

**Testimony of Brad Heavner, Director, Environment Maryland, Before the Subcommittee
on Energy and Air Quality of the Energy and Commerce Committee, U.S. House of
Representatives, July 17, 2008**

Summary

We can no longer ignore the terrible consequences of our reliance on fossil fuels. Energy bills are already a leading cause of home foreclosures, and with energy prices soaring heating and cooling bills will remain huge financial strain on families and businesses. Additionally our use of fossil fuels contributes to air pollution, global warming and other environmental degradation.

Preventing wasted energy in buildings is likely the biggest opportunity to reduce our consumption of fossil fuels. Almost half the energy we use in the United States – 10 percent of the energy in the world – is used to power our homes, businesses, and industrial buildings. Per unit of economic output, America's economy is twice as energy-intensive as Germany's and nearly three times as energy-intensive as Japan's. And a report by the McKinsey Global Institute found that by 2020 we could reduce annual United States energy consumption by 11 percent through simple building efficiency measures such as more efficient lighting, water heating, and appliances, and by designing new buildings to be more energy efficient.

In fact, we have the technology to completely eliminate energy use in the building sector. Homes and businesses already exist that use a fraction of the energy of typical buildings. Some also generate all the energy needed to power them on-site, using renewable sources such as wind and solar power. These zero energy buildings could be the standard for all new buildings by 2030.

To get there, we need to do everything we can to ramp up building efficiency and encourage on-site renewable energy:

- Building energy codes should be improved and enforced.
- We should adopt policies that encourage building far beyond code and retrofitting existing buildings.
- Policies should be designed to encourage on-site renewable power.
- We should set a national goal for all new buildings to be zero net energy by 2030.

The first thing Congress can do to lead us on the path towards a zero energy building sector is to require building energy codes to be strengthened and enforced. National legislation should require the model codes to be 30 percent more efficient beginning in 2010, and 50 percent more efficient beginning in 2020. It should ensure that all states require and enforce this level of energy efficiency in new buildings to 90 percent compliance.

Any federal legislation designed to enhance our energy security or reduce global warming emissions must take advantage of the vast energy savings available in buildings in order to help us meet our goals on global warming, cut the pollution going into our air and water, and help ease the strain of energy costs on American families and businesses. Ramping up building energy efficiency will also make America more energy independent, reinvigorate our economy, and create good, new jobs here at home.

**Testimony of Brad Heavner
Director, Environment Maryland**

**Before the Subcommittee on Energy and Air Quality
Of the Energy and Commerce Committee
U.S. House of Representatives
“Climate Benefits of Improved Building Energy Efficiency”
July 17, 2008**

Introduction

Thank you for the opportunity to share my views on the climate benefits of improved building energy efficiency. My name is Brad Heavner, and I am the Director of Environment Maryland, a state partner of Environment America. Environment America is the new home of U.S. PIRG’s environmental work. We are a federation of state-based, citizen-funded environmental advocacy organizations.

America is the largest consumer of energy in the world. Almost half of the energy we use—10 percent of the energy in the world—powers our buildings.¹ Most of this energy comes from burning fossil fuels. Our reliance on these fuels contributes to global warming and other environmental problems, makes us vulnerable to supply disruptions, and is becoming increasingly expensive.

We could be using far less energy in our buildings. Homes and businesses exist that use a fraction of the energy of typical buildings—some also generate 100 percent or more of the energy needed to power them on site, using renewable sources such as wind and solar power.

Approximately 75 percent of our buildings will be new or renovated by the year 2035.² Although this represents huge potential for saving energy, market barriers are preventing the widespread adoption of energy-efficient building practices.

Those barriers include:

- Many construction and home building firms resist the marginally higher upfront costs of actions to improve building efficiency and therefore are slow to adopt measures that would benefit renters and home and building owners.^{3, 4, 5}
- Buyers and renters lack the information needed to choose more energy-efficient properties.

Policies should be adopted to overcome these barriers and ensure that new buildings and renovations take advantage of energy-efficient practices:⁶

- Building energy codes should be improved and enforced. National model codes should be 30 percent more efficient starting in 2010 and 50 percent more efficient starting in 2020. State codes should be required to match or exceed the model codes, and enforce the codes to 90 percent compliance.
- Policies should encourage building far beyond code and retrofitting existing buildings for increased efficiency.
- Incentives should be designed to encourage on-site renewable power.
- Political leaders should set the goal for all new buildings to be zero net energy by 2030.

These policy changes would have a huge impact on energy use and global warming emissions in the United States, at little cost.

- Adopting and enforcing strong building codes nationally could reduce our annual energy consumption by 2 percent from 2030 projected use, reducing our annual carbon dioxide emissions by 41 MMT and saving consumers \$25.5 billion annually. In terms of global warming emissions, this is the equivalent of taking over 27 million cars off the road.^{7, 8}
- By 2020 we could reduce annual United States energy consumption by 11 percent through simple building efficiency measures such as more efficient lighting, water heating, and appliances, and by designing new buildings to be more energy efficient. This would reduce annual carbon dioxide emissions by 962 MMT.⁹

- A \$21.6 billion investment in cost-effective energy efficiency in buildings would save enough energy to eliminate the need for 22.3 conventional coal plants at a third of the cost. Similarly, supplying the same amount of energy with new nuclear plants would cost more than 5 times as much.¹⁰

Half of the buildings constructed today will still be in use in the middle of this century.¹¹ The decisions we make today will have a lasting effect on our energy use and global warming emissions.

The Problem: Energy Use and Global Warming Emissions in the United States

America is on the brink of an energy crisis. Our reliance on polluting energy sources contributes to global warming, unhealthy air quality, and mercury pollution in our lakes and rivers. From 1990 to 2005, global warming pollution from electricity generation increased by more than 25 percent.¹²

We are importing more and more of our energy from abroad, leaving us vulnerable to supply disruptions and sending billions of dollars out of the local economy. Natural gas has become increasingly expensive as demand inches closer toward available supply—driven in part by the increased use of gas for electricity generation. Gas prices have more than doubled since 2000, increasing the cost of heating our homes and fueling our industries.¹³

Since 1990, our consumption of energy has increased by 18 percent, and America is projected to use approximately 19 percent more energy in 2025 than we do today.^{14, 15}

Much of this energy is wasted. Per unit of economic output, America's economy is twice as energy-intensive as Germany's and nearly three times as energy-intensive as Japan's.¹⁶ We use more energy each year than China and Russia combined.¹⁷

Buildings represent the biggest culprit in wasted energy. Forty-eight percent of our energy is used inside buildings, and 76 percent of our electricity.^{18, 19} Building energy use is also

responsible for 43 percent of America's carbon dioxide pollution, making our workplaces and our homes our nation's biggest global warming polluters.²⁰

All of this waste, however, means that the building sector represents the largest opportunity to rescue ourselves from the impending crisis and re-create our energy economy to be efficient, clean, renewable and stable.

Energy efficiency is also the cheapest and cleanest way to increase our energy productivity. A recent McKinsey report calculates that a \$21.6 billion investment in simple, cost-effective building efficiency would save enough energy to eliminate the need for 22.3 conventional coal plants.^{21, 22} Based on that calculation, it would cost \$42.1 billion to gain one quad of energy through residential and commercial building efficiency.²³ In comparison, it would cost \$122 billion to deliver this much energy by building coal plants, and \$222 billion by building nuclear power plants.²⁴

Approximately 75 percent of our buildings will be new or renovated by the year 2035. Every building that is constructed without the highest levels of cost-effective efficiency technology available from now until then is truly a missed opportunity, the effects of which will stay with us for decades. We have to start seriously tackling the energy used in our buildings, today.

Policy Options

It is clear that we can and should be building and renovating homes and businesses to be much more energy-efficient, and setting ourselves on the path toward zero energy buildings as the standard. However, there are a number of barriers that will prevent progress unless we implement strong policies to overcome them.

Despite higher upfront costs, high efficiency buildings are ultimately cheaper for home and business owners. But "split" incentives often stand in the way of realizing these benefits: a builder or landlord doesn't want to pay upfront costs that will save money for buyers or renters.²⁵ This especially affects multi-family homes. In addition, many building firms are small and therefore unwilling to take risks by using practices and technologies they aren't used to.^{26, 27}

Compounding this problem is a general lack of awareness about the potential for energy savings in buildings, and the benefits that often come with higher efficiency, beyond their societal importance. When buying or renting, consumers often don't have the information they need to choose more energy-efficient properties. On the commercial side, energy expenses are often a small share of total expenses and therefore overlooked.

Moreover, "green" buildings are perceived as expensive, an optional added luxury, when in fact choosing energy efficient and zero energy techniques can be a way to save money over the long term; some techniques, such as orienting a building differently to maximize sunlight or reducing the size of the HVAC system, have no added upfront cost and can even lower the upfront cost of a building or renovation.

Public policy should be designed to eliminate these market barriers and to push new technologies into the marketplace so that they can become mainstream.

The experience of California shows how aggressive public policies can eliminate barriers to energy-efficient building. California has long been a leader in energy efficiency. It was the first state to adopt energy efficiency standards for home appliances, has the nation's most stringent building energy codes, and has long had well-funded, aggressive programs for promoting energy efficiency. While homes have become more efficient across the United States, California has truly excelled. On a per-capita basis, the country used 16 percent less energy in homes in 2002 than it did in 1975. But in California, residential energy use declined by more than 40 percent per capita between the mid-1970s and 2002.²⁸

If the United States had achieved the same per-capita percentage reduction in residential energy use between 1975 and 2002 as California did, the nation would have consumed more than 3 percent less energy in 2002. Moreover, residential energy consumption in the United States would have been 17 percent lower in absolute terms than it was in 1975, rather than 12 percent higher.²⁹

These changes can, and should, be replicated in other states and on a national level. We need both policies that establish a minimum standard for building energy efficiency, and those that encourage building far beyond those standards to put us on the path towards zero energy building.

Minimum energy efficiency standards—Building energy codes

Building energy codes regulate energy use in new buildings and major renovations, and strengthening the codes is the best way to affect the bottom line standard for building efficiency.

In general, building energy codes are adopted at the state or local level and based on national model codes. These model codes and standards are updated every few years and states and localities have the option of adopting them once the updated version is published.

Though many states have adopted the latest model codes, most have not, and some do not have any statewide code. In addition, in many states enforcement of the codes is severely lacking—compliance is estimated to be 40 to 60 percent for new buildings, depending on the state, and this number is probably even lower for renovations.³⁰ Building code agencies tend to be understaffed and understandably prioritize health and safety code enforcement while energy code enforcement falls by the wayside. This is compounded by a lack of training in energy code enforcement for code officials and in energy code requirements for builders and designers.³¹

The potential for saving energy through building codes is huge. If all states adopted building energy codes that are 30% more efficient starting in 2010 and 50% more efficient starting in 2020, and enforced them with 90 percent compliance, we would use 2.6 fewer quads of energy in 2030 – almost 3 percent of our current annual energy use. This would also reduce our carbon dioxide emissions by 41 MMT and save consumers \$25.5 billion annually. In terms of global warming emissions, this is the equivalent of taking over 27 million cars off the road. Under this scenario, cumulative savings through the year 2050 would be 111 quads of energy and 1,757 MMT of carbon dioxide emissions.³²

The House version of the 2007 Energy Bill included a provision that required the efficiency of the model codes to be increased by 30 percent starting in 2010, and by 50 percent in 2020, and that all states adopt the model code, or codes that meet these efficiency benchmarks. All states should be required to update their codes to match the model code as it improves over time, and to enforce the code to at least 90 percent compliance. Making full use of energy codes will have an enormous effect on energy use and global warming emissions from our buildings.

Improve the national model codes

Increasing the efficiency required by the model codes is the best way to affect the bottom line standard for building efficiency. Almost every state has standard energy codes for new residential and commercial buildings. Most of these are based on national model codes: the International Energy Conservation Code (IECC) for residential buildings, and the American Society of Heating, Refrigerating and Air-conditioning Engineers (ASHRAE) Standard 90.1 for commercial buildings. Both of these codes are updated every few years.

Increases in the efficiency mandated by these codes have been small and incremental in the past. However, in the current cycle the ASHRAE board has set a goal to make the 2010 commercial standard 30 percent more efficient than the 2004 version.

The Energy Efficient Codes Coalition (EECC), a broad coalition of regional energy efficiency networks, environmental groups, utilities and businesses, proposed changes to the 2009 IECC residential code that would increase its efficiency by 30 percent – the “30 Percent Solution”. The EECC developed the 30 Percent Solution in response to calls for an improved energy code from bodies such as the Western Governors Association, US Department of Energy, National Petroleum Council, American Institute of Architects, and Mayors for Climate Protection. Some of these changes passed the first round of decision-making, but not the full 30 percent. In the second round of voting, the full 30 percent could be reinstated for the published version if enough code officials turn out to vote for energy efficiency.

It is vital that the model codes are published with these efficiency increases, and that all states adopt the new codes, or codes of equal or greater efficiency. National legislation requiring these

efficiency improvements can ensure that new buildings take advantage of the technology available to save energy and reduce global warming emissions.

We must also set our sights much higher and put the country on a track towards net zero energy homes. The California Public Utility Commission has set a goal of net zero energy codes for all new residences by 2020, and all new commercial buildings by 2030.³³ This should be the goal for the entire country.

Improve state adoption of codes

Once model energy codes are improved, states must adopt them in order for them to have any effect. Only 18 states have adopted the most recent residential model codes or equivalents, and only 24 states have adopted the most recent commercial energy codes. Sixteen states currently have building energy codes that date to 1998 or prior, or have no statewide code, despite significant increases in the strength of building energy codes since then.

So while it is important that the model code is updated to reflect today's potential for building energy efficiency, it is equally vital to ensure that they will be adopted and enforced on a short timeline across the country. The best way to achieve this would be through a national requirement that states adopt codes that match or exceed the efficiency of the latest model codes.

Improve energy code enforcement

Enforcement of building energy codes is often lax; depending on the state, compliance can be as low as 40 percent for residential energy codes, and some jurisdictions don't enforce the energy codes at all.³⁴ Some state building legislation includes provisions that increase compliance with energy codes by requiring specific energy code training for all officials and inspectors, and requiring that all new construction and major renovations pass inspection by third party certified inspectors.³⁵ On the national level, legislation requiring state adoption of the model codes should require states to achieve 90 percent compliance with their updated codes.

Encouraging efficiency far beyond code

Establishing a baseline standard for efficiency through building energy codes is important in order to ensure that all new buildings at least meet the minimum of what is possible for energy efficiency. With so much potential for energy efficiency, however, policies that encourage building far beyond code can have a huge impact.

Annual energy consumption in residential and commercial buildings could be reduced by 11.1 quads in 2020 through cost effective changes such as lighting and appliance replacements for a cost of \$21.6 billion per quad.³⁶ That is, if we invested \$21.6 billion a year for five years on building efficiency through federal programs – a small portion of the recent \$168 billion economic stimulus package – we would use 5 fewer quads of energy a year and emit 433.6 MMT less carbon dioxide.³⁷

Many of these policies are especially suited to encourage higher efficiency through retrofits and renovations. These policies are also necessary to gain wider acceptance of new building methods and technologies, so that we can keep raising the minimum energy efficiency called for in the codes.

Time-of-transfer energy audit

A time-of-transfer energy audit requirement would establish a scoring system for building energy efficiency, to be evaluated when a building is bought or rented. This would give consumers the information they need to consider efficiency when buying a home or leasing a business space, and provide an incentive to increase energy efficiency in both new buildings and renovations and through retrofits.

A time-of-transfer system could also be used to enforce energy codes in existing buildings, to ensure that all of our buildings take advantage of the latest efficiency technology. The city of Davis, California, requires owners to show that their buildings are compliant with the city building code before sale or transfer.

Incentives

Incentives encourage building beyond code by lowering the upfront cost of building efficiently. Many local and state jurisdictions have tax incentives, tax deductions and/or rebates for energy efficient building. These are also the policies most often used to encourage retrofits.

In 2005 the federal government established the first comprehensive set of tax incentives for new buildings that use 50 percent less energy than typical building, through the Energy Policy Act of 2005 (EPACT 2005). EPACT 2005 also set up incentives for highly efficient heating and cooling equipment and appliances. However, some of these tax incentives expired at the end of 2007 and others will expire at the end of 2008, too short a time for most taxpayers to use them. These incentives were not renewed in the latest energy bill, and should be extended and increased to encourage efficient building in the next bill.³⁸

Even stronger tax incentives have been highly effective at the state level. In 2007, New Mexico enacted a “Green Building Tax Credit,” which extends some of the federal credits and also enacts stronger ones of its own, based on square footage, a green building rating and energy efficiency.³⁹ Oregon also enacted tax credits for energy-efficient building practices in 2007, with separate programs for residential and commercial buildings.⁴⁰ These tax credits can amount to thousands of dollars and large percentages of the incremental costs, making a significant difference in the ability of homeowners to save energy.

Funding for research and technology development

There is huge potential to improve energy-efficient technology, and to find ways to make it available and affordable on a wider scale. Building America is a program sponsored by the DOE that conducts research with the long-term goal of developing cost-effective net zero energy use homes. The program is a private/public partnership and works to develop energy-efficient techniques to improve both new and existing homes.⁴¹ Funding for programs such as this helps bring even higher levels of energy efficiency within our grasp.

Weatherization Assistance Program

For three decades, the federal government has been providing grants to state agencies that help low-income households improve their energy efficiency through the Weatherization Assistance

Program. A recent evaluation of the program in 19 states found that the program reduced natural gas consumption for space heating in affected homes by approximately 32 percent.⁴² Recently, this program has been threatened; instead it should be expanded to provide even further to reach more homes and provide even greater energy efficiency improvements.

Getting to zero

Zero energy buildings require small-scale renewable power to cancel out the small amount of energy they use. While solar power and small wind turbines are becoming more common, there are a number of barriers to their widespread use. Net-metering and connection policies in many states make it difficult to connect a small system to the grid, or limit the amount of electricity a household or business will be compensated for. And while solar panels can ultimately save money over time, the up-front cost of adding any of these systems is prohibitive for many.

Currently, electricity in the United States is supplied from large, centralized power plants. Distributed generation is a new model in which electricity is supplied by small, usually renewable generators owned by individuals and businesses to offset their power needs. This model better serves consumers by making prices more stable, reducing the amount of electricity lost in transmission, and making our power supply less vulnerable to large-scale failures, in addition to the environmental and national security benefits of local, renewable power.⁴³ Distributed generation also serves utilities by reducing the need to find new sources of power, and, in the case of small solar systems, supplying extra power at the times when demand is highest.

However, utilities inexperienced with distributed generation worry that it will make the grid unstable or pose a safety hazard and reduce their revenue.⁴⁴ In many states current policies cater to utility fears and discourage small generators; instead, policies should empower home and business owners to add renewable systems to their buildings.

Incentives can have a huge impact in reducing barriers to the wider use of on-site renewables. In addition to reducing the upfront costs to consumers in the short term, by increasing the market for renewable systems incentives can lower the cost of the systems over time, eventually

eliminating the need for incentives. In California the price of retrofitted residential solar energy systems dropped by 36 percent from 1998 to 2004 because of a strong incentive program.⁴⁵

Conclusion: Recommendations

We need to put America on the path toward zero energy buildings, and start taking advantage of all the energy efficiency techniques that are available and cost-effective today. Every new building or renovation that does not improve energy efficiency locks in global warming emissions for decades. Quick action will require strong leadership from policy-makers to make energy-efficient buildings the standard.

Government leaders should commit to a goal of zero energy buildings for all new construction starting in 2030. To get there, we need to do everything we can to ramp up building efficiency and encourage on-site renewable energy.

- Building energy codes should be improved and enforced.
- We should adopt policies that encourage building far beyond code and retrofitting existing buildings.
- Policies should be designed to encourage on-site renewable power.
- We should set a national goal for all new buildings to be zero net energy by 2030.

Last year's energy bill made progress towards these goals. But there is much more to do.

The first thing Congress can do to lead us on the path towards a zero energy building sector is to require building energy codes to be strengthened and enforced. National legislation should require the model codes to be 30 percent more efficient beginning in 2010, and 50 percent more efficient beginning in 2020. It should ensure that all states require and enforce this level of energy efficiency in new buildings. This provision was in the House version of the 2007 Energy Bill, and should be included in any federal legislation designed to enhance our energy security or reduce global warming emissions.

There are also a number of existing programs that Congress can use to help families, businesses, and municipalities retrofit existing buildings, and to encourage building more efficiently than the code requires.

- The energy tax credits set to expire at the end of this year include tax deductions and bonds to help Americans construct buildings that waste less energy and take advantage of solar power.
- The Energy Efficiency and Conservation Block Grant (EECBG) Program could be used to assist local governments promote high performance, energy efficient buildings. Congress has yet to allocate the \$2 billion per year to fund the program.
- For three decades, the federal government has been providing grants to state agencies that help low-income households improve their energy efficiency through the Weatherization Assistance Program. Recently, this program has been threatened; instead it should be expanded to reach more homes and provide even greater energy efficiency improvements.

Any federal legislation designed to enhance our energy security or reduce global warming emissions must take advantage of the vast energy savings available in buildings in order to help us meet our goals on global warming, cut the pollution going into our air and water, and help ease the strain of energy costs on American families and businesses. Ramping up building energy efficiency will also make America more energy independent, reinvigorate our economy, and create good, new jobs here at home.

We have the technology to save ourselves from the impending energy crisis, through new and traditional techniques that increase building efficiency and allow us to provide any remaining building energy needs with clean, renewable fuels. Strong policies can put these building methods and technologies into widespread use so that inefficient, wasteful buildings are a thing of the past. All we need is the commitment to make this vision a reality.

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