

Executive Order 13123: Greening the Government Through Efficient Energy Management

Guidance Documents for Federal Agencies
December 2000



Federal Energy Management Program
Office of Energy Efficiency and Renewable Energy
U.S. Department of Energy



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Implementation Guidance for Executive Order 13123

Executive Order 13123, Greening the Government through Efficient Energy Management, calls for Federal agencies to improve the energy efficiency of their buildings, promote the use of renewable energy, and reduce greenhouse gas emissions associated with energy use in their buildings, among other energy-related requirements. Signed in June of 1999, Executive Order 13123, also directed the Department of Energy to work with other Federal agencies to develop a variety of guidance, criteria, tools, and other information to assist agencies in implementing the provisions of the Order. This booklet packages these guidance documents into one useful reference source. These documents are also available electronically on FEMP's Web site www.eren.doe.gov/femp. Executive Order 13123 can be found in its entirety at www.eren.doe.gov/femp/aboutfemp/exec13123.html.

These guidance documents were drafted by special working groups convened by the Interagency Energy Management Task Force, which is chaired by FEMP. The working groups contributing to the Executive Order implementation guidance documents were:

- Energy Intensive Facilities Working Group,
- Project Financing Working Group,
- Renewable Energy Working Group,
- Reporting Working Group,
- Technical Tools/Training Working Group,
- Utility Markets Working Group, and
- Water Conservation Working Group.

FEMP would like to thank all of the agency representatives on the working groups for their efforts. The resulting guidance provide a strong framework for implementation of energy efficiency, renewable energy, and water conservation policy in Federal facilities well into the future.

An additional guidance document is included in this booklet: *Guidance for Preparing the Executive Order 13123 Implementation Plan for FY 2001*. This outline was developed by the Office of Management and Budget in collaboration with FEMP and the Interagency Energy Management Task Force. These plans describe how agencies should plan to apply strategies identified in the Executive Order to energy efficiency projects and activities in the coming year.

See page i for a listing of all the documents contained in this booklet.



Beth Shearer, Director
Federal Energy Management Program

Criteria for Exempting Facilities from the Goals of Executive Order 13123 and Guidance for Reporting Exemptions

December 8, 1999

Section 502(b) of Executive Order 13123 requires DOE to “establish criteria for determining which facilities are exempt from the Order. . .(and) provide guidance for agencies to report proposed exemptions.” This guidance was developed by the Reporting Working Group of the Interagency Energy Management Task Force. The technical contact for more information is Rick Klimkos, FEMP, 202-586-8287.

These criteria and accompanying guidance fulfill the requirement under Section 502(b) of Executive Order 13123. The Secretary of Energy, in collaboration with other agency heads, is required to “establish criteria for determining which facilities are exempt from the order. In addition, DOE must provide guidance for agencies to report proposed exemptions.” These criteria and guidance will be incorporated into the annual DOE Reporting Guidance for the *Annual Report to Congress on Federal Government Energy Management* for FY 2000. In subsequent years, these criteria will be subject to change as implementation issues arise and are addressed.

Three Categories of Buildings Under Executive Order 13123

Executive Order 13123 establishes three categories of Federal buildings and facilities pertaining to compliance with the goals and other requirements of the Order. These categories are:

- 1) **Standard buildings/facilities** subject to Section 202, Energy Efficiency Improvement Goals: “Through life-cycle cost-effective measures, each agency shall reduce energy consumption per gross square foot of its facilities, excluding facilities covered in Section 203 of this order, by 30 percent by 2005 and 35 percent by 2010 relative to 1985.”
- 2) **Industrial, laboratory, research, and other energy-intensive facilities** subject to the goals of Section 203, Industrial and

Laboratory Facilities: “Through life-cycle cost-effective measures, each agency shall reduce energy consumption per square foot, per unit of production, or per other unit as applicable by 20 percent by 2005 and 25 percent by 2010 relative to 1990.”

- 3) **Exempt facilities** as defined under Section 704: “a facility. . .for which an agency uses DOE-established criteria to determine that compliance with the Energy Policy Act of 1992 or this order is not practical.”

Standard buildings/facilities include, but are not limited to, the following types of buildings:

- Office buildings,
- Retail/stores,
- Schools,
- Churches/chapels,
- Gymnasiums,
- Libraries,
- Clinics,
- Warehouses,
- Jails, and
- Multi- and single-family residences.

The types of buildings that agencies may classify as *either standard buildings or as industrial, laboratory, research, or energy-intensive facilities* include, but are not limited to:

- Laboratories,
- Research hospitals,

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CRITERIA FOR EXEMPTING FACILITIES FROM THE GOALS OF EXECUTIVE ORDER 13123 AND GUIDANCE FOR REPORTING EXEMPTIONS*continued from previous page*

- Computer centers, and
- Bulk document handling/processing facilities.

Many facilities that house energy intensive operations offer great opportunities for saving large amounts of energy. In many cases, investments in energy efficiency measures can pay off particularly quickly in these types of facilities. Therefore, it may benefit the agency to keep these buildings in the standard buildings category to help the agency meet the 30 and 35 percent reduction goals.

Under the Order, industrial facilities should be classified as energy-intensive and be subject to the goals of Section 203. Section 706 defines “industrial facility” as “any fixed equipment, building, or complex for production, manufacturing, or other processes that uses large amounts of capital equipment in connection with, or as part of, any process or system, and within which the majority of energy use is not devoted to the heating, cooling, lighting, ventilation, or to service the water heating energy load requirements of the facility.” DOE understands that heating, cooling, ventilating, and water heating functions may also be an integral part of the industrial process. Therefore, “heating, cooling, lighting, ventilation, or to service the water heating energy load requirements” should be interpreted in this definition as referring to normal (non-process) energy loads for occupancy requirements.

Criteria for Exempting Facilities from Executive Order 13123 Goals

The following facilities may be exempted from Section 201, Greenhouse Gas Reduction Goal, Section 202, Energy Efficiency Improvement Goals for standard buildings and facilities, and the goals of Section 203, Industrial and Laboratory Facilities of Executive Order 13123.

- **Buildings and facilities in which it is technically infeasible to implement energy efficiency measures or where conventional performance measures are rendered meaningless by an overwhelming proportion of process-dedicated energy.** For these exemptions, a finding of impracticability must be approved by the Department of Energy as outlined in Section 543(c) of the National Energy Conservation Policy Act, as amended by the Energy Policy Act of 1992. Buildings and facilities where it is technically infeasible to implement energy efficiency measures, may be exempted. Agencies must provide a justification that explains why it is technically infeasible. Facilities with energy-intensive processes where agencies can clearly demonstrate that process-dedicated energy overwhelms other building energy consumption, and the fluctuation in the operation of the process would significantly impact meeting the aforementioned goals of the Executive Order, may be exempted. Agencies must provide a justification that explains why process-dedicated energy in these facilities may impact the Agencies ability to meet the goals.

The finding of impracticability must be submitted to the DOE Assistant Secretary for Energy Efficiency and Renewable Energy for approval and may be renewed in subsequent years by providing a statement to DOE declaring no significant change in building status. For buildings where exemptions are granted, agencies should undertake energy audits and are strongly encouraged to implement all life-cycle cost-effective measures per the recommendation of the audit.

- **Structures such as outside parking garages which consume essentially only lighting**

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CRITERIA FOR EXEMPTING FACILITIES FROM THE GOALS OF EXECUTIVE ORDER 13123 AND GUIDANCE FOR REPORTING EXEMPTIONS

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energy, yet are classed as buildings. While great opportunity exists for energy efficiency measures in such structures, the relatively lower energy use per square foot of the unconditioned space should not be counted as “building” space. Energy used for airport and street lighting not directly associated with a building may also be considered exempt from goals.

- **Buildings where energy usage is skewed significantly due to reasons such as: buildings entering or leaving the inventory during the year, buildings down-scaled operationally to prepare for decontamination, decommissioning and disposal, and buildings undergoing major renovation and/or major asbestos removal.** These buildings may be exempted only during the fiscal year when energy usage is skewed. Energy efficiency measures should be considered for down-scaled buildings awaiting disposal if the measures pay for themselves prior to building demolition.
- **Federal ships that consume “Cold Iron Energy,” (energy used to supply power and heat to ships docked in port) and airplanes or other vehicles that are supplied with utility-provided energy.**

Guidance for Agencies to Report Proposed Exemptions

Although buildings found exempt according to the previously-stated criteria are not subject to the requirements of Sections 202 and 203 of Executive Order 13123, DOE will continue to collect energy consumption data for these buildings under the new reporting category of “Exempt Buildings.” This ensures that accurate reporting on overall Federal energy consumption is maintained. Agencies will report energy consumption and costs under these four categories in FY 2000:

- 1) Buildings & Facilities,
- 2) Industrial, Laboratory, Research or Energy-Intensive Facilities,

- 3) Exempt Facilities, and
- 4) Vehicles & Equipment.

Agencies should report aggregate energy consumption in exempt buildings for each energy type in the reporting units listed below:

Electricity	(Megawatt Hours)
Fuel Oil	(Thousands of Gallons)
Natural Gas	(Thousand Cubic Feet)
LPG/Propane	(Thousands of Gallons)
Coal	(Short Ton)
Purchased Steam	(Billion Btu)
Other	(Billion Btu)

Each agency will submit to DOE its aggregate annual costs for each fuel type consumed in its exempt buildings.

Each agency shall also submit to DOE a list of the buildings/facilities exempted from the requirements of the Order. For each building or facility listed, the agency shall provide the gross square footage of the building and the justification for exclusion. This information must also be included in the agency’s annual report to the President. Section 303 (b) of Executive Order 13123 states that “each agency’s annual report to the President shall. . .include a listing and explanation of exempt facilities.”

Buildings with Fully-Serviced Leases

DOE assumes that agencies will not list or report energy consumption in buildings with fully-serviced leases, where the landlord is responsible for paying energy bills. In these cases, the agency has little control over building operations and cannot implement energy efficiency measures.

Guidelines:

Executive Order 13123, Section 203 Performance Goals for Industrial, Laboratory, Research, and Other Energy-Intensive Facilities

December 2, 1999

These guidelines fulfill the requirements of Section 502(a) and Section 502(c) of Executive Order 13123. Section 502 directs DOE to “issue guidelines to assist agencies in measuring energy per square foot, per unit of production, or other applicable unit in industrial, laboratory, research, and other energy-intensive facilities.” Section 502(c) directs DOE to “develop guidance to assist agencies in calculating appropriate energy baselines for previously exempt facilities and facilities occupied after 1990 in order to measure progress toward goals.” This guidance was developed by the Reporting Working Group of the Interagency Energy Management Task Force. The technical contact for more information is Rick Klimkos, FEMP, 202-586-8287.

Overview of Requirements

Section 203 of Executive Order 13123, Industrial and Laboratory Facilities, requires that “through life-cycle cost-effective measures, each agency shall reduce energy consumption per square foot, per unit of production, or per other unit as applicable by 20 percent by 2005 and 25 percent by 2010 relative to 1990. No facilities will be exempt from these goals unless they meet new criteria for exemptions, as issued by DOE.” These guidelines will be incorporated into the annual DOE Reporting Guidance for the *Annual Report to Congress on Federal Government Energy Management* for FY 2000. In subsequent years these guidelines will be subject to change as implementation issues arise and are addressed.

This requirement builds upon goals previously created under Executive Order 12902 for industrial facilities by mandating a further reduction target for 2010, establishing a framework for measuring performance, and expanding the types of facilities covered to include laboratories, research and other energy-intensive facilities. Exemptions from performance goals under Executive Order 13123 are also more strict than those under the previous Executive Order

and the National Energy Conservation Policy Act (NECPA) as amended by the Energy Policy Act of 1992. These exemption criteria are addressed separately in the Department of Energy’s guidance to agencies required under Section 502(b) of Executive Order 13123.

These Guidelines fulfill two requirements under Executive Order 13123. These are that the Secretary of Energy, in collaboration with other agency heads, shall:

- Issue guidelines to assist agencies in measuring energy per square foot, per unit of production, or other applicable unit in industrial, laboratory, research, and other energy-intensive facilities (Section 502(a)); and
- Develop guidance to assist agencies in calculating appropriate energy baselines for previously exempt facilities and facilities occupied after 1990 in order to measure progress toward goals (Section 502(c)).

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GUIDELINES: EXECUTIVE ORDER 13123, SECTION 203 PERFORMANCE GOALS FOR INDUSTRIAL, LABORATORY, RESEARCH, AND OTHER ENERGY-INTENSIVE FACILITIES*continued from previous page***Measuring Performance Toward the Goals for Industrial/Laboratory/Research/Other Energy-Intensive Facilities***Three Options for Measuring Performance*

Under the framework established by the Executive Order, agencies should select from three main options for measuring progress toward the 20 percent and 25 percent goals for industrial/laboratory/research/other energy-intensive facilities. The options are:

- 1) Use a rate-based measure of annual energy consumed per number of production units produced in that same year (**Btu/production unit**). This approach offers the best measure of energy efficiency performance for industrial facilities in that energy consumption is normalized to reflect actual output.
- 2) Use a rate-based measure of annual energy consumed per number of other applicable units for that same year (**Btu/performance unit**). This option may be more useful for measuring performance of laboratory, research, and other energy-intensive facilities. Applicable units having a valid correlation with the energy-intensive process being measured might include:
 - the number of experiments performed (**Btu/experiment**);
 - the weight of product produced (**Btu/ton**);
 - the number of customers served (**Btu/customers served**);
 - the cash value of the product produced (**Btu/\$**); and
 - manpower associated with the process (**Btu/labor hours expended**).
- 3) Use **Btu-per-gross-square-foot (Btu/GSF)** as a broad indicator of energy efficiency in industrial/laboratory/research/other energy-intensive buildings. This approach has shortcomings as a measure of performance where production levels fluctuate from year to year, but, it offers the advantage of allowing numerous facilities with varying functions to be easily aggregated into an agency-wide performance measure. If this approach is used, supporting documentation (and savings estimates) of energy efficiency measures, including projects undertaken may be provided to demonstrate compliance with the Order.

Aggregating Data to Determine Agency-Wide Performance

Agencies can apply any one of these options at the facility level, provided the square footage, production, or performance data is available for the appropriate reporting period. The difficulty arises, however, when attempting to aggregate the output-based measures used under Options 1 and 2 in order to determine agency-wide performance. Many agencies undertake many different types of operations and the range of energy consumed to produce one unit of output can vary widely depending on the operation. **In cases where operations vary so widely in energy intensity that production units or performance units are not appropriate measures, or in cases when this output data is unavailable, the Btu/GSF measure under Option 3 will have to be used by default. In these cases, an agency may wish to establish separate performance indicators for each process operation and report these separately to DOE along with the aggregated Btu/GSF. In this way, the agency can be credited with progress in individual operations which may not be reflected in the overall Btu/GSF progress.**

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GUIDELINES: EXECUTIVE ORDER 13123, SECTION 203 PERFORMANCE GOALS FOR INDUSTRIAL, LABORATORY, RESEARCH, AND OTHER ENERGY-INTENSIVE FACILITIES*continued from previous page**Selecting Which Option to Use*

If an entire agency has only one type of industrial operation manufacturing a sole product, production units are definitely the most appropriate measure of output and Option 1 should be used. Multiple operations within an agency can be combined under Option 1 into an agency-wide measure by summing the production units for all operations and dividing the total into the combined energy consumption of all operations. Agencies should exercise caution, however, if the range of energy consumed to produce one unit of output varies widely from one operation to another. In these instances, fluctuation in production levels of the more energy-intensive operations will skew the overall performance measure.

In cases where the number of production units produced vary widely between different operations at an agency, output might best be measured with an Option 2 performance unit, such as tons, in order to accommodate the different types of goods or hardware produced.

A key consideration when choosing a measure of output is availability of data. Under Options 1 and 2, information on product output should be available for the FY 1990 reporting period coinciding with the energy consumed in order to establish a meaningful baseline. This is discussed in more detail in the next section.

Calculating Appropriate Energy Baselines for Previously Exempt Buildings and Facilities*Baseline Development for Agencies with Available Consumption Data*

Some agencies have already reported to DOE energy consumption for industrial, laboratory, research and other energy-intensive facilities that were formerly considered "Excluded Buildings." ("Excluded Buildings" in this case refers to exclusion from the 30- and 35-percent Btu/GSF

reduction goal for ordinary buildings and facilities.) In these cases, the Btu side of the performance measure ratio is already known. DOE's database contains consumption data for the following agencies for the FY 1990 base year under the former "Excluded Buildings" category:

Agency	Billion Btu
Defense	39,209.1
Energy	11,649.9
NASA	7,135.0
Transportation	3,064.0
Agriculture	2,204.2
U.S. Information Agency	1,406.9
General Services Admin.	160.6

For these agencies, all that is needed to establish a baseline is a statement on the type of performance measure that will be used and the gross square footage, production unit, or performance unit associated with the consumption for that period. This number is then divided into the consumption figure to calculate the baseline Btu/GSF, Btu/production unit, or Btu/other performance unit ratio.

Output/Performance Data Unavailable for FY 1990 Base Year

If output or performance data comports with energy consumption is not available for any year, the agency should consider by default the Btu/GSF performance measure. If output or performance data is available for later years but not for the FY 1990 base year, then an agency should estimate output or performance for FY 1990. This can be done by taking the performance ratio (Btu/output or performance) from the earliest available year after 1990 and applying it to the known energy consumption for FY 1990. For example, in 1992, an agency's performance ratio for energy-intensive facilities was 1,250,000 Btu/production unit. In 1990, the agency's energy-intensive facilities used

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GUIDELINES: EXECUTIVE ORDER 13123, SECTION 203 PERFORMANCE GOALS FOR INDUSTRIAL, LABORATORY, RESEARCH, AND OTHER ENERGY-INTENSIVE FACILITIES*continued from previous page*

50 billion Btu, but the number of production units was unknown. Production units are estimated for FY 1990 as follows:

$$50,000,000,000 \text{ Btu} \div 1,250,000 \text{ Btu/prod. unit} = 40,000 \text{ production units}$$

This approach essentially calculates a baseline based on the performance ratio from the year closest to FY 1990. Thus, in the absence of FY 1990 data elements, agencies may use known data from later years to establish their baseline. Any procedure used to estimate an agency's baseline must be fully justified and documented the agency's report to DOE.

Non-Energy-Intensive Buildings Previously Reported as "Excluded Buildings"

It is possible that some buildings were improperly excluded from the ordinary building energy baseline. In addition, under the stricter exemption criteria of the new Executive Order, previously exempt buildings need to be re-examined. If a building that was previously excluded is now added to the ordinary building inventory, the baseline needs to be adjusted to reflect this.

Returning non-energy-intensive facilities to the ordinary building inventory involves re-submitting Annual Energy Management Data Reports to DOE (including consumption by fuel type in specified reporting units, costs by fuel type, and gross square footage). These reports should be re-submitted for all prior years back to the FY 1985 base year, adding the fuel-specific data for the formerly-excluded buildings to the existing data under the ordinary Buildings/Facilities category. DOE's Federal Energy Management Program office can provide assistance with this data reallocation.

1985 Base Year Adjustments for Industrial/Laboratory/Research/Other Energy-Intensive Facilities

Agencies should ensure that the energy consumption, costs, and GSF data for Industrial/Laboratory/Research/Other Energy-Intensive Facilities are, in fact, excluded from the ordinary building baseline. This is to ensure that the data used to measure progress toward the 30- and 35-percent reduction goals are not skewed. In other words, to avoid double counting and incorrect measurement of performance, agencies must recalculate their 1985 baseline to only include ordinary buildings (i.e., office buildings, residences, etc.). Likewise, energy and square footage data for all subsequent years must be separated into either the industrial/laboratory/research/other energy-intensive facilities category or the ordinary buildings category. In the very least, the energy-intensive facility data needs to be isolated and removed from ordinary buildings data for FY 1985 to ensure consistent reporting for the ordinary building goals.

Guidance on Life-Cycle Cost Analysis Required by Executive Order 13123

April 26, 2000

Section 502(d) of Executive Order 13123 directs DOE to “issue guidance to clarify how agencies determine the life-cycle cost for investments required by the Order, including how to compare different energy and fuel options and assess the current tools.” This guidance was developed by a small working group comprised of representatives from the National Institute of Standards and Technology and FEMP. The technical contact for more information is Ted Collins, FEMP, 202-586-8017. The length of this guidance document necessitates re-printing only the Executive Summary. To read the full text, see www.eren.doe.gov/femp/aboutfemp/pdfs/lifecycleguidance.pdf.

Executive Summary

Section 401 of Executive Order 13123 requires that “Agencies shall use life-cycle cost analysis in making decisions about investments in products, services, construction, and other projects to lower the Federal Government’s costs and to reduce energy and water consumption...”

The purpose of this guidance is to “clarify how agencies determine the life-cycle cost for investments required by the Order, including how to compare different energy and fuel options and assess the current tools” (Section 502(d)); and “assist agencies in ensuring that all project cost estimates, bids, and agency budget requests for design, construction and renovation of facilities are based on life-cycle costs.” (Section 505(a))

Definition of Life-Cycle Costs

Section 707 of Executive Order 13123 defines life-cycle costs as “...the sum of present values of investment costs, capital costs, installation costs, energy costs, operating costs, maintenance costs, and disposal costs over the life-time of the project, product, or measure.”

Life-cycle cost analysis (LCCA) is an economic method of project evaluation in which all costs arising from owning, operating, maintaining, and disposing of a project are considered important to the decision. LCCA is particularly suited to the evaluation of design alternatives that satisfy a required performance level, but that may have

differing investment, operating, maintenance, or repair costs; and possibly different life spans. LCCA can be applied to any capital investment decision, and is particularly relevant when high initial costs are traded for reduced future cost obligations.

Scope of Guidance

This guidance summarizes the life-cycle cost (LCC) requirements of Executive Order 13123. Decision-makers should be aware that the use of LCCA is required by law and Executive Order and that relevant LCC procedures and tools are well developed and have been supported by the Department of Energy’s Federal Energy Management Program (FEMP) and other agencies for over 20 years. This guidance provides a discussion of LCCA that combines generic present-value analysis with the LCCA regulatory criteria (10 CFR 436A) promulgated by FEMP. These criteria apply specifically to energy and water conservation and renewable energy projects in Federal buildings.

Products, Services, and Other Projects Covered by Executive Order 13123

The projects, products, services, construction, and other projects mentioned in Executive Order 13123 that are to be evaluated using LCCA, include but are not limited to the following (all are subject to LCC criteria in 10 CFR 436A):

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GUIDANCE ON LIFE-CYCLE COST ANALYSIS REQUIRED BY EXECUTIVE ORDER 13123*continued from previous page*

- Energy and water conservation, and renewable energy projects in Federal buildings, industrial facilities, and laboratories;
- Energy savings performance contracts and utility contracts and other alternative financing contracting mechanisms;
- Bundling of energy efficiency products with renewable energy products and retirement of inefficient equipment on an accelerated basis;
- ENERGY STAR and other energy-efficient products, strategies, and tools; including sustainable building design, model lease provisions, industrial facility efficiency improvements, and off-grid generation;
- Electricity use; and
- Mobile equipment.

Evaluation of ESPCs and Utility Contracts

The general principles of LCCA also apply to the evaluation of projects considered for alternative financing through an Energy Savings Performance Contract (ESPC) or a Utility Contract (UC). LCCA can be used to compare the costs of the existing equipment over a given time period with the costs over the same time period of an energy conservation measure (ECM) proposed by an energy service company. The costs of performing a feasibility study, setting up and administering the contract, and financing the project through the energy service company can all be included in the LCCA. LCCA allows the analyst to compare the life-cycle costs of financed ECMs with those of agency-funded ECMs, the latter implemented either immediately or in a future year. Assumptions and requirements regarding financing-related input data, study periods, and inflation treatment need to be considered.

Bundling of Energy Efficiency Projects

Section 401 of Executive Order 13123 states that “Where appropriate, agencies shall consider the life-cycle costs of combinations of projects, particularly to encourage bundling of energy efficiency projects with renewable energy projects. Agencies shall also retire inefficient equipment on an accelerated basis where replacement results in lower life-cycle costs.”

Individual energy conservation measures should be bundled together to optimize energy, cost, and/or environmental benefits of a project. Renewable energy measures and other measures that save great amounts of energy, improve energy-related infrastructure, reduce air pollution, or reduce greenhouse gas emissions may be bundled with other ECMs as long as the overall project is life-cycle cost effective. All items in the bundle must be complementary, i.e., an integral part of the project, and no single ECM should be significantly cost-ineffective. Furthermore, energy managers should take an integrated systems approach when defining the scope of a building retrofit or other energy-related project. In many cases, a decision about one ECM will directly affect the scope or type of other ECMs.

Life-Cycle Cost for Energy-Using Products

When purchasing energy-using products, agencies should perform an LCCA to assure that they are making a cost-effective selection. Pursuant to the FAR Section 23.704, agencies can purchase cost-effective energy-efficient products even if the first cost is higher than a less efficient product.

Basis for LCCA Guidance

This guidance does not supersede agency practices that are prescribed by or pursuant to law, Executive Order, or other relevant documents. It

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GUIDANCE ON LIFE-CYCLE COST ANALYSIS REQUIRED BY EXECUTIVE ORDER 13123

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is meant to assist agencies in conducting life-cycle cost analyses of investments in products, services, construction, and other projects. The methodology is explained in the context of energy and water conservation and renewable energy projects in federal buildings according to 10 CFR 436A, but it is applicable to any products, services, and other projects where future operational savings are traded off against higher initial investment costs.

The LCC methodology and procedures of 10 CFR 436A (as explained in NIST Handbook 135) are consistent with American Society for Testing and Materials (ASTM) Standards on Building Economics, in particular ASTM Standard Practices E917, E964, E1057, E1074, E1121, and E1185. The supporting NIST LCC computer software (BLCC) can generally be used to analyze any type of project whose costs can be categorized as:

- initial investment costs,
- operation and maintenance costs,
- energy costs and water costs,
- capital replacement costs,
- residual values, and
- financing costs.

Additional Reference Materials

The FEMP LCC rules in 10 CFR 436A are explained in NIST Handbook 135 *Life-Cycle Costing Manual for the Federal Energy Management Program* and its annual supplement *Energy Indices and Discount Factors for Life-Cycle Cost Analysis*.

Appendix A of this guidance refers the reader to additional Government documents that provide guidance on meeting the LCCA requirements of Executive Order 13123:

- *Facilities Standards for the Public Buildings Service*. This GSA document provides general guidance on LCCA for buildings and building systems.

- *Whole Building Design Guide* provides guidance on sustainable building design.
- *Criteria/Standards for Economic Analysis/Life-Cycle Costing for MILCON Design*. This DOD Tri-Services Memorandum of Agreement provides guidance on LCCA for military construction design.

Authority

This LCC guidance is issued under the authority of Executive Order 13123, June 3, 1999. The use of life-cycle costing to evaluate energy and water conservation, and renewable energy projects in the Federal Government arises from the requirements of the National Energy Conservation Policy Act (NECPA) of 1978 (PL 95-619), as amended; the Energy Policy Act of 1992 (PL 102-486); and subsequent legislation and Executive Orders. The LCC rules and regulations, codified in 10 CFR 436, Subpart A, *Life-Cycle Cost Methodology and Procedures*, were published by DOE in 45 FR 5820 on January 23, 1980, and amended in 1990 and 1996 (FR, Vol. 55, No. 224, November 20, 1990; FR, Vol. 61, No. 123, June 25, 1996).

To read the full text of this guidance, see www.eren.doe.gov/femp/aboutfemp/pdfs/lifecycleguidance.pdf.

Guidance for Providing Credit Toward Energy Efficiency Goals for Cost-Effective Projects Where Source Energy Use Declines But Site Energy Use Increases

April 26, 2000

Section 502(e) of Executive Order 13123 directs DOE to “issue guidance for providing credit toward energy efficiency goals for cost-effective projects where source energy use declines but site energy use increases.” This guidance was developed by the Reporting Working Group of the Interagency Energy Management Task Force. Input from natural gas and electricity industry groups was coordinated by the Alliance to Save Energy and considered in the development of this guidance. The technical contact for more information is Rick Klimkos, FEMP, 202-586-8287.

This guidance fulfills the requirement under Section 502(e) of Executive Order 13123. The Secretary of Energy, in collaboration with other agency heads, is required to “issue guidance for providing credit toward energy efficiency goals for cost-effective projects where source energy use declines but site energy use increases.” This guidance will be incorporated into the annual DOE Reporting Guidance for the *Annual Report to Congress on Federal Government Energy Management* for FY 2000. In subsequent years, this guidance will be subject to change as implementation issues arise and are addressed.

Section 206 of the Order establishes the following requirement pertaining to source-measured energy consumption:

Source Energy. The Federal Government shall strive to reduce total energy use and associated greenhouse gas and other air emissions, as measured at the source. To that end, agencies shall undertake life-cycle cost-effective projects in which source energy decreases, even if site energy use increases. In such cases, agencies will receive credit toward energy reduction goals through guidelines developed by DOE.

Background

Energy measured at the point of use is termed “site energy”. Energy measurement that accounts for the generation, transmission and distribution of the energy is called “source energy”. Whichever way consumption is measured, cost-effectiveness remains the mandated criteria for assessing, selecting, and funding potential Federal energy efficiency projects.

In June 1996, the Federal Interagency Energy Policy Committee (656 Committee) unanimously approved a policy statement that encourages cost-effective energy projects that result in reduced energy consumption regardless of whether that consumption is measured on a site basis or source basis. The purpose of this policy statement was to remove any perceived bias against projects which are cost effective and save energy when measured on a source basis but may not necessarily save energy when measured on a site basis. The most common example of this would be a fuel-switching project which substitutes lower cost natural gas for electricity. This policy remains in effect in that while Federal agencies should continue measuring and accounting for energy use at the point of use at the facility site, energy efficiency projects that result in operational cost savings and reduced source-measured energy consumption are also encouraged.

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GUIDANCE FOR PROVIDING CREDIT TOWARD ENERGY EFFICIENCY GOALS FOR COST-EFFECTIVE PROJECTS WHERE SOURCE ENERGY USE DECLINES BUT SITE ENERGY USE INCREASES

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The Department of Energy's *Annual Report to Congress on Federal Government Energy Management*, will continue to report facility consumption both ways and refers to source-measured energy as primary consumption and site-measured energy as net consumption. When tracking performance toward the mandated reduction goals for buildings and facilities, Btu-per-gross-square-foot will be measured on a site basis, although source-measured consumption is also reported in accompanying tables.

Crediting Project-Specific Source Energy Declines

Performance toward the energy efficiency goals established by Executive Order 13123 under Section 202 (Energy Efficiency Improvement Goals) and Section 203 (Industrial and Laboratory Facilities) are measured on an agency-wide basis. Therefore the impact of an individual project would be negligible on an agency-wide basis. Therefore, to make an impact on an agency-wide basis, an agency would have to complete numerous projects where source energy use declines but site energy use increases.

Agencies should continue to report energy consumption as in the past, i.e., aggregated and submitted in the units shown in the table below for each energy type.

Based on these submissions DOE will calculate energy consumption in site-delivered Btu and Btu-per-gross-square-foot. DOE will also calculate Btu per gross square foot on a source basis.

Agencies will receive credit for projects on their scorecard evaluation for life-cycle cost-effective projects where source energy declines and site energy increases. For each completed project where source energy use declines but site energy use increases, agencies should calculate source energy savings for the reported fiscal year. Agencies may use the national average source conversion factors used by DOE or may choose factors from the particular utility or steam provider. The conversion factors traditionally used by DOE are:

Electricity	11,600 Btu/kilowatt hour
Purchased Steam	1,390 Btu/pound

The electricity conversion factor has been used since 1985 by DOE for Federal energy reporting and includes energy lost in the generation process (66%), electricity used in the utility plant (2%), electricity lost in the transmission and distribution process (3%), and electricity delivered to the customer's site (29%). If an agency is using a conversion factor obtained from its utility, it should include each of these components and be properly documented in the agency's report to DOE.

Energy Type	Reporting Unit	Site Conversion Factor
Electricity	(Megawatt Hours)	3,412 Btu/kilowatt hour
Fuel Oil	(Thousands of Gallons)	138,700 Btu/gallon
Natural Gas	(Thousands Cubic Feet)	1,031 Btu/cubic foot
LPG/Propane	(Thousands of Gallons)	95,500 Btu/gallon
Coal	(Short Ton)	24,580,000 Btu/short ton
Purchased Steam	(Billion Btu)	1,000 Btu/pound
Other	(Billion Btu)	

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GUIDANCE FOR PROVIDING CREDIT TOWARD ENERGY EFFICIENCY GOALS FOR COST-EFFECTIVE PROJECTS WHERE SOURCE ENERGY USE DECLINES BUT SITE ENERGY USE INCREASES

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Agencies should use the following worksheet for each applicable project in order to document source energy reductions and site energy increases:

PROJECT WORKSHEET			EXAMPLE
Base Case (pre-project implementation)			
<i>Line 1</i>	Annual Source Energy Used	_____ MMBtu	<u>475</u> MMBtu
<i>Line 2</i>	Annual Site Energy Used	_____ MMBtu	<u>128</u> MMBtu
New Project			
<i>Line 3</i>	Annual Source Energy Used	_____ MMBtu	<u>258</u> MMBtu
<i>Line 4</i>	Annual Site Energy Used	_____ MMBtu	<u>233</u> MMBtu
	<i>Subtract Line 3 from Line 1, this is:</i>		
<i>Line 5</i>	Annual Source Energy Used	_____ MMBtu	<u>217</u> MMBtu
	<i>Subtract Line 2 from Line 4, this is:</i>		
<i>Line 6</i>	Annual Site Energy Increase	_____ MMBtu	<u>105</u> MMBtu

Once this worksheet is completed for each applicable project, compile the data from Line 5 and Line 6 for each project into the format below (as shown in the example):

ANNUAL COMPILATION WORKSHEET			
Name of Project	Annual Source Energy Saved		Annual Site Energy Increase
1) Water Heater Retrofit	_____ MMBtu		_____ MMBtu
2) 25 Water Heaters Replaced	_____ MMBtu		_____ MMBtu
3) 15 Water Heaters Replaced	_____ MMBtu		_____ MMBtu
	Total	_____ MMBtu	_____ MMBtu

EXAMPLE			
Name of Project	Annual Source Energy Saved		Annual Site Energy Increase
1) Water Heater Retrofit	<u>217</u> MMBtu		<u>105</u> MMBtu
2) 25 Water Heaters Replaced	<u>5,425</u> MMBtu		<u>2,625</u> MMBtu
3) 15 Water Heaters Replaced	<u>3,255</u> MMBtu		<u>1,575</u> MMBtu
	Total	<u>8,897</u> MMBtu	<u>4,305</u> MMBtu

**GUIDANCE FOR PROVIDING CREDIT TOWARD
ENERGY EFFICIENCY GOALS FOR COST-EFFECTIVE
PROJECTS WHERE SOURCE ENERGY USE DECLINES
BUT SITE ENERGY USE INCREASES**

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Submit this project compilation worksheet to DOE. To remove the perception that there is any disincentive to implementing these types of projects, DOE will work with the Office of Management and Budget to ensure that appropriate credit is given on the agency's scorecard. Credit will be applied to the component of the scorecard dealing with the energy efficiency improvement goals of Section 202 or 203, as appropriate.

Additional Benefits and Recognition of Projects that Reduce Source Energy

(1) Impact on Greenhouse Gas Reduction Goal: In measuring progress toward the new greenhouse gas reduction goal, greenhouse gas emission calculations will be based on source-measured energy. Therefore, projects that result in source energy reductions will directly contribute to an agency's performance toward the greenhouse gas reduction goal of Section 201 of the Order.

(2) Reductions in Source Energy per Gross Square Foot: Agency progress toward energy reduction goals will be tracked in the *Annual Report to Congress on Federal Government Energy Management* on a source-measured basis as well as on a site-measured basis. This will highlight agency achievements in source energy reductions as directed under Section 206 of the Order.

Guidance on Federal Government Renewable Energy Goal

May 15, 2000

Section 503(b) of Executive Order 13123 directs DOE to develop for the first time a goal for the amount of energy generated at Federal facilities from renewable energy. This goal was developed by the Renewable Energy Working Group of the Interagency Energy Management Task Force. The technical contact for more information is Anne Sprunt Crawley, FEMP, 202-586-1505.

This guidance fulfills the requirement for the Secretary of Energy to establish a Federal renewable energy goal under section 503(b) of Executive Order 13123, and consistent with Section 204:

“Sec. 204. Renewable Energy. Each agency shall strive to expand the use of renewable energy within its facilities and its activities by implementing renewable energy projects and by purchasing electricity from renewable energy sources.”

“Sec. 503. Within 1 year of this order, the Secretary of Energy, in collaboration with other agency heads, shall:

(b) develop goals for the amount of energy generated at Federal facilities from renewable energy technologies;”

Recommendation

The Secretary of Energy recommends that the Federal Government strive to have the equivalent of 2.5 percent of facilities' electricity consumption come from new renewable energy sources by 2005. New renewable energy would include any renewable energy acquired by the Federal Government after 1990. Using 1998 Federal energy consumption data, the goal would equal 1,355 gigawatt-hours (GWh) of electricity consumption annually or 4.6 trillion Btu. A preliminary analysis found 173 GWh of new renewable energy already in use or available under contract in the Federal sector.

To accomplish a meaningful goal, agencies will require maximum flexibility to obtain renewable energy in a manner that makes the most economic sense, and apply it wherever it is most advantageous. Although the goal is measured against facility electricity use because that is where the greatest opportunity for renewable energy exists, agencies will be allowed to substitute renewable energy generated or used in many situations, including transportation, energy-intensive facilities, or outside a facility. For example:

- on- and off-grid power technologies;
- thermal technologies;
- renewable transportation fuels (ethanol, hydrogen derived from renewable energy, etc.);
- passive solar energy captured by equipment and building design;
- renewable energy mechanical power;
- renewable energy from projects on Federal facilities facilitated by the host agency – for example, a geothermal project on Federal land where the host agency assisted with siting; and
- renewable energy used by clients of a Federal agency, if the agency provided financial or project development support – for example, solar energy on public housing.

For purchases of renewable energy, agencies will be required to submit information in their annual reports. FEMP will offer a voluntary, on-line

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GUIDANCE ON FEDERAL GOVERNMENT RENEWABLE ENERGY GOAL

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reporting system that will request a minimum amount of information for all other projects in order to estimate renewable energy output. FEMP will be responsible for developing engineering estimation techniques for converting project information into estimates of renewable energy use. Agencies will not be required to develop their own estimates, beyond the information requested by the on-line reporting system.

Since the goal is based on 2.5 percent of the Government's consumption of electricity, the targeted level of renewable energy use will be recalculated each year to account for changes in Federal energy consumption.

Agencies should also report in their scorecards and annual reports the efforts they have made to create opportunities for renewable energy use. Reports should focus on agency efforts to implement the mechanisms cited in the Executive Order: renewable power purchasing, use of energy savings from other projects to purchase renewable energy, bundling renewable energy with other measures in ESPCs, sustainable building design, and purchasing renewable energy equipment.

Guidance for Counting Renewable Energy Projects and Green Energy Purchases Toward Progress in Reaching Greenhouse Gas and Energy Reduction Goals; and Guidance for Estimating Greenhouse Gas Emissions Attributable to Facility Energy Use

May 15, 2000

Two separate Executive Order 13123 requirements (Section 503(a) and 503(b)) for guidance to be developed by DOE (in collaboration with other agencies) are combined into this document. The approaches outlined in the document below were developed by the Utility Working Group of the Interagency Energy Management Task Force. The technical contact for more information is Brad Gustafson, FEMP, 202-586-2204.

Background

This guidance fulfills the requirement for the Secretary of Energy under section 503(a) and 503(e) of Executive Order 13123:

“Sec. 503. Within 1 year of this order, the Secretary of Energy, in collaboration with other agency heads, shall:

(a) Provide guidance for counting renewable and highly efficient energy projects and purchases of electricity from renewable and highly efficient energy sources toward agencies’ progress in reaching greenhouse gas and energy reduction goals;

(e) Issue guidelines for agency use estimating the greenhouse gas emissions attributable to facility energy use. These guidelines shall include emissions associated with the production, transportation and use of energy consumed in Federal facilities;”

This guidance outlines how agencies may report renewable energy projects and green energy purchases so that they receive credit toward the Executive Order’s greenhouse gas, energy reduction, and renewable energy goals. This guidance also outlines the approach DOE will use to estimate greenhouse gas emissions from the

aggregate facility energy consumption data that agencies report to DOE’s Federal Energy Management Program (FEMP). It is important to note that the emission estimates will be calculated by FEMP and will result in no additional reporting burden on Federal agencies unless they choose to refine those estimates.

Two Types of Renewable and Green Activities Recognized

There are two types of renewable or green energy use that will be counted toward Executive Order goals, each with different reporting requirements. The first type involves *purchases* of electricity or fuel characterized as “green” and often including renewable energy as a major component. The second type involves agency-owned or agency-sponsored renewable energy *projects*, including on-site generation, passive solar design in new construction or building renovation, and off-grid generation as examples.

Crediting Green Energy Purchases Toward Goal Progress

Under regular circumstances, an agency purchases electricity conventionally-generated from whatever

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GUIDANCE FOR COUNTING RENEWABLE ENERGY PROJECTS AND GREEN ENERGY PURCHASES TOWARD PROGRESS IN REACHING GREENHOUSE GAS AND ENERGY REDUCTION GOALS

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resources are at its local utility's disposal. This electricity consumption is reported to DOE and factored into the agency's performance toward the energy and greenhouse gas reduction goals. With the advent of retail competition, however, Federal agencies may have opportunities to purchase renewable or cleaner energy in the competitive market as part of green power pricing programs. Federal agencies may now get credit for these activities toward meeting the goals of Executive Order 13123 by reporting information on these special purchases in the format shown in Exhibit A. This format will be incorporated into the Agency Annual Energy Management Data Report form distributed as part of DOE/FEMP's *Reporting Guidance for the Annual Report to Congress on Federal Government Energy Management*. (Regular purchases from local utilities of conventionally-generated electricity do not have to be reported in this format.) The form will also capture data on purchases of biomass or landfill gas and thermal energy from renewable energy sources to ensure credit from these purchases as well.

For green electricity purchases, agencies need to provide annual electricity usage and costs for the facilities included in the purchase and the State in which the facilities are located. Agencies also need to indicate (yes or no) if all of its facilities in that State are included in the purchase. In order to properly credit the agency with greenhouse gas reductions attributable to the competitive purchase, agencies also need to indicate the component shares of the different resources comprising the generation mix (e.g., percentage of generation from renewable energy, coal, natural gas, hydro, nuclear, etc.); this information can be obtained from the retail supplier.

Renewable Energy Goals. All renewable energy (as defined by the Executive Order) purchases will be credited 100 percent toward agencies' renewable

energy goals. Only energy purchases that specify renewable energy in the purchase contract will be reported in the Exhibit A format. Renewable energy or energy from other technologies that is inadvertently delivered as part of a local utility's normal generation mix will not be reported separately.

Greenhouse Gas Goals. Agency reports on new purchases of renewable energy, energy from highly-efficient technologies, or energy from technologies that substantially reduce greenhouse gas emissions since 1990 will be used to adjust agencies' greenhouse gas emission estimates. Renewable energy or energy from other technologies inadvertently delivered as part of the local utility's normal generation mix will not be considered as this is already captured in the State's emission factor.

Energy Reduction Goals. Only actual conventional energy use will be used to calculate energy use per square foot of facilities. Renewable energy components of green energy purchases separately reported to FEMP will be subtracted from agency total energy consumption.

Crediting Renewable Energy Projects Toward Goal Progress¹

Renewable Energy Goal. For renewable energy projects, FEMP will use existing project tracking databases at DOE and other agencies to the extent

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¹ Government-owned renewable energy projects that serve grid-connected facilities or reduce purchased fossil fuel use displace reported energy consumption, automatically crediting performance toward greenhouse gas and energy reduction goals. Only actual conventional energy use (captured mainly from utility bills) will be used to calculate energy use per square.

GUIDANCE FOR ESTIMATING GREENHOUSE GAS EMISSIONS ATTRIBUTABLE TO FACILITY ENERGY USE*continued from previous page*

possible to ensure these projects are credited toward agencies' progress in using renewable energy. To count projects that are currently not being tracked, FEMP will establish an electronic registry on the Internet that agencies can use to provide project information that is not accounted for in agency-wide reports or existing tracking systems. Agency participation will be voluntary; however, if an agency does not report its renewable energy projects in some form, these projects will not be counted toward the agency's renewable energy goals. In order to minimize the reporting burden, the registry will be designed to collect the bare minimum of project information FEMP needs to estimate the energy value of the projects and credit them to the sponsoring agency. For example, the capacity rating in kilowatts, agency contact, and location would be all the information necessary to estimate the output of a photovoltaic system.

DOE Approach for Estimating Greenhouse Gas Emissions

Section 201 of Executive Order 13123, *Greening the Government through Efficient Energy Management*, for the first time establishes a greenhouse gas reduction goal for Federal Government facilities. This goal applies to standard buildings subject to the energy efficiency goals of Section 202 and industrial, laboratory, and other energy-intensive facilities subject to the goals of Section 203. The requirement states:

“Through life-cycle cost-effective energy measures, each agency shall reduce its greenhouse gas emissions attributed to facility energy use by 30 percent by 2010 compared to such emissions levels in 1990. In order to encourage optimal investment in energy improvements, agencies can count greenhouse gas reductions from improvements in

nonfacility energy use toward this goal to the extent that these reductions are approved by the Office of Management and Budget (OMB).”

DOE/FEMP has the primary responsibility for developing methods to monitor and report progress by agencies in reducing greenhouse gas emissions over time. In the past, FEMP tracked and reported aggregate energy use for all Federal agencies and estimated carbon emissions using national fuel-specific emission factors. This approach, however, results in less accurate emission estimates for electricity use because carbon emission factors for electricity vary significantly by utility and State depending on the resource used to generate the electricity (e.g., coal, gas, nuclear, hydro).

To obtain a greater level of accuracy in estimating emissions from electricity use, FEMP has developed a new approach that places little or no additional reporting burden on the agencies.

Agencies may continue to report their aggregated national-level electricity consumption data as they have in the past. FEMP will then take that total consumption figure and apportion it across the States in which the agency has facility locations. FEMP will then multiply the apportioned electricity usage by the appropriate regional-level carbon emission factor assigned to each State. Once emissions from electricity use are calculated, these will be added to the emissions estimated from the other fuels used by the agency to determine total carbon emissions. (National factors may be appropriately used for fuel oil, natural gas, LPG/propane, coal, and purchased steam.)

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GUIDANCE FOR ESTIMATING GREENHOUSE GAS EMISSIONS ATTRIBUTABLE TO FACILITY ENERGY USE

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How FEMP Will Apportion Electricity Use Across States

In most cases, FEMP will estimate State electricity usage by determining the percentage of facility floor area for the agency and apportioning the reported total electricity use according to that percentage. For the purposes of estimating changes in greenhouse gas emissions over time, FEMP is assuming that floor area can be used as a reasonable proxy to represent the State-level usage pattern for electricity consumption for an agency. FEMP will use historical square footage data for Government-owned buildings from the General Services Administration's Office of Governmentwide Policy, Office of Real Property to determine each State's percentage floor area for each agency. Agencies will be given an opportunity to review these percentages to confirm consistency with their own records and knowledge of facility distribution. If an agency, through its own information systems, can readily obtain floor area data broken out by State, the agency should provide this information to FEMP to determine the apportionment percentages.

Agencies May Provide Electricity Use Data Disaggregated by State

For estimating carbon emissions, the greatest level of accuracy is achieved when an agency has State-specific electricity consumption data readily available, and provides this data to FEMP. FEMP encourages those agencies that can provide State-specific electricity data to do so as part of their annual energy report to DOE. For larger agencies that would find this reporting onerous, the approach outlined in this guidance document is offered as an alternative.

In conclusion, agencies may refine or enhance their emission estimates in two ways:

- Agencies may disaggregate total electricity consumption by the State in which the electricity is consumed (report electricity consumption broken out by State).
- Agencies may report, and receive credit for, special purchases of electricity generated from renewable energy sources as discussed earlier in this guidance document.

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EXHIBIT A
Format for Reporting Green Energy Purchases To Receive Credit Toward Executive Order Goals

PURCHASES OF GREEN ELECTRICITY					Fuel Mix of Electricity Purchase (percent)							
	Annual Consumption	Annual Cost (Thou. \$)	State	All Facilities (Y or N)	Coal	Natural Gas	Oil	Nuclear	Hydro	Biomass	Geo-thermal	Solar/Wind
Elec. Purchase 1	MWH											
Elec. Purchase 2	MWH											
Elec. Purchase 3	MWH											
(Add additional purchases as necessary)												
Total Purchases	MWH											

PURCHASED BIOMASS OR LANDFILL GAS (RENEWABLE ENERGY SOURCES)

	Annual	Annual Cost (Thou.)	State
Gas Purchase 1	Thou. Cu.		
Gas Purchase 2	Thou. Cu.		
Gas Purchase 3	Thou. Cu.		
(Add additional purchases as necessary)			
Total Purchases	Thou. Cu.		

PURCHASED THERMAL ENERGY FROM RENEWABLE ENERGY SOURCES

	Annual	Annual Cost (Thou.)	State
Purchase 1	BBtu		
Purchase 2	BBtu		
Purchase 3	BBtu		
(Add additional purchases as necessary)			
Total Purchases	MWH		

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EXHIBIT B
Carbon Coefficients for Estimating Carbon Emissions

FEMP will use factors derived from data from the Energy Information Administration (EIA) for estimating carbon emissions from non-electric fuels on a nation-wide basis. The regional emissions factors for electricity were calculated by summing the annual EIA data on electricity sales and carbon emissions for each State in a given region. These sums were then used to calculate the regional emissions/kWh (which were then converted to MMTCE/Quad). This value will be used for each State in a particular region.

Non-Electric Fuel National Coefficients
Million Metric Tons of Carbon Equivalent (MMTCE) per Quad
(or Metric Tons of Carbon/Billion Btu)

	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999*	2000*
Fuel Oil	19.95	19.95	19.95	19.95	19.95	19.95	19.95	19.95	19.95	19.95	19.95
Natural Gas	14.47	14.47	14.47	14.47	14.47	14.47	14.47	14.47	14.47	14.47	14.47
LPG/Propane	16.99	16.98	16.99	16.97	17.01	17.00	16.99	16.99	16.99	16.99	16.99
Coal	25.58	25.60	25.62	25.61	25.63	25.63	25.61	25.63	25.63	25.63	25.63
Purchase Steam	35.63	35.63	35.63	35.63	35.63	35.63	35.63	35.63	35.63	35.63	35.63

*Preliminary

Source: EIA's *Emissions of Greenhouse Gases in the United States*, 1998, Tables 11 and B1, DOE/EIA-0573(98), October 1999. The factor for purchased steam is derived from the coefficient for coal adding associated losses for generation and transportation (using a factor of 1.39 to convert site-delivered to primary energy).

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Exhibit B (continued)
Electricity Regional Coefficients
Million Metric Tons of Carbon Equivalent (MMTCE) per Site-Delivered Quad
(or Metric Tons of Carbon/Billion Btu)

	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999*	2000*
AK	49.51	TBD	TBD	TBD	TBD	TBD	TBD	44.66	44.66	44.66	44.66
AL, GA, MS, NC, TN, VA	43.28	TBD	TBD	TBD	TBD	TBD	TBD	45.27	45.27	45.27	45.27
AR, KS, LA, MO, OK	57.92	TBD	TBD	TBD	TBD	TBD	TBD	57.74	57.74	57.74	57.74
AZ, CO, NM	82.50	TBD	TBD	TBD	TBD	TBD	TBD	68.44	68.44	68.44	68.44
CA	15.12	TBD	TBD	TBD	TBD	TBD	TBD	13.42	13.42	13.42	13.42
CT, MA, ME, NH, RI, VT	33.08	TBD	TBD	TBD	TBD	TBD	TBD	32.27	32.27	32.27	32.27
DC, DE, MD, NJ, PA	47.39	TBD	TBD	TBD	TBD	TBD	TBD	43.36	43.36	43.36	43.36
FL	46.61	TBD	TBD	TBD	TBD	TBD	TBD	44.34	44.34	44.34	44.34
HI	61.59	TBD	TBD	TBD	TBD	TBD	TBD	49.47	49.47	49.47	49.47
IA, MN, NE, ND, SD	73.55	TBD	TBD	TBD	TBD	TBD	TBD	66.89	66.89	66.89	66.89
ID, MT, NV, OR, UT, WA, WY	41.83	TBD	TBD	TBD	TBD	TBD	TBD	40.12	40.12	40.12	40.12
IL, WI	44.50	TBD	TBD	TBD	TBD	TBD	TBD	51.37	51.37	51.37	51.37
IN, KY, MI, OH, WV	82.23	TBD	TBD	TBD	TBD	TBD	TBD	77.30	77.30	77.30	77.30
NY	40.59	TBD	TBD	TBD	TBD	TBD	TBD	25.95	25.95	25.95	25.95
TX	55.75	TBD	TBD	TBD	TBD	TBD	TBD	52.42	52.42	52.42	52.42

*Preliminary

Note: Regions match those defined in EIA's Electricity Market Module of the National Energy Modeling System.

Sources: For 1990 generation (for emissions factors): EIA, *Electric Power Annual 1991 Volume II*, Tables 26 and 73, DOE/EIA-0348(98)/2, December 1991 (used 1990 data).

For 1997 generation (for emissions factors): EIA, *Electric Power Annual 1998 Volume II*, Tables 4 and 61, DOE/EIA-0348(98)/2, December 1998 (used 1997 data).

For carbon emissions: EIA, *Electric Power Industry Estimated Carbon Emissions 1990 and 1997*.

Guidance to Federal Agencies for Determining Baseline Water Usage December 2, 1999

Section 207 of Executive Order 13123 states that “through life-cycle cost-effective measures, agencies shall reduce water consumption and associated energy use in their facilities to reach the goals set under section 503(f) of this order.” Section 502(f) and 503(f) direct DOE, in collaboration with other agencies, to provide guidance to assist each agency to determine a baseline of water consumption and to establish water conservation goals for Federal agencies. The two guidance documents below were developed by the Water Conservation Working Group of the Interagency Energy Management Task Force. The technical contact for more information is Stephanie Tanner, National Renewable Energy Laboratory, 202-646-5218.

Background

Executive Order 13123 encourages Federal agencies to reduce costs and implement cost-effective water efficiency improvements at Federal facilities. The Secretary of Energy must provide guidance to assist each agency to determine a baseline of water consumption, and will establish water conservation goals for Federal agencies by June 3, 2000.

Baseline water information will be used to describe total estimated Federal water usage and monitor the impact of future water efficiency improvements. It is likely that available data is incomplete, so an important component of this process will be to assess the existing data, improve the estimation process, and ultimately to collect more complete data on water use at Federal facilities. Agencies are encouraged to focus baseline development efforts on the subset of buildings comprising the majority of water usage.

Baseline Water Usage

Agencies shall establish baseline potable water usage at facilities owned by the United States Government. The baseline year is defined as FY00 (October 1, 1999 through September 30, 2000). Data shall be reported in Million Gallons per Year (MGY). Agencies should use actual data where available, or make a best estimate where actual data are not available.

Facilities Where Actual Data Are Available

Agencies should use data from one or more of the following sources: facility meter(s), the local water/wastewater supplier(s) and/or metered well(s) and spring(s). If multiple data sources are used, care should be taken to not “double count.”

Facilities Where Actual Data Are Not Available

Agencies with facilities where no actual water usage information is available should estimate water usage. If a facility has had a recent water use survey, agencies can use those results to estimate water use. Otherwise, to achieve a reasonable estimate, agencies should, at a minimum:

1. Identify the significant factors which determine water usage, such as number of beds in a hospital, number of prisoners, number of employees and visitors, production units and /or irrigated acreage;
2. Determine the numeric value for those factors;
3. Then, multiply the numeric value by water use indices to be provided by the Federal Energy Management Program. FEMP will provide water use indices for hospital beds,

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GUIDANCE TO FEDERAL AGENCIES FOR DETERMINING BASELINE WATER USAGE

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prisoners, employees, dwelling units, and schools. Agencies with other significant or unusual water usage should contact FEMP for assistance.

Schedule/Reporting

Agencies shall report FY00 water usage to the Department of Energy in their Fiscal Year 2000 annual energy reports. DOE shall provide a reporting format to Federal agencies by June 2000. Federal water usage will thereafter be reported every two years beginning in 2002. Agencies will also report water conservation measures implemented and water saved on an annual basis.

It is anticipated that the total estimated Federal water usage would decrease over time, due to future implementation of water efficiency measures. DOE recognizes that some agencies may have future increases in water usage for legitimate reasons such as changes in numbers of visitors, employees, and production. In the FY 2000 report, agencies should describe those factors that would explain any future increases in water usage. These factors may be similar to those identified in the baseline estimation methodology described above.

Attachments:

Table 1 Water Conversion Chart

Table 2 Draft-Federal Water Use Indices

**Table 1
Water Conversion Chart**

Volume Conversion		
1 gallon (gal)	=	8.34 pounds
1 cubic foot (ft ³)	=	7.47 gallons
1 unit (Ccf)	=	748 gallons
1 acre-foot (AF)	=	325,851 gallons
1 acre-foot (AF)	=	43,560 cubic feet
1 million gallons/day (MGD)	=	1121 acre feet/year
Metric Conversions		
1 acre	=	0.4 hectares
1 gallon	=	3.8 liters
1 cubic foot	=	0.03 cubic meters

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Table 2
Draft-Federal Water Use Indices

Category	User	Unit	Gallons/unit/per day	
			Range	Typical
Commercial	Airport	Passenger	4-5	3
	Apartment house	Person	100-200	100
	Boarding house	Person	25-50	40
	Hotel	Guest	40-60	50
		Employee	8-13	10
	Lodging house and tourist home	Guest	30-50	40
	Motel	Guest	25-40	35
	Motel with kitchen	Guest	25-60	40
	Laundry (self-service)	Machine	400-650	550
	Office	Employee	8-20	15
	Public Lavatory	User	3-6	5
	Restaurant (including toilet)			
	Conventional	Customer	8-10	9
	Short-order	Customer	3-8	8
	Shopping center	Parking Space	1-3	2
		Employee	8-13	10
	Open Space			
	Non-turf	Acre		785
Turf	Acre		1571	
Recreational	Apartment, resort	Person	50-70	60
	Bowling alley	Alley	150-250	200
	Camp			
	Pioneer type	Person	15-30	25
	with toilet and bath	Person	35-50	45
	Day, with meals	Person	10-20	15
	Day, without meals	Person	8-18	13
	Trailer	Trailer	75-150	125
	Campground	Person	20-40	30
	Country club			
		Members	80-125	100
		Employee	10-15	50
	Dormitory (bunk house)	Person	20-45	35
	Fairground	Visitor	1-2	3
	Picnic park with flush toilets	Visitor	5-10	6
	Swimming pool and beach	Customer	5-15	10
		Employee	8-15	10
	Visitor center	Visitor	4-8	5
Institutional	Assembly hall	Seat	2-4	3
	Hospital medical	Bed	130-250	150
		Employee	5-15	10
	Hospital mental	Bed	80-150	120
		Employee	5-15	10
	Prison	Inmate	80-150	120
		Employee	5-15	90
	Rest home	Resident	5-120	90
		Employee	5-15	10
	School day			
	with cafeteria, gym and showers	Student	15-30	25
	with cafeteria only	Student	10-20	15
	without café & gym	Student	5-15	10
School, boarding	Student	50-100	75	

Guidance to Establish Water Efficiency Improvement Goal for Federal Agencies

May 10, 2000

Agencies shall reduce potable water usage by implementing life cycle cost-effective water efficiency programs that include a water management plan, in accordance with Table 2, and not less than 4 separate FEMP Water Efficiency Improvement Best Management Practices (BMP), listed in Table 1. BMPs can be considered implemented at a facility when all the following criteria are met:

1. Water Management Plans have been developed/revised and incorporated into existing facility planning processes and operating plans; and
2. Applicable Operations & Maintenance Options have been put into practice, and Retrofit/Replacement Options have been reviewed within the last 2 years and those appropriate for implementation have been identified; and
3. Applicable cost-effective Retrofit/Replacement Options have been implemented.

The schedule for implementation is as follows:

05% of facilities by 2002
 15% of facilities by 2004
 30% of facilities by 2006
 50% of facilities by 2008
 80% of facilities by 2010

The Department of Energy will review agencies' progress in 2005, and may revise the water efficiency improvement goal at that time. Agencies should also refer to the FEMP web site for information about reporting baseline water consumption and cost.

Table 2 – Facility Water Management Planning Guidelines

Background

A successful water management program starts with development of a comprehensive water management plan. This plan should provide clear information about how a facility uses its water, from the time it is piped onto the facility through its ultimate disposal. Knowing how you currently use water and what it costs will enable you to make the most appropriate water management decisions. This plan should be included with existing facility operating plans.

Implementation

Develop or update facility water management plans to include at a minimum the following:

- 1) Operation and Maintenance (O&M) recommendations. Include appropriate O&M recommendations from the FEMP Best Management Practices in facility operating plans or procedure manuals.
- 2) Utility Information. Appropriate utility information should include the following:
 - a) Contact information for all water and wastewater utilities.
 - b) Current rate schedules and alternative schedules appropriate for your usage or facility type. You want to be sure you are paying the best rate.

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GUIDANCE TO ESTABLISH WATER EFFICIENCY IMPROVEMENT GOAL FOR FEDERAL AGENCIES

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- c) Copies of water/sewer bills for the past 2 years. This will help you identify inaccuracies and determine that you are using the appropriate rate structure.
 - d) Information on financial or technical assistance available from the utilities to help with facility water planning and implementing water efficiency programs. Sometimes energy utilities offer assistance on water efficiency.
 - e) Contact information for the agency or office that pays the water/sewer bills.
 - f) Production information, if the facility produces its water and/or treats its own wastewater.
- 3) Facility information. At a minimum, perform a walk-through audit of the facilities to identify all major water using processes; location and accuracy of water measurement devices; main shut off-valves; verify operating schedules and occupancy of buildings. Because of reporting requirements in Executive Order 13123, facilities should include a description of actions necessary to improve the accuracy of their water usage data. This can include a metering (or other measurement) plan for the facility.
- 4) Emergency response information. Develop water emergency and/or drought contingency plans that will describe how your facility will meet minimum water needs

in an emergency or reduce water consumption in a drought or other water shortage. This should be done in conjunction with your local water supplier.

- 5) Comprehensive Planning. Inform staff contractors and the public of the priority your agency or facility places on water and energy efficiency. Ensure that they take water supply, wastewater, storm water issues and water efficiency BMPs into account at the earliest stages of planning and design for renovation and new construction.

Table 1 – FEMP Water Efficiency Improvement Best Management Practices

Agencies shall implement a water management program that includes not less than four of the following best management practices:

- BMP # 1 – Public Information and Education Programs
- BMP # 2 – Distribution System Audits, Leak Detection & Repair
- BMP # 3 – Water Efficient Landscape
- BMP # 4 – Toilets and Urinals
- BMP # 5 – Faucets and Showerheads
- BMP # 6 – Boiler/Steam Systems
- BMP # 7 – Single-Pass Cooling Systems
- BMP # 8 – Cooling Tower Systems
- BMP # 9 – Miscellaneous High Water-Using Processes
- BMP #10 – Water Reuse and Recycling

Detailed descriptions of the ten BMPs can be downloaded from www.eren.doe.gov/femp/resources/water/draft_docs.html.

Guidance for Preparing the Executive Order 13123 Implementation Plan for FY 2001

The Implementation Plan should be formatted as described below. The format generally follows the outline for the Annual Report. Although the Implementation Plan will be submitted as an attachment to the Annual Report, the Plan should be considered a stand-alone document. Therefore, please do not refer to the Annual Report for Section I, Part A, or for any other part of the Plan that you feel may be redundant with the Annual Report. This Plan should be brief and should describe only activities planned for the next fiscal year.

I. Management and Administration. This section will describe (1) the agency's establishment of an energy management infrastructure and (2) the agency's plans to use management tools in implementing Executive Order 13123.

A. Energy Management Infrastructure

1. **Senior Agency Official.** Identify the agency's senior energy official and describe the official's role and responsibilities.
2. **Agency Energy Team.** Identify the members of the team and describe the team's responsibilities.

B. Management Tools

1. **Awards (Employee Incentive Programs).** Describe the agency's plans to use employee incentive programs to reward exceptional performance in implementing Executive Order 13123.
2. **Performance Evaluations.** Describe agency plans to include successful implementation of provisions of Executive Order 13123 in the position descriptions and performance evaluations of members of the agency energy team and facility/energy managers.

3. **Training and Education.** Describe plans to ensure that all appropriate personnel receive training for energy management requirements. Describe plans to develop and implement agency outreach programs that include education, training, and promotion of ENERGY STAR[®] and other energy efficient products for Federal purchase card users.

4. **Showcase Facilities.** Describe plans to construct or renovate exemplary facilities that the agency plans to designate as Showcase Facilities. Discuss why the facilities will be considered Showcase Facilities (i.e., discuss the facility design, the improvements made in energy or water efficiency, the use of renewable energy, etc.).

II. Implementation Strategies. The purpose of this section is to describe plans to use strategies to reduce energy consumption and improve energy efficiency. It is not expected that each agency will employ every strategy; rather, each strategy identified in Executive Order 13123 is listed as a subsection to remind agency officials of the existence of these strategies and to encourage their use

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GUIDANCE FOR PREPARING THE EXECUTIVE ORDER 13123 IMPLEMENTATION PLAN FOR FY 2001*continued from previous page*

where practical and life-cycle cost effective. If certain strategies will not be used, please explain why not.

- A. Life-Cycle Cost Analysis.** Outline plans to institute procedures to ensure the use of life-cycle cost analysis in making investment decisions about in products, services, construction, and other projects to lower the Federal Government's costs and to reduce energy and water consumption. Report on plans to implement the 10-Year Simple Payback Rule. (Under EPACT, energy conservation projects that will pay back investment costs within 10 years must be undertaken).
- B. Facility Energy Audits.** Describe the number/percentage of agency facilities that will be audited for energy and water efficiency during the next fiscal year. (Approximately 10% of facilities should be audited each year). Describe the prioritization criteria for audits (e.g., oldest facilities, most energy intensive facilities, etc.).
- C. Financing Mechanisms.** Provide narrative information related to the planned use of Energy-Savings Performance Contracts (ESPCs) and Utility Energy Services Contracts (UESCs).
- D. ENERGY STAR® and Other Energy-Efficient Products.** Describe steps to be taken to promote the purchase of ENERGY STAR® products and/or products that are in the upper 25 percent of energy efficiency as designated by FEMP. Note whether energy efficient criteria will be incorporated into all guide specifications and product specifications developed for new construction and renovation. Also note whether such criteria will be incorporated into product specification language. (See the ENERGY STAR® products and "green" products web sites by GSA [www.fss.gsa.gov/environ], DOE [www.eren.doe.gov/femp/procurement/begin.html], and EPA [www.epa.gov/wiseerko/index.html]).
- E. ENERGY STAR® Buildings.** Report the number and percentage of buildings that, in the next fiscal year, are expected to meet the ENERGY STAR® Building criteria and to be officially designated ENERGY STAR® Buildings. (Buildings must rank in the top 25 percent in energy efficiency relative to comparable commercial and Federal buildings to be eligible for the ENERGY STAR® Buildings designation. See www.epa.gov/buildings/label).
- F. Sustainable Building Design.** Report whether sustainable building design principles will be incorporated into the siting, design, and construction of new facilities. (See www.wbdg.org for a description of sustainable building design principles).
- G. Energy Efficiency in Lease Provisions.** Describe how energy and water efficiency will be considered when agencies enter into new leases or renegotiate/extend existing leases (e.g., preference for buildings with sustainable design and development, preference for certified ENERGY STAR® Buildings, etc.).

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- H. Industrial Facility Efficiency Improvements.** Highlight planned activities to explore efficiency opportunities in energy-intensive facilities. This may include activity in the following areas: steam systems, boiler operation, air compressor systems, industrial processes, fuel switching, cogeneration, and other efficiency and renewable energy technologies.
- I. Highly Efficient Systems.** Describe plans for new construction and/or retrofit projects for which combined cooling, heating, and power systems will be installed. Report whether local natural resources will be surveyed to optimize use of available biomass, geothermal, or other naturally occurring energy sources.
- J. Off-Grid Generation.** Describe plans for installing new solar hot water, solar electric, solar outdoor lighting, small wind turbines, fuel cells, and other off-grid alternatives.
- K. Water Conservation.** Highlight activities to be undertaken to improve water efficiency. Discuss plans to develop and implement Water Management Plans and Best Management Practices for efficient use of water (Note: FEMP will issue in July 2000 new guidance entitled *Water Efficiency Improvement Goal for Federal Agencies*. Water Management Plans and Best Management Practices are described in this guidance. The guidance will be available on FEMP's web site [www.eren.doe.gov/femp/aboutfemp/water.html]).

GSA's Model Lease Provisions Required Under Section 505(d)

The General Services Administration has issued the first installment of leasing energy and environmental business practices and solicitations for offers (SFO) language to implement Executive Order 13123.

Section 505(d) of the Order requires GSA to develop model lease provisions that incorporate provisions for energy efficiency and sustainable design. Specifically, the Order requires that agencies:

“shall incorporate lease provisions that encourage energy and water efficiency wherever life-cycle cost-effective. Build-to-suit lease solicitations shall contain criteria encouraging sustainable design and development, energy efficiency, and verification of building performance. Agencies shall include a preference for buildings having the ENERGY STAR® building label in their selection criteria for acquiring leased buildings. In addition, all agencies shall encourage lessors to apply for the ENERGY STAR® building label and to explore and implement projects that would reduce costs to the Federal Government, including projects carried out through the lessors' Energy-Savings Performance Contracts or utility energy-efficiency service contracts.”

In response to the requests of EO 13123, GSA's Public Buildings Service developed *Energy, Environmental, and Sustainable Design Business Practices for Lease Acquisitions and Standard SFO Paragraphs*.

The complete acquisition can be found on the GSA Web site at <http://hydra.gsa.gov/pbs/pe/green-lease.htm>.

The “Whole Building Design Guide” Meets Requirements Stated in Executive Order 13123 Guidance Documents

Section 505(a) of Executive Order 13123, *Greening the Government Through Efficient Energy Management*, requires the General Services Administration to issue guidance to assist agencies in ensuring that all cost and budget activities for design, construction, and renovation are life-cycle costs. This guidance can be found in the “Whole Building Design Guide,” which is located at www.wbdg.org. The “Whole Building Design Guide” also contains information regarding sustainable design and development principles for new construction, as instructed in Section 504 of the Executive Order. The “Whole Building Design Guide” is a complete Internet resource to a wide range of building-related design guidance, criteria and technology.

Executive Order 13123 directs Federal agencies to apply the principles of Sustainable Design to the siting, design, and construction of new facilities. The Executive Order also directs agencies to optimize life-cycle costs, reduce pollution prevention and other environmental and energy costs associated with the construction, life-cycle operation, and decommissioning of facilities.

The “Whole Building Design Guide” reminds us that sustainability is a mode of thinking and acting responsibly. The basic objectives of sustainability are to:

1. Reduce the consumption of energy, land, and other nonrenewable resources.
2. Minimize the waste of materials, water, and other limited resources.
3. Create livable, healthy, and productive environments.

The essential principles of Sustainable Design and Development can be organized into the following categories:

- Site,
- Energy,
- Materials,
- Water,
- Indoor Environmental Quality (IEQ), and
- Operations & Maintenance (O&M).

Sustainable Design and Development is a comprehensive strategy to create buildings, facilities and infrastructure that minimize the use of resources and reduce harmful effects on the environment. It is an integrated, synergistic approach in which all phases of the facility life-cycle are considered. The result is an optimal balance of cost, environmental, societal and human benefits while meeting the mission and function of the intended facility or infrastructure. In general terms, “reduce, reuse and recycle” are its key strategies.

The “Whole Building Design Guide” tells us that incorporating sustainable features in facilities need not lead to higher initial cost. For example, Federal agencies have completed buildings that consume between 30 percent and 50 percent less energy than traditional structures at minimal or no additional cost.

Sustainable Design and Development supports an increased commitment to environmental stewardship and conservation. It also provides a critical framework for the evaluation of all new Federal facilities and for the major renovation and alteration of existing Federal buildings and facilities.

**U.S. DEPARTMENT OF ENERGY
FEDERAL ENERGY MANAGEMENT PROGRAM, EE-90
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