

Center for American Progress



Rebuilding America

A National Policy Framework for Investment in Energy Efficiency Retrofits

Bracken Hendricks and Benjamin Goldstein Center for American Progress

Reid Detchon and Kurt Shickman Energy Future Coalition

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Foreward

The Center for American Progress and the Energy Future Coalition have teamed up to develop a national policy framework on “Rebuilding America” through energy efficiency retrofits, to meet the economic and environmental challenges of the 21st century.

The Center for American Progress is a non-partisan think tank dedicated to improving the lives of Americans through ideas and action. It combines bold policy ideas with a modern communications platform to help shape the national debate and challenge the media to cover the issues that truly matter. The Center is committed to restoring America’s global leadership to make America more secure and build a better world, seizing the energy opportunity to create a clean, innovation-led economy that supports a sustainable environment, and creating progressive economic growth that’s robust and widely shared, restoring economic opportunity for all.

The Energy Future Coalition is a non-partisan public policy initiative supported by foundations that seeks to speed the transition to a new energy economy. Combining expertise and advocacy, the coalition brings together business, labor, and environmental groups to identify new directions in energy policy with broad political support, especially those that address three great challenges related to the production and use of energy: The political and economic threat posed by the world’s dependence on oil; the risk to the global environment from climate change; and the lack of access of the world’s poor to the modern energy services they need for economic advancement.

This report is a detailed examination of how the United States can build a low-carbon economy by harnessing energy efficiency as our “first fuel.” By retrofitting existing homes and businesses, we can cost-effectively reduce end-use waste and pollution, and at the same time jump start an economic recovery, create good jobs, and give consumers real energy cost savings—even as we ensure a safer, healthier, and more secure future by combatting global warming.

This report sets a goal of developing an energy efficiency industry that will retrofit 40 percent of our nation’s building stock, or 50 million buildings, within the next 10 years. This project would require over \$500 billion in public and private investment, and create approximately 625,000 sustained full-time jobs directly and indirectly throughout the decade. Rebuilding America’s buildings for energy efficiency will reduce energy use, household bills, and global warming pollution by 20 to 40 percent for 50 million homes and small businesses, all while generating \$32 billion to \$64 billion in annual consumer energy cost savings.

A vibrant national retrofit market starts with rebuilding America for energy efficiency, directed with real leadership and innovative policy, and resulting in the launch of a new generation of competitive American businesses and sustainable careers. This paper offers a national framework to achieve this complex but critical goal.

– Bracken Hendricks and Benjamin Goldstein for the Center for American Progress
– Reid Detton and Kurt Shickman for the Energy Future Coalition
August 2009

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Executive summary

Investments in building efficiency retrofits can simultaneously address the challenges of economic recovery, energy insecurity, and global warming by laying the foundation for sustained economic growth, driving demand in the construction and manufacturing sectors, and creating hundreds of thousands of good jobs across the country. Retrofitting our homes and businesses will also slash consumer energy expenditures, increase real estate values, and provide low-cost, near-term reductions in global warming pollution.

Today, buildings account for 70 percent of all U.S. electricity consumption and 40 percent of total U.S. greenhouse gas emissions. Yet much of our housing and building stock is old, inefficient, and unnecessarily wasteful. While building codes and green building standards offer a tool for achieving deep improvements in energy use for new buildings, half of the buildings that will be standing in 30 years already dot our landscape. Any strategy to capture the benefits of energy efficiency in our “built environment” must include a program to retrofit our existing stock of residential, commercial and industrial structures.

Deep building retrofits can cut energy use by 20 to 40 percent with proven techniques and off-the-shelf technologies. Best of all, they can pay for themselves from the energy they save. “Rebuilding America,” a national program to cut energy waste in buildings, could reduce energy bills economy-wide by hundreds of billions of dollars annually. Energy efficiency retrofits also create good local construction jobs across the country at a time when well over a million construction workers sit idle in a sagging housing market. Demand for the manufactured products needed to retrofit buildings will also result in jobs by revitalizing the manufacturing sector and contributing to sustainable, long-term economic growth.

If building retrofits can be profitable and offer so many additional social and economic benefits, why has a large-scale market not yet materialized? The short answer is that the market for energy efficiency faces many information failures and real market barriers. Without specific public policies to encourage widespread private investments in energy efficiency, the great value of this market will be left unclaimed. The U.S. economy will be worse off for this failure to act. So too will our planet.

The failures evident in the lack of a thriving nationwide marketplace for energy efficiency products and services include:

- Poor availability of information for consumers about their energy consumption.
- Split incentives between building owners and tenants to invest in energy efficiency retrofits.
- Lack of capital or access to capital to support investments in energy efficiency.
- Limited tenancy or ownership structures that encourage short-term decision making and do not take into account the benefits of energy efficiency.
- Perceived costs of retrofits, and a lack of knowledge about available solutions.
- General risk aversion by consumers, especially when loans are tied to their personal credit instead of conveying with property.
- Disaggregated energy efficiency markets where many small decisions about purchasing, materials, operations, and maintenance are required in order to realize savings.
- High up-front borrowing costs for retrofits.
- The risk of creditor default in a real estate finance market that today is severely constrained.

Congress and the Obama administration have an historic opportunity to ensure that investments made in weatherization and energy efficiency as part of the recently passed American Recovery and Reinvestment Act evolve into a sustainable clean-energy retrofit program and a linchpin of the American economy for years to come. Together, government policymakers can forge a strategy that pursues clean energy as a tool for local and regional economic development in states and communities nationwide, as well for U.S. global economic competitiveness.

Retrofitting our houses and office buildings cannot be accomplished by public programs alone, however. Rebuilding our “built environment” will require changes in our real estate markets, new energy efficiency financing tools, more skilled labor to handle the construction and inspection work, and new private capital investments in the industries, infrastructure, and workforce required for energy efficiency. A coherent and coordinated national strategy for unleashing the market for energy efficiency is essential.

“Rebuilding America” focuses on the challenge of dramatically increasing investment in residential and commercial building energy efficiency, with a goal of retrofitting 50 million buildings—40 percent of our building stock—by 2020. Reaching that goal will require \$500 billion in public and private investment but will directly and indirectly generate approximately 625,000 sustained full-time jobs and save consumers \$32 billion to \$64 billion a year in energy costs, or \$300 to \$1,200 a year for individual families.

Clean energy and climate legislation recently passed by the House of Representatives calls for reducing greenhouse gas emissions from 2005 levels by 17 percent by 2020, and by 83 percent by 2050. Rapidly improving the efficiency of our existing buildings is essential to meeting these goals, and the House bill and a companion Senate bill now under consideration could help in some very specific ways by supporting:

- Easier access for new customers to energy-retrofit programs and financing.
- Improved capacity of businesses to meet this new demand for retrofits.
- Training and certifying workers to handle this new demand and assure quality.
- Affordable financing for residential and small business retrofits.
- New institutions that will organize this market.

All of these measures are necessary building blocks for a strong national energy efficiency strategy, but this paper also looks at what more is needed. We've identified five key areas where focused national policy leadership is required immediately to launch a nationwide energy efficiency retrofit industry:

- **Technical assistance and capacity building** to create a national energy efficiency effort that builds and strengthens existing state, local, and private sector initiatives.
- **Retrofit financing and cost recovery mechanisms** to facilitate investment and capture the value of energy efficiency.
- **Retrofit performance standards and quality assurance** to improve consumer confidence and facilitate measurement and verification of energy savings, in this now deeply fragmented market.
- **Smart codes and regulations** to shift incentives toward efficiency and provide certainty for investors.
- **Workforce development programs and job quality standards** to supply the requisite high-quality labor force.

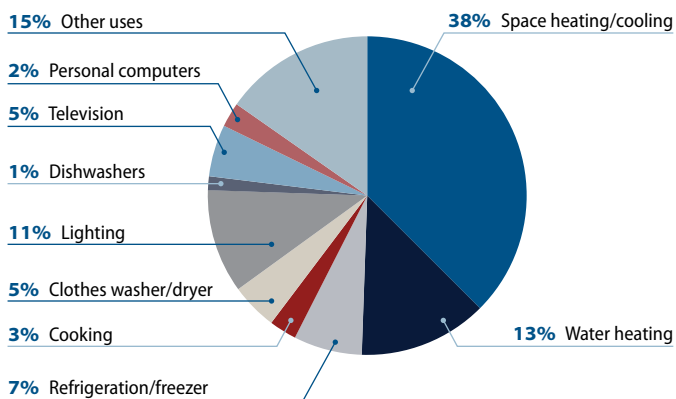
This architecture must be created through a comprehensive national policy approach consisting of a strategic combination of incentives and standards, both of which are critical to overcoming the numerous obstacles that have thus far discouraged consumers and businesses from taking action on energy efficiency. To create the market conditions needed to stand up an industry large enough to perform deep retrofits of 50 million buildings, Congress and the Obama administration should take two key actions:

1. Mobilize major institutions that have strong customer relationships with building owners to market energy efficiency to every building owner in America, provide improved tools for financing and repayment through existing billing mechanisms, and provide a trusted point of access for energy efficiency services that are certified and guaranteed. These institutions include:
 - Utilities and other suppliers of electricity and gas.
 - Banks and insurance companies that provide mortgages, insurance, and other financing.
 - Local governments to whom building owners pay property taxes for public services.
2. Encourage the growth of a high-performance, high-standards retrofit industry by taking early steps to ensure performance standards and verifiable energy savings, and engaging market participants at every level, including:

- Consumers: Enhancing confidence with standards for auditing, performance measurement and verification, and better labeling of energy efficient buildings
- Workers: Building strong labor markets through career training, job quality standards, and community-based pre-apprenticeship programs
- Industry: Empowering building owners and contractors to act by providing better information to markets through standards, incentives, and data

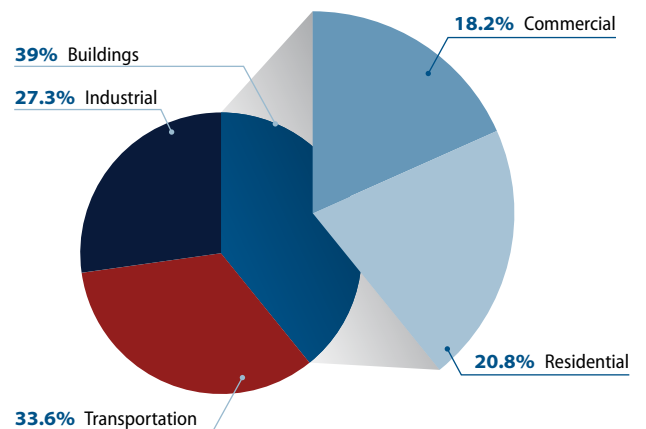
Without a strong public policy framework, the private sector acting alone will not invest to maximize the clear private and public benefits of encouraging comprehensive energy efficiency, and the harm to the global climate will continue unabated. Over time, however, the public-sector role in jump starting these new energy efficiency markets can be reduced as the private sector develops improved business and finance models and once a price is established on global warming pollution. That is the path outlined in this paper.

Energy consumption of a typical household, 2009



Source: Energy Information Association, Annual Energy Outlook 2009: Table A4.

U.S. greenhouse gas emissions by end use sector



Source: US EIA Emissions of Greenhouse Gases in the United States 2007 Table 6.

A national energy efficiency market: obstacles and benefits

The challenge of retrofitting the nation's existing buildings is immense. There are 115 million residential and small commercial structures in the United States. Even if we achieve the Obama administration's ambitious goal of retrofitting one million buildings per year, it would still take over a century to capture all the energy-saving potential within the existing built environment. Our economic and environmental crises do not afford us the luxury of 100 years.

Fortunately, these potential energy savings represent a huge, profitable, and virtually untapped resource. To seize the opportunity before us with the scale and urgency required, we need a robust and market-driven nationwide retrofit effort capable of rebuilding 50 million buildings by 2020—approximately 40 percent of all U.S. residential and small commercial building stock. “Rebuilding America” would cheaply and effectively make a significant contribution to the energy savings necessary for the United States to meet the near-term global warming pollution reduction goals outlined in emerging climate legislation, while providing consumers and small businesses much-needed savings on their utility bills, as well as driving job creation to help lift the country out of a difficult economic recession.

The urgency of action

Two challenges—the urgent need for economic recovery and job creation, and the growing threat of climate change—demand immediate action. Average global temperatures have already risen 1.5 degrees Fahrenheit since 1900 and are expected to continue to rise another 2 to 11.5 degrees by the end of the century if greenhouse gas emissions continue unabated.¹ The effects of a temperature rise even on the lower end of this range will be dramatic and felt throughout the United States. Changes in weather patterns, wildfire frequency, and a rising sea level will have major negative consequences on agriculture, infrastructure, ecosystems, public health, and the economy and society as a whole.

Meanwhile, the current recession is proving both severe and sustained. There are currently 14.7 million unemployed Americans, nearly double the number in December 2007.² And while recent reports indicate that the home foreclosure crisis may be close to cresting, the damage has been severe and will likely continue. The Congressional Joint Economic Committee estimates that the subprime mortgage crisis resulted in \$71 billion in direct

losses to homeowners, an additional \$32 billion in related costs, a decrease in housing values by \$2.3 trillion dollars, and foreclosures totaling 3.1 million in 2008, up from 1.2 million in 2006, a staggering 225 percent increase.^{3 4 5} Commercial real estate markets could also face strongly adverse economic conditions for some time to come.

A large-scale building efficiency retrofit effort will address both of these challenges: providing good jobs for hundreds of thousands of Americans while delivering consumer relief in the form of lower energy costs, increasing the value of our building stock through capital improvements and lower operating costs, and reducing greenhouse gas emissions from the building sector, the country's most significant energy user.

Market potential

The real estate market is typically divided into four segments: residential, commercial, industrial, and public, the last of which is often referred to as the MUSH sector as it includes municipal, university, school, and hospital buildings. This paper focuses on residential and small commercial buildings in particular because they:

- Represent the segments facing the most severe barriers and market failures.
- Cumulatively account for over half of all building-related global warming emissions.
- Offer tremendous potential for public engagement around the importance of energy-efficiency savings because these buildings are inextricably connected to the lives of millions of citizens and business owners nationwide.

Existing policies and market forces have enabled the larger commercial and industrial segments of the industry to be decently served by a retrofit industry through energy service companies. The service companies provide in-depth efficiency retrofit and conservation solutions and performance contracting, as well as offering a direct model for large commercial users to finance capital investments with verifiable energy savings. The more substantial total energy savings potential in large commercial buildings and the smaller transaction costs of retrofitting these buildings due to their scale have attracted more capital investment. Public buildings have also attracted significant investment in building efficiency—a trend that was greatly accelerated by the American Recovery and Reinvestment Act, which invested heavily in retrofitting government buildings to reduce energy use.

Meeting “Rebuilding America’s” goal of 50 million retrofits by 2020—an average of five million buildings a year over the next decade—will require a tremendous increase in financing, human capital, and manufactured goods. In the residential market, for example, the country currently only retrofits approximately 200,000 homes a year, spread across publicly subsidized programs such as the low-income Weatherization Assistance Program and the private home performance industry.⁶

Getting to five million retrofits a year will require investments averaging \$50 billion a year. Spending on this scale can only come from the private sector, but last year utilities spent only \$3.1 billion on efficiency programs, largely to comply with public policy mandates driven by innovative state programs in states such as Texas, New York, and California. Energy service companies spent only \$2.5 billion on efficiency in 2006 (the last year for which data is available), primarily on large facilities. And commercial building owners spent even less.⁷ A national strategy is needed that combines strong policy signals with incentives and standards to transform the market.

Residential potential

There are slightly more than 111 million single family homes and individual apartment units in the United States.⁸ Approximately 70 percent are owner occupied. The average U.S. home is about 40 years old and uses roughly 40 percent more energy than homes built after 2000.^{9,10}

While the results of individual retrofits vary based on a number of factors, most existing residential retrofit programs can achieve energy savings of 20 to 40 percent with an average investment of \$5,000 to \$20,000 per home. Federal low-income residential weatherization assistance is currently capped at \$6,500 per home (up from \$2,500 in recent years), but cost effective measures frequently justify significantly higher investment levels. Using a figure of \$10,000 per home, retrofitting 40 percent of residential building stock over the next ten years would create a total market value of \$444 billion—many times greater than the business-as-usual market scenario.¹¹



Installing high efficiency insulation.

The payoff from these investments is equally impressive. Americans currently spend \$200 billion per year to light, heat, and cool their homes.¹² Thus, energy savings of 20 to 40 percent in 40 percent of the residential building stock would produce total household savings on the order of \$16 billion to \$32 billion annually.¹³ These energy cost savings would be accompanied by the benefits of substantial carbon emission reductions and the development of a more energy efficient economy overall.

Of course, there is a good deal of diversity within residential real estate markets. This creates challenges for developing a nationwide retrofit strategy. There are real distinctions between owner-occupied homes and rental properties, and between single- versus multi-family dwellings—differences that influence the structure of retrofit companies’ business models. Incentives and building standards also vary widely by state and region, as do market structures. Different ownership and tenancy agreements within both residential and small commercial markets result in further complications for policy makers.

Low-income properties—both owner-occupied and rental units—deserve special attention within a national policy framework. The Weatherization Assistance Program, run by the Department of Energy, relies on annual appropriations that normally do not support more than 100,000 retrofits per year. This paper presumes the need for robust support for the Weatherization Assistance Program and similar programs, but looks beyond to explore how to access the far broader private market potential.

Commercial potential

U.S. businesses occupy 36 billion square feet of commercial space in over 4.6 million buildings of 50,000 square feet or less.¹⁴ The small commercial market accounts for 95 percent of total U.S. commercial buildings.¹⁵ A recent study by Pike Research found that an investment of \$10 to \$30 per square foot could reduce energy usage by 40 percent.¹⁶ Retrofitting 40

Job creation through building efficiency retrofits

We use the conservative calculation of 12.5 direct and indirect full-time-equivalent jobs created per \$1 million invested in building efficiency retrofits. This estimate fits squarely in the range of retrofit job creation estimated by the Political Economy Research Institute, the National Association of Homebuilders, the Center on Wisconsin Strategy, and many others. Approximately ⅔ of these jobs are created from direct installation of energy efficiency retrofit measures, and 1/3 are created indirectly, in the manufacture of parts and materials.

Retrofitting 50 million buildings at a conservative estimate of \$10,000 per building would generate \$500 billion in investments over 10 years. \$500 billion times 12.5 jobs/million produces 6.25 million person-years of employment, which averaged over 10 years equals 625,000 jobs sustained annually. This does not include the jobs that are induced in other sectors of the economy through an increase in economic activity and local spending.

12.5 jobs per \$1 million invested

\$10,000 per retrofit × 50 million retrofits = \$500 billion
(average)

\$500 billion ÷ 10 years

percent of small commercial buildings to this standard would create a total market of \$144 billion to \$432 billion by 2020.¹⁷ Again, a significant increase compared to business as usual.

The commercial real estate market is divided into owner-occupied and rental units, presenting a distinct, split-incentive challenge to boosting energy efficiency that we address later on in the paper. The real challenge today in the commercial market, however, is a toxic combination of plummeting property values and increased vacancy rates. Building owners are highly reluctant to make capital improvements when the value of their asset is decreasing and the building may end up vacant for a period of time.

Scale of the opportunity

The building sector is both urban and rural, and touches older northern industrial towns and rapidly expanding Sun Belt communities alike. Every region in America stands to gain from a robust national effort to retrofit 50 million buildings by the year 2020 because of the job creation it will spark, the energy savings it will foster, and the reduced carbon emissions it will ensure. The building and construction trades, and their supporting manufacturing and service industries, form a foundation of well paying, high-skill jobs in all parts of the country.

Job creation

Retrofitting our building stock to reduce energy waste would put Americans back to work in the industries hardest hit by the economic downturn—construction and manufacturing. The need for a major source of new job creation is urgent. Nationwide, approximately 1.6 million construction workers, or roughly 17 percent of the construction workforce, are without jobs. That number reaches 25 percent in some particularly hard-hit areas of the

= \$50 billion per year \$50 billion per year ÷ \$1 million invested × 12.5 jobs = **625,000 jobs** sustained year over year

country. Additionally, 2 million manufacturing workers are unemployed, equivalent to 12 percent of the total manufacturing workforce.¹⁸

Fortunately, the job-creation potential from building efficiency retrofits is significant. Unlike other infrastructure investment projects that are concentrated in particular geographic areas, retrofitting would create good, skilled jobs in every community because building efficiency gains and light manufacturing potential are available throughout the country.

With so many unemployed construction workers, there is a large reserve of ready labor in need of only moderate retraining and the proper certifications to enter the building retrofit workforce. Moreover, dramatically increasing demand for energy efficient building materials has the potential to invigorate domestic manufacturing centers to produce advanced-performance windows, insulation, appliances, and other high-efficiency durable goods that have ample potential to be produced right here in the United States.

The majority of these construction and manufacturing jobs will be in familiar occupations, repurposed and expanded with clean energy skills and knowledge, and directed towards low-carbon outcomes. What is the potential? According to a study by the Center for American Progress and the Political Economy Research Institute at University of Massachusetts at Amherst, every \$1 million invested in building efficiency retrofits directly creates 12 full-time-equivalent jobs.¹⁹

This number is corroborated by the Center on Wisconsin Strategy, which estimates that every \$1 million invested in residential and commercial retrofits directly creates 10 to 14

Job creation through 2020

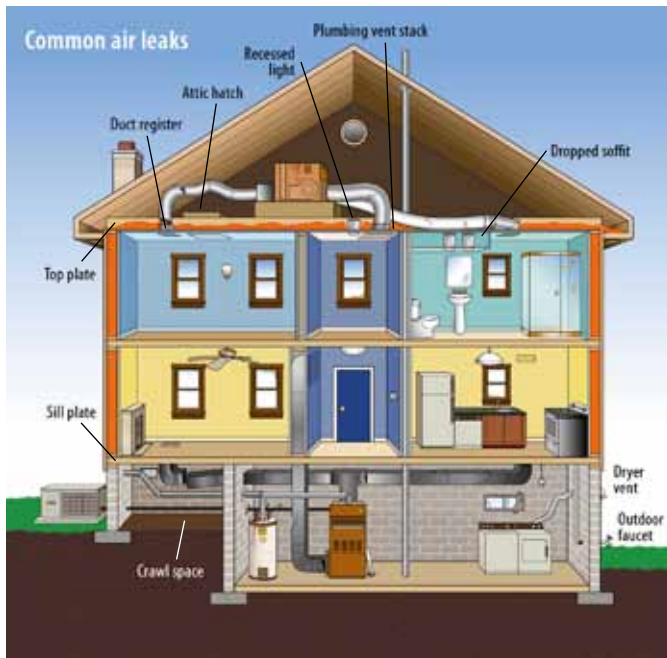
Investment per retrofit	Average annual investment for 50,000 retrofits	Job-years created
\$5,000	\$25 billion	312,500
\$10,000	\$50 billion	625,000
\$20,000	\$100 billion	1,250,000

Source: Energy Information Administration, Annual Energy Outlook with Projection to 2030, tables 4 and 5. Energy Information Administration, Emissions of Greenhouse Gases Report, table 6 (2008).

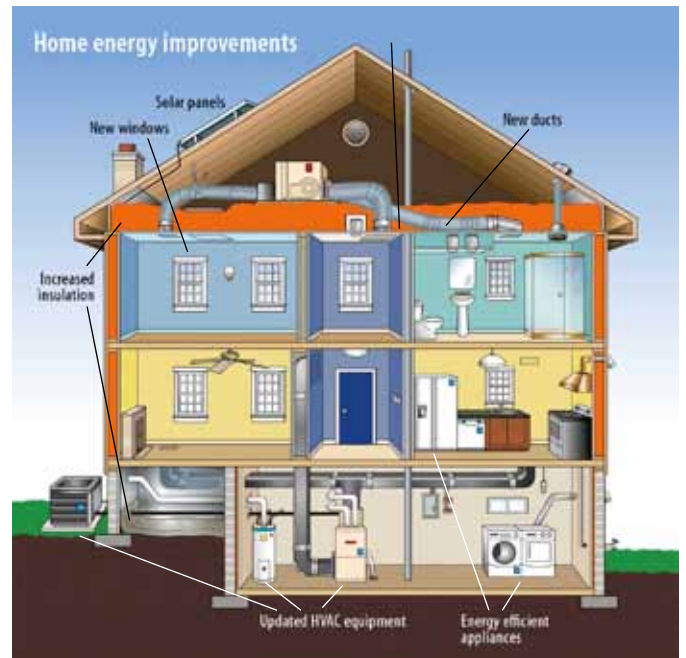
Annual savings to 2020

Reduction in energy consumption	Total annual average energy savings	Annual emissions reductions (CO ₂) Based on 2007 data	Annual consumer savings
20%	2.22 quadrillion btu	18.69 million metric tons	\$32 billion
40%	4.45 quadrillion btu	37.33 million metric tons	\$64 billion

Source: Energy Information Administration, Annual Energy Outlook with Projection to 2030, tables 4 and 5. Energy Information Administration, Emissions of Greenhouse Gases Report, table 6 (2008).



Source: U.S. Environmental Protection Agency.



Source: U.S. Environmental Protection Agency.

person years of construction jobs and program support, and 3 to 4 person years of indirect employment in manufacturing supply chains.²⁰ Through a combined average of direct and indirect jobs, a conservative working estimate is that every \$1 million investment in energy efficiency retrofits will result in 12.5 full-time-equivalent jobs per year.

Assuming an average of \$10,000 is invested in each retrofit,²¹ our target of 50 million buildings would require a \$500 billion investment over 10 years, creating approximately 6.25 million person-years of work in construction, manufacturing, and program administration (direct and indirect job creation). Spread out over 10 years, this would result in an average of 625,000 full-time-equivalent jobs sustained annually, not including the induced labor resulting from additional local economic activity.²²

Energy savings

Based on demonstrated retrofit performance, cost-effective energy savings of 20 to 40 percent can reliably be achieved throughout U.S. building stock, according to the National Action Plan for Energy Efficiency, a public-private partnership led by the U.S. Environmental Protection Agency and Department of Energy, along with representatives of the utility industry, state regulators, consumer advocates, and other businesses.²³ “Cost effective” in this case means that the particular efficiency upgrades can pay for themselves

through energy savings over time.²⁴ Investing in building efficiency creates real economic benefits for consumers by reducing their energy expenditures. The country as a whole spends approximately \$400 billion annually to power our residential and commercial buildings.²⁵ A 20 to 40 percent reduction in energy use in 50 million buildings would generate \$32 billion to \$64 billion in annual consumer energy savings.

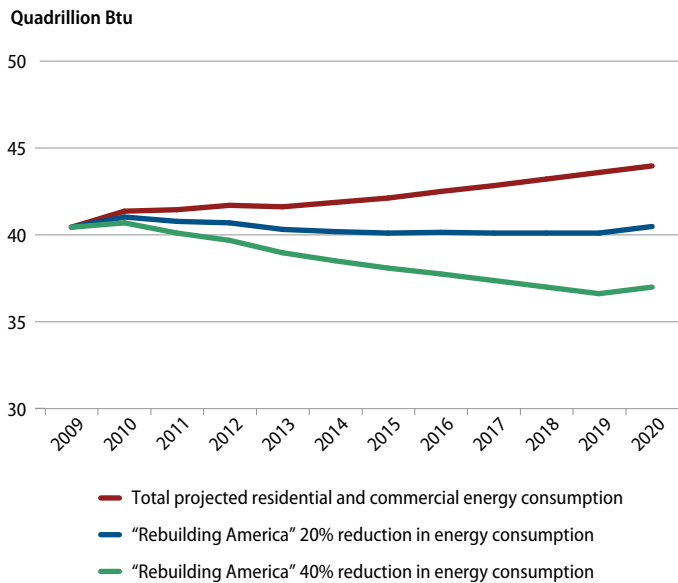
These savings can make a real difference for the average American family, which spends more than 5 percent of their income on home energy costs. Low-income households—those at 150 percent or less of the poverty line—spend 16 percent.²⁶ For the average homeowner spending \$1,500–\$3,000 per year on residential energy, savings of 20 to 40 percent amount to \$300 to \$1,200 in annual savings. Two successful local retrofit programs in cold areas of the country are currently reporting significant annual savings of \$600 and nearly \$1,000, respectively.²⁷

Similarly, small commercial buildings have tremendous potential energy savings, yet like residential real estate, these buildings have not been effectively served by existing commercial energy service companies and other existing providers, leaving substantial unclaimed value throughout this sector.

Other social benefits of energy efficiency include improved air quality due to decreased energy generation, (which in turn leads to improved public health outcomes), increased

property values as the building stock is improved, and gains in consumer spending in other sectors due to lower energy bills, creating a ripple effect of induced economic activity.

"Rebuilding America" Energy savings projections



Source: Energy Information Administration, Annual Energy Outlook with Projections to 2030, Table 2.

Reductions in carbon emissions

Cutting energy waste is the cheapest, fastest, and most important step we can take to address the growing crisis of global warming. The cleanest form of energy is the energy we do not use: the “negawatt,” as coined by physicist and energy efficiency evangelist Amory Lovins. Buildings account for 40 percent of total economy-wide energy use and a nearly equal amount of greenhouse gas emissions, a number that rises to nearly 48 percent when indirect energy use from the manufacture and transportation of building materials is factored in.^{28, 29}

Clean-energy and climate legislation recently passed by the House of Representatives calls for a reduction

in greenhouse gas emissions from 2005 levels by 17 percent by 2020, and 83 percent by 2050. Rapidly seizing the opportunity to systematically reduce energy waste from buildings is essential to meeting both of these goals.

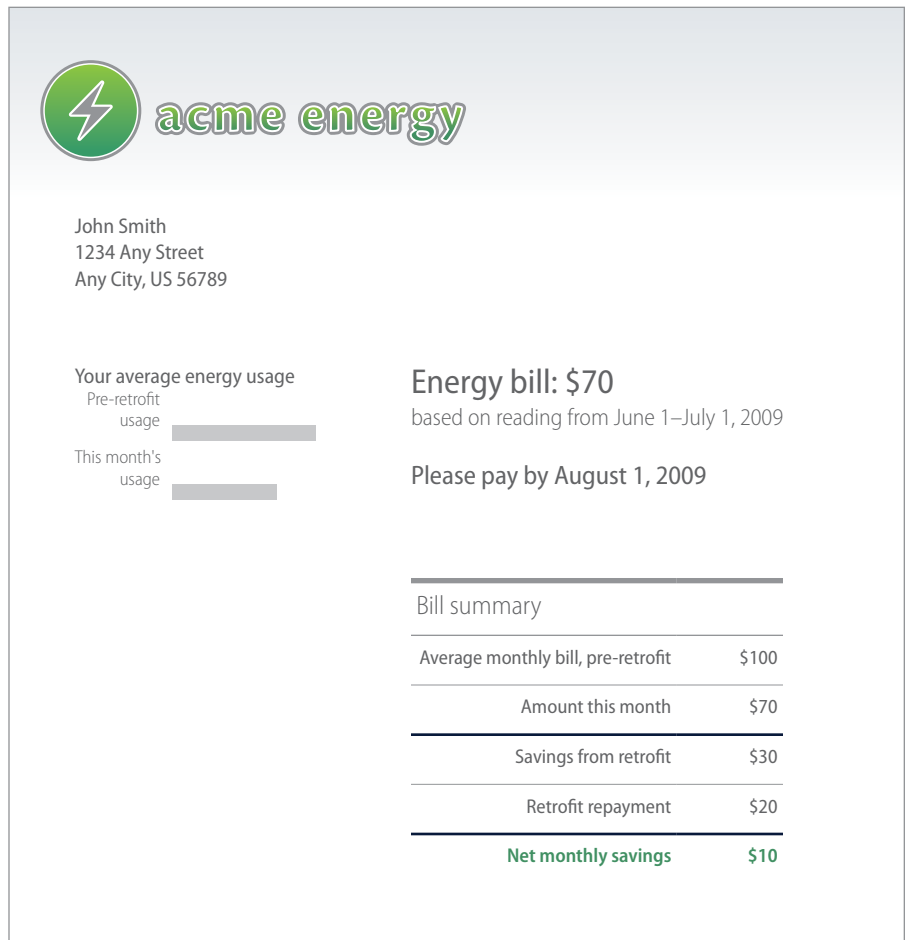
Small commercial and residential buildings currently use nearly 40 quadrillion British Thermal Units, or BTU's, of energy each year,³⁰ an amount of energy equal to 6.88 billion barrels of oil.³¹ A 20 to 40 percent reduction consistent with "Rebuilding America's" goals would yield a savings of approximately three to six quadrillion BTU's of energy annually, the equivalent of taking 48 to 96 million passenger cars off the road.

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From local programs to a national market

Some state and local energy efficiency programs have been quite successful and offer important lessons to inform the creation of a national market. At the municipal level, a handful of innovative programs are being developed and tested, including ones in Babylon, New York; Berkeley, California; and Cambridge, Massachusetts. In each case, local governments have used existing authorities in new ways to provide citizens with access to low-cost financing for energy efficient home retrofits with little or no out-of-pocket payments and ongoing repayment of retrofit costs through energy savings. Establishing these programs using local government provides a trusted point of contact for homeowners, and provides local businesses a way of accessing a growing pool of residential retrofit customers.

In addition, a number of states—most notably California—have used a combination of incentives and mandates to induce their utilities to invest in efficiency. Critical to success is regulatory reform to “decouple” utility sales from profits. Utility revenues in most states are linked to the amount of energy they sell. If efficiency programs reduce consumption, and if that in turn cuts profits, there clearly will be little utility enthusiasm for efficiency. In



Mock-up of "on-bill" retrofit financing.

the Northeast, a number of states use a consumer surcharge to support a “public benefits fund” that invests in efficiency. Other states, including Vermont and Delaware, have created “efficiency utilities” to deliver services directly to consumers. Increasingly, energy regulators have also allowed efficiency and demand management to compete directly with new energy supplies, bidding against new power plant construction for the ability to meet future energy needs at the lowest cost.

With the influx of \$18 billion from the American Recovery and Reinvestment Act, public officials across the country are ramping up programs to move this new funding out the door and into local retrofit programs. Federal spending has been used for local energy efficiency block grants, public housing efficiency measures, federal building efficiency upgrades, and expanded Weatherization Assistance Programs. Results of these efforts are already being seen on the ground today, as recovery funds reach state energy offices, local governments, and non-profit community action partnerships, to invest in projects around the country.

However, unless private capital markets begin to take over when direct public spending ends within two years, then these emerging businesses will quickly run into trouble. Smart federal legislation and executive branch leadership can support real and permanent market transformation to produce the conditions necessary for these local programs and supporting businesses to flourish and grow beyond this period of economic stimulus. With major pieces of clean energy and climate policy legislation currently moving through Congress, there is no better time than today to address this question.

The architecture of a national retrofit market

Major legislative and regulatory policy changes are required to create the conditions to support a vibrant national retrofit market, built on sustainable long-term private-sector investment, adequate capital, new business models, and well-trained workers to do the job.

Five key elements must develop simultaneously to grow the retrofit market on a national scale. Yet each area presents distinct challenges that will require specific policy-led solutions. These market components and key challenges include:

- **Customers:** Demand for retrofits must overcome barriers to entry such as the lack of up-front capital as well as uneven quality control.
- **Businesses:** Creating qualified retrofit businesses and facilitating access to the current fragmented market will require new standards, and certifications.
- **Workforce:** Supplying new workers will require training and certification as well as opportunities for career advancements.
- **Financing:** Attracting private capital and establishing dependable repayment mechanisms are essential to growing the market.
- **Institutions:** New organizations and agencies will be required to send the right policy signals that will create this market on a national scale.

In this section we describe why each of these components is significant, identify current market barriers and the policy levers necessary to surmount the existing barriers, and examine some innovative local models that address these challenges and point the way forward for a national retrofit effort.

Customers

Most people would love to cut their energy waste, save money on their utility bills, and improve the comfort of their home or business, but many barriers make the “product” (greater energy efficiency performance) too much of a hassle to pursue. These market barriers are numerous and complex:

- Consumers have inadequate information about their current energy consumption and therefore don't fully recognize the value of efficiency.
- The energy efficiency retrofit industry is not well established, and there are very few full-service retrofit contractors, making it difficult for customers to know where to turn and whom to trust to do the work.
- Many consumers have short planning horizons and prefer investments with near-term results, whereas the payoff for energy efficiency is more long-term.
- Building owners are skeptical about making an investment that won't transfer if they sell the property, particularly if access to capital is tied to their personal credit rather than attached to the property.
- High up-front costs can make access to capital a problem, especially for home and business owners with suboptimal credit histories or large existing debt burdens.
- Renters and owners are caught in a "split incentive" paradox in which the owner responsible for making capital investment decisions is not the same as the renter who pays the utility bills and reaps the benefits of improved building performance.

Any successful retrofit program must overcome these market barriers and increase individual consumer demand by making it cheap and easy to say "yes" to retrofits. Several local retrofit programs are showing increasing degrees of customer uptake by providing a complete retrofit product and then facilitating market transactions by:

- Creating a clear and accessible point of contact for the consumer for all information related to the retrofit.
- Requiring little or no up-front expenditures for customers who are cash-short, have inadequate credit, or who simply wish to spread their repayment obligation into the future.
- Financing at low interest rates.
- Designing a simple repayment mechanism that strives to remain cash-positive over time so that the energy savings are greater than the monthly loan payment.
- Ensuring that quality work is performed by certified contractors.
- Attaching the costs of the retrofit to the property title or the utility meter rather than the building occupant.
- Monitoring the work performed to verify the energy savings.

This list captures the most important characteristics of a successful retrofit program. Addressing all seven of them in a national retrofit program will go a long way toward overcoming the market barriers inhibiting customers from pursuing efficiency retrofits.

Businesses

Achieving real energy savings—and customer satisfaction—is largely contingent on the quality and the efficiency of the work being performed. Ensuring the integrity of this retrofit work by hundreds or thousands of new businesses across the country or existing

businesses entering this line of work will require national accreditation, monitoring, and verification for quality control.

Utilities, for example, are natural candidates to serve the home and small commercial retrofit market, but they often operate under an outdated regulatory system that creates disincentives for them to pursue cost-effective energy efficiency. Energy service companies have had success only by serving the large commercial, or MUSH—municipal, university, schools, and hospitals—segments of the real estate market. And the small number of building performance contractors currently serving the residential and small commercial markets have a tiny consumer base, consisting of proactive owners with access to financing, a long-term investment strategy, and often a measure of altruism.

To date, a paucity of successful business models and an unsupportive policy environment have severely hampered the growth of the private retrofit industry. The energy efficiency retrofit sector currently occupies only a small niche in the larger ecosystem of building contracting. Many businesses specialize in specific components of building performance, such as windows and heating, ventilating, and air conditioning systems—or HVAC—insulation, but very few businesses actually understand whole-building systems and the science and techniques behind comprehensive energy efficiency improvements.

But as a national industry grows, expect to see a proliferation of full-service building performance contractors qualified to perform or supervise all the requisite retrofit work. These full-service contractors will be able to perform most of the necessary work and hire and supervise subcontractors to bring down the total cost of a large pool of retrofits through specialization and efficiencies in the work performed.

Contractors currently shy away from individual residential and small commercial retrofits—one-off contracts for small jobs that include the time and opportunity costs of meeting with potential customers, assessing and estimating the cost of the job, and performing the actual work. Yet several local efforts show that it is possible to grow a pool of qualified businesses able to achieve profitability by accessing a large pool of ready customers. To thrive, businesses need the following market conditions:

- A mechanism to aggregate large numbers of individual retrofit projects in order to simplify the contracting process, reduce transaction costs, and help achieve economies of scale.
- A clear and dependable set of carrots and sticks—incentives and standards—that drive and reward customer demand, particularly at the outset as the market gets on its feet.
- A clear set of standards for contractor accreditation to ensure continuity across geographies and to support consumer confidence in the quality of work.

Let's consider each of these points in turn. A pool of customers can be aggregated by bundling multiple units into one retrofit contract or pooling retrofit projects by geography, for example, block-by-block or neighborhood-by-neighborhood. This aggregation could

Key ingredients for a national retrofit market

A national energy-efficiency retrofit market must bring together four groups of actors around new financing and cost-recovery mechanisms and performance standards to achieve long-term energy savings and carbon reductions.

- **Customers:** The owners and renters of residential and small commercial building whose properties would benefit from a retrofit, thereby reducing energy waste, saving money on utility bills, and improving the comfort of their homes or businesses.
- **Businesses:** Accredited building performance contractors, energy service companies, or other private-sector companies qualified to perform retrofit work subject to third-party verification.
- **Workforce:** The estimated 625,000 full-time-equivalent employees sustained over 10 years needed to perform direct retrofit work and some manufacturing of efficient building materials. In general, preparing this workforce will require only basic upgrades to existing skills already within the building and construction trades.
- **Financing and cost recovery:** A dependable source of inexpensive capital to pay for the upfront cost of the retrofit, with some security to lower the risk of creditor default, and a hassle-free mechanism for servicing the loan.
- **Institutions:** These include utilities, state and local energy agencies, municipal governments, or nonprofit organizations that oversee the market and coordinate transactions amongst the different actors. These institutions' primary responsibility is to increase demand by simplifying the retrofit process and removing market barriers.

be accomplished by a municipal government or non-profit energy efficiency utility providing a point of access for contracts with multiple customers within the same geographic area.

Consumer incentives are justified to incentivize individual action for the larger public good, but should be performance based to reward verifiable energy savings. Technology-based incentives, such as the \$1,500 tax credit currently available to homeowners through the American Recovery and Reinvestment Act, reward new products rather than energy savings, and often disincentivize low-cost, labor-intensive retrofit measures such as caulking and duct sealing because they reward only capital investments.

Standards for accrediting contractors and certifying workers are critical to growing an industry that is trusted by consumers and for enabling businesses to serve local markets throughout the country. Without adequate standards, there is a very real danger that sub-par work will do irreparable harm to the reputation of the retrofit industry, particularly in the formative growth years. Certification also offers more certainty to financial institutions. Retrofit financing will face lower default risks if quality retrofit work results in real energy savings.

The Building Performance Institute is the nationwide gold standard for accreditations for contractors and certifications for efficiency technicians. The Residential Energy Services Network is the national standards-setting body for building energy efficiency rating systems and energy rater certifications. These two institutions are the result of years of successful collaboration between industry stakeholders—and their standards should form the foundation of any national retrofit strategy. The Environmental Protection Agency's Home Performance with Energy Star program already incorporates these two standards and maintains a network of accredited contractors.

Nearly all successful local retrofit business programs utilize some sort of implementing institution to facilitate customer aggregation, streamline the contacting process, administer the financing, cost recovery and incentive packages, and verify the credentials of the contractor pool so that this administrative work does not encumber the business itself. Relieving businesses from performing these aggregating functions improves the profitability of the industry as a whole. Additional roles and the overall importance of these kinds of institutions are elaborated in detail on page 24.

Workforce

There is very promising job-creation potential associated with an ambitious scale-up of building energy efficiency retrofits. Yet the capability to rapidly train or re-train and certify workers to perform these jobs has the potential to create a bottleneck in the growth of a large-scale retrofit industry.

We estimate that retrofitting 50 million buildings over the next 10 years will create and sustain an average of 625,000 full-time-equivalent jobs for a decade. Most of these jobs will be in traditional occupations, repurposed and expanded with “green” skills, knowledge, and certifications.

Entry-level jobs in building efficiency retrofits include blowing insulation, caulking, and sealing air ducts. More advanced jobs include auditors who evaluate building performance, HVAC technicians, carpenters, and electricians. At the higher end of the training scale are the engineers versed in whole-house energy performance and the project managers who oversee multiple work crews. In general, most of the jobs created in the retrofit industry will require only basic upgrades to existing skills already existing within the building and construction trades.

Given the congruence between new jobs in the retrofit industry and more traditional construction jobs, enlisting an adequate supply of labor to serve a national retrofit market at scale will not be difficult. With over one-and-a-half million construction workers currently unemployed, there is a large reserve of ready labor in need of only moderate retraining and proper certification to enter the building retrofit workforce. This new retrofit market also creates an opportunity to build strong career ladders into jobs with family-sustaining wages for currently low-income and underemployed workers, connecting those who most need work with the work that most needs to be done.

Worker certification is necessary to guarantee the quality of retrofit work, and provides assurance to customers who would otherwise find it difficult to identify a qualified retrofit professional. Certification also helps elevate job quality across the industry and provide a foundation for career pathways into higher-skill specializations within the industry.



AP PHOTO/MARY ANN CHASTAIN

Workers install energy efficient windows in a home in West Columbia, South Carolina.

The current scarcity of certified workers should not impede the development of the retrofit market. As demand for retrofits increases, contracting companies will hire workers currently “on the bench” (skilled but unemployed), provide them with the necessary training, and assist them in obtaining the requisite certifications. This is one area where market mechanisms should function relatively well. Training and hiring pathways are well established in existing labor-management partnerships in the building and construction trades.

Third-party certifiers, such as the Building Performance Institute and the Residential Energy Services Network, are well established and deliver certifications that receive broad industry, government, and public support. These existing certifications should be relied upon heavily in the development of a worker certification system for the national retrofit market.

Despite the readiness of the labor pool and a template in place for worker certification, policy makers and industry stakeholders still confront two major challenges that the market will not automatically address:

- How to ensure that the jobs created in building efficiency retrofits are *good jobs* with living wages, benefits, and opportunities for advancement along career pathways?
- How to create pathways into the retrofit workforce for the economically disadvantaged to help lift people out of poverty and provide meaningful employment in a growing industry?

The first challenge is critical to ensuring that the building retrofit industry contributes to both short-term recovery and long-term economic development. It is not enough to simply create large numbers of jobs if these jobs are low-caliber. Retrofit jobs are not automatically good jobs, but they can be made so if adequate attention is given to the development of labor standards, wage classifications, training supports, and performance standards. A national strategy is critical.

The second challenge has received strong attention from community-based social justice groups, and increasingly from advocates on the national stage. There is a growing recognition that the emerging green economy can be a vehicle for reducing poverty and persistent unemployment. Civil rights, community, and workforce development groups have had various degrees of success in building these “pathways out of poverty” into good jobs in the emerging clean energy economy.

Less clear, however, is what these local efforts require from a national policy perspective in order to be successful. The Green Jobs Act, a piece of job training legislation originally passed in the 2007 Energy Independence and Security Act, contains specific language on building “pathways out of poverty.” Yet it has never been funded. The American Recovery and Reinvestment Act provides \$500 million for green jobs training, of which \$180 million is directed toward the economically disadvantaged—a good first step but still insufficient compared to the magnitude of the challenge. What’s more, this funding will expire in 2010.

One strategy being explored in several states and localities is a requirement that businesses that receive taxpayer support reach out and support disadvantaged or underserved populations through targeted hiring, workforce investment boards, apprenticeships, and similar programs. Ensuring that public funds are employed to benefit the broader public good is a smart and fiscally responsible strategy, with potential for application in a national retrofit market.

Financing and cost recovery

Financing and cost recovery represent two critical and interrelated components of the residential and commercial retrofit market. Financing provides the capital to pay for the up-front cost of the retrofit, and cost-recovery mechanisms establish a procedure for servicing the loan, typically in installments that are less than the anticipated value of the energy savings in order to create a transaction that is cash-positive for the customer.

Experience thus far shows that first-cost investment barriers (large out-of-pocket payments) are difficult to overcome. Consumers often have short investment horizons, tend to be skeptical of the energy savings projections, and are deterred by the “split incentive” challenge. Or they may simply not have the cash on hand or creditworthiness required to qualify for normal financing.

Even people with good credit and access to standard loans often don’t care to take on more debt, particularly if it is expensive debt, and particularly in today’s economy. Moreover, loan terms of 15-to-20 years are needed to achieve deep energy savings and still remain cash-positive in terms of monthly energy savings for the building owner. All these financial factors conspire against consumer demand for retrofits. (See box below.)

Access to low-cost financing and cost recovery in a national retrofit market can help remove these and other barriers inhibiting participation by both businesses and consumers. To overcome these barriers, a national retrofit effort must offer financing options with the following attributes:

- Inexpensive (low interest), with little or no up-front costs and hassle-free to the consumer.
- Accessible to those with below-average credit scores.

Hurdles to retrofit financing

- **High up-front costs:** High up-front costs are a deterrent for potential customers who lack the available cash to pay for the retrofit or face competing demands on a limited pool of funds. Even retrofit projects with a rapid payback will rarely take precedence over more pressing expenditures such as medical bills, mortgage payments, or car loans.
- **Split incentives:** Split incentives occur when the individual who pays the utility bill and would benefit from efficiency gains is not the individual who owns the building and makes the investment decisions. This most commonly occurs in a rental arrangement where the tenant pays the monthly bill and the landlord maintains the property and makes the capital investments. Rental units currently constitute about 30 percent of the U.S. residential housing stock.
- **Efficiency is an illiquid asset:** Americans move frequently, yet building retrofits are fixed capital investments that can not be easily transported. This creates an enormous disincentive to invest in cost-effective retrofits that may take 10 to 5 years to pay for themselves, particularly because the value of future energy savings is very difficult for the owner to internalize in the selling price of the property.
- **Difficulty securing the loan:** One reason private banks have thus far been reluctant to finance building retrofits is the difficulty establishing appropriate security for the loan. Energy efficiency retrofits simply do not constitute good collateral, and establishing a second lien on the property superior to the mortgage is a difficult procedure requiring the proper legal framework.
- **Suboptimal credit:** Many consumers who would be desirable to reach from an energy-savings perspective have a bad credit history, may be ineligible for a standard loan, or would be subject to an interest rate so high it would nullify the savings from the efficiency retrofit and result in a transaction that is no longer cash-positive.

- Recoverable by the lender through a repayment system that attempts to remain cash-positive for the consumer by amortizing the loan over a long term.
- Provides some security on the loan to lower the risk of default.

From a lender's point of view, this is not an easy mix of conditions to assemble.

Conventional financing options, including consumer loans from banks or credit unions, home equity loans, and energy efficiency mortgages have all been largely ineffective as a financing tool for energy efficiency retrofits due to the myriad barriers described above.

A recent study of over 150 residential energy efficiency loan programs revealed that most energy efficiency loan programs reach less than 0.5 percent of potentially eligible participants each year.³² These existing financing options should not be discarded as part of a national strategy to scale up building efficiency retrofits, but it is clear that an additional suite of financing tools will be necessary to build a national retrofit market.

Cities and states around the country are currently experimenting with innovative new approaches to financing and cost recovery, and their efforts offer insights as to how to deliver financing in a national retrofit market. One approach being explored in San Diego, CA—and elsewhere—is known as “on-bill financing,” where utilities provide a loan that is then serviced on the monthly utility bill.

“Tariffed installment payments” are a variant of on-bill financing that tie the repayment obligation to the utility meter rather than the customer, thus solving the problem of building-owner transience by transferring the loan to the new owner if the property changes hands. First Electric Cooperative, an Arkansas-based electricity provider, allows homeowners with good credit to secure loans of up to \$15,000 with a property lien, and the state of Pennsylvania provides secured loans up to \$35,000. In both of these approaches, the threat of utility shut-off adds a degree of security to the loan.

“Clean-energy assessment districts,” sometimes known as the PACE model, or Property Assessed Clean Energy, are being piloted in a few locations around the country, including Berkeley, CA, and Babylon, NY. This approach involves establishing a municipal financing district that enables individual building owners in the district to repay their loan over an extended term via a special assessment on their property tax bill or in some cases via a monthly municipal services fee, or “benefits assessment.” Initial loan capital is usually raised through a municipal bond, the financing can be secured by a lien on the property superior to the first mortgage, and the repayment obligation transfers with property ownership.³³

Implementing these innovative financing and cost-recovery mechanisms involves navigating a host of logistical, legal, and regulatory challenges, but states and localities are proving that these can be overcome. Problem is, the finance community has very little experience lending or investing for residential and small commercial energy efficiency retrofits. This

makes it difficult to gauge the riskiness of the investment and causes lenders to charge higher interest rates, discouraging consumers from taking out the loan. And the lack of a clear underlying security on the loan can give pause to prospective institutional investors, who otherwise might invest in these loans when lenders bundle them for sale in the secondary market.

A national retrofit effort will require policies to help drive down the cost of capital. Interest rate subsidies are one possible approach to drive down rates, yet this can be expensive for taxpayers. A cheaper approach is for the federal government to provide credit enhancements in the form of loan guarantees or bond insurance to help shoulder some of the risk and partially insulate lenders and investors against creditor default. These interventions would help leverage large amounts of private capital and lower interest rates for retrofit customers.

Finally, there is the potential of a national “Green Bank” or “Clean-Energy Deployment Administration,” now codified in legislation currently moving through Congress. A Green Bank could provide low-cost public financing or credit enhancements for retrofit programs, as part of a larger clean energy financing strategy targeting large capital-intensive renewable and energy efficiency projects. The CEDA is described in greater detail in the policy section below.

Institutions

Institutions such as utilities, state and local energy agencies, and municipal governments can be both the brains and the connective tissue of the residential and small commercial retrofit market, overseeing market transactions and coordinating the different actors. Their primary responsibility should be to increase demand by simplifying the retrofit process and removing market barriers normally confronted by consumers.

These intermediating institutions can take a variety of forms besides the ones listed above, including public-private partnerships such as the sustainable energy utilities operating in Delaware and Vermont.³⁴ In some cases, it may be a combination of several different entities. Here are some examples of responsibilities that may fall under their jurisdiction:

- Building public awareness of the retrofit program and its benefits.
- Serving as a focal point of contact for consumers looking for information and businesses seeking access to the market.
- Aggregating individual retrofit jobs to increase efficiency and scale.
- Coordinating bulk procurement to bring down the cost of materials.
- Facilitating transactions between all the different market actors.
- Maintaining a list of accredited contractors and periodically monitoring and verifying the integrity of their work.

- Providing and overseeing mechanisms for quality assurance and quality control.
- Publicizing and delivering incentives to the consumer or business.
- Administering the financing and cost-recovery systems best suited to the needs of the customer base.

One potential role for the federal government in helping to nurture a national retrofit market could be to provide financial support for the initial administrative costs of these institutions, which can be substantial. Once the core organizational infrastructure is built, however, the marginal cost of increasing retrofit volume is nominal.

These implementing institutions at the local, state or regional level should continue to be the primary market administrators in any nationwide retrofit effort. The objective should engender and incubate a self-sustaining national retrofit market, rather than to develop a federal program requiring administrative overhead, new bureaucracy, and annual appropriations.

Enabled and supported by reliable public investment, a vibrant marketplace—where energy efficiency is appropriately valued and thus profitably targeted by the private sector—can unleash a torrent of entrepreneurial businesses eager to capitalize on the chance to retrofit not just 40 percent of our nation’s existing residential and small business building stock but all of it.

That being said, Congress and the executive branch need to establish the ground rules, conditions, ongoing support and oversight of a national retrofit market. Congress will be responsible for developing appropriate legislation. Federal agencies will set standards, disseminate technical assistance, and facilitate financing. And equally important, the President can elevate the status of energy efficiency and urge a nationwide retrofit effort that responds to differences in regional conditions. These roles are all further elaborated in the following section.

Transforming the retrofit market: A strategy for moving forward

Creating a national building efficiency retrofit market will require changes in how we view and value energy efficiency in the marketplace. There are clear steps that both Congress and the Administration can take in the near term to begin building a low-carbon economy that prioritizes energy efficiency in the built environment, and supports diverse regional approaches. These include immediate legislative opportunities, executive action, and an ongoing outreach and public information campaign.

At the time of this writing, there are two major pieces of clean energy legislation moving through Congress. The American Clean Energy and Security Act of 2009, or ACES, passed the House on June 26. The American Clean Energy Leadership Act, or ACELA, was reported by the Senate Energy and Natural Resources Committee on June 17 and awaits Senate action in the fall, most likely in combination with legislation to reduce global warming pollution.

Both ACESA and ACELA contain valuable provisions that would help create a national energy efficiency retrofit market, but neither is sufficient to fully develop a “whole building” retrofit industry for the residential and small business real estate sector.

This section identifies provisions in ACESA and ACELA that should be kept or strengthened as these bills move through Congress, and describes holes where legislation could provide additional leverage. These policies are more fully elaborated in the Additional Recommendations section below.

The American Clean Energy and Security Act of 2009

ACESA contains a number of provisions that will help grow the retrofit market. Overall, this bill is strong—yet still incomplete—in its support of establishing a building energy efficiency retrofit industry at scale.

The most relevant provision in ACESA is the Retrofit for Energy and Environmental Performance program, or REEP, to support efficiency improvements in residential and commercial buildings. REEP provides states with funds for direct subsidies, energy audits, technical assistance, and workforce training. States are permitted flexibility to support

different retrofit financing strategies, with options including credit enhancements or interest rate subsidies, providing projects with initial up-front capital, and allocating funds for utility-run programs. REEP also requires that public and assisted housing retrofit projects receive a minimum of 10 percent of available funds.

REEP is funded through the State Energy and Environment Development, or SEED program, and must receive at least 5.5 percent of the allowances allocated to SEED, which itself receives 9.5 percent of total value of emissions allowances starting in 2012 and decreasing thereafter.

Despite REEP receiving a relatively small minimum percentage of overall SEED funding, the scale of state-initiated retrofit measures will significantly vary due to the leeway provided to states in how they spend their SEED dollars. According to the legislation, 20-to-80 percent of SEED allowances can be spent on various efficiency measures, including REEP. Other measures that can be funded through SEED include building performance labeling, renewable energy resources, smart-grid deployment and transportation projects.

The REEP program provides both prescriptive and performance-based pathways for home or building owners to qualify for direct support. In Section 202, the ACESA authorizes REEP grants for homeowners of \$1,000 for prescribed measures that achieve a reduction of more than 10 percent and \$2,000 for prescribed measures that achieve more than 20-percent reduction in energy consumption. For more stringent, performance-based retrofits, grants of \$3,000 are provided for residential building improvements that achieve savings of more than 20 percent, with an additional \$1,000 for awarded for every 5 percentage points above 20 percent achieved. Awards are also available for commercial buildings on a similar tiered structure, allocating from \$0.15-\$2.50 per square foot for demonstrated projects that reduce consumption 20 to 50 percent. Individual grant awards are capped at 50 percent of the total cost of the retrofit.

One important detail worth noting is that all retrofit work benefiting from REEP support must adhere to *high standards*. Residential Energy Services Network certification or Building Performance Institute certification is required for building auditors, inspectors, and raters—or an equivalent certification system as determined by the EPA Administrator—and retrofit contractors must be BPI-certified or licensed by the states. This strategy of tying access to federal funding to high standards is essential to developing a quality national retrofit industry capable of satisfying customers and achieving verifiable energy savings.



A technician from Sustainable Spaces, a home performance contractor based in San Francisco, conducts a blower door test to identify air infiltration.

ACESA introduces a new federal regulatory approach to drive adoption of renewable energy and energy efficiency by utility companies. The Combined Efficiency and Renewable Electricity Standard, or CERES, requires utilities to obtain 20 percent of their electricity from clean, renewable energy by 2020. Utilities must meet 5-to-8 percent of the total 20 percent through energy efficiency gains, defined as reductions in energy consumption relative to business-as-usual projections. Most likely, much of this energy savings will be obtained in the industrial and commercial sectors, where large efficiency gains are readily available and easier to access from large facilities than from small and heterogeneous buildings. Innovative tools for aggregating residential and small commercial energy efficiency are being developed that may ultimately increase the ability for these sectors to contribute more significantly. But ultimately, a more ambitious and independent Energy Efficiency Resource Standard is needed, as explained later in this section.

ACESA also creates the Clean Energy Deployment Administration, or CEDA, a public “green bank” established to serve as a government-owned independent corporation.³⁵ Authorized for an initial capitalization of \$7.5 billion, CEDA will support the private capital market by offering access to affordable financing for accelerated and large-scale deployment of clean-energy and energy-efficiency technologies. CEDA includes as one of its stated goals to support the “sufficient availability of financial products” to encourage and enable the private sector to make energy efficiency improvements in residential, commercial and industrial settings.

CEDA will provide support in the form of direct loans, letters of credit and loan guarantees. Significant attention is given to the development of breakthrough technologies, yet the effort can also provide important capital for deployment of energy efficiency projects. The creation of this new entity will significantly help overcome barriers to project finance resulting from the collapse of credit markets and will offer new opportunities for establishing innovative energy efficiency financing mechanisms.³⁶

CEDA credit support includes a wide-ranging toolbox that will assist states, localities, and the private sector in rolling out innovative mechanisms to finance building energy efficiency retrofits, including municipal bonds, utility loans with on-bill repayment, and commercial banks more inclined to provide loans for retrofits once CEDA lowers the technology risk associated with a lack of historic performance data.

Notably, access to all forms of direct support from CEDA are contingent on the borrower providing reasonable assurances that the construction work being financed will pay prevailing wages and adhere to a set of labor standards established by the Secretary of Labor according to existing statutes.³⁸ As is the case with REEP, CEDA ensures that public dollars are being utilized to build a high-road economy that engenders widespread social benefits and contributes to long-term economic development.

Finally, ACESA contains several significant provisions for energy efficiency retrofits originally put forth by Rep. Ed Perlmutter (D-CO) in H.R. 2336, the Green Resources for Energy Efficient Neighborhoods Act, including:

- Assisting in the development of location- and energy-efficient mortgages by developing and recommending model mortgage products and underwriting guidelines, and by facilitating the development of green banking centers that will provide information to customers who wish to seek information regarding such mortgages and similar loans.
- Directing Fannie Mae and Freddie Mac to develop loan products and flexible underwriting guidelines to facilitate a secondary market for location- and energy-efficient mortgages for very low, low- and moderate-income communities that facilitate energy efficiency, renewable energy improvements or both.
- Establishing incentives for mortgages for energy-efficient multifamily housing.
- Requiring residential and non-residential buildings owned by the Department of Housing and Urban Development to comply with energy-efficiency standards, including those set forth by ASHRAE, the American Society of Heating, Refrigerating and Air-Conditioning Engineers and the 2009 International Energy Conservation Code, which are the two principal recognized standards for commercial and residential building efficiency.
- Establishing a residential energy efficiency block grant program for single-family or multi-family housing.
- Requiring that federally related transactions appraisers must consider any renewable energy sources, energy efficiency or energy conserving improvements or features of the property.
- Establishing a revolving loan fund for states and Indian tribes that allow for 10-year loans to be made for renewable energy sources and energy efficiency improvements for structures.
- Authorizing HUD to guarantee the repayment of green portions of eligible mortgages pertaining to the new construction of single or multi-family housing or sustainable building elements for housing units.

The numerous provisions contained in the Green Resources for Energy Efficient Neighborhoods Act are valuable contributions to a larger strategy of market transformation, but most of them are incremental refinements to existing housing market architecture, rather than drivers for dramatic innovation.

The American Clean Energy Leadership Act

As passed out of the Senate Energy and Natural Resources Committee, ACELA includes three provisions critical to market transformation, and is a very strong bill in its offerings for building efficiency retrofits. However, like ACESA, ACELA is missing a few key policies necessary to dramatically change the rules of the game. These missing pieces are articulated after this summary of the legislation.

The State Energy Efficiency Retrofit program, or SEER, authorizes competitive grants to states to implement residential and commercial retrofit programs. For the residential sector, the program provides for grants of \$1,000 to homeowners who undertake prescribed efficiency improvements that result in 10-percent reductions in energy use and \$2,000 for 20-percent reductions, based on a list of energy savings measures determined by the Secretary of Energy. If the homeowner pursues a verifiable, performance-based approach, the grant award increases to \$3,000 for 20-percent reductions and up to \$12,000 or 50 percent of the total retrofit cost for achieved savings above 20 percent. Savings must be documented using approved whole-house simulation software, or through a test-in/test-out—before and after—HERS Index measurement. For quality-control purposes, at least through year one, 15 percent of performance-based retrofits are subject to third-party verification. Contractors must achieve a level of certification determined by the EPA administrator in consultation with the Secretary of Energy.

ACELA establishes a similar program for commercial retrofits, providing grants of \$0.15-\$3.00 per square foot for energy savings of 20-to-50 percent—slightly higher than provisions found in ACESA. Funding for both the residential and commercial retrofit grant programs would be evenly split, and the authorization is based on “such sums as are necessary” for the years 2010-2015. However, since the Senate has yet to determine the allocation of funds from carbon emission credits for ACELA, the actual funding available for the SEER program remains to be determined.

Section 266 of ACELA creates the Home Energy Retrofit Finance Program that authorizes grants to states to capitalize revolving loan funds to finance residential retrofit projects directly through interest rate buy-downs—not more than 20 percent—or direct funding or other financial support. To qualify for these grants, states—or the qualified program delivery entity of their designation—must establish a method for homeowners to pay back loans over time, through such techniques as property tax bill payback, energy utility programs that offer “on-bill” financing, as well as traditional financing. In general, this home retrofit finance program helps incentivize states to build the financing and cost-recovery infrastructure necessary to deliver effective and sustainable retrofit programs.

Also of significance is that ACELA authorizes \$1.7 billion per year from 2011 to 2015 for the Weatherization Assistance Program (Section 251) for low-income households, and \$250 million per year to the State Energy Program (Section 255). Section 242 establishes

the Multifamily and Manufactured Housing Energy Efficiency Grant Program for state and local governments or non-profits to establish and work to promote efficiency programs in this sector as well.

Other sections of the bill support retrofits by improving the quality and availability of performance data for building energy efficiency. Section 281 attempts to bolster building data gathering by improving the Residential and Commercial Energy Consumption Surveys, and improve information on comparative energy use. Among other things, Section 282 directs the Secretary of Energy, within 2 years of enactment, to promulgate uniform rules for documenting building energy savings and avoided greenhouse gas emissions from retrofits programs.

ACELA also includes a “Green Bank” or Clean Energy Deployment Administration provision similar to the one in ACESA, with some differences in authority and institutional structure. One notable strength of the House proposal is that it creates an independent agency housed outside of the Department of Energy. This structure would likely speed deployment of projects. In addition, the House version specifically ensures that investments will flow to a diverse array of technologies, further encouraging energy efficiency project development.

With several other committees working on global warming legislation and Senate leadership not calling for floor action before October 2009, there remains a significant window of opportunity to influence the final content of the Senate bill, which could be improved or expanded upon in important ways. Specifically:

- An independent Energy Efficiency Resource Standard of 15 percent by 2015 could easily be justified, based on the cost-effectiveness of energy efficiency as a carbon emission reduction strategy, and would be very helpful in rapidly driving conservation and efficiency opportunities. A recent report by the American Council for an Energy-Efficient Economy found that such a standard would yield 222,000 net permanent quality construction and manufacturing jobs in addition to preventing the emission of 262 million metric tons of greenhouse gas emissions—the equivalent to taking 48 million cars off the road.³⁹ A guaranteed demand for these projects would have real benefits in providing certainty and security to lenders and investors.
- Local electric utilities are currently the recipients of 35 percent of all free carbon emissions allowances. They could be required to dedicate a significant share of this money to energy efficiency programs approved by State Public Utility Commissions or established through the states. ACESA currently requires that natural gas utilities and home heating oil, propane and kerosene distributors use one third and one half, respectively, of their allowance allocation for cost-effective energy efficiency programs to reduce overall fuel costs and lower consumer energy bills. Using widely accepted estimates, this requirement will result in a \$3 billion annual investment by natural gas utilities and another \$1 billion

by oil, propane, and kerosene distributors. A one-third requirement for electric utilities would result in an additional annual investment of \$10 billion, enough to create an additional 125,000 full-time-equivalent direct and indirect jobs and finance one million whole building retrofits, assuming an average \$10,000 investment per retrofit.

- Link federal financial support for state and local energy efficiency efforts including technical assistance and other retrofit incentives to: high standards for workforce training and certification, contractor accreditation, and job quality; measurement, monitoring and verification of retrofit performance data; and access to utility usage data. Creating a sustainable national market for energy efficiency, and standing up a high-quality industry to serve this market, will require a policy architecture that is developed deliberately, with high standards and built-in access to good data established at the outset. ACESA goes further than ACELA in these regards, but whatever legislation emerges from the Senate floor or House-Senate conference should be stronger still.
- Include provisions for accelerated depreciation, investment tax credits, and other incentives for smart meters, advanced HVAC, and other energy-efficiency technology, to accelerate adoption of advanced energy-saving technology, particularly in the commercial sector. Incentives of this nature are effective at encouraging upgrades to more efficient equipment, particularly in a time when many businesses are reluctant about making major capital improvements.

Long Island Green Homes

The Long Island Green Homes Initiative in Babylon, New York is a residential energy-efficiency program that provides retrofits at no upfront cost to homeowners. When a resident chooses to participate in the program, an accredited energy auditor performs an evaluation of the house. The resident receives a report on how their home uses energy, what retrofit measures would reduce energy waste most cost effectively, and an estimate of the savings the homeowner could expect.

The owner then chooses the improvements they want. A Building Performance Institute-accredited private contractor performs the work,

and the town pays the contractor from its solid waste fund, which creatively expands the definition of waste to include carbon emissions. Homeowners then repay the town in monthly installments on their municipal services bill through a benefit assessment on the property.

These monthly payments are typically lower than the energy savings, resulting in a positive cash flow to the resident. And the benefit assessment stays with the property when it is sold, thus overcoming the challenge of owner transience.

Recommendations for the executive branch

Beyond the specific legislative policies listed above, there are a number of immediate actions that could be undertaken by executive branch agencies to support a national program of building retrofits. Strong White House leadership is needed to coordinate across agencies, starting with a concerted push for energy efficiency deployment and financing. The White House should establish a Presidential Task Force on Low-Carbon Energy Infrastructure and Economic Transformation, prioritizing cost-effective energy efficiency in the built environment, and supporting this commitment with the full engagement of all Cabinet agencies. Other policies that could be coordinated through this White House Task Force are included below.

These policy recommendations are organized into five discrete categories, each representing an unmet need for scalable solutions to build a sustainable energy-efficiency market. These include:

- Technical assistance and capacity building.
- Financing and cost recovery.
- Performance standards and quality assurance.
- Smart regulations to reform the energy market.
- Workforce development.

A successful program of market transformation requires that progress is made on all tracks simultaneously. For instance, policies to dramatically increase demand for energy efficiency services—such as new consumer incentives—must be balanced with financing tools and new utility regulatory regimes sufficient to allow the retrofit industry to become established. Scaling up demand too rapidly before the product delivery infrastructure is in place could lead to consumer dissatisfaction and a poorly functioning market. In the past, these “chicken-and-egg” problems have led to stalemate and inaction.

Technical assistance and capacity building

Successful state efficiency programs such as leading programs in California, New York, and Texas require a great deal of expertise and human resources to develop, implement, and maintain. Many states simply do not have the capacity or dedicated resources to capture the potential efficiency opportunity.

This problem is exacerbated by the economic downturn, which is severely crimping state fiscal resources. The federal government could play an extremely useful role in facilitating the transfer of resources, tools, and public models to state energy offices, utilities, and other intermediaries to help build stronger institutions across the nation and establish common protocols and better monitoring and quality assurance. We have two specific recommendations for the administration:

Establish a “National Energy Efficiency Advocate” within the Department of Energy or jointly with the Environmental Protection Agency to provide technical assistance to state and local stakeholders. Many utility commissions, energy offices, and other policymakers do not have the time or resources to gather and analyze detailed energy consumption data or to digest and enact the many examples of best practices available to them. Yet this data will be critical to assessing the success of building efficiency measures and making the case for investment in them. A national efficiency advocate could provide a dynamic link between federal government resources and policymakers at the local, state, and regional level through:

- Economic analyses.
- Information technology tools to track energy savings and greenhouse gas emissions.
- Legislative and regulatory templates and implementation road maps.
- Innovation success stories.

Develop a model state energy-efficiency planning framework, based on the best practices employed by leading states. Funding should be provided to the states to develop their plans according to protocol designs and data standards that will allow the 50 individual outputs to be assembled into a single national plan.

Financing and cost recovery

Two key barriers to scaling-up demand for retrofits are high up-front project costs and a lack of access to low-cost financing. The federal government can help address this issue by lowering the risk and cost of project financing, supporting the proliferation of innovative financing and cost-recovery mechanisms at the state and local levels, and convening a broad dialogue with the financial services and insurance communities on establishing the information base needed to mainstream efficiency-related financial and insurance products.

There are a number of innovative ways to help consumers finance the up-front costs of a retrofit, including performance contracting, on-bill or on-meter financing, retail installment contracts, and incorporating efficiency retrofits into new mortgage financing.

Currently, energy efficiency retrofits require up-front capital that, in most cases, requires homeowners and businesses to seek loans. Lending institutions require that their investment be appropriately collateralized to reduce their risk in the transaction. However, loans

for retrofits are typically not first-lien loans—mortgages are—but rather second-lien or perhaps even third-lien loans, which translates into higher borrowing costs.

This problem is further exacerbated by the current conditions in the credit market, where lenders are reluctant to lend to anyone but the most creditworthy and where lenders cannot sell these loans to institutional investors in the secondary market. Property tax liens programs such as the Property Assessed Clean Energy program described on page 23 appear particularly attractive, because they overcome the lien barrier and dramatically reduce the risk for the lender

The administration should open and accelerate a dialogue to address issues and questions surrounding the implementation of such a program on a nationwide scale for all stakeholders. Within this dialogue, the Department of Housing and Urban Development should commit to examining underwriting standards so that buildings with efficiency investments financed through property tax liens do not become a separate and complicated class of assets that investors try to avoid.

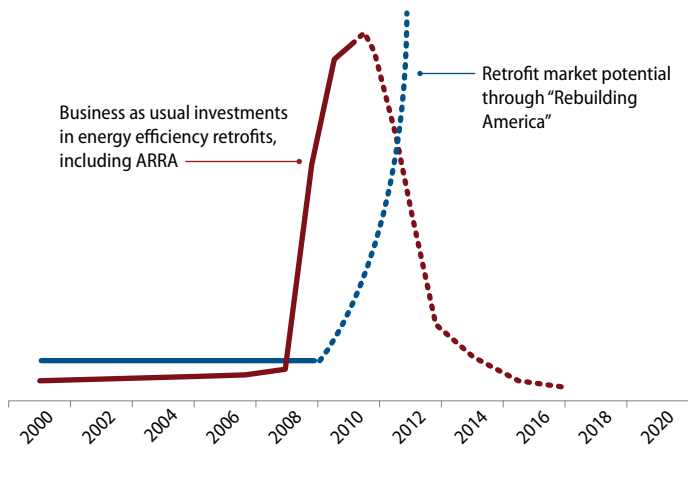
Because the potential market for retrofit financing is much too big to be funded solely through a government effort, the federal focus needs to be on credit enhancements to reduce risk for private investors. The federal government should establish an independent entity to lower the cost of capital and risk involved with any of these programs by granting access to low-cost government financing or loan guarantees.

The Clean Energy Deployment Administration, or CEDA, proposed in both the House and Senate energy and climate bills is a good first step in this direction. CEDA is a government-owned independent bank that would provide the type of financing described above, along with some limited direct lending. Congress should adopt the House proposal to set the bank up as an independent entity and capitalize the effort with at least \$10 billion. Energy efficiency projects, which have development timelines measured in months rather than years for renewable energy projects, should have priority status within the CEDA approval process.

Given that the fate of clean-energy legislation in Congress is unknown, the Department of Energy should reexamine its existing loan guarantee program established under Title XVII of the Energy Policy Act of 2005, the department should identify ways it could be employed to provide credit support for private financing of energy-efficiency retrofit programs.

The administration and Congress should also amend federal mortgage rules to capture the value of energy efficiency. As part of new banking rules now being developed, banks should adopt new mortgage underwriting criteria to include energy and transportation costs so that the value of energy efficiency is fully captured in every mortgage. Buyers purchasing energy-efficient homes should have their lower monthly energy costs reflected in the amount they are allowed to borrow—as provided by Fannie Mae—the Federal Housing Administration

Transforming the market for energy efficiency retrofits



and other housing agencies. Some of these changes are reflected in the GREEN Act provisions in ACELA, and should be added to the Senate bill.

Any large-scale restructuring of home mortgage loans should include a trigger for whole-home energy audits and retrofit financing as a part of the mortgage refinancing process. Such a measure would improve the long-term value of the assets, thus offering greater security to lenders even as it reduced operations and maintenance costs creating greater affordability for homeowners.

Insurance companies have had a difficult time evaluating how energy efficiency improvements affect the risk profile of a building—yet another example of market failure. The administration should engage the insurance industry and lead an effort to locate

and consolidate all performance data on high efficiency buildings, including average energy savings, emissions reductions, changes in vacancy and lease rates, and other information, to provide the insurance industry with adequate actuarial data to appropriately reflect the value of energy efficiency in its loan products. This effort will also help reveal precisely how much building energy efficiency reduces risk and lowers operating costs, and how the market value of efficient buildings compares to that of comparable yet inefficient building stock.

In addition, the administration should ask Congress to create incentives for time-of-sale energy audits and energy consumption disclosures to make energy data more available and to facilitate energy use-based valuation adjustments. These data should also be provided to insurance companies to promote the value of building energy efficiency in setting terms for their insurance products.

Finally, the administration should work with Congress to establish new banking rules to allow energy efficiency investments to count as equity on a dollar-for-dollar basis in the recapitalization of commercial buildings. As commercial property values fall in the current financial environment, banks are demanding that building owners increase their equity in the property. Commercial landlords should be allowed to treat efficiency investments as increases in their equity.

To help ameliorate pressures in the commercial loan market—with at least \$300 billion of commercial-multifamily loans set to mature later this year and in 2010—Treasury and the Internal Revenue Service should take administrative action to mitigate the tax impediments to commercial mortgage loan modifications, provided that building owners agree to perform cost-effective efficiency retrofits—those with a 5-to-10 year payback—to enhance the value and reduce the operating costs of their buildings

The administration should also work with the appraisal industry to update the Uniform Standards of Professional Appraisal Practice to take the increased value resulting from a building retrofit into greater account. The administration should simultaneously work with Congress and the commercial banking industry to identify other regulatory requirements to amend, in order to accommodate greater consideration of efficiency in building value, including maximum loan-to-value limits, debt service coverage tests, and the use of third party appraisals.

There is a very real chance that over the next year or two the crisis in commercial real estate could metastasize and seriously threaten the tenuous stability of the U.S. economy. The Obama administration, in this case, is sure to feel pressure to extend a lifeline to commercial lenders and/or owners. If the administration does move ahead with any type of federal assistance, then it should capitalize on the opportunity to leverage major energy savings from commercial buildings. There is a diversity of policy options available that could all be tied to an energy efficiency retrofit—from interest rate subsidies on refinanced mortgages to loan guarantee programs to instituting a temporary moratorium on commercial foreclosures.

Regardless of the specific intervention, the additional marginal costs incurred by the government and building owner to finance the retrofit will be far outweighed by the net economic benefit of these capital improvements and reduced operating expenses over time, not to mention the long-term benefits of efficiency savings for energy security, public health, and climate stability.

Performance standards and quality assurance

National policy has a critical role to play in reducing complexity and uncertainty in the retrofit market, improving transparency for consumers, and providing businesses with a clear set of expectations. The development of a national set of protocols and standards to govern the retrofit industry is critical to establishing the clear and level playing field necessary for the market to function properly.

Thus, the administration should work with stakeholders to codify a basic protocol for energy audits, and national standards for building efficiency rating systems, worker technical certifications, contractor accreditation, verification of energy savings, and assessment tools for cost-effectiveness of different retrofit measures. In fact, the imperative for a uniform set of evaluation, certification, performance, measurement and verification standards is so great that adoption of these nationwide standards at the state and local levels should be a precondition to receiving incentives and other supports within a national retrofit policy.

The administration should also establish national standards for energy efficiency labeling of buildings. As the Energy Star program has demonstrated for appliances, a nationally

recognized performance standard can significantly increase customer confidence and brand awareness of energy efficiency, driving increased market penetration.

Fortunately, even in the absence of a national retrofit policy architecture, many of these national standards already exist, having been developed over time through broad collaboration between industry, government, and public stakeholders. The Home Energy Rating System, or HERS index is developed and administered by the Residential Energy Services Network, and is widely utilized across the building industry by certified home energy raters to measure the relative energy efficiency of residential structures. And, while not quite as ubiquitous as HERS, RESNET also maintains the National Home Energy Audit Standard, which provides a framework for the actual audit process. Meanwhile, the Building Performance Institute provides nationally-recognized certifications for all types of building efficiency technicians, and accreditations for contractors.

The Home Performance with Energy Star program, which is a joint program of the Environmental Protection Agency and the Department of Energy, is a nationally accepted model for retrofitting existing homes, incorporating contracting and quality assurance standards, including third-party verification, and an active network of accredited contractors. Home Performance with Energy Star represents a successful program and brand in the home retrofitting industry and is a tested existing system for retrofitting homes. The administration should consider basing national standards on the Home Performance with Energy Star model, while continuing to strengthen and improve upon it.

The widespread acceptance of RESNET and BPI certifications and accreditations, and the Home Performance with Energy Star program, are the result of years of successful cooperation between diverse stakeholders in the industry, and their standards should form the backbone of any formal set of national retrofit standards developed by the administration.

The Obama administration also should create and disseminate nationwide methodologies for measuring and verifying energy savings and assessing cost-effectiveness. There has been a proliferation of state and local methodologies to evaluate the effectiveness of efficiency investments in the absence of a nationwide approach to building retrofits. Yet programs vary widely in their quantitative rigor, data inputs, assumptions and reporting timeframe. A lack of standard measurements makes it difficult or impossible to do any comparative studies or performance benchmarking across jurisdictions. Without national standardization, the cost and time commitment of understanding and complying with different definitions of “cost effective” and measuring real energy savings increases exponentially as contractors expand their operations. This hampers efforts to operate nationally. A national standard will also provide needed consumer awareness and confidence in retrofit savings, to help bolster and grow demand for energy efficiency services.

The Department of Energy (through the national labs) or the National Institute of Standards and Technology should evaluate existing methodologies for measurement and verification

of energy savings and cost-effectiveness, and establish nationwide standards for states and localities to follow in order to access federal grants or credit enhancement programs. Linking access to federal resources to adoption of national standards will motivate rapid uptake of the new standards and integration of these tools into existing local retrofit programs.

Utilities companies also have roles to play. They should be required to provide energy consumption data to federal agencies and to consumers to help further refine energy efficiency standards around the country. The availability of energy usage data is fundamental for consumers in making the retrofit investment decision as well as being central to any monitoring and verification scheme. Utilities are often reluctant or unable to release this information, for business, technical or legal reasons. When data is available, it is often provided in cumbersome formats that are difficult to for consumers to manipulate and use.

What's more, the type of data and metrics available varies across jurisdictions and sometimes within service territories, making it very hard for consumers to understand and make informed decisions about their energy use patterns. Utilities and regulators will need to address a number of issues including customer information system functionality, customer privacy and security issues, data quality standards and appropriate metrics, cost recovery policies, smart meter deployment, and standardization of electronic transmissions.

The Environmental Protection Agency recently published a report outlining the steps required to improve energy efficiency data collection and sharing.⁴⁰ The EPA should work with the Department of Energy and the national labs to evaluate existing best practices in customer data sharing and work with utilities, regulators, and other stakeholders to create a technical and legal roadmap to standardize the type and format of data shared. This effort should be accompanied by federal support to help utilities, municipals, coops, and other entities that currently hold customer data as they convert to new data standards.

Smart regulations to reform the energy market

As soon as it reaches his desk, President Obama should sign a robust clean-energy and climate legislation that puts a price on pollution and invests in solutions.

This legislation should include a robust national energy efficiency resource standard of 15 percent by 2015 that is “approach neutral” and allows states to meet the efficiency targets in the manner best suited to their unique conditions. In most cases, the most effective way to do so will be to change utility regulations to provide an incentive for pursuing all cost-effective efficiency at a level that reflects the benefit to society. DOE would provide guidance and assistance to regulators and utilities through the new efficiency advocate office to facilitate the transition, with particular focus on programs that take a “whole building” approach and that aggregate individual retrofit projects to achieve economies of scale, reduce investor risk, and provide an easier interface with contractors.

The administration also should review how governors have fulfilled their commitments, as a condition of receiving funding under the American Recovery and Reinvestment Act, to implement policies that align utilities' financial incentives with helping their customers use energy more efficiently. In the meantime, the Federal Energy Regulatory Commission should explore its ability to direct Regional Transmission Organizations and Independent Systems Operators, which coordinate the movement of wholesale of electricity across several states, to include demand response and energy efficiency assets in forward capacity market auctions for energy supply.

About half of U.S. electricity is consumed in areas covered by a Regional Transmission Organization or an Independent Service Operator that ensures adequate supply to meet demand by holding periodic auctions for future electricity capacity. Enabling aggregated quantities of demand response and energy efficiency to participate in these auctions could transform the electricity market landscape, because these "resources" almost always cost less than fossil fuel generation and are readily available throughout the country.

Recently, New England ISO and PJM Interconnection—a Regional Transmission Organization—have allowed demand response and energy efficiency assets to be treated as a part of the auction on equal footing with traditional power generation. Both efforts resulted in large amounts of energy efficiency and demand response being committed and substantially lowered the overall price to acquire electricity by underbidding the price to deliver most new and some existing generation. FERC should direct the RTOs and ISOs to replicate these models in their forward capacity markets and provide the technical and financial support necessary to adapt this practice to specific regional circumstances.

Specifically, FERC, with additional authority provided by Congress if needed, should expand and build upon FERC's Order 719 to require that all cost-effective demand-side capacity be deployed before any new capacity is built thereby putting energy efficiency on an equal footing with new generation in utility planning. Regulatory processes should allow Aggregators of Retail Customers—whether utilities, non-profit energy efficiency utilities, or other institutions—full access to compete in capacity markets on an even footing with traditional electricity suppliers, and allow other entities such as cities, or other third parties that aggregate residential and small business retrofit projects to participate in organized wholesale energy markets to appropriately recognize the ability of energy efficiency and demand management to play a robust role in meeting energy demand.

FERC should also call on state regulators to codify an electricity loading order that prioritizes cost-effective energy efficiency investments to meet increasing anticipated demand. Currently, most state regulators turn initially to the cheapest source of new generation to meet growing demand for power. Energy efficiency is rarely even given equal weight as a resource. Switching this logic, and encouraging state regulators to proactively pursue the enormous potential of cost-effective energy efficiency in buildings and equipment, could have major transformative effects on the market for efficiency.

Workforce development

The administration should be sure to enforce and periodically update national certifications for requisite skill sets in the retrofit workforce. Consistent national standards and certifications will be easier to enforce, improve confidence in the skill level of the workforce for consumers and employers, and increase the marketability of workers who earn them.

To help meet the demand for a skilled and certified workforce, the Obama administration should work with Congress to establish national guidelines for worker training programs. In order to ensure a steady flow of qualified workers to service the retrofit industry at all levels, the Department of Labor, Housing and Urban Development, the Small Business Administration, the Department of Agriculture, and the Department of Commerce's Economic Development Administration and Minority Business Administration and the Department of Energy should collaborate to identify existing successful training models and link federal support to their adoption.

Training the efficiency workforce starts by building a pool of candidates with basic job skills. Programs should encourage collaborative workforce development through promotion, outreach, recruitment, and pre-apprenticeship programs with an emphasis on successful public-private workforce training partnerships with community-based organizations. Promoting labor-management training programs can foster career ladders for incumbent workers in the retrofit industry. Training models should also offer "pathways out of poverty" for disadvantaged workers and others entering the clean energy workforce, including providing a pipeline into formal placement in registered, jointly-administered apprenticeships.

Training programs must be coordinated with job placement efforts so that trainees have a reasonable expectation of employment once training is complete. Where demand for workers is outpacing training, programs should encourage high-quality on-the-job training so workers can "learn while they earn." The use of community retrofit workforce agreements with enforceable construction career policies should be encouraged, as well as local hire rules, collective bargaining and other tools to ensure the industry creates long-term careers rather than short-term jobs.

Investments in education are critical to developing a skilled workforce but also to fostering innovation in the science of building efficiency. The administration should provide universities, colleges, and community colleges with resources to expand their engineering department course offerings to include curricula associated with developing, installing, operating, and maintaining energy efficiency technologies as well as measuring and verifying energy savings. Resources should be allocated to land grant colleges to train engineers in the building efficiency issues unique to rural communities.

Existing federal weatherization programs are a good point of entry for apprenticeships in building energy efficiency retrofitting trades. Programs should ensure current weatherization workers enjoy highest worksite standards and encourage workers to continue training and move into more sophisticated and higher-paying retrofitting markets, and careers in the building and construction trades

Any national guidelines for workforce training must be supported by and tied to consistent and adequate funding to facilitate implementation. The administration should work with Congress to establish a permanent funding stream for the Green Jobs Act authorized in the 2007 Energy Independence and Security Act, and to reauthorize the Workforce Investment Act this year.

The last word

The American people today face an economy buffeted by sustained job losses, contracting consumer demand, declining purchasing power, and tight credit conditions. The Great Recession, now 20 months old and counting, is probably at least as frightening to the average American as the gathering threat of global warming. Yet the prospect of rebuilding our homes and businesses to capture the gains from energy efficiency provides a rare opportunity to restore our economy by reinvesting in our communities while simultaneously reducing global warming pollution.

The United States can build a low-carbon economy by harnessing energy efficiency as our “first fuel.” The cheapest and cleanest source of power is the energy we never have to use. By retrofitting existing buildings with the latest energy-saving materials and appliances we can cost-effectively reduce waste and pollution while jump-starting economic recovery, creating good jobs, reinvigorating our manufacturing sector, and providing consumers with real energy cost savings. These same steps will help ensure a safer, healthier, and more secure future by deploying the lowest-cost strategy for reducing carbon emissions.

In short, energy efficiency makes the United States more productive, more competitive more secure and more prosperous. Yet without the public policies described in this report, the private sector acting alone will not invest to realize the clear private and public benefits of deep and comprehensive energy efficiency retrofits, and the harm we are doing to the global climate will continue unabated. Today, America needs immediate and decisive public action. This includes a strong roll for federal government leadership from both Congress and the Obama Administration, including fixing incentives for capital investment, improving information flow to the market, and finally putting a price on global warming pollution. Over time, however, the public-sector role in jump starting these new energy efficiency markets can be reduced as the private sector develops durable business and finance models and a new and vibrant industry steps in to create good jobs “Rebuilding America” for a clean energy future.

Glossary

Aggregators of Retail Customers: Businesses that pool efficiency or demand side- management capacity of smaller retail loads into a single larger account in order to bid the availability into organized energy markets, including forward capacity markets.

American Clean Energy and Leadership Act, or ACELA: Legislation passed out of the Senate Committee on Energy and Natural Resources on June 17, 2009, that contains a number of energy efficiency-related provisions, including the Clean Energy Deployment Administration and retrofit incentives for residential and commercial buildings.

American Clean Energy and Security Act of 2009, or ACESA: A comprehensive clean-energy and climate bill passed by the House of Representatives on June 26, 2009, that includes, among other things, renewable energy and energy efficiency standards for utilities, retrofit incentives for residential and commercial buildings, and a cap-and-trade program to reduce greenhouse gas pollution.

American Recovery and Reinvestment Act of 2009: Economic stimulus package signed into law on February 17, 2009, that includes funds for building energy efficiency, renewable energy, and state and local clean-energy programs.

Building Performance Institute: Nationally-recognized organization that provides workforce certification, contractor accreditation, and quality assurance verification.

Clean-Energy Assessment Districts: A method of financing retrofits in which a special municipal financing district is established that allows individual building owners to repay their loan over an extended term via an assessment on their property tax bill.

Clean Energy Deployment Administration: Two different versions of CEDA have been proposed in ACESA and ACELA, that establish an independent, government-owned “green bank” to provide direct loans, letters of credit, loan guarantees and other financial instruments to support clean energy projects.

Energy Efficiency Resource Standard: An Energy Efficiency Resource Standard is a market-based mechanism to encourage more efficient generation, transmission, and use of electricity and natural gas. An EERS requires utilities to reduce demand at a certain percentage below business-as-usual growth projections.

Energy Service Companies: Businesses that “develop, install, and arrange financing for projects designed to improve the energy-efficiency and maintenance costs for facilities over a 7- to 20-year time period. Energy service companies generally act as project developers for a wide range of tasks and assume the technical and performance risk associated with the project.”⁴¹

Forward Capacity Market: A market used by regional transmission organizations and independent system operators “to purchase sufficient capacity for reliable system operation for a future year at competitive prices where all resources, both new and existing, can participate.”⁴²

Green Jobs Act: Legislation passed as part of the Energy Independence and Security Act of 2007 to help train American workers for jobs in the renewable energy and energy-efficiency industries, with resources targeted specifically at underserved populations. The Green Jobs Act has yet to be funded, although \$500 million in training money consistent with the principles of the Green Jobs Act was provided in the American Recovery and Reinvestment Act.

Home Energy Rating System: The HERS Index is a building efficiency scoring system established by the Residential Energy Services Network, or RESNET. The lower a home’s HERS Index, the more energy efficient it is in comparison to the HERS Reference Home (based on the 2006 International Energy Conservation Code).

Home Performance with Energy Star Program: This is a joint program between the U.S. Environmental Protection Agency and the U.S. Department of Energy which offers a comprehensive, “while house” approach to home energy-efficiency. The program sets standards and provides accreditation to building professionals and has 23 state programs that engage third party auditors to ensure that its quality metrics and being met.

Independent System Operator: An organization that coordinates, controls, administers, and monitors nondiscriminatory access to the electric power system, independent from the owners of the generation and transmission facilities. ISOs are formed at the direction or recommendation of FERC and are similar to RTOs but usually cover a smaller area (within just one state).

Tax Lien: A legal claim imposed on a property to secure the payment taxes. Tax liens transfer with the property, meaning that the new property owner becomes responsible for payment even if the tax obligation was incurred by a prior owner.

National Home Energy Audit Standard: A standard developed by RESNET to determine energy performance of existing homes through uniform and comprehensive home energy audits. The standard defines a framework for a home energy audit process performed by an accredited provider.

Negawatt: A term coined by Amory Lovins to describe energy saved through conservation and efficiency as an alternative to building new generation and transmission capacity.

On-Bill Financing: A method of retrofit financing in which the utility provides a loan that is then serviced via the customer's monthly utility bill.

Public Benefit Funds: State funds dedicated to energy efficiency and renewable energy projects. Funds are typically collected through small charges on the bill of all electric or natural gas customers or through specified contributions from utilities.

Regional Transmission Organizations: Similar in function to an Independent Systems Operators (see above), but with a larger jurisdiction.

Residential Energy Services Network, or RESNET: An industry not-for-profit membership corporation that maintains standards for building energy efficiency rating systems and provides energy rater and home energy auditor certifications.

Retrofit for Energy and Environmental Performance program, or REEP: A program established in ACESA that allocates funding for residential and commercial retrofits for both prescriptive and performance-based measures.

State Energy and Environment Development Accounts, or SEED: Accounts established in ACESA that allocate funding to states for a wide range of energy efficiency programs, including building codes, retrofit incentives, low-income energy efficiency programs and the expansion and deployment of renewable energy technologies.

State Energy Efficiency Retrofit Program, or SEER: A program established in ACELA, similar to REEP that allocates funding for residential and commercial retrofit programs for both prescriptive and performance-based measures. SEER includes slightly higher incentives for commercial businesses.

Tariffed Installment Payments: A form of on-bill financing that ties a repayment obligation to the utility meter rather than the individual customer. This method of financing avoids the issue of building-owner transience by transferring the loan to the new owner if the property is sold.

Weatherization Assistance Program: A program run by the Department of Energy to increase the efficiency of dwellings occupied by low-income Americans through home weatherization; thereby reducing energy bills and improving health and safety.

Endnotes

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- 21 Federal low-income residential weatherization assistance is currently capped at \$6,500 per home (up from \$2,500), but cost effective measures frequently justify significantly higher levels of investment.
- 22 12.5 direct and indirect full-time-equivalent jobs are created per \$1 million invested in retrofits. Retrofitting 50 million buildings at a conservative estimate of a \$10,000 investment per building would generate \$500 billion in investments over 10 years. \$500 billion times 12.5 jobs/million produces 6.25 million person-years of employment, which averaged over 10 years equals 625,000 jobs sustained annually.
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- 27 This is a wide range, but reflects the very low end to the very high end of average savings. Twenty percent energy savings on \$1500 annual expenditure equals \$300, while a 40 percent savings on \$3000 annual expenditure equals \$1200. Several local retrofit programs are reporting savings in the upper end of this range.
- 28 Energy Information Association, "Annual Energy Review 2008; Table 2.1a Energy Consumption by Sector Overview" (2008).
- 29 "The Building Sector: A hidden culprit" available at http://www.architecture2030.org/current_situation/building_sector.html (last accessed July 2009)
- 30 Energy Information Administration, "An Updated Annual Energy Outlook 2009 Reference Case Reflecting Provisions of the American Recovery and Reinvestment Act and Recent Changes in the Economic Outlook" (2009).
- 31 1 British Thermal Unit is equal to 172 million barrels of oil. See: "Apples, Oranges and BTU" U.S. Department of Energy, Energy Information Agency, available at <http://www.eia.doe.gov/ncic/infosheets/apples.html> (last accessed July 2009)
- 32 Merrian Fuller, "Enabling Investments in Energy Efficiency: A Study of Programs that Eliminate First Cost Barriers in the Residential Sector" (Burlington: Efficiency Vermont, 2008).
- 33 See PACE NOW, available at <http://pacenow.org/>; and Renewable Funding, available at <http://www.renewfund.com/>.
- 34 See Efficiency Vermont, available at <http://www.efficiencyvermont.com/pages/>; and Delaware Sustainable Energy Utility, available at <http://www.seu-de.org/>.
- 35 Sections 182-189
- 36 For more information in the "Green Bank," see http://www.americanprogress.org/issues/2009/05/pdf/green_bank_memo.pdf
- 37 Section 188, "Indirect Support."
- 38 Section 187 (e)
- 39 Laura Furrey, Steven Nadel and John Laitner, "Laying the Foundation for Implementing a Federal Energy Efficiency Resource Standard" (Washington: ACEEE, 2009).
- 40 National Action Plan for Energy Efficiency (2008). *Utility Best Practices Guidance for Providing Business Customers with Energy Use and Cost Data*. ICF International, available at www.epa.gov/eeactionplan (last accessed July 2009).
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The Energy Future Coalition is a broad-based, non-partisan alliance that seeks to bridge the differences among business, labor, and environmental groups and identify energy policy options with broad political support. The coalition aims to bring about changes in U.S. energy policy to address the economic, security and environmental challenges related to the production and use of fossil fuels with a compelling new vision of the economic opportunities that will be created by the transition to a new energy economy.



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