federal Supply Schedule and Supply Catalog programs managed by GSA and the Defense Logistics Agency (see ch. 2). Currently the supply schedules and the GSA Supply Catalog provide little or no

[12] This type of standard is not unique to the Fe&~ Government. For example, New York's Executive Order 132, signed Jan. 2, 1990, directs State agencies to reduce energy consumption in both buildings and operations by 20 percent in the year 2000 relative to 1990.

[13] There are some complications even with this simple standard. For example, how should variations in energy use due to fluctuations in weather or occupancy levels be addressed?

[14] The target should specify whether source accounting or site accounting is used for electricity since the choice can make a difference (see ch. 2).

information on the energy efficiency of products provided. This is true even for energy-intensive products such as light bulbs and ballasts. Federal purchasers must obtain contractors' catalogs and price lists for information, but even these may contain inadequate or incomplete information on energy characteristics. To be effective, the information would have to be in a form useful to facility personnel. It may include information on both life-cycle costs and on efficiency or performance.

A second possible procurement change is to increase the use of life-cycle costing in the selection of goods and services. Currently, agencies are directed to consider life-cycle costs in their purchases of certain products such as HVAC equipment, and GSA considers life-cycle costs in selecting household appliances such as refrigerators and water heaters. This practice could be expanded to include more energy-using goods such as lamps, ballasts, and automobiles, and by performing more frequent updates of analyses for household appliances. Energy-related services could be included too. For example, the selection of contractors for operation and maintenance of HVAC equipment at Federal facilities could be based on life-cycle costs including not only the direct cost of the contract, but also the expected cost of energy used based on the practices specified in the contract.

A third possible procurement change is to simplify procurement of new energy efficient products and services. Some Federal procurement policies are complex, cumbersome, or confusing, which can impede use of novel goods and services. This is particularly important since many energy efficiency measures are relatively new. One example of a confusing situation which seems to have been resolved is the ability of Federal facilities to accept utility rebates. Because procurement policies had not previously addressed that situation, there was some question about whether and how Federal facilities could receive rebates for performing energy management activities. To clarify the issue, the National Defense Authorization Act for fiscal year 1991 (NDAA, 1991) and the Treasury, Postal Service and General Appropriations Act, 1991, explicitly allow DOD and GSA to participate in utility programs. Similarly, the New Item Introductory Schedules seem to be a useful mechanism for simplifying and speeding the availability of novel products in Federal facilities. There may be other areas where a change or clarification of acquisition regulations could help promote energy efficiency measures. For example, changing the regulations governing SES contracts to simplify them and increase agency flexibility may help promote that novel form of private financing. Also, the ''Operations and Maintenance Energy Services" contract developed by the Navy to simplify and speed up contracting for some high payback projects could be analyzed for use throughout the government.[15]

Rewarding Agencies and Facilities for Energy and Cost Savings

Because energy is not central to most agencies' mission, and because energy costs are such a small component of most agencies total spending, energy efficiency naturally receives a relatively low priority. Creating incentives **for agencies and individual facilities is one way to raise priorities for energy efficiency efforts.** There are notable exceptions, but generally Congress has neither rewarded nor penalized agencies for energy-related performance; regional and headquarters offices neither rewarded nor penalized facilities; and facility managers neither rewarded nor penalized their staff.

Under NDAA, 1991, military facilities are now allowed to retain two-thirds of the energy cost savings (see ch. 2). That type of incentive could be expanded by offering it to all agencies, not just Department of Defense (DOD) facilities. DOD's new incentive needs to be carefully monitored to ensure that it is being properly and fully implemented, and revised as necessary.

Rewarding Individuals for Energy and Cost Savings

At least two existing types of incentives for individuals could be considered for greater use.[16] First, FEMP's annual Federal Efficiency Energy Awards (see ch. 2) could be expanded by giving award winners not just a certificate of merit, but a cash bonus as well .17 Often, the FEMP award

[15]See U.S. Department of Energy, Federal Energy Management Program, "Federal Energy Management Activities, ' DOE/CE-0281-1, winter 1990, p. 4.

[16]Performance awards and superior accomplishment awards are explicitly allowed under 5CFR 430 and 5CFR451 (Jan. 1, 1991 edition).

[17]GSA currently gives Federal Energy Efficiency Award winners a $1,000 bonus as part of an incentive program.

winners have demonstrated not just innovation in energy management, but also produce tangible cost-savings which far exceed their salaries. A prize of several hundred to a few thousand dollars for each of the 15 award winners each year could be an effective part of a campaign to increase awareness and enthusiasm for FEMP's important activities, as well as reward excellence in public service. The cost of the prizes should be more than compensated for by reduced spending on energy, although the savings accrue to the agencies, not to FEMP.

To reach out to all of the several thousand Federal facilities (not just the handful receiving FEMP awards) would require a more broad-based incentive. One model which could be considered is the monetary incentive program developed by the National Capital Region of the General Services Administration (GSA) for its facility personnel (see ch. 6). **DOE and GSA could analyze the National Capital Region's innovative incentive program to determine how to best replicate it throughout Federal facilities.** Key issues include which personnel should be eligible for awards, the methods used to demonstrate that energy and cost savings actually occur, and the amount of the bonuses.

Following Through and Enforcing

Following through on Federal energy management programs is essential. Ongoing congressional attention in the form of new legislation, hearings and other contact helps raise the priority of energy efficiency efforts within Federal agencies. The same is true of the many General Accounting Office reports requested by Congress on Federal energy efficiency efforts.[18] To demonstrate further interest, Congress could consider requesting regular or occasional reports by inspectors general at the five key energy-using agencies which together account for over **90** percent of Federal energy use and have most responsibility for Federal energy management.[19]

Promoting Research, Development, and Demonstration

Research, development, and demonstration are all vital to innovation and the practical application of new energy efficient technologies. For example, highly efficient electronic ballasts which are now commercially available were partly a result of Federal R&D efforts at Lawrence Berkeley Laboratory.[20] **Vacuum insulation,** expected to become commercially available in applications such as highly efficient refrigerators later in this decade, is another technology benefiting from Federal R&D. R&D in physical sciences and engineering is essential for making this type of hardware available.

Commercialization and widespread application do not necessarily result rapidly after development of even economically attractive technologies. Again, the long time between research, commercial production, and eventual widespread use for modern electronic ballasts provides an example. Close cooperation between research and development and the manufacturers is critical to ensuring that useful new concepts proceed toward commercialization as rapidly as possible.

Even for economically attractive new commercial products, gaining consumer acceptance and widespread use takes considerable time. Under what conditions of initial cost, future savings, and risk will consumers and institutions adopt new energy efficient technologies? Research into these perspectives can be useful in developing programs which best deliver energy- and cost-saving technologies both for the Federal Government and for the private sector. Similarly, there can be substantial benefits to demonstrating how well and under what conditions energy efficient measures work in the real world. Making the most effective use of Federal funds involves a balance between this type of R&D and the type in physical sciences and engineering.

---

[18] General Accounting Office reports on Federal energy efficiency efforts reach back at least to the late 1970s. See, for example, U.S. Congress, General Accounting Office, *Evaluation of the Plan To Conserve Energy in Federal Buildings Through Retrofit Programs,* EMD-78-2 (Washington, DC: Mar. 29, 1977); and U.S. Congress, General Accounting Office, *More Use Should Be Made of Energy-Saving Products in Federal Buildings, EMD-79-10* (Washington, DC: Jan. 23, 1979).

[19] Among the purposes, Congress specified in establishing the offices of inspector general is "to provide leadership . . . and recommend Policies . . . to promote economy, efficiency, and effectiveness" in Federal agencies. Inspector General Act of 1978, as amended Public Law 95-452.

[20] M.A. Brown, L.G. Berry, and R.K. @cl, *Commercializing Government-Sponsored Innovations: Twelve Successful Buildings Case Studies,* ORNL/CON-275 (Oak Ridge, TN: Oak Ridge National Laboratories, January 1989), pp. 34-42.

One aid to demonstration would be to produce and disseminate written analyses of the major energy efficiency measures taken at Federal facilities (for example, those winning FEMP awards). These reports could describe the type of measures taken, the costs involved, staffing requirements, a comparison between estimated and actual savings of both energy and spending, and the name of someone to contact for further information. These reports could be compiled and published regularly as one part of FEMP's interagency coordination and information sharing activities. Eventually, there would be no need to report on some measures as they become widely accepted with well-understood costs and performance.

Another valuable demonstration would be to identify, implement and monitor *all* measures meeting minimum cost-effectiveness criteria at several selected facilities of different sizes and uses. These measures should include lighting, HVAC operations, maintenance and retrofits, and upgrades of miscellaneous equipment (e.g., refrigerators). In general, **performing the** most **cost-effective** measures frost appears to be a reasonable practice (as **long** as that doesn't preclude later retrofits). However, using several facilities as showcases or models of the entire range of measures could help demonstrate the Federal government's full cost-effective potential and the feasibility of different approaches. One example of this type of demonstration is an effort by the Pacific Northwest Laboratory and FEMP to develop a model for use by Federal customers of the Niagara-Mohawk Power Corp.[21]

Finally, basing Federal procurement of energy-using products on life-cycle costs can play a role both in encouraging development and in demonstration without increasing spending on R&D. (See "Supporting Markets for Suppliers of Efficient Products and Services," above.)

[21] Pacific Northwest Laboratory, "Proposed Federal Agency Energy Efficiency Model Program with Niagara Mobawk Customers," undated.