An Introduction to U.S. Policies to Improve Building Efficiency

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Acknowledgments

This report was inspired by staff at the China Sustainable Energy Program at the Energy Foundation who wanted more information about U.S. energy policies for their colleagues in China. We expanded upon their initial concept to also write this report for Americans who are new to energy efficiency policies and could use an introduction. To serve these two objectives, both English and Chinese versions of this report are available. This report is on programs and policies for the buildings sector. A companion report on programs and policies for the industrial sector is being published concurrent with this report.

In compiling this report, we received information and assistance from many people who are involved in running these different programs. We are very appreciative of their assistance. Helpful comments on a review draft of this report were provided by staff at the U.S. Department of Energy, Jeff Genzer at the National Association of State Energy Officials, and staff and experts associated with the China Sustainable Energy Program. We thank them for their comments and suggestions. Funding for this work was provided by the China Sustainable Energy Program of the Energy Foundation. We thank Kevin Mo, Director of the Buildings Program, and Zhang Ruiying, Deputy Chief Representative, for their support and assistance. This report was prepared by ACEEE and does not necessarily represent the views of the Energy Foundation.

For the Chinese version of this report, we used a professional translation service but then the translated version was polished by Dr. Zhang Shicong, an Associate Research fellow at the China Academy of Building Research, during his work as a Visiting Researcher at Lawrence Berkeley National Laboratory.

Abstract

The United States has had a variety of programs to encourage improved energy efficiency in residential and commercial buildings for about 40 years, going all the way back to the 1973 oil embargo. These programs are operated by the federal government as well as states, utilities, municipalities, and nonprofit organizations. Some of these programs are decades old; others are more recent.

This report summarizes many of the major efforts, with an emphasis on federal programs, but also including summaries of other efforts. This study was written with two audiences in mind. First, it is designed to serve as a "Building Efficiency Policy 101" introduction for Americans who are new to the energy efficiency field and could benefit from a quick tutorial on many of the major programs. Second, it was commissioned by the Energy Foundation China Sustainable Energy Program so that Chinese policymakers and energy efficiency practitioners can learn more about U.S. energy efficiency programs and policies, allowing them to learn from what the U.S. has been and is doing, which will help to inform discussions about appropriate programs and policies for China. To serve this objective, both English and Chinese Mandarin versions of this report are available.

Glossary of Abbreviations

AMERICAN COUNCIL FOR AN ENERGY-EFFICIENT ECONOMY (ACEEE) A nonprofit, 501(c)(3) organization that acts as a catalyst to advance energy efficiency policies, programs, technologies, investments, and behaviors. ACEEE conducts in-depth technical and policy analyses; advises policy makers and program managers; convenes conferences and workshops, primarily for energy efficiency professionals; and works collaboratively with businesses, government officials, public interest groups, and other organizations.

ASHRAE *ADVANCED ENERGY DESIGN GUIDES* (*AEDG*) A series of publications designed to provide recommendations for achieving energy savings over the minimum code requirements of ANSI/ASHRAE/IESNA Standard 90.1. The guide is developed in collaboration with several partnering organizations focused on building energy efficiency. The Guides are educational guidance intended to provide a simple and easy approach to design and build energy efficient buildings for use by contractors and designers who design and construct the specific building types represented in the Guides.

ADVANCED ENERGY RETROFIT GUIDES (AERGS) A guide created to help decision makers plan, design, and implement energy improvement projects in their facilities. These guides are primarily reference documents, allowing energy managers to consult the particular sections that address the most pertinent topics. The guides present a broad range of practices that can help energy managers take specific actions at any stage of the retrofit process.

AMERICAN INSTITUTE OF ARCHITECTS (AIA) A professional organization of architects in the United States that offers education, government advocacy, community redevelopment, and public outreach to support the architecture profession and improve its public image. The AIA also works with other members of the design and construction team to help coordinate the building industry.

AMERICAN NATIONAL STANDARDS INSTITUTE (ANSI) A private non-profit organization that oversees the development of voluntary consensus standards for products, services, processes, systems, and personnel in the United States. The organization also coordinates U.S. standards with international standards so that American products can be used worldwide. The ANSI's mission is to enhance both the global competitiveness of U.S. business and the U.S. quality of life by promoting and facilitating voluntary consensus standards and conformity assessment systems, and safeguarding their integrity.

AMERICAN RECOVERY AND REINVESTMENT ACT OF 2009 (ARRA) An economic stimulus package enacted by the 111th United States Congress in February, 2009 as a response to the economic recession. ARRA was estimated to cost $787 billion which went into infrastructure, education, health, and energy, federal tax incentives, and expansion of unemployment benefits and other social welfare provisions.

THE AMERICAN SOCIETY OF HEATING, REFRIGERATING AND AIR CONDITIONING ENGINEERS (ASHRAE) ASHRAE is a building technology society with more than 50,000 members worldwide. ASHRAE and its members focus on building systems, energy efficiency, indoor air quality, refrigeration and sustainability within the industry.

ANNUAL NET ENERGY PERFORMANCE (ANEP) The total annual energy use of a building for all purposed minus the annual energy use of the building supplied form renewable energy sources of reclaimed waste energy associated with the building of the building site.

ASIA-PACIFIC PARTNERSHIP ON CLEAN DEVELOPMENT AND CLIMATE (APP) An international, voluntary, public-private partnership among Australia, Canada, India, Japan, the People's Republic of China, South Korea, and the United States. Member countries account for over 50% of the world's greenhouse gas emissions, energy consumption, GDP and population. The Partnership engaged member countries to accelerate the development and deployment of clean energy technologies, with no mandatory enforcement mechanism. As of 5 April 2011, the Partnership formally concluded although a number of individual projects continue.

ASTM INTERNATIONAL (ASTM) An international standards organization that develops and publishes voluntary consensus technical standards for a wide range of materials, products, systems, and services. The ASTM has developed around 12,000 standards that are used around the world to improve product quality, enhance safety, facilitate market access and trade, and build consumer confidence.

BUILDING PERFORMANCE WITH ENERGY STAR (BPWES) A program designed to help utilities and energy efficiency program sponsors engage their business customers and local trade allies in an ongoing relationship centered on strategic energy management and a path to continuous performance improvement. The program helps energy efficiency programs achieve deeper, more comprehensive energy savings in commercial buildings by repackaging EPA's business energy management and building upgrade strategies along with the ENERGY STAR brand.

BUILDING TECHNOLOGIES PROGRAM (BTP) A program run by the U.S. Department of Energy (DOE) that works to improve the efficiency of buildings and the equipment, components, and systems within them through supporting research and development (R&D) activities and provides tools, guidelines, training, and access to technical and financial resources.

COMMERCIAL BUILDING INITIATIVE (CBI) An initiative within the Building Technologies Program which works to improve energy efficiency of new and existing commercial buildings through researching technologies, strategies, and tools to improve energy savings over current building codes. CBI also engages commercial building owners and operators to ensure these technologies are market-ready.

COMMERCIAL BUILDING ENERGY ALLIANCES (CBEA) An alliance which works with the Building Technologies Program and is comprised of building owners, managers, and operators. The objective of the alliances is to identify and implement best practices, key decision-making tools, and advanced technologies for significant energy savings in their portfolios.

COMMERCIAL BUILDINGS ENERGY CONSUMPTION SURVEY (CBECS) A national survey that collects information on the stock of U.S. commercial buildings, their energy-related building characteristics, and their energy consumption and expenditures. Commercial buildings include all buildings in which at least half of the floorspace is used for a purpose that is not residential, industrial, or agricultural, so they include building types that might not traditionally be considered "commercial," such as schools, correctional institutions, and buildings used for religious worship.

COMMUNITY DEVELOPMENT BLOCK GRANT (CDBG) A program within the U.S. Department of Housing and Urban Development (HUD) that provides communities with resources to address a wide range of unique community development needs. It provides annual grants on a formula basis to 1209 general units of local government and States.

COUNCIL ON ENVIRONMENTAL QUALITY (CEQ) A division of the Executive Office of the President that coordinates federal environmental efforts in the United States and works closely with agencies and other White House offices in the development of environmental and energy policies and initiatives.

U.S.-CHINA CLEAN ENERGY RESEARCH CENTER (CERC) A research center equally funded by the United States and China, with the mission to facilitate joint research and development on clean energy technology by teams of scientists and engineers from the United States and China. The CERC operates with broad participation from universities, research institutions and industry. U.S. funds are used exclusively to support work conducted by U.S. institutions and individuals only, and Chinese funds support work conducted by Chinese institutions and researchers.

COMBINED HEAT AND POWER PLANTS (CHP) Also known as co-generation, a system by which multiple usable energy outputs (both electricity and steam/heat) are derived, from a single fuel supply using an integrated system. It generates electricity and useful thermal energy in a single, integrated system.

CHAMBER OF COMMERCE (COC) A non-governmental lobbying group that represents the interests of businesses and trade associations.

DEPARTMENT OF COMMERCE (DOC) The Cabinet department of the U.S. government concerned with promoting economic growth. The mission of the department is to "promote job creation and improved living standards for all Americans by creating an infrastructure that promotes economic growth, technological competitiveness, and sustainable development". Among its tasks are gathering economic and demographic data for business and government decision-making, issuing patents and trademarks, and helping to set industrial standards.

DEPARTMENT OF DEFENSE (DOD) The Executive Department of the Government of the United States of America charged with coordinating and supervising all agencies and functions of the government concerned directly with national security and the United States armed forces. The Department is headed by the Secretary of Defense and has three subordinate military departments: the Department of the Army, the Department of the Navy, and the Department of the Air Force, plus there are many Defense Agencies.

DEPARTMENT OF ENERGY (DOE) A Cabinet-level department of the United States government concerned with the United States' policies regarding energy and safety in handling nuclear material. Its responsibilities include the nation's nuclear weapons program, nuclear reactor production for the United States Navy, energy conservation, energy-related research, radioactive waste disposal, and domestic energy production.

DEPARTMENT OF NAVY (DON) A military department within in the Department of Defense (DoD) that is headed by the Secretary of the Navy. The department provides a government organizational structure

to the United States Navy, the United States Marine Corps, and, when directed by the President, for the United States Coast Guard as a service within the Navy.

DEPARTMENT OF STATE (DOS) A U.S. federal executive department often referred to as the State Department, responsible for international relations of the U.S., equivalent to the foreign ministers of other countries. The department is led by the Secretary of State. The Department operates the diplomatic missions of the United States abroad and is responsible for implementing the foreign policy of the United States and U.S. diplomacy efforts.

DEPARTMENT OF TRANSPORTATION (DOT) A Cabinet department of the United States government concerned with transportation. The mission of the Department is to "serve the United States by ensuring a fast, safe, efficient, accessible and convenient transportation system that meets our vital national interests and enhances the quality of life of the American people, today and into the future."

ENERGY CONSERVATION AND COMMERCIALIZATION (ECO) Bilateral Project Agreement was signed between the Government of India (GOI) and the United States in January 2000 with the objective to enhance commercial viability and performance of the Indian energy sector as well as to promote utilization of clean and energy-efficient technologies in the sector.

INTERNATIONAL ENERGY EFFICIENCY BUILDINGS PROGRAM (EEBUILDINGS) A program developed by EPA to assist developing countries' building energy efficiency. The program draws on the EPA's own domestic experiences with the ENERGY STAR® and Green Lights voluntary programs. Specifically, eeBuildings matches the assets of these programs to the particular needs and barriers of its fieldwork market.

ENERGY EFFICIENCY AND CONSERVATION BLOCK GRANT (EECBG) A formula grant program administered by HUD and funded by ARRA 2009, intended to assist U.S. cities, counties, states, territories, and Indian tribes to develop, promote, implement, and manage energy efficiency and conservation projects and programs.

ENERGY EFFICIENT MORTGAGE PROGRAM (EEM) Program under the Federal Housing Administration (FHA) that helps homebuyers or homeowners save money on utility bills by enabling them to finance the cost of adding energy efficiency features to new or existing housing as part of their FHA insured home purchase or refinancing mortgage.

OFFICE OF ENERGY EFFICIENCY AND RENEWABLE ENERGY (EERE) Office at DOE that invests in clean energy technologies that strengthen the economy, protect the environment, and reduce dependence on foreign oil.

Energy Efficiency Resource Standards (EERS) A simple, market-based mechanism to encourage more efficient use of electricity and natural gas, also known as an Energy Efficiency Portfolio Standards (EEPS),. An EERS consists of electric and/or gas energy savings targets for utilities, sometimes with flexibility to achieve the target through a market-based trading system. All EERS's include end-user energy savings improvements that are aided and documented by utilities or other program operators. Some EERS's include distribution system efficiency improvements. It is sometimes used in conjunction with a Renewable Portfolio Standard (RPS).

EMERGENCY ECONOMIC STABILIZATION ACT OF 2008 (EESA) A law enacted in response to the subprime mortgage crisis authorizing the United States Secretary of the Treasury to spend up to $700 billion to purchase distressed assets, especially mortgage-backed securities, and supply cash directly to banks.

ENERGY INDEPENDENCE AND SECURITY ACT OF 2007 (EISA) A law enacted by the 110th Congress the purpose of the bill was to move the United States to greater energy independence by increasing renewable energy, and efficiency products, buildings, and vehicles.

BUREAU OF ENERGY RESOURCES (ENR) A bureau established within the U.S. State Department that reports to the U.S. Under Secretary for Economic Growth, Energy, and the Environment. The Bureau works to ensure all of the U.S. diplomatic relationships advance U.S. access to secure, reliable, and ever-cleaner sources of energy.

EXECUTIVE ORDER (E.O.) An order or directive issued by the head of the executive branch, commonly applied to orders by the President.

ENERGY POLICY ACT OF 1992 (EPACT 1992) A law enacted by the 102nd Congress the bill consists of twenty-seven titles detailing various measures designed to lessen the nation's dependence on imported energy, provide incentives for clean and renewable energy, and promote energy conservation in buildings. EPAct 1992 set goals, created mandates, and amended utility laws to increase clean energy use and improve overall energy efficiency in the United States. It reformed the Public Utility Holding Company Act and amended parts of the Federal Power Act of 1935. EPAct 1992 addressed the these items and several others: energy efficiency, energy conservation and energy management; natural gas imports and exports; alternative fuels and requiring certain fleets to acquire alternative fuel vehicles; electric motor vehicles; radioactive waste; coal power and clean coal; and renewable energy. For energy efficiency, the bill added standards for some fluorescent and incandescent reflector lamps; plumbing products; electric motors; commercial water heaters; and heating, ventilation, and air conditioning (HVAC) systems. EPAct 1992 allowed for the future development of standards for many other products. The law also provided for voluntary testing and consumer information programs for office equipment, luminaries, and windows.

ENERGY POLICY ACT OF 2005 (EPACT 2005) A law enacted by the 110th Congress, the bill changes United States energy policy by providing tax incentives and loan guarantees for various types of energy production, primarily innovations that avoid greenhouse gases such as nuclear power, biofuels, clean coal initiatives, wind and other renewable energy sources, tidal power, geothermal power, and others. For energy efficiency, the bill established a number of energy management goals for Federal facilities and fleets. It also amended portions of the National Energy Conservation Policy Act (NECPA) and established minimum efficiency standards for 15 products.

ENVIRONMENTAL PROTECTION AGENCY (EPA) An Agency of the United States government which was created for the purpose of protecting human health and the environment. The agency conducts environmental assessments, research, and education. It has the responsibility of writing, maintaining and enforcing national standards and regulations under a variety of environmental laws, in consultation with state,

tribal, and local governments. EPA has enforcement powers and works with industries and all levels of government in a wide variety of voluntary pollution prevention programs.

ENERGY POLICY AND CONSERVATION ACT OF 1975 (EPCA) signed by President Gerald R. Ford, the bill was enacted for the purpose of serving the nation's energy demands and promoting conservation methods when feasibly obtainable. The Act mandated vehicle fuel economy standards, extended oil price controls to 1979, and directed the creation of a strategic petroleum reserves.

ENERGY RESEARCH AND DEVELOPMENT AUTHORITY (ERDA) The replacement policy for Atomic Energy Commission (AEC), which was created to focus the federal government's energy research development activities into one unified agency, which was also to include AEC's nuclear energy defense activities.

ENERGY SAVINGS PERFORMANCE CONTRACTS (ESPCS) A partnership between Federal agencies and an energy service company (ESCO) that allow Federal agencies to accomplish energy savings projects without up-front capital costs and without special Congressional appropriations.

ENERGY SERVICE COMPANIES (ESCOS) A business that develops, installs, and arranges financing for projects designed to improve the energy efficiency and maintenance costs for facilities typically over a seven to twenty year time period.

ENERGY USE INTENSITY (EUI) A unit of measurement that describes a building's energy use. EUI represents the energy consumed by a building relative to its size. EUI is calculated by taking the total energy consumed in one year (measured in kBtu) and dividing it by the total floorspace of the building.

EXPORT-IMPORT BANK OF THE UNITED STATES (EX-IM BANK) The official export credit agency of the United States federal government. The purpose of the bank is to finance and insure foreign purchases of United States goods for customers unable or unwilling to accept credit risk. The mission of the Bank is to create and sustain U.S. jobs by financing sales of U.S. exports to international buyers.

FEDERAL ENERGY MANAGEMENT PROGRAM (FEMP) A program administered by DOE that provides services, tools, and expertise to Federal agencies to help them achieve their legislated and executive-ordered energy, greenhouse gas, and water reduction goals. These are delivered through project, technical, and program services.

FEDERAL HOUSING ADMINISTRATION (FHA) An administration within HUD that provides mortgage insurance on loans made by FHA-approved lenders throughout the United States and its territories. FHA insures mortgages on single family and multifamily homes including manufactured homes and hospitals.

FEDERAL TRADE COMMISSION (FTC) An independent agency of the United States government, which promotes consumer protection and eliminates anti-competitive business practices, such as coercive monopoly. They administered the Energy Guide labeling program for appliances.

THE GREEN BUILDING INITIATIVE (THE GBI) A nonprofit organization whose mission is to accelerate the adoption of building practices that result in energy-efficient, healthier, and environmentally sustainable buildings by promoting credible and practical green building approaches for residential and

commercial construction. The organization aims to bring green building into the mainstream. They are governed by a multi-stakeholder board of directors featuring representatives from industry, GNOs, construction companies, architectural firms and academic institutions.

GOVERNMENT ACCOUNTABILITY OFFICE (GAO) An office which is part of the Legislative Branch, the audit, evaluation, and investigative arm of the United States Congress. The mission of the Office is to "support the Congress in meeting its constitutional responsibilities and to help improve the performance and ensure the accountability of the federal government for the benefit of the American people. We provide Congress with timely information that is objective, fact-based, nonpartisan, nonideological, fair, and balanced."

GREENHOUSE GASES (GHG) A gas in the atmosphere that absorbs and emits radiation within the thermal infrared range. These gases include water vapor, carbon dioxide, methane, nitrous oxide, and ozone.

HOME PERFORMANCE WITH ENERGY STAR (HPWES) A program developed and managed by DOE, EPA and local sponsors. Under the Program recruit and assist home improvement contractors who are qualified to perform comprehensive home assessments, and offer whole-house solutions to home owners with high energy bills and comfort problems.

HEALTH AND HUMAN SERVICES (HHS) A Cabinet department of the United States government with the goal of protecting the health of all Americans and providing essential human services. Its motto is "Improving the health, safety, and well-being of America".

HEATING, VENTILATION, AND AIR CONDITIONING SYSTEMS (HVAC) The technology of indoor and automotive environmental comfort (e.g., heating and cooling units and systems).

HOME ENERGY RATING SYSTEM (HERS) A standardized evaluation and measurement of a home's energy efficiency.

HOME INVESTMENT PARTNERSHIPS PROGRAM (HOME) A program that provides formula grants to States and localities that communities use—often in partnership with local nonprofit groups—to fund a wide range of activities that build, buy, and/or rehabilitate affordable housing for rent or homeownership or provide direct rental assistance to low-income people.

HOUSING AND URBAN DEVELOPMENT (HUD) A Cabinet-level agency in the U.S. Government, HUD oversees federally own houses, loans for housing development, and works "to provide strong, sustainable, inclusive communities and quality, affordable homes for all Americans."

ILLUMINATING ENGINEERING SOCIETY (IES) A non-profit learned society with the objective to communicate information on all aspects of good lighting practice to its members, to the lighting community, and to consumers, through a variety of programs, publications, and services. The Society publishes nearly 100 varied technical publications, and works cooperatively with related organizations on a variety of programs and in the production of jointly published documents and standards. IES is the recognized technical authority on illumination.

INDEPENDENT SYSTEM OPERATOR (ISO) An organization that coordinates, controls, and monitors the operation of the electrical power system, usually within a region but sometimes a single U.S. State. Under FERC rules, ISO's need to be independent from owners of the transmission grid.

INTEGRATED RESOURCE PLANNING (IRP) A planning process under which both energy supply resources (e.g., new power plants, transmission lines, etc.) and energy demand-side resources (energy efficiency, load management/demand response, etc.) are examined together. The plan integrates energy supply resources and energy-demand resources in ways that minimizes costs while meeting other objectives (e.g., reliability, robust across a range of possible futures).

INTERNATIONAL ENERGY CONSERVATION CODE (IECC) A building code created by the International Code Council in 2000. It is a model code adopted by many countries and U.S. States to establish design and construction requirements for energy efficiency.

INTERNATIONAL GREEN CONSTRUCTION CODE (IGCC) A code to regulate construction of new and existing commercial buildings. The IGCC was established to aid in the construction of sustainable buildings in the business and residential sectors.

JOINT COMMITTEE ON TAXATION (JCT) A Committee of the U.S. Congress that is composed of ten Members: five from the Senate Finance Committee and five from the House Ways and Means Committee. The Committee: investigates the operation, effects, and administration of internal revenue taxes; investigates measures and methods for the simplification of taxes; makes reports on the results of those investigations and studies and make recommendations; and reviews any proposed refund or credit of taxes in excess of $2,000,000.

LAWRENCE BERKELEY NATIONAL LABORATORY (LBNL) A DOE National Laboratory that conducts scientific research, located at the University of California Berkeley.

LEADERSHIP IN ENERGY AND ENVIRONMENTAL DESIGN (LEED) A rating system developed by the U.S. Green Building Council to provide building owners and operators with a concise framework for identifying and implementing practical and measurable green building design, construction, operation and maintenance solutions, for high performance green buildings, homes and neighborhoods.

LOW INCOME HOME ENERGY ASSISTANCE PROGRAM (LIHEAP) A federal social services program that offers financial assistance to qualifying low-income households who require support in paying their home heating or cooling bills.

PUBLIC UTILITIES REGULATORY POLICIES ACT (PURPA) A law enacted in 1978 by Congress as part of the National Energy Act with the goal to reduce dependence on foreign oil, to promote alternative energy sources and energy efficiency, and to diversify the electric power industry.

MUNICIPALITIES, UNIVERSITIES, SCHOOLS AND HOSPITALS (MUSH) Also known as the "MUSH sector," MUSH is a set of public institutions that are a primary market for energy service companies.

MEASUREMENT AND VERIFICATION (M&V) The process of using measurement to reliably determine actual savings created within an individual facility by an energy management, energy conservation or energy efficiency project or program.

NATIONAL APPLIANCE ENERGY CONSERVATION ACT OF 1987 (NAECA) Enacted by Congress, the bill amended process for implementing the minimum energy efficiency standard established under EPCA and added standards for many household appliances. It also set new rules for when state regulations will be superseded by federal regulations in regard to testing and labeling requirements, and energy conservation standards.

NATIONAL ACTION PLAN FOR ENERGY EFFICIENCY (NAPEE) A private-public initiative to create a sustainable, aggressive national commitment to energy efficiency through the collaborative efforts of gas and electric utilities, utility regulators, and other partner organizations.

NATIONAL FENESTRATION RATING COUNCIL (NFRC) A NFRC is a non-profit organization that administers the only uniform, independent rating and labeling system for the energy performance of windows, doors, skylights, and attachment products.

OPERATIONS AND MAINTENANCE (O&M) Activities related to the performance of routine, preventive, predictive, scheduled, and unscheduled actions aimed at preventing equipment failure or decline with the goal of increasing efficiency, reliability, and safety.

OFFICE OF MANAGEMENT AND BUDGET (OMB) An Executive Office of the President that is responsible for assisting the President in overseeing the preparation of the federal budget and to supervise its administration in Executive Branch agencies. The office evaluates the effectiveness of agency programs, policies, and procedures, assesses competing funding demands among agencies, and sets funding priorities. The OMB ensures that agency reports, rules, testimony, and proposed legislation are consistent with the President's Budget and with Administration policies.

OAK RIDGE NATIONAL LABORATORY (ORNL) A multi-program science and technology national laboratory managed for the United States Department of Energy (DOE) based at the University of Tennessee. Its programs focus on materials, neutron science, energy, high-performance computing, systems biology and national security.

OFFICE OF SUSTAINABLE HOUSING AND COMMUNITIES (OSHC) Office in HUD that works to create strong, sustainable communities by connecting housing to jobs, fostering local innovation, and helping to build a clean energy economy.

PROPERTY ASSESSED CLEAN ENERGY (PACE) Programs that help home and business owners pay for the upfront costs of green initiatives, such as solar panels or comprehensive energy efficiency retrofits, which the property owner then pays back by increasing property taxes by a set rate over about 20 years.

OFFICE OF PUBLIC AND INDIAN HOUSING (PIH) An agency within HUD, which establishes and maintains rental housing for eligible low-income families, the elderly, persons with disabilities and Indian housing units. PIH also works towards the modernization of the housing stock, the improvement of the management of the programs by the public and Indian housing authorities which own the housing,

and for programs to address crime and security and provide supportive services and tenant opportunities.

Pacific Northwest National Laboratory (PNNL) One of the DOE national laboratories managed by DOE's Office of Science. The mission of the lab is to "transform the world through courageous discovery and innovation." The lab provides the facilities, unique scientific equipment, and world-renowned scientists and engineers to strengthen U.S. scientific foundations through fundamental research and innovation; prevents and counter acts of terrorism through applied research in information analysis, cyber security, and the non-proliferation of weapons of mass destruction; increases U.S. energy capacity and reduce dependence on imported oil through research of hydrogen and biomass-based fuels; and reduces the effects of energy generation and use on the environment.

Power Purchase Agreements (PPAs) A contract between two parties, one who generates electricity for the purpose of sale (the seller) and one who is looking to purchase electricity (the buyer).

Qualified Energy Conservation Bonds (QECBs) A debt instrument that enables qualified state, tribal and local government issuers to borrow money to fund energy conservation projects.

Residential Conservation Service (RCS) A program, passed by Congress, which requires utilities to offer energy audits to their residential customers.

Research and Development (R&D) Refers to creative work undertaken on a systematic basis in order to increase the stock of knowledge and the use of that knowledge to devise new applications. R&D contributes to advancing energy efficiency by promoting the creation, development, and commercialization of new, energy-efficient technologies and practices.

Real Estate Investment Trusts (REITs) A tax designation for a corporate entity investing in real estate. The purpose of this designation is to reduce or eliminate corporate tax on the entity, passing on the income to the investors in the trust.

Residential Energy Services Network (RESNET) A nonprofit membership corporation that helps homeowners reduce the cost of their utility bills by making their home more energy efficient. They administer the most widely used HERS program in the United States.

Regional Transmission Organizations (RTO) An organization, created by FERC, that is responsible for moving electricity over large interstate areas. An RTO coordinates, controls, and monitors an electricity transmission grid that is larger with much higher voltages than the typical power company's distribution grid. RTOs need to follow FERC rules.

Super-efficient Equipment and Appliances Deployment (SEAD) An international market transformation initiative to accelerate the deployment of super-efficient equipment and appliances. SEAD is an activity (task group) within the International Partnership for Energy Efficiency Cooperation (IPEEC) and is a multilateral agreement under the Clean Energy Ministerial. The goal is to: 1) Raise the efficiency ceiling by pulling super-efficient and efficient appliances and equipment into the market through cooperation on measures such as incentives, procurement, awards, and research and development

investments; 2) Raise the efficiency floor by working together to bolster national or regional policies like minimum efficiency standards; and 3) Strengthen the efficiency foundations of programs by coordinating technical work to support these activities.

STATE AND LOCAL ENERGY EFFICIENCY ACTION NETWORK (SEE ACTION) A state and local effort facilitated by the federal government that helps states, utilities, and other local stakeholders take energy efficiency to scale.

STATE ENERGY PROGRAM (SEP) A program that provides financial and technical assistance to states through formula and competitive grants.

SOLID-STATE LIGHTING (SSL) A type of lighting that uses semiconductor light-emitting diodes (LEDs), organic light-emitting diodes (OLED), or polymer light-emitting diodes (PLED) as sources of illumination rather than electrical filaments, plasma (used in arc lamps such as fluorescent lamps), or gas and is significantly more energy efficient.

UNITED STATES AGENCY FOR INTERNATIONAL DEVELOPMENT (USAID) The United States federal government agency primarily responsible for administering civilian foreign aid. The agency seeks to "extend a helping hand to those people overseas struggling to make a better life, recover from a disaster or striving to live in a free and democratic country." The agency's goals are providing "economic, development and humanitarian assistance around the world in support of the foreign policy goals of the United States." The agency operates in Sub-Saharan Africa, Asia and the Near East, Latin America and the Caribbean, Europe, and Eurasia.

UTILITY ENERGY SERVICES CONTRACTS (UESCS) Contracts that offer Federal agencies an effective means to implement energy efficiency, renewable energy, and water efficiency projects. In a UESC, a utility arranges funding to cover the capital costs of the project, which are repaid over the contract term from cost savings generated by the energy efficiency measures. With this arrangement, agencies can implement energy improvements with no initial capital investment.

U.S. GREEN BUILDING COUNCIL (USGBC) A non-profit trade organization that promotes sustainability in how buildings are designed, built, and operated. The organization developed the Leadership in Energy and Environmental Design (LEED) green building rating systems and Greenbuild, a green building conference and expo that promotes the green building industry, including environmentally responsible materials, sustainable architecture techniques and public policy.

UNITED STATES CONFERENCE OF MAYORS (USCM) The official non-partisan organization for cities with populations of 30,000 or more. The cities are each represented by their mayor or other chief elected official.

U.S. TRADE AND DEVELOPMENT AGENCY (USTDA) An independent U.S. Government foreign assistance agency established to advance economic development and U.S. commercial interests in developing and middle income countries. The mission is to "promote economic growth in developing and middle income countries, while simultaneously helping American businesses to export their products and services, thereby creating U.S. jobs," and the agency currently works in 66 countries.

Weatherization Innovation Pilot Program (WIPP) A pilot program within the EERE, aims to accelerate innovations in whole-house weatherization for low-income families through the use of new materials, technologies, behavior-change models, and processes.

Zero Energy Performance Index (zEPI) A rating scale currently used by the ASHRAE Building EQ and other programs to standardize the method for rating buildings.

Introduction

The United States has had a variety of programs to encourage improved energy efficiency in residential and commercial buildings for about 40 years, going all the way back to the 1973 oil embargo. These programs are operated by the federal government as well as states, utilities, municipalities, and nonprofit organizations. Some of these programs are decades old; others are more recent.

In this report, we summarize many of the major efforts, with an emphasis on federal programs, but also including summaries of other efforts. This study was commissioned by the Energy Foundation China Sustainable Energy Program so that Chinese policymakers and energy efficiency practitioners can learn more about U.S. energy efficiency programs and policies, allowing them to learn from what the U.S. has been and is doing, which will help inform discussions about appropriate programs and policies for China. To serve this objective, both English and Chinese Mandarin versions of this report are available.

In addition, this report is designed to serve as a "Building Efficiency Policy 101" introduction for Americans who are new to the energy efficiency field and could benefit from a quick tutorial on many of the major programs.

The body of this report is divided into 17 sections, one on each profiled program and policy area. In each section we describe the program, program dates, budgets, and results. In addition we provide references and links for more information on each program and policy. The programs and policies profiled are organized into several categories—programs administered by DOE, programs administered by other agencies, and cross-cutting programs and policies in which multiple federal agencies, and often states and municipalities, are involved. The profiled programs and policies areas include:

Department of Energy Programs

- Buildings Technology Program
- State Energy Program (SEP)
- Energy Efficiency and Conservation Block Grants (EECBG)
- Weatherization Assistance Program (WAP)
- Federal Energy Management Program (FEMP)

Programs Administered by Other Agencies

- U.S. Department of Housing and Urban Development Energy Efficiency Programs
- Low Income Home Assistance Program (LIHEAP)
- Department of Defense Energy Efficiency Initiatives in Buildings

Cross-Cutting Policies

- Building Codes

- Building Rating and Disclosure
- Voluntary Green Construction Codes
- Residential Retrofits
- Commercial Retrofits
- Appliance and Equipment Standards
- Appliance Labeling
- ENERGY STAR
- Utility Energy Efficiency Programs
- Financing
- Energy Efficiency Tax Incentives
- Energy Savings Performance Contracting
- Federal Government Support to International Programs/ Projects/ Initiatives

To provide an overview of the many programs covered, Table 1 summarizes several key aspects of each of these 21 programs. Table 2 summarizes the various cross-cutting programs and which agencies are involved. In addition, the Glossary lists the many abbreviations used and provides their meaning. Appendix A contains a summary of the major energy efficiency laws that have been enacted.

Table 1. Summary of Major U.S. Federal Buildings Efficiency Programs and Policies

Program/ Policy	Start Year	Who Administers	Mandatory/ Voluntary	Subsidies Included?	Budget in Most Recent Year ($million)	Energy Savings in Most Recent Year*
1. Buildings Technology Program	1977	U.S. Department of Energy	Voluntary	Sometimes	$219 million in fiscal year 2012	Not available
2. State Energy Program (SEP)	1975	U.S. Department of Energy	Voluntary	Generally not	Has averaged ~$41.5 million; additional $3.1 billion provided by ARRA for 2009-2012	In 2005 estimated annual energy savings of 47.6 million MBtu and $334 million
3. Energy Efficiency and Conservation Block Grants (EECBG)	2009	U.S. Department of Energy	Voluntary	Sometimes	ARRA provided $3.2 billion for 2009-2012.	Not yet available
4. Weatheri-zation Assistance Program (WAP)	1976	U.S. Department of Energy	Voluntary	Yes	Average of $181million; ARRA provided $5 billion for 2009-2012.	The average participating household saved 30.5 million Btu (32.2 GJ) of natural gas.
5. Federal Energy Management Program (FEMP)	1978	U.S. Department of Energy	Mandatory	Yes	$30.0 million in fiscal year 2012	ESPC projects reduced annual energy consumption by 32.8 trillion Btu and $13.1 billion.
6. U.S. Department of Housing and Urban Development Energy Efficiency Programs	1974	U.S. Department of Housing and Urban Development (HUD)	Voluntary	Rarely	Program specific budgets; energy efficiency portion not available	Not available
7. Low Income Home Assistance Program (LIHEAP)	1980	U.S. Department of Health and Human Services (HHS)	Voluntary	Yes	$3,400 million in fiscal year 2012. Most of this is to pay energy bills; perhaps 10% went to energy efficiency.	Not available

Program/ Policy	Start Year	Who Administers	Mandatory/ Voluntary	Subsidies Included?	Budget in Most Recent Year ($million)	Energy Savings in Most Recent Year*
8. Department of Defense Energy Efficiency Initiatives in Buildings	2005 for recent efforts	U.S. Department of Defense	Mandatory	Yes	~$2.35 billion in fiscal year 2012	9-15% reduction in energy intensity relative to 2003 baseline
9. Building Codes	1975	States and municipalities; support from U.S. Department of Energy (DOE)	Voluntary adoption by States. Generally mandatory upon adoption.	Generally not.	DOE Building Energy Codes Program had a federal budget of ~$8.5 million in fiscal year 2012 ; States and municipalities spend much more	Total primary energy savings were about 0.54 quadrillion Btu in 2000; annual savings of 33 billion kWh; and about 172 trillion Btu (181 PJ) of fuel per year.
10. Building Rating and Disclosure	2006	States and municipalities	Voluntary	No	City specific and low-cost to administer	Not yet available
11. Voluntary Green Construction Codes	2000	USGBC, ASHRAE, ICC and FEMP	Voluntary	Generally not	Not available	More than 55,000 projects LEED certified
12. Residential Retrofits (e.g., Home Performance with Energy Star)	~1973 (2001 for Home Performance)	States, utilities, and municipalities; assistance from DOE	Voluntary	Often -- program specific	Not readily available	Home Performance has treated ~200,000 homes with average per-home energy savings of 20%.
13. Commercial Retrofits	Energy Star Buildings late 1990s; Building Performance with Energy Star 2010	States and utilities with leadership from EPA	Voluntary	Often – program specific	Not readily available	Over 25% of buildings benchmarked with about 10% of these earning Energy Star label

Program/ Policy	Start Year	Who Administers	Mandatory/ Voluntary	Subsidies Included?	Budget in Most Recent Year ($million)	Energy Savings in Most Recent Year*
14. Appliance and Equipment Standards	1974 in California; 1987 for U.S.	DOE	Mandatory	No	Over $50 million in fiscal year 2012	In 2010 these standards saved 3.4 quadrillion Btu (3.6 EJ) of energy.
15. Appliance Labeling	1980	Federal Trade Commission (FTC)	Mandatory	No	Limited budget; amount not available	Not available
16. ENERGY STAR	1992	Primarily administered by the U.S. Environmental Protection Agency (EPA) with assistance from DOE	Voluntary	Generally not	~$50 million in fiscal year 2012	~245 billion kWh and $20 billion in 2010. These savings overlap with other programs.
17. Utility Energy Efficiency Programs	Varies by state; some in place for several decades	Utilities and state utility regulators	Voluntary for consumers; often mandatory for utilities	Yes	$5,500 million in 2010	13 million kWh saved from measures installed in 2009.
18. Financing	Some programs in place for several decades	Typically administered by state agency or local banks	Voluntary	Sometimes	Program specific; some programs over $100 million	Not available
19. Energy Efficiency Tax Incentives	2005	Treasury Department with advice from DOE	Voluntary	Yes	Over $5 billion in 2009; probably less than $1 billion in 2011 as credits less generous	Not available for overall program; are estimates for some provisions.
20. Energy Savings Performance Contracting	1992	Energy service companies (ESCO); oversight & assistance from DOE and other agencies such as U.S. Department of Defense	Voluntary	Generally not	$2 million per year for training and assistance	333 trillion Btu (351 PJ) of life-cycle energy savings

Program/ Policy	Start Year	Who Administers	Mandatory/ Voluntary	Subsidies Included?	Budget in Most Recent Year ($million)	Energy Savings in Most Recent Year*
21. Federal Govt. Support to Internat'l Programs/ Projects/ Initiatives	Late 1970s	DOE, EPA, State Dept.	Voluntary	Generally not	Not available	Not available

* Unless otherwise noted, energy savings are for most recent year available and include savings as a result of measures installed in that year and in previous years but that are still in use.

Table 2. Cross-Cutting Program Areas and the Major Agencies Involved

Program Area	DOE	EPA	HUD	Other Federal	States	Local
Building Codes	x	X			X	X
Building Rating and Disclosure	x	x			x	X
Voluntary Green Building Certification Programs	X	X				
Residential Retrofits	X	X	X	Treasury	X	X
Commercial Retrofits	x	X			X	X
Appliance and Equipment Standards	X				X	
Appliance Labeling	x			FTC		
ENERGY STAR	x	X			X	X
Utility Energy Efficiency Programs	x	x		FERC	X	X
Financing	x	x	X	Agriculture	X	X
Energy Efficiency Tax Incentives	x			Treasury	X	
Energy Savings Performance Contracting	X		x	Defense	X	X
International Programs	x	x		State		

X= major role; x= moderate role.

Section 1. Buildings Technology Program

DESCRIPTION

The DOE operates the Building Technologies Program which works to improve the efficiency of buildings and the equipment, components, and systems within them. The program supports research and development (R&D) activities and provides tools, guidelines, training, and access to technical and

financial resources. The program works in partnership with the private sector, state and local governments, national laboratories, and universities.

The Building Technologies Program's is currently organized in several key program areas. Each of these areas contain projects and programs that all work together to improve the efficiency of buildings and the equipment, components, and systems within them. Each program also utilizes research to identify the best technologies and strategies necessary for rapid integration into the marketplace and works with industry partners in the deployment process. While they are all geared toward achieving these common goals, each program area has its own unique focus, which is summarized below:

BetterBuildings

This program aims to improve homes, offices, hospitals, schools, and other types of buildings across the nation by using energy efficiency technology, products, and tools. This is primarily a deployment program, not a research program. Included are the following:

- **Better Information.** DOE and the Appraisal Foundation are working together to ensure that appraisers for commercial buildings have the building performance information, practical guidelines, and professional resources they need to evaluate energy performance when conducting commercial building appraisals. This is designed to enable investors, building owners and operators, and others to accurately assess the value of energy efficiency as part of the building's overall appraisal thereby helping American businesses to reduce energy waste.
- **Better Tax Incentives.** DOE is working with the Treasury Department and Congress to improve the current tax deduction for commercial building upgrades, including establishing simple paths for partial envelope and HVAC projects and to increase the amount of the incentive in order to better encourage building owners and real estate investment trusts (REITs) to retrofit their properties.
- **Better Financing.** DOE and the Small Business Administration are working to increase and accelerate financing opportunities for commercial and public building energy improvements.
- **Better Workforce.** DOE is partnering with National Institute of Standards and Technology to enhance training and education programs for the energy efficiency workforce through a pilot program focusing on areas such as energy auditing and buildings operations.
- **Better State and Local Policies.** Much of the authority to alter codes, regulations, and performance standards relating to commercial energy efficiency lies in the jurisdiction of states and localities. DOE is assisting state and local bodies with information and technical assistance.
- **Better Buildings Neighborhood Program.** Federal funding is helping more than 40 competitively selected state and local governments develop sustainable programs to upgrade the energy efficiency of over 100,000 buildings. These leading communities are innovating in various ways to expand the building improvement industry, test program delivery business models, and create jobs—with an emphasis on home energy improvement. Funds come from the EECBG program discussed above.

Building America

Building America is an industry-driven, cost-shared research program working with national laboratories and building science research teams to accelerate the development and adoption of advanced building energy technologies and practices in new and existing homes. The program works closely with industry partners to develop innovative, real-world solutions that achieve significant energy and cost savings for homeowners and builders.

Building America acts as a national residential test bed where different building system options are evaluated, designed, built, retrofitted, and vetted to ensure that requirements for energy efficiency, quality, sustainability, risk mitigation, and comfort are met. Research is conducted on individual measures and systems, test houses, and community-scale housing in order to validate the reliability, cost-effectiveness, and marketability of technologies when integrated into existing and new homes.

This program conducts and supports research, development, and demonstration activities that will produce cost-effective new homes that use up to 50 % less energy than the homes built to the IECC 2009 energy code as well as demonstrate how existing homes can reduce energy use by 50% cost-effectively. It partners with more than 270 companies comprised of architects, engineers, builders, equipment manufacturers, material suppliers, community planners, mortgage lenders, and contractor trades.

Commercial Building Initiative

The Commercial Building Initiative (CBI) aims to significantly improve the energy efficiency of new and existing commercial buildings. To achieve this goal, CBI researches technologies, strategies, and tools to improve energy savings over current building codes. CBI also engages commercial building owners and operators, architects, engineers, contractors and building occupants to enable the voluntary development and uptake of solutions. CBI components include the following:

- **Commercial Building Energy Alliances** seek to minimize the energy use and environmental impact of commercial buildings. CBEA invites building owners, managers, and operators to work with the Building Technologies Program (BTP) and with each other to identify and implement best practices, key decision-making tools, and advanced technologies for significant energy savings in their portfolios. CBEA is comprised of subgroups focusing on the following areas:
    - Retailer Energy Alliance—Retailers, supermarkets, and restaurants
    - Commercial Real Estate Energy Alliance—Commercial real estate and hospitality
    - Hospital Energy Alliance—Hospitals and healthcare organizations
    - Higher Education Energy Alliance—Colleges, universities, and other postsecondary institutions.
- **Solid-State Lighting (SSL) Initiative** works with industry to advance the development and market introduction of solid-state lighting. DOE, together with industry partners, sponsors a multifaceted program to spur SSL research, development, and commercialization. Components address research and development, demonstrations, product testing, competitions to spur development of improved lamps and luminaires and educational information.

- **Appliances and Commercial Equipment Standards** works with product manufacturers, designers, utilities, consumers, and other government agencies to develop test procedures and sets minimum efficiency standards for residential appliances and commercial equipment. This work is described more fully in a separate chapter on Appliance and Equipment Standards.
- **Building Energy Codes** supports development of more stringent and easier-to-understand building energy codes; develops downloadable compliance tools and materials; and provides technical and financial assistance to help states adopt, implement, and enforce building energy codes. This work is described more fully in a separate chapter on Building Codes.

In the past, the DOE Buildings program has been organized in different ways. For example, at one point the program was organized by end-use—lighting, building envelope, HVAC, etc.

DATES

The Buildings program goes back to the beginning of DOE, which was formed by Congress in 1977. Some elements of the program date to a predecessor agency—the Energy Research and Development Authority (ERDA).

RESULTS

The DOE Buildings Program has conducted research and development throughout its history. The National Academy of Sciences reviewed the program in 2001 and found that, in the aggregate, the benefits of federal applied energy R&D had exceeded the costs—they estimated total DOE costs of $7 billion over the 1977-2000 period but net benefits of approximately $30 billion just from the 17 projects they reviewed. They observed that the DOE portfolio has included both striking successes and expensive failures. In particular, just a just a few striking successes have dominated the benefits including DOE work to develop electronic ballasts for fluorescent lamps, low-emissivity glass, and advanced refrigerator/freezer compressors. These successes have resulted in benefits many times the cost of the entire multiyear building technologies program.

More recently, some of the accomplishments of the current programs described above include (BTP 2012):

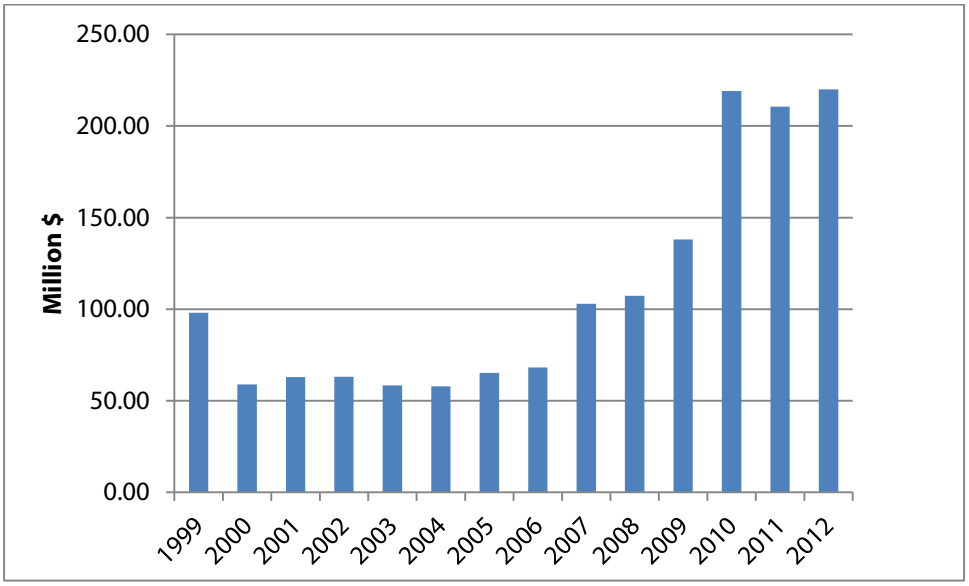
- Development of refrigerators that use 50% less energy than current federal minimum standard, for a price premium of less than $100 per unit.
- Development of an air-source integrated heat pump for water heating and space heating and cooling that reduces energy use 40-45% relative to equipment meeting federal minimum standards.
- Development of improved windows including faster production techniques for R5 windows and new coatings to allow R10 windows with higher solar heat gain.
- Successful "L Prize" competition that resulted in an A19 LED general service lamp with average lumen maintenance of over 99% after 25,000 hours of operation and that meets strict lighting quality and stress test specifications.
- Research on strategies for all climate zones to improve the energy efficiency of both new and existing homes by 30% by 2014 and 50% by 2017.

- A Home Performance with Energy Star program that expects to retrofit about 60,000 homes in 2012 in partnership with many utilities, states and local agencies.

BUDGET

The annual budget for DOE's Building Technology program was $207 million in fiscal year 2011 and $219 million in fiscal year 2012. The budget history for the program is shown in Figure 1.

Figure 1. Budget for DOE's Building Technology Program by Year



Note: These figures *include* the building code and appliance standards budgets.
Source: Laughlin (2012)

FOR ADDITIONAL INFORMATION

http://www.eere.energy.gov/topics/buildings.html

Energetics Inc. 2012. "BTP High-Impact Projects". Jan. 18. Washington, DC: Building Technologies Program, U.S. Department of Energy.

BTS Fact Sheet http://apps1.eere.energy.gov/buildings/publications/pdfs/corporate/btp_fs.pdf

National Research Council. *Energy Research at DOE: Was It Worth It?* Washington, DC: National Academy Press.

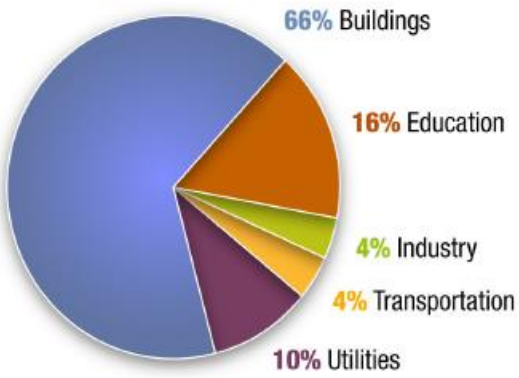
Section 2. State Energy Program (SEP)

DESCRIPTION

The State Energy Program (SEP) operates across the United States in all 56 states and territories, providing financial and technical assistance to state energy offices through both formula and competitive grants from the U.S. Department of Energy. Formula grants are based on state population and energy use. States use formula grants to finance projects and planning to address their energy

priorities. As shown in Figure 2, the largest share of formula grants goes to the buildings sector (66% of the total), followed by education (16%) and utilities (10%). Competitive grant solicitations are for specific programs such as building code adoption and specific projects to increase use of energy efficiency and renewable energy. Programs include energy efficiency, renewable energy technology and installation, transportation measures, industrial retrofit, revolving loan funds, on-bill financing strategies, and performance contracting (DOE 2011g; Oliver 2011).

Figure 2. SEP Distribution of Formula Investment



Source: Baily and Benioff (2008)

The State Energy Program is a cornerstone of a large and comprehensive partnership between the DOE and the states. State energy offices in each state and territory are the decision-makers that administer and manage program activities within each state, addressing national energy goals and coordinating energy-related emergency preparedness across the nation (DOE 2011g).

SEP helps states target both near-term deployment of energy efficiency and renewable technologies and long-term market transformation (DOE 2011a). SEP assists states in developing strategic energy plans; increasing regional collaboration; and promoting sharing information, tools, and lessons learned among states, while also enhancing the measurement and marketing of successes (Bailey and Benioff 2008).

DATES[1]

In 1975, the Energy Policy and Conservation Act of 1975 (P.L. 94-163) established the State Energy Conservation Program.

In 1983, the Warner Amendment of 1983 (P.L. 95-105) allocated oil overcharge funds—called Petroleum Violation Escrow (PVE) funds—to state energy programs.

[1] This section is based upon information available at http://www1.eere.energy.gov/wip/sep_history.html.

In 1986, these funds became substantial when the Exxon and Stripper Well settlements added more than $4 billion into this mix.

In 1990, the State Energy Efficiency Programs Improvement Act of 1990 (P.L. 101-440) encouraged states to undertake additional activities designed to improve efficiency and stimulate investment in and use of alternative energy technologies.

In 1992, the Energy Policy Act (EPAct) of 1992 (P.L. 102-486) recognized the crucial role states play in regulating energy industries and promoting new energy technologies. EPAct also expanded the policy development and technology deployment role for the states.

In 2009, the American Recovery and Reinvestment Act of 2009 (ARRA) provided $3.1 billion for SEP formula grants with no matching fund requirements.

RESULTS

According to the DOE, one dollar of federal investment from SEP leverages $10.69 in additional investment in energy projects from other federal programs, state and local governments, and private companies. Of this leverage, $3.58 comes from state and local governments, and private companies. Each federal dollar to SEP saves $7.23 in costs in the form of reduced energy expenditures (DOE 2011g).

The achievements from the ARRA funding included 165 million square feet (50.29 million m^2) of building space retrofitted to increase energy efficiency, $290 million in loans for energy efficiency and renewable energy projects, and the training of 118,000 Americans in energy efficiency and/or renewables-related opportunities (Oliver 2011).

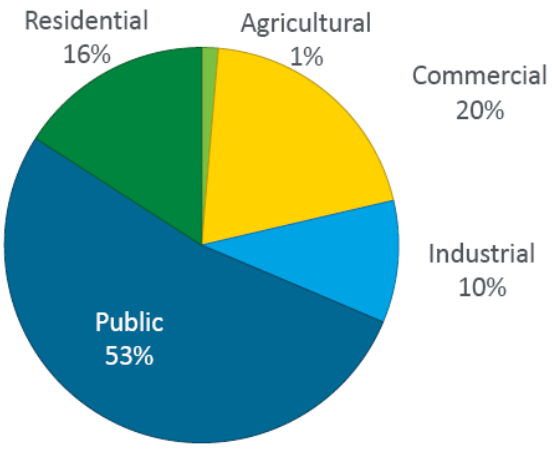
Oak Ridge National Laboratory (ORNL) has led several impact assessment and evaluation studies of SEP. In 2005, ORNL estimated that SEP has produced annual energy savings of 47.6 million MBtu (50.2 GJ), annual cost savings of $333.6 million, and annual carbon mitigation of 0.8 million metric tons (Schweitzer and Tonn 2005). A new evaluation is now underway. In their *Detailed Study Plan*, ORNL and KEMA (2011) outlined the national evaluation of SEP in FY 2008 to FY2011 according to four key impacts: (1) energy, cost, and demand savings; (2) job creation; (3) renewable energy generation; and (4) carbon mitigation. The report is expected to be published in late 2012.

BUDGET

SEP is a federal program with modest funding; the average per annum appropriation between 2001 and 2006 was $41.5 million.

In 2009, the ARRA provided $3.1 billion for a SEP formula grant, with no cost matching required. Figure 3 shows that the ARRA funding was mainly directed towards buildings (50%), electric power and renewable energy (30%), industry (9%), and policy and planning (5%). Public building retrofits represented the single largest type of activity funded from the $1.5 billion allocated (Oliver 2011).

Figure 3. Retrofits by Sector



Source: Oliver (2011)

For Additional Information

The official SEP website at the DOE is at http://www1.eere.energy.gov/wip/sep.html. This site introduces the program's history, goals and metrics, and federal regulations and guidelines (DOE 2011f).

The National Association of State Energy Officials (NASEO) also contains much information about SEP: http://www.naseo.org/programs/sep/index.html.

The Oak Ridge National Laboratory (ORNL) provides technical support to states. ORNL maintains a SEP website: http://weatherization.ornl.gov/evaluation_sep.shtml, which mainly focuses on the evaluation of SEP.

Section 3. Energy Efficiency and Conservation Block Grants (EECBG)

Description

In the United States, a federal grant program for state and local governments was authorized in the Energy Independence and Security Act of 2007 (EISA) and funded as part of the American Revitalization and Reinvestment Act (ARRA) of 2009 (U.S. Congress 2007, 2009). This program, the Energy Efficiency and Conservation Block Grant (EECBG) program, was modeled after the Community Development Block Grant program administered by the Department of Housing and Urban Development (HUD) and was intended to assist communities in the development of energy efficiency and conservation plans and projects. More specifically, the EECBG program was intended to assist state, local, and tribal governments in implementing strategies to:

- Reduce fossil fuel emissions
- Reduce total energy use
- Improve energy efficiency in the transportation, building, and other sectors
- Spur economic growth

- Create and/or retain jobs

Under ARRA, $3.2 billion was allocated for the EECBG program, which has been administered by the DOE. The Office of Weatherization and Intergovernmental Programs in the Office of Energy Efficiency and Renewable Energy (EERE) distributed the funds. Under the EECBG program, grants totaling over $2.7 billion were available to states, large cities, Native American tribes, and counties. Funds were allocated directly to cities and counties with populations greater than 35,000 and 200,000 people, respectively, as well as the top ten highest populated cities and counties in each state, regardless of population. Additional money was also distributed to states with a requirement that at least 60% of funding received by states be redistributed to smaller cities and counties ineligible for direct grants. In total, the EECBG program made over $1.8 billion available to cities and counties across the U.S. About $767 million went to states and over $450 million of the grant money was made available through direct, competitive grants (DOE 2010e).

EECBG grants funded activities such as building energy retrofits and weatherization, building code development and implementation, energy-efficient street lighting, and installation of combined heat and power systems. EECBG funds could also be used for financial incentive programs such as revolving loan funds and on-bill financing. Eligible activities included (WIP 2009):

- Development of an energy efficiency and conservation strategy
- Building energy audits and retrofits, including weatherization
- Financial incentive programs for energy efficiency such as energy savings performance contracting, on-bill financing, and revolving loan funds
- Transportation programs to conserve energy
- Building code development, implementation, and inspections
- Installation of distributed energy technologies including combined heat and power and district heating and cooling systems
- Material conservation programs including source reduction, recycling, and recycled content procurement programs
- Reduction and capture of greenhouse gas emissions generated by landfills or similar waste-related sources
- Installation of energy-efficient traffic signals and street lighting
- Installation of renewable energy technologies in or on government buildings
- Any other appropriate activity that meets the purposes of the program and is approved by DOE

In addition, grantees could use EECBG funds to support the issuance of Qualified Energy Conservation Bonds (QECBs). EECBG funds supporting QECBs could be used for (DOE 2010e):

- Debt Service Reserve Funds—amounts required by a bond contract to be held in reserve
- Capitalized Interest Funds—amounts used to make future bond payments
- Principal Sinking Fund Payments—amounts used to reduce debt of bond issuer by repayment or purchase of outstanding loans and securities held against the bond issuer in order to repay bondholders

DATES

The EECBG program was authorized in the Energy Independence and Security Act of 2007 (EISA 2007), but was funded for the first time through the American Recovery and Reinvestment Act of 2009 (ARRA 2009). Funds began to reach cities and states in the second half of 2009, and most funds needed to be spent prior to 2013, with deadlines as late as September 30, 2015 for some special competitive solicitations (DOE 2012a).

RESULTS

A status report by the U.S Government Accountability Office found that 65% of funds had been allocated for just three of fourteen eligible activities:

- 36.8% of funds have been allocated to energy efficiency retrofits, including grants to nonprofit organizations and governmental agencies for retrofitting existing facilities.
- 18.5% of funds have been allocated to financial incentive programs including rebates, subgrants, and revolving loans.
- 9.8% of funds have been allocated for programs for buildings and facilities such as installing storm windows or solar hot water technology (GAO 2011b).

A survey of cities by the United States Conference of Mayors found that most cities invested some portion of these funds in energy-efficient lighting upgrades and 40% of cities invested in new building technologies (USCM 2011). The same survey found that respondents representing 85% of cities believe that EECBG has been important for deploying new energy technologies and 87% feel that additional EECBG funds are needed for further deployment of these technologies.

The funds were allocated as part of an effort to quickly stimulate the U.S. economy. However, the U.S. Department of Energy and states received some criticism for allocating funds too slowly. An analysis of financial data submitted by EECBG grant recipients revealed that while recipients had made significant progress in expending EECBG funds, having spent $1.3 billion (nearly half of the $2.7 billion) by July 18, 2011, that $879 million (33% of the $2.7 billion) of the funding was still unobligated (DOE 2011e). More recent data (as of July 5, 2012) indicates that all of the money has been obligated and 79% has been spent (DOE 2012k).

Additional work to evaluate the impact of the program is planned for 2012 including collection of information on energy and cost savings, other key outcomes, and key factors influencing the magnitude of these outcomes (DOE 2012d).

BUDGET

The EECBG program was a one-time Congressional allocation under ARRA legislation. The program was allocated $3.2 billion. While additional funds could be allocated, given the tight federal budget, most observers think that additional appropriations are unlikely.

For Additional Information

For more information about the program, see the U.S. Department of Energy website: http://www1.eere.energy.gov/wip/eecbg.html.

Additional resources can be found on the website of the National Association of State Energy Officials (NASEO): http://www.naseo.org/arra/archive/eecbg/index.html.

Detailed information about grant allocations by state is at http://www1.eere.energy.gov/wip/eecbg_state_allocations.html.

Section 4. Weatherization Assistance Program (WAP)

Description

The Weatherization Assistance Program (WAP) aims to help low-income households to reduce their energy bills by making their homes more energy efficient. In operation since 1977, WAP is the largest national residential energy efficiency program operated by the DOE. It targets low-income households, and has provided services to more than 6.7 million households.

The DOE provides funding directly to states, the District of Columbia, United States overseas territories, and Indian tribal governments. These grantees then contract with local sub-grantees that include more than 1000 local community action agencies and nonprofit organizations to provide specific weatherization services. Each year, about 100,000 low-income households receive assistance from WAP (DOE 2012f). Box 1 presents common WAP services.

Figure 4. Services Provided by WAP

Professionally trained weatherization crews use computerized energy assessments and advanced diagnostic equipment, such as a blower doors, manometers, or infrared cameras to determine the most cost-effective measures appropriate for each home.

Typical measures may include installing insulation, sealing ducts, tuning and repairing heating and cooling systems, mitigating air infiltration, and reducing electric base load consumption

Weatherization crews also perform health and safety tests that may include testing heating units and appliances for combustion safety, carbon monoxide, and gas leaks; assessing moisture damage; checking electrical system safety; replacing unsafe heating and cooling systems; and installing smoke and carbon monoxide detectors.

Source: DOE (2010a)

The identification of "low income" households in the current WAP regulations is based on an income level double that of the poverty level determined in accordance with criteria established by the White House Office of Management and Budget (DOE 2010b).

In 2009, President Obama signed into law the American Recovery and Reinvestment Act (ARRA) of 2009, Public Law 111-005. ARRA provided $5 billion for WAP, significantly increasing federal funding for WAP in FY2009 and FY2010.

The DOE recently launched several innovative initiatives and programs to be implemented by WAP. The Weatherization Innovation Pilot Program (WIPP) is one of them. WIPP aims to promote innovations in whole-house weatherization and advance the DOE's goal of increasing the energy efficiency and health and safety of low-income families' homes. Currently, 16 grantees of WIPP are implementing weatherization innovation projects using experimental approaches to find new and better ways to weatherize homes. The approaches employed include financial tools, green and healthy homes, new technologies and techniques, and residential energy behavior change (DOE 2012j).

In recent years, WAP has been promoted not only as a means to reduce the energy bills of needy families while benefiting their health and the safety of their homes, but also as an important means to create jobs and speed the country's economic recovery.

DATES[2]

1976, Congress established the WAP focusing on low-cost energy saving measures. Many of these were emergency and temporary measures.

By the 1980s, the WAP began to focus on more cost-effective and permanent measures.

In 1982, the enactment of the Omnibus Reconciliation Act of 1982 led to the establishment of LIHEAP. The related regulations allow transfer of up to 15% of LIHEAP funds to WAP.

In 1984, the WAP included the use of cooling efficiency measures, such as air conditioner replacements, ventilation equipment, and screening and shading devices.

In 1985, the WAP included furnace and boiler replacements.

In the 1990s, the WAP included the development and adoption of advanced home energy audits.

In 2008, the WAP had served more than 6 millions of homes since its inception.

In 2009, President Obama signed into law ARRA. ARRA significantly increased federal funding for WAP in FY2009 through FY2012. It also increased eligibility for WAP to families earning up to 200% of the poverty level (previously it had been 150%) (DOE 2010b).

In FY2009, WAP was extended to include Native American Tribes and U.S. territories.

[2] This timeline is based on information in DOE (2010c).

RESULTS

Since its inception, the WAP has provided weatherization services to nearly 7 million low-income households, with more than 100,000 homes receiving WAP services annually through DOE funds. During ARRA's funding period, over 700,000 homes benefited from services (Genzer 2012).

According to the DOE, families receiving weatherization services reduce their annual energy bills by an average of about $437 (DOE 2012f). The improvement of building performance made possible by WAP creates an enduring financial impact on household energy savings, with weatherization returning $1.67 for every dollar invested in the program (DOE 2010d).

The most recent evaluation of the program was published in 2005 and was a "meta-evaluation" that reviewed and analyzed the results of state-level evaluations in 17 states. This meta-evaluation focused on natural gas savings and found that WAP on average was reducing household gas use by 22.9%, saving the average household 30.5 million Btu (32.2 GJ) of natural gas (Schweitzer 2005).

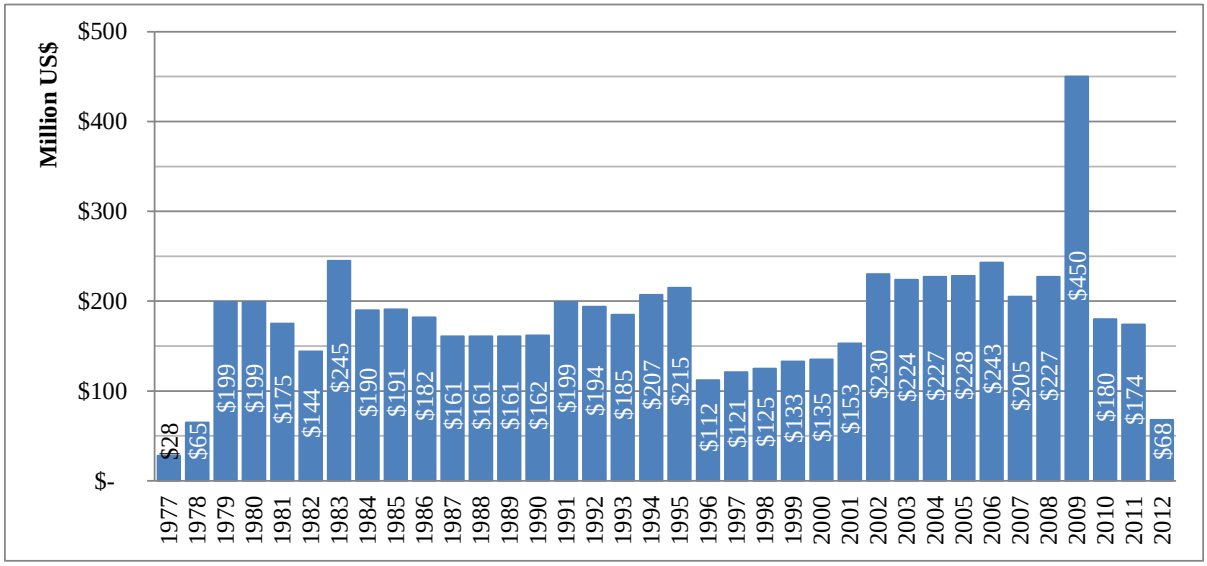
A new evaluation of the WAP program began in January 2012 and is planning to roll-out findings over the course of 2012 and into 2013 (ECW 2012).

In January 2012, DOE reported that WAP ranked as second highest Recovery Act job creator (DOE 2012g).

BUDGET

Figure 5 reveals that the total annual federal funding for WAP has increased from $28 million in 1977 to an average of $181 million in the past two decades (between 1978 and 2008). In 2009, due to the passage of the Recovery Act, federal funding to WAP jumped to nearly US$5.0 billion, nearly double its total budget compared to its FY2008 levels. From the large increase in funding that occurred in 2009, US$29 million was used to establish 26 new weatherization training centers and supplement eight existing centers (Oliver 2011). In FY2010-FY2012, Congress has cut the regular budget WAP, knowing that substantial ARRA funds were still available. It is unclear what level of funding the program will receive going forward.

Figure 5. Annual Federal Funding for WAP, FY1977-FY2012



Source: NCAT (2012)
Note: Does not include ARRA funds.

The federal government is the chief source of funding for the WAP program, indeed during the years 1979 to 1982, the program received all of its funds from the DOE. Since then, many states have made use of the DOE funding to leverage additional funding sources. The federal money usually supports the training/technical assistance and administrative costs of an agency, as well as payment for materials and supplies, while the states often leverage additional funds to increase the number of services provided and homes covered.

About 40% of grantees leverage utility funds each year. Since 2005, the leveraged annual fund has ranged from about US$120 million to US$150 million from private sources, and US$350 million to US$600 million from federal and non-federal sources (e.g., LIHEAP funds from HHS) (Oliver 2011). It is estimated that for every $1 invested by the DOE, the WAP program leverages a further $1.54 from other federal, state, utility, and private sources (DOE 2010d).

For Additional Information

The official WAP website at the DOE is at http://www1.eere.energy.gov/wip/index.html. This site introduces the program's history, project information by state, program guidance, available technical assistance and financial opportunities.

A WAP information hub at http://www.waptac.org/ introduces related program information and documentation, including rules and guidance, technical tools, public information, best practices, and training resources.

The Oak Ridge National Laboratory provides WAP technical support to the DOE. The ORNL maintains a WAP website, http://weatherization.ornl.gov/index.shtml, which mainly focuses on the evaluation of WAP.

Section 5. Federal Energy Management Program (FEMP)

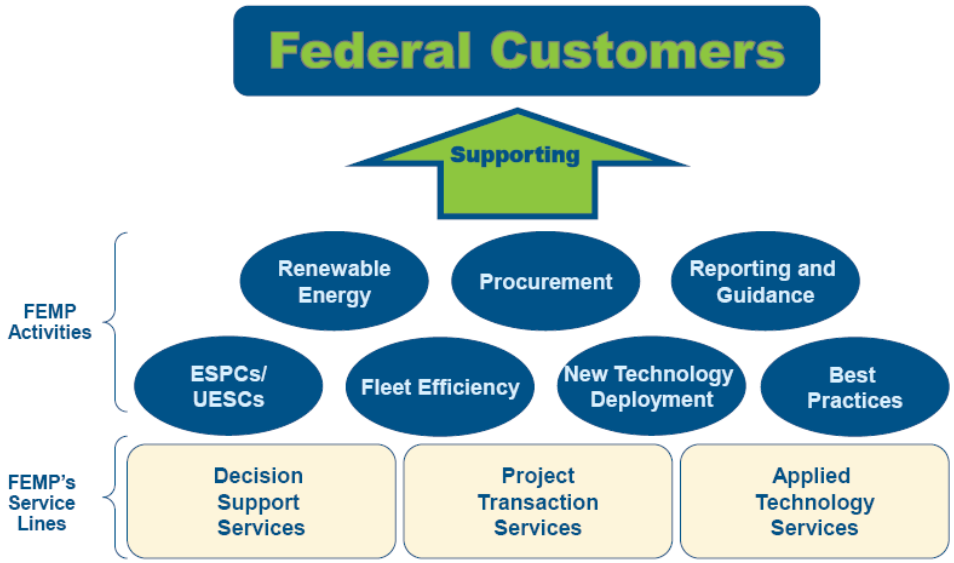
DESCRIPTION

The Federal Government, as the nation's largest energy consumer, has a tremendous opportunity and clear responsibility to lead by example. FEMP helps federal agencies carry out the implementation of cost-effective energy management and operations in three main areas: (1) energy management at federal facilities, (2) energy management at the DOE, and (3) sustainable fleet management. This section serves as an introduction to the first two of these areas of focus (DOE 2012b).

1. Energy Management at Federal Facilities[3]

FEMP helps federal agencies improve their energy management by providing (1.1) decision support services, (1.2) project transaction services, and (1.3) applied technology services—see Figure 6.

Figure 6. FEMP Mission Structure



Source: Boomsma (2011)

(1.1) DECISION SUPPORT SERVICES FEMP helps federal agencies better understand legislation and regulations, and to develop their energy management goals through education and training.

(1.2) PROJECT TRANSLATION SERVICES FEMP supports federal agencies to implement their energy efficiency, renewable energy, and water conservation projects through funding assistance for energy efficiency and renewable energy projects, including energy savings performance contracts (ESPCs), utility energy services contracts (UESCs), power purchase agreements (PPAs), and energy efficiency and demand response programs.

[3] The contents are based on http://www1.eere.energy.gov/femp/about/emff.html.

ESPCs [4] are contracts that allow federal agencies to procure facility improvements with no up-front capital cost or special appropriations from Congress.

UESCs are contracts that allow the utilities to perform assessments of opportunities for cost-effective energy and water conservation projects. The utilities pay for the assessment, design, construction, performance testing and other costs (Sahl 2011).

(1.3) APPLIED TECHNOLOGY SERVICES FEMP helps federal agencies adopt and deploy technology projects through FEMP's research and market expertise. The major working areas include (a) high-performance building design, operation and maintenance, (b) energy-efficient product procurement, (c) renewable energy technology deployment, (d) water efficiency and conservation best practices, and (e) greenhouse gas emission measurement and abatement.

HIGH-PERFORMANCE BUILDING DESIGN, OPERATION AND MAINTENANCE FEMP helps federal agencies implement sustainable design practices that integrate greenhouse gas (GHG) mitigation, energy efficiency, renewable energy, water efficiency, and other aspects related to enhanced sustainability. These practices include those related to new construction projects, retrofits, and ongoing building operation and maintenance.

ENERGY-EFFICIENT PRODUCT PROCUREMENT The EPAct 2005 requires federal agencies to purchase equipment that is ENERGY STAR-qualified or FEMP-designated for energy efficiency and low standby power. These products are in the upper 25% of energy efficiency in their category.

2. Energy Management at DOE[5]

Executive Order (E.O.) 13514 requires all federal agencies to establish an integrated sustainability plan to reduce GHG emissions, use water more efficiently, promote pollution prevention and eliminate waste, construct high performance sustainable buildings, purchase energy efficient and environmentally preferred products, and reduce the use of fossil fuels through improved fleet management.

DOE has pursued a commitment for a 28% reduction in agency-related GHG emissions by FY 2010. FEMP helped DOE to achieve this emissions reduction goal, in addition to requirements outlined in E.O. 13514 and in other federal regulations (DOE 2011d).

Dates[6]

In 1978, the National Energy Conservation Policy Act (NECPA) was enacted as part of the National Energy Act 1978. NECPA serves as the underlying authority for federal energy management, and is regularly updated and amended by subsequent laws and regulations.

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[4] These are discussed in more depth in section Energy Savings Performance Contracting in the Federal Government.

[5] This section is based on http://www1.eere.energy.gov/femp/about/energymanage.html.

[6] The source of information for this section is http://www1.eere.energy.gov/femp/regulations/requirements_by_reg.html.

In 1992, the Energy Policy Act of 1992 (EPAct 1992) establishes federal energy management in such areas as (1) federal energy efficiency funding, (2) utility incentive programs, (3) demonstration of new technologies, (4) energy audit teams, and others.

In 2001, Executive Order (E.O.) 13221, *Energy Efficient Standby Power Devices*, calls for federal agencies to purchase products that use minimal standby power when possible.

In 2005, the Energy Policy Act of 2005 sets federal energy management requirements in such areas as (1) metering and reporting, (2) energy-efficient product procurement, (3) energy savings performance contracts, (4) building performance standards and others.

In 2007, the Bush Administration issued Executive Order (E.O.) 13423, *Strengthening Federal Environmental, Energy, and Transportation Management.* E.O. 13423 sets federal energy and environmental management requirements in such areas as (1) implementing instructions, (2) reducing energy intensity, (3) increasing use of renewable energy, (4) designing and operating sustainable buildings, and others.

In 2007, the Energy Independence and Security Act (EISA 2007) set federal energy management requirements in (1) energy reduction goals for federal buildings, (2) facility management/benchmarking, (3) performance and standards for new building and major renovations, (4) high-performance buildings, and others.

In 2009, the Obama Administration issued Executive Order (E.O.) 13514, *Federal Leadership in Environmental, Energy, and Economic Performance*. E.O. 13514, which sets federal energy requirements in such areas as (1) accountability and transparency, (2) strategic sustainability performance planning, (3) greenhouse gas management, (4) sustainable building and communities, and others.

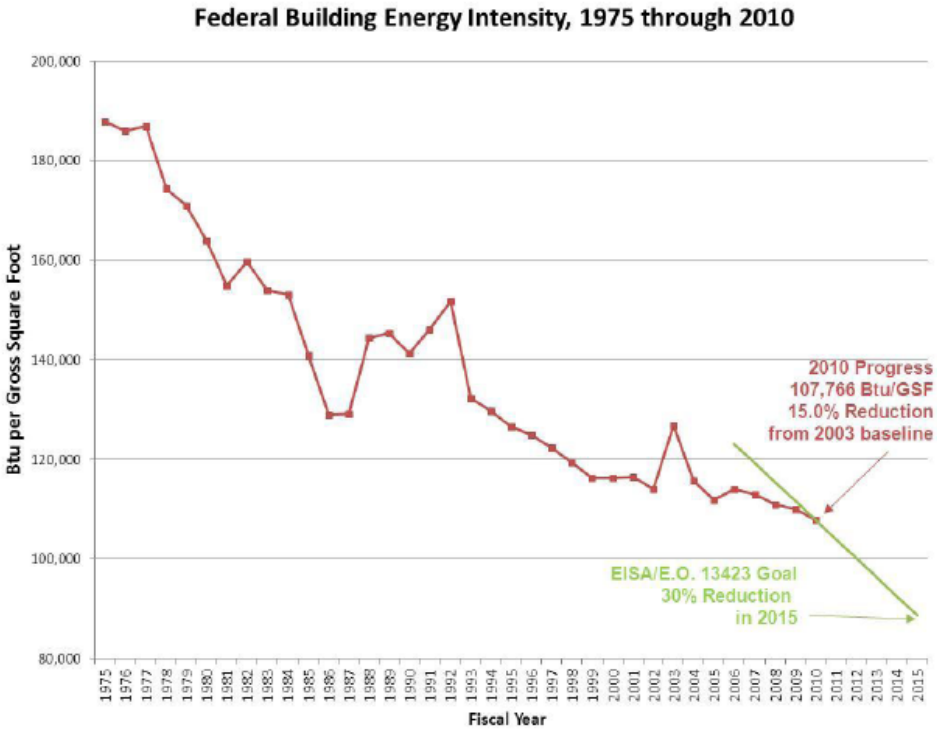
RESULTS

By May 2011, FEMP had 570 ESPC projects worth $3.9 billion awarded to 25 federal agencies and organizations. These projects reduced annual energy consumption by 32.8 trillion Btu (34.6 PJ), and resulted in energy savings valued at $13.1 billion , of which approximately $10.1 billion went to finance project investments, leaving a net saving of $3 billion (DOE 2011d).

Since 1994, more than 1,680 UESC projects have been awarded. The total value of funding allocated to these projects in 2011is approximately $2.3 billion. The result has been a savings of over 14 trillion Btu (15 PJ) (DOE 2011d).

As a consequence of measures taken by the Federal Government over the past four decades, the energy intensity of federal buildings has decreased dramatically, as displayed in Figure 7.

Figure 7. Federal Building Energy Intensity, 1975-2010



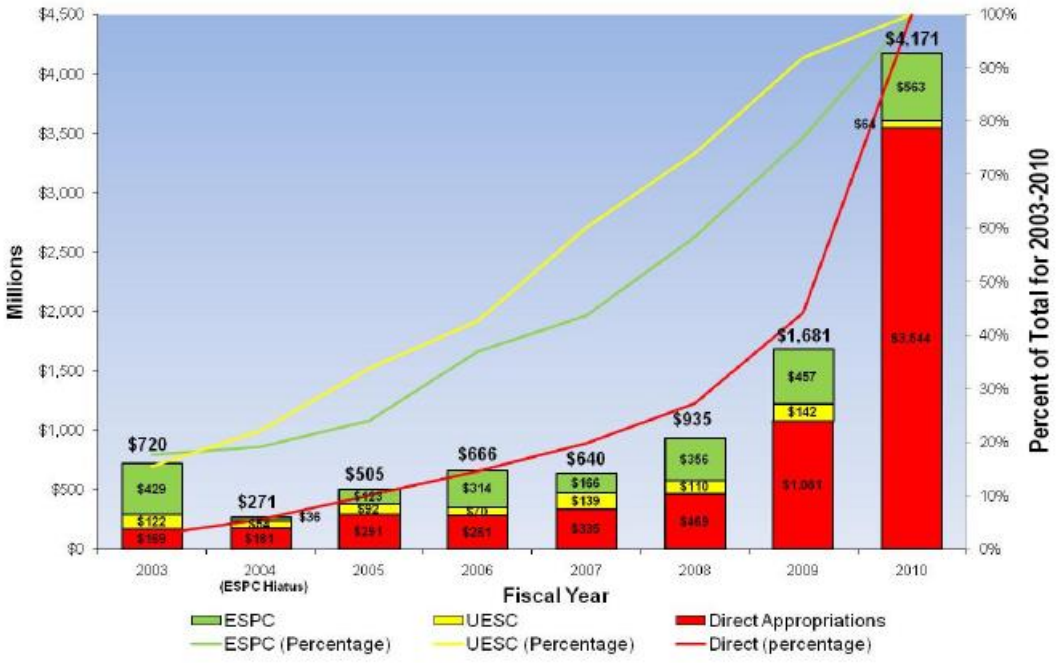
Source: Sahl (2011)

BUDGET

Funding for FEMP includes ESPC, UESC and direct appropriations from Congress. Figure 8 shows that there were significant increases in direct appropriations in 2009 and 2010, which were mainly due to funding contributions from the American Recovery and Reinvestment Act (ARRA). Direct appropriations were $30.4 million in 2011 and $30.0 million in 2012.[7]

[7] http://ase.org/resources/fy-2013-federal-energy-efficiency-programs-funding-senate-committee-report

Figure 8. Investment in Energy Efficiency Projects in Federal Facilities, 2003-2010



Source: Sahl (2011)

For Additional Information

The official FEMP website at the U.S. DOE is at http://www1.eere.energy.gov/femp/.

This site introduces the different aspects of the program, laws and regulations, project funding and information sources.

The Lawrence Berkeley National Laboratory (LBNL) maintains a measurement and verification site for FEMP at http://mnv.lbl.gov/home.

Section 6. U.S. Department of Housing and Urban Development Energy Efficiency Programs

Description

Energy efficiency has been a relatively small but growing consideration in housing and community development policy in the United States. Most urban housing and planning at the federal level happens through the U.S. Department of Housing and Urban Development (HUD). HUD performs two primary functions: (1) providing funding and guidance to state and local governments for planning, housing development, and affordable housing preservation, and (2) providing housing finance to consumers through subsidized mortgages and mortgage insurance. In most of its programs, HUD encourages energy efficiency through information and technical assistance only; in some programs it provides incentives for efficiency, but largely it does not include energy efficiency among program requirements. HUD also has regulatory authorities related to energy efficiency, notably

through mortgage lending and building codes for manufactured housing.[8] Though HUD has direct stewardship of 1.2 million units of public housing and a million units of assisted housing (HUD 2012f) and indirect influence over nearly all private housing finance in the United States, there is no centralized oversight of energy use in the asset portfolio nor an office within HUD charged specifically with energy management.

The HUD Strategic Plan for 2010-2015 includes as Subgoal 4B, "Promote energy-efficient buildings and location-efficient communities that are healthy, affordable, and diverse." Two of 22 outcome measures for the plan are related to energy efficiency:

- "Completing cost-effective energy and green retrofits of 159,000 public, assisted, and other HUD-supported affordable homes by the end of FY 2011."
- "Reducing the share of household income spent on the combined costs of housing and transportation in communities that receive assistance from the Office of Sustainable Housing and Communities."

The strategies for implementing this plan include: incorporating sustainability and energy efficiency into all HUD programs; promoting coordinated planning at the local state and regional levels for sustainable housing, transportation, and communities; expanding green building practices and reducing energy consumption in HUD-supported affordable housing; and supporting an energy-efficient housing market through retrofitting existing housing, energy-efficient new construction, home energy labeling, and promoting financing products (HUD 2010a). Under the previous administration, HUD developed an Energy Action Plan (HUD 2001, 2006, 2008a). In the paragraphs below we discuss HUD's major energy-related initiatives and authorities, including block grants, competitive grants, public housing, rental assistance and utility allowances, influence over the mortgage market, the Sustainable Housing and Communities Initiatives, and building codes.

Block Grants

HUD administers two large block grant programs, the Community Development Block Grant (CDBG) and the HOME Investment Partnerships Program (HOME), in which funds are granted to state and local governments with broad guidelines on eligible activities. CDBG funds a wide variety of local community development needs. Eligible activities related to energy efficiency include: weatherization of homes or apartments, financing energy efficiency measures, district heating, and development of community energy strategies (HUD 1981). HOME funds are dedicated to building or rehabilitating affordable housing or to providing direct rental assistance. HUD provides guidance and technical assistance to encourage that projects be undertaken with high levels of energy efficiency (HUD 2008b, 2009), but the programs do not include energy efficiency requirements or provide preference to grantees pursuing energy efficiency. However, the Neighborhood Stabilization Program (NSP), a component of CDBG established in 2008, does include energy efficiency requirements for new construction and gut rehabilitation projects (USGBC 2012). Also, HUD is planning to release a

[8] Although, as discussed below, the authority over manufactured homes is moving to the U.S. Department of Energy.

rule that requires the application of energy efficiency standards for HOME assisted housing units (Federal Register 2011a).

Competitive Grant Programs

While having a limited role in the guidance for HUD's large block grant programs, energy efficiency has been more successfully integrated into the selection criteria for several competitive HUD programs in recent years. The Multifamily Preservation Revitalization Demonstration grant programs, HOPE VI/Choice Neighborhoods program, and the Section 202 and 811 supportive housing programs incorporate minimum energy efficiency standards and/or provide additional points to applications meeting certain green building criteria (USGBC 2012; HUD 2011a).

In 2011, HUD announced funding availability for a competitive grant program, the Multifamily Energy Innovation Fund, specifically designed to address barriers to energy efficiency in assisted housing. This $25 million pilot program requires grantees to demonstrate that they will reduce energy consumption by 20% or more (HUD 2011b).

Public Housing

The Office of Public and Indian Housing (PIH) administers programs to assist housing owned and operated by Public Housing Authorities and Tribes around the United States, including funding for operational and capital needs. Several of these programs are directly focused on or relate to energy efficiency.

In 2011, PIH proposed updated energy efficiency standards requiring public housing using funds from the Public Housing Capital Fund to meet 2006 International Energy Conservation Code or ASHRAE 90.1-2004 standards and requiring the purchase of ENERGY STAR appliances. This same proposed rule allowed for the development cost of projects to be increased if the cost increase was related to energy efficiency measures (Federal Register 2011b).

The Office of Public and Indian Housing is developing requirements for Housing Authorities to undertake Physical Needs Assessments, including energy audits, every 5 years (Federal Register 2011c). The goal of the effort is to integrate energy efficiency and other green improvements into the capital planning process through providing a method for surveying long-term, life-cycle capital needs over 20 years (USGBC 2012). In 2012, PIH also began requiring quarterly reporting on energy efficiency measures implemented with HUD Operating Fund grants, through the Energy Performance Information Center (EPIC) (HUD 2012c).

The Office encourages the use of energy performance contracting (EPC) to improve energy efficiency and decrease energy costs for Public Housing. They have developed guidance and an approval process for Housing Authorities to follow before entering into an EPC. Changes in the Operating Fund formula (Code of Federal Regulations Title 24, Part 990) for public housing in 1991, 2001, and 2005 have begun encouraging energy improvements and incrementally made it easier to fund them with private funds. It is estimated that around $900 million has been successfully invested in public housing improvements through EPCs (Morgan 2012). For small Public Housing Authorities who have traditionally had difficulties entering into EPCs, HUD is developing a pilot financing program

that connects Housing Authorities with lenders and allows them to repay loans through existing HUD funding programs (USGBC 2012).

The technical assistance offered by HUD to public housing and other assisted multifamily housing includes resources aggregated in the Public Housing Environmental and Conservation Clearinghouse and tools developed by the Office of Environment and Energy for analyzing the potential for combined heat and power (CHP) to serve multifamily buildings (HUD 2009).

Project-Based Rental Assistance and Utility Allowances

One of the largest federal programs providing funding for affordable housing is the Project-Based Rental Assistance program, founded in 1974, also known as Section 8. The Section 8 program provides a subsidy to reduce the rental cost of particular properties for a contractually determined period. Part of the funding for Section 8 properties (as well as for most public housing and much assisted housing) is the "utility allowance," which is intended to help cover energy costs and is deducted out of the tenant's portion of payments to the property owner (HUD 2012e). The most common practice to date has been to calculate utility allowances based on the entire housing portfolio of the local public housing authority. However, this method is a disincentive to energy efficiency improvements because changes in energy efficiency of a particular unit will not result in a lower utility allowance calculation or higher revenue for the owner of the unit (USGBC 2012).

HUD has recently begun to make some changes to its policy regarding utility allowances and energy efficiency, including allowing "residual receipts" and "reserves for replacements" to be used for energy efficiency measures. However, the utility allowance calculation and other calculations for housing assistance payments still disincentivize energy efficiency investments. The Internal Revenue Service and public housing authorities in California have developed alternative methods for calculating utility allowances for their properties that are more conducive to energy efficiency investments and which can serve as model for reforms to HUD policy (USGBC 2012).

Federal Housing Administration

The Federal Housing Administration (FHA) is an agency within HUD that regulates the mortgage industry and is also the largest mortgage insurer in the world. FHA offers several products that directly relate to energy efficiency including the Power Savers loan program for single-family homes and Green Refinance Plus program for affordable rental housing. These are discussed in the Financing section of this report.

FHA's regulatory authority over the mortgage market, including requiring energy costs to be accounted for in mortgage underwriting, has been identified in multiple reports as an under-utilized opportunity for advancing energy efficiency (GAO 2008 USGBC 2012).

American Recovery and Reinvestment Act of 2009

The American Recovery and Reinvestment Act of 2009 (ARRA) invested over $13 billion in HUD programs, nearly $5 billion of which was targeted at improving energy efficiency. Of this, $4 billion was invested in energy-efficient modernization for public housing and $510 million was invested in energy efficiency improvements for Native American housing (HUD 2012d). ARRA also allocated

$250 million to the Green Retrofit Program to provide loans and grants for energy retrofits to HUD assisted multifamily housing. While this program has now ended, it funded improvements to 20,000 apartment homes, resulting in an estimated 25% average reduction in energy use and an annual savings of $12 million in utility bills (HUD 2010b). The program also provided a model for energy-related reforms to other programs, including the development of green physical needs assessment requirements of public housing and the Green Refinance Plus program (USGBC 2012).

Another result of ARRA was the development of the HUD-DOE Weatherization Partnership. The partnership was intended to address historic barriers toward using Weatherization Assistance Program (WAP) funds, administered by the DOE, to fund energy efficiency improvements to public and assisted multifamily housing. While this had been an issue for decades, it became particularly acute for multifamily housing along with the supplemental $5 billion allocated to the WAP program under ARRA. A result of the partnership was the development of a regularly updated list, effective as of 2010, of multifamily buildings certified by HUD as meeting income eligibility requirements of the WAP program and which therefore to not need further verification of eligibility (DOE 2012c).

Sustainable Housing and Communities Initiatives

Launched in 2010, the HUD Office of Sustainable Housing and Communities (OSHC) is charged with advancing sustainability through better connecting federal housing and transportation investments with local decision-making. The Office acts as the HUD representative to the Partnership for Sustainable Communities (a collaboration between HUD, the U.S. Department of Transportation, and the EPA), which aims to align activities, programs, and policies across the three agencies. OSHC in collaboration with the Office of Policy Development and Research hosts technical assistance resources on green building and other sustainable community topics through the Sustainable Communities Resource Center.

The Sustainable Housing Initiative is located within OSHC and coordinates activities within HUD and with other agencies, including the EPA, with a focus on advancing energy efficiency and green building. Major activities include leading implementation of HUD's Annual Performance Goal for Energy Efficiency and Green Building, working to coordinate and update energy efficiency requirements for programs across HUD and with other agencies, and expanding the availability of finance for energy efficiency in single-family and multifamily housing.

Building Codes

HUD has been responsible for building codes for manufactured housing (mobile homes) since 1976, including energy requirements, under HUD regulation 24 CFR Part 3280, commonly known as the HUD-code. However, the last major update to the codes by HUD took place in 1994 (GAO 2008). The Energy Independence and Security Act of 2007 required the DOE to develop energy standards for manufactured housing in consultation with HUD that would eventually replace the HUD codes. The DOE submitted draft regulations for review by the Office of Management and Budget in December 2011 where they are pending approval (OMB 2012).

DATES

1974—Community Development Block Grant program established under the Housing and Community Development Act

1990—HOME housing block grants established under the Cranston-Gonzalez National Affordable Housing Act

1995—FHA Energy Efficient Mortgage program offered nationwide

2009—American Recovery and Reinvestment Act

2010—Office of Sustainable Housing and Communities established

RESULTS

As of the end of Fiscal Year 2011, HUD had enabled energy-efficient and green retrofits to more than 195,000 housing units, exceeding its goal of 159,000 units set in the Strategic Plan (HUD 2012a). HUD has set a goal of accomplishing the same number again by the end of Fiscal Year 2013 (HUD 2012b) but without the aid of ARRA funds. An assessment of the energy savings impacts of the investments under ARRA, the Green Energy Retrofit Assessment, is currently underway (FedBizOpps 2011). Energy performance contracts in public housing are estimated to have reduced energy use by 20% on average (Morgan 2012). HUD has historically had difficulty in obtaining and tracking energy performance data for properties and projects they finance (GAO 2008, USGBC 2012). Energy-related accomplishments of other HUD programs are not systematically tracked. Recent efforts to address this include the proposed Energy Management and Tracking System/Residential Energy Modeling System (USGBC 2012; HUD 2012a).

BUDGET

While budgets for many energy efficiency specific initiatives are often small and funded on a year to year basis, HUD's largest programs that can be used to improve energy efficiency—CDBG, HOME, and the various Public Housing programs—consistently have annual budgets of a billion or more. The budgets for important energy-related programs in recent years are included in Table 3.

Table 3. Budgets for Energy Efficiency-Related HUD Programs (not including supplemental allocations through ARRA)

Note: While these programs include energy efficiency, it only accounts for a minority of expenditures under these programs.

Program	Fiscal Year 2009	FY 2010	FY 2011	FY 2012	FY 2013 request
Community Development Block Grant (formula)	$3.6 billion	$3.9 billion	$3.3 billion	$2.9 billion	$2.9 billion
HOME Investment Partnerships Program (formula)	$1.8 billion	$1.8 billion	$1.6 billion	$1.0 billion	$1.0 billion
Public Housing Capital Fund	$2.5 billion	$2.5 billion	$2.0 billion	$1.9 billion	$2.1 billion
Public Housing Operating Fund	$4.5 billion	$4.8 billion	$4.6 billion	$4.0 billion	$4.5 billion
Project Based Rental Assistance (Section 8)	$7.5 billion	$8.6 billion	$9.3 billion	$9.3 billion	$8.7 billion
Sustainable Communities Initiative	—	$150 million	$100 million	$0	$100 million
Policy Development and Research	$32 million	$48 million	$48 million	$46 million	$52 million

Sources: http://portal.hud.gov/hudportal/HUD?src=/program_offices/comm_planning/communitydevelopment/budget and http://nlihc.org/sites/default/files/FY13_Budget_Chart.pdf

FOR ADDITIONAL INFORMATION

General

Office of Environment and Energy, including combined heat and power analysis tools: http://portal.hud.gov/hudportal/HUD?src=/program_offices/comm_planning/library/energy

Office of Sustainable Housing and Communities—Sustainable Housing Initiative: http://portal.hud.gov/hudportal/HUD?src=/program_offices/sustainable_housing_communities/sustainable_housing_initiative

Green Building on the Sustainable Communities Resource Center:
http://www.huduser.org/portal/sustainability/resources_green_sustainability.html

Public Housing

Energy Performance Contracting:
http://portal.hud.gov/hudportal/HUD?src=/program_offices/public_indian_housing/programs/ph/phecc/eperformance

Public Housing Environmental and Conservation Clearinghouse:
http://portal.hud.gov/hudportal/HUD?src=/program_offices/public_indian_housing/programs/ph/phecc

Multifamily Homes

Green Refinance Plus—FHA/Fannie Mae:
http://portal.hud.gov/hudportal/HUD?src=/press/press_releases_media_advisories/2011/HUDNo.11-106

Multifamily Energy Innovation Fund:
http://portal.hud.gov/hudportal/HUD?src=/press/press_releases_media_advisories/2012/HUDNo.12-051

Single-Family Homes

FHA Energy Efficient Mortgage Program:
http://portal.hud.gov/hudportal/HUD?src=/program_offices/housing/sfh/eem/energy-r

Recovery Act

Green Retrofit Program: http://portal.hud.gov/hudportal/HUD?src=/recovery/programs/green

HUD-DOE Weatherization Partnership:
http://portal.hud.gov/hudportal/HUD?src=/recovery/partnerships/HUD_DOE

Manufactured Homes

Energy Efficiency Standards for Manufactured Housing:
http://www.energycodes.gov/status/mfg_housing.stm

Section 7. Low Income Home Assistance Program (LIHEAP)

DESCRIPTION

The Low Income Home Energy Assistance Program (LIHEAP) is a federal social service program that helps low-income households to meet their home energy needs (i.e., to cover costs related to household heating and cooling). LIHEAP has been in operation since 1981 and is the largest public energy assistance program in the United States.

The Administration for Children and Families (ACF) of the U.S. Department of Health and Human Services (HHS) is responsible for the management of LIHEAP at the federal level, and for the distribution of LIHEAP funding to grantees. The grantees include the fifty states, the District of Columbia, five territories and 140 tribal governments (ACF 2011a). These grantees independently manage LIHEAP at a local level.

Supported by a mandatory block grant,[9] two types of LIHEAP funding are available: regular funds and emergency contingency funds. Regular funds are annually allocated to grantees based on a formula, while contingency funds, which are not issued every year, may be released to one or more grantees at the discretion of the Secretary of the Department of HHS based on emergency need. The Energy Policy Act of 2005 requires the Secretary of the Department of HHS to report to Congress regarding how the LIHEAP "could be used more effectively to prevent loss of life from extreme temperatures." For the 2010 fiscal year (FY), the total value of the regular fund was $4.5 billion, and the contingency fund was $0.59 billion.

LIHEAP offers one-time financial assistance to qualifying low-income households enabling them to pay their home heating or cooling bills, while additional crisis assistance is also available. Eligible applicants must have an income less than 150% of the federal poverty level or 60% of the state median poverty level to be eligible (ACF 2011a), however some states have expanded their programs to include more households (for example, in Massachusetts, applicants' household income must be no greater than 200% of the federal poverty level). Payments are usually made by LIHEAP directly to local utility companies or vendors.

Under LIHEAP laws and regulations, states may transfer up to 15% of their LIHEAP funds to WAP. Historically, prior to recent cutbacks in LIHEAP funding, about 10% of funds have been so transferred (Genzer 2012).

In some states, the HHS-managed LIHEAP and the DOE-managed WAP[10] have frequently coordinated their efforts to help low-income households cover their home energy use expenses. In 32 states the same departments that manage LIHEAP also administer the DOE's WAP. In some states households are required to accept home weatherization as a condition for eligibility for LIHEAP assistance.

DATES

In 1980, Congress established a predecessor program to LIHEAP, the Low Income Energy Assistance Program (LIEAP) as part of the Crude Oil Windfall Profits Tax Act (P.L. 96-223). The program sought to address the heating needs of eligible low-income households.

In 1981, Congress enacted LIHEAP as part of the Omnibus Budget Reconciliation Act (P.L. 97-35), thus replacing LIEAP. The total budget for LIHEAP in 1981 was US$1.85 billion.

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[9] A block grant is a large sum of money granted by the national government to a regional government with only general provisions as to the way it is to be spent.

[10] See Weatherization Assistance Program section of this report.

In 1982, the first contingency funds were released with a total value of US$123 million.

In 1984, Congress reauthorized LIHEAP as part of the Human Services Reauthorization Act (P.L. 98-558), which was the first time a program was implemented to address both the heating and cooling needs of eligible households.

In 1985 and 1987, the development and the passage of the Graham Rudman Hollins Act, which aimed to reduce the federal deficit, led to a decrease of funding for LIHEAP.

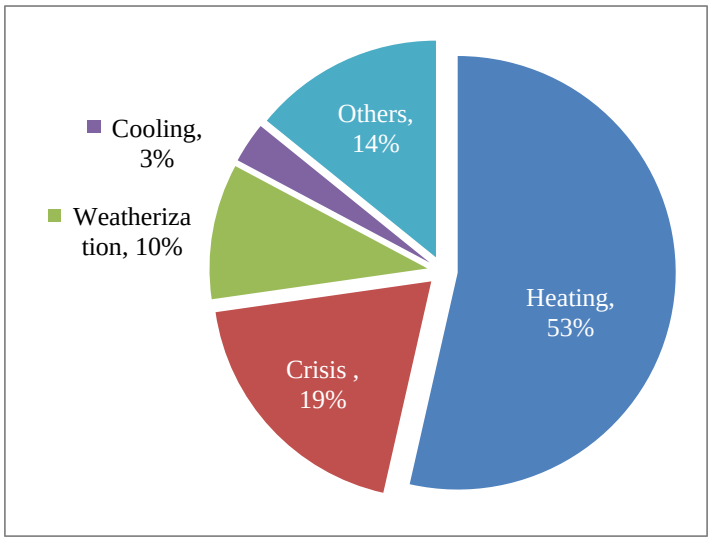
Since FY 1991, state and tribal LIHEAP grantees have had the opportunity to participate in the LIHEAP Leveraging Incentive Program, established under the 1990 reauthorization of LIHEAP (Public Law 101-501).

The 1994 reauthorization of LIHEAP added a new section to the LIHEAP statute. Section 2607(b), effective as of FY 1996, authorizes a new, optional initiative, the Residential Energy Assistance Challenge (REACH) grant, funding for which would be taken out of the LIHEAP Leveraging Incentive Program funds (up to 25% of the total amount authorized for the leveraging program).

RESULTS

As displayed in Figure 9, the largest portion of home energy payments made from LIHEAP in FY2008 was for heating benefits (53% of the total fund), followed by crisis benefits (19%) and weatherization benefits (10%). Cooling benefits only represented 3% of the total funds. (ACF 2011b)

Figure 9. LIHEAP Assistance Use in FY2008

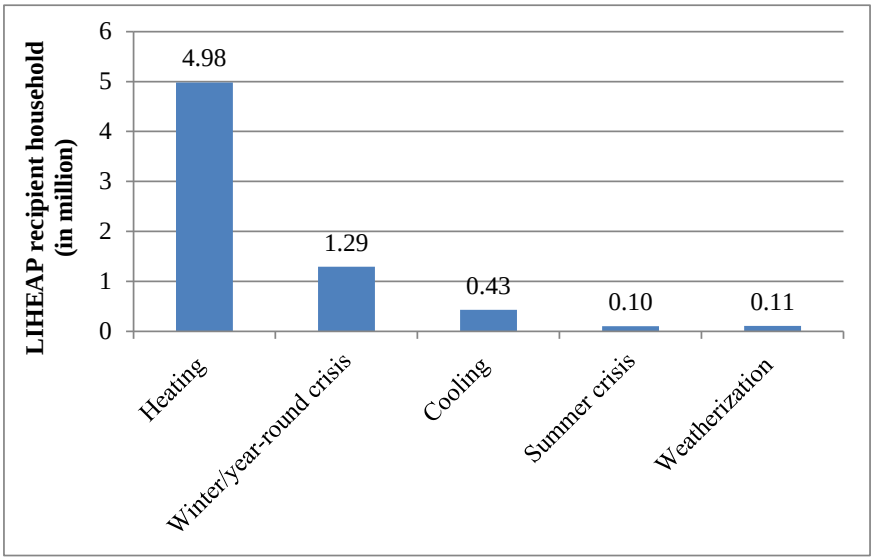


Source: ACF (2011b)

In FY 2008, approximately 4.98 million households were recipients of heating benefits, while roughly 1.29 million households were also recipients of winter/year-round crisis benefits, shown in Figure 10. In addition, 430,000 households received cooling-related financial support, and 100,000 households benefited from summer crisis financial assistance. Note that the total (i.e., unduplicated) number of

households receiving LIHEAP assistance cannot be calculated because some households received more than one type of LIHEAP assistance during FY 2008.

Figure 10. Number of LIHEAP Recipient Households by Type of Assistance



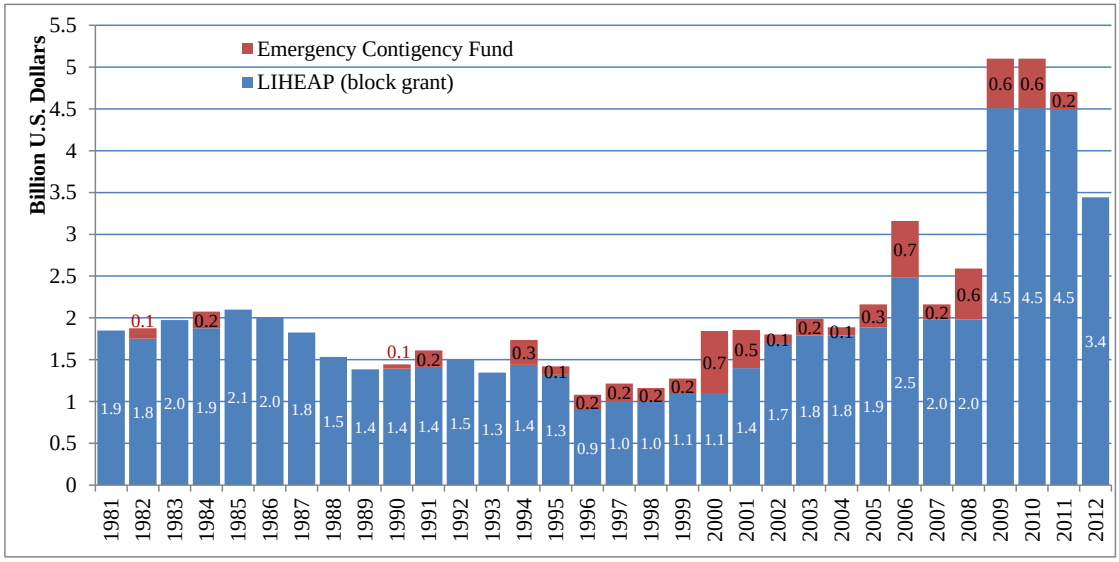
Source: ACF (2011b)

There was wide variation in states' FY 2008 average household benefit levels for the various types of LIHEAP fuel assistance, ranging from $184 for summer crisis assistance to $389 for winter/year-round crisis assistance. The national average household benefit was $293 for heating assistance, which increased to $363 when heating and winter/year-round crisis benefits were combined (ACF 2011b).

BUDGET

LIHEAP is a federal block grant that consists of two types: regular and emergency, see Figure 11.

Figure 11. Annual Funding for LIHEAP, 1981-2012



Source: NACT (2012)

The total annual federal funding for LIHEAP has increased from US$1.85 billion in 1981 to US$3.44 billion in 2012. The highest regular federal funding for LIHEAP occurred in FY2009, FY2010 and FY2011, with US$4.5 billion allocated in each of these years, and the total for each year being 128% higher than the 2008 level. However, in 2012 the regular funding of LIHEAP fell by 24% relative to its 2011 level, and the Obama administration has proposed further reductions for 2013. Some states supplement federal funds with their own funds.

For Additional Information

The official LIHEAP website under the U.S. HHS: http://www.acf.hhs.gov/programs/ocs/liheap/index.html. This site introduces the program, recent funding information, how to apply for assistance, guidance, policies and procedures of LIHEAP, plus related publications and reports.

More state-level information about LIHEAP can be found at the LIHEAP clearinghouse: http://www.liheap.ncat.org/.

Wikipedia provides a short introduction to LIHEAP: http://en.wikipedia.org/wiki/Low_Income_Home_Energy_Assistance_Program. This page also includes some information about how LIHEAP and the Weatherization Assistance Programs (WAP) work together.

A detailed history about LIHEAP statute: http://www.acf.hhs.gov/programs/ocs/liheap/guidance/statute/statute.html.

A history review about LIHEAP can be found at Gish, Melinda. 2001. "The Low-Income Home Energy Assistance Program (LIHEAP)."

http://digital.library.unt.edu/ark:/67531/metacrs1652/m1/1/high_res_d/94-211epw_2001Jun26.pdf . CRS Report for Congress.

Section 8. Department of Defense Energy Efficiency Initiatives in Buildings

DESCRIPTION

The U.S. Department of Defense (DoD) is the largest energy consumer in the United States spending a total of $21.3 B on total energy resources in 2011. The DoD separates its facility energy use from its operational energy use. Its facility budget includes over 539,000 buildings and structures (2.2 billion square feet) amounting to approximately 19% of its total energy costs that was in excess of $3.85 B in 2011 (cite). Each of the military branches, the Army, Navy, and the Air Force, has their own discrete energy budgets, programs and procedures with some level of policy directives and guidance from the DoD Office of the Secretary of Defense. [11]

A number of barriers or issues facing DoD in terms of accomplishing greater energy efficiency are as follows:

- Aging infrastructure - many of DoD's buildings are fifty to sixty years old and consequently largely energy inefficient.
- Cost of retrofitting all the facilities controlled by the DoD is an issue that must be addressed in a time of constrained federal budgets.
- The mission of DoD is not one that historically embraces energy efficiency as a high priority.
- Security of data is a high priority that prevents easy transmission of data to monitor energy use.

Responsibility for DoD energy goals and attainment is housed with the Assistant Secretaries for Installations and Environment in each of the service branches. These offices provide policy guidance with technical support being provided generally by Civil Engineering staff.

In general, DoD's energy efficiency goals are the same as those set by statute or Executive Order for all of the Federal Agencies. In the case of facility retrofits, the goal is for a 30% reduction in energy use from a 2000 baseline by the year 2015. Additionally, there are requirements to purchase the most efficient technologies for replacement parts and to purchase Energy Star products from a supply schedule. New federal facilities must be built to an energy performance level 30% higher than ASHRAE Standard 90.1 – 2007 for non-residential buildings and for residential buildings the standard is the 2009 International Energy Conservation Code (IECC). Links to these provisions are provided later in this section.

[11] The 2011 data listed comes from a PowerPoint presentation delivered at ICF International on April 12, 2012 by then Deputy Under-Secretary of Defense, Installations and Environment Dorothy Robyn. See http://www.icfi.com/events/breakfasts/2012/04/the-dod-energy-security-technological-innovation Presentation available upon request.

DoD uses several tools and methods to comply with their energy reduction goals and these include a mix of federally appropriated funding and private sector financing. Each of the branches has a varying level of appropriated funding dedicated to energy efficiency. Usually, these funds are part of the DoD's Sustainment and Modernization funds and are therefore not able to be broken out specifically around energy-related expenditures. In addition, the DoD Military Construction budget includes the Energy Conservation Investment Program, which dedicates funds to a list of specific energy-related projects each year. Over the past several years, these funds have been used for renewable projects in large measure.

The branches of the DoD are also using private sector financing tools such as Energy Savings Performance Contracting (ESPC) and Utility Energy Services Contracts (UESC) to improve their energy use. Some branches have been more active than others in the use of private sector resources with the Army using $840 M of private sector resources and expertise to improve their energy use over a three year time table and the other two branches committing to only about $200 M over this same three year time frame.

In addition to working to help install more energy efficient technology in their facilities, the Office of the Secretary of Defense has also been working to incorporate new technologies for facility energy improvements. Currently, DOD is dedicating approximately $30 M per year to new technology demonstration and is looking for ways to incorporate these cutting edge technologies in energy improvement projects on a more sustainable basis.

A recently released report by the Center for Climate and Energy Solutions (Seidel 2012) shows that the DoD, as an example of "leading by example", has an initiative to create online collaboration and communication tools to lower travel and training spending. The Defense Connect Online system already has more than 700,000 users, and DoD expects that to grow to 2.5 million in four years.

See: http://www.c2es.org/publications/leading-by-example-federal-sustainability-and-ict

At this point no study by been undertaken by DoD to ascertain what level of energy savings has been or can be achieved through this initiative. The report strongly suggests that DoD undertake such a study in order to justify additional expenditures in appropriations with a Congress that is pulling back on increased investments at DoD and other federal agencies.

Among the three branches, DoD is spending direct appropriations on metering their facilities, which includes the use of smart meters and a certain amount of research and development (R&D). Much of the problem with monitoring individual facility energy use is complicated and costly because of the need to secure all data. Wireless technology is particularly problematic at least from the perspective of the branches. That is a security issue preventing the quicker and less expensive method of sharing energy use data with a common data collection point.

The following details individual energy efficiency goals in each of the branches of DoD. Links to key documents are provided at the end of this section.

U.S. Army

The Army published its Army Energy Security Implementation Strategy in 2009 with the following goals:

- Reduce energy consumption
- Increase energy efficiency across platforms and facilities
- Increase use of renewable/alternative energy supplies
- Assure access to sufficient energy supplies
- Reduce adverse impacts on the environment

The Army set a specific goal to have five installations meet "net-zero" energy goals by 2020, and an additional 25 achieve net-zero energy by 2030. Net-zero energy means the installation produces as much energy on-site as it uses.

U.S. Navy and Marine Corps

The Department of the Navy (DoN) established its Task Force Energy, consisting of an executive steering committee, the Navy Energy Coordination Office, and seven working groups encompassing both tactical and shore programs to meet energy goals. Goals include:

- Energy-Efficient Acquisition: Evaluation of energy considerations will be mandatory when awarding contracts for systems and buildings.
- Reduce non-tactical petroleum use in the commercial fleet by 50% by 2015.
- Produce at least 50% of shore-based energy from alternative sources by 2020.
- 50% of Navy and Marine Corps installations will be net-zero by 2020.
- By 2020, 50% of total energy consumption will come from alternative sources.

The Marine Corps (part of DoN) established the Expeditionary Energy Office to reduce energy consumption, with the goals of increasing combat effectiveness by reducing the need for liquid fossil fuel by 50% by 2025 and using liquid fuel only for mobility systems, which will be more energy efficient than systems are today.

U.S. Air Force

In May 2010, the Air Force published its Air Force Energy Plan with the vision: To "make energy a consideration in all we do."

Their goals include:

- Reduce energy demand by installations, flight operations, and ground operations
- Increase energy supply by developing and utilizing renewable and alternative energy wherever possible
- Change the culture to increase energy awareness in day-to-day operations
- Meet energy "End State Goals" by 2030:
    - Bases meet Air Force energy security criteria, while optimizing the mix of on-base and off- base generation

- Aircraft are flying on alternative fuel blends if cost competitive, domestically produced, and have a lifecycle greenhouse gas footprint equal to or less than petroleum
- Forward Operating Bases are capable of operating on renewable energy
- Energy utilization is optimized as a tactical advantage across disciplines

The Air Force is recognized by the Environmental Protection Agency (EPA) as a Green Power Partner, one of the nation's top purchasers of green power. "Green power" is defined by the EPA as electricity produced from environmentally preferable resources, such as solar, wind, geothermal, biogas, biomass, and low-impact small hydroelectric resources.

AUTHORIZATIONS/DATES

Existing Facilities

Title 10 requirements (DOD) closely mirror those below for all Federal Agencies

- Sustainability Executive Order 13423
- EISA 2007 Section 431 setting 30% reductions (EPACT 2005 Section 102 set it at 20% by 2015)
- EISA 2007 Section 432 Commissioning, retro-commissioning, measurement and verification of savings for any sort of project, web-based tracking of efficiency projects, auditing of Federal building stock
- EPACT 2005 Section 102 – Energy Reduction requirement in federal facilities
- EPACT 2005 Section 103 – Metering of Federal Facilities
- EPACT 2005 Section 104 – Procurement of Energy Star products

New Facilities

- Federal Register notice: http://www.gpo.gov/fdsys/pkg/FR-2011-08-10/pdf/2011-20024.pdf

RESULTS

The following results are from the DoD Annual Energy Management Report for Fiscal Year 2011 (DoD 2012). See http://www.acq.osd.mil/ie/energy/library/FY.2011.AEMR.PDF.

In FY2011, despite increases in military activity at U.S. installations, the Army was still able to reduce goal-subject facility energy use by 4.7 percent from 72.9 to 69.5 trillion BTUs, between FY 2010 and FY 2011, while reducing its goal-subject square footage by 5.2 percent, from 855 million square feet to 810 million square feet. The Army accomplished this decrease through various activities such as joint basing, a combination of increased senior level energy program leadership, and increased conservation efforts by installation energy users. In FY 2011, the Army's energy intensity reflected an 11.8 percent reduction from the FY 2003 baseline.

In FY 2011, the Air Force's energy intensity reflected a 16.3 percent reduction from the FY 2003 baseline, a 1.4 percent reduction from its level in 2010. In FY 2011, the Air Force's energy priorities evolved with the development of an overarching framework that addresses many dimension of the Air Force's energy challenges. As stated in the Air Force Energy Plan, the Air Force is committed to

"improve resilience, assure supply, reduce demand and foster an energy culture." Although facilities consume only 12 percent of the total Air Force energy consumption, this represents 17 percent of the total government inventory and incurs more than $1B in energy commodity expenditures each year. Several factors contributed to the Air Force not reaching its energy intensity goal, including reduced allowable credit from renewable energy purchases, and a more severe weather year.

In FY2011, the Department of the Navy (DON) reduced its energy intensity by 15.8 percent from its FY 2003 level, the Navy by 16.9 percent and the Marine Corps by 9.4 percent from their respective baselines. On-site source energy credits accounted for 6 percent of DON's energy intensity reduction, the largest single technology contribution. However, the DON did not reach the 18 percent goal in FY 2011. One contributing factor was the insufficient number of energy efficiency projects awarded in prior years to maintain the annual 3 percent reduction. Another determinant was the lack of funding for energy audits, resulting in missed opportunities to identify improvements in energy efficiency. Energy efficiency opportunities programmed for FY 2012 and FY 2013 are expected to accelerate the DON's energy efficiency savings. In January 2011, the DON launched its "Energy Program for Security and Independence" aimed at reducing installation energy intensity by 50 percent by FY 2020 relative to a FY 2003 baseline.

BUDGETS

Based on budgets for the 2012 Fiscal Year, budgets have been as follows:

- Department of the Army Energy Efficiency and Renewable Energy Funding for facilities: Approximately $250 M in 2012
- Department of the Air Force Energy Efficiency and Renewable Energy Funding for facilities: Approximately $1 B
- Department of the Navy Energy Efficiency and Renewable Energy Funding for facilities: Approximately $1 B
- In addition, the following cross-branch budgets are available:
    - Energy Conservation Investment Program: Approximately $65 M per year
    - New Technology Demonstrations: Approximately $30 M per year

FOR ADDITIONAL INFORMATION

For DoD energy bill information see: http://oilprice.com/Energy/Energy-General/A-Look-At-The-DODs-Energy-Usage-In-2010.html

Office of the Assistant Secretary of Operational Energy Plans and Programs: http://energy.defense.gov/

Operational Energy Strategy: http://energy.defense.gov/OES_report_to_congress.pdf

July 2010 Memorandum of Understanding between DoD and the US Department of Energy: http://energy.gov/downloads/memorandum-understanding-between-us-department-energy-and-us-department-defense

Army Energy Security Implementation Strategy;
http://www.asaie.army.mil/Public/Partnerships/doc/AESIS_13JAN09_Approved%204-03-09.pdf

Army "net-zero" Energy Goals:
http://www.asaie.army.mil/Public/IE/doc/Net%20Zero%20White%20Paper%2014%20Dec%202010%20with%20graphics%20test%20%28Revised%29%202.pdf

Navy and Marine Corps Task Force Energy: http://greenfleet.dodlive.mil/energy/task-force-energy/Air Force Energy Plan: http://www.safie.hq.af.mil/shared/media/document/AFD-091208-027.pdf

Section 9. Building Codes

DESCRIPTION

Building codes are one of the most cost-effective ways to improve energy efficiency in buildings. In the United States, national model building codes are developed by leading non-governmental organizations and are adopted by states and localities. The majority of states have building codes in place—many since 1975.

At the federal level, federal law requires states to adopt the national model commercial code and to consider the national model residential code (U.S. Congress 2005). When the national model commercial codes are updated, the U.S. Department of Energy (DOE) reviews these updates and, if it determines the revised codes will improve energy efficiency in commercial buildings, it gives each state two years to update its codes. States submit documentation to the DOE on their code adoption activities. In addition, the DOE provides technical assistance and grants to states to assist with code adoption and implementation. The DOE also provides technical assistance and code proposals to the national code bodies in developing new codes. The situation is similar for residential codes, although states are only obliged to "consider" adoption of new model codes.

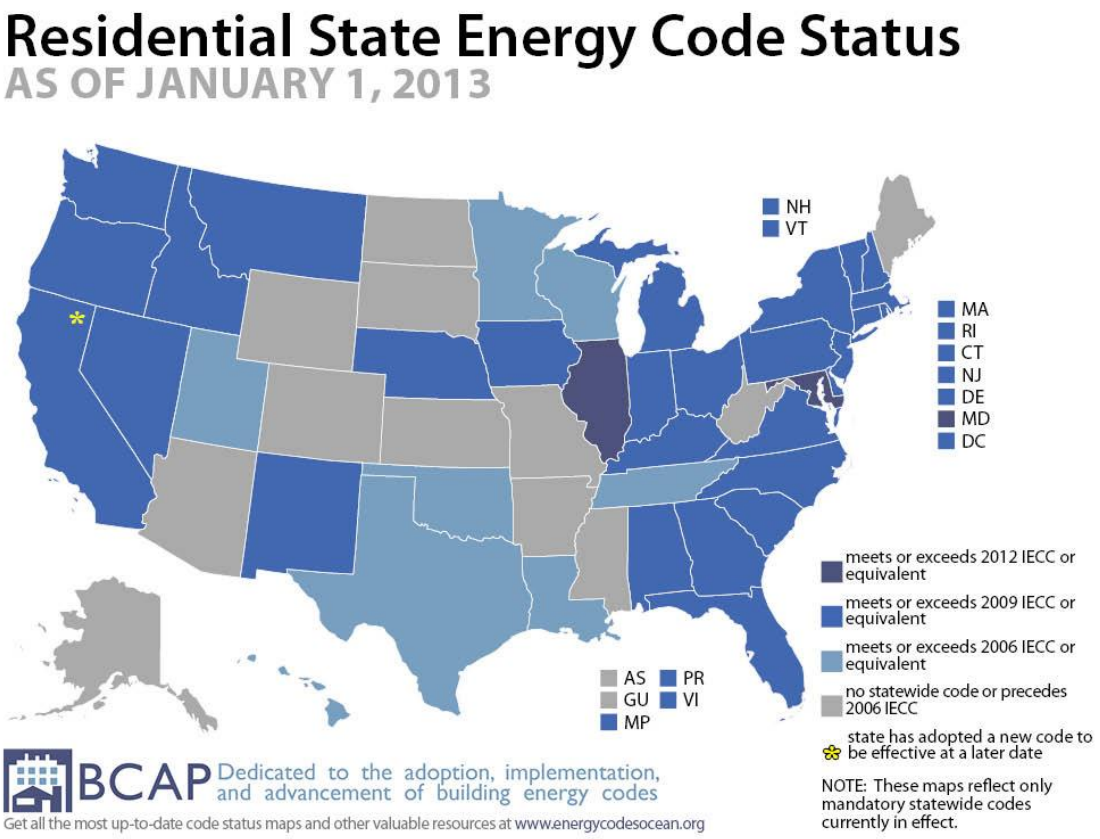
Federal law also covers energy standards for new federal buildings. In consultation with appropriate federal agencies and organizations, the DOE must periodically issue rules requiring new federal buildings to meet or exceed the national model code.

Residential Codes

The International Energy Conservation Code (IECC) is a building code created by the International Code Council in 2000 and is a model by which countries, states, and municipal local governments can design their requirements for residential building energy efficiency. This code is generally revised every three years, with the current code dated 2012. As seen in Figure 12, two states have adopted the 2012 code as of January 1, 2013. Twenty-eight states have adopted the 2009 IECC or equivalent, 8 have adopted 2006 IECC or equivalent, 12 meet 1998-2003 IECC or equivalent, have one from prior to 1998, or do not have a statewide code. Only a few states out of the 12 that are shaded gray do not have any code in place. In states without statewide codes, the largest municipalities sometimes have

codes. The number of states that have not adopted residential building energy codes has declined slightly in recent years.[12]

Figure 12. Residential State Energy Code Status



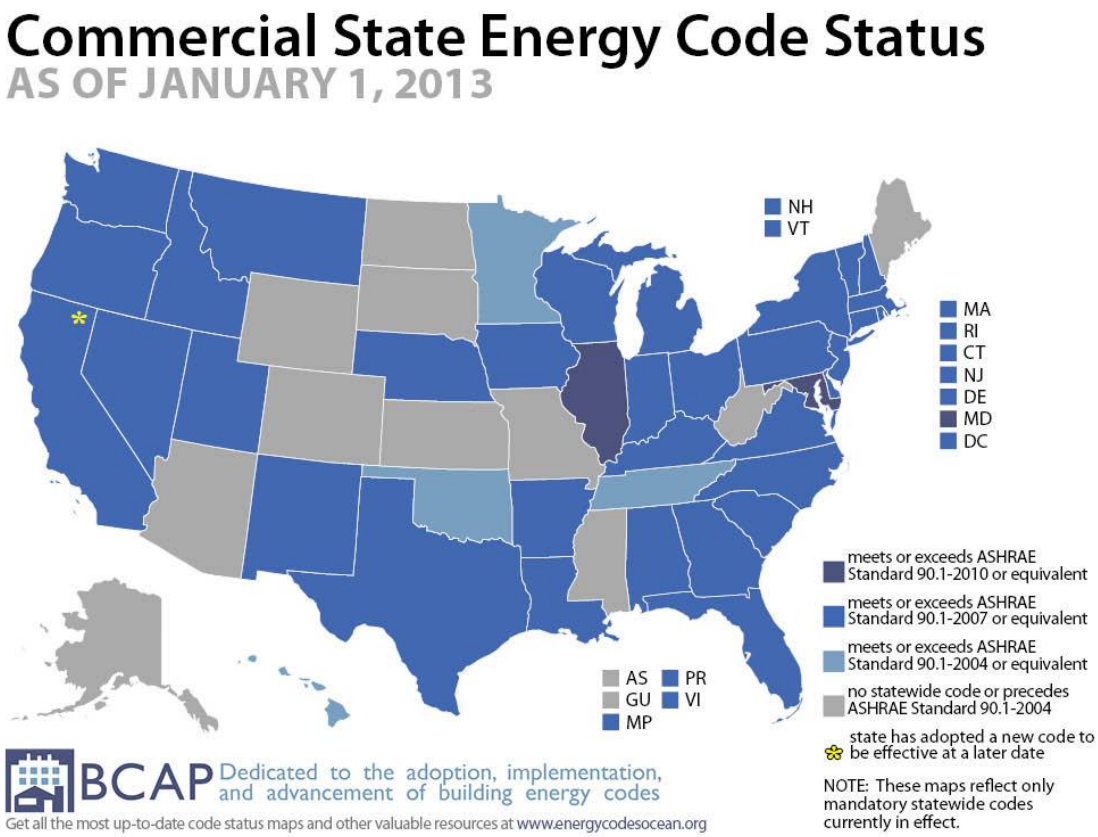
Commercial Codes

The U.S. commercial sector building energy codes follow the same trends as the residential sector. The American Society of Heating, Refrigerating and Air Conditioning Engineers (ASHRAE) is an international organization of over 50,000 individuals that supports the integration of increased energy efficiency in building design through technological enhancements. ASHRAE has published a series of standards and guidelines. ASHRAE Standard 90.1 is the federal model commercial building code, covering new construction and substantial renovation of commercial buildings. This standard is commonly adopted by states or municipalities and is generally updated every 3 years. The latest standard was published in December 2010. As of January 1, 2013, two states had adopted the 2010 standard (or equivalent). As shown in Figure 13, 33 states have adopted ASHRAE 90.1 2007 standards or equivalent for commercial buildings, 4 have adopted 2004 standards, and 11 states,

[12] From ACEEE staff research and analysis.

shaded grey, have either no code in place or one that precedes the 2004 standards. The number of states that have not adopted commercial building energy codes has declined slightly in recent years.[13]

Figure 13. Commercial State Energy Code Status



Dates

The majority of states have had some residential and commercial energy code in place since the 1970s. The model ASHRAE and IECC codes are updated periodically, which states and localities then adopt on a case-by-case basis. DOE has had an active program to assist states and model code bodies through most of this period.

Results

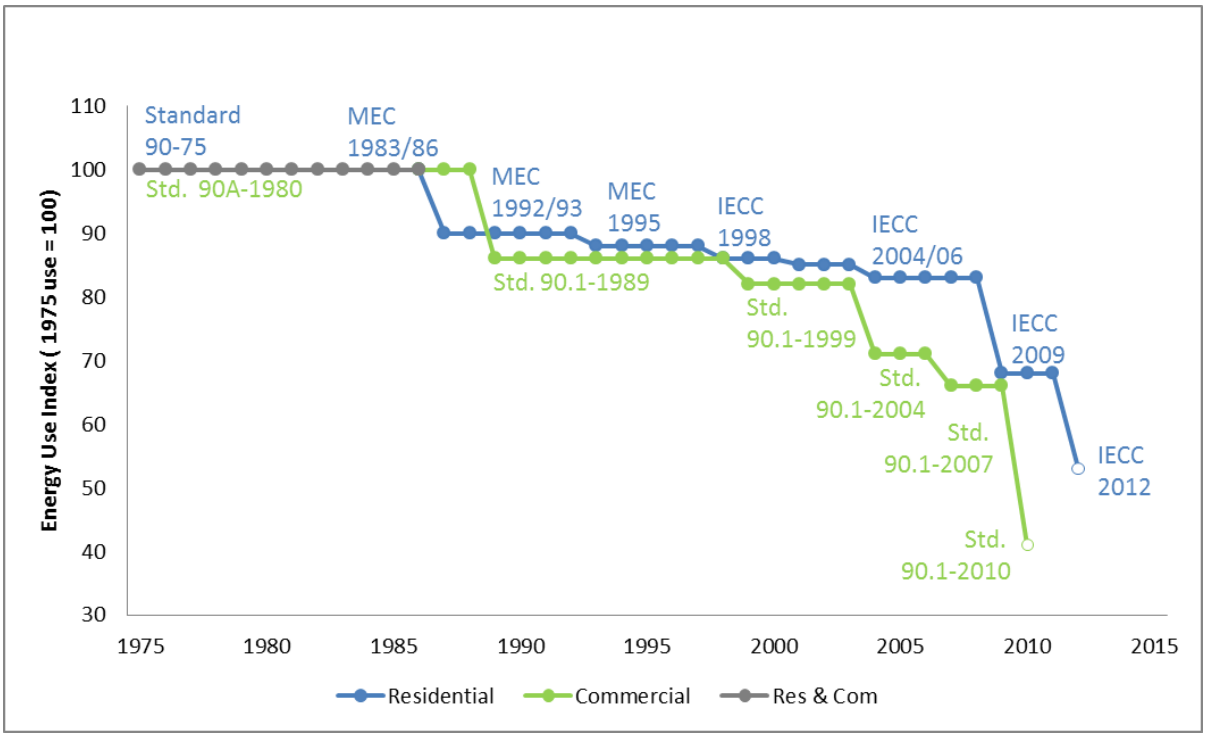
A study for the National Commission on Energy Policy estimated that over the 1990-2000 period, building energy codes influenced nearly 80% of new construction so that by 2000, annual savings totaled about 33 billion kWh of electricity and about 172 trillion Btu of fuel (181 PJ) (Nadel 2004).

[13] From ACEEE staff research and analysis.

Total primary energy savings were about 0.54 quadrillion Btu (0.57 EJ) (out of roughly 100 quadrillion Btu (106 EJ) used by the U.S. each year).

More recently, the past two IECC code cycles (2009 and 2012) and ASHRAE code cycles (2007 and 2010) produced large efficiency gains. Combined, the last two code cycles will reduce energy use by about 30%, the largest gains in the past 30 years. This means that with wide adoption of the latest IECC and ASHRAE codes, the energy consumption of new buildings could decrease significantly. Figure 14 shows the increased energy savings potential in the new building code standards.

Figure 14. History of U.S. Residential and Commercial Building Code Efficiency Improvements

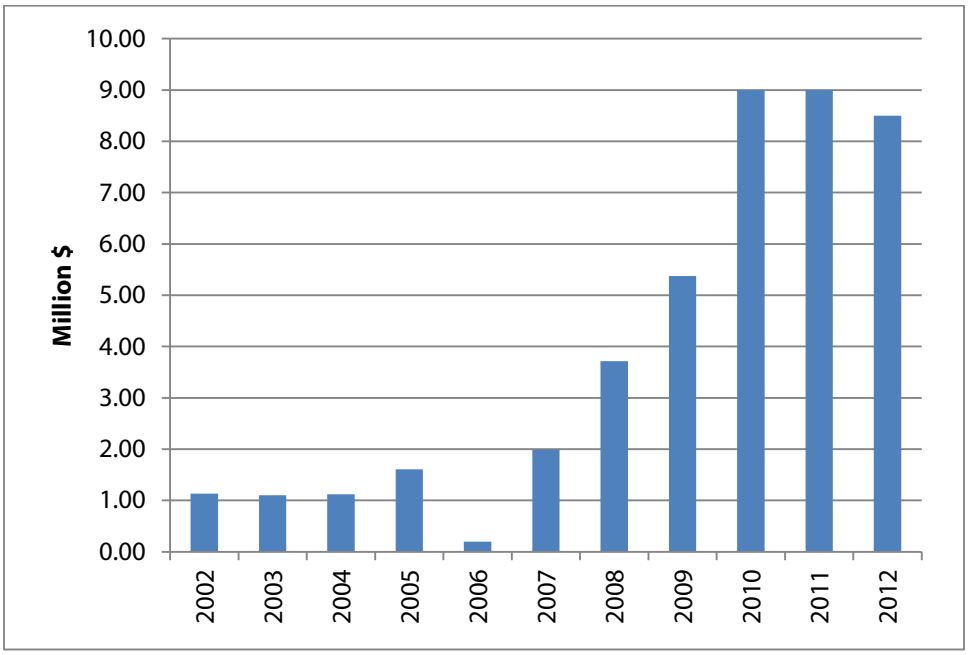


Source: ACEEE staff research and analysis

BUDGET

Because building codes are standards of performance, there isn't a program budget per se. Rather, adoption, implementation, and enforcement of codes imposes a range of costs. Many of these costs are local and case-by-case, therefore they are difficult to quantify. A panel of experts engaged with the Institute for Market Transformation estimates that in order for states to achieve 90% code compliance, annual spending of $810 million at the local, state, and federal level is needed for energy code training, outreach, implementation, and enforcement (IMT 2010). The federal budget for the Building Energy Codes Program has increased significantly in recent years due to economic stimulus spending, from $5 million in FY2009 to $9 million in FY2010 (DOE 2010f). In addition, Figure 15 shows an approximation of annual budgets for the DOE building codes program.

Figure 15. Approximate Annual Budget for DOE Building Codes Program



Source: DOE Buildings Technology Program (DOE 2010h). Figures for the earlier years may not be directly comparable to figures from the latter years due to changes in staff and methods.

For Additional Information

IECC codes can be purchased at http://www.iccsafe.org/Pages/default.aspx.

ASHRAE codes can be purchased at http://www.ashrae.org/resources--publications/

Information from the DOE is available at http://www.energycodes.gov/.

Information from the Building Codes Assistance Project is available at http://bcap-energy.org/

For additional information on the states that have not adopted codes, see *Opportunity Knocks: Examining Low-Ranking States in the State Energy Efficiency Scorecard* (Sciortino, Young & Nadel 2012), which discusses these states and the barriers to energy efficiency policies, including building codes, in greater detail.

Section 10. Building Rating and Disclosure[14]

Description

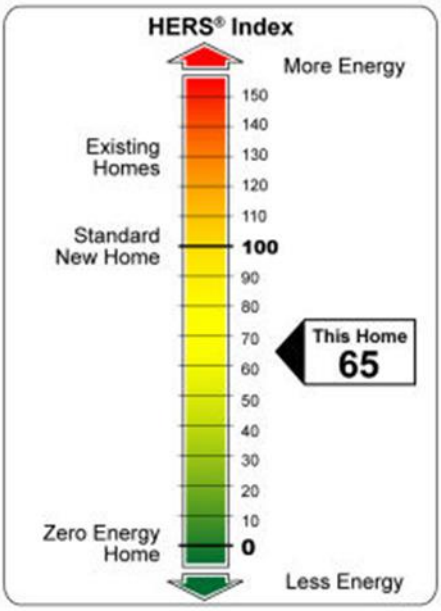
There is not yet a mandatory building label or a single common approach to labeling in the United States. However, many of the key elements needed for a comprehensive labeling infrastructure are in place or under development, a few voluntary labels have gained significant market share, and new

[14] This section of the report draws from a larger discussion of building labeling and disclosure prepared by ACEEE for a forthcoming LBNL report (Levine et al. 2012).

labels have been introduced at the state or local level or are in the pilot stage. In addition, the DOE is developing national, voluntary guidelines for rating and labeling homes and commercial buildings.

Residential Rating and Disclosure

Home Energy Rating System. The most well-known and widely accepted residential rating in the United States is the Home Energy Rating System (HERS), developed by the Residential Energy Services Network (RESNET) to provide an asset rating based on a home as designed and built. A HERS rating gives homeowners and prospective buyers a way to assess a home's energy performance and helps identify improvements in existing homes. A HERS rating is required for a home to qualify for an energy-efficient mortgage, ENERGY STAR® labeling, and many energy efficiency programs that target new construction.



Under the HERS Index scoring system, the lower a home's score the more energy efficient it is in comparison to the HERS Reference Home. A home built to the specifications of the HERS Reference Home (based on the 2006 International Energy Conservation Code) is awarded a HERS score of 100, and a net-zero-energy home scores zero. Each 1-point decrease in the HERS Index corresponds to a 1% reduction in energy consumption compared to the HERS Reference Home. Thus, a home with a HERS Index of 85 is 15% more energy efficient than the HERS Reference Home and a home with a HERS Index of 80 is 20% more energy efficient (RESNET 2011).

In support of HERS, RESNET has adopted standards for home energy audits conducted for HERS ratings, provides training and auditor certification, and approves energy modeling software eligible to calculate a HERS rating. Currently, four software programs are accredited by RESNET. As of 2009, there were more than 3,000 HERS raters nationwide, 88 accredited rating providers, and 29 rater training providers. More than one million U.S. homes have received HERS ratings, many in conjunction with the ENERGY STAR for Homes program and federal new home tax incentives. A rating typically costs anywhere from $300 to $800 and may be paid for by a builder, homeowner, or other interested party (RESNET 2011).

Home Energy Score. The DOE recently completed an initial pilot test of its Home Energy Score and associated label. The intent of the label is to allow comparison of a home's energy consumption to that of other homes using a simple metric, similar to a vehicle's mile-per-gallon rating. Scores are on a scale from 1 to 10, with 10 representing a home that has excellent energy performance and 1 representing a home needing extensive energy improvements or upgrades. The Home Energy Score is an asset rating and may not reflect how a home performs as used by current occupants. The assessor gives the homeowner a list of recommended energy improvements and the associated cost savings estimates as well as the Home Energy Score label. The assessment process for the Home

Energy Score is simpler than the HERS rating and therefore less expensive and time-consuming but may not provide the same level of accuracy or detailed information as HERS.

In the summer of 2011, the DOE completed a set of pilot studies to test homeowner response to the energy score, home energy assessor training and reaction to the scoring tool, quality assurance methods, and climate adjustments of the scoring tool, among other issues. Based on input from the pilot studies, the DOE has simplified the label and score, improved the scoring tool, revised assessor training and testing, and is working with partners in 15 states to incorporate the Home Energy Score into their programs (Glickman 2012).

Home Energy Labeling and Disclosure Policies. To date, at least 14 states and municipalities have enacted mandatory requirements for home energy labeling or rating and disclosure. The requirements vary significantly by jurisdiction. Table 5 summarizes key elements of these policies.

Table 5. Summary of Residential Rating and Disclosure Policies

Jurisdiction	Effective Date	Description
Alaska	2008	Disclosure of average annual utility costs to prospective buyers of single-family homes.
Austin, Texas	2009	Single-family homes must be audited prior to sale and audit results disclosed to prospective buyers. Audit results are valid for 10 years.
	2011	Multifamily buildings must be audited and audit results posted within the building. Some deficiencies found in the audit may trigger mandatory upgrades.
Boulder, Colorado	1996 with Updates 2006-07	HERS ratings required for all new construction Energy audit and/or HERS ratings required for existing properties undergoing renovations and additions
Chicago, Illinois	1987	Disclosure of projected annual and average monthly utility costs to prospective buyers or renters of single-family homes and multi-family units.
Hawaii	2009	Disclosure of three months of utility usage data to prospective buyers of single-family homes.
Kansas	2007	Disclosure of energy efficiency characteristics to to prospective buyers of new single-family and low-rise multifamily homes.
Maine	2006	Disclosure of energy efficiency characteristics to prospective renters.
Montgomery County, Maryland	2008	Disclosure of 12 months of utility data to prospective buyers of single-family homes.
New York	1981	Disclosure of utility bills to prospective homebuyers and renters.

Jurisdiction	Effective Date	Description
New York City	2010-2013	Benchmarking and disclosure for multifamily buildings larger than 4645 m^2 to the city government and the public via a website
Santa Fe, New Mexico	2008	Display of HERS ratings in new single-family homes.
Seattle, Washington	2011-2013	Benchmarking and disclosure of ratings for multifamily buildings with more than five units to the city government and tenants.
South Dakota	2009	Sellers of new single-family and low-rise multifamily homes must disclose home efficiency characteristics to prospective buyers.
Washington, DC	2010-2014	Benchmarking and disclosure for multifamily buildings larger than 4645 m^2 to the city government and the public via a website.

Source: Cluett and Amann 2013

Commercial Rating and Disclosure

Interest in commercial building labeling is also growing, with movement toward mandatory benchmarking and disclosure of commercial building energy performance ratings in several states and municipalities. Since 2007, two states and seven large cities have passed legislation requiring benchmarking and disclosure of building energy ratings; policies are now under consideration in an additional ten states and three cities. Each of these jurisdictions requires benchmarking using the ENERGY STAR Portfolio Manager tool.[15] The specifics of each policy differ to some degree, particularly with regard to the size and type of buildings covered, whether disclosure is public or only available to transactional parties, and the timing of disclosure. Table 6 summarizes existing policies. These policies cover more than 60,000 buildings and more than 371 million m^2 of space (Burr 2012).

State and local governments are pursuing benchmarking policies as a way to verify the energy savings from publicly funded retrofit programs, develop a database of the energy performance of their building stock to guide decision making regarding programs and investments, and encourage greater consideration of building energy performance in purchase, lease, and financing transactions.

[15] See the ENERGY STAR section of this report for more on Portfolio Manager

Table 6. Summary of Commercial Labeling and Disclosure Policies

Jurisdiction	Effective Date	Description
Austin, Texas	2011	Requires benchmarking and disclosure of ratings for all public and non-residential buildings to the city government and prospective buyers
California	2010-2012	Requires benchmarking and disclosure of ratings for all non-residential buildings to the state government and prospective buyers, lenders, and lessees
Minneapolis, Minnesota	TBD	Requires benchmarking and disclosure of ratings for non-residential buildings larger than 4645 m^2 to the city government and the public via a website
New York City, New York	2010-2013	Requires benchmarking and disclosure of ratings for public buildings larger than 929 m^2 and commercial buildings larger than 4645 m^2 to the city government and the public via a website
Philadelphia, Pennsylvania	TBD	Requires benchmarking and disclosure of ratings for non-residential buildings larger than 4645 m^2 to the city government, prospective buyers, lessees, and the public via a website
San Francisco, California	2011-2013	Requires benchmarking and disclosure of ratings for public and commercial buildings larger than 929 m^2 to the city government, tenants, and the public via a website
Seattle, Washington	2011-2013	Requires benchmarking and disclosure of ratings for public buildings larger than 929 m^2 and commercial buildings larger than 4645 m^2 to the city government and tenants
Washington State	2011-2013	Requires benchmarking and disclosure of ratings for public buildings larger than 929 m^2 and private non-residential buildings larger than 4645 m^2 to prospective buyers, lenders, and lessees
Washington, DC	2010-2014	Requires benchmarking and disclosure of ratings for public buildings larger than 929 m^2 and commercial buildings larger than 4645 m^2 to the city government and the public via a website

Source: www.buildingrating.org

DATES

Most of the existing residential rating and disclosure policies went into effect over the 2006 to 2011 period. Of the commercial rating and disclosure policies enacted, only a few have so far been implemented; most will phase in from 2011 to 2015.

RESULTS

Most building rating and disclosure policies have only recently taken effect or are still being phased in so there has been limited evaluation or reporting on results. Still, early experience, as discussed below, provides some useful insights and lessons regarding unanticipated challenges and barriers, opportunities, and best practices that can be used as others move forward.

Residential

The City of Austin has tracked home sales since the single-family home audit requirements took effect in June 2009. Compliance with the audit requirement has increased slightly from 63% over the first four months of the program to 69% for the most recent year reported (October 2010 to September 2011). From the effective date through September 2011, sale-related retrofits have been completed in 5.8% of homes sold in Austin (Kisner 2012). The audit requirement has provided Austin Energy with better information on the condition and common deficiencies in homes and the utility is working to better target their incentive programs to the most needed upgrades.

Commercial

New York City achieved a high rate of compliance (more than 70%) with the initial reporting deadline for private building benchmarking data—much higher than initial compliance in Seattle and San Francisco where it was estimated at approximately 30%. New York City's high compliance rate is attributed to the high levels of public awareness and media attention for the comprehensive package of building efficiency policies (the Greener Greater Buildings Plan) that the benchmarking requirements were enacted with and the active role vendors played in educating and working with building owners. Auditing firms, consulting engineers, and others have begun offering benchmarking as a new service to clients and are using benchmarking to engage owners in further audits and upgrade projects (Burr 2011). Aggressive efforts by contractors to market benchmarking services resulted in significant outsourcing of private building benchmarking, which costs $500 to $1500 per building.

More data on New York City's policy should be available soon. The law requires the city to conduct studies assessing compliance with the requirements and the accuracy of the benchmarking tool each of the first three years that the law is in effect—the first year reports should be published in late 2012.

Budget

Building rating and disclosure policies are relatively low cost to administer. Based on limited experience to date, cities have dedicated approximately two full-time employees to implement commercial rating and disclosure policies.

For Additional Information

More information on HERS is available from RESNET at www.resnet.us.

For up-to-date information on building rating and disclosure programs and policies in the U.S. and around the world, see www.buildingrating.org.

More information on the Home Energy Score is available from DOE at www.homeenergyscore.gov.

More information on the ENERGY STAR Buildings Program including the Portfolio Manager tool is available at http://www.energystar.gov/index.cfm?c=business.bus_index

More information on the City of Austin's Energy Conservation Audit and Disclosure ordinance is available at www.austinenergy.com/go/ecad

More information on New York City's PlaNYC Greener, Greater Buildings Plan is available at http://www.nyc.gov/html/planyc2030/html/about/ggbp.shtml

Section 11. Voluntary Green Construction Codes

This section summarizes five major voluntary green construction programs, with subsections on the following programs:

- Leadership in Energy and Environmental Design (LEED)
- International Green Construction Code (IGCC)
- ASHRAE Standard 189.1
- ASHRAE Advanced Energy Design Guides (AEDG)
- Federal Sustainable Buildings Program

Leadership in Energy and Environmental Design (LEED)

DESCRIPTION

Green building ratings and labels have a growing presence in the United States with a number of programs operating at the national, state, and local levels. By far the most widely adopted system is Leadership in Energy and Environmental Design (LEED), developed and administered by the U.S. Green Building Council (LBNL 2012.) There are currently nine different LEED rating systems:

- New Construction (commercial construction and major renovations): LEED-NC
- Existing Buildings: Operations & Maintenance: LEED-EB
- Commercial Interiors (covering tenant improvements): LEED-CI
- Core & Shell: LEED-CS
- Schools: LEED for Schools
- Retail: LEED-NC Retail
- Health care: LEED-HC
- Homes (new construction): LEED for Homes
- Neighborhood Development: LEED-ND

LEED committees, made up of architectural, engineering, design, and related professionals, develop and update each LEED rating system using an open, consensus-based process including consideration of review comments from the public. The rating system is slated for update in 2012.

As a green rating system, LEED awards points to a project for a wide variety of green attributes. Table 7 summarizes points available under the LEED for New Construction system, which was the first of the LEED rating systems to be developed. Several levels of LEED rating are available depending on the project's total point score: LEED Certified (40–49 points); LEED Silver (50–59 points); LEED Gold (60–79 points), and LEED Platinum (80 points or higher).

Table 7. Points Available under the LEED for New Construction System

Category	Possible Points	Summary of Credits
Sustainable Sites	26	Construction activity pollution prevention (required) Site selection, development density, brownfield redevelopment, alternative transportation Storm water, heat Island effect and light pollution reduction
Water Efficiency	10	Water-use reduction (required) Water-efficient landscaping Innovative wastewater technologies
Energy and Atmosphere	35	Fundamental commissioning of building energy systems (required) Minimum energy performance (required) Fundamental refrigerant management (required) Optimized energy performance On-site renewable energy and green power Measurement and verification
Materials and Resources	14	Storage and collection of recyclables (required) Building reuse Construction waste management Materials reuse and recycled content Materials selection: regional, rapidly renewable, certified wood
Indoor Environmental Quality	15	Minimum indoor air quality performance (required) Environmental tobacco smoke control (required) Outdoor air delivery monitoring and increased ventilation Low-emitting materials and indoor chemical and pollutant source control Controllability of systems, thermal comfort, and daylight and

Category	Possible Points	Summary of Credits
		views
Innovation in Design	6	Innovation in design LEED-accredited professional
Regional Priority	4	Regional priority

DATES

The LEED rating system was developed in 2000 and had several subsequent updates and additions since then. There is a current update cycle that will be completed in 2013.

RESULTS

Given the broad range of green features covered by LEED scoring, the rating system has not resulted in guaranteed superior energy performance; early experience with the system yielded mixed building energy performance results. In each revision of the LEED rating system, the U.S. Green Building Council has taken steps to improve the energy-related credits to ensure that LEED rated buildings exhibit better energy performance in operation.

Since its introduction in 2000, LEED has garnered significant market attention. As of November 2011, more than 55,000 projects had been LEED certified in the United States including more than:

- 21,000 LEED-NC
- 15,000 LEED for Homes
- 7,200 LEED-EB
- 5,400 LEED-CI
- 2,900 LEED-CS
- 1,500 LEED for Schools
- 50 LEED-HC

In December 2011, commercial building space certified under the LEED for Existing Buildings rating system surpassed that of LEED for New Construction by a cumulative 15 million ft^2 (USGBC, 2011). Today there are 79 USGBC chapters, 14,000 member organizations and 162,000 LEED professionals worldwide.

BUDGET

Federal tax reports for the USGBC in 2010 indicated that total revenue was $70 million. The 79 USGBC local chapters reported an $18 million operating budget in 2011, a significant portion of overall USGBC operations (USGBC 2011b.)

FOR ADDITIONAL INFORMATION

Additional information on the USGBC LEED program is available from the organization's Resources web page: http://www.usgbc.org/DisplayPage.aspx?CategoryID=20

The International Green Construction Code (IGCC)

DESCRIPTION

The International Green Construction Code (IGCC), developed and published by the International Code Council (ICC), consists of a wide ranging set of requirements intended to reduce the negative impact of buildings on the natural environment. The IGCC is intended to be administered by code officials and adopted by governmental units at any level on a mandatory basis. It has the potential to take green and sustainable building design to market segments larger than voluntary green building programs by virtue of its mandatory building code approach. Indeed, the IGCC is intended to fit in with and complement the International Code Council's other building code documents.

The IGCC has been developed by the International Code Council (ICC) in association with cooperating sponsors ASTM International (ASTM) and the American Institute of Architects (AIA). Other supporting organizations include the U.S. Green Building Council (USGBC), producers of the LEED green building rating systems, and The Green Building Initiative (The GBI), producers of the Green Globes green building rating system. The IGCC also allows jurisdictions to choose ASHRAE Standard 189.1 as an alternative compliance path. ASHRAE Standard 189.1, Standard for High-Performance Green Buildings Except Low-Rise Residential Buildings, is an American National Standards Institute (ANSI) standard developed by the American Society of Heating, Refrigeration and Air-Conditioning Engineers (ASHRAE) in association with the Illuminating Engineering Society (IES) and the U.S. Green Building Council (USGBC).

The IGCC has unique local applicability features. Adopting jurisdictions can choose code provisions that enhance building performance in many specific critical areas of local concern, including energy, water, natural resources and material conservation. Instead of relying on an overall score attained by choosing from a wide array of voluntary choices in all environmental categories with few mandatory requirements, as is typical of most green building rating systems, the IGCC is composed primarily of mandatory requirements. What sets it apart from other building codes is that the jurisdiction must specifically select, during the IGCC adoption process, which measures will be mandatory before they become enforceable, including specific requirements in each environmental category. Thus, the IGCC can be tailored to specific local energy and environmental needs.

The major categories of mandatory provisions in the IGCC include:

- Jurisdictional requirements and project electives, including Whole Building Life Cycle Assessment
- Site development and land use
- Material resource conservation and efficiency
- Energy conservation, efficiency and earth atmospheric quality
- Water resource conservation and efficiency

- Indoor environmental quality and comfort

In addition to mandatory requirements, the IGCC uses project electives to encourage, but not require, the investigation and implementation of various environmentally beneficial practices which may not be applicable to every project as mandatory requirements. The IGCC requires that a minimum number of project electives be complied with on each project, allowing the owner or design professional to select which specific ones are to be implemented. Project electives enable the IGCC to encourage the construction of buildings which may outperform its minimum requirements. Such buildings will come much closer to fulfilling the ideal goals of sustainability.

The IGCC is also distinguished by providing several flexible ways of complying with the Energy requirements. In addition to a separate traditional prescriptive path, the IGCC also provides three individual methods of performance path compliance. The IGCC uses the concepts of:

- **A ZERO ENERGY PERFORMANCE INDEX, OR ZEPI** This is defined as a scalar representing the ratio of the energy performance of the proposed design compared to the average energy performance of buildings in the benchmark year of 2000, with similar occupancy, operation schedule and climate. The ratio is multiplied times 100 such that 100 represents a building that uses the same amount of energy as the 2000 average and zero represents a zero net energy building. The zEPI scalar is selected by the local jurisdiction at time of adoption.
- **ENERGY USE INTENSITY, OR EUI** The requirement in this path is to achieve an EUI that is in the top 10% of existing buildings in terms of energy performance based on the latest U.S. Department of Energy (DOE) Commercial Buildings Energy Consumption Survey (CBECS). The building EUI must be less than or equal to the source energy use intensity needed to the building to achieve an EPA energy performance score of 90.
- **AN OUTCOME-BASED COMPLIANCE APPROACH, OR ANNUAL NET ENERGY PERFORMANCE (ANEP)** Under this path, a building demonstrates, through metered energy use data, that it meets or exceeds annual targets set by the adopting jurisdiction with respect to annual energy consumption, peak demand levels, and carbon dioxide reductions.

The other Energy requirements of the IGCC encompass the following broad topics as part of the minimum requirements from the International Energy Conservation Program:

- Energy Metering, Monitoring and Reporting
- Automated Demand Response Infrastructure
- Building Envelope Systems
- Building Mechanical Systems
- Building Service Water Heating Systems
- Specific Appliances and Equipment
- Building Renewable Energy Systems
- Energy Systems Commissioning and Completion

These compliance paths, in combination with project electives, encourage the construction of net-zero energy buildings and to realize buildings which come much closer to meeting their intended energy goals.

DATES

The IGCC was announced in 2009 by the ICC. Public Version 1.0 was released in March, 2010 and Public Version 2.0 in November 2010. Development work continued in 2011 with a release of a new version in March, 2012. The next development phase for the IGCC will take place in 2014.

RESULTS

The ICC reports that the IGCC has been adopted in part by the Florida Department of Management Services, the North Carolina Building Code Council, the State of Oregon Building Codes Division and the Scottsdale City Council.

BUDGET

The 2010 annual revenue for the International Code Council was $44 million. There is no separate budget information available for IGCC development and maintenance.

FOR ADDITIONAL INFORMATION

More detailed information is found in the IGCC Public Version 2.0 Synopsis available at http://www.iccsafe.org/cs/igcc/documents/publicversion/igcc_pv2_synopsis.pdf

ASHRAE Standard 189.1

DESCRIPTION

ASHRAE Standard 189.1, subtitled "Standard for the Design of High-Performance, Green Buildings Except Low-Rise Residential Buildings" was the nation's first code-intended standard for high-performance buildings. The Standard provides, according to ASHRAE, a "total building sustainability package."

The Standard is developed and published by the American Society of Heating, Refrigerating and Air-Conditioning Engineers (ASHRAE). ASHRAE, founded in 1894, is a building technology society with more than 50,000 members worldwide. The Society's mission is "To advance the arts and sciences of heating, ventilating, air conditioning and refrigerating to serve humanity and promote a sustainable world." ASHRAE and its members engage in research, standards writing, publishing and continuing education with an emphasis on building systems, energy efficiency, indoor air quality and sustainability.

Standard 189.1 establishes mandatory criteria in all topic areas: site sustainability, water use efficiency, energy efficiency, indoor environmental quality, and the building's impact on the atmosphere, materials, and resources. Standard 189.1 includes mandatory provisions in each section with an option to utilize a prescriptive path or performance path for compliance. The requirements are presented in code-intended language. According to ASHRAE, all projects must comply with the mandatory provisions. The prescriptive option contains additional criteria that provide a simple way to show compliance that involves little or no calculations. The performance option provides more design flexibility and is typically more complex than the prescriptive option.

In complying with the standard, buildings are required to address the following areas and subsections.

Table 8. Summary of Requirements for ASHRAE Standard 189.1

ASHRAE Standard 189.1 Technical Coverage	Summary of Major Measure Categories
Sustainable Sites	Site Selection Reduced heat island effect Reduced light pollution
Water Use Efficiency	Site water use, including possible use of bio-diverse plantings, hydrozoning, and smart irrigation controllers Building water use, examining plumbing fixtures, appliances, and HVAC systems and equipment, as well as establishing cooling tower maximum cycles of concentration Water measurement for buildings and subsystems
Energy Efficiency	Increased energy efficiency over that required by Standard 90.1 Renewable energy ready mandatory provisions Energy measurement for verification Electric peak load reduction
Renewable energy prescriptive requirement	Removed in current version
Indoor Environmental Quality	Indoor air quality --Ventilation rates per ASHRAE Standard 62.1 --Outdoor air flow rate monitoring of minimum outside air --MERV filters --No smoking inside building --Source contaminant control Daylighting provisions Acoustical control for exterior noise
Construction and Operations Plans	Acceptance testing/commissioning IAQ construction management plan Plans for operations regarding high-performance building operation, maintenance, service life, and transportation management

DATES

ASHRAE Standard 189.1 was first published in 2009 and updated in 2011.

RESULTS

The U.S. Department of Energy, through the National Renewable Energy Laboratory, made a preliminary energy savings estimate for Standard 189.1, and estimated that applying the minimum set of prescriptive recommendations in Standard 189.1-2009 would result in weighted average site energy savings of 30% when compared to Standard 90.1-2007. Energy improvement targets for Standard 189.1-2011 include a 5%-15% improvement over Standard 189.1-2009. Standard 189.1 is an approved alternative compliance method for the International Green Construction Code (IGCC.)

BUDGET

ASHRAE's operating budget was $22 million in 2010. There is no separate budget information available for Standard 189.1 development and maintenance.

FOR ADDITIONAL INFORMATION

Additional information on ASHRAE Standard 189.1 can be accessed at http://www.ashrae.org/resources--publications/bookstore/standard-189-1

ASHRAE Advanced Energy Design Guides (AEDG)

DESCRIPTION

The ASHRAE *Advanced Energy Design Guides (AEDG)* are a series of publications designed to provide recommendations for achieving energy savings over the minimum code requirements in ANSI/ASHRAE/IESNA Standard 90.1, which is the first step in the process toward achieving a net zero energy building. The Guides are educational guidance intended to provide a simple and easy approach to design and build energy efficient buildings for use by contractors and designers who design and construct the specific building types represented in the Guides.

Since many of these building types may use design teams without the modeling resources necessary to evaluate energy conserving alternatives, and many of these buildings are constructed via design/build firms or contractors, the Guide is intended to provide a simple and easy approach for use by contractors and designers. The prescriptive recommendations provide a "pre-modeled" solution to achieving an energy efficient building design. Only measures and equipment that were deemed to be both practical and commercially available from at least two manufacturers were considered. Although some of the products may be considered premium, products of similar energy efficiency performance are available from multiple manufacturers.

The Advanced Energy Design Guide series is being developed through a partnership with the American Society of Heating, Refrigerating and Air-Conditioning Engineers (ASHRAE), American Institute of Architects (AIA), U.S. Green Building Council (USGBC), and Illuminating Engineering Society of North America (IESNA). The New Buildings Institute also participated in the development of the initial Guide.

The first series, begun in 2004 and now consisting of 6 different Guides, was for 30% higher efficiency than ASHRAE Energy Standard 90.1-1999. The 50% guides, based on the more stringent ASHRAE Energy standard 90.1-2004, have treated an additional four building types. Available AEDGs are summarized in Table 9.

Table 9. ASHRAE Advanced Energy Design Guides

Energy performance Target	Available AEDGs
Energy performance improvement of 50% over ASHRAE Standard 90.1-2004	Medium to Big Box Retail Buildings: 50%
	Small To Medium Office Buildings: 50%
	K-12 School Buildings: 50%
	Large Hospitals: 50%
Energy performance improvement of 30% over ASHRAE Standard 90.1-1999	Small Office Buildings: 30%
	Small Retail Buildings: 30%
	Small Warehouses and Self-Storage Buildings: 30%
	K-12 School Buildings: 30%
	Highway Lodging: 30%
	Small Hospital and Healthcare Facilities: 30%

Additional 50% guides being considered at this time include Grocery Stores, Highway Lodging, and Quick Service Restaurant.

The Guides are prepared in a standardized format which is adapted for each building type. Each Guide is also well documented in a Technical Support Document prepared by the Pacific Northwest National Laboratory which is available on-line from the ASHRAE web site. The standard AEDG format includes the topics shown in Figure 16.

Figure 16 . Standardized Content of ASHRAE AEDGs

Chapter 1 – Introduction
- How to use this document

Chapter 2 – Integrated Design Process
- How the design process changes in order to achieve 50% energy savings

Chapter 3 – Integrated Design Strategies
- Overview of the technical approaches to achieving 50% savings

Chapter 4 – Design Strategies and Recommendations by Climate Zone
- Specific technical requirements to meet the 50% goal

Chapter 5 – How To Implement Recommendations
- Specific technical guidance for implementation of recommendations, including technical resources and warnings

Appendices
- Envelope Thermal Performance Factors
- International Climatic Zone Definitions
- Commissioning Information and Examples
- Early Phase Energy Balancing Calculations

The AEDGs are intended for voluntary use and are not known to be included in mandatory state and local energy codes. However, the USGBC LEED program has recognized the AEDGs and has allowed Energy and Atmospheric points for their use in LEED compliance.

DATES

The development work on the ASHRAE AEDGs began in 2004 and has continued since then. More Guides for other building types are planned as noted above.

RESULTS

ASHRAE reports that distribution of the 30% series guides is over 300,900 copies as of May. 2011 (no comparable data are available for the 50% Guides.) The AEDGS are available for purchase as paper copies, and are also available for free downloads at the ASHRAE web site. ASHRAE has also commissioned an evaluation of the market impact of the 30% AEDGs (ECW 2010.) Researchers found that on average, sampled buildings achieved a 24% to 28% reduction in design energy use compared with the minimum requirements of 90.1-1999. Sampled buildings implemented approximately half of all AEDG recommendations, with higher implementation rates for heating and cooling recommendations and lower implementation rates for lighting and water heating recommendations.

BUDGET

ASHRAE's operating budget was $22 million in 2010. There is no separate budget information available for Advanced Energy Design Guide development and maintenance.

FOR ADDITIONAL INFORMATION

Additional information on the AEDGs and download access is found at
http://www.ashrae.org/standards-research--technology/advanced-energy-design-guides

Additional information on the AEDG Technical Support Documents can be found at
http://www.ashrae.org/standards-research--technology/aedg-technical-support-documents

Federal Sustainable Buildings Program

DESCRIPTION

The United States Federal Government owns or manages 500,000 buildings and is responsible for their energy use and costs as well as their environmental impact. The US Government has been concerned about reducing operating costs since the 1980s and the Executive branch has issued a series of Executive Orders requiring energy use reductions at executive agencies, usually a percentage decrease compared to a baseline year. In recent years the program has become more comprehensive and is addressing sustainability concepts in design and operation. The US Department of Energy provides technical support and guidance through the Federal Energy Management Program (FEMP). Interagency coordination on carrying out these policies is done through the Interagency Sustainability Working Group.

In 2010, the Obama Administration announced that the Federal Government will reduce its direct greenhouse gas emissions, such as those from fuels and building energy use, by 28% by 2020 and will reduce its indirect greenhouse gas emissions, such as those from employee business travel and employee commuting, by 13% by 2020. By meeting these two goals, the Federal Government could save up to $11 billion in energy costs over the next decade and eliminate the equivalent of 235 million barrels of oil from its own activities.

Under Executive Order 13514, Federal agencies are required to develop, implement, and annually update a Strategic Sustainability Performance Plan that describes how they will achieve the environmental, economic, and energy goals mandated in the Executive Order. Agencies must prioritize actions based on a positive return on investment for the American taxpayer. The plans are updated each year, reviewed by Council on Environmental Quality (CEQ) and approved by the Office of Management and Budget (OMB) to ensure that actions are carefully aligned with resources, Administration priorities, and the Federal budget process.

On June 15, 2012, Federal agencies released their annual OMB Sustainability and Energy Scorecards. These scorecards help agencies identify, target and track the best opportunities to lead by example in clean energy; and hold them accountable for meeting annual energy, water, pollution, and waste reduction targets. Based on scorecard benchmarks, each agency will update its annual Sustainability Plan to expand on successes and address areas needing improvement.

Since 2006, OMB has used the scorecard process to evaluate Federal agencies' performance in achieving energy, transportation, and environmental goals. To streamline the evaluation process, make it more transparent, and align it with the goals of Executive Order 13514, OMB combined past scorecard metrics into a single OMB Sustainability/ Energy scorecard.

Through the OMB scorecard process, agencies are assessed on energy and water intensity reductions; fleet petroleum reduction; greenhouse gas emissions; green building practices; and, renewable energy use. Agencies are also evaluated on their progress towards implementing additional statutory or Executive Order targets and goals reflected in their annual Sustainability Plans, such as green purchasing and electronics stewardship. CEQ and OMB work with agency leadership to craft strategies for improvement and provide additional support and assistance as needed.

Results

In April 2011, the White House Council on Environmental Quality released the first-ever comprehensive Greenhouse Gas (GHG) Emissions Inventory for the Federal Government, which accounts for the GHG emissions associated with the Federal Government's operations in 2010. The Federal Government's GHG inventory for 2010 was 66.4 metric tons of carbon dioxide emissions (MMTCO2e). The 2010 GHG inventory shows that the Federal Government successfully reduced GHG pollution by 2.5 million metric tons of carbon dioxide emissions (MMTCO2e) since its 2008 baseline, and is on track to meeting the 2020 Federal GHG pollution reduction target.

Budget

Federal budget information that tallies combined Federal agency expenditures for implementing the Federal Sustainable Buildings Program is not available.

For Additional Information

For an overview of Federal sustainable buildings policies and programs, see:
http://www.fedcenter.gov/programs/sustainability/

A central information source for implementation of Federal sustainability programs can be found at:
http://sustainability.performance.gov/?CFID=1955897&CFTOKEN=30069498

The Office of the Federal Environmental Executive's (OFEE) report on Federal Commitment to Green Building: Experiences and Expectations highlights the advances within the Federal Government, identifies barriers to greater progress, and provides recommendations for how the Federal sector can overcome obstacles and construct more sustainable buildings. See
http://www1.eere.energy.gov/femp/pdfs/fedcomm_greenbuild.pdf

Section 12. Residential Retrofits

Description

There are approximately 114 million households in the United States. These homes consume roughly 22% of total U.S. energy consumption. Given current rates of new home construction, energy use trends, and the efficiency of the existing building stock, existing homes represent one of the best

opportunities for significant energy savings, far outweighing the savings available in new construction. The federal government is pursuing a number of initiatives to increase home energy retrofits.

Home Performance with ENERGY STAR

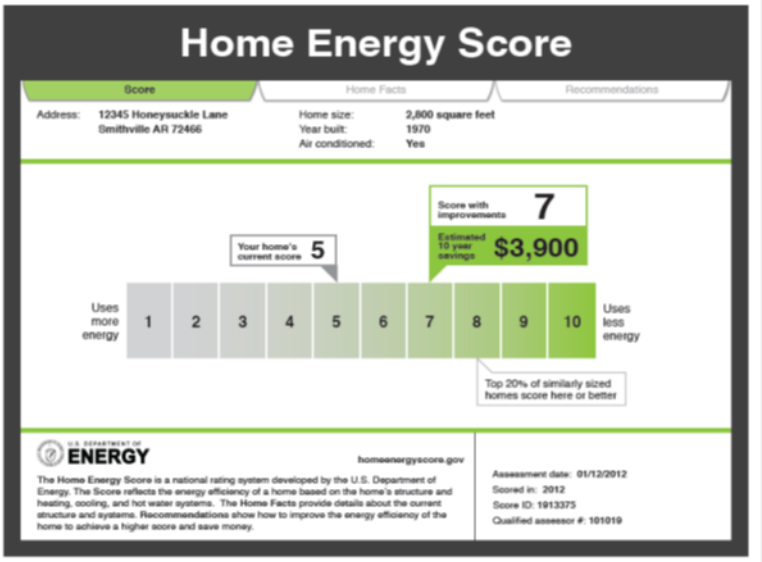
Research shows that a comprehensive whole-house approach to retrofits optimizes energy efficiency and increases occupant comfort by considering interactions between the home, building systems, environment, and occupants. The Home Performance with ENERGY STAR (HPWES) program takes a whole-house approach to home audit and retrofit programs by coupling a thorough diagnostic assessment with a clear pathway for the homeowner to complete the recommended retrofit measures.

Originally developed by the EPA, the HPWES program is now administered by the DOE. Through the program, the DOE works with local program sponsors who run the program locally. Sponsors include states, municipalities, and utilities. Sponsors recruit contractors who are qualified to perform comprehensive home assessments—many sponsors incorporate contractor training and certification in their local programs to help build market capacity. The HPWES assessments cover heating and cooling equipment, ducts, windows, insulation, air infiltration/ventilation, and a safety check on any gas-fired appliances. Upon completion of home energy upgrades, the contractor is required to assess the home's performance again to document that specified improvements were properly installed to achieve the promised energy savings. All participating contractors are subject to quality assurance reviews by a third-party sponsor to ensure that projects meet program standards and homeowners are assured of high-quality work. To date, more than 200,000 homes have been enrolled in the program, including more than 50,000 in 2011 (DOE 2012e). Program sponsors are active in 32 states offering a wide range of incentives to contractors and homeowners through the HPWES program, including cash rebates and interest rate buy-downs on project financing.

HPWES project improvements typically include increasing attic insulation; insulating crawl spaces or rim joists; sealing, repairing, and insulating ducts; air sealing cracks; and installing programmable thermostats, energy-efficient replacement water heaters, heat pumps, air conditioners, furnaces, boilers, lighting, or windows. For the program sponsor's planning purposes, program guidance (EPA and DOE 2011) suggests potential annual savings ranging from 1,400 kWh electricity and 400 therms natural gas in the northeast United States to 4,600 kWh electricity and 200 therms natural gas in the southern United States.

Home Energy Score

In 2012, the DOE will introduce the Home Energy Score program nationwide.



The program is designed to allow comparison of a home's energy consumption to that of other homes using a simple metric. To calculate a Home Energy Score, a qualified assessor briefly walks through the home and collects approximately 45 data points. The assessor uses the DOE's Home Energy Scoring Tool (an on-line free software program) to estimate a home's energy use, convert that into a score, and develop recommendations for energy improvements. The assessor gives the homeowner a list of recommended energy improvements and the associated cost savings estimates as well as the Home Energy Score label. Scores are on a scale from 1 to 10, with 10 representing a home that has excellent energy performance and 1 representing a home needing extensive energy improvements or upgrades. The Home Energy Score label (see figure) provides an asset rating and may not reflect how a home performs as used by current occupants.

Guidelines for Home Energy Professionals

To support growth in the home retrofit industry and ensure that adequate training and certification is in place for a qualified and skilled workforce, the DOE is developing Guidelines for Home Energy Professionals including guidelines for (1) Quality Work, (2) Effective Training, and (3) Professional Certifications. Respectively, the guidelines provide mechanisms for employers, workers, and consumers to ensure high-quality, effective home energy retrofits. The guidelines are currently in the draft review or pilot stage.

DATES

The HPWES program was introduced in 2001. The DOE released a proposal for a revised HPWES Version 2.0 (DOE 2012e) and is currently reviewing stakeholder comments on the proposal.

RESULTS

As noted above, approximately 200,000 homes have participated in the HPWES program. Additional retrofits have been carried out through other retrofit programs or without any type of program support. Within the HPWES program, the average retrofit project size varies widely, with the average job costing $9,000. Nationwide, consumer expenditures on HPWES projects total approximately $2 billion. Program sponsor participation has ramped up significantly in recent years—over the first several years of the program, participation was limited to five or six sponsors; as of 2012, 50 program sponsors operate in 34 states. The number of participating contractors also continues to grow: as of 2012, the program has more than 1,800 contractor partners and the number of Century Club partners (those completing more than 100 jobs per year) has increased from 36 in 2009 to 87 in 2011 (EPA 2011b, Jacobsohn 2012).

Neither the U.S. Environmental Protection Agency (EPA) nor the DOE has published an estimate of national level savings from the HPWES program. Based on results from the longest-running HPWES programs, the agencies estimate average per-home energy savings of 20% (EPA 2011a). Savings are typically higher in homes where heating, cooling, or water heating equipment is replaced as part of the project.

Budget

The DOE programs outlined above are administered by the Office of Energy Efficiency and Renewable Energy, Building Technologies Program and are part of the BTS budget discussed in Department of Energy Buildings Technology Program section. Data on budgets for just home retrofits are not readily available.

An HPWES program requires a much higher investment of program resources at start-up when the sponsor is typically supporting infrastructure development (e.g., contractor training and certification, marketing, inspections, etc.), but the costs decrease over the long-term. EPA (2011a) estimates the levelized cost of saved energy for a mature HPWES program at $0.05 per kWh. Programs including gas savings are typically much more cost effective because gas savings in most climates are significant.

For Additional Information

More information on the Home Performance with ENERGY STAR Program is available at http://www.energystar.gov/index.cfm?fuseaction=hpwes_profiles.showSplash.

More information on the Home Energy Score is available at http://www1.eere.energy.gov/buildings/homeenergyscore/.

More information on the Guidelines for Home Energy Professionals is available at http://www1.eere.energy.gov/wip/retrofit_guidelines.html.

Section 13. Commercial Retrofits

Description

Annual primary energy use in U.S. commercial buildings is estimated at 18.3 quadrillion Btu (19.3 exajoule), representing close to 20% of total U.S. energy consumption. The existing stock of commercial buildings offers significant opportunities for energy savings through retrofit of the building envelope and building systems as well as improved operations and maintenance practices. The federal government is pursuing a number of initiatives to increase retrofits in commercial buildings and to encourage more comprehensive retrofits yielding higher levels of energy efficiency.

The ENERGY STAR Buildings Program

The ENERGY STAR Buildings Program leverages the widely-recognized ENERGY STAR brand which is used to label energy-efficient consumer products to increase energy efficiency in commercial building energy management. The program brings together a suite of tools designed to address the barriers to greater investment in energy-efficiency improvements in existing commercial buildings and to build demand for better building energy performance. The program consists of four core elements, each targeting a particular barrier or market need.

ENERGY STAR Portfolio Manager and Performance Score

In 2000, U.S. EPA introduced an on-line tool designed to allow users—primarily commercial building owners and building managers—to compare the operational energy performance of their buildings to that of similar buildings from across the country. ENERGY STAR Portfolio Manager is a free

interactive energy management tool that allows the user to track and assess energy and water consumption and generate a benchmark score from 1 (the worst) to 100 (the best). The tool is widely used by building owners and managers to understand the energy performance of individual buildings or of an entire portfolio of buildings, identify underperforming buildings in need of attention, and verify efficiency improvements including savings from changes to operations and maintenance (O&M) practices. The most widely used commercial building benchmarking tool in the United States, Portfolio Manager has been used to benchmark more than 1.95 billion m^2 of space (EPA 2011c). Originally designed for commercial office buildings, Portfolio Manager can now be used to benchmark 15 non-residential building types (EPA 2012b).

Portfolio Manager uses basic building characteristics, such as size, location, operating hours, and number of occupants, along with 12 months of consecutive utility bill data to compute a set of performance metrics. These metrics are then normalized for climate, vacancy, and space use to generate an operational rating (the "performance score"). Automated benchmarking tools allow companies to continuously monitor their building's energy performance and track their energy performance score without ongoing manual data entry.

The ENERGY STAR Portfolio Manager tool is also playing an important role in mandatory building rating and disclosure policies adopted at the state and local level. Each of the states (California and Washington) and large cities (Austin, New York City, San Francisco, Seattle, and Washington DC) that have passed legislation requiring benchmarking and disclosure of building energy ratings require use of the ENERGY STAR Portfolio Manager.

ENERGY STAR Buildings Label

Commercial buildings with an ENERGY STAR Performance Score of 75 or higher (i.e., the building outperforms 75% of similar buildings) are eligible for the ENERGY STAR Buildings Label. To earn the label, building energy performance must be certified to U.S. EPA and the building must meet certain standards for indoor air quality. The ENERGY STAR Buildings label offers building owners and managers recognition for their energy management efforts and incentives to improve the energy efficiency of underperforming facilities. For investors and tenants, the label has become a widely-recognized and easily-understood symbol of energy efficiency. To hold onto the ENERGY STAR designation, the building must demonstrate continued top performance through ongoing annual certification.

Other Tools and Resources

The other two components of the ENERGY STAR Buildings Program are a suite of financial evaluation tools and technical assistance resources. The financial evaluation tools are designed to address a critical barrier to greater investment in energy-efficiency upgrades and improved energy management—the lack of awareness or misconceptions about the potential financial benefits. Free financial evaluation tools including the Financial Value Calculator, Cash Flow Opportunity Calculator, and Building Upgrade Value Calculator help make the business case for better building energy performance:

Building owners and managers also have access to detailed technical assistance resources to help them establish improved energy management practices. U.S. EPA has published *Guidelines for Energy Management* and an *Energy Management Assessment Matrix* (EPA 2012c) as well as "how-to" guides on forming effective energy teams and other topics. These resources introduce and support a strategic energy management framework to help building owners and managers set goals, prioritize opportunities, and establish management practices. The *Building Upgrade Manual* (EPA 2008) guides users through a recommended sequence of building performance assessment, retro-commissioning (largely operations and maintenance improvements), load reduction, and equipment upgrade.

BUILDING PERFORMANCE WITH ENERGY STAR

A growing number of energy-efficiency programs across the United States have incorporated the ENERGY STAR Buildings Program into their commercial sector programs. In most cases, program managers work with participants to benchmark buildings, identify facilities with the greatest opportunities for energy-savings and the facilities qualified for the ENERGY STAR Buildings label, establish priorities, and drive participation in relevant incentive and/or technical assistance programs offered by the program administrator. A number of programs have used ENERGY STAR benchmarking to drive competition for improved energy performance among building owners. Others offer automated benchmarking services that allow customers to submit electronically their monthly energy consumption data to U.S. EPA; in return, the customers receive their ENERGY STAR performance scores, weather-normalized energy use intensity benchmarks, and carbon emissions estimates for ongoing tracking and continuous energy management.

To expand on the interest of efficiency program administrators, U.S. EPA launched the Building Performance with ENERGY STAR (BPwES) pilot program in 2010 with eight program partners. Modeled on the Home Performance with ENERGY STAR program, BPwES is intended to serve as a framework to encourage more programs to adopt comprehensive whole buildings performance programs using the ENERGY STAR Buildings Program platform. Pilot partners are running BPwES programs targeting the office, retail, healthcare, hospitality, and assisted living market segments as well as general commercial property management firms. Early experience in these pilot programs suggest five particularly promising best practices and program strategies (EPA 2012a):

- Engage customers at the portfolio level rather than targeting individual buildings
- Use benchmarking as a "mechanism of discovery" for identifying underperforming buildings
- Establish the program sponsor as a trusted advisor and advocate for the building owner or property manager
- Establish program offerings for all customers—those new to energy efficiency as well as more sophisticated customers with the potential to pursue deeper savings and continuous improvement strategies
- Target higher levels of senior management with a well-developed, long-term value proposition

These findings and other lessons from the pilots will be used to develop best practices and strategies for a potential nationwide rollout of the BPwES program.

Department of Energy Commercial Buildings Initiative

DOE develops and disseminates resources to encourage energy efficiency improvements in commercial buildings.

Commercial Building Energy Asset Rating Program

DOE's Building Technologies Program has developed a commercial building energy asset rating program to allow building owners, managers, and operators to more accurately assess building energy performance. The asset rating program will provide a free, standardized web-based modeling tool to evaluate the physical characteristics and as-built energy efficiency of buildings and identify cost-effective efficiency opportunities. The asset rating serves as a complement to the operational rating provided by ENERGY STAR Portfolio Manager. DOE conducted an initial pilot of the rating program from March to September 2012. Results from this early pilot effort will be used to improve the asset rating program prior to a second pilot program scheduled to begin in summer 2013 (DOE 2012l).

Advanced Energy Retrofit Guides

DOE has also published a series of Advanced Energy Retrofit Guides (AERGs) tailored to specific business sectors and building types. The guides are designed to help with planning, designing and implementing energy efficiency projects with a specific emphasis on retrocommissioning and the most effective retrofits for the given facility type. Targeted toward energy managers, the guides outline best practices for each stage of a retrocommissioning or retrofit project and provide guidance on calculating and presenting project cost-effectiveness. Free guides are available for office buildings, retail buildings, and grocery stores with guides for K-12 schools and health care facilities in development (DOE 2012m).

Commercial Building Tax Incentive

Tax incentives for new and existing commercial buildings provide a deduction of up to $1.80 per ft^2 for owners and tenants who reduce heating, cooling, ventilation, water heating, and interior lighting energy use by 50% relative to ASHRAE standard 90.1-2001. The same incentive applies to new buildings and retrofit projects. Partial deductions of $0.60 per square foot can be taken for improvements to one of three building systems that reduce total heating, cooling, ventilation, water heating and interior lighting energy use by a certain percentage below ASHRAE 90.1-2001—the building envelope (10%), lighting (20%), or heating and cooling system (20%). This deduction is discussed further in the Tax Incentives chapter of this report.

Dates

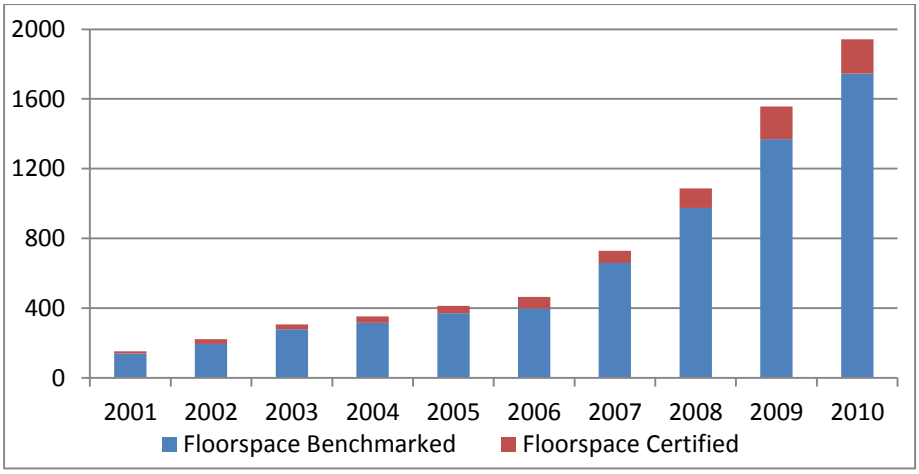
The ENERGY STAR Buildings Program was created in the late 1990s followed by introduction of Portfolio Manager in 2000. EPA and its partners launched the Building Performance with ENERGY STAR pilot in the spring of 2010. The commercial buildings tax deduction is available for buildings or systems placed in service from January 1, 2006, through December 31, 2013.

Results

Since the first ENERGY STAR building was labeled in 1999, the energy performance of more than 200,000 buildings has been assessed using Portfolio Manager. These buildings represent almost 1.9

billion square meters of space—over 25% of total U.S. commercial sector floor space. Of the buildings assessed, more than 12,600 (185 million square meters) have a certified Energy Performance Score of 75 or higher to earn the ENERGY STAR label. Program participation continues to ramp up—in 2010, more than 6,200 buildings earned the ENERGY STAR, an increase of almost 60% over 2009. Buildings with the ENERGY STAR label can signify large energy savings compared with typical buildings: 10% of all ENERGY STAR certified buildings use 50% less energy than typical buildings (EPA 2011a). Figure 17 shows the growth in ENERGY STAR benchmarking and certification since program launch.

Figure 17. Building Space Benchmarked and Certified (million square meters)



Source: (EPA 2011c)

Of the buildings benchmarked to date, more than 8300 have improved their energy performance score by 10 points or more, and as a growing number of building owners work to benchmark their entire portfolio of properties, at least one firm has achieved a 50% portfolio-wide improvement in energy performance (EPA 2011c). As of 2009, U.S. EPA estimates the program prevented emissions of nearly 120 million metric tons of carbon dioxide equivalent, equal to the emissions from the electricity used by more than 60 million American homes per year. As mandatory benchmarking and disclosure policies ramp up and as the BPwES program expands nationally, the program's impact will increase substantially. Comprehensive results from the BPwES pilots are not yet available.

The commercial building tax deduction has been of limited success in driving retrofits. Although data are limited, anecdotal evidence suggests that few whole-building deductions were taken between 2005 and 2010. Low participation is credited to delays in guidance and software approval from OE and the Internal Revenue Service, as well as the failure of the agencies to develop the contractor certification standards that the legislation requires (Gold & Nadel, 2011). Commercial lighting deductions account for the vast majority of the incentives claimed because they proved the easiest to understand and with which to comply.

BUDGET

The ENERGY STAR program falls within the EPA Office of Atmospheric Programs, Climate Protection Partnerships Division. The ENERGY STAR Buildings Program and BPwES are operated within the larger ENERGY STAR program budget discussed in the ENERGY STAR section of this report.

The DOE programs outlined above are administered by the Office of Energy Efficiency and Renewable Energy, Building Technologies Program and are part of the BTS budget discussed in Department of Energy Buildings Technology Program section of this report.

FOR ADDITIONAL INFORMATION

The financial analysis tools discussed here can be downloaded from the ENERGY STAR website: http://www.energystar.gov/index.cfm?c=assess_value.financial_tools

More information on the Building Performance with ENERGY STAR Program is available at http://www.energystar.gov/index.cfm?c=eeps_guidebook.eeps_building_performance

More information on the Commercial Building Initiative is available at http://www1.eere.energy.gov/buildings/commercial_initiative/about.html

http://www1.eere.energy.gov/buildings/commercial_initiative/assetrating.html

Section 14. Appliance and Equipment Standards

DESCRIPTION

Appliance standards have served as one of the United States' most effective policies for improving energy efficiency. The first standards were enacted at the state level in California in 1974. Over the next two decades, states continued to lead on appliance standard adoption, in the face of federal inaction and ultimately a successful court suit that ordered DOE to apply specific criteria to set standards. To address concerns over differing state standards and uncertainties about what DOE would do, manufacturers negotiated with energy efficiency advocates and states, reaching a consensus on national efficiency standards covering many major household appliances that would preempt the individual state standards. The resulting agreement formed the basis for a new federal law, the National Appliance Energy Conservation Act of 1987 (NAECA), enacted by Congress and signed by President Reagan (U.S. Congress 1987).

States continued developing new standards for products not covered by NAECA, and in 1992 Congress enacted another round of standards. The Energy Policy Act (U.S. Congress 1992) added standards for several common types of light bulbs, electric motors, commercial heating and cooling equipment, and plumbing fittings (U.S. Congress 1992).

Since 2001, 13 states and the District of Columbia have adopted new state-level standards. As in the past, states' initiatives have continued to elicit a federal response. In 2005, the Energy Policy Act (EPAct 2005) set new standards for 16 products and directed DOE to set standards via rulemaking for another five (U.S. Congress 2005). In 2007, Congress passed the Energy Independence and Security

Act (EISA 2007), enacting new or updated standards for 13 products, several of which had been first regulated at the state level. EISA created the first-ever U.S. standards for general service light bulbs, which began to phase out conventional incandescent light bulbs in 2012, although more efficient halogen incandescent bulbs remain on the market (U.S. Congress 2007).

Most of the initial standards were negotiated between manufacturers and energy efficiency organizations and then proposed to the U.S. Congress. Congress has a long history of adopting these consensus proposals into law. State efficiency standards and ENERGY STAR® specifications are often the foundation for these negotiated standards. While manufacturers generally prefer not to be regulated, they often prefer uniform national standards to a patchwork of state standards.

A list of laws and products included in each is provided in Table 10.

Table 10. Products with National Minimum Efficiency Standards in the U.S. by Law

National Appliance Energy Conservation Act of 1987	Energy Policy Act of 1992	Energy Policy Act of 2005	Energy Independence and Security Act of 2007
Refrigerator-freezers	Fluorescent lamps	Ceiling fan light kits	Incandescent lamps
Freezers	Incandescent reflector lamps	Dehumidifiers	Additional motors (e.g., > 200 hp)
Room air conditioners	Electric motors (1-200 hp)	Compact fluorescent lamps	Walk-in coolers and freezers
Central AC & heat pumps	Commercial AC & HP	Torchiere lighting fixtures	Metal halide lighting fixtures
Furnaces & boilers	Comm'l furnaces/boilers	Comm'l AC & HP	External power supplies
Water heaters	Comm'l water heaters	Comm'l clothes washers	Furnace fans*
Clothes washers	Showerheads	Exit signs	
Clothes dryers	Faucet aerators	Comm'l ice makers	Implementation of National Consensus Appliance Agreements Act (pending)
Dishwashers	Toilets	Comm'l refrigerators/freezers	Outdoor lighting
Ranges & ovens	Small electric motors*	Mercury vapor lamp ballasts	Commercial furnaces
Direct-fired space heaters	Distribution transformers*	Traffic signals	Drinking water dispensers
Pool heaters	HID lamps*	Pre-rinse spray valves	Portable electric spas

National Appliance Energy Conservation Act of 1987	Energy Policy Act of 1992	Energy Policy Act of 2005	Energy Independence and Security Act of 2007
Televisions*		Comm'l unit heaters	Hot food holding cabinets
		Battery chargers*	Heat pump pool heaters
		Battery chargers*	
Fluorescent lamp ballasts (1988)		Large comm'l refrigeration*	
		Beverage vending machines*	

Notes: * DOE rulemakings.

In general, Congress has enacted an initial standard and directed DOE to review and, if warranted, strengthen the standard on a set schedule. DOE conducts this review and revision process through a public rulemaking process. This process typically takes three years and entails extensive analysis by government-hired consultants, publication of draft government analyses, public hearings, formal written input from stakeholders, and final regulation. Standards typically apply to products three years after the regulation is published.

Manufacturers and efficiency proponents have been able to negotiate consensus proposals for specific new standards in roughly one-third of the DOE rulemakings completed to date. For each of the others, DOE has completed contested rules, issuing strengthened standards even though no consensus emerged.

Negotiations in the U.S. have been conducted informally among private parties. The parties have typically included manufacturers of the regulated products, usually represented by their trade association, but also with direct participation by the major manufacturers in the talks. Leading energy efficiency proponents have comprised the other side of the negotiating table. These efficiency proponents have included energy and water efficiency, and environmental and consumer advocacy organizations; state government officials; and utility companies. These individuals and their organizations bring a range of technical, legal, and policy expertise to the negotiating table.

There are no written rules for the negotiations. Most of the parties now have considerable prior history working together. Although the usual participants do not always agree, they generally operate with a relatively high level of mutual understanding and respect. In general, all discussions are considered confidential and all agreements non-binding unless and until a final agreement is reached. Usually, an initial in-person meeting is followed by several weeks of back-and-forth on specific topics. Subsequent in-person meetings are usually needed to close the final, toughest issues. The entire process may take from two months to more than a year. In order to reach consensus, industry works within the rules of its trade organization to develop common positions. The efficiency proponent caucus works to form consensus among its participants. In most cases, all participants support the final agreement, but occasionally a participant or two has declined to support a final agreement.

Thus, "consensus" agreements have not always been unanimously supported by the initial negotiators. In most cases, the final agreement is memorialized in a memorandum of understanding signed by officials from the negotiating companies and organizations.

The government has generally played no formal role in these negotiations, although DOE staff have recently indicated that they want to directly convene more negotiations in the future. In some cases, members of Congress or DOE officials have encouraged negotiations, including by indicating that they intend to act whether a consensus is reached or not. Sometimes, DOE has provided technical consultants to help provide assistance to the negotiators. However, these consultants and DOE officials have generally not been a party to the negotiations or signatory to any final agreement. Once an agreement is presented to Congress or DOE, they still must complete their legislative or rulemaking process. In general, both Congress and DOE are pleased to accept and act on proposals that are broadly representative of the major stakeholders. But, the process for Congressional or DOE adoption can still be time-consuming and difficult, especially if there are parties that disagree with the consensus proposal or if DOE is uncertain that it has the legal authority to carry out the recommendations.

The appliance standards program historically has had strong bipartisan support. The program was started by President Ford and expanded under legislation signed by President's Reagan, H.W. Bush, and G.W. Bush. However, in the past few years some very conservative policymakers have questioned standards as government mandates, preferring to leave these choices to consumers. To some extent, these discussions have been fueled by mis-information, such as claims that standards on general service light bulbs "ban incandescent lamps" when in fact they are a performance standard that some incandescent lamps can meet. But some of this debate is fueled by philosophical issues on the role of government and the role of markets. So far this has just been a discussion with little policy impact as work on standards proceeds. For example, in 2011 the U.S. Senate Energy and Natural Resources Committee endorsed an equipment standards bill on a bipartisan 18-4 vote, with only the most conservative Senators opposing. Still, conservative concerns raise some uncertainties for the U.S. standards program.

DATES

NAECA was adopted in October 1987 and the first federal standards took effect over the 1988-1993 period, varying by product. As discussed above, subsequent laws have added additional products. The DOE appliance standards program is very active—in 2012 more than a dozen rulemakings were underway,

RESULTS

A 2012 analysis by ACEEE and the Appliance Standards Awareness Project (ASAP) estimated the savings from standards that have been set (Lowenberger et al. 2012). These results are provided in Tables 11 and 12. Altogether, in 2010 these standards reduced U.S. electricity use by about 7% relative to 2010 total consumption and CO_2 emissions by about 200 tons (about 3.5% of U.S. net 2010 emissions). Savings from already existing standards will increase to 11% of projected electricity use by

2025 and 350 tons CO_2 in 2025 (roughly 6% of projected U.S. net emissions). Cumulative net savings for consumers will exceed $900 billion by 2035.

Table 11. Cumulative Energy Savings and Net Present Value from Existing Standards, Decayed

	Groups of Standards	Cumulative Energy Savings Through 2035 (quads)	NPV of Purchases Through 2035 (billion 2010$)
Legislation	NAECA 1987 & 1988	18.0	$159
	EPAct 1992	33.2	$262
	EPAct 2005	17.4	$107
	EISA 2007	26.9	$133
DOE Rules	1989 - 2008	40.1	$178
	2009-2011	26.6	$73
	TOTAL	162.2	$913

Note: "Decayed" means that savings estimates were reduced based on the assumption that eventually the savings from standards would be captured by an unregulated market, with a delay of more than a decade.

Table 12. Energy Savings from Existing Standards, Decayed

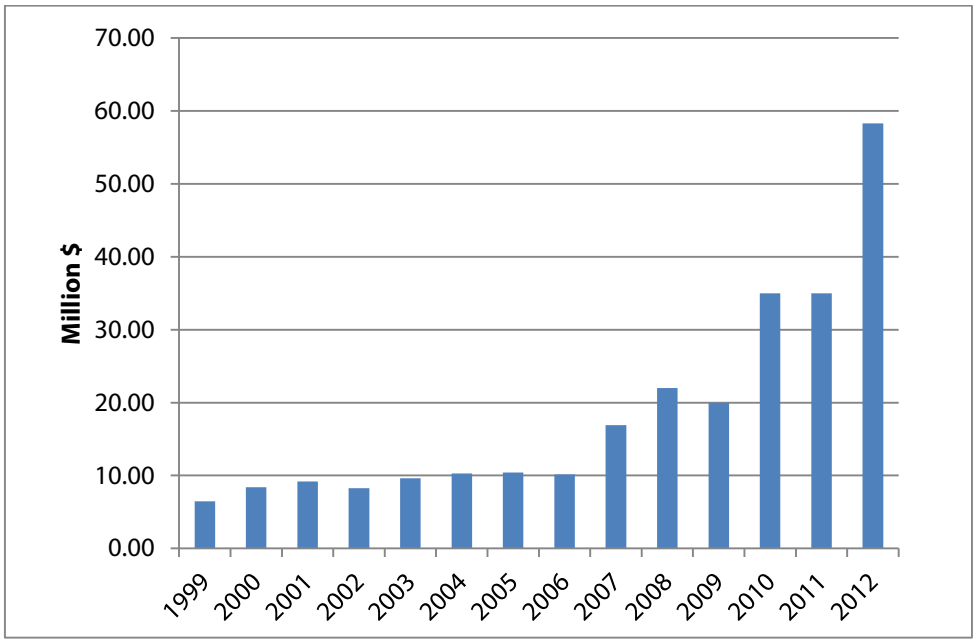
	Groups of Standards	Annual savings in 2025			Annual savings in 2035		
		Electricity (TWh)	Natural Gas (TBtu)	Total Quads	Electricity (TWh)	Natural Gas (TBtu)	Total Quads
Legislation	NAECA 1987 & 1988	24.6	37.5	0.3	2.3	3.6	0.0
	EPAct 1992	55.6	174.2	0.8	6.6	49.1	0.1
	EPAct 2005	63.3	144.4	0.8	43.6	106.9	0.6
	EISA 2007	132.9	22.1	1.4	102.7	35.5	1.1
DOE Rules	1989 - 2008	133.4	135.5	1.5	82.8	74.2	0.9
	2009-2011	126.2	128.9	1.4	123.7	178.6	1.5
	TOTAL	535.9	642.6	6.2	361.7	447.9	4.2

Note: "Decayed" means that savings estimates were reduced based on the assumption that eventually the savings from standards would be captured by an unregulated market, with a delay of more than a decade.

BUDGET

The budget for the DOE appliance and equipment standards program varies from year to year depending on workload and the political process. The budget history is shown in Figure 18. In recent years the budget grew to about $35 million per year as DOE sought to catch-up on overdue rulemakings. In 2012 the budget increased to over $50 million as DOE continued to catch up on the backlog, began an effort to increase enforcement of standards, and also began work on standards for several new products that are not currently regulated (e.g., industrial fans and pumps, set-top boxes used in homes).

Figure 18. Annual Funding for the Federal Standards Program.



Source: Laughlin (2012)

For Additional Information

Legislation and implementing regulations are available at http://www1.eere.energy.gov/buildings/appliance_standards/. This page also includes information on individual product rulemakings.

For estimates of past and future savings, see Lowenberger et al. (2012), *Efficiency Boom*: http://www.aceee.org/research-report/a123.

For a more detailed history of the appliance standards program, see Nadel and Goldstein 1996 at http://www.aceee.org/research-report/a963.

For a discussion on negotiations under the appliance standards program, see Nadel and deLaski (2011) at http://proceedings.eceee.org/visabstrakt.php?doc=2-098-11 .

Section 15. Appliance Labeling

Description

As directed by the Energy Policy and Conservation Act of 1975 (EPCA), the Federal Trade Commission (FTC) administers mandatory energy labeling programs covering major appliances, equipment, and lighting. The legislation suggests two goals for the labeling program: to improve energy efficiency and assist consumers in making purchase decisions. FTC issued the initial Appliance Labeling Rule (16 CFR Part 305) in 1979 and program implementation began in 1980.

Under the program, the FTC requires manufacturers to affix energy information labels to products and/or product packaging. Separate labeling program requirements have been established for household appliances and equipment and lighting products. Table 13 provides details on label types

and products covered under the Appliance Labeling Rule. EPCA also requires DOE to support FTC to determine new product categories warranting coverage under the labeling program. Since the program's launch, a few products have been added; FTC has solicited comments on expanding coverage to additional consumer electronics products including personal computers, cable and satellite set-top boxes, digital video recorders, and monitors (FTC 2011).

Table 13. Products Covered under the Appliance Labeling Program

Label Type	Products Covered
EnergyGuide	• Appliances (white goods) o clothes washers o dishwashers o refrigerators o freezers o window air conditioners • Equipment o water heaters o central air conditioners o furnaces o heat pumps o pool heaters • Consumer electronics o televisions
Lighting Facts	• General service lamps (medium screw base), including most: o incandescent lamps o incandescent reflector lamps o compact fluorescent lamps o LED lamps
Other labels/disclosures	• Fluorescent lamp ballasts (T12) • Ceiling fans • Metal halide light fixtures

The EnergyGuide Label

Major household appliances and equipment covered under the Appliance Labeling Program must display the EnergyGuide label (see Figure 19). FTC has issued detailed guidance for manufacturers on the design and placement of the EnergyGuide to ensure consistency of content and make it easier for consumers to locate and use the information provided.

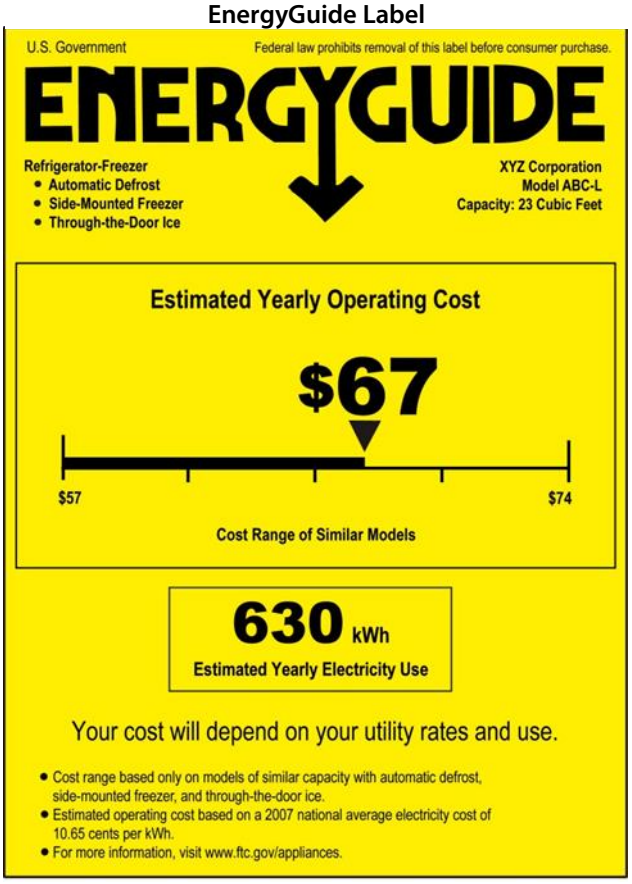
Label Features For most products, the EnergyGuide label provides the estimated annual energy use of the labeled product and uses a continuous-style comparison graphic to show how the annual operating cost of the labeled product compares to the energy use of similar models. Labels on space conditioning equipment—central air conditioners, heat pumps, furnaces ,and boilers—provide a comparison based on the product's energy efficiency rating instead of estimated annual operating cost

given the wide variation in use by climate. Reported annual energy use and operating cost or energy efficiency rating must be determined in accordance with DOE test procedures.

The label must also provide information about the product (e.g., manufacturer, model number, size/capacity, features) and the assumptions used to calculate annual operating cost such as national average electricity or fuel cost and typical usage (e.g., loads of clothes or dishes washed per week) based on figures published by DOE. If the product qualifies for the ENERGY STAR label, the manufacturer is allowed to include the ENERGY STAR logo on the EnergyGuide.

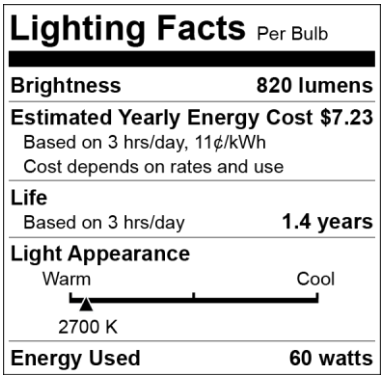
Placement Manufacturers are required to affix the EnergyGuide label to the front surface of the product or to attach a hang tag label in the interior of the appliance (in the case of refrigerators, freezers, clothes washers, and dishwashers). Online and catalog retailers are required to provide consumers the same information found on the EnergyGuide label, while manufacturers of heating and cooling equipment also must provide energy information in fact sheets or an industry directory.

Figure 19. Sample of Current EnergyGuide Label



The Lighting Facts Label

In July 2010, the FTC published expanded rules for light bulb labels. The Lighting Facts label includes information on brightness, annual energy cost, life, color appearance, and energy use. As of January 2012, manufacturers of medium screw-base lamps must disclose brightness and annual energy cost information on the front of the product package and the full Lighting Facts label on the back of the package (see below). The FTC is currently considering expanding the labeling requirements to all screw-based lamps (e.g., candelabra) and to certain pin-base lamps (e.g., GU-10 and GU-24).



Other Labels/Disclosures

In addition to the EnergyGuide and Lighting Facts labels, the Appliance Labeling Rule includes limited disclosures on fluorescent ballasts and metal halide light fixtures and ceiling fans.

- T12 fluorescent ballasts and luminaires and metal halide ballasts and luminaires must be marked with an encircled "E" printed on the product surface as well as packaging for ballasts and any fixture sold with the ballast incorporated.
- Ceiling fans must be labeled with an energy information label including airflow at high speed, electricity use at high speed (exclusive of lights), and airflow efficiency.

Compliance and Enforcement

Compliance with provisions of the Appliance Labeling Rule falls primarily on manufacturers. In addition to requirements for properly testing and labeling covered products, manufacturers are required to submit annual reports to the FTC providing the energy consumption or efficiency rating data disclosed on product labels as well as notification when new models are manufactured. Data from these submittals is available to the public on the FTC website.[16]

While EPCA requires the FTC to ensure manufacturers meet the labeling and reporting requirements, it is under no obligation to test products to verify manufacturer claims. At its discretion, the FTC can require manufacturers to provide covered products to the agency for testing at the manufacturer's expense. In practice, the FTC has relied on DOE to enforce manufacturer compliance under the testing and certification requirements of the appliance standards program since the data provided under the labeling and standards programs is the same.

The role of retailers in labeling program compliance is limited. Retailers are prohibited from removing EnergyGuide labels from products, but are under no obligation to replace missing labels that have been damaged in transit, removed by consumers, etc.

DATES

As noted above, EPCA was enacted in 1975. The FTC published the Appliance Labeling Rule in 1979 and the first appliances were labeled under the program in 1980. Over the years, the program has been revised and expanded to cover additional products. Key dates in the program's evolution are summarized in Table 14.

[16] See www.ftc.gov/appliancedata.

Table 14. Key Developments in Appliance Labeling Program

Year	Development
1979	EnergyGuide program established, labels required for: • Clothes washers • Dishwashers • Refrigerators and refrigerator-freezers • Freezers • Water heaters • Window air conditioners • Furnaces
1987	EnergyGuide program expanded: • Central air conditioners • Heat pumps
1989	Labeling requirements for fluorescent lamp ballasts
1993	Labeling requirements for plumbing products
1994	Labeling requirements for general service lamps EnergyGuide program expanded to pool heaters Revisions to EnergyGuide label graphic
2000	ENERGY STAR allowed on EnergyGuide label
2007	Revised EnergyGuide label design
2010	Revised labeling requirements for general service lamps Introduction of Lighting Facts
2010	EnergyGuide program expanded to televisions

RESULTS

The FTC has not conducted any thorough evaluation of the program's cost and effectiveness. Although EPCA directs DOE to assess energy savings from the appliance labeling program, no such analysis has been published to date. As part of the 2007 rulemaking on revisions to the EnergyGuide, the FTC did conduct a survey on the effectiveness of the label design, but did not attempt to estimate the program's actual energy savings.

In 2002, ACEEE completed an in-depth evaluation of the efficacy of the EnergyGuide label and alternate label designs (Thorne and Egan 2002). The study found that while there was high consumer awareness of the label, the EnergyGuide had limited impact on consumer product selections. Research findings also provided strong evidence that a redesigned label could improve consumer comprehension, encourage wider use of the label, and motivate consumers to consider energy use more when purchasing a labeled appliance. Chief among the studies recommendations were a shift from the continuous-style graphic to a stars-based categorical comparison label. In 2007, the FTC adopted a number of the changes recommended by the study, including improvements to the continuous graphic design rather than moving to a categorical-style label. The FTC cited concerns with the stars-based categorical label including potential confusion with the ENERGY STAR program

and the potential for consumers to mistake the stars for a rating of product quality rather than just energy efficiency (FTC 2007).

Budget

The FTC has a limited budget for administration of the appliance labeling program. In recent years, the program budget has covered approximately 1.5 full-time employees.

For Additional Information

The Appliance Labeling Rule including all rules for labeling appliances, lighting, and plumbing products is available at 16 CFR Part 305.

For more on ACEEE's research on appliance labeling, see Thorne and Egan (2002) and http://www.aceee.org/topics/appliance-labeling.

The FTC provides links to all rules, notices, and other resources related to the Appliance Labeling Rule at www.ftc.gov/appliances.

Section 16. ENERGY STAR®

Description

ENERGY STAR serves as a common brand for energy efficiency in the United States. Jointly administered by the EPA and the DOE, the ENERGY STAR portfolio includes programs targeting a wide range of products as well as new and existing residential and commercial buildings.

Started in 1992 as a voluntary initiative to label and promote energy-efficient office equipment, the program rapidly expanded to include residential heating and cooling equipment, appliances, lighting, and consumer electronics. The program now includes ENERGY STAR labeling programs for more than 60 categories of residential and commercial products and equipment, labels for new homes and existing commercial buildings, and programs promoting efficient whole home energy efficiency retrofits. Manufacturers, retailers, states, and utilities partner with the EPA and the DOE to promote ENERGY STAR and incorporate it into their advertising, outreach, and incentive programs.

Product Labeling

The EPA oversees the ENERGY STAR product labeling program. Through the program, the EPA works with manufacturers and other stakeholders to develop product specifications with the goal of recognizing the top 25% of products in terms of energy efficiency. As market share for ENERGY STAR-qualified products grows, the specifications are revised to maintain ENERGY STAR recognition for only the most efficient products on the market. In addition to energy efficiency, ENERGY STAR specifications may include other requirements—for example, water efficiency for clothes washers, lifetime and performance for compact fluorescent lamps.

Since the program was launched with an emphasis on office equipment, the number and types of products eligible for ENERGY STAR has grown. The EPA uses the following criteria when determining whether to add new product categories to the program (EPA 2012):

- Product would contribute significant national energy savings.
- Qualified products deliver energy efficiency with no negative impact on features and performance.
- Qualified products are cost-effective within a reasonable time period.
- Required efficiency levels can be achieved using non-proprietary technologies offered by more than one manufacturer.
- Energy consumption can be measured and verified with testing.
- Labeling can effectively differentiate products and is visible for purchasers.

Table 15 provides a list of product categories currently included in the ENERGY STAR program.

Table 15. Current ENERGY STAR Products

Category	Products
Appliances	Clothes washers (residential and commercial), dehumidifiers, dishwashers, freezers, pool pumps, refrigerators, room air cleaners and purifiers, vending machines and water coolers
Building products	Sealing and insulation, roof products, windows, doors, and skylights
Commercial food service equipment	Commercial dishwashers, fryers, griddles, hot food holding cabinets, ice machines, ovens, refrigerators and freezers, and steam cookers
Computers	Computers, displays, enterprise servers, imaging equipment, and uninterruptible power supplies
Electronics	Audio/video, cordless phones, set-top boxes, and televisions
Battery chargers	Handheld vacuums, personal care products, power tools, and yard care tools with qualified battery chargers
Heating & cooling	Central air conditioners, room air conditioners, boilers, ductless heating and cooling, ventilating fans, furnaces, air-source and geothermal heat pumps, and light commercial heating and cooling
Lighting & fans	Decorative light strings, ceiling fans, light bulbs, light fixtures, and commercial LED lighting
Plumbing	Water heaters

HOMES

Two ENERGY STAR programs target homes: the ENERGY STAR Homes program covers residential new construction; and Home Performance with ENERGY STAR (HPWES)[17] covers home retrofits.

EPA launched the first version of the ENERGY STAR for Homes specification in 1995. Since then, nearly 1.2 million new homes have earned the ENERGY STAR label, including more than 126,000 homes in 2010 alone (108,000 single-family homes plus multi-family homes and manufactured housing) (EPA 2011b). In 2011, EPA began to phase-in ENERGY STAR for Homes Version 3. Each new version of the ENERGY STAR guidelines has introduced new features and more stringent guidelines to ensure greater savings than under previous versions and relative to minimum energy codes. EPA allows specific regional variations in the ENERGY STAR guidelines to account for unique

[17] HPWES is examined in greater detail in the Residential Retrofits section of this report.

climate conditions or stronger state code requirements. Table 16 summarizes the main features of each version of the ENERGY STAR for Homes specification.

In 2010, 25% of single-family homes built in the United States earned the ENERGY STAR rating. Sixteen states met or exceeded national market penetration, including several of the states that have the largest numbers of new home starts. The highest market penetrations are in Hawaii (77%), Nevada (66%), Iowa (57%), Arizona (52%), and Ohio (50%). The largest number of ENERGY STAR-labeled homes was constructed in Texas, where 66,244 new homes representing 44% of the market earned the label in 2010, more than six times the number of ENERGY STAR homes built in any other state (EPA 2011b).

Table 16. ENERGY STAR for Home Specifications

Version 1: 1995-2006	Version 2: 2006-2011	Version 3: 2011-
• High-performance windows • Tight construction and ducts • Efficient HVAC system • 3rd-party verification (HERS rating)	***Version 1 requirements, plus:*** • Thermal bypass checklist • Visual inspection of insulation installation • Right-sized HVAC systems • Promotion of efficient lighting and appliances	***Version 2 requirements, plus:*** • Thermal enclosure system rater checklist • HVAC system quality installation checklists (rater and contractor) • Water management system builder checklist • Prescriptive and performance paths

Commercial Buildings

The ENERGY STAR Buildings Program provides a framework and a suite of tools designed to address the barriers to greater investment in energy efficiency improvements in existing commercial buildings and to build demand for better building energy performance. The program consists of four core elements, each targeting a particular barrier or market need:

1. ENERGY STAR Portfolio Manager and Performance Score
2. ENERGY STAR Buildings Label
3. Financial Evaluation Tools
4. Technical Assistance Resources

Introduced in 2000, ENERGY STAR Portfolio Manager is an on-line tool designed to allow users—primarily commercial building owners and building managers—to compare the operational energy performance of their buildings to that of similar buildings from across the country. Portfolio Manager is a free interactive energy management tool that allows the user to track and assess energy and water consumption and generate a benchmark score from 1 (the worst) to 100 (the best). The tool is widely used by building owners and managers to understand the energy performance of individual buildings or of an entire portfolio of buildings, identify underperforming buildings in need of attention, and verify efficiency improvements including savings from changes to operations and maintenance (O&M) practices.

Portfolio Manager uses basic building characteristics, such as size, location, operating hours, and number of occupants, along with 12 months of consecutive utility bill data to compute a set of performance metrics. These metrics are then normalized for climate, vacancy, and space use to generate the operational rating. Since its introduction, Portfolio Manager has been used to benchmark more than 1.95 billion m^2 of space—more than 25% of total U.S. commercial building floor space (EPA 2011b). Originally designed for commercial office buildings, Portfolio Manager can now be used to benchmark 15 non-residential building types.

Commercial buildings earning a rating of 75 or higher using ENERGY STAR Portfolio Manager are eligible for the ENERGY STAR Buildings Label. Since the first building was labeled in 1999, more than 12,600 buildings representing more than 185 million m^2 of space have earned the ENERGY STAR label. Program participation continues to increase. In 2010, more than 6,200 buildings earned the ENERGY STAR label, an increase of almost 60% over 2009 (EPA 2011b). The ENERGY STAR label can signify dramatic energy savings relative to typical buildings; 10% of all ENERGY STAR-certified buildings use 50% less energy than typical buildings (EPA 2011b).

DATES

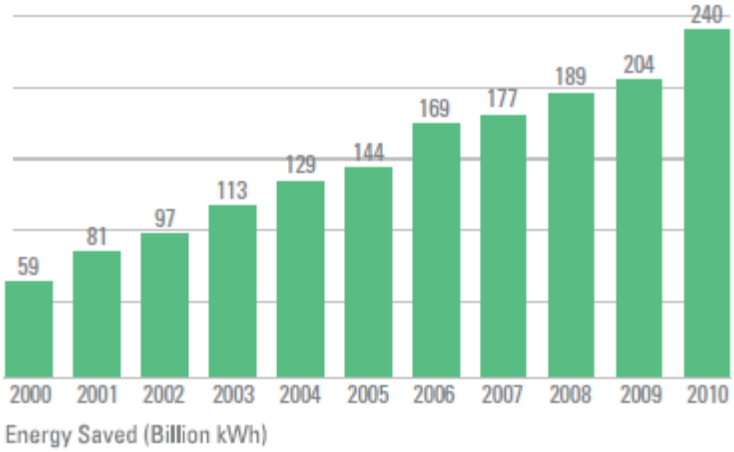
The ENERGY STAR program was launched in 1992 with a focus on office equipment. Since that time, the program has continued to grow and expand to cover additional products as well as whole buildings. Program specifications and requirements are reviewed and revised on a regular basis.

RESULTS

ENERGY STAR is widely recognized by U.S. consumers, businesses, and institutions. Recent studies estimate that more than 80% of U.S. consumers recognize and understand the label (EPA 2012). The brand has had a significant impact in the market: approximately 300 million ENERGY STAR qualified products are purchased in the U.S. each year—a total of 3.5 billion since 2000 (EPA 2011b).

Awareness of the ENERGY STAR brand and the broad range of programs offered under the ENERGY STAR umbrella translates into significant energy savings. EPA estimates program energy savings of almost 245 billion kWh (5% of national demand) and cost savings of $20 billion in 2010. The largest savings came from ENERGY STAR-qualified products (47%) and commercial building improvements (46%); ENERGY STAR new homes accounted for 1% of savings and industrial facilities the remaining 6% (EPA 2011). Figure 7 shows the increase in energy savings from ENERGY STAR since 2000.

Figure 7. Energy Savings from ENERGY STAR



Source: EPA (2011b)

The ENERGY STAR program has also been an important driver of market transformation. As ENERGY STAR labeled products gain market share, the higher efficiency level becomes the basis for revised minimum efficiency standards and new ENERGY STAR levels are developed to continue the cycle. The ENERGY STAR programs for new homes, home retrofits, and commercial building performance drive market transformation by engaging builders and contractors, helping to develop improved construction and building operating practices, and providing information about building energy use and opportunities to increase efficiency.

BUDGET

The ENERGY STAR program falls within the EPA Office of Atmospheric Programs, Climate Protection Partnerships Division and the DOE Office of Energy Efficiency and Renewable Energy, Building Technologies Program. The total budget for ENERGY STAR varies each year.

EPA:	2011:	$52.31 million
	2012:	$49.67 million

DOE activities in support of ENERGY STAR are covered in the Building Technologies Program budget.

FOR ADDITIONAL INFORMATION

More information on can be found at the following sites:

- ENERGY STAR Products: http://www.energystar.gov/index.cfm?fuseaction=find_a_product

- ENERGY STAR New Homes: http://www.energystar.gov/index.cfm?c=new_homes.hm_index
- ENERGY STAR Buildings: http://www.energystar.gov/index.cfm?c=business.bus_index
- ENERGY STAR Home Improvement (including Home Performance with ENERGY STAR and other retrofit programs): http://www.energystar.gov/index.cfm?c=home_improvement.hm_improvement_index

Section 17. Utility Energy Efficiency Programs

DESCRIPTION

In the United States, utility regulation is primarily a state responsibility, but the federal government does play a role. Below we first discuss the federal role and then briefly summarize what states have done to encourage or require utilities to implement energy efficiency programs.

The federal government regulates wholesale electric sales through the Federal Energy Regulatory Commission (FERC). In addition, the federal government frequently provides technical assistance to states on energy efficiency programs and policies and sometimes provides guidance. Infrequently, there is a federal mandate that applies to state-regulated utilities.

FERC regulates wholesale electricity markets. This includes regulation of the transmission system as well as approval of wholesale rates. For example, in recent years FERC has encouraged the formation of Regional Transmission Organizations (RTO's) or Independent System Operators (ISO's) to operate the grid in distinct regions (FERC 2012). As part of this push, FERC has encouraged use of demand response (shifting loads from one period to another) as a capacity resource, and it has approved the use of forward capacity markets to help establish market signals for cost-effective use of demand response and energy efficiency (FERC 2006, 2011). The New England forward capacity market is most developed and includes substantial demand response and energy efficiency resources. Auctions are conducted annually, three years in advance of when savings need to be delivered, which provides an opportunity for energy efficiency, but since contracts are at most three years long, it can be hard to use this program to drive investments in measures with longer paybacks (NE-ISO 2012). Forward capacity markets also exist for the PJM RTO[18] and have been proposed for the Midwest Independent Transmission System Operator, Inc. (MISO)[19] (Peterson and Sabodash 2009).

One of the main ways the federal government encourages utility investments in energy efficiency is through technical assistance. Within the DOE's Office of Electricity Delivery and Energy Reliability there are a variety of research and technical assistance activities to help states and utility regulators consider and adopt energy efficiency, demand response, and smart grid programs and policies. Information on their energy efficiency activities can be found on their website, which is included in

[18] PJM RTO initially served Pennsylvania, New Jersey, Maryland, Delaware, and the District of Columbia but it has now expanded and serves states as far west as Illinois.

[19] MISO covers transmission systems across the Midwest United States and Manitoba, Canada.

the For Additional Information section below. Likewise, the DOE and EPA have a joint project, the State and Local Energy Efficiency Action Network (SEE Action), which encourages and assists states to act on energy efficiency. SEE Action in turn builds upon a joint EPA and DOE effort to develop a variety of resources states can use under the National Action Plan for Energy Efficiency (NAPEE). Links to SEE Action and NAPEE can be found in the For Additional Information section.

At times, federal law provides guidance but not mandates to states. These are generally through section 111(d) of the Public Utilities Regulatory Policies Act (PURPA). These sections direct states to "consider" specific policies. States need to hold proceedings on these policies and either adopt them or report to the DOE why they did not adopt them. To date, the following policies have been covered by these sections:

In the original 1978 law, review of customer rate determination and design including:

1. Cost of service
2. Declining block rates
3. Time of use rates
4. Seasonal rates
5. Interruptible rates
6. Load management techniques

In 1992, following additional issues were added for states to consider:

7. Integrated resource planning
8. Investments in conservation and demand management
9. Energy efficiency investment in power generation and supply
10. Consideration of the effects of wholesale power purchases on utility cost of capital, effect of leveraged capital structures on reliability of wholesale power sellers, and assurance of adequate fuel supplies

In 2005 additional provisions were added concerning:

11. Net metering
12. Fuel sources
13. Fossil fuel generation efficiency
14. Time-based metering and communications
15. Interconnection
16. Integrated resource planning (a new round of consideration, 13 years after the first round)
17. Rate design modifications to promote energy efficiency.

More information about these requirements can be found in manuals prepared by the National Association of Regulatory Utility Commissioners (NARUC 2006, 2008) to help guide state considerations.

In a few cases, the federal government has mandated utility action. Regarding energy efficiency, these are two notable provisions. First, in the National Energy Conservation Policy Act, Congress required utilities to offer energy audits to their residential customers. The program was known as the Residential Conservation Service (RCS). We discuss this program more fully in the Results section below.

Second, a key provision of PURPA when it was adopted in 1978 was a requirement that regulated, natural monopoly electric utilities buy power from renewable energy or other more efficient producers, paying for that power at the utility's "avoided cost." The avoided cost was the additional costs that the electric utility would incur if it generated the required power itself, or if available, could purchase its demand requirements from another source. At the time generally, where demand was growing, this was considered to be the construction and fossil fuel costs incurred in the operation of another thermal power plant. This provision helped encourage *cogeneration* plants that generated both heat and electricity (today generally called combined heat and power plants—CHP). This part of PURPA is more extensively discussed in a companion report on U.S. industrial energy efficiency policies that ACEEE will publish in late 2012.

As noted above, most of the implementation of utility energy efficiency programs is under state laws and regulations. State laws and regulations come in many different "flavors" but the most common approaches include:

1. Energy Efficiency Resource Standards (EERS); also sometimes called Energy Efficiency Portfolio Standards or (EEPS)
2. Requirements to acquire all cost-effective efficiency resources
3. Integrated resource planning
4. Improving the business case for utility investments in energy efficiency

EERS are state laws or regulations that require utilities to meet specific energy savings targets. As of this writing, 24 states have adopted such targets. These programs generally require utilities to meet specific targets over multiple years, with increased savings over time. Most targets are specified in terms of the amount of energy efficiency savings that must be documented by the utility, as a percent of total electricity sales. Such targets can range from fractions of a percent each year to as much as 2.5% savings as a percent of sales from programs operated during a year. Since energy efficiency savings remain in place for many years, a utility that achieves 2.5% savings per year for ten years might be saving around 20% after ten years, after allowing for some attrition of savings. Further information about how EERS work and the states that have adopted them can be found in the For Additional Information section.

Instead of setting specific targets in law, some states have mandated that utilities acquire all energy efficiency resources that are "cost-effective." State utility commissions then work out the details, generally through an integrated resource planning process (discussed in the next paragraph). Requirements for "all cost-effective efficiency" have been adopted in southern New England (Connecticut, Massachusetts, and Rhode Island) and in Washington State. Information on states and

their specific policies can be found in the ACEEE State Policy Database, listed in the For Additional Information section.

Integrated Resource Planning (IRP) is a planning process under which both energy supply resources (e.g., new power plants, transmission lines, etc.) and energy demand-side resources (energy efficiency, load management/demand response, etc.) are examined together and a plan adopted that integrates the two in ways that minimize costs while meeting other objectives (e.g., reliability, robust across a range of possible futures). In many states, utilities are required to prepare IRPs, which are then subject to public hearings, adoption, and implementation. Energy efficiency is generally a low-cost resource and therefore most IRPs include substantial investments in energy efficiency. A guide to IRP has been published by the U.S. Agency for International Development (Tellus Institute, undated).

In the United States, about three-quarters of electric power is provided by investor-owned utilities. These utilities have a responsibility to their stockholders to earn a profit. Energy efficiency investments reduce sales, which can reduce profits. To address this, many states have reviewed their regulations and adopted policies to improve the business case for utility investments in energy efficiency. Such strategies commonly include three elements:

1. Cost recovery for energy efficiency investments—the costs of energy efficiency programs are incorporated into rates.
2. Fixed cost recovery—a portion of rates are designed to recover fixed costs, such as the cost of the transmission and distribution system. If sales decline, fixed costs may not be fully recovered, eating into profits. States have used several approaches to address this problem, including decoupling (actual sales are compared to projected sales used to determine rates) and adjustments made to rates so that fixed costs are fully recovered but not over-recovered) and lost revenue recovery (a one-way adjustment to collect the fixed-cost portion of rates that are lost due to energy efficiency programs).
3. Shareholder incentives—providing shareholders with a return on their energy efficiency investments. For example, utility shareholders may be provided with a share (e.g., 10%) of the net benefits (value of lifetime benefits of efficiency minus the costs) from their energy efficiency programs, if energy savings and other goals are met.

The business case for utility energy efficiency investments is discussed more fully in ACEEE's white paper, *The Old Model Isn't Working: Creating the Energy Utility for the 21st Century* (York and Kushler 2011).

The remaining one-quarter of electric power is provided by public utilities, including federal power marketing administrations (e.g., the Bonneville Power Authority and Tennessee Valley Authority), municipal utilities and rural electric cooperatives. Some of these have been leaders in energy efficiency programs (e.g., the Austin, Texas; Sacramento, California; and Seattle, Washington municipal utilities). But in many cases energy efficiency efforts by public utilities have been modest, often because staffing is too limited to plan and operate such programs.

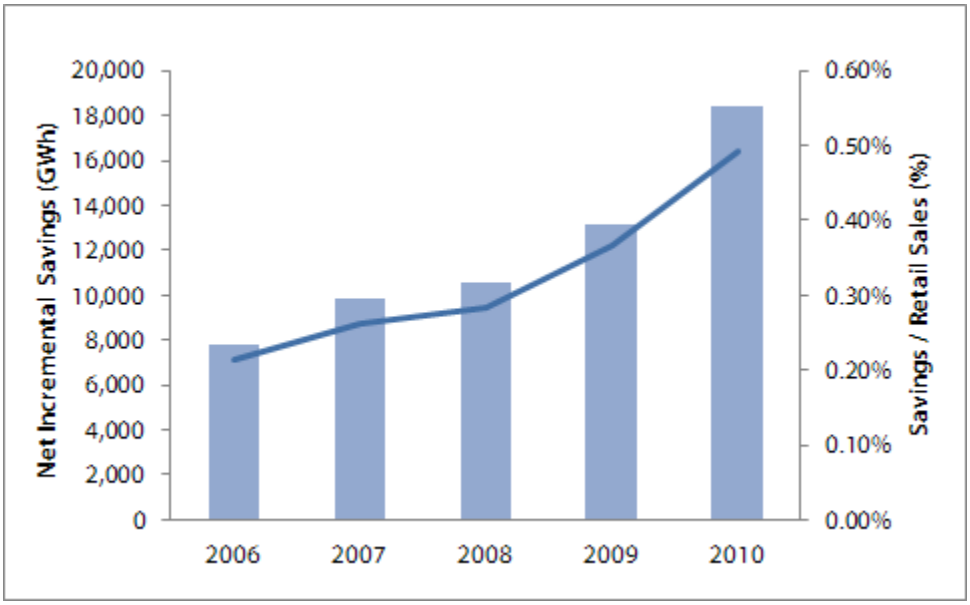
DATES

While some utility energy efficiency programs were offered in the 1970's, these programs did not become common until the 1980's. Interest has ebbed and flowed over the years, but as shown in the Budget section below, since 2006 interest and funding have really picked up.

RESULTS

Rate-payer funded energy efficiency programs have saved a substantial amount of energy. Figure 8 below shows the national incremental electricity savings from programs operated each year. Measures installed in 2009 saved more than 13 million kWh, about 0.37% of total electricity sales that year. As seen in the figure, incremental savings have been growing steadily from year to year. When savings from measures installed in earlier years that are still in operation are included, total savings in 2009 are likely more than 2% of total U.S. energy use.

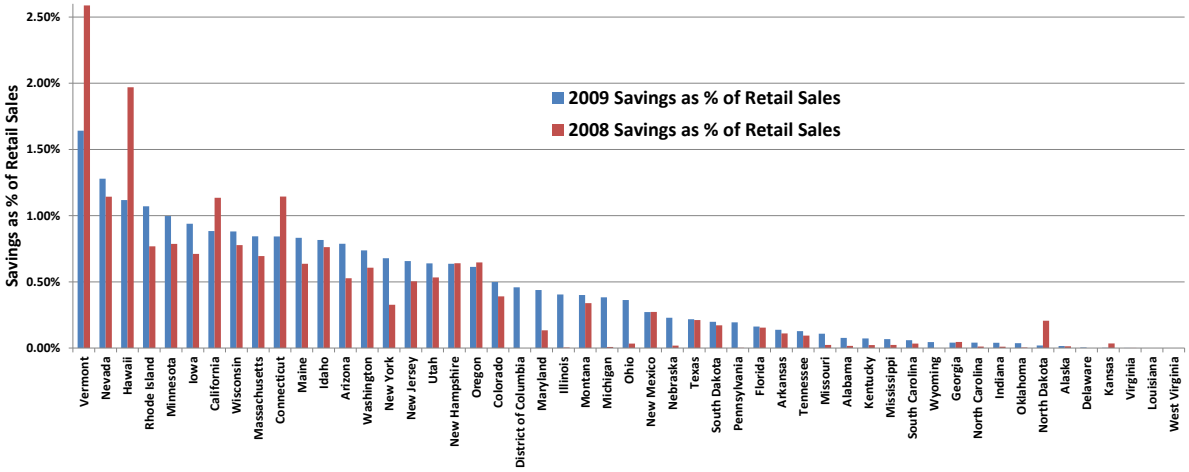
Figure 8. Annual Incremental Electricity Savings from Utility-Sector Energy Efficiency Programs



Note: The right-hand axis is percent of total electricity sales each year.
Source: ACEEE State Energy Efficiency Scorecards.

Savings vary substantially by state, with the top dozen states accounting for two-thirds of the total savings (Sciortino et al. 2011). The distribution of savings by state is illustrated in Figure 9.

Figure 9. Electricity Savings from Ratepayer Funded Energy Efficiency Programs as a Percent of Retail Electric Sales



Source: Sciortino et al. (2011)

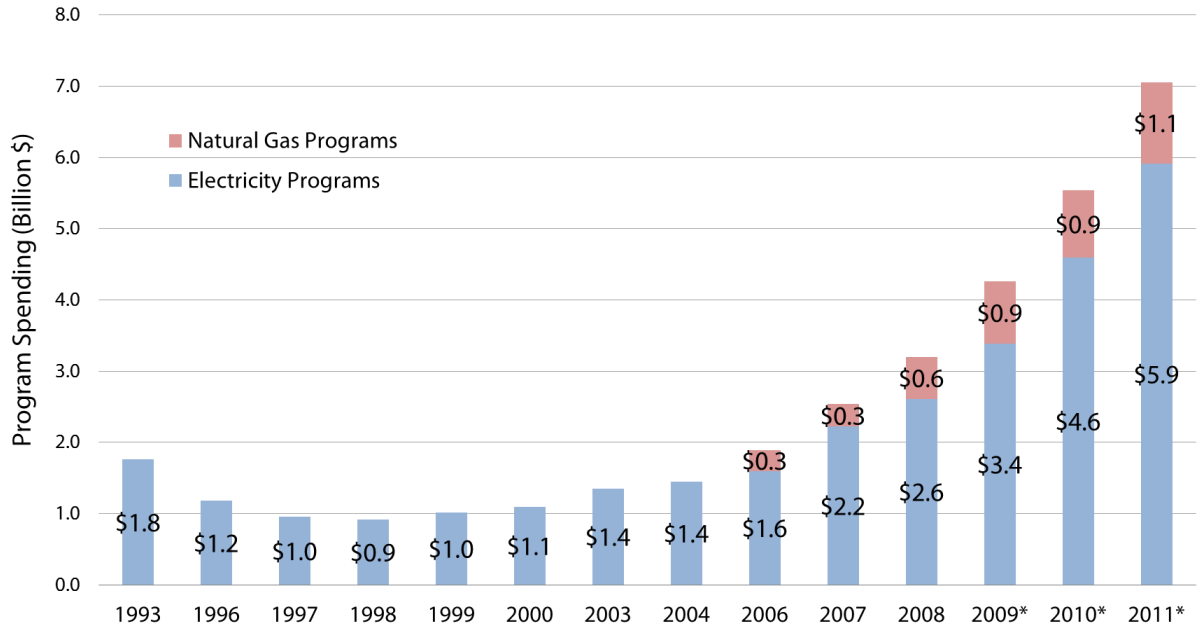
Regarding implementation of specific federal policies, results have been mixed. For example, a 1997 review on implementation of the provisions enacted in 1992 found that on the order of a dozen states opened dockets on the issues covered, but that not much policy change seemed to result, in part because at the same time many states were considering restructuring their utility sectors (Geller et al. 1997). On the other hand, a 2011 review of implementation of the 2005 provision on net metering and smart metering found that 38 states considered the provision, 16 took regulatory action and 13 took legislative action (Gold and Nadel 2011). There have not been any consequences to states for not considering these provisions, although it appears that if the issues are of interest, the majority of states do consider these policies.

The RCS program was extensively evaluated when it was offered. An evaluation of the program 7 years after it was started found that about 7% of eligible households participated. Evaluations of savings in audited households found average energy use reductions of 3-5% net of savings in control groups that did not receive audits. Benefits of the program were greater than costs, but overall net benefits were modest (Nadel 1991). The requirement that all utilities operate a RCS program was repealed in 1992 and replaced with voluntary guidelines. At that time, most utilities discontinued energy audits although some utilities continue to offer them.

BUDGETS

Total utility spending on energy efficiency programs has been growing steadily. These trends are shown in Figure 10, with budgets of about $7 billion in 2011.

Figure 10. Utility Energy Efficiency Program Budgets by Year



*All values actual program spending (EIA Form 861) except for 2009-2011, which are budgets (CEE Annual Industry Reports).
Source: Foster et al. (2012)

Federal budgets for technical assistance and guidance are generally modest. For example, in Fiscal Year 2012, DOE's Office of Electricity had an energy efficiency budget of about $1 million (Mansuetti 2012). Additional money is spent on smart grid issues. And DOE's Office of Energy Efficiency and Renewable Energy (EERE) spent about $1.5 million (Hogan 2012).

For Additional Information

Federal Energy Regulatory Commission demand response and energy efficiency: http://www.ferc.gov/industries/electric/indus-act/demand-response.asp

DOE Office of Electricity, energy efficiency program: http://www.doe.gov/oe/electricity-policy-coordination-and-implementation/state-and-regional-policy-assistance/technic-0

SEE Action: http://www1.eere.energy.gov/seeaction/

NAPEE: http://www.epa.gov/cleanenergy/energy-programs/suca/resources.html

ACEEE State Energy Policy Database: http://www.aceee.org/sector/state-policy

ACEEE State Energy Efficiency Scorecard report including a discussion on many state utility-sector policies: http://aceee.org/research-report/e115

On Energy Efficiency Resource Standards: http://www.aceee.org/topics/eers.

USAID Guide to Integrated Resource Planning: http://pdf.usaid.gov/pdf_docs/PNACQ960.pdf

York and Kushler (2011) paper on the business case for utility investments in energy efficiency: http://www.aceee.org/white-paper/the-old-model-isnt-working

Tellus Institute. Undated. *Best Practices Guide: Integrated Resource Planning for Electricity.* Washington, DC: U.S. Agency for International Development, Office of Energy, Environment and Technology. http://pdf.usaid.gov/pdf_docs/PNACQ960.pdf .

Section 18. Financing

DESCRIPTION

Loan programs are a mechanism used to help achieve energy savings in the building sector by providing financing to pay the upfront costs of energy efficiency retrofits. At the federal level, Fannie Mae offers an "energy improvement" mortgage in partnership with the Department of Housing and Urban Development and the Federal Housing Administration. However, there is no widely used national energy efficiency loan program, making state programs particularly important. In the paragraphs below we describe the federal programs and then give a brief overview of state efforts.

Federal Housing Authority Energy Efficient Mortgage Program

FHA's Energy Efficient Mortgage program (EEM) enables homeowners to finance the cost of adding energy efficiency features to new or existing housing as part of an FHA-insured home purchase or refinancing mortgage. The mortgage loan amount for an FHA EEM can be increased by the cost of effective energy improvements. The improvements can be included in a borrower's mortgage only if their total cost is less than the total dollar value of the energy that will be saved during their useful life. No additional down payment is required, and FHA loan limits don't interfere with the process of obtaining the EEM.

FHA EEMs are available for site-built as well as for manufactured homes. A limit on the cost of the energy efficient improvements that may be eligible for financing into the mortgage is the lesser of

- The dollar amount of cost-effective energy improvements, plus cost of report and inspections
- 5% of the value of the property
- 115% of the median area price of a single-family dwelling
- 150% of the maximum borrowing limit allowed for a standard Freddie Mac loan (the "conforming Freddie Mac limit") (FHA 2012)

The cost of the energy improvements and estimate of the energy savings must be determined by a home energy rating report that is prepared by an energy consultant using a Home Energy Rating System (HERS). The energy improvements are installed after the loan closes using money the lender has placed in an escrow account. The money is released to the borrower after an inspection verifies that the improvements are installed and the energy savings will be achieved.

Green Refinance Plus Program

Launched in 2011 between HUD's Federal Housing Administration (FHA) and Fannie Mae, the Green Refinance Plus program allows owners of existing affordable rental housing properties to refinance into new mortgages that include funding for energy- and water-saving upgrades, along with other needed property renovations (HUD 2011c). Under the program, FHA and Fannie Mae share the risk on loans to refinance existing rent-restricted projects while permitting owners to borrow additional funds to make energy-saving improvements to their properties. Properties at least 10 years old with an agreement that assures the housing provided will be affordable can take advantage of the program. An assessment is made to identify opportunities that will reduce operating and capital costs for the property owner, while reducing utility costs for tenants and improving indoor environmental quality.

Power Saver

Since 1995, FHA has offered an Energy Efficient Mortgage program across the country. The program allows homebuyers to finance energy efficiency improvements to their home at time of purchase or refinance. FHA also offers an insurance program for stand-alone energy efficiency home improvement loans, known as Title I. These programs have historically been used very little by consumers. As of 2007, just over 1,000 energy efficient mortgages had been issued (GAO 2008). However, Title I was relaunched with a new program design in 2010 as PowerSaver (LBNL 2010).

State Efforts

States across the United States have implemented efficiency loan programs with varying degrees of success. Some of these programs have several decades of experience and have issued hundreds of millions of dollars in loans. In recent years, many programs were begun with funding under the American Recovery and Reinvestment Act. Another source of funds has been Qualified Energy Conservation Bonds (DOE undated). Information on many of these programs has been compiled by the National Association of State Energy Officials (NASEO)—see the For More Information Section.

In addition, a number of innovative approaches to financing with promising potential are emerging such as on-bill financing, where loans are repaid through the energy bill and payments due may be adjusted according to actual savings that result from the project. Another promising approach is a loan loss reserve, where a fraction of the total amount of money lent to borrowers is retained in a pool to cover defaults. This reduces the risk of default for lenders and can help to attract private capital. Finally, in some areas Property Assessed Clean Energy (PACE) programs have emerged. In areas with PACE legislation in place, governments issue bonds and loan the revenues to consumers and businesses to pay for energy efficiency retrofits. The loans are repaid via an annual assessment on the property tax, meaning the debt remains with the building rather than following the individual borrower. Commercial PACE programs are gradually expanding (Turner 2011) but residential programs were largely put on hold after the Federal House Finance Agency issued a statement determining that PACE programs present "significant safety and soundness concerns that must be addressed…" and directing the federal home loan banks to review their policies to assure that pledged collateral is not adversely affected by PACE liens (FHFA 2010).

DATES

Loan programs for improving the energy efficiency of buildings have been in place for decades although a significant number of new programs were started in the past few years using funds from the American Recovery and Reinvestment Act. The Green Refinance Plus Program was launched in 2011 and Power Saver in 2010.

RESULTS

Unfortunately, most programs do not measure energy savings from a project. HUD estimates that in 2008 the EEM program resulted in $390,000 worth of energy savings (Freedberg 2008). Those programs that do report energy savings at the state level fall within a similar range of 12-17% of annual energy use for the eligible customer class served by the utility or utilities participating in the program (Hayes 2011). Participation rates are also generally low across programs. The percentage of total customers in the classes served by programs compared to the total number of program participants reveals that more than half of the programs had participation rates below 0.5% of a targeted customer class. The highest rates were found in state programs at 8% for a program targeting the commercial and small business sector in Connecticut and 16% for a residential program run by the Sacramento Municipal Utility District that has been in operation for over 30 years (Hayes 2011). Even after decades of loan programs, there continues to be a massive untapped potential for energy savings from building energy efficiency retrofits.

Default rates for these types of loans are very low, typically ranging from 0-3% (Hayes 2011). In spite of this, the market has yet to come to scale. There is a lack of information, uniformity, and standards, which make it difficult for private lenders to evaluate the risk these types of loans present. The lack of uniformity also makes it difficult to package these small loans into larger portfolios for sale to larger financial institutions on the secondary market. Without access to private capital, there will be limited funding for efficiency retrofits and the associated jobs, energy and cost savings, and environmental benefits will not be realized.

BUDGET

- **Federal Housing Authority Energy Efficient Mortgage Program.** This program has not been widely used. In 2005, only 430[20] energy efficient mortgages were reported. This number doubled in 2006 to 861 and increased yet again in 2007 to 1,066. During this time there was a cap of $8,000 on the amount of energy efficiency retrofits that could be financed. Assuming every project borrowed the maximum allowed, this would suggest the following approximate amounts loaned annually under this program:

[20] This figure may represent a partial count due to mid-year changes in reporting procedures.

Year	Total Loans	Maximum Approximate Budget
2005	430	$3,440,000
2006	861	$6,888,000
2007	1,066	$8,528,000

- **Green Refinance Plus Program.** Fannie Mae and HUD anticipate an initial refinance volume of approximately $100 million with an average loan amount of $3.5–$5 million. Only 4–5% of the loan amount ($150,000–$250,000) must be spent on energy efficiency upgrades (HUD 2011c). The program has a goal of 245,000 HUD-assisted energy retrofits.
- **Power Saver.** HUD estimates the 2-year pilot program will fund approximately 24,000 loans worth up to $300 million, though the program is not capped. The HUD's mortgage insurance unit will provide up to $25 million in grants as incentives to participating lenders (LBNL 2010).
- **State Efforts.** While several programs have many years of experience and have issued thousands of loans, this market has yet to come to scale. Some of the state programs with the largest origination budgets (i.e., the total dollar amount of loans issued during the life of the program) are the Sacramento Municipal Utility District Residential Loan Program ($447.4 million), Southern California Gas Company Home Energy Upgrade Financing Program ($300 million), and Texas LoanStar ($296.3 million) programs (Hayes 2011). All three of these programs have been established for more than 15 years each. There is no standard program size, but annual origination budgets for the largest programs are around $20–27 million. Annual origination budgets for residential programs of all sizes range from $1–2 million to slightly above $20 million.

For Additional Information

For additional information about U.S. experience with energy efficiency loan programs, see: http://aceee.org/research-report/u115.

For the NASEO database of state loan programs, see: http://www.naseo.org/resources/selfs/.

For additional information about on-bill financing, see: http://www.aceee.org/research-report/e118.

For detailed information about a successful on-bill financing program, see a case study on the Oregon Clean Energy Works Program here: http://aceee.org/sector/local-policy/case-studies/clean-energy-works-portland.

More information about the Sacramento Municipal Utility District Residential Loan Program can be found at https://www.smud.org/en/residential/save-energy/rebates-incentives-financing/documents/Residential%20Financing%20Fact%20Sheet.pdf.

More information about the Southern California Gas Company Home Energy Upgrade Financing program can be found at http://www.sdge.com/residential/homeImpFinance.shtml.

More information about the Texas LoanStar Program can be found at http://seco.cpa.state.tx.us/ls.

A fact sheet on the Green Refinance Plus program is at http://portal.hud.gov/hudportal/documents/huddoc?id=greenrefiplusfactsheet.pdf.

FHA PowerSaver—Energy Retrofit Loan: http://portal.hud.gov/hudportal/HUD?src=/press/press_releases_media_advisories/2010/HUDNo.10-251.

Section 19. Energy Efficiency Tax Incentives

DESCRIPTION

The Energy Policy Act of 2005 (EPAct 2005) established energy efficiency tax incentives in the residential and commercial sectors with the purpose of increasing the market share of advanced energy efficiency products and encouraging business owners and homeowners to undertake energy efficiency improvements (EPAct 2005). For the most part, these tax incentives were designed to cover the very highest levels of efficiency available to the market in 2005 (e.g., equipment and practices with less than a 5% market share). In addition to shifting the market, this approach was intended to keep costs to the Federal Treasury down and to minimize "free riders" (tax credit participants who would have purchased eligible products even if the tax credits weren't available). Tax credits were created for a range of products and practices. The major energy efficiency credits are summarized according to the following categories; appliances, new homes, existing homes, and commercial buildings.

- **Appliances.** The provisions related to appliances provided per-unit credits to manufacturers for the production of the most efficient refrigerators, clothes washers, and dishwashers. The incentives only applied to appliances produced in the United States and had a total cap per manufacturer (initially $75 million for 2006-2007 combined). The incentives for appliances were extended several times, and as part of these extenions the stringency that products had to meet in order to qualify for a credit was increased twice and a new cap per manufacturer established. The credit for clothes washers has ranged from $150-250 per unit depending on model year and performance. The credits for refrigerators have ranged from $100-$200 per unit and the credit for dishwashers has ranged from $25-$75 per unit.
- **New Homes.** The provision for new homes provided a credit of $2,000 for builders of homes that use 50% less energy for space heating and cooling than homes built according to the 2004 supplement to the International Energy Conservation Code (IECC) for 2006–2008. The provision also included a $1,000 tax credit to the builder of a new manufactured home achieving 30% energy savings for heating and cooling over the 2004 IECC and supplements (at least one-third of the savings had to come from building envelope improvements), or a manufactured home meeting the ENERGY STAR requirements.
- **Existing Homes.** Existing homes were provided tax credits for energy-efficient new central air conditioners, heat pumps, furnaces, boilers, and water heaters in existing homes. In addition, there were tax credits for upgrading building envelope components in existing homes, such as ENERGY STAR windows and doors, insulation, sealing against air infiltration, and ENERGY STAR metal roofs. The tax credits have typically been for 10% of project cost up to a

maximum of $500, but for 2010-2011 this was increased to 30% of project cost up to a maximum of $1500.

- **Commercial Buildings.** The commercial building provision provides a deduction per square foot for owners and tenants of new and existing commercial buildings that reduce energy use for HVAC and interior lighting by 50% relative to ASHRAE standard 90.1-2001. In addition, partial deductions are available for building envelope; lighting; and heating, ventilation, and air conditioning (HVAC) systems.

DATES

- **Appliances.** These tax credits were first available in 2005 and were extended to cover 2008–2010 as a part of the *Emergency Economic Stabilization Act of 2008 (EESA)*.[21] They were extended again in 2011 as a part of the *Tax Relief, Unemployment Insurance Reauthorization, and Job Creation Act of 2010*, with incentive levels adjusted to focus on even more efficient products (Tax Act 2010). The tax credit for refrigerators, clothes washers, and dishwashers were then extended at the end of 2012, covering products shipped in 2012 and 2013.
- **New Homes**. The tax credits for new homes were put in place as part of EPAct 2005. They were extended in the *Emergency Economic Stabilization Act of 2008* until December 31, 2009. The credit lapsed in 2010, but was renewed to cover new homes built in 2010 and 2011 as a part of the *Tax Relief, Unemployment Insurance Reauthorization, and Job Creation Act of 2010*. The new homes tax credit was extended at the end of 2012 to cover new homes built in 2012 and 2013.
- **Existing Homes.** These provisions were originally for equipment put in place in 2006 and 2007. They were extended with some changes in eligibility levels as a part of the *Emergency Economic Stabilization Act of 2008*, covering improvements installed in 2009, but not 2008. ARRA extended these through December 2010, and increased the incentive to 30% of equipment cost (had been 10%) and increased the cap on incentives from $500 to $1500 per household. They were extended to 2011, but with the original level of incentives and a $500 limit as a part of the *Tax Relief, Unemployment Insurance Reauthorization, and Job Creation Act of 2010*. The credits for insulation, windows, heating and cooling systems, and water heaters were extended at the end of 2012 to cover equipment installed in 2012 and 2013.
- **Commercial Buildings.** The original provision was effective immediately after enactment of EPAct 2005 and provided the deduction for buildings placed in service in 2006 until January 1, 2008. This tax deduction was extended in the *Emergency Economic Stabilization Act of 2008* until December 31, 2013.

RESULTS

These tax credits have been largely successful (Gold and Nadel 2011). The new homes and appliances manufacturing incentives have transformed the market for clothes washers, dishwashers, refrigerators, and new homes. These incentives have been extended and the levels of efficiency improved twice. In addition, the residential insulation and HVAC tax credits were largely successful,

[21] Division A of Pub.L. 110-343. October 3, 2008.

although in general, consumer incentives are typically more difficult to implement and take longer to ramp up than manufacturer or builder incentives. The window incentives have helped to sell a lot of windows but suffer from high levels of "free riders."

- **Appliances.** The tax incentives encouraged manufacturers to produce more of their highest efficiency products on the market and to offer related discounts and promotions on these units. Market data from the Association of Home Appliance Manufacturers in Table 17 reveals that the appliance manufacturing industry has responded to the tax credits by producing more eligible products over time. Between 2008 and 2009, when this tax incentive was extended again, the total potential units eligible for the tax credit went up by 120%.

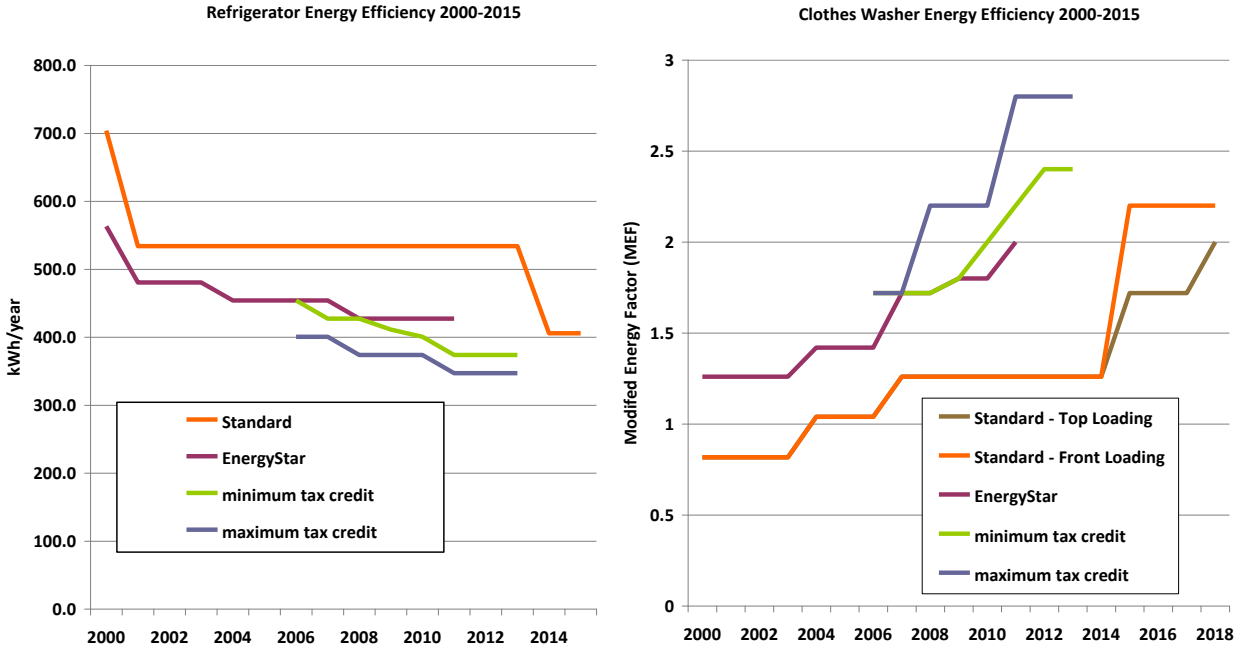
Table 17. Units Eligible for Appliance Manufacturers Tax Credit, 2008–2009

	Total Potential Units Ineligible for Tax Credit		Unit Decrease (2008 to 2009)	Total Potential Units Eligible for Tax Credit		Unit Increase (2008 to 2009)	Energy Saved in 2009 (GWh/yr)
	2008	2009		2008	2009		
Dishwashers	4,645,291	1,684,282	(2,961,009)	1,349,709	3,718,718	2,369,009	131
Clothes Washers	7,091,331	4,920,450	(2,170,881)	1,200,669	2,944,550	1,743,881	978
Refrigerators	7,793,740	6,092,173	(1,701,567)	1,516,260	2,304,827	788,567	280
Total	19,530,362	12,696,905	(6,833,457)	4,066,638	8,968,095	4,901,457	1,390

Source: AHAM (2010)

Figure 13 shows the market transformation of refrigerators and clothes washers that has occurred in recent years, spurred in part by the tax incentives. Of the ENERGY STAR clothes washers available in 2005 before the tax credit began, only 153 of 258 products (or 59%) had an efficiency level more than the minimum to earn an incentive (a 1.72 modified energy factor or MEF) (Karney 2011). By 2007, this was the minimum ENERGY STAR level, so 100% of the qualified ENERGY STAR products available were at 1.72 MEF. In 2005, ENERGY STAR products had a total market share of 36%, which increased to 42% in 2007 (DOE 2009). As a result, we can estimate that the tax credit-eligible models' overall market share went from about 21% of the total market to about 42% of the total market, doubling their market share.

Figure 13. Market Transformation of Refrigerators and Clothes Washers, 2000–2015



- **New Homes.** The new homes tax credit has been successful in transforming a segment of the new homes market toward more energy-efficient homes. As shown in Table 18, the number of homes participating in the credit grew four-fold between 2006 and 2009. In addition, energy-efficient homes gained a greater market share, as the number of homes certified as complying with the tax credit rose to 10% of new homes sold in 2009, although due to the recession the number of new homes declined substantially (Baden 2010).

Table 18. Number of New Homes Certified as Complying with the Federal Tax Credit

Year	Number of New Homes Certified as Complying with the Credit Annually	Number of New Homes Annually	Market Share of Certified Homes
2006	8,141	1,051,000	0.8%
2007	23,702	776,000	3.1%
2008	21,939	485,000	4.5%
2009	37,506	375,000	10%
2010	21,000	300,000	7%*
2011	32,000	290,909	11%

*This decline is likely due to the fact that the credit was renewed retroactively in December of 2010.
Source: Baden (2010)

- **Existing Homes.** A report by the U.S. Government Accountability Office found that most of the total reported spending by consumers taking advantage of this credit in 2006 could be accounted for by three of the available types of improvements: windows, insulation, and

exterior doors. Metal roofs, energy-efficient building property, furnaces, hot water boilers, and circulating furnace fans each made up a small portion of consumer spending (GAO 2010a). In 2007, windows, insulation, and exterior doors dominated consumer spending, with a noticeable increase in energy-efficient exterior windows purchases in particular (GAO 2010b). Table 19 shows consumer spending for homes taking advantage of this tax credit in 2006, 2007, and 2009.

Table 19. Total Spending on Efficiency Improvements in Existing Homes

Year	Total Spending (million)
2006	$7,947
2007	$7,484
2009	$25,567

Source: GAO (2011b)

- **Commercial Buildings.** Data on use of the commercial buildings deduction is not available as this deduction is combined with other deductions in IRS forms and records. Interviews with key observers of the tax credits indicate that use of the deduction has been limited, with the exception of lighting retrofits , but less so for whole building retrofits. Lighting retrofits are more common because the legislation provided for a simple path for lighting retrofits. For whole building projects computer modeling of building energy use is required and the incentive was considered to be too small by many developers to justify the documentation they needed to provide. Limited use of partial credits for HVAC and building shell can be attributed to a number of factors, including the complexity of qualifying with building shell and HVAC measures, the requirement that large savings needed to be achieved in single systems to achieve a credit, and the fact that the DOE and the Internal Revenue Service never implemented the regulations required in the legislation to make documentation of savings simple and reproducible (Gold and Nadel 2011).

BUDGET

- **Appliances.** The U.S. Joint Committee on Taxation forecasted an annual expenditure of $100 million for these credits during the 2008-2010 period (JCOT 2009). This estimate turned out to be low as both Whirlpool and GE realized substantial revenues from the credits. The credits can be taken in future years and Whirlpool was able to use the credits to generate an effective income tax rate of negative 10.9%. It is estimated that a one year extension of the program will cost the U.S. government $235 million in foregone revenue over the next decade (Coleman-Lochner and Rubin 2011).
- **New Homes.** The U.S. Joint Committee on Taxation forecasted an annual expenditure of less than $50 million for these credits during the 2008-2012 period. In 2011, 32,000 homes were certified which would mean the credit was $64 million in that year if all eligible homes applied. Costs are likely significantly less as not all eligible taxpayers will apply for the credit.

- **Existing Homes.** The U.S. Joint Committee on Taxation forecasted an annual expenditure of $800 million in 2008, $300 million in 2009, and $1 billion in 2010. A 2012 analysis by the U.S. Government Accounting Office estimates that total credits claimed as follows:

Year	Estimates[1] (million)	Actual Credits Claimed[2] (million)
2006	NA	$956
2007	NA	$938
2008	$800	NA
2009	$300	5,288
2010	$1,000	NA

[1]JCOT 2009; [2]GAO 2011

- **Commercial Buildings.** The U.S. Joint Committee on Taxation forecasted an expenditure of $200 million for these credits during the 2008-2012 period.

For Additional Information

For a more detailed summary of these tax credits see: *Energy Efficiency Tax Incentives, 2005-2011: How Have they Performed* (Rachel Gold and Steven Nadel). Washington DC: American Council for an Energy-Efficient Economy. June, 2011. http://aceee.org/white-paper/energy-efficiency-tax-incentives.

See also: *Assessing the Harvest: Implementation of the Energy Efficiency Provisions in the Energy Policy Act of 2005* (Rachel Gold and Steven Nadel). Washington, DC: American Council for an Energy-Efficient Economy. 2011. http://aceee.org/research-report/e113.

For summaries of the tax credits and links to additional information see the Tax Incentive Assistance Project (TIAP) website: http://www.energytaxincentives.org/

For results of the appliance tax credits: http://www.energysavers.gov/financial/rebates/pdfs/seearp.pdf

Information on the commercial building tax deduction: http://www.nema.org/gov/efficientbuildings/

Information on the ENERGY STAR manufactured homes requirements: http://www.energystar.gov/index.cfm?c=bldrs_lenders_raters.pt_builder_manufactured

Section 20. Energy Savings Performance Contracting[22]

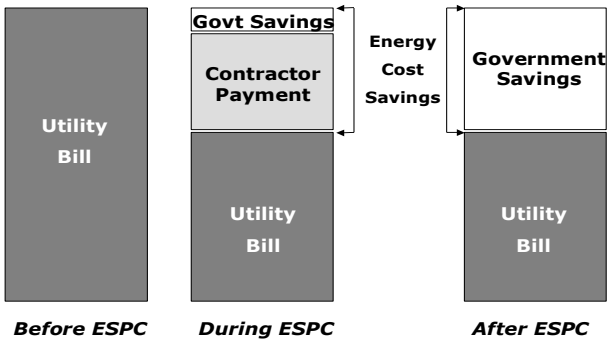
Description:

Energy savings performance contracts (ESPCs) allow Federal agencies to accomplish energy savings projects without up-front capital costs and without special Congressional appropriations.

[22] This section was written by Jennifer Shafer of Cascade Associates and Don Gilligan with the National Association of Energy Service Companies.

An ESPC is a partnership between a Federal agency and an energy service company (ESCO). The ESCO conducts a comprehensive energy audit for the Federal facility and identifies improvements to save energy. In consultation with the Federal agency, the ESCO designs and constructs a project that meets the agency's needs and arranges the necessary funding. The ESCO guarantees that the improvements will generate a specified level of energy cost savings, and the agency pays for the delivered savings for the life of the contract. After the contract ends, all additional cost savings accrue to the agency, see Figure 22. Contract terms up to 25 years are allowed; however, according to recent reports from the Lawrence Berkeley National Laboratory, the median federal ESPC project term is about 14 years (Shonder 2012).

Figure 22. ESPC Energy Savings Performance Contracting



Federal IDIQ Contracts

There are two contracts within the Federal government that include preapproved Energy Service Companies (ESCOs)—one with the Department of Energy and the other with the Army Corp of Engineering. Both energy savings performance contracts are indefinite-delivery, indefinite-quantity (IDIQ) contracts designed to make ESPCs as practical and cost-effective as possible for Federal agencies. DOE and the Army Corp awarded these "umbrella" contracts to ESCOs based on their ability to meet terms and conditions established in IDIQ contracts. DOE ESPCs can be used for any Federally-owned facility worldwide. Army Corp contracts can be used by military agencies.

Benefits

DOE energy savings performance contracts help Federal agencies meet energy efficiency, renewable energy, water conservation, and emissions reduction goals by providing contract funding for energy management projects in the absence of Congressional appropriations. The streamlined process provides increased quality and value through:

- Access to private-sector expertise in energy efficiency, renewable energy, water conservation, and reduced emissions
- Built-in incentives for ESCOs to provide high-quality equipment, timely services, and thorough project commissioning

- Infrastructure improvements to enhance mission support
- Healthier, safer working and living environments
- Flexible, practical contract and procurement processes to ensure each project is done the way site managers want
- Expert, objective technical support through FEMP assistance, including:
    - FEMP-provided legal and funding guidance, project facilitators, advanced technology experts, and training for Federal agencies
- Smart project management that:
    - Provides building efficiency improvements and new equipment without upfront capital costs
    - Funds energy improvements without relying on special Congressional appropriations
    - Guarantees energy and related operation and maintenance cost savings
    - Enhances the ability to plan and budget energy, operation, and maintenance accounts
    - Reduces vulnerability to budget impacts due to volatile energy prices, weather, and equipment failure

DATES

The National Energy Conservation Policy Act of 1978 (NECPA) (U.S. Congress 1978 first gave Federal agencies the authority to enter into shared-energy savings contracts with private-sector energy service companies (ESCOs). It was superseded by the Energy Policy Act of 1992 (EPAct 1992) (U.S. Congress 1992), which:

- Authorized Federal agencies to execute guaranteed-savings ESPCs
- Required ESCOs to guarantee savings
- Required measurement and verification (M&V) of savings
- Set the maximum contract term at 25 years, including the construction period

EPAct 1992 provisions were then implemented by the DOE Final Rule (10 CFR 436 Subpart B) which established a list of specified a list of procedures and criteria for selecting ESCOs, recommended standard terms and conditions, defined conditions of payment and addressed annual Measurement and Verification (M&V) requirements (DOE 1992). DOE Final Rule (10 CFR 436 Subpart B) included the following provisions for ESPCs (Implemented energy savings performance contracts authority in 10 CFR 436 Subpart B.

ESPCs for use in the Federal government were reauthorized for 10 year in the Energy Policy Act of 2005 (U.S. Congress 2005) and became permanent in the Energy Independence and Security Act of 2007 (U.S. Congress 2007). That act additionally:

- Authorized use of any combination of appropriated funds and private financing in Federal ESPCs
- Prohibited agencies from making policies that arbitrarily limit the maximum contract term to less than 25 years or limit the total amount of private financing
- Authorized the sale or transfer of energy generated on Federal sites from renewable energy sources or cogeneration in excess of Federal needs to utilities or non-Federal energy users in accordance with existing Federal or state laws

- Called for a study of non-building applications of ESPCs

RESULTS

Since the inception of the DOE's energy savings performance contracts (ESPCs) in 1998, 270 DOE ESPC delivery orders and task orders have been awarded. More than $2.5 billion has been invested in Federal energy efficiency and renewable energy improvements. These improvements have resulted in more than 333 trillion Btu (351 PJ) of life-cycle energy savings and more than $6.8 billion of cumulative energy cost savings for the Federal Government for measures installed by 2011 (DOE 2011c).

In addition, much larger savings have been achieved in the so-called "MUSH" market (Municipalities, Universities, Schools and Hospitals). For example, the LBNL database (Larsen 2012) includes a sampling of MUSH projects with total net benefits of about $1.3 billion. Larsen (2012) estimates the database contains about 20% of total MUSH projects, implying net benefits are about $6.5 billion. By comparison, the LBNL database estimates that net benefits for federal projects are about $2.1 billion.

In the Federal space, the President announced in December 2011 a goal of $2 billion in private sector investment in Federal ESPCs within two years. This is significantly more than the $350 million per year on average that has been invested to date and would significantly improve energy efficiency of the Federal government's own building stock.

The DOE ESPC contract has an authorized ceiling of $80 billion over 10 years. According to a 2011 Oak Ridge National Laboratory Study (March 31, 2011, Bob Slattery), meeting this ceiling, would generate over $20.2 billion in net energy cost savings and eliminate federal expenditure of an additional $30 billion in infrastructure improvements.

In addition to energy and cost savings, use of ESPCs, at all levels, provides an estimated average of 110 jobs per $10 M of investment according to an analysis by the Federal Performance Contracting Coalition (Shafer 2004). These are approximately 22 direct jobs to the ESCO, another 42 local contractor jobs and an additional 41 manufacturing jobs (Shafer 2012).

The U.S. Chamber of Commerce, in April 2011 testimony before the House Science Committee—Bill Kovacs, April 13, 2011 (COC 2011)—estimated that using the entire contract ceiling of the DOE SuperESPC contract would generate approximately 540,000 jobs (348,000 during construction and an additional 191,000 jobs during the performance period).

State and Local Efforts

While this report is primarily about federal energy efficiency efforts, a brief overview of state and local efforts is useful to put ESPCs in overall context. ESPCs work quite well in most public sector buildings—the MUSH market. The most recent report published by the Lawrence Berkeley National

Laboratory on the ESCO industry[23] indicates that the MUSH ESPC market is about four times the size of the federal ESPC market on an annual basis. The DOE recommended ESPC was a sustainable energy efficiency strategy recommended in the guidance documents issued to state and local governments for the ARRA State Energy Program (SEP) and Energy Efficiency and Conservation Block Grant (EECBG) programs (DOE 2012h; DOE 2012i). The DOE has reported that about $200 million of SEP and EECBG funds were used to enhance ESPC projects (DOE [Gathering Reference]), and more funds from SEP and EECBG-funded financing programs may be used for ESPC projects in the near future.

Budget

To be clear, ESPCs use private sector money and expertise to acquire energy savings and/or renewable energy assets so no federal funds are necessary. The DOE does, however, dedicate some staff to assisting other federal agencies in implementing ESPCs. The total cost is likely about $2 million per year for training and assistance in ESPCs (Shafer 2012).

For Additional Information

US Chamber of Commerce Report http://www.uschamber.com/press/releases/2011/april/us-chamber-testimony-calls-president-congress-move-forward-clean-energy-te

The DOE FEMP ESPC website http://www1.eere.energy.gov/femp/financing/espcs.html

The FPCC website http://federalperformancecontracting.com/

Section 21. Federal Government Support to International Programs/ Projects/ Initiatives

Description

The U.S. federal government started to support international collaborative activities to promote building energy efficiency in the late 1970s and early 1980s. For example, the DOE has supported the Air Infiltration and Ventilation Center through the International Energy Agency (IEA)'s Implementation Agreement since 1979. The United States Agency for International Development (USAID), DOE and the Environmental Protection Agency (EPA) supported an ACEEE study that helped Brazil develop its electricity conservation plan in 1983.

In the early 1990s, the EPA created the International Energy Efficiency Buildings Program, or eeBuildings, to assist developing countries to improve building energy efficiency. The eeBuildings program draws on the EPA's own domestic experiences with the ENERGY STAR® and Green Lights voluntary programs (Bagle, McNeil & Greenberg. 2002). These programs have been successfully implemented in many developing countries, including China, Brazil and the Philippines.

[23] "A Survey of the U.S. ESCO Industry: Market Growth and Development from 2008 to 2011," June 2010 http://www.naesco.org/resources/industry/documents/ESCO%20study.pdf

In the mid to late 2000s, the Federal Government enhanced its international collaboration activities through existing multilateral agreements, including the Asia-Pacific Economic Cooperation (APEC) forum, through the IEA Implementing Agreement, and by means of new initiatives, such as the Asia-Pacific Partnership on Clean Development and Climate (APP) launched in 2006, and the Super-efficient Equipment and Appliances Deployment (SEAD) initiative, which was initiated in 2010.

The APP countries include the U.S., China, Australia, Canada, India, Japan, and the Republic of Korea. As one of the six APP task forces, the building task force included a variety of projects. China has been involved in the following APP building projects: Building Energy Performance Certification (2008-2012), Implementation of Building Energy Codes in China (2008-2010), Promotion of Green Buildings in China (2008-2010), and the International Net Zero Energy Home Coalition/Dialogue (2009-2011).

Since 2009 the U.S. federal government has been actively pursuing comprehensive collaboration activities with two key partners, China and India. In 2009, the U.S. and China announced a far-reaching collaboration package, including the U.S.-China Clean Energy Research Center (CERC). CERC is expected to spend US$150 million (funded in equal parts by the U.S. and China) over five years on research and development of clean energy technologies by teams of scientists from both countries. Building energy efficiency (CERC-BEE) is one of the initiative's three key areas of study. The CERC-BEE aims to help both nations develop and commercialize greener building technologies through research in five areas: monitoring and simulation, the building envelope, building equipment, whole building efficiency, and commercialization (China FAQs 2012). In the same year, the U.S. and India launched an Indo-U.S. Clean Energy Research and Development Initiative. The new initiative includes the development and deployment of energy technologies and energy efficient buildings.

In 2010, USAID initiated the U.S.-China Sustainable Buildings Partnership (SBP). SBP aims to promote energy efficiency in China's commercial buildings by focusing on a range of tools and methods, especially those that involve voluntary approaches (USAID 2010). In the same year, DOE and the National Fenestration Rating Council (NFRC) launched the Zero Energy Home project in India.

In the past four decades, DOE, the Department of State (DOS), USAID and the EPA have been the major government agencies that have been active in providing government support to the international promotion of energy efficiency. In recent years, in line with promoting domestic production and creating domestic jobs, the U.S. Department of Commerce (DOC), the U.S. Trade and Development Agency (USTDA) and the Export-Import Bank of the United States (Ex-Im Bank) have joined forces. For example, in 2010 USTDA and DOS organized an Energy Efficient Solutions Workshop on Energy Savings Performance Contracting in South Africa. In the same year, USTDA and the Ex-Im Bank signed a Memorandum of Understanding with China to promote investment in energy efficiency in China (PNNL 2010).

In 2011, DOS established the Bureau of Energy Resources (ENR) with three major goals: (1) to manage the geopolitics of today's energy economy through vigorous diplomacy with producers and

consumers, (2) to stimulate market forces through the creation of transformational policies in alternative energy, electricity, development and reconstruction, and (3) to increase access to energy in developing countries (DOS 2011). The establishment of ENR was one clear indication of the Obama Administration's increased emphasis of energy efficiency and renewable energy in international collaboration.

DATES[24]

In the 1990s, the EPA launched the eeBuilding project to support building energy efficiency in developing countries.

In 2000, USAID and the Government of India initiated the Energy Conservation and Commercialization (ECO) project aimed at promoting energy efficiency in India. ECO launched a long-term collaboration between USAID and the Indian government for promoting building energy efficiency. In 2005, USAID launched ECO III.

In 2006, the U.S., Australia, Canada, Japan, China, India, and Republic of Korea initiated the Asia-Pacific Partnership on Clean Development and Climate (APP) with six task forces, including the Buildings and Appliances task force.

In 2006, the U.S.-China Strategic Economic Dialogue, a bi-annual, cabinet-level dialogue, was established to improve communication on energy efficiency issues.

In 2008, the U.S. and China signed the Ten Year Framework for Cooperation on Energy and Environment. This Framework aims to facilitate the exchange of information and best practices between the two countries, with the goal of promoting collaboration on pressing energy and environmental problems.

In 2009, the U.S. and India announced the establishment of an Indo-U.S. Clean Energy Research and Development Initiative.

In 2009, the U.S. and China announced further collaboration on establishing CERC, the U.S. China Energy Efficiency Action Plan (which includes building codes, labels and rating systems, consumer product testing and labeling), and the U.S. China Energy Cooperation Program (which includes green building) (White House 2009).

In 2010, DOE sponsored the Super-efficient Equipment and Appliances Deployment initiative (SEAD), which is a global initiative supported by the Major Economic Forum.

In 2011, DOS established its Bureau of Energy Resources.

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[24] This section is partly based on the International Building Energy Exchange Database developed by PNNL http://ibex.pnnl.gov/wiki/index.php/Activity_List.

RESULTS

According to the International Building Energy Exchange Database, developed by Pacific Northwest National Laboratory (PNNL), since 1979 DOE has developed or been directly involved in 85 international projects, programs or initiatives related to building energy efficiency, with USAID involved in 24, the EPA in 15, and DOS in 13.

These international collaborations have not only promoted building energy efficiency in the participating countries and regions but also more widely at a global level.

For example, the eeBuildings program has provided financial and technical support to help developing countries enhance their capacity building and to establish and develop their own practices. For instance, the eeBuilding program contributed to the development of the China Green Lights Program, and also trained 1,000 building owners and managers in Shanghai on no-cost/low-cost ways to reduce building energy use. The program, with the support of USAID, also provided training to professionals in Mumbai and New Delhi[25]. Supported by USAID and the Government of India, the ECO I, II and III projects helped India to establish its first governmental energy efficiency agency, the Bureau of Energy Efficiency, and have furthered the development and deployment of building energy codes, while also playing a major role in the promotion of building energy efficiency across the country.

BUDGET

There is as yet no documentation to summarize the total federal spending or budget for international collaboration activities on building energy efficiency. Table 20 lists some international projects for which spending/budget information is available.

[25] Please see http://www.juccce.com/documents/Green%20Building/eeBuildings.pdf.

Table 20. Selected U.S.-China Collaboration Projects Supported by the U.S. Federal Government

Funding Agency	Project Name	Funding	Start Year	Countries
USAID, DOE, EPA	Promoting Energy Efficiency in the Indian Public Sector	US$5.8 million	2005	India
USAID	ICF to Promote Green Buildings in China	US$2 million over 3 years	2008	China
DOE, DOS	Implementation of Building Energy Codes in China	US$500,000 over two years	2008	China
USAID	Energy Efficiency and Capacity Building in Pakistan	US$24 million over three years	2009	Pakistan
USAID	Municipal Heating Reform Project	US$15 million over three years	2009	Ukraine
US federal government	CERC	US$75 million over 5 years	2009	China
DOE	SERD	US$3 million per year	2010	Brazil, Canada, China, France, Germany, Italy, Japan, Mexico, Republic of Korea, Russia, U.K., and U.S.
USAID	ICF International to support global energy efficiency for USAID	US$10 million over 5 years	2011	Global, Brazil, China, India, Brazil, Russia

Data sources: compiled based on the International Building Energy Exchange (PNNL 2012)

FOR ADDITIONAL INFORMATION

For more information about federal government support to international projects, programs and initiatives related to building energy efficiency, consult the International Building Energy eXchange. http://ibex.pnnl.gov/wiki/index.php/Activity_List

For detailed information concerning the Bureau of Energy Resources (DOS), see http://www.state.gov/e/enr/index.htm

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Appendix A: Summaries of Major U.S. Energy Efficiency Laws

This section contains summaries of the major U.S. energy efficiency laws. They were prepared by the Congressional Research Service at time of passage and downloaded from the Library of Congress Website—www.thomas.gov . They are not copyrighted. Included are the following laws:

- Energy Policy and Conservation Act of 1975
- National Energy Conservation Policy Act of 1977
- National Appliance Energy Conservation Act of 1987
- Energy Policy Act of 1992
- Energy Policy Act of 2005
- Energy Independence and Security Act of 2007

Many of these laws deal with both energy efficiency and other energy subjects. In these cases we just include summaries of the energy efficiency sections.

Energy Policy and Conservation Act of 1975

S.622
Latest Title: Energy Policy and Conservation Act
Sponsor: Sen Jackson, Henry M. [WA] (introduced 2/7/1975) Cosponsors (13)
Related Bills: H.R.7014, S.349, S.677, S.1883
Latest Major Action: 12/22/1975 Public law 94-163.
Link: http://thomas.loc.gov/cgi-bin/bdquery/z?d094:S622:

SUMMARY AS OF:
12/9/1975--Conference report filed in House. (There is 1 other summary)

(Motion to strike certain provisions of conference report passed house, roll call #786 (300-103))

Energy Policy and Conservation Act - =

=Title III: Improving Energy Efficiency= - Adds to the Motor Vehicle Information and Cost Savings Act a new title as follows: "Title V: Improving Automotive Efficiency".

Requires that the average fuel economy for passenger automobiles manufactured by any manufacturer in any model year after model year 1977 shall not be less than the number of miles per gallon established for such model year, as follows: 18.0 miles per gallon in 1978, increasing to 27.5 miles per gallon in 1985 and thereafter. Requires a yearly report to the Congress on the implementation of average fuel economy standards.

Permits manufacturers to apply for a modification of any average fuel economy standard for model years 1978, 1979, or 1980.

Provides that if a manufacturer demonstrates and the Secretary finds that a Federal standards fuel economy reduction is likely to exist for such manufacturer for the model year to which the application relates, and such manufacturer applied a reasonably selected technology, the Secretary shall reduce the average fuel economy standard.

Defines "Federal standards fuel economy reduction" to mean reduction of a manufacturer's average fuel economy standard resulting from application of Federal standards under the Clean Air Act, the National Traffic and Motor Vehicle Safety Act, and the Noise Control Act.

Specifies the method by which the EPA Administrator shall calculate average fuel economy. Requires separate consideration in such calculation of domestically and foreign manufactured automobiles.

Permits judicial review for those adversely affected by rules prescribed under the provisions of this title relating to automobile fuel economy.

Requires each manufacturer to submit a report to the Secretary during the 30-day period preceding the beginning of each model year after model year 1977, and during the 30-day period beginning on the 180th day of each such model year, containing: (1) a statement as to whether such manufacturer will comply with average fuel economy standards; (2) a plan which describes the steps the manufacturer has taken or intends to take in order to comply with such standards; and (3) such information as the Secretary may require.

Requires each manufacturer to cause to be affixed, and each dealer to cause to be maintained, on each automobile manufactured in any model year after model year 1976, in a prominent place, a label indicating the fuel economy of such automobile, the estimated annual fuel cost associated with the operation of such automobile, and the range of fuel economy of comparable automobiles (whether or not manufactured by such manufacturer).

Sets forth civil penalties for violations of this title, and a system of credits toward such penalties based upon the extent to which a manufacturer exceeds average fuel economy standards. Imposes an additional civil penalty of $10,000 per day of continuing violation of this title by any person.

Provides that the President shall, within 120 days after the date of enactment of this title, promulgate rules which shall require that all passenger automobiles acquired by all executive agencies in each fiscal year which begins after such date of enactment achieve a fleet average fuel economy for such year not less than 18 miles per gallon, or the average fuel economy standard for the model year which includes January 1 of such fiscal year, whichever is greater.

Requires the Federal Trade Commission to establish a program for systematically examining fuel economy representations made with respect to retrofit devices.

Requires the Administrator to direct the development of test procedures for the determination of estimated annual operating costs for home appliances.

States that effective 90 days after a test procedure rule applicable to a covered product is prescribed under this title, no manufacturer, distributor, retailer, or private labeler may make any representation in writing (including a representation on a label), or any broadcast advertisement, respecting the energy consumption of such product or cost of energy consumed by such product, unless such product has been tested in accordance with such test procedure and such representation fairly discloses the results of such testing.

Directs the Federal Trade Commission to prescribe labeling rules applicable to all covered products, except to the extent that the Administrator determines that test procedures cannot be developed which meet the requirements of this title; or the Commission determines that labeling is not technologically or economically feasible.

States that a rule prescribed under this title shall require that each covered product bear a label which discloses the estimated annual operating cost of such product.

Provides that, not later than 180 days after the date of enactment of this Act, the Administrator shall, by rule, prescribe an energy efficiency improvement target for each type of covered product, which shall be designed so that, if met, the aggregate energy efficiency of covered products which are manufactured in calendar year 1980 will exceed the aggregate energy efficiency achieved by products of all such types manufactured in calendar year 1972 by a percentage which is the maximum percentage improvement which the Administrator determines is economically and technologically feasible, but which in any case is not less than 20 percent.

Sets forth the procedure by which an energy efficiency standard shall be prescribed.

Provides that the provisions of this Act relating to home appliances and the labeling thereof shall supersede any State regulation insofar as such State regulation may provide for the disclosure of information with respect to any measure of energy efficiency or energy use of a covered product.

Prohibits importation of such appliances not meeting the requirements of this Act.

Makes it unlawful for any manufacturer or private labeler to distribute in commerce any new covered product unless such covered product is labeled in accordance with this Act; or for any manufacturer or private labeler to distribute in commerce any new covered product which is not in conformity with an applicable energy efficiency standard.

Allows any person to commence a civil action against any manufacturer or private labeler who is alleged to be in violation of any provision of this title or any rule thereunder; or any

Federal agency which has a responsibility under this title where there is an alleged failure of such agency to perform any act or duty under this part which is not discretionary.

Directs the Administrator to carry out a program of consumer education regarding the significance of estimated annual operating costs; and to report annually to the President on the progress of the program relating to home appliances and labeling.

Authorizes appropriations through fiscal year 1978 to carry out such program.

Provides that the Administrator shall, by rule, within 60 days after the date of enactment of this Act, prescribe guidelines for the preparation of a State energy conservation feasibility report; and shall invite the Governor of each State to submit, within 3 months after the effective date of such guidelines, such a report. Requires such report to include: (1) an assessment of the feasibility of establishing a State energy conservation goal, which goal shall consist of a reduction, as a result of the implementation the State energy conservation plan described in this title, of 5 percent or more in the total amount of energy consumed in such State in the year 1980 from the projected energy consumption for such State in the year 1980; and (2) a proposal by such State for the development of a State energy conservation plan to achieve such goal.

Provides that the Administrator shall, by rule, within 6 months after the date of enactment of this Act, prescribe guidelines with respect to measures required to be included in, and guidelines for the development, modification, and funding of, State energy conservation plans. Requires the Administrator to invite the Governor of each State to submit, within 5 months after the effective date of such guidelines, a report which shall include a proposed State energy conservation plan designed to result in scheduled progress toward, and achievement of, the State energy conservation goal of such State.

Makes technical and financial assistance available to States for the development and implementation of energy conservation plans.

Requires the Administrator to set an energy conservation goal for each State by 1980.

Authorizes appropriations to carry out such provisions relating to energy conservation plans; and requires annual reports to the Congress and the President on the operation of such provisions.

Directs the Administrator to establish and maintain, in consultation with the Secretary of Commerce and the Administrator of the Energy Research and Development Administration, a program to promote increased energy efficiency by American industry, and to establish voluntary energy efficiency improvement targets for at least the 10 most energy-consumptive major energy-consuming industries.

Requires the President to establish or coordinate Federal agency actions to develop mandatory standards with respect to energy conservation and energy efficiency to govern the procurement policies and decisions of the Federal Government and all Federal agencies, and

to develop and implement a 10-year plan for energy conservation with respect to buildings owned or leased by an agency of the United States.

Directs the Civil Aeronautics Board, the Interstate Commerce Commission, the Federal Maritime Commission, the Federal Power Commission, and the Federal Aviation Administration to each conduct a study and report to the Congress within 60 days after the date of enactment of this Act with respect to energy conservation policies and practices which such agencies have instituted subsequent to October 1973.

Requires the Federal Trade Commission to prescribe: (1) test procedures for the determination of substantial equivalency of re-refined or otherwise processed used oil or blend of oil; and (2) labeling standards applicable to containers of recycled oil.

[In addition there are other titles that do not address energy efficiency]

National Energy Conservation Policy Act of 1977

H.R.5037
Latest Title: National Energy Conservation Policy Act
Sponsor: Rep Kemp, Jack [NY-38] (introduced 3/14/1977) Cosponsors (None)
Related Bills: H.RES.1427, H.RES.1434, H.R.8444, S.701, S.2057
Latest Major Action: 11/9/1978 Public Law 95-619.
Link: http://thomas.loc.gov/cgi-bin/bdquery/z?d095:H.R.5037:

SUMMARY AS OF:
10/10/1978--Conference report filed in House. (There is 1 other summary)

(Conference report filed in House, H. Rept. 95-1751)

National Energy Conservation Policy Act - =Title I: General Provisions= - Declares that the purposes of this Act are to provide for the regulation of interstate commerce, to reduce the growth in demand for energy, and to conserve non-renewable energy resources without inhibiting beneficial economic growth.

=Title II: Residential Energy Conservation= - Directs the Secretary of Energy to establish procedures for the approval and implementation of residential energy conservation plans by State utility regulatory authorities, non-regulated utilities, and home heating suppliers. Prescribes energy conservation measures to be included in such plans. Establishes criteria governing programs to be carried out by public utilities as part of such energy conservation plans. Authorizes temporary exemptions from such requirements where alternative programs will be implemented. Authorizes the Secretary to implement and enforce a Federal plan in the event of inadequate action by a State or a nonregulated utility, except where a temporary exemption to such plan requirements has been approved. Imposes civil penalties on any utility which violates any plan requirement or fails to comply with a Federal order requiring implementation of a Federal plan.

Directs the Secretary to consult with: (1) the Secretary of Commerce, acting through the National Bureau of Standards, with regard to product or material standards relied on in implementing such plans as a basis for judging the efficacy, energy efficiency, safety, or other attributes of energy conservation materials, products, or devices; and (2) the Federal Trade Commission to insure against unfair and deceptive trade practices which may arise as a result of the operation of such standards.

Requires the Secretary to prepare a report on energy conservation in apartment buildings. Requires the Federal Trade Commission to complete a study and submit a report to Congress and the President on the activities of public utilities and home heating suppliers, including reviews on the financing and installation of residential energy conservation measures.

Authorizes the appropriation of $5,000,000 for each of fiscal years 1979, 1980, 1981 for the Utility Program established by this Act.

Amends the Energy Conservation in Existing Buildings Act of 1976 to permit a raise in the eligible income level for weatherization grants to low-income families. Expands the definition of the term "weatherization materials" in such Act to include additional devices and technologies. Limits the amount of financial assistance available under such Act that may be spent on weatherization materials and specified accompanying costs.

Amends the Housing Act of 1949 to require the Secretary of Agriculture to conduct a weatherization program financing the installation of weatherization materials in farm residences occupied by low-income people.

Amends the Federal National Mortgage Association Charter Act to direct the Federal National Mortgage Association to purchase loans insured under the National Housing Act and made to low- and moderate-income families for the installation of energy conserving improvements in residences owned by such families.

Permits the Secretary of Housing and Urban Development to insure loans for the installation of energy conserving improvements and solar energy systems in single homes and multifamily housing.

Allows the Government National Mortgage Association (GNMA) to have standby authority to purchase loans for energy-conserving improvements.

Authorizes the GNMA to purchase and sell loans and advances of credit which are insured under the National Housing Act and which are made to the owners of one-to-four-family dwelling units for the purpose of financing the purchase and installation of solar energy systems.

Permits the Federal Home Loan Mortgage Corporation and the Federal National Mortgage Association to deal in insured and uninsured residential energy conservation loans in their secondary market operations.

Amends the National Housing Act to permit increased amounts of financial assistance to be insured if such increase results from increased cost of a residence or project due to the installation of a solar energy system.

Permits the Secretary of Housing and Urban Development to enter into annual contribution contracts to finance the installation of energy-conserving improvements in existing low-income housing projects.

Directs the Secretary of Housing and Urban Development and the Secretary of Agriculture to promote the use of energy-saving techniques through minimum property standards established for newly constructed residential housing subject to federally-insured mortgages or assisted under the Housing Act of 1949.

Directs the Secretary of Housing and Urban Development to conduct a study to determine the necessity of mandatory Federal requirements that all residential dwelling units meet energy efficiency standards.

Directs the President to conduct a study to monitor the weatherization activities authorized by this Act and/or undertaken independently of this Act.

Amends the Energy Conservation Standards for New Buildings Act of 1976 to increase the authorization of appropriations for new building performance standards to $10,000,000 for each of the fiscal years 1978 and 1979.

=Title III: Energy Conservation Programs for Schools and Hospitals and Buildings Owned by Units of Local Governments and Public Care Institutions= - Requires the Secretary of Energy to publish guidelines for the conduct of preliminary energy audits of schools and hospital facilities.

Requires the Secretary, within 90 days after enactment of this Act to prescribe guidelines for the development of State plans to implement energy conservation projects.

Authorizes the Secretary to make grants: (1) to States to conduct preliminary energy audits and energy audits of school and hospital facilities for technical assistance; and (2) to schools and hospitals for energy conservation project costs.

Allows the Secretary to conduct preliminary energy audits within any State which fails to conduct such an audit within two years after the date of enactment of this Act.

Requires the Secretary to allocate 80 percent of the funds available for financial assistance among the States according to a formula devised by the Secretary. Specifies that ten percent is to be allocated for critical energy situations, and ten percent for specified classes of hardship cases.

Authorizes to be appropriated for the purpose of making grants to schools and hospitals for energy conservation projects $180,000,000, $295,000,000, and $400,000,000 for fiscal years

1978, 1979, and 1980, respectively. Authorizes the appropriation of $20,000,000 for fiscal year 1978 and $5,000,000 for fiscal year 1979 for the purpose of conducting preliminary energy audits required by this Act.

Requires the Secretary to submit to Congress annual reports of actions taken and actions planned pursuant to the above requirements.

Requires grantees to keep and furnish records, as prescribed by the Secretary.

Amends the Energy Policy and Conservation Act to authorize the Secretary to make grants to States, units of local government, and public care institutions to conduct preliminary energy audits and to support technical assistance programs for buildings owned by such units and institutions.

Directs the Secretary to prescribe guidelines, within 90 days after enactment of this Act, for the development of State plans for the implementation of technical assistance programs for buildings owned by units of local government and public care institutions.

Authorizes the appropriation of $7,500,000 for each of the fiscal years 1978 and 1979 for the purpose of conducting energy audits under this program. Authorizes the appropriation of $17,500,000 for fiscal year 1978 and $32,500,000 for fiscal year 1979 for the purpose of making technical assistance grants under this program.

Requires the Secretary to report to Congress on the actions taken and actions planned under this program.

=Title IV: Energy Efficiency of Certain Products and Processes= - Amends the Motor Vehicle Information and Cost Savings Act to increase the maximum amount of civil penalties for violations of the fuel economy standards imposed by such Act.

Requires fuel efficiency disclosure on vehicles of 8,500 pounds or less. Requires an Environmental Protection Agency (EPA) report on the accuracy of fuel economy estimates for new automobiles. Requires that the fuel economy label required by the Motor Vehicle Information and Cost Savings Act include a disclosure of the tax upon fuel inefficient automobiles upon enactment of such tax legislation.

Directs the Secretary of Energy to establish energy efficiency standards for specified household appliances. Stipulates that such standards shall reflect the maximum improvement in energy efficiency which is technologically feasible and economically justified.

Amends the Energy Policy and Conservation Act to prescribe procedures for the assessment of civil penalties for violations of energy efficiency standards.

Preempts all State energy efficiency standards prescribed after January 1, 1978. Permits a State to petition the Secretary requesting a rule that such State regulation is not to be superseded pursuant to this Act, and authorizes the Secretary to make such a rule only if he

finds: (1) there is a significant State or local interest to justify such State regulation; (2) such State regulation is more stringent than the corresponding Federal standard; and (3) such State regulation would not unduly burden interstate commerce. Permits a person subject to a State energy efficiency regulation prescribed on or before the establishment of corresponding Federal Standards to petition the Secretary to prescribe a rule under this Act which supersedes such State regulation.

Makes technical and conforming amendments to the Energy Policy and Conservation Act.

Authorizes additional appropriations for fiscal year 1979 to carry out the purposes of this program.

Amends the Energy Policy and Conservation Act to direct the Secretary to prescribe energy efficiency standards for classes of industrial equipment after making an evaluation and determination of standard classifications of specified industrial equipment. Requires the Secretary to submit a report of such evaluation and classifications to the Congress no later than 18 months after the date of enactment of this Act.

Requires mandatory labeling of industrial equipment subject to the Federal standards. Imposes civil penalties for violation of such requirements. Authorizes appropriations for fiscal years 1978 and 1979 to carry out such program.

Requires the Secretary to establish targets for the increased utilization of energy-saving recovered materials for four industries: metals and metal products, paper and allied products, textile mill products, and rubber.

=Title V: Federal Energy Initiatives= - Amends the Energy Policy and Conservation Act to specify which agencies are subject to the requirements of the President's ten-year energy conservation plan. Authorizes additional appropriations to carry out the purposes of this part.

Directs the Secretary: (1) to establish a program to demonstrate solar heating and cooling technology in Federal buildings; and (2) to promulgate criteria for evaluating Federal agency proposals with respect to such demonstration program. Authorizes the appropriation of $100,000,000 through fiscal year 1980 for such program.

Declares the policy of the United States that the Federal Government has the responsibility to promote the use of energy conservation, solar heating and cooling, and other renewable energy sources in Federal buildings.

Directs the Secretary to establish methods for estimating and comparing life cycle costs for Federal buildings. Requires all new Federal buildings to be life cycle cost effective in accordance with the methods established by the Secretary. Directs the Secretary to make available to the public information on the use of life cycle cost methods in the construction of buildings and other structures in all segments of the economy.

Directs the Secretary to establish energy performance targets for Federal buildings.

Directs each Federal agency to conduct a preliminary energy audit of all existing buildings under its jurisdiction and to furnish the results of such audit to the Secretary, who shall submit a full report to the Congress by August 15, 1979, for buildings with 30,000 or more square feet, and by August 15, 1980, for buildings with 1,000 or more but less than 30,000 square feet.

Requires at least one percent of the total square footage in all Federal buildings under the jurisdiction, occupancy, or control of Federal agencies, to be retrofitted to improve energy efficiency during the first full fiscal year beginning after the date of enactment of this Act. Requires all Federal buildings to be retrofitted by January 1, 1990, to assure their minimum life cycle costs.

Directs all Federal agencies, in leasing buildings, to give preference to buildings which use solar energy equipment or other renewable energy resources or which otherwise minimize life cycle costs.

Directs the Secretary to submit an annual report to Congress on all activities under this part.

Authorizes the appropriation of up to $2,000,000 for fiscal year 1979 to enable the Secretary to perform the functions vested in him under this part.

Federal Photovoltaic Utilization Act - Establishes a photovoltaic energy commercialization program for the accelerated procurement of photovoltaic solar electric systems in new and existing Federal facilities.

Authorizes the Secretary to make contracts for the acquisition of such photovoltaic systems at an annual level substantial enough to allow suppliers to use low-cost production techniques. Directs the Secretary to establish a photovoltaic systems evaluation and purchase program designed to insure that such systems reflect the most advanced technology.

Directs the Secretary: (1) to consult with the Secretary of Defense to insure that such program does not interfere with defense-related activities; and (2) to prescribe appropriate rules and regulations for monitoring and assessing the performance and operation of installed photovoltaic electric systems.

Establishes an advisory committee to assist in the establishment and conduct of the program. Authorizes the appropriation of $98,000,000 for fiscal years 1979 - 1981 to carry out such program.

Title VI: Additional Energy-Related Measures - Expands the existing industrial energy reporting systems to cover industries identified by the Secretary as major energy-consuming industries or industries which use at least one trillion BTU's [xx GJ] of energy per year. Requires all individual plants of corporations which comprise such industries to (periodically) file with their corporate headquarters plant reporting forms detailing their energy-efficiency progress.

Amends the Energy Policy and Conservation Act to authorize additional appropriations for State energy conservation programs for fiscal year 1979.

Requires the Secretary to report to the Congress, within six months of enactment of this Act, on the coordination of Federal energy conservation programs involving State and local governments.

Establishes, within the Department of Energy, an Office of Minority Economic Impact, to advise the Secretary on the effect of energy-related actions on minorities and minority business enterprises and on methods to insure that minorities have an opportunity to participate in the Federal energy programs of the Department. Authorizes the Secretary to make loans to minority businesses to assist them in participating in such programs. Authorizes appropriations to carry out this program.

Repeals the authority granted to the Governor of a State, under the Clean Air Act, as amended, which allowed him to prohibit major fuel-burning stationary sources from using fuels other than regional or local coal or coal derivatives. Allows the Governor of a State to petition the President to exercise his presidential authority under such Act where it can be shown that significant local or regional economic disruption or unemployment would result from use by such sources of fuels other than local or regional coal.

Requires the Secretary of Transportation to conduct a study: (1) on the energy-conserving potential of recreational motor vehicles; and (2) on the energy-conserving potential of increased bicycle transportation, and on the development of a comprehensive program to achieve increased bicycle use.

Requires the Secretary of Energy to conduct a study on the relevance to energy conservation programs of the use of the concept of the second law of thermodynamics.

Makes necessary technical and conforming amendments to the Energy Policy and Conservation Act.

National Appliance Energy Conservation Act of 1987

S.83
Latest Title: National Appliance Energy Conservation Act of 1987
Sponsor: Sen Johnston, J. Bennett [LA] (introduced 1/6/1987) Cosponsors (68)
Related Bills: H.R.87
Latest Major Action: 3/17/1987 Became Public Law No: 100-12.
Link: http://thomas.loc.gov/cgi-bin/bdquery/z?d100:S83:

SUMMARY AS OF:
2/17/1987--Passed Senate amended. (There are 2 other summaries)

(Measure passed Senate, amended, roll call #28 (89-6))

National Appliance Energy Conservation Act of 1987 - Amends the Energy Policy and Conservation Act to add to the list of products covered under the Act: (1) freezers which can be operated by alternating current electricity (with specified exceptions); (2) central air conditioning heat pumps; (3) direct heating equipment; and (4) pool heaters. Deletes from specific coverage: (1) humidifiers; and (2) dehumidifiers. Excludes from such coverage consumer products designed solely for use in recreational vehicles and other mobile equipment.

Authorizes the Secretary of Energy (the Secretary) to amend Federal energy efficiency test procedures for appliances under specified guidelines.

Prohibits manufacturers from making any representations regarding the energy efficiency of appliances covered by this Act unless such appliances have been tested in accordance with the Federal test procedures, and the manufacturer's representations fairly disclose the results of such testing.

Sets forth specific Federal energy conservation standards for products covered by this Act and manufactured after certain dates. Establishes deadlines by which the Secretary must issue rules regarding such standards. Details the criteria to be applied if such standards are revised. Provides that after the statutory deadlines have been met, the Secretary is authorized to publish further final rules to determine whether standards for a covered product should be amended. Authorizes any person to petition the Secretary to conduct a rulemaking to determine whether the standards established in previous rulemakings should be amended. Sets forth the criteria which the Secretary must meet in order to grant such a petition.

Revises the information requirements with which manufacturers must comply to provide that the Secretary shall exercise authority in a manner designed to minimize unnecessary burdens on manufacturers of covered products.

Revises the rules under which State regulations are superseded by the Federal regulations for testing and labeling requirements and energy conservation standards.

Permits the waiver of Federal preemption if the Secretary finds that such waiver is needed to meet compelling and unusual local energy conditions. Prescribes procedural guidelines for such a waiver.

Details conditions under which State and local building code requirements regarding energy conservation standards are not superseded by the standards promulgated under this Act.

Permits the commencement of a citizen's suit against the Secretary for failure to comply with a nondiscretionary duty to issue rules according to prescribed schedules. Directs the courts to expedite the disposition of such suits.

Vests jurisdiction in the Federal district courts over actions brought by: (1) any adversely affected person to determine whether a State or local government is complying with the

requirements of this Act; and (2) any person who files a petition for an amended standard which has been denied by the Secretary.

Declares that the required submission by the Secretary of an annual report regarding Federal energy efficiency standards does not constitute a defense or justification for a failure by the Secretary to comply with the nondiscretionary duty provided for in this Act.

Energy Policy Act of 1992

H.R.776
Latest Title: Energy Policy Act of 1992
Sponsor: Rep Sharp, Philip R. [IN-2] (introduced 2/4/1991) Cosponsors (54)
Related Bills:
H.RES.134, H.RES.459, H.RES.464, H.RES.601, H.R.1078, H.R.1301, H.R.1667, H.R.1712
,
H.R.2578, H.R.2824, H.R.2825, H.R.2871, H.R.3081, H.R.3113, H.R.3167, H.R.3421, H.R.3693,
H.R.3721, H.R.3784, H.R.3802, H.R.3856, H.R.3941, H.R.3973, H.R.4068, H.R.4126, H.R.4128,
H.R.4186, H.R.4344, H.R.4381, H.R.4500, H.R.4559, H.R.4722, S.2166
Latest Major Action: 10/24/1992 Became Public Law No: 102-486.
Link: http://thomas.loc.gov/cgi-bin/bdquery/z?d102:H.R.776:

SUMMARY AS OF:
10/5/1992--Conference report filed in House. (There is 1 other summary)

Energy Policy Act of 1992 - **Title I: Energy Efficiency - Subtitle A: Buildings** - Amends the Energy Conservation and Production Act to set a deadline by which each State must certify to the Secretary of Energy (the Secretary) whether its energy efficiency standards with respect to residential and commercial building codes meet or exceed those of the Council of American Building Officials (CABO) Model Energy Code, 1992, and of the American Society of Heating, Refrigerating, and Air-Conditioning Engineers, respectively.

Requires the Secretary to provide technical assistance and incentive funding to the States to promote increased use of energy efficiency codes for buildings. Authorizes appropriations.

Directs the Secretary to: (1) establish standards that require energy efficiency measures that are technologically feasible and economically justified in new Federal buildings; and (2) review them every five years. Mandates Federal agency compliance with such standards. Prescribes guidelines under which the Secretary shall support the upgrading of voluntary building energy codes for new residential and commercial buildings.

Amends the Cranston-Gonzalez National Affordable Housing Act to require the Secretary of Housing and Urban Development (HUD), and the Secretary of Agriculture to jointly establish energy efficiency standards for residential housing. (Currently only the Secretary of

HUD is required to do so). Amends Federal law regarding veterans' readjustment benefits to condition a loan for new residential housing upon compliance with such standards.

Amends the National Energy Conservation Policy Act to direct the Secretary of Energy to: (1) issue voluntary building energy code guidelines for use by the private and public sectors to encourage the assignment of energy efficiency ratings for new residential buildings; (2) establish a technical assistance program for State and local organizations to encourage the use of residential energy efficiency rating systems consistent with such guidelines; (3) provide matching grants for the establishment of regional building energy efficiency centers in each of the regions served by a Department of Energy (DOE) regional support office; and (4) establish an advisory task force to evaluate grant activities. Authorizes appropriations.

Requires the Secretary of HUD to: (1) assess the energy performance of manufactured housing and make recommendations to the National Commission on Manufactured Housing regarding thermal insulation and energy efficiency improvements; and (2) test the performance and determine the cost effectiveness of manufactured housing constructed in compliance with certain statutory standards. Authorizes the States to establish thermal insulation and energy efficiency standards for manufactured housing if the Secretary of HUD has not issued final regulations by October 1993.

Amends the Cranston-Gonzalez National Affordable Housing Act to direct the Secretary of HUD to promulgate a uniform affordable housing plan using energy efficient mortgages (mortgages that provide financing incentives either for the purchase of energy efficient homes, or for incorporating the cost of such improvements into the mortgage).

Requires the Secretary of HUD to establish an energy efficient mortgage pilot program in five States under prescribed guidelines in order to promote the purchase of existing energy efficient residential buildings and the installation of cost-effective improvements in existing residential buildings. Authorizes appropriations.

Subtitle B: Utilities - Amends the Public Utility Regulatory Policies Act of 1978 (PURPA) to mandate that: (1) each electric utility employ integrated resource planning; (2) the rates for a State regulated electric utility are such that its outlay for demand side management measures (including energy conservation and energy efficiency resources), are at least as profitable as those for the construction of new generation, transmission, and distribution equipment; (3) the rates charged by any electric utility are such that it is encouraged to make outlays for all cost-effective improvements in energy efficient power generation, transmission and distribution; and (4) such rates and charges are implemented in a manner that assures that utilities are not granted unfair competitive advantages over small businesses engaged in transactions regarding demand side energy management measures.

Prescribes guidelines under which the Secretary of Energy may provide grants to State regulatory authorities to encourage demand-side management (including energy conservation, efficiency, and load management techniques), and as a means of meeting gas supply needs. Permits a State regulatory authority to provide financial assistance to nonprofit subgrantees of the DOE Weatherization Assistance Program. Authorizes appropriations.

Directs the Tennessee Valley Authority (TVA) to conduct a least-cost planning program according to prescribed guidelines. Exempts TVA from specified least-cost planning requirements which might arise from its electric power transactions with the Southeastern Power Administration.

Amends the Hoover Power Plant Act of 1984 to establish guidelines within which the Administrator of the Western Area Power Administration shall require each customer purchasing electric energy under a long-term firm power service contract with the Western Area Power Administration to implement integrated resource planning by October 1995. Permits different regulations for certain small customers that have limited capability to conduct integrated resource planning. Authorizes the Administrator to provide customers with technical assistance to implement such resource planning. Sets forth: (1) a schedule within which each customer must submit an initial integrated resource plan and periodic revisions to the Administrator; and (2) approval criteria for integrated resource plans. Provides for enforcement of integrated resource plan requirements, including the imposition of a surcharge, and a reduction in the power allocation of a noncomplying customer. Permits customers to form integrated resource planning cooperatives.

Amends PURPA to mandate that: (1) gas utilities employ integrated resource planning for gas customers; and (2) the rates charged by a State regulated gas utility are such that its prudent outlays for demandside measures (such as energy conservation and load shifting programs) are at least as profitable as its outlays for supplies and facilities. Requires a State regulatory authority to implement its integrated resource planning standards in a manner that assures that utilities are not provided with unfair competitive advantages over small businesses.

Subtitle C: Appliance and Equipment Energy Efficiency Standards - Directs the Secretary to provide financial assistance to support a voluntary national window rating program that will develop energy ratings and labels for windows and window systems. Requires the National Fenestration Rating Council to develop such rating program according to specified procedures. Requires the Secretary to develop specified alternative rating systems if a national voluntary window rating program consistent with this Act has not been developed.

Amends the Energy Policy and Conservation Act to: (1) detail energy conservation and labeling requirements for specified commercial and industrial equipment (including lamps and plumbing products); and (2) delineate standards for heating and air-conditioning equipment, electric motors, high intensity discharge lamps, and distribution transformers.

Directs the Secretary to provide financial and technical assistance to support a voluntary national testing and information program for widely used commercial office equipment and luminaries with potential for significant energy savings.

Requires the Secretary to report to the Congress on: (1) the potential for the development and commercialization of appliances which are substantially more efficient than required by

Federal or State law; and (2) the energy savings and environmental benefits of early appliance replacement programs.

Subtitle D: Industrial - Directs the Secretary to: (1) make matching grants to industry associations for energy efficiency improvement programs; (2) establish an annual recognition award program for industrial entities that have significantly improved their energy efficiency; and (3) report to the Congress on the establishment of Federally mandated energy efficiency reporting requirements and voluntary energy efficiency improvement targets for energy intensive industries.

Directs the Secretary to make renewable grants to the States to: (1) promote the use of energy-efficient technologies in covered industries; (2) establish industry-by-industry training programs to conduct process-oriented industrial assessments; (3) assist utilities in developing energy efficiency programs and technologies for industrial customers in covered industries; (4) establish and update criteria for conducting process-oriented industrial assessments on an industry-by-industry basis energy efficiency technologies; (5) establish a nationwide directory of organizations offering industrial energy efficiency assessments, technologies, and services; (6) establish an annual recognition award program for utilities operating outstanding or innovative industrial energy efficiency technology assistance programs; and (7) convene annual meetings of parties interested in process-oriented industries. Authorizes appropriations.

Requires the Secretary to: (1) establish voluntary guidelines for energy efficiency audits and insulation in industrial facilities; and (2) conduct educational and technical assistance programs to promote their use.

Subtitle E: State and Local Assistance - Amends the Energy Policy and Conservation Act to: (1) authorize the Secretary to provide funds to specified States to finance energy efficiency improvements in State and local government buildings; and (2) expand the optional features of State energy conservation programs.

Amends the Energy Conservation and Production Act to: (1) direct the Secretary to provide financial assistance to governmental weatherization assistance recipients for the development and initial implementation of private sector arrangements under which non-Federal financial assistance would be made available to support energy efficiency improvement programs for low-income housing; and (2) authorize the Secretary to provide financial assistance to such recipients for energy efficiency technical transfer measures.

Repeals the National Energy Extension Service Act.

Subtitle F: Federal Agency Energy Management - Amends the National Energy Conservation Policy Act to set a deadline by which each Federal agency must install energy and water conservation measures with payback periods of less than ten years. Requires the President to transmit in the annual budget request to the Congress a statement of the amount of appropriations requested on an individual agency basis for energy conservation measures in Federal facilities.

Requires the Secretary to: (1) develop a mechanism for Federal agencies to implement an energy conservation incentive program; and (2) establish a Federal Energy Efficiency Fund to provide grants to agencies to meet Federal energy management requirements.

Authorizes Federal agencies to participate in utility incentive programs for energy and water conservation. Directs the Secretary to: (1) establish a financial bonus program for outstanding Federal facility energy managers; (2) establish an energy conservation technology demonstration program for installation in Federal facilities or federally assisted housing; and (3) implement a survey of potential energy savings in Federal buildings.

Amends the Federal Property and Administrative Services Act of 1949 to cite conditions under which the Administrator of General Services may obligate: (1) funds from the Federal Building Fund for energy management improvement and source reduction and recycling programs; and (2) goods and services received from a utility which enhance the energy efficiency of Federal facilities.

Amends the National Energy Conservation Policy Act to prescribe the parameters of statutorily mandated energy savings performance contracts entered into by a Federal agency.

Requires the Administrator of General Services to hold regular, biennial conference workshops in each of the ten standard Federal regions on energy management, conservation, efficiency and planning strategy.

Requires specified Federal executive departments to undertake programs to ensure full training of facility energy managers.

Directs the Secretary of Energy to make energy audit teams available to all Federal agencies. Requires the Director of the Office of Management and Budget to establish guidelines for Federal agencies to use in assessing energy consumption in their facilities.

Sets a deadline by which certain Inspectors General must: (1) identify agency compliance activities to meet specified requirements of the National Energy Conservation Policy Act; and (2) determine if such agencies have the requisite internal accounting mechanisms to assess the accuracy and reliability of energy consumption and energy cost figures pursuant to such Act. Requires the President's Council on Integrity and Efficiency to report to certain congressional committees regarding such Inspector General reviews.

Prescribes guidelines under which the Administrator of General Services, the Secretary of Defense, and the Director of the Defense Logistics Agency must include energy efficient products in their procurement and supply operations.

Directs the Secretary of Energy to study and report to the Congress on financing options for certain statutorily mandated energy and water conservation measures.

Requires the Postmaster General to: (1) conduct a prescribed energy survey for Postal Service buildings; (2) report to certain congressional committees on the building

management program as it related to energy efficiency; and (3) ensure that each Postal Service facility meets certain statutorily mandated energy management requirements.

Requires each agency to establish criteria for the improvement of energy efficiency in Federal facilities operated by Federal Government contractors.

Directs the Architect of the Capitol to retrofit congressional buildings according to prescribed energy conservation guidelines. Authorizes appropriations.

Subtitle G: Miscellaneous - Amends the Department of Energy Organization Act to direct the Administrator of the Federal Energy Administration to engage in energy information data collection including: (1) electricity production from domestic renewable energy resources; (2) residential and commercial energy; and (3) demand-side management programs conducted by electric utilities.

Requires the Secretary to study and report to the Congress on specified aspects of district heating and cooling programs and vibration reduction technologies.

[In addition there are other titles that do not address energy efficiency]

Energy Policy Act of 2005

H.R.6
Latest Title: Energy Policy Act of 2005
Sponsor: Rep Barton, Joe [TX-6] (introduced 4/18/2005) Cosponsors (2)
Related Bills: H.RES.219, H.RES.394, H.R.1530, H.R.1533, H.R.1640, H.R.1705, S.10
Latest Major Action: Became Public Law No: 109-58 [GPO: Text, PDF]
Latest Conference Report: 109-190 (in Congressional Record H6691-6836)
Links: http://thomas.loc.gov/cgi-bin/bdquery/z?d109:H.R.6:

SUMMARY AS OF:
8/8/2005--Public Law. (There are 2 other summaries)

Energy Policy Act of 2005 - Sets forth an energy research and development program covering: (1) energy efficiency; (2) renewable energy; (3) oil and gas; (4) coal; (5) Indian energy; (6) nuclear matters and security; (7) vehicles and motor fuels, including ethanol; (8) hydrogen; (9) electricity; (10) energy tax incentives; (11) hydropower and geothermal energy; and (12) climate change technology.

Title I: Energy Efficiency - Subtitle A: Federal Programs - (Sec. 101) Directs the Architect of the Capitol to develop and implement a cost-effective energy conservation and management plan for all facilities administered by Congress.

(Sec. 102) Amends the National Energy Conservation Policy Act (NECPA) to revise energy reduction goals and performance requirements for federal buildings, including: (1) a timetable for reduced energy consumption; (2) metering of energy use; (3) federal

procurement guidelines for energy efficient products, including Energy Star products and Federal Energy Management Program (FEMP) designated products; and (4) extension of federal agency authority to enter into energy savings performance contracts.

(Sec. 106) Authorizes the Secretary of Energy (the Secretary throughout this bill, unless otherwise named) to enter into voluntary agreements with one or more persons in industrial sectors that consume significant amounts of primary energy per unit of physical output to reduce the energy intensity of their production activities. Directs the Secretary to recognize and publicize the achievements of participants in such voluntary agreements.

(Sec. 107) Instructs the Secretary to establish an Advanced Building Efficiency Testbed demonstration program for advanced engineering systems, components, and materials to enable innovations in building technologies. Authorizes appropriations for FY2006-FY2008.

(Sec. 108) Amends the Solid Waste Disposal Act to prescribe procedural guidelines for increased use of recovered mineral component in federally funded projects involving procurement of cement or concrete.

(Sec. 109) Amends the Energy Conservation and Production Act (ECPA) to direct the Secretary to establish, by rule, revised federal building energy efficiency performance standards meeting specified requirements.

(Sec. 110) Amends the Uniform Time Act of 1966 to extend standard daylight time from March to November (currently it runs from April to October). Requires the Secretary to report to Congress on the impact of this extension upon energy consumption in the United States. Retains the right of Congress to revert Daylight Saving Time back to the 2005 time schedules.

(Sec. 111) Requires the Secretaries of the Interior, of Commerce, and of Agriculture to seek to: (1) incorporate energy efficient technologies in public and administrative buildings associated with management of the National Park System, National Wildlife Refuge System, National Forest System, National Marine Sanctuaries System, and other public lands and resources they manage; and (2) use energy efficient motor vehicles, including those equipped with biodiesel or hybrid engine technologies, in such management.

Subtitle B: Energy Assistance and State Programs - (Sec. 121) Amends the Low-Income Home Energy Assistance Act of 1981 and ECPA to extend the low-income home energy assistance and weatherization programs through FY2007 and FY2008, respectively.

Authorizes the states to purchase renewable fuels, including biomass, to implement the Low-Income Home Energy Assistance programs.

(Sec. 123) Amends ECPA to increase from 10% to 25% mandatory state energy efficiency goals in calendar year 2012 as compared to calendar year 1990.

(Sec. 124) Prescribes guidelines for: (1) a state energy efficient appliance rebate program; (2) federal grants to the states for energy efficient public buildings; (3) a low income community energy efficiency pilot program; and (4) a State Technologies Advancement Collaborative.

(Sec. 128) Amends ECPA to prescribe guidelines for state building energy efficiency codes incentives.

Subtitle C: Energy Efficient Products - (Sec. 131) Amends ECPA to: (1) establish a voluntary program at the Department of Energy (DOE) and the Environmental Protection Agency (EPA) to identify and promote energy-efficient products and buildings (Energy Star Program); (2) direct the Secretary to implement a consumer education program for homeowners and small business owners on energy efficiency benefits of air conditioning, heating, and ventilation systems; (3) direct the Secretary to convene a conference to promote a national public energy education program; and (4) direct the Secretary to implement an energy efficiency public information initiative.

(Sec. 135) Prescribes energy conservation standards for additional products, including: (1) testing requirements for ceiling fans and ceiling fan light kits, as well as (together with energy conservation standards for) refrigerated bottled or canned beverage vending machines, commercial refrigerators, freezers, and refrigerator-freezers; and (2) definitions and test procedures for the power use of battery chargers and external power supplies. Prescribes the bases for test procedures for illuminated exit signs, distribution transformers (including the low voltage dry-type), traffic signal modules, and medium base compact fluorescent lamps.

(Sec. 137) Directs the Federal Trade Commission to consider the effectiveness of the current consumer products labeling program, and changes to labeling rules.

(Sec. 138) Instructs the Administrator of General Services to study and report to Congress on the advantages and disadvantages of employing intermittent escalators in the United States.

(Sec. 139) Directs the Secretary to study and report to Congress on: (1) state and regional policies that promote cost-effective programs to reduce energy consumption by state-regulated utilities and nonregulated utilities; and (2) failure to comply with deadlines for new or revised energy conservation standards.

(Sec. 140) Directs the Secretary to establish a pilot program of financial assistance to between three and seven states to implement energy efficiency pilot projects.

Subtitle D: Public Housing - (Sec. 151) Amends the United States Housing Act of 1937 to include among the capital and management activities for which assistance may be made available to public housing agencies from the Public Housing Capital Fund, the improvement of energy and water-use efficiency by certain energy and water conserving fixtures and fittings, and integrated utility management and capital planning to maximize energy conservation and efficiency measures.

(Sec. 152) Requires a public housing agency to purchase energy-efficient appliances designated as Energy Star products or FEMP products unless it is not cost-effective to do so.

(Sec. 153) Amends the Cranston-Gonzales National Affordable Housing Act with respect to energy efficiency standards.

(Sec. 154) Requires the Secretary of Housing and Urban Development to report to Congress on development and implementation of an integrated energy strategy to reduce utility expenses through cost-effective energy conservation and efficiency measures and energy efficient design and construction of public and assisted housing.

Title XIII: Energy Policy Tax Incentives - Energy Tax Incentives Act of 2005

Subtitle C: Conservation and Energy Efficiency Provisions - (Sec. 1331) Allows a tax deduction for energy efficient commercial building property placed in service before 2008. Sets forth standards, special rules, and certification requirements for such property.

(Sec. 1332) Allows certain home contractors a business tax credit for the construction of new energy efficient homes acquired before 2008. Sets forth energy savings and certification requirements for such homes.

(Sec. 1333) Allows individual taxpayers a tax credit for certain residential energy efficiency improvements made before 2008. Imposes a lifetime limitation of $500 on such credit, less aggregate credit amounts for all prior taxable years.

(Sec. 1334) Allows a business tax credit for the production of certain household appliances (clothes washers, dishwashers, and refrigerators) with a specified energy efficiency rating.

(Sec. 1335) Allows individuals a tax credit for 30% of expenditures made for certain residential energy efficient property, including photovoltaic property, solar water heating property, and fuel cell property placed in service before 2008.

(Sec. 1336) Allows an investment tax credit for the installation of qualified fuel cell property or qualified microturbine property. Terminates such credit after 2007.

(Sec. 1337) Increases the energy tax credit from 10 to 30% for qualified fuel cell property and for solar and geothermal energy property. Makes hybrid solar lighting systems eligible for the energy tax credit until 2008. Disqualifies solar energy property used to heat swimming pools from the energy tax credit.

[In addition there are other titles and subtitles that do not address energy efficiency]

Energy Independence and Security Act of 2007

H.R.6
Latest Title: Energy Independence and Security Act of 2007

Sponsor: Rep Rahall, Nick J., II [WV-3] (introduced 1/12/2007) Cosponsors (198)
Related Bills:
H.RES.66, H.RES.839, H.RES.846, H.RES.873, H.RES.877, H.R.453, H.R.632, H.R.1705, H.R.1721, H.R.1933, H.R.2635, H.R.2701, H.R.3221, H.R.4773, S.103, S.193, S.357, S.962, S.987, S.992,
S.1321, S.1419, S.1656, S.1657, S.1771
Latest Major Action: Became Public Law No: 110-140 [GPO: Text, PDF]
Note: Omnibus energy legislation.
Link: http://thomas.loc.gov/cgi-bin/bdquery/z?d110:H.R.6:

SUMMARY AS OF:
12/19/2007--Public Law. (There are 3 other summaries)

Energy Independence and Security Act of 2007—**Title I: Energy Security Through Improved Vehicle Fuel Economy - Subtitle A: Increased Corporate Average Fuel Economy Standards** - Ten-in-Ten Fuel Economy Act - (Sec. 102) Amends federal transportation law to instruct the Secretary of Transportation (Secretary in this title) to prescribe separate average fuel economy standards for passenger and for non-passenger automobiles for model years 2011-2030. Repeals the current requirement that the average fuel economy standard for passenger automobiles manufactured after model year 1984 be 27.5 miles per gallon. Incorporates 27.5 miles per gallon into a formula for determining the minimum standard for domestically manufactured passenger automobiles.

Requires the combined fuel economy average for model year 2020 to be at least 35 miles per gallon for the total fleet of passenger and non-passenger automobiles manufactured for sale in the United States for that model year. Requires the average fuel economy to be attained by each fleet of passenger and non-passenger automobiles manufactured for sale in the United States for model years 2021-2030 to be the maximum feasible standard for each fleet.

Directs the Secretary to study the fuel efficiency of work trucks and commercial medium-duty or heavy-duty on-highway vehicles to determine appropriate test procedures, methodologies, and metrics for measuring such efficiency.

(Sec. 104) Authorizes the Secretary to establish a corporate average fuel economy (CAFE) credit trading program that allows manufacturers whose automobiles exceed prescribed average fuel economy standards to earn credits to: (1) be sold to manufacturers whose automobiles fail to achieve such standards; or (2) apply them within that manufacturer's fleet to a compliance category of automobiles that fails to achieve such standards.

(Sec. 105) Instructs the Secretary to develop and implement a program to require manufacturers to: (1) label new automobiles sold in the United States with information and a rating system on an automobile's performance on the basis of criteria reflecting fuel economy and greenhouse gas and other emissions; and (2) include pertinent information in the owner's manual for vehicles capable of operating on alternative fuels.

Directs the Secretary to develop a consumer education program regarding: (1) the benefits of alternative fuel in automobiles; and (2) fuel savings that would be recognized from the purchase of vehicles equipped with thermal management technologies.

Directs the Secretary to require fuel tank labels for alternative fuel automobiles.

(Sec. 107) Directs the Secretary to execute an agreement with the National Academy of Sciences (NAS) to report to Congress an evaluation of: (1) vehicle fuel economy standards; and (2) medium-duty and heavy-duty truck fuel economy standards.

(Sec. 109) Replaces current requirements for the maximum model year increase in a manufacturer's average fuel economy attributable to dual fueled automobiles with requirements for a maximum model year fuel economy increase for alternative fuel automobiles.

Prescribes the maximum model year fuel economy increases for alternative fuel automobiles (extending the flexible fuel vehicle credit program) through model year 2019.

Modifies the formula for the dual fueled vehicle credit program to accommodate B20 biodiesel.

(Sec. 110) Requires the Administrator of the Environmental Protection Agency (EPA) every five years to reevaluate, and report to certain congressional committees on, the accuracy of fuel economy labeling procedures.

(Sec. 111) Directs the Secretary to promulgate rules establishing a national tire fuel efficiency consumer information program for replacement tires designed for use on motor vehicles.

Sets forth a civil penalty for noncompliance with national tire fuel efficiency information program.

(Sec. 112) Instructs the Secretary of the Treasury to transfer to the Secretary of Transportation each fiscal year funds derived from civil penalties and other enforcement actions, half of which shall be used for administration and half of which shall be used to carry out a program to make grants to manufacturers for retooling, reequipping, or expanding existing manufacturing facilities in the United States to produce advanced technology vehicles and components.

(Sec. 113) Repeals provisions governing a manufacturer's exemption from the requirement of separate calculations of average fuel economy.

Subtitle B: Improved Vehicle Technology - (Sec. 131) Instructs the Secretary of Energy to establish a competitive grants program to: (1) encourage the use of plug-in electric drive vehicles or other emerging electric vehicle technologies by governmental and quasi-

governmental entities and private or nonprofit entities; and (2) conduct qualified electric transportation projects.

Authorizes appropriations for the plug-in program for FY2008-FY2012 and for the electric transportation projects for FY2008-FY2013.

Directs the Secretary of Energy to develop a nationwide electric drive transportation technology education program, including a Dr. Andrew Frank Plug-in (hybrid) Electric Vehicle Competition to create or support related degree programs at institutions of higher education. Authorizes appropriations.

(Sec. 132) Amends the Energy Policy Act of 2005 to direct the Secretary of Energy to establish a program to encourage domestic production and sales of efficient hybrid and advanced diesel vehicles and their components. Authorizes appropriations.

(Sec. 133) Amends the Energy Policy Act of 1992 to direct the Secretary of Energy to allocate credits for acquisition of specified electric vehicles and for investment in emerging related technology. Authorizes appropriations for FY2008-FY2013.

(Sec. 134) Amends the Energy Policy Act of 2005 to provide loan guarantees for fuel-efficient automobile parts manufacturers.

(Sec. 135) Directs the Secretary of Energy to establish a program to provide guarantees of loans by private institutions for the construction of facilities for the manufacture of advanced vehicle batteries and battery systems developed and produced in the United States, including advanced lithium ion batteries and hybrid electrical system and component manufacturers and software designers. Authorizes appropriations.

(Sec. 136) Directs the Secretary of Energy to provide facility funding awards to automobile manufacturers and component suppliers to pay up to 30% of the cost of: (1) modifying or establishing manufacturing facilities to produce qualifying advanced technology vehicles or components; and (2) engineering integration performed in the United States of qualifying vehicles and qualifying components.

Directs such Secretary to establish a program to provide up to $25 billion in loans for the costs of such activities. Requires loan applicants to provide written assurances that laborers and mechanics employed by contractors or subcontractors during construction, alteration, or repair financed by such loan shall be paid wages at rates not less than those prevailing on similar construction in the locality.

Instructs the Secretary to use at least 10% of loan funds for awards to small automobile manufacturers and component suppliers.

Subtitle C: Federal Vehicle Fleets - (Sec. 141) Amends the Energy Policy Act of 1992 to prohibit a federal agency from acquiring a light duty motor vehicle or medium duty passenger vehicle that is not a low greenhouse gas emitting vehicle, unless certain

circumstances exist, including alternative, most cost-effective agency measures to reduce petroleum consumption.

Instructs the EPA Administrator to issue guidance annually identifying the makes and model numbers of low greenhouse gas emitting vehicles.

(Sec. 142) Amends the Energy Policy and Conservation Act (EPCA) to instruct the Secretary of Energy to issue regulations requiring certain federal agency fleets to reduce petroleum consumption and increase alternative fuel consumption so that by October 1, 2015, and for each ensuing year, each federal agency achieves at least a 20% reduction in annual petroleum consumption and a 10% increase in annual alternative fuel consumption.

Title III: Energy Savings Through Improved Standards for Appliance and Lighting - Subtitle A: Appliance Energy Efficiency - (Sec. 301) Amends EPCA to set forth amended efficiency standards and updated test procedures for class A external power supplies and appliances, including residential boilers.

(Sec. 305) Revises requirements for the amendment of standards. Prescribes requirements for the analysis of potential energy savings for certain industrial equipment (including air conditioning, heating, and related equipment), and subsequent mandatory establishment of uniform national product standards.

(Sec. 306) Sets forth requirements for regional and base national standards for furnaces (except boilers), central air conditioners, and heat pumps.

(Sec. 308) Prescribes requirements for expedited rulemaking to establish an energy or water conservation standard.

(Sec. 309) Prescribes requirements for final rules prescribing energy conservation standards for battery chargers, or a determination that no energy conservation standard is technically feasible and economically justified.

(Sec. 310) Requires test procedures and standards for all covered consumer products (other than automobiles) to include standby mode and off mode energy consumption.

(Sec. 311) Revises Energy Factors for home appliances, including dehumidifiers, residential clothes washers and dishwashers, and refrigerators and freezers.

(Sec. 312) Establishes energy standards for walk-in coolers and freezers.

(Sec. 313) Revises the definition of electric motor, dividing it into subtypes I and II, and prescribes new energy efficiency standards for such motors.

(Sec. 314) Prescribes energy efficiency standards for single package vertical air conditioners and heat pumps.

(Sec. 315) Amends the Energy Policy Act of 2005 to: (1) expand R&D programs to include technologies to improve the energy efficiency of appliances and mechanical systems for buildings in cold climates, including combined heat and power units and increased use of renewable resources, including fuel; and (2) make eligible for special allocations any state whose energy efficient appliance rebate program provides rebates to residential consumers for the purchase of products with improved energy efficiency in a cold climate.

Subtitle B: Lighting Energy Efficiency - (Sec. 321) Amends EPCA to prescribe energy efficiency standards for general service incandescent lamps, rough service lamps, and other designated lamps.

Directs the Secretary of Energy to: (1) conduct and report to the FTC on an annual assessment of the market for general service lamps and compact fluorescent lamps; and (2) carry out a proactive national program of consumer awareness, information, and education about lamp labels and energy-efficient lighting choices. Authorizes appropriations for FY2009-FY2012.

Prohibits a manufacturer, distributor, retailer, or private labeler from distributing in commerce specified adapters for incandescent lamps.

Authorizes the Secretary to carry out a lighting technology research and development program. Authorizes appropriations for FY2008-FY2013.

Instructs the Secretary of Energy to report to Congress on: (1) federal measures to reduce or prevent release of mercury during the manufacture, transportation, storage, or disposal of light bulbs; (2) whether specified rulemaking deadlines will be met; (3) an NAS review of advanced solid state lighting R&D and the impact upon the types of lighting available to consumers of an energy conservation standard requiring a minimum of 45 lumens per watt for general service lighting; and (4) the time frame for commercialization of lighting to replace incandescent and halogen incandescent lamp technology.

(Sec. 322) Sets forth minimum energy efficiency standards for incandescent reflector lamps.

(Sec. 323) Amends federal law governing congressional approval of proposed public buildings projects to require the Administrator of General Services (GSA) to: (1) transmit to Congress an estimate of the future energy performance of the building or space and a specific description of the use of energy efficient and renewable energy systems, including photovoltaic systems; and (2) include, with respect to space to be leased, the minimum performance requirements for energy efficiency and renewable energy.

Sets forth requirements for the use of energy efficient lighting fixtures and bulbs in public building construction, alteration, and acquisition.

(Sec. 324) Amends EPCA to include within its regulatory oversight: (1) metal halide lamp fixtures; and (2) energy efficiency labeling for designated consumer electronic products.

Title IV: Energy Savings in Buildings and Industry - Subtitle A: Residential Building Efficiency - (Sec. 411) Amends the Energy Conservation and Production Act (ECPA) to: (1) reauthorize the weatherization assistance program through FY2012; and (2) authorize the Secretary of Energy to make funding available to local weatherization agencies for materials, benefits, and renewable and domestic energy technologies not covered by the weatherization assistance program for residential buildings.

(Sec. 412) Instructs such Secretary to: (1) study and report to Congress on renewable energy rebate programs; and (2) establish standards for energy efficiency in manufactured housing.

Subtitle B: High-Performance Commercial Buildings - (Sec. 421) Requires the Secretary of Energy to appoint a Director of Commercial High-Performance Green Buildings (Commercial Director) to: (1) establish and manage the Office of Commercial High-Performance Green Buildings; (2) coordinate activities with the Office of Federal High-Performance Green Buildings; (3) promote research and development of high-performance green buildings; (4) jointly establish with the Federal Director a national high-performance green building clearinghouse to provide high-performance green building information and disseminate research results; and (5) work with GSA and relevant federal agencies to ensure full coordination of high-performance green building information and activities.

Requires the Commercial Director to: (1) formally recognize groups that qualify as a high-performance green building partnership consortium; and (2) report to Congress on the status of high-performance green building initiatives and development of such initiatives at the state and local level.

(Sec. 422) Requires the Commercial Director to establish the Zero-Net-Energy Commercial Buildings Initiative to: (1) reduce the quantity of energy consumed by commercial buildings and achieve zero net energy commercial buildings in the United States; and (2) competitively select a consortium to develop and implement the initiative.

Authorizes appropriations for FY2008-FY2018.

Requires the Commercial Director and the Federal Director, in coordination with the Consortium, to implement public outreach to tell individuals and entities about the information and services available government-wide.

Subtitle C: High-Performance Federal Buildings - (Sec. 431) Amends the National Energy Conservation Policy Act (NECPA), regarding energy and water efficiency in federal buildings, to set forth: (1) energy reduction goals for federal buildings for FY2006-FY2015; (2) require federal agencies to designate an energy manager to reduce facility energy use; (3) instruct the Secretary of Energy to develop criteria governing federal facilities with certain energy intensive operations; and (4) implementation procedures. Authorizes appropriations.

(Sec. 433) Amends ECPA to direct the Secretary of Energy to establish specified federal building energy efficiency performance standards.

(Sec. 434) Amends NECPA to require each federal agency to: (1) ensure that any large capital energy investment in an existing building that involves either replacement of installed equipment, or renovation, rehabilitation, expansion, or remodeling of existing space, employs the most energy efficient designs, systems, equipment, and controls that are lifecycle cost effective; and (2) report to the Director of the Office of Management and Budget (OMB) on development of a compliance review process for large capital energy improvements.

Directs OMB to evaluate and report to Congress on agency compliance.

Requires federal agencies to provide for equivalent metering of natural gas and steam by October 1, 2016, in accordance with guidelines established by the Secretary of Energy.

(Sec. 435) Prohibits a federal agency, three years after enactment of this Act, except in certain circumstances, from contracting to lease space in a building that has not earned the Energy Star label in the most recent year.

(Sec. 436) Instructs the GSA to establish an Office of Federal High-Performance Green Buildings and to appoint a Federal Director to: (1) establish and manage such Office;(2) coordinate activities with the Office of Commercial High-Performance Green Buildings, and with the Secretary of Energy; and (3) ensure full coordination of high-performance green building information and activities within GSA and relevant agencies.

Requires the Federal Director to identify and provide to the Secretary a certification system most likely to encourage a comprehensive and environmentally-sound approach to certification of green buildings.

(Sec. 437) Directs the Comptroller General to audit the implementation of this Act.

(Sec. 438) Requires the sponsor of any development or redevelopment project involving a federal facility with a footprint that exceeds 5,000 square feet to use site planning, design, construction, and maintenance strategies for the property to maintain or restore its predevelopment hydrology with regard to temperature, rate, volume, and duration of flow (storm water runoff).

(Sec. 439) Directs the GSA Administrator to establish a cost-effective technology acceleration program at GSA facilities, including review of: (1) current use of cost-effective lighting technologies and geothermal heat pumps; and (2) the availability of cost-effective lighting technologies and geothermal heat pumps to such facilities managers.

Requires the GSA Administrator to: (1) ensure designation for each GSA facility of a manager responsible for reducing facility energy use; and (2) submit to Congress a compliance plan that identifies the specific activities needed to achieve at least a 20% reduction in operational costs from 2003 levels at GSA facilities within five years after enactment of this Act. Authorizes appropriations.

(Sec. 440) Authorizes appropriations to carry out this subtitle for FY2008-FY2012.

(Sec. 441) Increases from 25 to 40 years the period, alternative to the expected life of a building's energy system, whose associated capital and operating expenses the Secretary of Energy is to use in establishing present value methods for estimating and comparing life cycle costs for federal buildings.

Subtitle D: Industrial Energy Efficiency - (Sec. 451) Amends EPCA to establish an industrial energy efficiency program under which the EPA Administrator shall establish a recoverable waste energy inventory program that involves: (1) an ongoing survey of major domestic industrial and large commercial combustion sources and their locations; and (2) a review of the quantity and quality of waste energy produced at such sources.

Requires the EPA Administrator to: (1) establish a Registry of Recoverable Waste Energy Sources, and sites on which the sources are located; and (2) publish a rule for establishing criteria for site inclusion.

Instructs the EPA Administrator to: (1) calculate the total quantities of potentially recoverable waste energy from sources at the sites, nationally and by state; and (2) make such quantities public, including greenhouse gas emissions savings that might be achieved with recovery of the waste energy from all sources and sites listed on the Registry.

Requires the EPA Administrator to notify owners or operators of recoverable waste energy sources and sites listed on the Registry before publishing the listing.

Authorizes appropriations for FY2008-FY2012.

Instructs the Secretary of Energy to establish a waste energy recovery incentive grant program to provide incentive grants to: (1) owners and operators of projects that successfully produce electricity or incremental useful thermal energy from waste energy recovery; (2) utilities purchasing or distributing the electricity; and (3) states that have achieved 80% or more of recoverable waste heat recovery opportunities.

Sets forth additional incentives for recovery, use, and prevention of industrial waste energy.

Redesignates the Combined Heat and Power Application Centers of DOE as Clean Energy Application Centers.

Instructs the Secretary of Energy to: (1) relocate administration of the Clean Energy Application Centers to the Office of Energy Efficiency and Renewable Energy within DOE; and (2) award grants to universities, research centers, and other institutions to ensure continued operations and effectiveness of eight Regional Clean Energy Application Centers in specified regions.

Authorizes appropriations for FY2008-FY2012.

(Sec. 452) Instructs the Secretary of Energy to establish a program to support, research, develop, and promote, in cooperation with energy-intensive industries and national industry

trade associations representing the energy-intensive industries, the use of new materials processes, technologies, and techniques to optimize energy efficiency and the economic competitiveness of domestic industrial and commercial sectors.

Requires the Secretary to establish energy efficiency partnerships with eligible entities to improve the energy efficiency of equipment and processes used by energy-intensive industries.

Authorizes competitive grants to universities, individual inventors, and small companies for innovative technology research, development, and demonstrations.

Instructs such Secretary to fund institutions of higher education-based industrial research and assessment centers.

Authorizes appropriations for FY2008-FY2012 and ensuing fiscal years.

(Sec. 453) Directs the Secretary and the EPA Administrator to: (1) initiate a voluntary national information program for widely used data centers and data center equipment and facilities for which there is a potential for significant data center energy savings; and (2) designate jointly an information technology industry (data center efficiency) organization to consult with and coordinate the program.

Subtitle E: Healthy High-Performance Schools - (Sec. 461) Amends the Toxic Substances Control Act to authorize a grants award program to states for: (1) technical assistance for EPA programs for schools to address environmental issues (including the Tools for Schools Program and the Healthy School Environmental Assessment Tool); and (2) development and implementation of state school environmental health programs.

Instructs the EPA Administrator to: (1) issue voluntary school site selection guidelines; and (2) issue voluntary guidelines for use by states in developing and implementing environmental health program for schools. Authorizes appropriations for FY2009-FY2013.

(Sec. 462) Requires the EPA Administrator to arrange with the Secretaries of Education and of Energy to study how sustainable building features such as energy efficiency affect multiple perceived indoor environmental quality stressors on students in K-12 schools. Authorizes appropriations for FY2008-FY2013.

Subtitle F: Institutional Entities - (Sec. 471) Amends EPCA to instruct the Secretary of Energy to implement an information dissemination and technical assistance grants program to assist institutional entities in identifying, evaluating, designing, and implementing infrastructure projects in energy sustainability.

Directs the Secretary to award grants to institutional entities to: (1) improve energy efficiency on their grounds and facilities; and (2) engage in innovative energy sustainability projects.

Sets forth mandatory allocations to institutions of higher education with small endowments.

Instructs the Secretary to: (1) provide loans to institutional entities to implementing energy efficiency improvements and sustainable energy infrastructure; and (2) establish procedures for solicitation and evaluation of potential projects for grant and loan funding and administration of the grant and loan programs.

Authorizes appropriations for FY2009-FY2013.

Subtitle G: Public and Assisted Housing - (Sec. 481) Amends the Cranston-Gonzalez National Affordable Housing Act to substitute the 2006 International Energy Conservation Code for specified energy building codes, including the Council of American Building Officials Model Energy Code, 1992, as the measure for energy efficiency standards developed by the Secretary of Housing and Urban Development (HUD) and the Secretary of Agriculture for public and assisted housing.

Requires construction and rehabilitation of specified affordable housing to meet certain revised energy conservation requirements if the HUD and Agriculture Secretaries fail to amend their standards after such revision, as long as specified criteria are also met.

Subtitle H: General Provisions - (Sec. 491) Instructs the Federal Director and the Commercial Director to: (1) establish guidelines to implement a demonstration project to contribute to the research goals of the Office of Commercial High-Performance Green Buildings and the Office of Federal High-Performance Green Buildings; and (2) carry out demonstration projects related to green features of federal buildings and other facilities and supportive of research initiatives regarding high-performance green buildings generally.

Authorizes appropriations for FY2008-FY2012.

(Sec. 492) Requires the Federal Director to develop and implement a comprehensive indoor air quality program for federal facilities to ensure the safety of federal workers and facility occupants.

(Sec. 493) Amends the Clean Air Act to direct the EPA Administrator to establish a competitive grants program to assist local governments, with respect to local government buildings, to: (1) deploy cost-effective technologies and practices; and (2) achieve operational cost savings, through application of cost-effective technologies and practices. Authorizes appropriations for FY2007-FY2012.

(Sec. 494) Instructs the Federal Director, in coordination with the Commercial Director, to establish a Green Building Advisory Committee.

(Sec. 495) Directs the Secretary of Energy to establish an Advisory Committee on Energy Efficiency Finance to provide advice and recommendations on energy efficiency finance and investment issues, and to assist the energy community in identifying practical ways of

lowering costs and increasing investments in energy efficiency technologies. Authorizes appropriations.

Title V: Energy Savings in Government and Public Institutions - Subtitle A: United States Capitol Complex - (Sec. 501) Authorizes the Architect of the Capitol (Architect) to: (1) conduct feasibility studies regarding construction of photovoltaic roofs for the Rayburn House Office Building and the Hart Senate Office Building; and (2) construct a fuel tank and pumping system for E-85 fuel at or within close proximity to the Capitol Grounds Fuel Station. Authorizes appropriations.

(Sec. 503) Directs the Architect to: (1) include energy efficiency and conservation measures, greenhouse gas emission reduction measures, and other appropriate environmental measures in the Capitol Complex Master Plan; (2) operate steam boilers and the chiller plant at the Capitol Power Plant in the most energy efficient manner possible to minimize carbon emissions and operating costs; and (3) evaluate and correct the accuracy of the meters at the Plant.

(Sec. 505) Directs the Architect to conduct a feasibility study evaluating the available methods to capture, store, and use carbon dioxide emitted from the Capitol Power Plant as a result of burning fossil fuels.

Authorizes the Architect to conduct demonstration projects to capture and store or use carbon dioxide emitted from the Capitol Power Plant as a result of burning fossil fuels, if the feasibility study determines that such a project is technologically feasible and economically justified. Authorizes appropriations.

Subtitle B: Energy Savings Performance Contracting - (Sec. 511) Amends NECPA, with respect to the authority of federal agencies to enter into energy savings performance contracts to repeal the requirement that, 30 days before the award of any such contract containing a clause setting forth a cancellation ceiling in excess of $10 million, the agency head notify the appropriate authorizing and appropriating committees of Congress.

(Sec. 512) Authorizes a federal agency, in carrying out such a contract, to use any combination of appropriated funds and private financing under an energy savings performance contract.

(Sec. 513) Prohibits a federal agency in connection with promotion of long-term energy savings performance contracts from: (1) establishing an agency policy that limits the maximum multiyear contract to a period shorter than 25 years; or (2) limiting the total amount of obligations under such contracts or other private financing of energy savings measures.

Sets forth measurement and verification requirements for private financing.

Requires each federal agency to modify indefinite delivery and quantity energy savings performance contracts to conform to certain amendments made by this Act (including other indefinite delivery and indefinite quantity contracts using private financing).

(Sec. 514) Repeals the termination date for authority to enter into new energy savings performance contracts (thus making such authority permanent).

(Sec. 516) Modifies the federal agency utility incentive program to repeal the requirement that 50% of water and energy cost savings realized by an agency shall remain available for expenditure for additional energy efficiency measures.

(Sec. 517) Instructs the Secretary of Energy to create and administer in the Federal Energy Management Program a training program for federal contract negotiation and contract management personnel to: (1) negotiate energy savings performance contracts; (2) conclude effective and timely contracts for energy efficiency services; and (3) review federal contracts for potential energy efficiency opportunities and contract implications.

(Sec. 518) Instructs the Secretaries of Energy and of Defense to jointly study and report to Congress and the President on the potential for energy savings performance contracts to reduce energy consumption and provide energy and cost savings in nonbuilding applications.

Subtitle C: Energy Efficiency in Federal Agencies - (Sec. 521) Instructs the GSA Administrator to install a photovoltaic system, as set forth in the Sun Wall Design Project, for the headquarters building of the DOE headquarters building (the Forrestal Building) in Washington, DC.

(Sec. 522) Prohibits, as of January 1, 2009, purchases or installment of general service incandescent lamps in a Coast Guard facility, except in specified circumstances.

(Sec. 523) Amends ECPA to direct the Secretary of Energy to establish revised federal building energy efficiency performance standards that require, if lifecycle cost-effective, at least 30% of the hot water demand for each new federal building or federal building undergoing a major renovation to be met through the installation and use of solar hot water heaters.

(Sec. 524) Amends NECPA to require that purchases of federally procured appliances with standby power comply with specified power wattage.

(Sec. 526) Prohibits a federal agency from entering into a contract for procurement of an alternative or synthetic fuel, including a fuel produced from nonconventional petroleum sources, for any mobility-related use (other than for research or testing), unless the contract specifies that the lifecycle greenhouse gas emissions associated with the production and combustion of the fuel supplied under the contract must, on an ongoing basis, be less than or equal to such emissions from the equivalent conventional fuel produced from conventional petroleum sources.

(Sec. 527) Requires a federal agency subject to this Act to submit annually to the Director of the Office of Management and Budget (OMB) a government efficiency status report on: (1) its compliance with this Act; (2) implementation of initiatives to improve energy efficiency and reduce energy costs and greenhouse gas emissions; and (3) taxpayer savings resulting from improvements required by this Act.

(Sec. 528) Requires OMB to submit an annual government efficiency report to certain congressional committees containing: (1) a summary of the government efficiency information reported by federal agencies; and (2) an evaluation and recommendations on the overall progress of the federal government toward compliance with this Act.

Directs OMB to describe individual agency compliance with this Act in any annual energy scorecard.

(Sec. 529) Directs the Federal Energy Regulatory Commission (FERC) to: (1) conduct a National Assessment of Electricity Sector Demand Response; and (2) develop a National Action Plan on Demand Response. Authorizes appropriations for FY2008-FY2010.

Subtitle D: Energy Efficiency of Public Institutions - (Sec. 531) Amends EPCA to authorize appropriations for state energy programs for FY2009-FY2012.

(Sec. 532) Amends the Public Utility Regulatory Policies Act of 1978 (PURPA) to require each electric utility to: (1) integrate energy efficiency resources into utility, state, and regional plans; (2) adopt policies establishing cost-effective energy efficiency as a priority resource; and (3) implement rate design modifications to promote energy efficiency investments.

Requires a natural gas utility to: (1) integrate energy efficiency resources into its plans and planning processes; (2) adopt policies that establish energy efficiency as a priority resource in such plans and processes; and (3) implement rate design modifications to promote energy efficiency investments.

Subtitle E: Energy Efficiency and Conservation Block Grants - (Sec. 542) Instructs the Secretary of Energy to establish the Energy Efficiency and Conservation Block Grant Program to assist eligible entities in implementing strategies that: (1) reduce their fossil fuel emissions and total energy use; and (2) improve energy efficiency in the transportation, building, and other appropriate sectors.

(Sec. 543) Sets forth: (1) fund allocation and use requirements with respect to local governmental units, states, Indian tribes and competitive grants; and (2) grant recipient requirements.

(Sec. 548) Authorizes appropriations for FY2008-FY2012.

[In addition there are other titles that do not address energy efficiency]