

DEPARTMENT OF ENERGY
FY 2003 CONGRESSIONAL BUDGET REQUEST
ENERGY EFFICIENCY AND RENEWABLE ENERGY
ENERGY CONSERVATION
(Tabular Dollars in Thousands, Narrative in Whole Dollars)

BUILDING TECHNOLOGY, STATE, AND COMMUNITY SECTOR
PROGRAM MISSION

Mission: In partnership with industry and government, the Office of Building Technology, State, and Community Programs (BTS) develops, promotes, and integrates energy technologies and practices that make buildings more efficient, productive, and affordable.

The BTS research and development portfolio as well as the BTS demonstration and deployment activities directly address the increasing U.S. energy security concern of our national energy supply infrastructure being vulnerable to natural or man-made failures, as well as attenuating the spikes of fluctuating energy prices and the resulting energy trade deficits. By developing cost-effective building energy efficiency technologies, BTS programs can significantly contribute to reducing these vulnerabilities in the future:

- BTS's portfolio reduces the amount of oil and gas required for domestic and commercial building uses, and for electricity generation
- BTS addresses the reliability of the energy supply system and its ability to rebound from adverse events by reducing the demand for peak electricity, and facilitating the buildings integration of distributed generation systems.

The Office of Building Technology, State and Community Programs FY 2003 Budget Request reflects the pressing energy efficiency needs of the buildings sector, while responding to the Administration's National Energy Policy (NEP) and in particular recommendations that improved conservation and energy efficiency be established as a national priority¹.

One of the most critical issues identified in the NEP is the energy supply-demand imbalance, with a particular focus on the expected growth in peak electricity demand and resulting price spikes. Buildings consume 2/3 of U.S. electricity generated, and therefore changes in building energy consumption will have a major impact on the need for added electric generating capacity in the coming years. Building efficiency improvements can reduce this need. The economic impact is enormous, costing energy buyers \$240 billion annually. Buildings in existence today will represent over 2/3 of the buildings that will exist in 2010. Improvements in energy utilization in existing buildings and in new

¹ The BTS budget request reflects the NEP discussions in the Overview (Pages ix, xi-xii.), Chapter One: Taking Stock (Pages 1-3 to 1-4.), Chapter Two: Striking Home (Pages 2-1 to 2-5), Chapter Three: Protecting America's Environment (Pages 3-1, 3-5 to 3-7.), Chapter 4: Using Energy Wisely (Pages 4-1 to 4-5, 4-6 to 4-8).

construction can help alleviate pressure on the energy supply system in the near-, mid-, and long-term. In addition, the NEP has a special focus on the energy needs of low-income households and proposes an increase in Weatherization Assistance funding.

Table 1: NEP Recommendations:

NEP Recommendation	BTS Program which Addresses
<p>The NEPD Group recommends that the President increase funding for the Weatherization Assistance Program by \$1.2 billion over ten years. This will roughly double the spending during that period on weatherization. Consistent with that commitment, the FY 2003 Budget includes a \$47.1 million increase over 2002. The Department of Energy will have the option of using a portion of those funds to test improved implementation approaches for the weatherization program.</p>	<p>- Weatherization program</p>
<p>The NEPD Group recommends that the President direct the Secretary of Energy to conduct a review of current funding and historic performance of energy efficiency research and development programs in light of the recommendations of this report. Based on this review, the Secretary of Energy is then directed to propose appropriate funding of those research and development programs that are performance-based and are modeled as public-private partnerships.</p>	<p>- Residential Integration Program - Commercial Integration Program - Equipment, Materials, & Tools Program</p>
<p>The NEPD Group recommends that the President direct the Secretary of Energy to promote greater energy efficiency.</p> <ul style="list-style-type: none"> • Expand the Energy Star program beyond office buildings to include schools, retail buildings, health care facilities, and homes. • Extend the Energy Star labeling program to additional products, appliances, and services. • Strengthen Department of Energy public education programs relating to energy efficiency. 	<p>- Energy Star Program - Community Energy Program</p>
<p>The NEPD Group recommends that the President direct the Secretary of Energy to improve the energy efficiency of appliances.</p> <ul style="list-style-type: none"> • Support the appliance standards program for covered products, setting higher standards where technologically feasible and economically justified. • Expand the scope of the appliance standards program, setting standards for additional appliances where technologically feasible and economically justified. 	<p>- Equipment, Materials, & Tools Program</p>

NEP Recommendation	BTS Program which Addresses
<p>The NEPD Group recommends that the President direct the Secretary of Energy to establish a national priority for improving energy efficiency. The priority would be to improve the energy intensity of the U.S. economy as measured by the amount of energy required for each dollar of economic productivity. This increased efficiency should be pursued through the combined efforts of industry, consumers, and federal, state, and local governments.</p>	<p>- All BTS Programs</p>
<p>The NEPD Group recommends that the President direct the EPA Administrator to develop and implement a strategy to increase public awareness of the sizable savings that energy efficiency offers to homeowners across the country. Typical homeowners can save about 30 percent (about \$400) a year on their home energy bill by using Energy Star-labeled products.</p>	<p>- Energy Star Program - Community Energy Program</p>
<p>The NEPD Group recommends that the President direct federal agencies to support continued research into global climate change; continue efforts to identify environmentally and cost-effective ways to use market mechanisms and incentives; continue development of new technologies; and cooperate with allies, including through international processes, to develop technologies, market-based incentives, and other innovative approaches to address the issue of global climate change.</p>	<p>- Residential Integration Program - Commercial Integration Program - Equipment, Materials, & Tools Program</p>

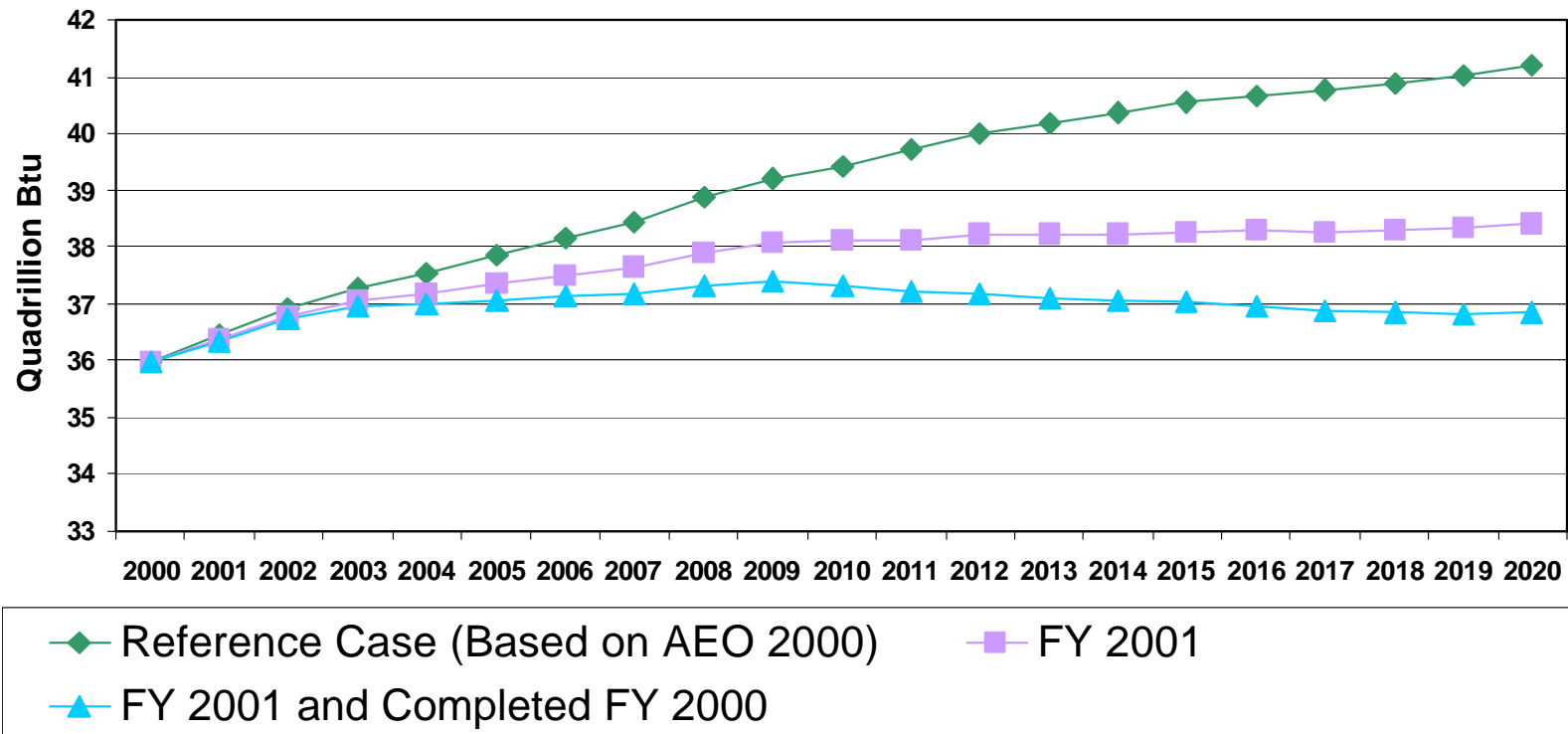
Context: Residential and commercial buildings consumed 36 percent of the nation’s energy in 1999 and utilize almost two-thirds of all the electricity generated. The growth in the economy, as well as the nation’s rising population is leading to more, larger, and better equipped homes and commercial buildings, resulting in increasing energy consumption in this sector. Introduction of new energy efficiency technology can have significant economic and environmental benefits. The production of energy consumed in buildings, primarily electricity, represents a major source of acid rain, smog, and greenhouse gas emissions, and includes 47 percent of U.S. sulfur dioxide emissions, 22 percent of nitrogen oxide emissions, and 35 percent of carbon dioxide emissions. In terms of economic impact, Americans spend approximately one-quarter trillion dollars per year to heat, cool, light and operate appliances and other equipment in buildings.

The majority of BTS’ R&D activities are in the area of fundamental technology, efforts that are in our nation’s interest but are too risky or long-term to be conducted by the private sector. In addition to excessive risk, there are a number of other market factors which retard building energy efficiency R&D investments: fragmentation of the industry, first-costs vs. life-cycle costs, lack of builder and consumer information, lack of incentives in the market, compartmentalization of the building professions, designers, and developers, cost pass-through to consumers, etc.

Strategic Approach: BTS has identified six portfolio strategies to achieve its mission:

- 1) Accelerate the introduction of highly-efficient technologies and practices through research and development.
- 2) Increase minimum efficiency levels of buildings and equipment through codes, standards, and guidelines.
- 3) Use of energy efficiency and renewable energy technologies and practices through technology transfer and financial assistance.
- 4) The programs use an integrated approach to energy efficiency, one that takes into account the complex and dynamic interactions between a building and its environment, among a building's energy systems, and between a building and its occupants. This "whole buildings" approach has achieved energy savings of 20 to 30 percent beyond those obtainable by focusing solely on individual building components, such as energy-efficient windows, lighting, and water heaters.
- 5) Modernize the R&D portfolios to ensure that the most promising, to include revolutionary, technologies and techniques are being explored, and align the Residential and Commercial Integration programs to an interim vision of zero net energy buildings.
- 6) Appropriately exit those technologies which are sufficiently mature or proved to the marketplace, and by closing efforts that investigations prove to be technically or economically infeasible ("off ramps").

Building Energy Expenditures to Increase Significantly Without BTS Programs



Management Strategy: Partnerships and cost share arrangements with industry, academia, and government entities underlie most of the programs' successes. By bringing together relevant stakeholders, BTS is able to build the critical mass necessary to overcome many of the barriers to building advances. Chief among these barriers is the fragmentation of the design, construction, materials, and equipment manufacturers and building operation and maintenance industries, making it difficult to reach a consensus on new technologies or coordinate efforts on concepts like whole building design. Integral to implementing BTS' plan are four integral ways of doing business: a customer-focused, team-based organization for greater accountability and improved results; collaboratively developed technology roadmaps to provide for a more integrated, customer driven R&D portfolio; greater competition in project solicitations to increase the innovation and broaden research participation; and increased peer review to assure our science is sound.

R&D Investment Criteria: As part of the President's Management Agenda, BTS applied the White House-developed objective investment criteria for funding federal R&D projects. These criteria helped focus BTS' R&D portfolio on technologies that address national energy policy goals, provide clear public benefits, and would not be developed by the private sector alone. The application of this criteria addressed the need for performance-based public-private partnerships, well-defined comprehensive program plans, and clear "off ramps" or termination points.

Long-Term Program Goals and Benefits: BTS programs contribute to continuously improving energy efficiency and by **2010:**

- Save families and businesses \$12 billion in energy bills by displacing about 2 quads of energy use per year, equal to the current amount of energy used in buildings in North Carolina per year.
- Develop market-ready building design strategies to reduce new building energy use by 50 percent compared to 1996 levels.
- Develop market-ready building retrofit strategies to reduce energy use in existing buildings by 20 percent compared to 1996 levels.

By **2020**, BTS will foster the displacement of approximately 5 quads of energy, saving consumers and businesses approximately \$30 billion annually.

Benefits:

BTS activities improve building quality (energy efficient buildings are usually more comfortable and have lower levels of indoor air pollution), reduce construction wastes, and help revitalize the communities they serve. These results strongly support the EERE/DOE goal of increasing the efficiency of the energy system and help put U.S. building industry firms in a stronger position to compete in rapidly growing international buildings-technology markets.

Program Strategic Performance Goal (PSPG) ER1-1 Residential Buildings Integration

R & D activities will provide the energy technologies and solutions that will catalyze a 20 percent increase in the energy efficiency of both new and existing prototype residential buildings by 2008 relative to the 1996 baseline.

Program Strategic Performance Goal (PSPG) ER1-2 Commercial Buildings Integration

R & D activities will provide the energy technologies and solutions that will catalyze a 15 percent increase in the energy efficiency of both new and existing prototype commercial buildings by 2008 relative to the 1996 baseline.

Program Strategic Performance Goal ER1-3: Equipment, Tools, and Materials

Introduce 5 new ready-for-transition-to-market products by 2008 through component and tool R & D activities; issue 13 formal proposals for enhanced product standards and test procedures by 2009.

Program Strategic Performance Goal (PSPG) ER3-1 The Weatherization Assistance Program

Will complete weatherization upgrades for 770,900 low-income households through 2008.

Program Strategic Performance Goal (PSPG) ER1-4 Community Energy Program

Will retrofit an additional 400 million square feet of commercial and public/institutional space through Rebuild America activities, educate 20 million more consumers through delivery of appropriate energy conservation information, and achieve adoption of upgraded model residential and commercial building energy codes in 20 additional States between 2003 and 2008.

Program Strategic Performance Goal (PSPG) ER1-5 State Energy Program

Will Award 280 grants to 56 States and Territories by 2008 to undertake energy technology activities appropriate for states' implementation.

Program Strategic Performance Goal ER1-6: Energy Star

Will achieve a 65 percent market share for ENERGY STAR windows and a 20 percent market share for ENERGY STAR appliances by 2010, compared with approximately 40 percent and 13 percent respectively in 1999.

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 (Dollars in Thousands)

BUILDING TECHNOLOGY, STATE, AND COMMUNITY SECTOR

PROGRAM FUNDING PROFILE

Program Activity	FY 2001 Comparable Appropriation	FY 2002 Comparable Appropriation	FY 2003 Request	\$ Change	% Change
Building Research and Standards					
Technology Road Maps and Competitive R&D	\$ 6,761	\$ 6,857	\$ 2,357	\$ -4,500	-65.6%
Residential Buildings Integration	\$ 11,917	\$ 12,478	\$ 13,478	\$ 1,000	8.0%
Commercial Buildings Integration	\$ 4,505	\$ 4,510	\$ 5,010	\$ 500	11.1%
Equipment, Materials, and Tools	\$ 39,679	\$ 38,547	\$ 31,718	\$ -6,829	-17.7%
Subtotal, Building Research and Standards	\$ 62,862	\$ 62,392	\$ 52,563	\$ -9,829	-15.8%
Building Technology Assistance					
Weatherization Assistance Program	\$ 152,664	\$ 230,000	\$ 277,100	\$ 47,100	20.5%
State Energy Program	\$ 37,916	\$ 45,000	\$ 38,798	\$ -6,202	-13.8%
Community Energy Program	\$ 17,805	\$ 18,788	\$ 20,037	\$ 1,249	6.6%
Energy Star Program	\$ 2,169	\$ 3,000	\$ 6,200	\$ 3,200	106.7%
Subtotal, Building Technology Assistance	\$ 210,554	\$ 296,788	\$ 342,135	\$ 45,347	15.3%

Program Activity	FY 2001 Comparable Appropriation	FY 2002 Comparable Appropriation	FY 2003 Request	\$ Change	% Change
Cooperative Programs with the States	\$ 1,964	\$ 2,000	\$ 0	\$ -2,000	-100.0%
Energy Efficiency Science Initiative	\$ 3,828	\$4,000 ^b	\$ 0	\$ -4,000	-100.0%
Management and Planning	\$ 14,133	\$ 15,090	\$ 14,093	\$ -997	-6.6%
TOTAL	\$ 293,341	\$ 380,270	\$ 408,791	\$ 28,521	7.5%

Summary

Operating Expenses	\$ 293,341	\$ 380,270	\$ 408,791	\$ 28,521	7.5%
Total Program	\$293,341^a	\$380,270^c	\$408,791^d	\$ 28,521	7.5%

Staffing (FTEs)	Actual	Budgeted	Budgeted
HQ FTEs	75	76	73
Total FTEs	75^{e/}	76	73

Authorizations:

- P.L. 94-163, "Energy Policy and Conservation Act" (EPCA) (1975)
- P.L. 94-385, "Energy Conservation and Production Act" (ECPA) (1976)
- P.L. 95-91, "Department of Energy Organization Act" (1977)
- P.L. 95-618, "Energy Tax Act of 1978"
- P.L. 95-619, "National Energy Conservation Policy Act" (NECPA) (1978)

P.L. 95-620, "Power plant and Industrial Fuel Use Act of 1978"

P.L. 96-294, "Energy Security Act" (1980)

P.L. 100-12, "National Appliance Energy Conservation Act of 1987"

P.L. 100-615, "Federal Energy Management Improvement Act of 1988"

P.L. 102-486, "Energy Policy Act of 1992"

a/ Reflects adjustment of \$-651,000 for Omnibus Rescission, P.L. 106-554. Also reflects comparability adjustment of \$-21,450,000 for the new Power Technologies Program; reflects SBIR/STTR Comparable Adjustments made for Appropriations transfer 01-R-02 to Science for SBIR

b/ Does not reflect FY 2002 Interior and Related Agencies Appropriation (P.L. 107-63) language directing that 50 percent of Energy Efficiency Science Initiative funds for FY 2002 (\$2,000,000) and beyond shall be made available to the DOE Fossil Energy Research and Development account.

c/ FY 2002 SBIR/STTR estimate of \$1,896 based upon prior experience.

d/ FY 2003 SBIR/STTR estimate of \$1,657 based upon prior experience.

e/ For comparability with FY 2002 and FY 2003 columns, budgeted FY 2001 FTE is 81.

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SUMMARY OF CHANGES

BUILDING TECHNOLOGY, STATE, AND COMMUNITY SECTOR

	FY 2003 Request
FY 2002 Enacted	\$ 380,270
Non-Discretionary	
- Increase for Federal Pay Raise and Locality Pay	175
	\$ 380,445
<u>Building Research and Standards:</u>	
- Technology Road Maps and Competitive R&D - Assists research programs in implementing technology road maps and eliminate funding for Competitive R&D	-4,500
- Residential Buildings Integration - Increases the number of new highly resource-efficient homes constructed in 2003, improves efforts to address existing homes, and helps expand EERE technologies and practices beyond buildings in 10% - 20% of existing 330 partnerships.	+1,000
- Commercial Buildings Integration - Expand Indoor Environmental Quality R&D, increasing to 3-5 cost-shared new building projects and new R&D activities.	+500
- Equipment, Materials and Tools - Increases for Lighting R&D and Lighting and Appliance Standards; decreases for Space Conditioning and Refrigeration, Appliances and Emerging Technologies, Building Envelope, and Analysis Tools and Design Strategies.	-6,829

Building Technology Assistance:

-	Weatherization Assistance Program - Increase will weatherize 18,000 additional homes.	+47,100
-	State Energy Program.- Decrease due to proposed reduction in State Grants	-6,202
-	Community Energy Program - Increases to develop a comprehensive training program to transfer Building America lessons learned to home builders in 5 of the 10 fastest growing markets for home construction, to expand into healthcare, grocery, and restaurant facilities, to incorporate energy efficiency into university building design courses, and to assist in building new energy efficient schools..	+1,249
-	Energy Star Program - Increase expands energy awareness programs as recommended by the NEP, including increasing market share for Energy Star appliances and windows and adding water heaters by 2003 and commercial HVAC equipment by 2005.	+3,200

Cooperative Programs with States:

-	Due to funding priorities in other program activities there is no funding requested for FY 2003	-2,000
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Energy Efficiency Science Initiative:

-	Due to funding priorities in other program activities there is no funding requested for FY 2003	-4,000
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Management and Planning:

-	Program Direction decreases by three FTE, reflecting change in project missions and scope.	-1,172
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	FY 2003 Congressional Budget Request.	<u>\$ 408,791</u>
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BUILDING TECHNOLOGIES
BUILDING TECHNOLOGY, STATE AND COMMUNITY SECTOR
(dollars in thousands)

BUILDING RESEARCH AND STANDARDS

I. Mission Supporting Goals and Objectives

Mission: The Building Research and Standards (BRS) program develops, implements, and coordinates R&D that improves the energy efficiency of building components, and then uses system design and regulatory activities to integrate these technologies and improved design techniques into building energy systems.

Summary: Buildings Research and Standards is comprised of three EERE programs: the Residential Buildings Integration Program, the Commercial Buildings Integration Program, and the Equipment, Materials, and Tools Program, supported by Technology Road Maps & Competitive R&D activities. The Residential Integration Program improves the energy efficiency in new and existing homes through R&D, demonstrations, and regulatory strategies. The Commercial Buildings Integration Program works with competitively selected industry groups on cost-shared projects that accelerate the development and adoption of new building technologies and practices, and conducts regulatory activity focusing on commercial building codes. The Equipment, Materials, and Tools Program promotes the widespread adoption of energy-efficient products and technologies in both residential and commercial buildings through both R&D and regulatory activities. The Technology Road Maps & Competitive R&D activities are used to inform and guide the three referenced programs.

Context: The Residential Buildings Integration Program directly supports NEP Recommendations for increased energy efficiency. The program will re-compete the Building America consortia to enable reinvigoration of the public-private partnership program and to initiate an expanded “whole-building” focus on existing homes. The request will add 20 new partners, and allows work in three community scale developments.

The Residential Buildings Integration Program addresses the energy efficiency issues for the market of approximately 1.3 million annual new housing starts and in the 80 million existing homes. The Commercial Integration Program addresses the \$640 billion annual capital construction that should all be energy efficient. The Equipment, Materials, and Tools Program addresses the multitude of building components such as lighting, building envelope technologies including advanced windows, and new designs for appliances, that will increase the energy efficiency of buildings and improve building performance, and also develops, promulgates, and enforces test procedures and

energy conservation standards for residential appliances and certain commercial equipment, under the Energy Policy and Conservation Act, as amended (EPCA).

The Commercial Buildings Integration Program directly supports NEP Recommendations for improved energy efficiency. Commercial Building Integration also increases public-private partnerships through cost-shared R&D projects (5 to 7 projects) with mid- to long-term results, and through near-term technical assistance to high profile commercial construction projects to showcase performance-based building excellence.

The Equipment, Materials, and Tools Program directly supports NEP Recommendations for increased energy efficiency and Global Climate Change mitigation by focusing on technologies that can be utilized in new and existing homes to reduce peak and baseload electricity demand (e.g. efficient compressor replacements). The Roadmap activity will better synchronize BTS R&D agenda with private sector and other public sector participants.

Management Strategy: The Building Research and Standards programs address components and equipment technology development and building design strategies to reduce overall energy needs and improve the quality of building services. This “whole buildings” approach allows builders to simultaneously reduce construction and energy costs and helps build energy systems that deliver the proper amount of service (e.g., heating, cooling, lighting, etc.) where needed. The approach also identifies ways that systems can work harmoniously to provide increased energy and construction savings.

Program Strategic Performance Goals

ER1-1: Residential Buildings Integration

R & D activities will provide the energy technologies and solutions that will catalyze a 20 percent increase in the energy efficiency of both new and existing prototype residential buildings by 2008 relative to the 1996 baseline.

Performance Indicators

- Number of technological solutions developed, researched, and evaluated.
- Number of project and demonstration homes developed in the *Building America* program.
- Number of building code change proposals developed and adopted.
- Number of upgrades of Federal Building Codes issued.

Annual Performance Results and Targets

FY 2001 Results	FY 2002 Target	FY 2003 Proposed Target
<ul style="list-style-type: none"> ● With <i>Building America</i> Partners, completed 3,000 energy-efficient, environmentally-sound high performance homes. ● Developed and submitted 1 major code change package for 2003 International Energy Code Council, which would result in 5-10% energy savings relative to pervious versions, and more importantly, improves the “usability” of the code. 	<ul style="list-style-type: none"> ● Increase knowledge base of residential construction industry by pursuing 6 lines of research investigations focusing on industry identified priorities, e.g. low cost moisture protection, right sized HVAC designs, super efficient distribution systems, etc.. ● Complete at least 850 highly resource-efficient, cost-effective homes through the <i>Building America</i> consortia, bringing the total number of homes built through the program to more than 4,500. ● Publish 1 proposal for upgrade to Federal Residential Building codes. 	<ul style="list-style-type: none"> ● Increase industry cost-shared contributions to research investigations of the most promising technological solutions considering regional and housing type differences, and the extent of previous research to 10%. ● Complete at least 800 highly resource-efficient, cost-effective homes through the <i>Building America</i> consortia, bringing the total number of homes built through the program to more than 5,300. ● Expand focus and resources on the needs of existing residential buildings ● Issue 1 upgrade to Federal Residential Building codes

ER1-2: Commercial Buildings Integration

R & D activities will provide the energy technologies and solutions that will catalyze a 15 percent increase in the energy efficiency of both new and existing prototype commercial buildings by 2008 relative to the 1996 baseline.

Performance Indicators

- Numbers of commercial building designs that include consideration of energy efficiency.
- Number of industry cost shared projects
- Number of building code change proposals developed and adopted.
- Number of upgrades of Federal Building Codes issued.

Annual Performance Results and Targets

FY 2001 Results	FY 2002 Target	FY 2003 Proposed Target
<ul style="list-style-type: none"> • Developed and submitted 1 major code change package for 2003 International Energy Code Council which would result in 5-10% energy saving relative to previous versions, and more importantly, improves the “usability” of the code. 	<ul style="list-style-type: none"> • Establish 1 High Performance Buildings Roadmap implementation framework leading to the goal of 30% more energy efficient new commercial construction compared to 1996 standard practice. • Publish 1 proposal for upgrade to Federal Commercial Building codes 	<ul style="list-style-type: none"> • Facilitate a 10% increase in commercial building designs that have meaningful consideration of energy efficiency by developing improved design tools including code compliance tools and completing six research assisted design case studies in cooperation with industry. • Issue 1 upgrade to Federal Commercial Building codes

Program Strategic Performance Goal ER1-3: Equipment, Tools, and Materials

Introduce 5 new ready-for-transition-to-market products by 2008 through component and tool R & D activities; issue 13 formal proposals for enhanced product standards and test procedures by 2009.

Performance Indicators

- Products ready for transition to market
- Product standards and test procedures proposed

Annual Performance Results and Targets

FY 2001 Results	FY 2002 Target	FY 2003 Proposed Target
<ul style="list-style-type: none"> • Issued 3 proposals for upgrades and 3 upgrades to appliance standards and test procedures. • Developed 1 detailed research plan and produced 1 market assessment for solid state lighting for general illumination. • Completed one-dimensional hygrothermal model completed and issued via DOE web site for consumer use. • WINDOW 5 released and approved by NFRC; algorithms adopted as International Standards Organization (ISO) standard 	<ul style="list-style-type: none"> • Issue 2 proposals for upgrades and five upgrades to appliance standards and test procedures. • Refine the R&D planning documents for solid state lighting. • Complete investigation of barriers to wide spread use of lighting controls for energy efficiency purposes. • Complete investigation of 4 methods to increase the optimum selection of equipment components for air conditioning and heat pumps. • Construct two-dimensional hygrothermal model and continue material property measurements. 	<ul style="list-style-type: none"> • Issue 4 proposals for upgrades to appliance standards and test procedures. • Implement research plan for development of practical and efficient solid-state devices for general illumination. • Develop 1 lighting control system that can reliably be utilized to reduce peak demand loads while minimizing the disruption to occupants. • Complete investigation of 5 methods to increase the optimum selection of equipment components for air condition and heat pumps. • Field test 3 approaches to retrofit space conditioning systems in existing homes to improve efficient. • Complete development of the two-dimensional hygrothermal model and material property measurements.

FY 2001 Results	FY 2002 Target	FY 2003 Proposed Target
<ul style="list-style-type: none"> • Completed development and beta testing of Version 1.0 of EnergyPlus and release Version 1.0 for general use Planned, developed, and tested new simulation capabilities within SPARK Version 2.0 • Completed Phase I field demonstrations of heat pump water heaters, with utility partners. 	<ul style="list-style-type: none"> • Implement and improve WINDOW 5 for NFRC production runs; train and support NFRC simulators • Begin development and testing of Energy Plus Version 1.1. Release Version 2.0 (final version) of SPARK • Conclude field demonstrations of heat pump water heaters, with utility partners. 	<ul style="list-style-type: none"> • Complete WINDOW 5.2, for basic retrofit product - NFRC rating & labeling- begin algorithm development for complex retrofit/new products and high performance products • Release EnergyPlus Version 1.1 building energy efficiency design tool

Significant Accomplishments and Program Shifts

Technology Road Maps and Competitive R&D

The road mapping process is a fundamental component of the BTS Strategic Plan and will help align government resources with the high-priority needs identified by industry. The road maps will guide cooperation among public and private researchers, State and Federal programs, and others involved in helping to achieve the technology goals.

Residential Buildings Integration Program

In partnership with homebuilders, industry, States, and communities, the Residential Buildings Integration Program improves the energy efficiency in new and existing homes through R&D, demonstrations, and regulatory strategies. A significant element of the BTS R&D program is making homes more energy efficient and environmentally sound at little or no additional cost. Increased energy efficiency is achieved through *Building America*, BTS' partnership with industry to jointly fund, develop, demonstrate, and deploy housing that integrates energy-efficient technologies and practices. *Building America* employs such strategies as improved design techniques that greatly reduce thermal leakage through the building envelope, or improved insulation and windows whose costs are offset by resulting reductions in the size of required space-conditioning equipment. These new homes save consumers money, are more environmentally benign, and provide more comfortable living space. *Building America* will begin developing and testing system integration and whole-house design that can be applied to the 80 million existing homes in the country. In addition, BTS will coordinate with the Power Technologies Program to develop residential whole buildings approaches that will enable the cost-effective design, construction, and operation of net-zero-energy buildings. Regulatory activities will focus on updating the International Energy Code Council's (IECC) residential building code and also develop and promulgate final energy efficiency standards for Federally-owned residential buildings. The Residential Building Integration Program will align to the vision of "zero net energy residential buildings."

Benefits

In addition to the energy savings, which have national security implications, and associated environmental benefits, the Residential Buildings Integration Program will improve the indoor environmental quality, durability, and affordability of homes. This program also will improve exterior environmental quality by reducing construction waste by 50%.

Commercial Buildings Integration Program

Late in FY 2002, Commercial Buildings Integration will begin emulation of the public/private partnership successes of the residential buildings-oriented *Building America* Program. Accordingly, the Commercial Buildings Integration program works with competitively solicited industry groups on cost-shared research assistance on new building projects that accelerate the development and adoption of new

building technologies and practices. Regulatory activity will focus on updating the International Energy Code Council's commercial building code and final energy efficiency standards for Federally-owned commercial buildings. The Commercial Buildings Integration Program will align to the vision of "zero net energy commercial buildings."

Benefits

In addition to the energy savings, which have national security implications, and associated environmental benefits, the Commercial Buildings Integration Program will improve indoor environmental quality, durability, economic return, and productivity of workers using the buildings.

Equipment, Materials, and Tools Program

In collaboration with industry and other stakeholders, the Equipment, Materials, and Tools Program promotes the widespread adoption of energy-efficient products and technologies in both residential and commercial buildings through a balanced program of R&D and regulatory activities.

The Program collaborates with industry to conduct R&D on building components such as innovative lighting, building envelope technologies such as advanced windows, and new designs for appliances, that will increase the energy efficiency of buildings and improve building performance. The Program works with other EERE sectors on crosscutting R&D initiatives in the area of combined cooling, heat, and power systems for buildings.

The Equipment, Materials, and Tools Program also develops, promulgates, and enforces test procedures and energy conservation standards for residential appliances and certain commercial equipment, under the Energy Policy and Conservation Act, as amended (EPCA). In 1996, DOE initiated a more transparent and collaborative process for setting energy conservation standards for appliances, which has been successful in reaching consensus agreements on standards for fluorescent lamp ballasts and clothes washers. Based on this process, DOE has been able to accelerate the rulemakings for these products and include provisions to reduce manufacturers' burdens and provide further benefits to consumers.

Benefits

To date, the 12 appliance standards developed by DOE have saved consumers over \$25 billion in cumulative electricity costs.

II. A. Funding Table: BUILDING RESEARCH AND STANDARDS

Program Activity	FY 2001 Comparable Appropriation	FY 2002 Comparable Appropriation	FY 2003 Request	\$ Change	% Change
Technology Road Maps and Competitive R&D					
Road Maps	\$ 1,632	\$ 797	\$ 2,297	\$ 1,500	188.2%
Competitive R&D	\$ 4,785	\$ 6,000	\$ 0	\$ -6,000	-100.0%
Tech/Program Management Support	\$ 344	\$ 60	\$ 60	\$ 0	0.0%
Subtotal, Technology Road Maps and Competitive R&D	\$ 6,761	\$ 6,857	\$ 2,357	\$ -4,500	66.6%
Residential Buildings Integration					
Research and Development (Building America) .	\$ 11,271	\$ 11,843	\$ 12,843	\$ 1,000	8.4%
Residential Building Energy Codes	\$ 574	\$ 590	\$ 590	\$ 0	0.0%
Tech/Program Management Support	\$ 72	\$ 45	\$ 45	\$ 0	0.0%
Subtotal, Residential Buildings Integration	\$ 11,917	\$ 12,478	\$ 13,478	\$ 1,000	8.0%
Commercial Buildings Integration					
Research and Development	\$ 3,800	\$ 3,954	\$ 4,454	\$ 500	12.6%
Commercial Building Energy Codes	\$ 680	\$ 541	\$ 541	\$ 0	0.0%
Tech/Program Management Support	\$ 25	\$ 15	\$ 15	\$ 0	0.0%
Subtotal, Commercial Buildings Integration	\$ 4,505	\$ 4,510	\$ 5,010	\$ 500	11.1%

Program Activity	FY 2001 Comparable Appropriation	FY 2002 Comparable Appropriation	FY 2003 Request	\$ Change	% Change
Equipment, Materials, and Tools					
Lighting Research and Development	\$ 5,994	\$ 5,794	\$ 7,294	\$ 1,500	25.9%
Space Conditioning and Refrigeration R&D	\$ 5,015	\$ 5,754	\$ 3,054	\$ -2,700	-46.9%
Appliances and Emerging Technologies	\$ 1,877	\$ 2,255	\$ 1,755	\$ -500	-22.2%
Building Envelope Research and Development .	\$ 11,509	\$ 11,492	\$ 5,092	\$ -6,400	-55.7%
Analysis Tools and Design Strategies	\$ 3,854	\$ 3,626	\$ 3,126	\$ -500	-13.8%
Lighting and Appliance Standards.	\$ 9,165	\$ 8,426	\$ 9,197	\$ 771	9.2%
Tech/Program Management Support	\$ 2,265	\$ 1,200	\$ 2,200	\$ 1,000	83.3%
Subtotal, Equipment, Materials, and Tools.	\$ 39,679	\$ 38,547	\$ 31,718	\$ -6,829	-20.2%
Total, Building Research and Standards.	<u>\$62,862^{a/}</u>	<u>\$ 62,392</u>	<u>\$ 52,563</u>	<u>\$ -9,829</u>	<u>-15.8%</u>

a/ A total of \$1,381,000 was reduced from the FY 2001 Building Research and Standards funding for Small Business Innovative Research (SBIR) activities managed by the DOE Office of Science.

II. B. Laboratory and Facility Funding Table: BUILDING RESEARCH AND STANDARDS

	FY 2001 Comparable Appropriation	FY 2002 Comparable Appropriation	FY 2003 Request	\$ Change	% Change
Argonne National Lab (East)	\$ 202	\$ 201	\$ 169	\$ -32	-15.9%
Brookhaven National Lab	\$ 980	\$ 972	\$ 819	\$ -153	-15.7%
Lawrence Berkeley National Lab	\$ 10,038	\$ 9,963	\$ 8,394	\$ -1,569	-15.7%
National Renewable Energy Lab	\$ 10,618	\$ 10,539	\$ 8,878	\$ -1,661	-15.8%
Oak Ridge National Lab	\$ 13,302	\$ 13,202	\$ 11,122	\$ -2,080	-15.8%
Pacific Northwest National Lab	\$ 3,293	\$ 3,268	\$ 2,753	\$ -515	-15.8%
All Others	\$ 24,429	\$ 24,247	\$ 20,428	\$ -3,819	-15.8%
Total, Building Research and Standards	<u>\$ 62,862</u>	<u>\$ 62,392</u>	<u>\$ 52,563</u>	<u>\$ -9,829</u>	<u>-15.8%</u>

III. Performance Summary: BUILDING RESEARCH AND STANDARDS

Program Activity	FY 2001	FY 2002	FY 2003
Technology Road Maps and Competitive R&D	Technology Road Maps and Competitive R&D	Technology Road Maps and Competitive R&D	Technology Road Maps and Competitive R&D
	<p>In collaboration with industry partners, academia, States, and National Laboratories, completed the strategic road maps for residential buildings, appliances, and building envelope technologies. Continued on-going research projects from FY 1999 and FY 2000 competitive solicitations. Initiated 9 new projects for R&D related to completed road maps and for research topics not covered by road maps. The funding for road-mapped activities were used to bridge the gap between ongoing R&D activities and newly identified high-priority areas. Selection criteria include technical feasibility, potential energy savings, and a minimum 20 percent cost share.</p>	<p>Coordinate the implementation phase of technology road maps with industry partners and disseminate completed road maps for all areas to participants, stakeholder, and the public. Continue on-going research projects from previous solicitation. Initiate 6 new projects through full competition and industry cost share.</p>	<p>DOE will align the individual R&D programs with the high-priority actions identified in the road maps and coordinate the implementation phase of technology road maps with industry partners. Funding will allow follow-through on the expectations of several hundred industry partner-participants in BTS road maps, who are looking to the Federal government as the catalyst and to integrate the effort. Assist research programs in implementation of the technology road maps.</p>
	<p>Participants include: GE, National Energy Technology Laboratory, A.D.Little, Davis Energy Group, (Road Maps \$1,632, Competitive R&D \$4,785)</p>	<p>Participants: National Energy Technology Lab (NETL), other National laboratories and industry partners TBD. (Road Maps \$797, Competitive R&D \$6,000)</p>	<p>Participants: National Energy Technology Lab (NETL), other National laboratories and industry partners TBD (\$2,297)</p>

III. Performance Summary: BUILDING RESEARCH AND STANDARDS (Cont'd)

Program Activity	FY 2001	FY 2002	FY 2003
Technology Road Maps and Competitive R&D (Cont'd)	<p>Technical/Program Management Support Included activities which are integral part of the technology road maps and competitive R&D program. Representative activities included preparation of program, strategic plans, and operating plans; R&D feasibility studies and trade-off analysis; evaluation of the impact of new legislation on R&D programs; analysis of energy issues pertinent to the R&D program; identification of performance methodologies (including GPRA); collected data to assess program and project performance, efficiency and impacts; and development of performance agreements with management. Technology Analysis, & Engineering-Economics & Market Assessment - Support Service A.D. Little (\$344)</p>	<p>Technical/Program Management Support Includes activities which are integral part of the technology road maps and competitive R&D program. Representative activities include preparation of program, strategic plans, and operating plans; R&D feasibility studies and trade-off analysis; evaluation of the impact of new legislation on R&D programs; analysis of energy issues pertinent to the R&D program; identification of performance methodologies (including GPRA); data collection to assess program and project performance, efficiency and impacts; and development of performance agreements with management. TBD(\$60)</p>	<p>Technical/Program Management Support Will include activities which are integral part of the technology road maps program. Representative activities will include preparation of program, strategic plans, and operating plans; R&D feasibility studies and trade-off analysis; evaluation of the impact of new legislation on R&D programs; analysis of energy issues pertinent to the R&D program; identification of performance methodologies (including GPRA); data collection to assess program and project performance, efficiency and impacts; and development of performance agreements with management. TBD(\$60)</p>
Total, Technology Road Maps and Competitive R&D	\$6,761	\$6,857	\$2,357

III. Performance Summary: BUILDING RESEARCH AND STANDARDS (Cont'd)

Program Activity	FY 2001	FY 2002	FY 2003
Residential Buildings Integration	<p>Research and Development <i>(Building America)</i></p> <p>Increased industry participation by signing up 25 new partners, including lead builders, equipment manufacturers, material suppliers, contractors, mortgage lenders, and utilities, bringing the total number of partners to 225. The <i>Building America</i> consortia developed more than 3,000 highly energy-efficient, environmentally sound, and cost-effective houses. In addition to a 50 percent cost share, the new partners contributed significant efficiency improvements to the new housing stock by broadening the participation of production builders, their suppliers and contractors, and local planning officials. The FY 2001 <i>Building America</i> program targeted an overall 50 percent improvement in total energy efficiency.</p> <p>Added 5 additional communities with high performance building systems to serve as models of resource-efficient residential neighborhoods, bringing the total number of communities to 12. The 7 communities added 1,000</p>	<p>Research and Development <i>(Building America)</i></p> <p>Develop over 2,000 highly resource-efficient, cost-effective private sector homes through the <i>Building America</i> consortia, bringing the total number of homes to 5,000. Increase from 1,500 units in FY 2001 to 2,000 units in FY 2002. The program will conduct detailed research investigations to develop 10 innovative solutions that can contribute to increasing energy efficiency with little or no additional cost. With due consideration to regional and housing differences, the investigations will develop, construct, and evaluate technological concepts that have not been widely tried or utilized. The result is scientifically credible information to further adoption. Begin limited development and demonstration of technologies and strategies for implementing energy efficiency upgrades (appliances, equipment, building envelope and/or windows, etc.) in existing homes. Conduct pilot programs to develop cost-effective methods to disseminate innovations to other builders. Coordinate with the</p>	<p>Research and Development <i>(Building America)</i></p> <p>Continue to support production builder partners from FY2002. <i>Building America</i> will continue to monitor and analyze data from a limited number of instrumented homes. An investigation will be undertaken of higher performance structural insulated panels.</p> <p>At this level, 20 more production builders will be engaged than in 2002. Technical assistance will continue for large community scale developments - Civano, Stapleton, Playa Vista and Sommerset at Frick Park. Regional and climatic efforts will have significant impact on buildings research activities. Application of DOE energy conservation technology to the maintenance, replacement and remodeling market of existing homes represents 101 million households and a huge market for energy efficiency manufacturing installation and service jobs. Program will develop effective dissemination methods including software tools, training curricula, and other vehicles designed to increase the</p>

III. Performance Summary: BUILDING RESEARCH AND STANDARDS (Cont'd)

Program Activity	FY 2001	FY 2002	FY 2003
Residential Buildings Integration (Cont'd)	<p data-bbox="428 284 848 354">new homes, bringing the total to 3,000.</p> <p data-bbox="428 397 911 1450">Applied strategies in these communities that in addition to saving energy, reduce construction waste, conserve water, and use best land practices. Used a systems engineering approach to evaluate cost and performance tradeoffs associated with advanced equipment and systems to meet building heating, cooling, ventilation, hot water, and lighting loads. Expanded use of high performance envelope designs, gas-fired cooling systems, renewable energy technologies, distributed power generation systems, and Energy Star appliances. Monitored and reported on performance of the initial, community-scale <i>Building America</i> projects to determine the impact of occupant behavior on overall building energy use. Through continued systems engineering research and demonstration, expanded the technology base for retrofit technologies in response to the needs of PATH, DOE's Weatherization Assistance Program, and DOE's <i>Building America</i> factory-</p>	<p data-bbox="940 284 1415 656">Office of Power Technologies to develop residential whole buildings approaches that will enable the cost-effective design, construction, and operation of net-zero-energy buildings. The Special Project State Grant Solicitation will be conducted to involve State research partners in developing and evaluating advanced retrofit technologies.</p>	<p data-bbox="1457 284 1898 354">exposure of the Building America successes.</p>

III. Performance Summary: BUILDING RESEARCH AND STANDARDS (Cont'd)

Program Activity	FY 2001	FY 2002	FY 2003
Residential Buildings Integration (Cont'd)	<p data-bbox="428 284 848 354">constructed infill and brownfield projects.</p> <p data-bbox="428 397 911 1036">Applied promising natural and hybrid cooling strategies in two advanced, very low energy buildings. Developed and demonstrated residential ventilation strategies and designs that meet the proposed new ASHRAE Residential Ventilation Standard 62.2 issued in FY 2000. Working with <i>Building America</i> industry teams, continued to develop cost-effective strategies for downsizing space conditioning equipment for very low or net-zero-energy/net energy buildings without compromising comfort or energy performance on peak heating and cooling periods.</p> <p data-bbox="428 1079 911 1300">Continued work with factory-constructed housing industry on developing an integrated approach to building design and component efficiency that was initiated by the FY 1999 competitive solicitation.</p> <p data-bbox="428 1344 869 1451">Participated in the Special Project State Grants that are provided to states on a competitive basis.</p>		

III. Performance Summary: BUILDING RESEARCH AND STANDARDS (Cont'd)

Program Activity	FY 2001	FY 2002	FY 2003
Residential Buildings Integration (Cont'd)	<p>Participants included: IBACOS, Building Science Consortium, CARB, Industrialized Housing Partnership, NREL, NAHBRC, LBNL, ORNL, others listed on EREN Buildings web site (Special Project State Grants include \$300 from <i>Building America</i>). (\$11,271)</p>	<p>Participants will include: Building Science Consortium, Consortium for Advanced Residential Buildings (CARB), Industrialized Housing Partnership, The Integrated Building and Construction bringing Solutions of Pittsburgh (IBACOS), LBNL, National Association of Homebuilders' Research Center (NAHBRC), ORNL (\$11,843)</p>	<p>Participants will include successful bidders resulting from the FY 2002 re-competition of the <i>Building America</i> Program. TBD (\$12,843)</p>
	<p>Residential Building Energy Codes</p>	<p>Residential Building Energy Codes</p>	<p>Residential Building Energy Codes</p>
	<p>Developed comprehensive revisions to the 2003 IECC residential building codes revision cycle that will simplify code compliance. Completed development of new code compliance tool, <i>MECcheck</i>, for private sector residential construction. Published a determination in the <i>Federal Register</i> regarding the 1998 and 2000 International Energy Conservation Code (IECC). (\$574)</p>	<p>Submit comprehensive revisions to the IECC codes revision cycle, i.e., reducing the number of climate zones to streamline code requirements and eliminating the Window/Wall Ratio (WWR) method to simplify code compliance. Develop an energy code for Federally-owned residential buildings based on the work generated by the IECC comprehensive overhaul initiative funded in FY 2001. Promote and support revisions to the residential building codes that will support new energy efficiency technologies and practices. Develop new code compliance tools for use in residential construction to foster a "whole buildings" approach in new</p>	<p>An essential, though relatively modest, effort will be continued to assure the effectiveness of model energy codes for the residential sector, and for Federal housing units. This activity is essential to ensure that codes are updated in a way that enables builders to utilize the advanced technologies, design approaches, and engineering solutions developed by Building America and others.</p>

III. Performance Summary: BUILDING RESEARCH AND STANDARDS (Cont'd)

Program Activity	FY 2001	FY 2002	FY 2003
Residential Buildings Integration (Cont'd)		<p>and existing residential buildings. Revise the National Fire Protection Association manufactured home standards to reflect increased cost effective energy efficiency.</p> <p>Participants will include: NREL, PNNL, Others TBD (\$590)</p>	
	<p>Technical/Program Management Support</p>	<p>Technical/Program Management Support</p>	<p>Technical/Program Management Support</p>
	<p>Included activities which are integral part of the residential buildings integration program. Representative activities included preparation of program, strategic plans, and operating plans; R&D feasibility studies and trade-off analysis; evaluation of the impact of new legislation on R&D programs; analysis of energy issues pertinent to the R&D program; identification of performance methodologies (including GPRA); collected data to assess program and project performance, efficiency and impacts; and development of performance agreements with management.(\$72)</p>	<p>Includes activities which are integral part of the residential buildings integration program. Representative activities include preparation of program, strategic plans, and operating plans; R&D feasibility studies and trade-off analysis; evaluation of the impact of new legislation on R&D programs; analysis of energy issues pertinent to the R&D program; identification of performance methodologies (including GPRA); data collection to assess program and project performance, efficiency and impacts; and development of performance agreements with management. (\$45)</p>	<p>Will include activities which are integral part of the residential buildings integration program. Representative activities will include preparation of program, strategic plans, and operating plans; R&D feasibility studies and trade-off analysis; evaluation of the impact of new legislation on R&D programs; analysis of energy issues pertinent to the R&D program; identification of performance methodologies (including GPRA); data collection to assess program and project performance, efficiency and impacts; and development of performance agreements with management.(\$45)</p>

III. Performance Summary: BUILDING RESEARCH AND STANDARDS (Cont'd)

Program Activity	FY 2001	FY 2002	FY 2003
Total, Residential Buildings Integration	\$11,917	\$12,478	\$13,478

III. Performance Summary: BUILDING RESEARCH AND STANDARDS (Cont'd)

Program Activity	FY 2001	FY 2002	FY 2003
Commercial Buildings Integration	<p data-bbox="428 360 915 506">Research & Development Issued and awarded a second competitive solicitation to implement whole-building activities based on the commercial buildings road map.</p> <p data-bbox="428 548 915 1450">Conducted cost-shared R&D on advanced technologies identified in the commercial buildings road map in collaboration with the design and construction community, controls and equipment companies, developers, and building owners and operators. New areas included energy management practices, whole building design concepts, low-cost sensor technology, and information management systems. In coordination with the <i>Rebuild America</i> program and its most progressive community partnerships, expanded research on innovative techniques and strategies for energy-efficient building renovations. Worked with 7 <i>Rebuild America</i> community partnerships to test the viability of new energy-efficient commercial equipment and systems in practical applications. Researched and demonstrated energy efficiency</p>	<p data-bbox="940 282 1423 1450">Research & Development Initiate implementation of the Commercial Buildings Roadmap by working and sharing costs with industry groups on 3-5 buildings projects that accelerate the development and adoption of new building technologies and practices, emulating the public/private partnership successes of the residential Building America program. Conduct industry workshops on metrics R&D needs for energy performance, indoor environment quality, and other significant areas of building performance. Research and develop low cost passive, semi-passive and active wireless sensors for building control systems to better control occupant comfort at lower cost Continue support of National Science Foundation building industry-university cooperative research centers (IUCRC), such as the Center for the Built Environment at the University of California Berkeley, California, and the Center for Building Performance and Diagnostics at Carnegie Mellon</p>	<p data-bbox="1457 282 1940 1450">Research & Development Actively implement the Commercial Buildings Roadmap by working and sharing costs with industry groups on 3-5 buildings projects that accelerate development and adoption of new building technologies and integration practices, emulating the public/private partnership successes of the residential <i>Building America</i> program. Develop and work with industry to implement metrics for energy, indoor environment quality, and other significant areas of building performance. Increase will enable expansion of Indoor Environmental Quality R&D activities to include those recommended by building industry in the Roadmap; increase 7 - 10 new building products; begin R&D framework for existing commercial buildings, representing 60 billion sq. ft. of space and \$80 billion in energy costs. The program will also establish private-sector participation by soliciting 5 - 7 new building projects and three new R&D activities from the industry-driven Roadmap, addressing the huge new commercial construction market.</p>

III. Performance Summary: BUILDING RESEARCH AND STANDARDS (Cont'd)

Program Activity	FY 2001	FY 2002	FY 2003
Commercial Buildings Integration (Cont'd)	<p>techniques and strategies, including whole-building design techniques, Internet-based building controls combined with real time utility pricing strategies, innovative lighting design and technologies, new information management techniques for the design and construction process, and new heating and cooling technologies, such as compressorless cooling, fuel cells, and cogeneration. This effort directly linked together BTS research and deployment activities for commercial buildings.</p> <p>Supported National Science Foundation grants to university “centers of excellence”, such as the Center for the Built Environment in Berkeley, California, that tests and assesses advances and innovations in materials, components, and assemblies for thermal, visual, acoustic, and air quality performance. These partners have participated in cost sharing, providing in FY 2001 more than 10 times the Building Technology State and Community Programs (BTS) funding of \$80,000. Published findings from the testing and evaluation of BTS-developed</p>	<p>University. By cost sharing with many industry partners, these IUCRC provide leverage of 10-15 times DOE funding.</p>	

III. Performance Summary: BUILDING RESEARCH AND STANDARDS (Cont'd)

Program Activity	FY 2001	FY 2002	FY 2003
Commercial Buildings Integration (Cont'd)	<p>technologies by two major commercial real estate developments.</p> <p>Conducted research to offset the increase in energy use that will result from the expected increase in the recommended ventilation rate for commercial buildings in the industry consensus standards. Explored natural ventilation solutions for commercial buildings. Continued interagency work on productivity effects from improved indoor environments to include widespread dissemination of findings.</p> <p>Participants included: PNNL, NREL, UC, Carnegie Mellon University, LBNL, NIST (\$3,800)</p>	<p>Participants will include: Carnegie Mellon University, LBNL, National Institute of Standards and Technology (NIST), NREL, PNNL, University of California, Others TBD) (\$3,954)</p>	<p>Participants will include: Carnegie Mellon University, LBNL, National Institute of Standards and Technology (NIST), NREL, PNNL, University of California, Others TBD) (\$4,454)</p>
	<p>Commercial Building Energy Codes</p>	<p>Commercial Building Energy Codes</p>	<p>Commercial Building Energy Codes</p>
	<p>Developed supporting materials and propose lighting controls, transformer, and fenestration (windows and doors) amendments to the model commercial energy code, Standard 90.1-1999. Developed and proposed upgrades to</p>	<p>Issue final rulemaking on the next generation of Energy Codes for Federal Commercial and High-Rise Residential Buildings. Support technical improvement of private sector codes, such as the International Energy Code Council's adoption of a</p>	<p>An essential, though relatively modest, effort will be continued to assure the effectiveness of model energy codes for the commercial sector, and for Federal commercial buildings. This activity is essential to ensure that codes are updated in a way</p>

III. Performance Summary: BUILDING RESEARCH AND STANDARDS (Cont'd)

Program Activity	FY 2001	FY 2002	FY 2003
Commercial Buildings Integration (Cont'd)	<p>ASHRAE/IESNA Guideline 18, Energy Guideline for Buildings Except Low-Rise Residential Buildings, to assist those wanting to improve energy efficiency greater than Standard 90.1-1999. Proposed the International Energy Code Council in the 2003 IECC, upgrade their simplified compliance path to be consistent with Standard 90.1-1999.</p>	<p>simple method to demonstrate code compliance.</p> <p>Issue DOE determination whether Standard 90.1-2002 will improve the energy efficiency of commercial buildings compared to Standard 90.1-1999.</p>	<p>that enables builders to utilize the advanced technologies, design approaches and engineering solutions developed by the High Performance Buildings effort and others. Support will be continued for the technical improvement of private sector codes, such as the International Energy Code Council's adoption of a simple, yet effective, method to demonstrate code compliance.</p>
	<p>Completed revisions to <i>COMcheck-EZ</i>, and <i>COMcheck-PLUS</i>, including compliance checking for the upgraded Federal commercial code, 10 CFR 434. (EPA Act Section 101)</p>		
	<p>Participants included PNNL. (\$680)</p>	<p>Participants will include: PNNL, and Others TBD (\$541)</p>	<p>Participants will include: PNNL, and Others TBD (\$541)</p>
	<p>Technical/Program Management Support</p>	<p>Technical/Program Management Support</p>	<p>Technical/Program Management Support</p>
	<p>Included activities which are integral part of the commercial buildings integration program. Representative activities included preparation of program, strategic plans, and operating plans; R&D feasibility studies and trade-off analysis; evaluation of the impact of new legislation on R&D programs;</p>	<p>Includes activities which are integral part of the commercial buildings integration program. Representative activities include preparation of program, strategic plans, and operating plans; R&D feasibility studies and trade-off analysis; evaluation of the impact of new legislation on R&D programs;</p>	<p>Will include activities which are integral part of the commercial buildings integration program. Representative activities will include preparation of program, strategic plans, and operating plans; R&D feasibility studies and trade-off analysis; evaluation of the impact of new legislation on R&D programs;</p>

III. Performance Summary: BUILDING RESEARCH AND STANDARDS (Cont'd)

Program Activity	FY 2001	FY 2002	FY 2003
Commercial Buildings Integration (Cont'd)	analysis of energy issues pertinent to the R&D program; identification of performance methodologies (including GPRA); collected data to assess program and project performance, efficiency and impacts; and development of performance agreements with management. (\$25)	analysis of energy issues pertinent to the R&D program; identification of performance methodologies (including GPRA); data collection to assess program and project performance, efficiency and impacts; and development of performance agreements with management. (\$15)	analysis of energy issues pertinent to the R&D program; identification of performance methodologies (including GPRA); data collection to assess program and project performance, efficiency and impacts; and development of performance agreements with management. (\$15)
Total, Commercial Buildings Integration	\$4,505	\$4,510	\$5,010
Equipment, Materials and Tools	<p>Lighting R&D</p> <p>Further aligned R&D priorities with the lighting technology road map and accelerated the development of energy-efficient lighting technology with lighting industry partners, small business firms, national laboratories and universities, using the competitive solicitation approach begun in FY99.</p> <p>In the new light sources area, continued research on two paths: seeking technology breakthroughs for conventional types of lamps (incandescent, fluorescent, and gas discharge) to improve efficiency 20 to</p>	<p>Lighting R&D</p> <p>Continue the best of competitively awarded lighting research projects selected from prior year solicitations. Conduct basic and applied research on advanced light sources with an increased focus on the science and enabling technology for solid state lighting. Accelerate research on white light emitting organic LEDs. Develop new approaches to the effective distribution and control of lighting in buildings and determine the impact of lighting on performance and comfort of building occupants. Conduct this work through an integrated program consisting of cost-shared contracts</p>	<p>Lighting R&D</p> <p>Continue basic and applied research on advanced light sources with an increased focus on the science and enabling technology for solid state lighting. Investigate issue of integration of lighting control systems with other building control systems. Continue developing new approaches to the effective distribution and control of lighting in buildings and determine the impact of lighting on performance and comfort of building occupants. Conduct this work through an integrated program consisting of cost-shared contracts with manufacturers, utilities, and</p>

III. Performance Summary: BUILDING RESEARCH AND STANDARDS (Cont'd)

Program Activity	FY 2001	FY 2002	FY 2003
Equipment, Materials and Tools (Cont'd)	<p>50 percent and developing revolutionary lighting technologies that can potentially double efficiency. Continued research on a luminaire-integrated ballast for CFLs, cost-shared with a major lamp manufacturer, by testing a fully integrated laboratory test unit and evaluating marketing strategies.</p> <p>Continued to develop the low-power sulfur lamp by testing a breadboard prototype lamp system using the lamp designs and power supply technologies developed in the prior two years. Initiated fundamental studies to better understand physical mechanisms thought to limit efficacy and lifetime of solid state devices and initiated research to better understand the application of these novel lighting technologies to general purpose lighting. Initiated research on new phosphors which can potentially double the efficiency of fluorescent lamps and on new solid state power supplies for electrodeless lamps of either gas discharge or molecular radiator design. With industry input, continued study of lighting energy use and savings potential.</p>	<p>with manufacturers, utilities, and small business R&D firms in addition to scientific support from National Laboratories and universities.</p> <p>In the light sources area, continue research on two paths: seek technology breakthroughs for conventional types of lamps to improve efficiency by 20 to 50 percent, and develop revolutionary lighting technologies that can potentially double efficiency. Initiate applied research on substrates, reactor diagnostics tools, luminescent materials, and encapsulant materials as another pathway to improve the efficiency of white-light LEDs. Increase consumer awareness of and confidence in leading-edge technologies by validating performance claims of manufacturers and disseminating objective reviews of the technology by way of a web-based newsletter.</p> <p>Complete synthesis of high color rendering index phosphors and industry workshop on research opportunities in identified quantum-splitting phosphors.</p>	<p>small business R&D firms with scientific support from national laboratories and universities.</p> <p>In the light sources area, continue research on two paths: seek technology breakthroughs for conventional types of lamps to improve efficiency by 20 to 50%, and develop revolutionary lighting technologies that can potentially double efficiency. Increase research to improve the efficiency of LED and OLED light sources.</p> <p>Complete the cost-shared demonstration for potential energy savings through scotopically, dim light vision, and enriched light sources in office lighting. Continue data gathering work on productivity improvements through optimized lighting systems.</p>

III. Performance Summary: BUILDING RESEARCH AND STANDARDS (Cont'd)

Program Activity	FY 2001	FY 2002	FY 2003
Equipment, Materials and Tools (Cont'd)	<p>Under the lighting controls and distribution research element, continued two competitively-awarded hybrid lighting projects with small business firms to develop technology for new optical fibers and hollow light guides which distribute light from centralized electric/solar light sources. Evaluated candidate materials and test prototype systems for these two distribution technologies.</p> <p>In the lighting impacts area, continued two preliminary field tests of the most promising concepts for saving energy through improved vision, with a potential energy savings of 30 percent in office and/or highway lighting systems.</p>	<p>Under the lighting controls and distribution research element, initiate research and development of a novel control approach that reduces the size and cost of the ballast and increases lifetime and efficiency of the electrical circuit. This approach can be applied to a wide range of lamp technologies. Identify major barriers to the use of energy-saving lighting control systems. Work with stakeholders to develop plausible solutions, strategies, and improvements in technology. Monitor and verify energy savings potential from utilization of the optimized dedicated CFL table lamp developed at LBNL. Establish new technologies or configurations of existing technology to reduce lighting loads and enhance task area lighting by a unified task/ambient lighting solutions.</p>	
		<p>In the lighting impacts area, complete two preliminary field tests and initiate scotopic dim light vision demonstration of the most promising concepts for saving energy through improved vision, with a potential savings up to 30 percent in office</p>	

III. Performance Summary: BUILDING RESEARCH AND STANDARDS (Cont'd)

Program Activity	FY 2001	FY 2002	FY 2003
Equipment, Materials and Tools (Cont'd)	Participants include: GE, Fusion Lighting, LANL, LBNL, Meadow River, ADL, Translight, Lighting Research Center, and Abratech. (\$6,082)	lighting systems. Utilizing information gathered from the lighting roadmap program work with the conventional lighting industry trade and technical associations to define specific projects to be initiated and the appropriate role of the government. Participants will include: GE, Fusion Lighting, Cree Lighting, Abratech, Lumineds, LBNL, Lighting Research Center, Others TBD. (\$5,794)	Participants will include: LBNL, Lighting Research Center, Others TBD. (\$7,294)
	Space Conditioning and Refrigeration R&D	Space Conditioning and Refrigeration R&D	Space Conditioning and Refrigeration R&D
	Research in residential absorption heat pumps, desiccants and chillers, and oil heat was transferred to the power technologies program. Completed development of a supermarket system energy evaluation guide and work with commercial equipment manufacturers and supermarket operators to implement the guide.	Collaborate with manufacturers to investigate alternatives for affordable efficiency advancements and development of design tools for the optimum selection of equipment components for air conditioners and heat pumps. Support research and initial development of component technologies for applications in existing buildings. Continue to develop refrigeration systems that reduce defrost energy needed for heat pumps and residential and commercial	Conduct a competitive solicitation to identify new technical approaches for more efficient space conditioning technology, including distribution systems with potential for reducing peak load demand as well as improving annual energy efficiency. Continue collaboration with manufacturers to investigate alternatives for affordable efficiency advancements and development of design tools for the optimum selection of equipment components for air
	Initiated development of an improved defrost system for refrigeration		

III. Performance Summary: BUILDING RESEARCH AND STANDARDS (Cont'd)

Program Activity	FY 2001	FY 2002	FY 2003
Equipment, Materials and Tools (Cont'd)	<p>display cases. Initiated development of diagnostic tools to maintain installed efficiency of air conditioners. Continued development of test procedures for determining air distribution system losses of installed space conditioning equipment and transfer for publication as an ASHRAE standard. Continued development of a new high efficiency heat pump water heater design, initiated and completed accelerated laboratory durability testing of ten water heaters to achieve the equivalent of ten years of cyclic operation.</p> <p>Continued support of the Air-Conditioning and Refrigeration Technology Institute (ARTI) Research for the 21st Century R&D projects.</p> <p>Continued development of efficient heat pump water heater and frosteless heat pump designs through initiation of field testing with a utility and a manufacturing partner.</p>	<p>food storage equipment. Continue to develop field test diagnostic tools and test methods to maintain the installed system efficiency of air conditioners and heat pumps. Also supports continuation of the best of competitively awarded research projects. Initiate research for design and demonstration for reduced energy use by refrigerated display cases.</p> <p>Continue support for the Air Conditioning and Technology Institute (ARTI) Research for the 21st Century R&D projects and continuation of the best of competitively awarded research projects. Complete analysis of public comments for proposed ASHRAE standard for distribution system losses of installed space conditioning equipment and revise proposed standard for ASHRAE publication. Initiate research to reduce peak energy impacts of residential and commercial roof top air conditioners.</p>	<p>conditioners and heat pumps. Continue to develop refrigeration systems that reduce defrost energy needed for heat pumps and commercial food storage equipment. Continue to develop test methods and field test diagnostic tools to maintain the installed system efficiency of air conditioners and heat pumps. Field test approaches to retrofit space conditioning systems in existing homes to improve efficiency.</p>
	Participants included: National Institute of Standards and Technology	Participants will include: BNL, LBNL, NIST, ORNL, Univ of Ill,	Participants will include: BNL, LBNL, NIST, ORNL, Univ of Ill,

III. Performance Summary: BUILDING RESEARCH AND STANDARDS (Cont'd)

Program Activity	FY 2001	FY 2002	FY 2003
Equipment, Materials and Tools (Cont'd)	(NIST), LBNL, ORNL, University of Illinois, University of Maryland, ARTI (\$5,015)	Univ MD. (\$5,754)	Univ MD, and others that are competitively selected. (\$3,054)
	<p>Fuel Cells/Cogeneration: In FY 2002, this research was transferred to the Office of Power Technologies.</p>		
	<p>Appliances and Emerging Technologies R&D</p>	<p>Appliances and Emerging Technologies R&D</p>	<p>Appliances and Emerging Technologies R&D</p>
	<p>Conducted R&D on emerging technologies and developed and monitored the performance of the next generation of appliances. Continue demonstrations of heat pump water heaters, with utility partners.</p>	<p>Recruit additional manufacturing partners to introduce heat pump water heaters (HPWH) to market and provide infrastructure support, such as field testing, case study dissemination and fact sheets. Coordinate with utility and end-user partners to enhance marketability and demand for HPWH. Continue to establish rooftop A/C and three emerging lighting products on the market with manufacturers and end-user-groups. Work with end-user groups, utilities, and the research establishment to commercialize the next-generation of smarter, more efficient appliances. Identify and explore potential innovative appliances and emerging technologies for commercial adaption.</p>	<p>Recruit additional manufacturing partners to introduce heat pump water heaters (HPWH) to market and provide infrastructure support, such as field testing, case study dissemination and fact sheets. Coordinate with utility and end-user partners to enhance marketability and demand for HPWH. Continue to establish rooftop A/C, HPWH, and emerging lighting products on the market with manufacturers and end-user-groups. Work with end-user groups, utilities, and the research establishment to commercialize the next-generation of smarter, more efficient appliances.</p>
	<p>Established sub Cfls (smaller in size) on the market with manufacturers and end-use groups. Coordinated with partners on very-high efficiency rooftop air conditioners.</p>		

III. Performance Summary: BUILDING RESEARCH AND STANDARDS (Cont'd)

Program Activity	FY 2001	FY 2002	FY 2003
Equipment, Materials and Tools (Cont'd)	Participants include: ORNL, PNNL, SE HPWH Council. (\$1,877)	Participants will include: ORNL, PNNL, NE HPWH Consortium, Dawnbreaker, Others TBD. (\$2,255)	Participants will include: ORNL, PNNL, SE HPWH Council, Others TBD. (\$1,755)
	Building Envelope R&D	Building Envelope R&D	Building Envelope R&D
	Competitive Solicitation: Awarded new competitively-selected project to accelerate implementation of the windows and building envelope road map. Continued to develop an integrated window/wall system including integrated HVAC functions in a competitively-selected, cost-shared project with industry. (\$2,142)	Competitive Solicitation: Award approximately 2 additional, second-phase competitive solicitations and/or award new competitively-selected projects to accelerate implementation of the windows and building envelope road map. (\$2,000)	The road map was completed in FY 2001 and the Federal sector will continue to implement building envelop technology. No competitive solicitation is sought due to the need to accommodate higher priority activities. (\$0)
	Thermal Insulation and Building Materials: Completed development of super-insulating materials that exhibit R-25 insulating value per inch. Continued cooperative research with industry on improving insulations using environmentally benign materials. Initiated development of two new advanced building construction technology concepts for retrofit and new construction that are energy efficient and affordable. Performed industry-supported testing and evaluation of	Thermal Insulation and Building Materials: Draft update of economics in the DOE Insulation Fact Sheet and prepare a final draft of the Attic Handbook. Solve Building America moisture issues. Initiate development of database of measured hygrothermal properties and include this database in an update of WUFI ORNL/IBP. Develop and test energy performance of an innovative insulated attic duct system compared to standard ducts. Complete work on monitoring field performance and durability of roof	Thermal Insulation and Building Materials: Conduct research to improve the thermal performance of the building envelope through the evaluation of materials and construction practices including approaches to retrofit existing home envelopes. NREL, ORNL. (\$1,564)

III. Performance Summary: BUILDING RESEARCH AND STANDARDS (Cont'd)

Program Activity	FY 2001	FY 2002	FY 2003
Equipment, Materials and Tools (Cont'd)	<p>envelope materials and structures to identify opportunities for improving energy efficiency and wind resistance. Continued characterization and development of models to predict the performance of third-generation blowing agents in closed-cell foams. Completed development of an advanced multidimensional heat, air, and mass transfer model to predict the moisture tolerance durability of envelope systems. Developed air barrier and vapor barrier alternatives to existing products that eliminate liquid and vapor traps within building envelopes. Prepared a draft of the Attic Handbook, a consumer-oriented compilation of information regarding attic systems and design. Constructed prototype apparatus for testing condensation potential of cold pipe insulation materials. Developed calculators on the Web for estimating energy savings of highly effective roofing. Developed database for predicting the energy efficiency of steel framed attics. Initiated educational programs to introduce modeling tools and improved building designs, equipment,</p>	<p>coatings and membranes, and roof-modeling activities for manufacturers, consumers and designers. Initiate project to investigate the potential energy savings on Infrared enhanced pigments. Continue program with Universities to teach the next generation of building designers about the latest Building envelope research products developed by DOE. Develop "Dynamic Energy Savings Calculator" for massive wall systems. Initiate full scale envelope energy efficiency testing of a modular home and continue testing of a manufactured home under extreme artificial winds to provide methods, materials and devices to alleviate wind damage and improve energy performance. Continue to develop new Energy Efficient Envelope Construction Technologies to support the Building Envelope Roadmap's emphasis on energy efficiency, durability, safety and moisture control materials and strategies. Develop and test material properties and retrofit/new construction technologies that minimize materials, energy, time, labor cost and expense through better design and construction. Continue</p>	

III. Performance Summary: BUILDING RESEARCH AND STANDARDS (Cont'd)

Program Activity	FY 2001	FY 2002	FY 2003
Equipment, Materials and Tools (Cont'd)	materials, and construction technologies to colleges and universities. (\$2,983)	construction and laboratory and field structural and thermal tests of 2 new envelope construction technologies, that are affordable, durable, safe, healthy, and energy efficient. NREL, ORNL. (\$3,264)	
	<p>Window Technologies: Coordinated advanced window research, e.g., complex fenestration systems, with International Energy Agency partners. Fabricated and initiated test of full size, prototype commercial electrochromic windows developed through a 50 percent cost share by industry . Supported research leading to industry's design of a full-size production line. Supported industry development of durable, spectrally-selective and low-E glazing for sunbelt and retrofit applications. Completed research supporting basic WINDOW 5 version of rating & design software.</p>	<p>Window Technologies: Explore and develop advanced window technologies for existing building retrofit applications, such as durable, high performance Low E and solar control coatings for glass and films. Initiate, in partnership with industry, CEC, HUD, and others, field evaluation of high performance windows including electrochromics. Continue support for the best competitively selected windows research projects. Publish Commercial Glazing handbook; and initiate companion web-based engineering design and specification tools. Implement through NFRC new WINDOW 5 rating and design software suite based on International Standards Organization (ISO) procedures. Upgrade software to facilitate rating of 30,000 products per year by NFRC simulators. Initiate research expanding rating & design</p>	<p>Window Technologies: Continue the evaluation of high performance windows. Continue to implement through NFRC new WINDOW 5 rating and design software suite based on International Standards Organization procedures. Continue training of builders, architects and manufacturers through Efficient Window Collaborative. Field test technologies for retrofit in existing homes.</p>

III. Performance Summary: BUILDING RESEARCH AND STANDARDS (Cont'd)

Program Activity	FY 2001	FY 2002	FY 2003
Equipment, Materials and Tools (Cont'd)	<p>Participants included Aspen Research, Sage Electrochromics, North Carolina Advanced Research Corp., Aerodyne Research, Aspen Systems, and Colorado State University (\$6,296)</p>	<p>capability to emerging technologies & most major commercial building window types. Continue training of builders, architects and manufacturers through Efficient Window Collaborative.</p> <p>Participants will include: Florida Solar Energy Center, LBNL, NREL, ORNL, UN. MA, UN. MN, CA Energy Commission, Alliance to Save Energy. (\$6,228)</p>	<p>Participants will include: Florida Solar Energy Center, LBNL, NREL, ORNL, UN. MA, UN. MN, CA Energy Commission, Alliance to Save Energy. (\$3,528)</p>
	<p>Analysis Tools and Design Strategies</p>	<p>Analysis Tools and Design Strategies</p>	<p>Analysis Tools and Design Strategies</p>
	<p>Completed development, testing, and release Version 1.1 of new building simulation software for EnergyPlus. Continued working with and supporting private sector developers of interfaces and simulation modules for EnergyPlus. Based on recommendations from the Commercial Buildings Road Map, planned and began development of EnergyPlus Version 1.1.</p>	<p>Continue working with building industry groups to support energy decision-making for design of new and retrofit of existing residential and commercial buildings. Focus efforts on EnergyPlus development to incorporate new technology simulation capabilities; conclude development and prepare for release of final versions of SPARK, Building Design Advisor, and Energy-10.</p>	<p>Continue working with building industry groups to support early design decision-making and associated software tools, for renewable energy and energy efficiency within residential and small commercial buildings. Focus efforts on EnergyPlus development, releasing Version 1.1. Develop and demonstrate successful energy-efficient design solutions.</p>
	<p>Planned, developed, and tested new simulation capabilities within</p>	<p>Continue working with the International Alliance for</p>	

III. Performance Summary: BUILDING RESEARCH AND STANDARDS (Cont'd)

Program Activity	FY 2001	FY 2002	FY 2003
Equipment, Materials and Tools (Cont'd)	<p>SPARK Version 2.0.</p> <p>Made the Building Design Advisor Version 2.0, available to the private sector for commercialization.</p>	<p>Interoperability through release 2.X of their Industry Foundation Classes (IFCs). Update utilities for sharing building energy related information among software tools.</p>	
	<p>Continued development and testing of Energy-10 Version 2.0 for release in FY 2002.</p>	<p>Continue performance measurement research with ASHRAE, ASTM, and others to advance the calculation basis of all energy analysis tools.</p>	
	<p>Continued working with the International Alliance for Interoperability through release 3.0 of their Industry Foundation Classes (IFCs). Create a utility for using IFCs with EnergyPlus and the Building Design Advisor.</p>	<p>Highlights include issuance of thermal distribution and ventilation standards by ASHRAE.</p>	
	<p>Continued performance measurement research with ASHRAE, ASTM, and others to advance the calculation basis of all energy analysis tools. Highlights include issuance of thermal distribution and ventilation standards by ASHRAE.</p>		
	<p>Participants included: NREL, LBNL, Athena Sustainable Materials Institute, ASHRAE, Sustainable Building Industries Council, GARD Analytics, J. Neymark Associates,</p>	<p>Participants include: ASHRAE, Athena Sustainable Materials Institute, Florida Solar Energy Center, GARD Analytics, LBNL, J. Neymark Associates, NREL, Oklahoma State</p>	<p>Participants include: ASHRAE, Athena Sustainable Materials Institute, GARD Analytics, LBNL, J. Neymark Associates, NREL, Oklahoma State University,</p>

III. Performance Summary: BUILDING RESEARCH AND STANDARDS (Cont'd)

Program Activity	FY 2001	FY 2002	FY 2003
Equipment, Materials and Tools (Cont'd)	California State University, Fullerton/ Chapman University, University of Illinois/U.S. Army Construction Engineering Research Laboratories, Oklahoma State University, University of Wisconsin. (\$3,854)	University, Sustainable Building Industries Council, University of Illinois, U.S. Army Construction Engineering Research Laboratory, University of Wisconsin. (\$3,626)	University of Illinois/U.S. Army Construction Engineering Research Laboratories, University of Wisconsin. (\$3,126)
	Lighting and Appliance Standards	Lighting and Appliance Standards	Lighting and Appliance Standards
	Promulgated amended energy conservation standards designed to achieve the maximum improvement in energy efficiency that is technically feasible and economically justified. Issued Final Rule concerning standards for clothes washers, water heaters, certain commercial heating, air conditioning and water heating products and supplemental Notice of Proposed Rulemaking (NOPR) for residential central air conditioners/heat pumps.	Issue Final Rule for residential central air conditioners/heat pumps energy efficiency standards. Continue to develop Advanced Notice of Proposed Rulemaking (ANOPR) regarding energy conservation standards for electric distribution transformers, which promise high levels of energy savings. Review existing test procedures to ensure that they remain current with advancing technology (e.g., dishwashers, water heaters). Issue final test procedure for residential central air conditioners and heat pumps, dishwashers, commercial furnaces, water heaters, air conditioners, and boilers. Ensure compliance to standards through follow-up inquiries, random audits, and investigations of noncompliance allegations.	Develop NOPR regarding energy conservation standards for electric distribution transformers and ANOPR for commercial air-source central air conditioners and heat pumps, and residential furnaces and boilers, which promise high levels of energy savings. Review existing test procedures to ensure that they remain current with advancing technology, i.e. dishwashers. Ensure compliance to standards through follow-up inquiries, random audits, and investigations of noncompliance allegations. Begin implementation of a plan to add new products to the lighting and appliance standards program.
	Conducted research to develop, maintain, simplify, and improve test procedures for appliances. Revised the test procedures to ensure innovative designs can be fairly tested and process manufacturer requests for test procedure waivers. Issued NOPR for test procedures for		

III. Performance Summary: BUILDING RESEARCH AND STANDARDS (Cont'd)

Program Activity	FY 2001	FY 2002	FY 2003
Equipment, Materials and Tools (Cont'd)	residential central air conditioner/heat pumps, commercial furnaces, water heaters, air conditioners and boilers.		
	Continued to work with equipment manufacturers to insure products are properly certified and that they meet the standards. Continued to work with the Federal Trade Commission (FTC) to support mandatory energy rating and labeling programs for residential appliances. Developed a labeling program for commercial equipment and support voluntary, industry-sponsored rating programs for commercial office equipment and luminaires.		
	Participants included: NIST, LBNL, PNNL, NREL. (\$9,165)	Participants will include: LBNL, NIST, NREL, PNNL, Others TBD. (\$8,426)	Participants will include: LBNL, NIST, NREL, PNNL, Others TBD. (\$9,197)
	Technical/Program Management Support	Technical/Program Management Support	Technical/Program Management Support
	Included activities which are integral part of the equipment, materials, and tools program. Representative activities included preparation of program, strategic plans, and operating plans; R&D feasibility studies and trade-off analysis;	Includes activities which are integral part of the equipment, materials, and tools program. Representative activities include preparation of program, strategic plans, and operating plans; R&D feasibility studies and trade-off analysis;	Will include activities which are integral part of the equipment, materials, and tools program. Representative activities will include preparation of program, strategic plans, and operating plans; R&D feasibility studies and trade-off

III. Performance Summary: BUILDING RESEARCH AND STANDARDS (Cont'd)

Program Activity	FY 2001	FY 2002	FY 2003
Equipment, Materials and Tools (Cont'd)	evaluation of the impact of new legislation on R&D programs; analysis of energy issues pertinent to the R&D program; identification of performance methodologies (including GPRA); collected data to assess program and project performance, efficiency and impacts; and development of performance agreements with management. (\$2,265)	evaluation of the impact of new legislation on R&D programs; analysis of energy issues pertinent to the R&D program; identification of performance methodologies (including GPRA); data collection to assess program and project performance, efficiency and impacts; and development of performance agreements with management. (\$1,200)	analysis; evaluation of the impact of new legislation on R&D programs; analysis of energy issues pertinent to the R&D program; identification of performance methodologies (including GPRA); data collection to assess program and project performance, efficiency and impacts; and development of performance agreements with management. (\$2,200)
Total, Equipment, Materials, and Tools	\$39,679	\$38,547	\$31,718
Total, Building Research & Standards	\$62,862	\$62,392	\$52,563

BUILDING TECHNOLOGIES
BUILDING TECHNOLOGY, STATE AND COMMUNITY SECTOR
(Dollars in Thousands)

BUILDING TECHNOLOGY ASSISTANCE

I. Mission Supporting Goals and Objectives

Mission: The Building Technology Assistance (BTA) Program accelerates the adoption of energy efficiency and renewable energy technologies and practices, through technical and financial assistance and public/private partnerships, primarily targeting energy use in buildings but also emphasizing integrated solutions to customer-focused issues and opportunities in States and communities.

Summary: The four component programs included within the Building Technology Assistance Program are the Weatherization Assistance Program, the State Energy Program, the Community Energy Program and the Energy Star program. The Weatherization Assistance Program works to reduce the energy costs of low-income households by providing cost-effective, energy efficiency improvements while ensuring the health and safety of people served. The State Energy Program (SEP) supports Federal/State partnerships that transfer energy efficiency technologies to the State and local level through formula grants which allow States to tailor energy efficiency programs to local needs and leverage non-Federal resources. The Community Energy Program provides technical assistance, demonstrations, training, and education to communities to accelerate the use of innovative and cost-effective energy technologies, strategies, and methods. The Energy Star Program is a collaborative effort with the Environmental Protection Agency and industry that provides its trademark name to commercial buildings and equipment, windows and home designs, and appliances that are highly efficient and cost-effective.

Context: The overview of the National Energy Policy report states, “Americans share the goal of energy conservation. The best way of meeting this goal is to increase energy efficiency by applying new technology.” The individual component programs as well as the corporate mission of BTA all support the strategy of increasing energy efficiency by applying new technology. Furthermore, the FY 2003 budget request for each component program also addresses specific NEP recommendations.

The Weatherization Assistance Program request is consistent with the stated Presidential Priority for low-income assistance, and supports the NEP Recommendation that the President increase funding for the Weatherization Assistance Program by \$1.4 billion over ten years. From a base increase of \$77 million appropriated in FY 2002, an increment has been calculated for each of the remaining nine years, which altogether add up to an increase of \$1.4 billion, and, by offsetting annual inflation, enable the weatherization network to maintain a steady production level. The NEP Recommendation also states, “The Department of Energy will have the option of using a portion of those funds to test improved implementation approaches for the weatherization program.” Accordingly, the budget request for Weatherization funds allocated to centralized training and technical assistance anticipates use of a portion of those dollars for such purposes.

There are approximately 27 million households whose income qualifies them for weatherization assistance. These families' energy bills represent 18-20 percent of their income, a burden about four times as high as for other American families. Between 10 to 15 million of these low-income households have dwellings which are good candidates for weatherization upgrades. With the funding requested, the Weatherization Assistance Program will weatherize approximately 123,000 homes annually, saving an average of \$2.10 in energy costs for every dollar invested, over the life of the measures (based on current EIA data).

The request for the State Energy Program (SEP) supports the NEP Recommendation that the Department of Energy pursue improving energy efficiency "through the combined efforts of industry, consumers, and federal, state, and local governments." The SEP request provides funding to all State energy offices to address State-specific priorities, issues and opportunities for improved energy efficiency. Furthermore, DOE is working with the States to implement the SEP Strategic Plan for the 21st Century, emphasizing key goals of market transformation and collaboration with environmental and economic development interests at federal, state and local levels.

This NEP Recommendation is also supported by the requests for the Community Energy Program and the Energy Star Program. Within the Community Energy Program, DOE's Rebuild America is establishing partnerships with states and with public and private entities at the community level, for the pursuit of very specific energy efficiency improvements. DOE's Energy Star activities directly involve the industries producing and selling energy efficient lighting, windows and appliances, and involve states as well.

The requests for the Community Energy Program and Energy Star also support the NEP Recommendation for increased energy information dissemination: The information outreach and training efforts of the Community Energy and Energy Star Programs address the immediate need for additional business and consumer education on currently available highly-efficient appliances and office equipment, replacement building equipment and windows, new home construction, as well as on conservation opportunities in home and commercial buildings operation.

There are 56 State and territorial energy offices, and the State Energy Program (SEP) provides grants to every one of them for planned project activities promoting increased use of energy efficiency and renewable energy. The SEP also provides technical assistance and training to develop State-level capabilities to form collaborative partnerships, to incorporate advanced technologies, and to manage and evaluate the effectiveness of State energy efficiency and renewable energy activities.

The Community Energy Program has components addressing a variety of markets. A major market is existing commercial buildings, which includes over 63 billion square feet of floor space. Rebuild America is providing technical assistance to help its partners upgrade approximately 60 million square feet annually of floor space in schools and commercial buildings and state and local government-owned facilities. Another major market is new school buildings, of which about 6,000 are expected to be built in the next 4-6 years: Rebuild America aims to help over 1,000 school districts by 2005 to build new schools that are 30 percent more energy efficient than energy codes.

Further, the NEP recommends that the Energy Star Program be expanded to include additional, highly energy-efficient products and services, is specifically addressed by the 110 percent increase requested for DOE's Energy Star budget in FY 2003.

Currently, there are approximately 29 million appliances sold each year in the four categories for which DOE has defined and promotes Energy Star specifications: air conditioners, refrigerators, dishwashers and clothes washers. Approximately 17 percent of those sales are Energy Star labeled products. Of the estimated 33 million such products sold annually by 2010, DOE aims to increase the market share for Energy Star to a significant 25 percent.

Management Strategy: The Building Technology Assistance (BTA) Program uses a variety of complementary approaches to attain significant returns on energy savings. The office provides technical assistance and formula grant monies to State and local weatherization agencies, supports Federal/State partnerships, leverages Federal, local, and private funds for maximum effectiveness; focuses services to meet local needs, educates individuals and organizations about energy saving opportunities, provides communities with technical support, training, and assistance, and conducts energy savings demonstrations.

Program Strategic Performance Goals

ER3-1 Weatherization Assistance Program

Will complete weatherization upgrades for 770,900 low-income households through 2008

Performance Indicator

Number of homes weatherized.

Annual Performance Results and Targets

FY 2001 Results	FY 2002 Target	FY 2003 Proposed Target
<ul style="list-style-type: none"> Weatherized 75,340 homes, bringing the total number of homes weatherized to 5.0 million. (GREEN) 	<ul style="list-style-type: none"> Weatherize 105,000 homes, bringing the total number of homes weatherized to 5.1 million. 	<ul style="list-style-type: none"> Weatherize 123,000 homes, bringing the total number of homes weatherized to 5.2 million.

Notes:

1. The annual amount of homes weatherized is based on DOE contributions, the cumulative total includes homes weatherized with DOE and leveraged funds.
2. Homes weatherized results/target based on a States' program year not fiscal year.

ER1-5: State Energy Program

Will Award 280 grants to 56 States and Territories by 2008 to undertake energy technology activities appropriate for states' implementation.

Performance Indicators

- Strong and robust network of State Energy Offices to help reduce energy intensity across the nation
- Timely issuance of grants.
- Effective, well attended regional workshops
- Effective, well attended National Meeting

Annual Performance Results and Targets

FY 2001 Results	FY 2002 Target	FY 2003 Proposed Target
<ul style="list-style-type: none">• Awarded \$37,866,000 in grants to 56 States and Territories to support planning and implementation of state-wide energy programs to address their individual energy situations while contributing to the achievement of national energy goals.• Provided technical assistance to 56 States and Territories to strengthen the State Energy Office network.• Supported 56 States and Territories in continued implementation of the SEP Strategic Plan for the 21st Century.	<ul style="list-style-type: none">• Award \$45,000,000 in grants to 56 States and Territories to support planning and implementation of state-wide energy programs to address their individual energy situations while contributing to the achievement of national energy goals.• Provide technical assistance to 56 States and Territories to strengthen the State Energy Office network.• Support 56 States and Territories in continued implementation of the SEP Strategic Plan for the 21st Century.	<ul style="list-style-type: none">• Award \$38,798,000 in grants to 56 States and Territories to support planning and implementation of state-wide energy programs to address their individual energy situations while contributing to the achievement of national energy goals.• Provide technical assistance to 56 States and Territories to strengthen the State Energy Office network.• Support 56 States and Territories in continued implementation of the SEP Strategic Plan for the 21st Century.

ER1-4: Community Energy Program

Will retrofit of an additional 400 million square feet through *Rebuild America activities*, educate 20 million more consumers through delivery of appropriate energy conservation information, and achieve adoption of upgraded model residential and commercial building energy codes in 20 additional states between 2003 and 2008.

Performance Indicators

- Rebuild partnerships established.
- Millions of square feet of buildings retrofitted.
- Number of states adopting upgraded model building energy codes.
- Number of people trained in code compliance and enforcement.
- Number of BTS internet pages visited by consumers.
- Number of consumers assisted through information clearinghouse (EREC).
- Number of direct mail and newsletter pieces distributed.

Annual Performance Results and Targets

FY 2001 Results	FY 2002 Target	FY 2003 Proposed Target
<ul style="list-style-type: none"> • Established 40 new Rebuild America community partnerships and assist these communities to retrofit 80 million square feet of floor space in K-12 schools, colleges, public housing, state and local governments. • 9 States adopted upgraded 1999 and 2000 model commercial or residential building energy codes. • Trained over 4,000 architects, engineers, builders and code officials on the 1998 and 2000 IECC and Standard 90.1-1999. • 3,196,431 (BTS) internet pages visited by consumers. • 53,349 consumers assisted through information clearinghouse (EREC). 	<ul style="list-style-type: none"> • Establish 40 new Rebuild America community partnerships and assist these communities to retrofit 80 million square feet of floor space in K-12 schools, colleges, public housing, state and local governments. • 4 States will adopt upgraded 2001 and 2000 model commercial or residential building energy codes. • Train 2,000 architects, engineers, builders and code officials on the 2000 IECC and Standard 90.1-2001. • 3,500,000 (BTS) internet pages expected to be visited by consumers. • 58,000 consumers to be assisted through information clearinghouse (EREC). 	<ul style="list-style-type: none"> • Established 40 new Rebuild America community partnerships and assist these communities to retrofit 60 million square feet of floor space in K-12 schools, colleges, public housing, state and local governments. • 4 States will adopt upgraded 2001 and 2003 model commercial or residential building energy codes. • Train 2,000 architects, engineers, builders and code officials on the 2003 IECC and Standard 90.1-2001. • 3,800,000 (BTS) internet pages to be visited by consumers. • 64,000 consumers to be assisted through information clearinghouse (EREC).

FY 2001 Results	FY 2002 Target	FY 2003 Proposed Target
<ul style="list-style-type: none"> 107,436 direct mail and newsletter pieces distributed. 	<ul style="list-style-type: none"> 118,000 direct mail and newsletter pieces to be distributed. 	<ul style="list-style-type: none"> 129,000 direct mail and newsletter pieces to be distributed.

ER1-6: Energy Star

Will achieve a 65 percent market share for ENERGY STAR windows and a 20 percent market share for ENERGY STAR appliances by 2010, compared with approximately 40 percent and 13 percent respectively in 1999.

Performance Indicators

- Maintain existing and recruit new private sector partnerships to increase market share of Energy Star appliances, windows and lighting products.
- Increase the number of Energy Star qualified products by working on consensus criteria with industry creating a higher number of sustainable private sector commitments to the program.

Annual Performance Results and Targets

FY 2001 Results	FY 2002 Target	FY 2003 Proposed Target
<ul style="list-style-type: none"> Recruited 400 new ENERGY STAR partners, bringing the total number of stores marketing ENERGY STAR appliances up to 6,500. 	<ul style="list-style-type: none"> Recruit 500 additional retail stores, 5 additional utilities and 3 additional manufacturers bringing the total number of stores marketing ENERGY STAR appliances to 7,000. 	<ul style="list-style-type: none"> Recruit 500 additional retail stores, 5 additional utilities and 10 additional manufacturers. Add domestic hot water heaters to the program.

Significant Accomplishments and Program Shifts

The Weatherization Assistance Program

DOE implements the Weatherization Assistance Program by providing technical assistance and formula grant monies to State and local weatherization agencies throughout the U.S. The network of approximately 970 local agencies provide the trained crews who perform the weatherization services for eligible low-income households, in single-family homes, multifamily dwellings, and mobile homes. Priority is

given to the elderly, persons with disabilities, families with children, and households with high energy burden. Homes receive a comprehensive energy audit and a cost-effective combination of energy-saving measures. Execution of the Weatherization Assistance Program depends on the participation of states. This information (and the amount of Federal funds provided) for each State is shown in the following table:

Weatherization Assistance Program Funding for 2000

(Last Year for Which Full Data Is Available)

State	2000 Federal DOE Funds	2000 Non-Federal Funds	Source of Non-Federal Funds	State	2000 Federal DOE Funds	2000 Non-Federal Funds	Source of Non-Federal Funds
Alabama	\$1,427,301	\$0		Montana	\$1,505,972	\$1,262,027	Utility Funds
Alaska	\$1,011,006	\$1,000,000	Alaska Housing Finance Agency (State)	Nebraska	\$1,478,552	\$0	
Arizona	\$8,057,061	\$1,662,811	State Funds and Utility Funds	Nevada	\$495,366	\$142,000	Housing Trust Fund
Arkansas	\$1,227,539	\$100,000	State General Funds	New Hampshire	\$894,446	\$0	
California	\$3,731,841	\$0		New Jersey	\$3,030,050	\$2,000,000	Heating System Improvements
Colorado	\$3,248,602	\$2,600,000	Utility Funds	New Mexico	\$1,132,197	\$1,050,000	Utility Funds and State Funds
Connecticut	\$1,486,201	\$1,500,000	Utility Funds	New York	\$11,957,186	\$6,500,000	Leveraged Non-Federal, Utilities, Owner Invest.
Delaware	\$340,923	\$0		North Carolina	\$2,465,323	\$0	
District of Columbia	\$384,980	\$325,000	Utility Funds and Landlord Contributions	North Dakota	\$1,493,353	\$40,000	Utility Funds
Florida	\$1,160,466	\$2,000,000	State Document and Stamp Tax	Ohio	\$8,145,702	\$8,000,000	Utility Funds
Georgia	\$1,735,940	\$800,000	Utility Funds	Oklahoma	\$1,536,365	\$0	

State	2000 Federal DOE Funds	2000 Non-Federal Funds	Source of Non-Federal Funds	State	2000 Federal DOE Funds	2000 Non-Federal Funds	Source of Non-Federal Funds
Hawaii	\$121,246	\$0		Oregon	\$1,672,654	\$997,500	Utility Funds
Idaho	\$1,170,011	\$487,144	Utility Funds and Landlord Contributions	Pennsylvania	\$8,718,522	\$0	
Illinois	\$8,210,049	\$7,500,000	State Supplemental Energy Assistance	Rhode Island	\$685,520	\$200,000	Utility Funds
Indiana	\$3,883,726	\$130,560	Utility Funds and Landlord Contributions	South Carolina	\$1,052,650	\$70,000	Utility Funds
Iowa	\$2,957,797	\$2,135,970	Utility Funds and Landlord Contributions	South Dakota	\$1,136,380	\$0	
Kansas	\$1,500,217	\$0		Tennessee	\$2,478,927	\$0	
Kentucky	\$2,679,526	\$0		Texas	\$3,305,233	\$3,960,984	Utility Funds
Louisiana	\$1,026,468	\$0		Utah	\$1,231,447	\$541,000	Utility Funds; State Funds
Maine	\$1,818,937	\$0		Vermont	\$757,669	\$4,333,443	Utility Funds; Landlord Contributions; State Funds
Maryland	\$1,572,536	\$2,351,151	Utility Funds and CDBG Funds	Virginia	\$2,381,204	\$0	
Massachusetts	\$3,882,059	\$10,000,000	Utility Funds	Washington	\$2,691,555	\$6,762,500	Utility Funds; State Funds
Michigan	\$9,004,806	\$0		West Virginia	\$1,904,073	\$150,000	Utility Funds and Landlord Contributions
Minnesota	\$5,852,382	\$800,000	State Appropriations - State Tax	Wisconsin	\$5,079,583	\$4,500,000	Program Income and Public Benefits
Mississippi	\$977,345	\$70,000	Utility Funds	Wyoming	\$698,399	\$0	
Missouri	\$3,558,957	\$970,000	State General Revenue Funds				
				Total	\$132,700,000	\$74,942,090	

Benefits

The Weatherization Assistance Program will (1) reduce energy costs for low income households, which are disproportionately burdened by utility bills (14.5 percent of these households' income, vs. 3.5 percent of other households' income); (2) benefit local economies by reducing the local impacts of energy price volatility; (3) reduce the need for other public services such as fuel assistance, housing, and health care; (4) improve housing and community conditions.

Energy Savings from BTS Programs

- Beginning in 2003, weatherize approximately 123,000 homes of low-income families saving an average of about \$218 per household annually (in 2000 dollars).

The State Energy Program

The State Energy Program (SEP) supports Federal/State partnerships that transfer energy efficiency technologies to the State and local level through formula grants which allow States to tailor energy efficiency programs to local needs and leverage non-Federal resources. To date, State Energy Offices have been able to leverage their Federal formula grant funding at the rate of \$4 in non-Federal funding for each Federal dollar and, for some activities, as much as \$13 to \$14 in non-Federal funding for each Federal dollar. The SEP also has a component that engages States in helping achieve EERE sector goals, through competitive grants using sector-directed funds. The States collaborated in developing an SEP strategic plan for the 21st century, establishing three key goals. DOE technical assistance will be provided to support implementation of the strategic plan, emphasizing these goals. For each of these three goals, repeated in the section below, DOE's proposed indicator of successful progress, at the budget level requested, is appended in parentheses.

Benefits

The State Energy Program (1) promotes the use of new energy-efficient technologies and practices; (2) leverages Federal, local, and private funds for maximum effectiveness; (3) focuses services to meet local needs; (4) educates individuals and organizations about energy saving opportunities; and (5) provides communities with technical support and assistance.

Energy Savings from SEP

	2005	2010	2020
Total Primary Energy Displaced (Trillion Btu)	26.71	51.14	96.62
Energy Costs or Savings (Millions of \$)	190	374	703
Carbon Equivalent Emissions Displaced (MMTCe)	0.48	0.88	1.64

Source: Estimates based on the GPRA 2001 EERE Database.

Note: Program benefit projections are developed through an impact analysis process undertaken annually by EERE, based on assumptions for future energy markets derived from EIA's annual energy outlook. EERE's sectors analyze the impacts their programs will have on energy savings, energy cost savings, and carbon reductions if all program goals are met, and future energy markets develop as expected. A sample of program benefit estimates are externally reviewed by Arthur D. Little.

The Community Energy Program

The Community Energy Program provides technical assistance, demonstrations, training, and education to communities to accelerate the use of innovative and cost-effective energy technologies, strategies, and methods. The program helps communities, towns, and cities save energy, create jobs, promote economic growth, and protect the environment through improved energy efficiency and less energy intensive building design and operation through Rebuild America partnerships. It also provides financial and technical assistance to States to update and implement their building energy codes.

Rebuild America partnerships are wide-ranging, with partners encompassing mayors' and governors' offices, community and economic development agencies, school boards, citizen conservation groups, building owners/ operators/ financiers, and energy specialists. As illustration, Rebuild America provides schools with a comprehensive portfolio of EERE technologies and works directly with national, state, and local organizations that influence school construction and modernization. The program also assists States and communities in updating and implementing building energy codes to raise minimum energy performance levels for new construction and major renovations. BTS utilizes technical resources and DOE Regional Offices to work with States, local partners, and industry and leverages \$10 for each Federal dollar invested. The Community Energy Program allows local citizens to become active participants in improving their communities. BTS continues to evaluate how best to deliver services to America's communities.

Benefits

In 2010, 293 trillion Btu are expected to be displaced, saving more than \$2.2 billion. The Community Energy Program helps communities improve schools, provide affordable housing reduce government operating costs, revitalize downtown buildings, implement building energy codes, and provide consumers and businesses with information to help them reduce energy costs.

Energy Savings from BTS Programs

The FY 2003 Community Energy Program will displace 21 trillion Btu, saving communities \$137 million. In FY 2010, 293 trillion Btu are expected to be displaced, saving more than \$2.2 billion.

The Energy Star Program

The Energy Star Program is a collaborative effort with the Environmental Protection Agency and industry that provides its trademark name to commercial buildings and equipment, windows and home designs, and appliances that are highly efficient and cost-effective. By identifying and promoting products, equipment and buildings that are typically 20 percent more efficient than the minimum mandated energy efficiency standards or guidelines, the Energy Star Program raises the public's awareness of equipment and appliance energy use and provides easy-to-use information for consumers to make their own energy choices.

The program also raises awareness of some of the products that are developed through technology research in BTS. The Energy Star Program helps increase the market penetration of high efficiency appliances, office equipment, homes, and commercial buildings through consumer education and voluntary industry partnerships. The Program collaborates with manufacturers, retailers, and utilities to identify, label, and promote products, equipment, and buildings that are typically 20 percent more efficient than the minimum mandated energy efficiency standards or guidelines. The strategy is to work with additional manufacturers, utilities, and retailers to expand the joint EPA-DOE Energy Star Program and aggressively raise the public's awareness of equipment and appliance energy use, including results from BRS' R&D projects, such as high-efficiency windows. States have an important role in the Energy Star promotion strategy, and incorporation of Energy Star purchasing is an evolving feature of the State Energy Program as well as the Community Energy Program and the Weatherization Assistance Program.

II. A. Funding Table: BUILDING TECHNOLOGY ASSISTANCE

Program Activity	FY 2001 Comparable Appropriation	FY 2002 Comparable Appropriation	FY 2003 Request	\$ Change	% Change
Weatherization Assistance Program					
Weatherization Assistance	\$ 152,364	\$ 230,000	\$ 277,100	\$ 47,100	20.5%
Technical/Program Management Support	\$ 300	\$ 0	\$ 0	\$ 0	0.0%
Subtotal, Weatherization Assistance Program	\$ 152,664	\$ 230,000	\$ 277,100	\$ 47,100	20.5%
State Energy Program					
State Energy Program	\$ 37,866	\$ 45,000	\$ 38,798	\$ -6,202	-13.8%
Technical/Program Management Support	\$ 50	\$ 0	\$ 0	\$ 0	0.0%
Subtotal, State Energy Program	\$ 37,916	\$ 45,000	\$ 38,798	\$ -6,202	-13.8%
Community Energy Program					
Community Energy Program	\$ 17,756	\$ 18,738	\$ 19,987	\$ 1,249	6.7%
Technical/Program Management Support	\$ 49	\$ 50	\$ 50	\$ 0	0.0%
Subtotal, Community Energy Program	\$ 17,805	\$ 18,788	\$ 20,037	\$ 1,249	6.6%
Energy Star Program					
Energy Star Program	\$ 2,169	\$ 3,000	\$ 6,200	\$ 3,200	106.7%
Total, Building Technology Assistance	<u>\$210,554^a</u>	<u>\$ 296,788</u>	<u>\$ 342,135</u>	<u>\$ 45,347</u>	<u>15.3%</u>

^a/ A total of \$325,000 was reduced from the FY 2001 Building Technology Assistance funding for Small Business Innovative Research (SBIR) activities managed by the DOE Office of Science.

II. B. Laboratory and Facility Funding Table: BUILDING TECHNOLOGY ASSISTANCE

	FY 2001 Comparable Appropriation	FY 2002 Comparable Appropriation	FY 2003 Request	\$ Change	% Change
Argonne National Lab (East)	\$ 29	\$ 41	\$ 48	\$ 7	17.1%
Lawrence Berkeley National Lab	\$ 596	\$ 840	\$ 968	\$ 128	15.2%
National Renewable Energy Lab	\$ 1,192	\$ 1,680	\$ 1,936	\$ 256	15.2%
Oak Ridge National Lab	\$ 2,806	\$ 3,956	\$ 4,560	\$ 604	15.3%
Pacific Northwest National Lab	\$ 3,665	\$ 5,166	\$ 5,955	\$ 789	15.3%
All Others	\$ 202,266	\$ 285,105	\$ 328,668	\$ 43,563	15.3%
Total, Building Technology Assistance.	<u>\$ 210,554</u>	<u>\$ 296,788</u>	<u>\$ 342,135</u>	<u>\$ 45,347</u>	<u>15.3%</u>

III. Performance Summary of Key Activities: BUILDING TECHNOLOGY ASSISTANCE

Program Activity	FY 2001	FY 2002	FY 2003
Weatherization Assistance Program	<p data-bbox="449 334 898 743">Weatherization Assistance Provided State formula grants to weatherize approximately 75,000 low-income homes. Ninety percent of the total Weatherization Assistance Program (WAP) funding was allocated to the States as operating funds for this purpose, i.e. for labor, materials, equipment, administrative systems, etc.</p> <p data-bbox="449 889 898 1295">The other ten percent of the total program funding was allocated for training and technical assistance, to maintain a high standard of technology application, effectiveness, and results. Most of those activities were performed at State and local levels, with \$13,000,000 allocated to States for that purpose. (All 50 States and D.C.) (\$150,700)</p>	<p data-bbox="961 334 1411 821">Weatherization Assistance Provide State formula grants to weatherize approximately 105,000 low-income homes, saving \$2.10 in energy costs for every dollar invested over the life of the measures (based on current EIA data). Ninety percent of the WAP funding is allocated to the States as operating funds for this purpose, i.e. for labor, materials, equipment, administrative systems, etc.</p> <p data-bbox="961 889 1411 1295">The other ten percent of the total program funding is allocated for training and technical assistance, to maintain a high standard of technology application, effectiveness, and results. Most of those activities are performed at State and local levels, with \$19,550,000 allocated to States for that purpose. (\$228,336)</p>	<p data-bbox="1474 334 1923 854">Weatherization Assistance Provide State formula grants to weatherize approximately 123,000 low-income homes, saving \$2.10 in energy costs for every dollar invested over the life of the measures (based on current EIA data). Ninety percent of the total WAP funding will be allocated to the States as operating funds for this purpose, i.e. for labor, materials, equipment, administrative systems, etc.</p> <p data-bbox="1474 889 1923 1295">The other ten percent of the total program funding will be allocated for training and technical assistance, to maintain a high standard of technology application, effectiveness, and results. Most of those activities will be performed at State and local levels, with \$23,615,000 allocated to States for that purpose. (\$273,005)</p>

III. Performance Summary of Key Activities: BUILDING TECHNOLOGY ASSISTANCE

Program Activity	FY 2001	FY 2002	FY 2003
Weatherization Assistance Program (Cont'd)	<p>National and Regional Training and Technical Assistance</p> <p>In line with previous years, 1.5 percent of the total funds were reserved by DOE for training and technical assistance activities that were more cost-effectively performed at regional or national levels. These included work on legislative and regulatory changes for increased program flexibility; technical training materials, conferences and workshops, development of advanced audit tools, and support for expanding State and local capabilities to leverage resources. Management information systems and program evaluation support were also maintained.</p>	<p>National and Regional Training and Technical Assistance</p> <p>In order to effectively support the necessary expansion of the Weatherization network's technical production capacity, enabling it to deliver services to many more low-income households over the ten-year period beginning in FY 2002, DOE has submitted a reprogramming request to correct the allocation of training and technical assistance funds between States and DOE, to resume the historical ratio of 8.5 percent for State activities and 1.5 percent for activities that can be more cost-effectively performed at national/regional levels. With approval of the reprogramming request, DOE will continue to maintain essential management systems and evaluation functions, will continue analytic and technical support functions, will complete projects delayed from previous year, and will work with stakeholders to ensure investment in such critical expansion areas as</p>	<p>National and Regional Training and Technical Assistance</p> <p>DOE will fund training and technical assistance activities that can be more cost-effectively performed at national/regional levels, to support effective program operations by the network of State and local Weatherization agencies. DOE will conduct analysis, measure and document program performance, and promote (e.g. through pilot programs, publications, training programs, workshops and peer exchange) the application of advanced techniques and collaborative strategies to continually improve program effectiveness.</p>

III. Performance Summary of Key Activities: BUILDING TECHNOLOGY ASSISTANCE

Program Activity	FY 2001	FY 2002	FY 2003
Weatherization Assistance Program (Cont'd)	Participants included: ORNL, NREL, Data Tree, and D&R International (\$1,664)	equipment and training for additional crews. Participants include: ORNL, NREL, Data Tree, and D&R International. (\$1,664)	Participants will include: ORNL, D&R, TBD. (\$4,095)
	Technical/Program Management Support		
	<p>Included activities which are integral part of the Weatherization Assistance Program.</p> <p>Representative activities included preparation of program, strategic plans, and operating plans; feasibility studies and trade-off analysis; evaluation of the impact of new legislation on Weatherization Assistance and other programs; analysis of energy issues pertinent to the programs; identification of performance methodologies (including GPRA); collected data to assess program and project performance, efficiency and impacts; and</p>		

III. Performance Summary of Key Activities: BUILDING TECHNOLOGY ASSISTANCE

Program Activity	FY 2001	FY 2002	FY 2003
Weatherization Assistance Program (Cont'd)	development of performance agreements with management. (\$300)		
Total, Weatherization Assistance Program	\$152,664	\$230,000	\$277,100

III. Performance Summary of Key Activities: BUILDING TECHNOLOGY ASSISTANCE

Program Activity	FY 2001	FY 2002	FY 2003
State Energy Program	State Energy Program	State Energy Program	State Energy Program
	<p>Provided grants to 50 States, D.C., and 5 Territories for energy efficiency programs. Supported implementation of SEP Strategic Plan for the 21st Century, addressing key goals of market transformation and collaboration with environmental and economic development interests. Focused technical assistance/training on developing State-level capabilities to use collaborative partnerships. Worked with States, EPA and other appropriate parties to formalize the State Energy Offices' ongoing involvement in meeting EPA Clean Air Act requirements. (\$37,866)</p>	<p>Provide grants to 50 States, D.C., and 5 Territories for energy efficiency programs. Support implementation of SEP Strategic Plan for the 21st Century, addressing key goals of market transformation and collaboration with environmental and economic development interests. Provide technical assistance and training to develop State-level capabilities to form collaborative partnerships and conduct evaluation of the impact of State energy efficiency and renewable energy programs nationwide. (\$45,000)</p>	<p>Provide grants to 50 states, D.C., and 5 territories for energy efficiency programs. Support implementation of SEP Strategic Plan for the 21st Century, addressing key goals of market transformation and collaboration with environmental and economic development interests. Provide technical assistance and training to develop State-level capabilities to form collaborative partnerships and conduct evaluation of the impact of State energy efficiency and renewable energy programs nationwide. (\$38,798)</p>
	<p>Participants included: States, ORNL, NREL, Data Tree.</p>	<p>Participants include: States, Data Tree, NREL, ORNL.</p>	<p>Participants include: States, Data Tree, NREL, ORNL.</p>
	Special Project State Grants	Special Project State Grants	Special Project State Grants
	<p>Awarded more than 100 Special Project State Grants to states on a cost-shared competitive basis to help deploy end-use sector</p>	<p>Award Special Project State Grants to states on a competitive, cost-shared basis to help deploy end-use sector technologies in the following</p>	<p>Award Special Project State Grants to states on a competitive, cost-shared basis to help deploy end-use sector technologies in the following</p>

III. Performance Summary of Key Activities: BUILDING TECHNOLOGY ASSISTANCE

Program Activity	FY 2001	FY 2002	FY 2003
State Energy Program (Cont'd)	technologies in the following EERE programs (shown here for information, but funded in the individual programs):	EERE programs (shown here for information, but funded in the individual programs):	EERE programs (shown here for information, but funded in the individual programs):
	Building Technology, State and Community Programs: Building America \$300, Rebuild America \$1,200, Updating and implementing State Building Energy Codes \$4,200;	Building Technology, State and Community Programs: Building America \$300, Rebuild America \$2,500, Updating and implementing State Building Energy Codes \$1,800;	Building Technology, State and Community Programs: Rebuild America \$3,000, Updating and implementing State Building Energy Codes \$1,855;
	Federal Energy Management Program: \$400;	Federal Energy Management Program: \$500;	Federal Energy Management Program: \$500;
	Industrial Technologies: Industries of the Future - Specific \$1,340, Industries of the Future - Crosscutting \$1,460;	Industrial Technologies: Industries of the Future - Specific \$1,440, Industries of the Future - Crosscutting \$1,560;	Industrial Technologies: Industries of the Future - Specific \$1,340, Industries of the Future - Crosscutting \$1,460;
	Transportation Technologies: Clean Cities \$3,800	Transportation Technologies: Clean Cities \$4,500	Transportation Technologies: Clean Cities \$3,500
	Power Technologies: Renewable Energy Resources \$1,750.	Power Technologies: Renewable Energy Resources \$5,900.	Power Technologies: Renewable Energy Resources \$5,900.
	Subtotal, Energy Conservation (\$12,700)	Subtotal, Energy Conservation (\$12,600)	Subtotal, Energy Conservation (\$11,655)
	Subtotal, Renewable Energy Resources. (\$1,750)	Subtotal, Renewable Energy Resources. (\$5,900)	Subtotal, Renewable Energy Resources. (\$5,900)

III. Performance Summary of Key Activities: BUILDING TECHNOLOGY ASSISTANCE

Program Activity	FY 2001	FY 2002	FY 2003
State Energy Program (Cont'd)	Total, SEP Special Projects State Grants \$14,450.	Total, SEP Special Projects State Grants \$18,500.	Total, SEP Special Projects State Grants \$17,555.
	<p>Technical/Program Management Support Included activities which are integral part of the State Energy Program. Representative activities included preparation of program, strategic plans, and operating plans; feasibility studies and trade-off analysis; evaluation of the impact of new legislation on Weatherization Assistance, Community Energy, and Energy Star programs; analysis of energy issues pertinent to the programs; identification of performance methodologies (including GPRA); collected data to assess program and project performance, efficiency and impacts; and development of performance agreements with management. (\$50)</p>		
Total, State Energy Program	\$37,916	\$45,000	\$38,798

III. Performance Summary of Key Activities: BUILDING TECHNOLOGY ASSISTANCE

Program Activity	FY 2001	FY 2002	FY 2003
Community Energy Program	<p data-bbox="443 329 898 1235">Rebuild America Established 100 new Rebuild America community partnerships and assist these communities to retrofit 100 million square feet of floor space in K-12 schools, colleges, public housing, state and local governments, and commercial buildings. Assisted these communities to increase use of innovative and cost-effective building technologies, strategies, and practices through energy-saving programs that respond to their own circumstances and goals. Assistance included outreach materials; workshops; tools and training on advanced technologies, financing options, affordable housing, volume purchasing, highly reflective surfaces, and the construction and retrofit process; and design assistance.</p> <p data-bbox="443 1279 842 1461">Documented the success of 80 community energy projects for dissemination to other communities. Established a national network of Rebuild</p>	<p data-bbox="953 329 1409 1198">Rebuild America Establish 50 new Rebuild America community partnerships and assist these communities to retrofit 80 million square feet of floor space in schools and commercial buildings and state and local government-owned facilities. Overcome information barriers by providing web-based training, decision tools, and case studies that increase the market demand for energy efficient products, and project development and financing services while making building owners better informed buyers. Apply BTS whole-buildings research to Rebuild America building energy projects. Partner with national organizations, manufacturers, utilities, and the energy service industry to leverage resources.</p>	<p data-bbox="1463 329 1919 1425">Rebuild America Help over 400 existing partnerships upgrade 80 million square feet of floor space in schools and commercial buildings and state and local government-owned facilities. Expand into healthcare, grocery, and restaurant facilities to support Energy Star label. Overcome information barriers by providing web-based training, decision tools, and case studies that increase the market demand for energy efficient products, and project development and financing services while making building owners better informed buyers. Apply BTS whole-buildings research to Rebuild America building energy projects. Partner with national organizations, manufacturers, utilities, and the energy service industry to leverage resources. By 2005, assist over 1,000 school districts build new schools that are 30% more efficient than energy codes. Energy cost savings can help hire teachers or buy computers and books.</p>

III. Performance Summary of Key Activities: BUILDING TECHNOLOGY ASSISTANCE

Program Activity	FY 2001	FY 2002	FY 2003
Community Energy Program (Cont'd)	<p>America partnerships to accelerate the transfer of best practices, lessons learned, and resources among partnerships. Promoted the Energy Star building label for completed retrofit projects through Rebuild America partners. Increased education and outreach activities with Rebuild America industry partners, e.g. utilities, energy service companies, and major equipment manufacturers.</p>		
	<p>Using Rebuild America partnerships, continued to support K-12 schools. Discontinued the separate EnergySmart Schools initiative. Activities included: targeting the school sector within existing and new Rebuild America community partnerships; developing strategic partnerships with national organizations representing policy, facility, and business officials; identifying best practices in school renovation and new school design; demonstrating advanced technologies; and developing energy specifications for school design and construction.</p>		

III. Performance Summary of Key Activities: BUILDING TECHNOLOGY ASSISTANCE

Program Activity	FY 2001	FY 2002	FY 2003
Community Energy Program (Cont'd)	(Included \$1,200 for the State Energy Program Special Project State Grants)	(Includes \$2,500 for the State Energy Program Special Project State Grants)	(Includes \$3,000 for the State Energy Program Special Project State Grants)
	Participants included: LBNL, ORNL, PNNL, ANL, NREL, American Public Power Association, US Conference of Mayors. (\$10,759)	Participants include: ORNL, PNNL, LBNL, Association of State Energy Officials, National Association of Energy Service Companies. (\$11,938)	Participants include: ORNL, PNNL, LBNL, National Association of State Energy Officials, National Association of Energy Service Companies. (\$12,723)
	Information Outreach	Information Outreach	Information Outreach
	Increased efforts that target builders, homeowners, and building owners by providing information and education materials on energy efficiency through a variety of media outlets to help them make the best decisions related to new construction, renovations, and purchasing of products.	Focus outreach efforts to homeowners and homebuilders by providing information and education materials on energy efficiency to media outlets and other business communication channels. The effort is designed to help the target audiences make the best decisions related to new construction, renovations and purchasing of products.	Information-outreach is essential to overcome information barriers in the marketplace and to allow consumers and businesses to make informed purchasing decisions. FY 2003 communication campaigns will target three key markets; consumers, home builders, and school officials.
	Participants included: NREL, ORNL. (\$793)	Participants included: NREL, ORNL, Others TBD. (\$2,500)	Participants included: NREL, ORNL, Others TBD (\$2,409)

III. Performance Summary of Key Activities: BUILDING TECHNOLOGY ASSISTANCE

Program Activity	FY 2001	FY 2002	FY 2003
Community Energy Program (Cont'd)	<p data-bbox="447 334 905 440">Training and Assistance for State and Federal Building Energy Codes</p> <p data-bbox="447 488 905 1122">Provided technical and financial assistance to support the updating and implementation of State and Federal building energy codes. Completed updating core code compliance and training materials and tools to incorporate the provisions of the 1999 edition of Standard 90.1 for commercial buildings and the 2000 edition of the International Energy Conservation Code (IECC) for residential buildings. Trained approximately 4,000 code officials, designers, and builders on the 2000 ECC via Train-the-Trainer and distance learning.</p> <p data-bbox="447 1382 905 1448">Participants included: PNNL, International Council of Building</p>	<p data-bbox="959 334 1417 440">Training and Assistance for State and Federal Building Energy Codes</p> <p data-bbox="959 488 1417 1122">Provide technical and financial assistance to States to update and implement their energy codes to meet Standard 90.1-1999 for commercial buildings and the 2000 IECC for residential buildings. Train approximately 2,000 code officials, designers and builders to implement these codes. Update core code compliance and training materials and tools to incorporate the provisions of the 2001 edition of Standard 90.1 and initiate the updating of core code compliance and tools to incorporate the provisions of the Federal residential code and the 2003 IECC.</p> <p data-bbox="959 1382 1417 1448">Participants include: PNNL, International Council of Building</p>	<p data-bbox="1472 334 1929 440">Training and Assistance for Building Energy Codes and Advanced Building Practices</p> <p data-bbox="1472 488 1929 1349">Provide technical and financial assistance to States to update and implement their energy codes to meet the 2001 edition of Standard 90.1 for commercial buildings and the 2003 edition of the International Energy Conservation Code for residential buildings. Train approximately 1,000 code officials, designers, and builders to implement these codes. Update and improve core materials and code compliance software to reflect recent changes in the model energy codes and emerging energy efficiency technologies. Builder Training: Develop a comprehensive training program, including building codes, to transfer Building America lessons learned (beyond code) to home builders in selected fast growing markets for home construction.</p> <p data-bbox="1472 1382 1929 1448">Participants include: PNNL, International Council of Building</p>

III. Performance Summary of Key Activities: BUILDING TECHNOLOGY ASSISTANCE

Program Activity	FY 2001	FY 2002	FY 2003
Community Energy Program (Cont'd)	Officials (ICBO), ASHRAE, and BCAP. (Includes \$4,200 for the State Energy Program Special Project State Grants) (\$6,204)	Officials (ICBO), ASHRAE, and BCAP. (Includes \$1,800 for the State Energy Program Special Project State Grants) (\$4,300)	Officials (ICBO), ASHRAE. (Includes \$1,855 for State code grants) (\$4,855)
	<p>Technical/Program Management Support</p> <p>Included activities which are integral part of the Community Energy Program. Representative activities included preparation of program, strategic plans, and operating plans; feasibility studies and trade-off analysis; evaluation of the impact of new legislation on Weatherization Assistance, State Energy, and Energy Star programs; analysis of energy issues pertinent to the programs; identification of performance methodologies (including GPRA); collected data to assess program and project performance, efficiency and impacts; and development of performance agreements with management. (\$49)</p>	<p>Technical/Program Management Support</p> <p>Includes activities which will be an integral part of the distributed generation technology development program. Representative activities include preparation of program, strategic plans, and operating plans; R&D feasibility studies and trade-off analysis; evaluation of the impact of new legislation on R&D programs; analysis of energy issues pertinent to the R&D program; development of communication tools; identification of performance measures and methodologies (including GPRA); data collection to assess program and project performance, efficiency and impacts; and development of performance agreements with management. (\$50)</p>	<p>Technical/Program Management Support</p> <p>Will include activities which will be an integral part of the distributed generation technology development program. Representative activities will include preparation of program, strategic plans, and operating plans; R&D feasibility studies and trade-off analysis; evaluation of the impact of new legislation on R&D programs; analysis of energy issues pertinent to the R&D program; development of communication tools; identification of performance measures and methodologies (including GPRA); data collection to assess program and project performance, efficiency and impacts; and development of performance agreements with management. (\$50)</p>

III. Performance Summary of Key Activities: BUILDING TECHNOLOGY ASSISTANCE

Program Activity	FY 2001	FY 2002	FY 2003
Total, Community Energy Program	\$17,805	\$18,788	\$20,037
Energy Star Program	<p>Energy Star Program</p> <p>Expanded the Energy Star product portfolio by developing a commercial Energy Star window specification with industry and converting three Federal product recommendations into Energy Star products. Converted the Federal Energy Management Program (FEMP)-produced product recommendations increased the purchase of energy-efficient products, extending the benefits beyond the Federal market. Phased in the new qualifying levels for Energy Star refrigerators and established higher energy efficiency qualifying levels for Energy Star room air conditioners. Based on the sales data developed in FY 1999, increased market share of Energy Star appliances by 5 percent over the FY 2000 level.</p>	<p>Energy Star Program</p> <p>Develop draft criteria for a commercial Energy Star window specification. Begin the development of an Energy Star specification for domestic hot water heaters. Work with the Building Research and Standards Program and industry partners to resolve outstanding testing and specification issues on dishwashers and other appliances. Coordinate with EPA on scheduling of future products deemed ready for Energy Star specifications.</p> <p>Increase targeted promotional and consumer education activities with over 1,300 existing and emerging utility, manufacturing, and retail partners. Increase emphasis with the existing established state and regional groups to integrate</p>	<p>Energy Star Program</p> <p>The NEP recommends expanding a variety of federal energy awareness programs, including the voluntary Energy Star program that is intended to help consumers pick out more energy efficient appliances. Funding is requested for Energy Star to expand consumer interest in energy efficient appliances and windows and add hot water heaters to the Energy Star label. This funding will result in the following impacts:</p> <p>Promote energy-efficiency upgrade path for the homes of middle-income families</p> <p>Increase market share for Energy Star appliances to 20% by 2005 & 25% by 2010, compared to 17% in 2001</p>

III. Performance Summary of Key Activities: BUILDING TECHNOLOGY ASSISTANCE

Program Activity	FY 2001	FY 2002	FY 2003
Energy Star Program (Cont'd)	<p>Recruited 5 additional utility partners, in the Southeast and Southwest U.S., to promote ENERGY STAR products and an additional 160 partners to promote ENERGY STAR windows. Recruited an additional 500 retail stores to label ENERGY STAR appliances. Worked with two manufacturers to incorporate the ENERGY STAR logo into the FTC label. Collaborated with EPA to increase consumers' awareness of the benefits and cost savings of energy-efficient appliances and products by promoting the ENERGY STAR building label, educating consumers about the benefits of replacing inefficient residential appliances, and providing technical assistance and software tools to manufacturers.</p> <p>Continued support of the Efficient Windows Collaborative regional initiatives, including the Sunbelt Project, provided technical assistance to architects, builders, and manufacturers in their application and development of</p>	<p>ENERGY STAR into their energy efficiency programs. Update materials for partners for use in their own training programs. Coordinate with EPA on website functionality, partner database and cross-promotional materials.</p> <p>The Efficient Windows Collaborative has been transferred to the Windows research area and is no longer supported by the ENERGY STAR program.</p>	<p>By 2010 increases market share for Energy Star windows to 40%, compared to 25% in 2001</p> <p>Add water heaters to the program in 2003.</p> <p>Enables the addition of commercial HVAC equipment by 2005, reducing peak demand in the mid-term.</p> <p>The Efficient Windows Collaborative was transferred to the Windows research area in FY 2002 and is no longer supported by the ENERGY STAR program.</p>

III. Performance Summary of Key Activities: BUILDING TECHNOLOGY ASSISTANCE

Program Activity	FY 2001	FY 2002	FY 2003
Energy Star Program (Cont'd)	<p>advanced window products. The Collaborative promoted wider participation in the ENERGY STAR windows program.</p> <p>Participants included: ASE, ORNL, D&R, ADL, and Gallup. (\$2,169)</p>	<p>Participants include: ASE, ORNL, D&R, ADL, and Gallup. (\$3,000)</p>	<p>Participants include: ASE, ORNL, D&R, ADL, and Gallup. (\$6,200)</p>
Total, Energy Star Program	\$2,169	\$3,000	\$6,200
Total, Building Technology Assistance	\$210,554	\$296,788	\$342,135

BUILDING TECHNOLOGIES
BUILDING TECHNOLOGY, STATE, AND COMMUNITY SECTOR
(Dollars in Thousands)

COOPERATIVE PROGRAMS WITH STATES

I. Mission Supporting Goals and Objectives

Mission: The Cooperative Programs with States pursues collaborative applied research, development, and demonstration (RD&D) that accelerate the use of clean energy technologies. Collaborating with states can provide opportunities to leverage funding for RD&D that might not otherwise receive adequate support at either the Federal or the State level.

Summary: Collaborating with states provides opportunities to leverage funding for important RD&D that might not otherwise receive adequate support at either the Federal or the State level. These joint efforts, both in applied research and technology field tests, maximize the benefits of clean and efficient building technologies. In the buildings sector, the competitive grants awarded in FY 2001 continue to accelerate the feasibility of new technologies that improve the energy efficiency of school facilities. The need for advanced technologies and design strategies in both new and existing schools is great.

Context: As a result of a slow start for this new program in FY 2000, the project performers funded in FY 2000 and FY 2001 has continued work into FY 2001 and FY 2002, respectively. However, the returns from this activity do not appear to be as high as from other activities, and due to the need to accommodate higher priority activities, no additional funds will be requested in FY 2003.

Management Strategy: DOE pursues this mission by entering into cooperative agreements with State energy offices, organizations that represent State energy offices, state energy research entities, and organizations that represent state energy research entities. These organizations are encouraged to enter teaming arrangements with industry, DOE national laboratories, institutions of higher education, non-profit organizations, and Native American organizations.

II. A. Funding Table: COOPERATIVE PROGRAMS WITH STATES

Program Activity	FY 2001	FY 2002	FY 2003	\$ Change	% Change
Cooperative Program with States	\$1,964 ^a	\$ 2,000	\$ 0	\$ (2,000)	-100.0%

a/ A total of \$32,000 was reduced from the FY 2001 Cooperative Programs with States funding for Small Business Innovative Research (SBIR) activities managed by the DOE Office of Science.

II. B. Laboratory and Facility Funding Table: COOPERATIVE PROGRAMS WITH STATES

	FY 2001	FY 2002	FY 2003	\$ Change	% Change
All Other	\$ 1,964	\$ 2,000	\$ 0	\$ -2,000	-100.0%
Total, Cooperative Program with States	\$ 1,964	\$ 2,000	\$ 0	\$ -2,000	-100.0%

III. Performance Summary: COOPERATIVE PROGRAMS WITH STATES

Program Activity	FY 2001	FY 2002	FY 2003
Cooperative Programs with States	<p>Cooperative Programs With States</p> <p>Awarded cooperative agreements with state organizations under a competitive solicitation to accelerate the adoption of new energy-efficient technologies. These projects conducted applied research and field test projects through an integrated buildings approach in a range of technology areas, such as daylighting, indoor air quality, and thermal distribution. The results of these efforts communicated to researchers, engineers, facility managers, and others to promote continued technology improvement, and commercial application. (\$1,964)</p>	<p>Cooperative Programs With States</p> <p>Award cooperative agreements with state organizations under a competitive solicitation to accelerate the adoption of new energy-efficient technologies. These projects will conduct applied research and field test projects through an integrated buildings approach in a range of technology areas, such as daylighting, indoor air quality, and thermal distribution. The results of these efforts will be communicated to researchers, engineers, facility managers, and others to promote continued technology improvement, and commercial application. (\$2,000)</p>	<p>Cooperative Programs With States</p> <p>As a part of EERE's ongoing program evaluation activities, this program will be rebaselined in FY 2003 based on the results of projects completed during FY 2001 and FY 2002. For this reason, no additional funds are requested in FY 2003. (\$0)</p>
TOTAL, COOPERATIVE PROGRAMS WITH STATES	\$1,964	\$2,000	\$0

BUILDING TECHNOLOGIES
BUILDING TECHNOLOGY, STATE AND COMMUNITY SECTOR
(Dollars in Thousands)

ENERGY EFFICIENCY SCIENCE INITIATIVE

I. Mission Supporting Goals and Objectives

Mission: The Energy Efficiency Science Initiative (EESI) seeks to identify and fund “bridging” research and development (R&D) that falls between fundamental exploratory science and pre-commercial applied R&D.

Summary: By stimulating R&D that maximizes synergies among different research fields, technologies, investigator communities, and end-use applications, this initiative expands EERE’s R&D activities among energy efficiency technologies. It also cuts across traditional energy end-use sectors by emphasizing distributed power generation applications for industrial and buildings systems, transportation, and stationary power.

Context: This initiative expands on existing cooperative efforts with the DOE Office of Fossil Energy in areas such as natural gas-fueled turbine and fuel cell technologies, combined heat, power and cooling applications, hydrogen production, and carbon emission sequestration. This effort also involves coordination with the DOE Office of Science in pursuing follow-on research in areas critical to energy efficiency and clean energy development, such as basic biosciences, plant genetics, photo emission, heat transfer, new materials, catalysts, and computational science. The awards are generally small, and universities, small businesses, national labs (not as the lead), and industry (as appropriate) are all eligible to participate in this initiative.

Management Strategy: In FY 2001, this program completed its second year. Projects funded to date have been performed in collaboration with academia in partnership with the National Laboratories. As a result of a slow start for this new program in FY 2000, the project performers funded in FY 2000 and FY 2001 have continued work into FY 2001 and FY 2002, respectively. Due to the need to accommodate higher priority activities, no additional funds will be requested in FY2003.

II. A. Funding Table: ENERGY EFFICIENCY SCIENCE INITIATIVE

Program Activity	FY 2001	FY 2002	FY 2003	\$ Change	% Change
Energy Efficiency Science Initiative	\$3,828 ^a	\$4,000 ^b	\$ 0	\$ -4,000	-100.0%

a/ A total of \$63,000 was reduced from the FY 2001 Energy Efficiency Science Initiative funding for Small Business Innovative Research (SBIR) activities managed by the DOE Office of Science.

b/ Does not yet reflect FY 2002 Interior and Related Agencies Appropriation (P.L. 107-63) language directing that 50 percent of Energy Efficiency Science Initiative funds for FY 2002 (\$2,000,000) and beyond shall be made available to the DOE Fossil Energy Research and Development account.

II. B. Laboratory and Facility Funding Table: ENERGY EFFICIENCY SCIENCE INITIATIVE

	FY 2001	FY 2002	FY 2003	\$ Change	% Change
All Other	\$ 3,828	\$ 4,000	\$ 0	\$ -4,000	-100%
Total, Energy Efficiency Science Initiative . . .	<u>\$ 3,828</u>	<u>\$ 4,000</u>	<u>\$ 0</u>	<u>\$ -4,000</u>	<u>-100%</u>

III. Performance Summary: ENERGY EFFICIENCY SCIENCE INITIATIVE

Program Activity	FY 2001	FY 2002	FY 2003
Energy Efficiency Science Initiative	Energy Efficiency Science Initiative <p>As part of the continuing initiative to support R&D to bridge the gap between fundamental exploratory science and pre-commercial applied R&D, EERE conducted a follow-on strategic visioning workshop (e-vision 2001). This workshop built on the tremendous technology possibilities identified during e-vision 2000, and will broaden the understanding of the proposed options for the Nation's energy future. In succeeding years, it is expected that the e-vision workshops will be conducted biennially. Up to 5 research projects were awarded as a follow-on to recommendations from e-vision 2000. Additionally, funded approximately 10 to 20 cooperative agreements with research and development teams, which are being led by universities and include industrial, national laboratory and other partners. The cooperative agreements focus on industrial sector fundamental strategic R&D, as contained in the visions and roadmaps for the nine Industries of</p>	Energy Efficiency Science Initiative <p>In collaboration with the DOE Office of Fossil Energy, a single award solicitation will be issued to address technology gaps between exploratory science and pre-commercial applied R&D. (\$4,000)</p>	Energy Efficiency Science Initiative <p>As a part of EERE's ongoing program evaluation activities, this program is being rebaselined in FY 2003 on the results of projects completed during FY 2001 and FY 2002. For this reason, no additional funds are requested in FY 2003. (\$0)</p>

Program Activity

FY 2001

FY 2002

FY 2003

the Future. (\$3,828)

**TOTAL,
ENERGY
EFFICIENCY
SCIENCE
INITIATIVE**

\$3,828

\$4,000

\$0

BUILDING TECHNOLOGIES
BUILDING TECHNOLOGY, STATE, AND COMMUNITY SECTOR
(Dollars in Thousands)

MANAGEMENT AND PLANNING

I. Mission Supporting Goals and Objectives

Mission: The BTS Office of Management and Planning provides the information, analyses, and personnel necessary to skillfully conduct the Building Sector program.

Context: Management and Planning provides a well-planned and efficiently-managed program that will lead to the achievement of the BTS Strategic Plan and building sector goals in the most cost-effective manner possible. Effective management requires efficient organizational design, adequate human resources, sufficient and high quality information, and good communication, both within the organization and with outside parties. A solid analytical foundation is basic to understanding the potential for increasing the penetration of energy-efficient and renewable technologies in the building sector, and for achieving the correct balance and direction of programmatic activities. The Management and Planning Program will provide this foundation by carrying out its mission through Evaluation, Planning, and Analysis and Program Direction functions necessary to effectively guide and support all BTS programs.

Strategic Approach: Management and Planning will collect data, develop analytical tools and models, and conduct analyses required for program planning, prioritization, and management. In addition, customer-focused services are provided for State and local grants programs and regional planning, as well as services to in-state customers. The organization maintains strong capabilities in data analysis and model development to ensure that decisions regarding program direction and resource allocation are guided by the best possible information. Analytical capabilities and the supporting database are continually refined and strengthened to improve the information available for program guidance decisions and to better evaluate the energy, economic, and environmental impacts of programmatic alternatives.

Program Direction provides BTS' personnel to manage the sector programs. It includes salaries, benefits, travel, and support for 73 FTEs located at DOE headquarters in Washington; additionally it provides critical infrastructure support such as LAN hardware, software, operation, and maintenance. These efforts support EERE's goal of continuously demonstrating managerial and operation excellence.

II. A. Funding Table: MANAGEMENT AND PLANNING

Program Activity	FY 2001 Comparable	FY 2002 Comparable	FY 2003 Request	\$ Change	% Change
Evaluation, Planning, and Analysis	\$ 4,910	\$ 4,528	\$ 4,528	\$ 0	0.0%
Program Direction	\$ 9,223	\$ 10,562	\$ 9,565	\$ -997	-9.4%
Total, Management and Planning	<u>\$ 14,133</u>	<u>\$ 15,090</u>	<u>\$ 14,093</u>	<u>\$ -997</u>	<u>-6.6%</u>

II. B. Laboratory and Facility Funding Table: MANAGEMENT AND PLANNING

	FY 2001 Comparable	FY 2002 Comparable	FY 2003 Request	\$ Change	% Change
Brookhaven National Lab	\$ 0	\$ 0	\$ 0	\$ 0	0.0%
Lawrence Berkeley Lab	\$ 50	\$ 53	\$ 50	\$ -3	-5.7%
National Renewable Energy Lab	\$ 135	\$ 145	\$ 135	\$ -10	-6.9%
Oak Ridge National Lab	\$ 615	\$ 656	\$ 613	\$ -43	-6.6%
Pacific Northwest Lab	\$ 1,523	\$ 1,626	\$ 1,519	\$ -107	-6.6%
All Other	\$ 11,810	\$ 12,610	\$ 11,776	\$ -834	-6.6%
Total, Management and Planning	<u>\$ 14,133</u>	<u>\$ 15,090</u>	<u>\$ 14,093</u>	<u>\$ -997</u>	<u>-6.6%</u>

III. Performance Summary: MANAGEMENT AND PLANNING

Program Activity	FY 2001	FY 2002	FY 2003
Evaluation, Planning and Analysis	<p data-bbox="453 302 905 915">Evaluation, Planning and Analysis</p> <p data-bbox="453 418 905 915">Developed, organized, interpreted, and disseminate the basic data required to implement energy policy for buildings and to plan, manage, and evaluate the BTS program. Activities supported include portfolio analysis, GPRA evaluation of benefits and accomplishments, and analysis of emerging trends in buildings energy use. Provided guidance and direction to implement BTS' Strategic Plan.</p> <p data-bbox="453 961 905 1455">Collaborated with EIA to refine and update buildings energy use data. Conducted topical analyses on research needs and opportunities, regulatory and technology deployment opportunities, international technology and program opportunities. Evaluated the potential carbon and pollution savings and associated costs and employment impacts of BTS programs and the impacts of utility restructuring on the building sector,</p>	<p data-bbox="961 302 1413 837">Evaluation, Planning and Analysis</p> <p data-bbox="961 418 1413 837">Conduct program evaluation and planning by developing, interpreting and disseminating the basic data required to implement energy policy for buildings and to plan, manage and evaluate BTS programs, including the continued collaboration with EIA on buildings energy use data. Responsible for the execution of NAPA Implementation Plan.</p>	<p data-bbox="1478 302 1929 1185">Evaluation, Planning and Analysis</p> <p data-bbox="1478 418 1929 1185">Conduct program evaluation and planning by developing, interpreting and disseminating the basic data required to implement energy policy for buildings and to plan, manage and evaluate BTS programs, including the continued collaboration with EIA on buildings energy use data. Conduct crosscutting studies and analyses on topics of emerging importance, internal to BTS and in coordination with EERE, other DOE organizations, and external organizations, as required. Coordinate BTS activities related to implementation of the National Energy Policy. Responsible for the execution of the BTS NAPA Implementation Plan.</p>

III. Performance Summary: MANAGEMENT AND PLANNING (Cont'd)

Program Activity	FY 2001	FY 2002	FY 2003
Evaluation, Planning and Analysis (Cont'd)	<p>and other subjects as appropriate.</p> <p>Continued the evaluation of all BTS programs.</p> <p>Participants included: PNNL, LBNL, BNL. (\$1,527)</p>	<p>Participants include: PNNL, LBNL, BNL. (\$1,925)</p>	<p>Participants include: PNNL, LBNL, BNL. (\$1,925)</p>
	<p>Support for State and Local Grant Programs</p>	<p>Support for State and Local Grant Programs</p>	<p>Support for State and Local Grant Programs</p>
	<p>Provided technical assistance to State partners in areas such as utility restructuring, newly developed energy efficiency technologies, and urban/regional planning for sustainability. Continued to foster strengthened partnerships between EERE end-use sector offices and the States through activities that support the successful implementation of the Special Project State Grants. Supported evaluation study to assess impacts of the State Energy Program at the State level and nationwide. Supported program oversight, provided State Energy Advisory Board support, and</p>	<p>Provide technical assistance to State partners in areas such as utility restructuring, newly developed energy efficiency technologies, and urban/regional planning for sustainability. Continue to foster strengthened partnerships between EERE end-use sector offices and the States through activities that support the successful implementation of the Special Project State Grants. Support evaluation study to assess impacts of the State Energy Program at the State level and nationwide. Support program oversight, provide State Energy Advisory Board support, and respond to Congressionally</p>	<p>Provide technical assistance to State partners in areas such as utility restructuring, newly developed energy efficiency technologies, and urban/regional planning for sustainability. Continue to foster strengthened partnerships between EERE end-use sector offices and the States through activities that support the successful implementation of the Special Project State Grants. Support evaluation study to assess impacts of the State Energy Program at the State level and nationwide. Support program oversight, provide State Energy Advisory Board support, and</p>

III. Performance Summary: MANAGEMENT AND PLANNING (Cont'd)

Program Activity	FY 2001	FY 2002	FY 2003
Evaluation, Planning and Analysis (Cont'd)	<p>responded to Congressionally mandated reporting requirements. Participants included: Atlanta Regional Office (RO), Boston RO, Chicago RO, Denver RO, Philadelphia RO, San Francisco RO, ORNL, NREL, Data Tree. (\$2,933)</p> <p>Provided critical technical and program management support services. (\$450)</p>	<p>mandated reporting requirements. Participants include: Atlanta Regional Office (RO), Boston RO, Chicago RO, Denver RO, Philadelphia RO, San Francisco RO, ORNL, NREL, Data Tree. (\$2,353)</p> <p>Provided critical technical and program management support services. (\$250)</p>	<p>respond to Congressionally mandated reporting requirements. Participants include: Atlanta Regional Office (RO), Boston RO, Chicago RO, Denver RO, Philadelphia RO, San Francisco RO, ORNL, NREL, Data Tree. (\$2,353)</p> <p>Provided critical technical and program management support services. (\$250)</p>
Total, Evaluation, Planning, and Analysis	\$4,910	\$4,528	\$4,528

Program Direction			
	The following is a breakdown of the funding by Object Class:	The following is a breakdown of the funding by Object Class:	The following is a breakdown of the funding by Object Class:
	<p>11.9 Personnel compensation \$ 7,407</p> <p>12.1 Civilian personnel benefits \$ 1,625</p> <p>21.0 Travel and transportation of persons \$ 490</p> <p>25.0 Other contractual services \$ 50</p>	<p>11.9 Personnel compensation \$ 7,363</p> <p>12.1 Civilian personnel benefits \$ 1,620</p> <p>21.0 Travel and transportation of persons \$ 460</p> <p>25.0 Other contractual services \$1,119</p>	<p>11.9 Personnel compensation \$ 6,114</p> <p>12.1 Civilian personnel benefits \$ 1,528</p> <p>21.0 Travel and transportation of persons \$ 490</p> <p>25.0 Other contractual services \$ 1,433</p>
	Provided salaries with cost of living increase, benefits, travel, and support usage of 75 FTEs to manage Building Technology,	The request provides salaries with cost of living increase, benefits, travel for 76 FTEs to manage Building Technology, State	The request provides salaries with cost of living increase, benefits, travel for 73 FTEs to manage Building Technology, State, and

III. Performance Summary: MANAGEMENT AND PLANNING (Cont'd)

Program Activity	FY 2001	FY 2002	FY 2003
Program Direction (Cont'd)	<p>State and Community programs, including responsibilities under the Energy Policy Act of 1992 (Budgeted 81 FTE). Total obligational authority of \$9,572,000 includes an estimated \$1,829,000 of FY 2000 unobligated carryover in Program Direction to cover FY 2001 requirements. Also, activities included systematic analysis of critical staffing needs within the context of current and projected R&D program missions and the development of a comprehensive plan to focus on building and sustaining a talented and diverse workforce of R&D Technical Managers. (\$7,743)</p> <p>TRANSFER FROM: Residential Buildings Integration; Commercial Buildings Integration; Equipment, Materials and Tools; Community Partnerships; and Energy Star Program.</p>	<p>Community programs, including responsibilities under the Energy Policy Act of 1992.</p> <p>Additionally, training in areas crucial for effective job performance will be a key element. (\$9,443)</p>	<p>Community programs, including responsibilities under the Energy Policy Act of 1992.</p> <p>Additionally, training in areas crucial for effective job performance will be a key element. (\$8,132)</p>
	Management Support Services	Management Support Services	Management Support Services
	Included activities such as	Includes activities such as	Includes activities such as

III. Performance Summary: MANAGEMENT AND PLANNING (Cont'd)

Program Activity	FY 2001	FY 2002	FY 2003
Program Direction (Cont'd)	improving the effectiveness, efficiency, and economy of management and general administrative services. These activities were critical to the planning, formulation, and execution of the Energy Conservation programs. (\$1,480)	improving the effectiveness, efficiency, and economy of management and general administrative services. These activities were critical to the planning, formulation, and execution of the Energy Conservation programs. (\$1,119)	improving the effectiveness, efficiency, and economy of management and general administrative services. These activities were critical to the planning, formulation, and execution of the Energy Conservation programs. (\$1,433)
Total, Program Direction	\$9,223	\$10,562	\$9,565
TOTAL, MANAGEMENT AND PLANNING	\$14,133	\$15,090	\$14,093