

TESTIMONY OF
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Good morning, Chairman Boucher and members of the Subcommittee. Thank you for the opportunity to testify on behalf of the Environmental Protection Agency concerning the climate benefits of improved building energy efficiency. My name is Brian McLean and I am Director for the Office of Atmospheric Programs within EPA's Office of Air and Radiation, the office that oversees EPA's energy efficiency programs.

Overview

The EPA is here testifying today because energy and air pollution are inextricably linked. The combustion of fossil fuels to produce the energy we use across the economy causes the majority of our nation's air pollution and emissions of greenhouse gases (GHGs). Commercial and residential buildings, in particular, are responsible for roughly 40%¹ of the carbon dioxide (CO₂) emissions from fossil fuel use in the country – more than the emissions from either the industrial or transportation sectors – through their consumption of electricity as well as their direct combustion of natural gas and oil to meet the energy service needs of their occupants. Further, buildings offer significant opportunities for low cost greenhouse gas reductions.

¹ Inventory of U.S. Greenhouse Gas Emissions and Sinks: 1990-2006 (US EPA, 2008)

However, a pervasive set of market barriers limit the ability to capture these low cost reductions, so targeted policies and programs continue to be necessary. Unfortunately, there is no single policy solution as these low cost opportunities are present in millions of different locations across the country and require changes in decision-making that go into the design, construction, and operation of our buildings and the energy-using equipment they contain. Also, we believe that many of these market barriers will still exist even if climate legislation is passed as many of the barriers are not changed by the higher costs of energy that would likely result from such legislation.

EPA has more than fifteen years of experience working to address many of the barriers to energy efficiency and is achieving important results. Our focus is on market-based solutions such as voluntary and partnership programs with key stakeholders. These efforts complement the many other important energy efficiency policies undertaken throughout the Federal government such as building codes, appliance standards, R&D, and energy efficiency in public and federally-assisted housing, where rising energy costs impose a special burden on low- and moderate-income families. These efforts also form a critical part of the Administrator's new strategic approach to green building at the Agency.

I am happy to testify from the perspective of these programs. I would like to address three topics:

- The importance of energy efficiency in buildings to cost-effectively reduce U.S. greenhouse gas emissions,

- EPA’s ongoing efforts and accomplishments in this area, and
- Our priorities as we look ahead.

I will limit my remarks to energy use in residential and commercial buildings, with the understanding that energy efficiency also has an important role in the industrial sector and in energy supply, transmission, and distribution and that my office has efforts underway to advance energy efficiency in these areas as well.

The Importance of Energy Efficiency in Buildings to Cost-Effectively Reduce U.S. Greenhouse Gas Emissions

We believe that improving the energy performance of residential and commercial buildings in the United States offers a particularly large and low-cost opportunity for realizing greenhouse gas reductions in both the near and long terms. These buildings currently represent about 40 percent of the nation’s CO₂ emissions from fossil fuel use and their energy consumption is expected to grow in the coming years on the order of 1%² or more per year through 2025 and beyond.

Recent studies at international, national, and state levels have shown that buildings offer significant opportunities for low cost greenhouse gas emissions reductions. One study, the 2007 IPCC 4th Assessment Report, concluded that the residential and commercial buildings sector offered the highest cost-effective potential to reduce greenhouse emissions by 2020 from all sectors they evaluated. They characterized this conclusion as being supported by “much

² Annual Energy Outlook 2008. (EIA, 2008)

evidence” and with “high agreement” from the studies reviewed. This holds for both developed and developing countries.

Another widely cited 2007 study by the consulting firm McKinsey & Company, “Reducing GHG Emissions: How Much at What Cost?” focused on GHG mitigation opportunities in the United States and reached very similar conclusions: that large opportunities for low-cost greenhouse gas reductions exist in the U.S. buildings sector.

Studies at the state level are also highlighting this opportunity. Studies have been completed in States such as California, Connecticut, Georgia, New Mexico, and Utah, which highlight significant potential for energy savings and greenhouse gas reductions in the buildings sector³. For example, California’s June 2008 Draft Scoping Plan, which lays out a suite of recommendations for achieving reductions necessary to meet the economy-wide targets established by state law, relies on energy efficiency policies targeting residential and commercial buildings for over 10% of these economy-wide reductions in GHG emissions.

These are just the most recent set of such studies; some of the earlier studies provided the basis for the energy efficiency programs at the EPA. These studies have also identified why the cost-effective energy efficiency improvements do not happen purely as a result of market mechanisms. These market barriers include:

³ National Action Plan for Energy Efficiency (2007). Guide for Conducting Energy Efficiency Potential Studies. Prepared by Philip Mosenthal and Jeffrey Loiter, Optimal Energy Inc. www.epa.gov/eeactionplan, Table 2-1 and Table 2-2.

- “Split-incentive” barriers, which limits home builders’ and commercial developers’ motivation to invest in energy efficiency for new buildings because they do not pay the energy bill; and
- Imperfect information, such as lack of information on energy saving opportunities.

In addition to these market barriers, other factors continue to limit the realization of these identified low-cost GHG mitigation opportunities in the buildings sector. These include:

- Public policy barriers, which can present significant disincentives for utility support and investment in energy efficiency in many cases;
- Utility, state, and regional planning barriers, which do not allow energy efficiency to compete equally with supply-side resources in energy planning; and
- Energy efficiency program barriers, which limit investment due to lack of knowledge about the most effective energy efficiency program portfolios, the best program design , and/or the energy performance of available technologies.

EPA now has more than 15 years experience in designing and implementing strategies to address many of these barriers to the cost-effective adoption of energy efficiency in buildings. These efforts constitute a major portion of EPA’s responsibilities within the Administration’s climate strategy to significantly reduce U.S. greenhouse gas intensity. Beyond the contribution to U.S. climate policy, EPA’s energy efficiency programs provide the added benefits of helping to reduce criteria air pollutants like nitrogen oxides and sulfur dioxide, as well as contributing to improved national energy security.

EPA's Efforts and Accomplishments in Improving Energy Efficiency in Residential and Commercial Buildings

I would like to provide an overview of EPA's efforts in three areas that have an important role in advancing energy efficiency and reducing GHG emissions in the buildings sector:

- the ENERGY STAR program,
- the National Action Plan for Energy Efficiency, and
- the State Clean Energy-Environment Program.

EPA introduced **ENERGY STAR** in 1992 as a voluntary labeling program to reduce greenhouse gas emissions by identifying and promoting energy efficient products.⁴ Since then, the program has grown to offer energy efficiency solutions across the residential, commercial, and industrial sectors and grown to not only promote efficient products but also energy efficient management practices and services across these three sectors. In each sector, the ENERGY STAR strategy is to dismantle identifiable and pervasive market barriers limiting investment in energy efficiency and bring practical solutions to the residential, commercial and industrial sectors.⁵

The results from the ENERGY STAR program for the products and services that EPA manages are substantial. In 2007, Americans with the help of ENERGY STAR, prevented 40 million metric tons of greenhouse gas emissions—equivalent to the annual emissions from 27 million vehicles—and saved more than \$16 billion on their utility bills⁶. And these benefits are on

⁴ EPA signed an MOU with DOE in 1996 making ENERGY STAR a joint effort with each agency handling a set of products, with EPA handling ENERGY STAR new homes and EPA handling commercial building efforts.

⁵ ENERGY STAR and Other Climate Protection Partnerships: 2006 Annual Report (US EPA, 2007)

⁶ ENERGY STAR Overview of 2007 Achievements (US EPA, 2008)

track to nearly double⁷ in 10 years as more households, businesses, and organizations rely on ENERGY STAR for guidance on investing in energy efficient products, practices, and policies.

Further, we have developed a national platform for energy efficiency that has strong public recognition, is positively influencing many consumer decisions, and is a platform that can continue to expand and achieve greater results. Recent surveys show⁸:

- More than 70% of U.S. households recognize the ENERGY STAR label and understand its purpose;
- More than 35% of households knowingly purchased at least one ENERGY STAR qualifying product in the last twelve months, and more than 70% of them reported that the label was influential in their purchasing decision.; and
- Eighty percent of purchasing households say they are likely to recommend ENERGY STAR to others showing that ENERGY STAR is positioned for continued growth.

I would now like to address the role that ENERGY STAR is playing in some of the key program areas across residential and commercial buildings.

Products

EPA now offers the ENERGY STAR label across about 50 product categories, and DOE offers the ENERGY STAR label for almost ten additional products categories. The EPA-managed product categories include heating and cooling equipment, consumer electronics, office equipment and lighting. ENERGY STAR identifies efficient products above federal minimum efficiency standards, where they exist; however, for many of the product categories, there are

⁷ Ibid.

⁸ National Awareness of ENERGY STAR for 2007: Analysis of 2007 CEE Household Survey. (US EPA, 2008)

no federal or state minimum efficiency standards. Many ENERGY STAR qualifying products offer consumers savings of 30 to 60%, relative to typical models, and up to 30 percent savings, or \$600 annually, in a household using all ENERGY STAR products.⁹

To establish the eligibility criteria for an ENERGY STAR product category, EPA consistently follows a set of guiding principles that have proven to address existing market barriers and lead to significant results. ENERGY STAR is designed to be easy for consumers as a binary (yes/no) label and is technology neutral across a product category to avoid picking winners and losers. The criteria are established so that ENERGY STAR products will not sacrifice performance or quality and will offer energy savings with attractive paybacks to the buyer -- such as two years or less -- if there are higher initial first costs.¹⁰ Currently, two-thirds of the product categories under ENERGY STAR are offering efficient products with no price premium – a real win for today’s consumers, and these product categories are providing the majority of the energy savings from the product labeling part of the ENERGY STAR program.

As part of its ENERGY STAR product labeling responsibilities, EPA routinely engages in

- Technical work to establish test procedures to facilitate product labeling and revisions of specifications as the market share of ENERGY STAR products increases,
- Consumer education,
- Partnerships with manufacturers, retailers, utilities, state and local governments and others,

⁹ ENERGY STAR and Other Climate Protection Partnerships: 2006 Annual Report (US EPA, 2007).

¹⁰ Building a Powerful and Enduring Brand: The Past, Present, and Future of the ENERGY STAR® Brand (Interbrand, 2007)

- Activities to protect the integrity of the ENERGY STAR label,¹¹ and
- Work with 7 international partners (Australia, Canada, the European Union, Japan, New Zealand, and Taiwan) who are implementing the ENERGY STAR program in their own countries and regions.

A number of the product categories that EPA addresses such as consumer electronics and office equipment are quickly evolving, so considerable effort is made to develop and keep specifications up to date. For example, EPA has recently completed work with the International Electrotechnical Commission on an internationally approved, technology-neutral testing procedure for testing “on mode” energy consumption in TVs which helped pave the way for the launch of a new comprehensive ENERGY STAR specification that becomes effective later this year and addresses plasma, LCD, rear projection, and CRT television technologies.

EPA adds 2 product categories to the ENERGY STAR program on average each year and is currently working on enterprise servers and commercial food service equipment and is scoping a variety of other products for future years.

New Homes

EPA has managed the ENERGY STAR program for new homes since 1995. Today, ENERGY STAR qualified homes are typically 20 to 30 percent more efficient than standard homes. It is important to note that while ENERGY STAR is defined as being 15 to 20 percent better than

¹¹ Maintaining the Value of the ENERGY STAR: 2006 Report (US EPA, 2007)

the national energy code, EPA requires additional specifications that are not addressed by the code, such as improved practices for ensuring the thermal integrity of the home and matching the size of the air conditioner to the demands of the home, that provide additional savings beyond that 15 to 20 percent.

This program provides consumer education and helps overcome the split incentive issue in the new construction market place by helping builders differentiate and sell more efficient, higher value homes. ENERGY STAR qualified homes can include a variety of energy efficient features, such as effective insulation, high performance windows, tight construction and ducts, efficient heating and cooling equipment and ENERGY STAR qualified lighting and appliances. ENERGY STAR promotes the best available, off-the-shelf technology as well as effective construction practices known to the building industry.

Significant numbers of new homes are being built to ENERGY STAR requirements. More than 12 percent of housing starts were ENERGY STAR qualified in 2006. There are 10 states and more than 20 metropolitan areas with 20 percent or more market penetration of ENERGY STAR qualified homes¹². By the end of this calendar year, we expect that 1 million homes will have been built to ENERGY STAR requirements. To date more than 5,000 builders have partnered with EPA, and as interest in ENERGY STAR grows, we are developing the next generation of ENERGY STAR specifications that will make these homes even more efficient.

EPA is also working with HUD and others to bring ENERGY STAR to all of HUD's major affordable housing programs, particularly public housing. HUD data show that in 2007 alone, there was an estimated \$33 million in energy savings as a result of these and other conservation

¹² ENERGY STAR and Other Climate Protection Partnerships: 2006 Annual Report (US EPA, 2007).

efforts. HUD now provides bonus points through its competitive grant programs for use of the Energy Star label, both for products and new homes, and is also seeing success in local communities adopting the ENERGY STAR label for its formula grant programs as well. We have also worked with 21 state housing finance agencies (HFAs) to promote ENERGY STAR products and homes in their funding criteria for housing projects. More than 30 HFAs give preference to projects that include ENERGY STAR products and guidelines, and five states (Delaware, Nevada, New Jersey, Utah, and Washington) require all new homes funded with housing tax credits be ENERGY STAR qualified.¹³

Existing Homes

In terms of opportunities for reducing emissions of greenhouse gases, we cannot overlook the more than 100 million existing homes in this country. Many of these homes present opportunities for low cost greenhouse gas reductions, particularly the more than 40 million homes that were constructed before the existence of modern energy codes¹⁴. These homes have inadequate insulation, high levels of air infiltration, inefficient heating and air conditioning, as well as inefficient water heaters and appliances. A ten percent reduction in energy use in existing homes would generate a savings of some \$20 billion, and reduce greenhouse gas emissions equivalent to annual emissions of 25 million vehicles.¹⁵

To address this opportunity, EPA, working with DOE, developed Home Performance with ENERGY STAR as a whole-house retrofit program that provides homeowners with guidance and services for going beyond the purchase of efficient products and helping them tap into the

¹³ ENERGY STAR Overview of 2007 Achievements (US EPA, 2008).

¹⁴ U.S. Census Bureau. American Community Survey (2006).

¹⁵ See Partnerships for Home Energy Efficiency, July 2005, at www.energysavers.org

low cost efficiency improvements in their homes. EPA has now partnered with 20 State and local program sponsors of Home Performance with ENERGY STAR. EPA estimates that these programs can help homeowners save 20 percent on average on their energy bills.

In addition, to address another important issue in the residential market place, EPA has helped complete two pilot programs for ENERGY STAR proper installation of heating and cooling equipment, setting the stage for a national program this year. Heating and cooling typically represent almost 50 percent of a household energy bill, and studies indicate that more than half of our central air conditioners may be improperly installed, leading to lower efficiency and higher demand on peak energy days¹⁶.

Commercial Buildings

EPA has managed energy efficiency programs in the commercial sector since 1991 and now works with thousands of public and private organizations to advance superior energy management at the organizational level, provide a range of technical resources and trainings, and help organizations achieve energy savings of 10 to 30 percent across their entire suites of buildings.

An important foundation of the ENERGY STAR program is a standardized building energy performance rating system. In the mid-1990's, EPA determined that not knowing whether a building was efficient or inefficient was a key barrier to building owners and operators improving the energy efficiency of their buildings. Building energy use can vary by a factor of 10 or more (on a per square foot basis) and is not closely tied to the age of the building or the

¹⁶ ENERGY STAR Overview of 2007 Achievements (US EPA, 2008).

presence or absence of newer technologies. To address this obstacle, EPA developed a standardized measurement approach for building energy use, like the miles per gallon rating for vehicles, which compares the energy use of an individual building against the national stock of similar buildings using a 1 to 100 point rating system. This system enables building owners and managers to measure how well building systems are integrated, operated, and maintained and to set and measure progress toward energy performance goals.

EPA's energy performance rating system has grown so that it can address more than 70 percent of the commercial square footage across the country, with the inclusion of retail space just last year, and the rating system is experiencing tremendous growth in use. Building owners and operators have now used the system to rate the energy efficiency of 62,000 buildings or about 15 percent of commercial square footage in the country¹⁷, including

- 55% of hospital space (acute care),
- 52% of supermarket space,
- 31% of office building space,
- 24% of school space, and
- 24% of hotel space across the country.

Further, EPA is engaging the public and private sector in its ENERGY STAR Building Challenge which calls on U.S businesses and institutions to reduce energy use in their buildings by 10% or more as measured with this rating system. Almost 800 organizations and individuals—including more than 150 local governments—have now joined the Challenge.

¹⁷ Ibid.

This includes influential government associations such as the National Association of Counties and the U.S. Conference of Mayors.¹⁸

EPA also offers the ENERGY STAR label to the most efficient of these buildings across the country, those that rate in the top 25 percent on the energy performance rating scale, so that the market place can find energy efficient buildings and appropriately value them for their lower energy bills. More than 4,000 buildings have earned the ENERGY STAR label and these buildings are using about 40% less energy than average ones¹⁹. Achieving the label is becoming increasingly important. For example, recently CoStar, the leading multiple listing service for U.S. Commercial real estate properties, now shows which buildings for lease or sale have earned an ENERGY STAR label, and the Minnesota Governor called for the achievement of 1,000 ENERGY STAR buildings across the state by 2010.

Small business

EPA also provides technical assistance to small commercial customers. They make up a significant portion of overall utility energy demand and can benefit from purchasing ENERGY STAR qualifying products, as well as building tune-ups and other efficiency upgrades. On a per-square-foot basis, small customers can achieve the same energy savings as large customers with an attractive return on investment. EPA offers such tools as a free guide to help small business understand energy efficiency opportunities and prioritize projects; a tool to help them understand their energy intensity; and specific resources targeted to small business sectors such as grocery and convenience stores, congregations, lodging, home-based businesses, and

¹⁸ Ibid.

¹⁹ Ibid.

restaurants. More than 1800 small businesses and congregations participate in the ENERGY STAR network.²⁰

The **National Action Plan for Energy Efficiency**, begun in 2006, is an EPA and DOE facilitated private-public initiative established to create a sustainable, aggressive commitment to cost-effective energy efficiency investments. A Leadership Group directs and oversees the work of the Action Plan and is comprised of more than 60 leading privately, publicly, and cooperatively owned electric and gas utilities, utility regulators, state agencies, large energy users, consumer advocates, energy service providers, and environmental and energy efficiency organizations. The Action Plan is co-chaired by Marsha Smith, a Commissioner with the Idaho Public Service Commission and current President of the National Association of Regulatory Utility Commissioners, and Jim Rogers, President and CEO of Duke Energy.

The Action Plan is structured around five key policy recommendations and a suite of supporting materials have been developed to help parties overcome the barriers to energy efficiency and advance their own commitments to energy efficiency. These resources address the critical “nuts and bolts” of building best practices in policies and programs at the state or utility level in order to aggressively support adoption of economically attractive energy efficiency investments. These resources include:

- a guide for evaluating, monitoring and verifying the results of energy efficiency programs,
- a guide for conducting energy efficiency potential studies,

²⁰ ENERGY STAR and Other Climate Protection Partnerships: 2006 Annual Report (US EPA, 2007)

- guidelines for developing and implementing energy efficiency programs, and
- a paper addressing options for aligning a utility's financial incentives with the achievement of real energy savings through energy efficiency programs.

To date, over 120 organizations across 49 states have made commitments under the Action Plan and even more are turning to the Action Plan for fact-based, objective information on policy and programs.

Most recently, the Action Plan has put forth a Vision for 2025 – an Implementation Framework for state-specific policies and programs to achieve all cost-effective energy efficiency by 2025. If implemented, this could be expected to reduce the growth in energy use by 50 percent or more by 2025²¹. This framework offers a way to engage in the important dialogue of how to increase investment in energy efficiency, pull from experiences around the country, and improve our thinking as we move forward. To facilitate this dialogue, the Leadership Group will also be measuring progress towards the Vision through policy and program steps, as well as quantitative metrics.

Important outcomes of this effort, as reflected in the metrics the group is tracking, will be increased funding for energy efficiency programs at the state level as well as increased measurable savings from energy efficiency. Currently, states leading on energy efficiency are spending about 3 to 4 percent of energy revenues on energy efficiency and if this were to be nationwide, funding would be 4 to 5 times current levels^{22,23}.

²¹ National Action Plan for Energy Efficiency (2007). *National Action Plan for Energy Efficiency Vision for 2025: Developing a Framework for Change*. <www.epa.gov/eeactionplan>

²² National Action Plan for Energy Efficiency (2006). *National Action Plan for Energy Efficiency*. <www.epa.gov/eeactionplan>

EPA's State Clean Energy-Environment Program helps states develop clean energy policies and programs, including those intended to improve energy efficiency in buildings. The program was launched in 2005 to provide states with proven, cost-effective best practice strategies for implementing energy efficiency (and other clean energy) policies and programs across their states and within their own operations. The program has issued a number of guidance documents, including the well-regarded Clean Energy-Environment Guide to Action: Policies, Best Practices and Action Steps for States. The Guide to Action describes 16 clean energy policies, many of which are focused on improving energy efficiency in buildings, including energy efficiency portfolio standards, public benefits funds for energy efficiency, building codes, appliance standards, government “lead by example” programs, and policies to support small scale distributed generation at the building level. The Guide to Action is a tool to help state policy makers zero in on the most proven strategies, learn how these have worked in other states, and gain information on how to go about designing, implementing and evaluating the effectiveness of the different approaches.

In addition to issuing guidance, the State Clean Energy-Environment Program provides technical assistance to states, hosts numerous peer exchange opportunities, and supports a number of key analytical tools. The State Clean Energy-Environment Program also includes 16 formal state partners who receive direct policy and analytical support through EPA and represent about half the population, energy use and greenhouse gas emissions in the United States.

²³ National Action Plan for Energy Efficiency (2007). *National Action Plan for Energy Efficiency Vision for 2025: Developing a Framework for Change*. <www.epa.gov/eeactionplan>

EPA's Priorities for Continuing to Improve Energy Efficiency in Residential and Commercial Buildings

With that overview of EPA's key efforts, I would now like to outline some of EPA's current priorities. Important areas that we see for continuing to capture low-cost greenhouse gas reductions through energy efficiency include:

- Engaging the consumer in the role they can play to reduce their own energy use and carbon footprint through the ENERGY STAR program.
- Partnering with utilities and other state and local program sponsors to offer energy efficiency improvement programs for existing homes as well as existing commercial buildings and new construction.
- Providing ENERGY STAR new homes as a "beyond-code" opportunity for builders interested in differentiating themselves by offering homes with significant savings over code-built homes.
- Expanding the ability to rate the energy use of the nation's buildings using standardized measurement systems and promoting the value of this information.
- Working with state policy makers on effective state policies for delivering energy efficiency across the buildings sector through the National Action Plan and State Partnerships, and engaging local governments in the role they can play with their facilities and within their communities.
- Focusing on improving practices for evaluation, measurement, and verification of energy efficiency programs to improve the ability of energy efficiency to compete with energy supply options.

Conclusion

Improving energy efficiency in residential and commercial buildings is an important opportunity to cost-effectively reduce GHG emissions in the near and longer term. Significant progress has been made in identifying the barriers limiting greater adoption of cost-effective technologies and practices and in designing and implementing policies and programs to address them. EPA's market-based programs play an important role. Moving forward, the continued provision of a platform for energy efficiency at the Federal level that will assist key players in capturing the energy efficiency potential is important to meeting GHG emission reduction goals at lower cost. Many of these efforts will become more important as energy prices may rise in response to climate legislation. Energy efficiency programs such as ENERGY STAR will be important in helping consumers and public and private organizations lower their costs and in providing technical assistance to states, utilities and other energy efficiency program administrators as they ramp up investments in energy efficiency programs across the country.