

# The 2030 Blueprint

Solving Climate Change Saves Billions



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## Introduction

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Faced with the daunting crisis of global warming, the U.S. is struggling to find a solution while preserving the energy status quo. This approach will not work. As the following analysis illustrates, a new approach is needed that both avoids dangerous climate change and is advantageous for the U.S. economy. The implementation of the 2030 Blueprint proposed below will dramatically reduce U.S. greenhouse gas emissions and simultaneously provide a much-needed stimulus to the U.S. economy.

According to Dr. James Hansen's et al. recent paper, titled *Target CO<sub>2</sub>: Where Should Humanity Aim?* ([http://www.columbia.edu/~jeh1/2008/TargetCO2\\_20080317.pdf](http://www.columbia.edu/~jeh1/2008/TargetCO2_20080317.pdf)), the bar for acceptable levels of CO<sub>2</sub> (the major greenhouse gas) in the atmosphere should be lowered to 350ppm, possibly lower, if we are to avert catastrophic climate change. We are currently at 385ppm and increasing at about 2ppm annually.

Many times, complex problems require the simplest of solutions. One of the most important questions facing those attempting to solve the climate change crisis is, "How do we reduce CO<sub>2</sub> emissions dramatically and immediately?" The simplest answer is, "Turn off the coal plants."

Although coal produces about half of the energy supplied by the Electric Power Sector, it is responsible for 81% of this sector's CO<sub>2</sub> emissions. According to *Target CO<sub>2</sub>*, if we are to have any chance of averting a climatic catastrophe, we must implement an immediate moratorium on the construction of any new conventional coal-fired power plants and complete a phasing out of all existing conventional coal plants by the year 2030. Anything short of this will fail.

Not surprisingly, because of the many vested interests in the coal industry (existing infrastructure, jobs and large U.S. coal reserves), it is difficult for some to let go of a 'sure thing,' even when faced with a planetary crisis. Although the coal industry has offered up 'clean' coal, i.e., coal with carbon capture and sequestration (CCS), as a fix for the offending CO<sub>2</sub> emissions of conventional coal plants, this 'solution' cannot be implemented in time to avert dangerous climate change. According to scientists, the world has seven years to reverse its current CO<sub>2</sub> trend<sup>1</sup>. The coal industry itself has acknowledged that, if it can be proven possible and economically feasible, implementing CCS technology is 20 years out<sup>2</sup>.

The economic feasibility of any proposed actions regarding climate change is a particularly important consideration in this time of looming recession. Therefore, this study is an investigation not only of the most effective actions that can be taken in addressing climate change, but also of the implications of these actions on the US economy.

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<sup>1</sup> Source: Washington Post, November 18, 2007, *Emissions Growth Must End in 7 Years, UN Warns* (<http://www.washingtonpost.com/wp-dyn/content/article/2007/11/17/AR2007111700566.html?hpid=moreheadlines>). To read the conclusions of IPCC's fourth complete report, go to: <http://www.ipcc.ch/>

<sup>2</sup> Zakaria, F., *Cathedral Thinking*, Newsweek, August, 2007 ([http://www.duke-energy.com/pdfs/Newsweek\\_14952.pdf](http://www.duke-energy.com/pdfs/Newsweek_14952.pdf))

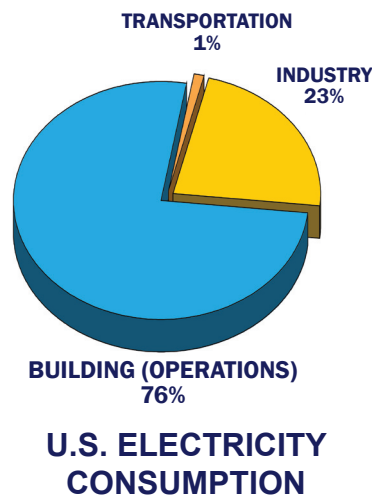
## The Biggest Bang for the Buck: Cost vs. Benefit

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To 'turn off the coal plants', one must replace conventional coal plants with another energy source and/or eliminate the demand for the energy produced by these plants. The following analysis compares the effectiveness, costs and benefits of three very different energy resource approaches to the climate change crisis: energy efficiency in buildings, 'clean' coal, and nuclear power.

As stated above, coal is responsible for 81% of the CO<sub>2</sub> emissions from the Electric Power Sector. Because 76% of all electricity generated by power plants in the U.S. is used to operate buildings<sup>3</sup>, it is necessary to consider the impact of energy efficiency in buildings as a viable strategy in addressing global warming.

Today, of the approximately 38.5 QBTu<sup>4</sup> of primary energy consumed by residential and commercial building operations in the U.S. each year, 27.3 QBTu is consumed in the form of electricity. About 14.2 QBTu of this electricity is produced by conventional coal-fired power plants<sup>5</sup>. According to a recent McKinsey Global Institute report<sup>6</sup> (February, 2008), the implementation of just straightforward, off-the-shelf, residential and commercial building efficiency measures would reduce energy consumption by 11.1 QBTu for an investment of \$21.6 billion per QBTu<sup>7</sup>.



Investment in building energy efficiency is surprisingly effective. A single investment of \$21.6 billion would replace 22.3 conventional 500 MW coal-fired power plants, reduce annual CO<sub>2</sub> emissions by 86.7 million metric tons, save 204 billion cu. ft. of natural gas and 10.7 million barrels of oil each year<sup>8</sup>, save consumers \$8.46 billion in energy bills annually<sup>9</sup> (less than a 3-year simple payback) and create 216,000 permanent new jobs<sup>10</sup>.

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<sup>3</sup> Source: Energy Information Administration statistics, combining building operations electricity consumption in the residential, commercial and industrial sectors.

<sup>4</sup> Primary Energy is the total energy consumed by an end-user, including the energy used in the generation and transmission of electricity.

<sup>5</sup> Source: Energy Information Administration. Total 2004 primary electricity consumption for residential and commercial buildings is 27.3 QBTu, with 52% of that amount produced by coal-fired power plants, or 14.2 QBTu.

<sup>6</sup> Farrell, D., et al., The Case for Investing in Energy Productivity, McKinsey Global Institute, February, 2008.

<sup>7</sup> According to the February, 2008 McKinsey study cited above, there are 7.1 QBTu of residential Building Sector primary energy reduction opportunities at \$17.6 billion/QBTu, and 4.0 QBTu of commercial Building Sector reduction opportunities at \$26.0 billion/QBTu, or the average for residential and commercial building sector reduction opportunities is \$20.6 billion/QBTu. To be conservative, we used a figure of \$21.6 billion/QBTu for this study. The 11.1 QBTu total energy reduction opportunity is assumed to take place over a 12 year period. To be conservative, we used a figure of \$21.6 billion/QBTu for this study.

<sup>8</sup> One primary Quad (QBTu) of energy consumed in the Building Sector is equal to: i) the energy produced (including losses) by 22.3 conventional coal-fired power plants (.71 QBTu), plus ii) the 204 billion cu. ft. of natural gas and 10.7 million barrels of oil consumed directly in buildings (.29 QBTu).

<sup>9</sup> Source: Department of Energy, 2006 Buildings Energy Data Book.

<sup>10</sup> This job figure assumes that each \$100,000 of investment in building energy efficiency will create one permanent job. This is a conservative figure. A report analyzing the federal New Markets Tax Credits program, determined that a federal investment of approximately \$3,500 to \$50,000 in building projects created one permanent job (<http://prattcenter.net/reports.php>). A National Renewable Energy Laboratory report determined that each investment of \$67,045 by the Sacramento Municipal Utility District in building energy efficiency measures created one permanent job. The Economic Policy Institute estimates that an investment of between \$82,000 and \$100,000 in infrastructure renovation creates one permanent job (<http://www.epi.org/subjectpages/stimulus.cfm>).

By comparison, as the chart below illustrates, neither ‘clean’ coal plants, nor nuclear plants, can compete with the clean energy, cheap price, widespread economic benefits and job creation of building energy efficiency. Investing the same \$21.6 billion in either ‘clean’ coal plants or nuclear plants costs significantly more (rather than saving consumers money), replaces far fewer conventional coal plants, reduces CO<sub>2</sub> by far less and would create no new jobs, since the jobs created by these new plants would simply replace existing conventional coal plant jobs.

**\$21.6 BILLION**  
**Investment in Energy Production**

	<b>Building Efficiency</b>	Coal (CCS)	Nuclear
Conventional Coal Plants (500 MW)	<b>-22.3 Coal Plants -204 BCF Natural Gas -10.7 MB Oil</b>	-6.6 Coal Plants	-7.2 Coal Plants
CO <sub>2</sub> Emissions	<b>-86.7 MMT CO<sub>2</sub></b>	-21.1 MMT CO <sub>2</sub>	-23.0 MMT CO <sub>2</sub>
Annual Consumer Savings	<b>\$8.46 Billion</b>	\$0 Billion	\$0 Billion
Job Creation	<b>216,000 Jobs</b>	0 Jobs	0 Jobs

In addition, because building is a local activity (construction jobs cannot be outsourced), the money invested in this sector is spread across the entire country and across all industries from wood, metals and glass to sealants, paint and banking. Both the \$21.6 billion invested and the \$8.46 billion saved on energy bills will cycle through the economy several times.

## The Cost of Energy Production

A comparative analysis of the cost of energy production also provides useful information. As shown in the chart below, the cost to build enough new coal plants with CCS to produce just one QBtu of delivered energy<sup>11</sup> would be \$256 billion<sup>12</sup>. The cost to build enough nuclear plants to produce just one QBtu of delivered energy is \$222 billion<sup>13</sup>. The cost to incorporate energy efficiency measures into residential and commercial buildings to negate the need for one QBtu of delivered energy is \$42.1 billion<sup>14</sup>.

<sup>11</sup> Delivered Energy is the energy consumed by an end-user on site, not including electricity generation and transmission losses.

<sup>12</sup> FutureGen, the 275 MW coal-with-CCS demonstration plant cancelled by the Department of Energy in January 2008 due to escalating costs, was projected to cost \$1.8 billion at the time of cancellation. To be conservative, this study based its calculations on the \$1.8 billion figure to estimate the cost of producing one delivered QBtu of electrical energy using coal with CCS technology. It should also be noted, that the cost to build a conventional 1000 MW coal-fired power plant today is approximately \$2.6 billion, or it would cost \$122 billion to produce one delivered QBtu of energy, about three times the cost of building efficiency measures. ([http://www.nytimes.com/2008/01/31/business/31coal.html?\\_r=1&oref=slogin](http://www.nytimes.com/2008/01/31/business/31coal.html?_r=1&oref=slogin)).

<sup>13</sup> For this study, the conservative number of \$6 billion was used for the cost of constructing a 1000 MW nuclear power plant. Recent reporting reveals that the actual figure can be significantly higher, e.g., the Progress Energy Florida 2-1100 MW nuclear plant is expected to cost \$17 billion (<http://www.platts.com/Nuclear/News/6812261.xml>). The nuclear industry is also heavily subsidized by taxpayer dollars.

<sup>14</sup> Cost of a delivered QBtu in the building sector is equal to \$21.6 billion (cost of a primary QBtu) x 1.95 (multiplier for energy losses) or \$42.1 billion.

## COST OF ENERGY PRODUCTION

1 QBTu of Delivered Energy

\$ = \$10 Billion

COAL (CCS)	\$	\$256.0 Billion
NUCLEAR	\$	\$222.0 Billion
BUILDING EFFICIENCY	\$\$\$\$\$	\$42.1 Billion

While coal with CCS is at least 20 years out and a single nuclear plant takes 8 to 12 years to get on line, energy efficiency measures can be implemented today – at today’s prices with off-the-shelf materials, appliances and equipment.

### The 2030 Challenge

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In January of 2006, Architecture 2030 officially issued the ‘2030 Challenge’, a measured and achievable strategy to dramatically reduce global GHG emissions and fossil-fuel consumption in the Building Sector by the year 2030. Specifically, the Challenge calls for 1) all new buildings and developments to be designed to use half the fossil fuel energy they would typically consume, i.e., half the regional or country average for that building type, 2) at a minimum, an equal amount of existing building area be renovated annually to use half the amount of fossil fuel energy they are currently consuming, and 3) the fossil fuel reduction standard for all new buildings be increased to 60% in 2010, 70% in 2015, 80% in 2020, 90% in 2025 and carbon neutral by 2030 (using no fossil fuel GHG-emitting energy). We recommend the fossil fuel reduction targets be achieved through design, the application of renewable energy technologies and/or the purchase of renewable energy (20% maximum).

Those adopting the 2030 Challenge are encouraged to achieve the reductions called for largely through proper design, i.e., building shape and orientation, natural heating and cooling, daylighting and ventilation strategies, proper shading and straightforward, off-the-shelf building energy efficiency measures.

The Challenge has had a significant national impact, having been adopted by the American Institute of Architects, the U.S. Conference of Mayors (for all buildings in all cities; Resolution #50), U.S. Green Building Council, National Association of Counties, California Public Utilities and Energy Commissions, and individual cities, counties and states. The Challenge targets, part of the Energy Bill passed by Congress and signed by the President in January of this year, are now required for all new and renovated federal buildings beginning in 2010.

Each year in the U.S., we build approximately 5 billion square feet (sq. ft.) of new building, renovate approximately 5 billion sq. ft. and demolish approximately 1.75 billion sq. ft. of existing buildings. By the year 2038, three-quarters of the built-environment in the U.S. will be either new or renovated. This transformation of the built-environment over the next 30 years represents an opportunity to dramatically reduce i) Building Sector energy demand and ii) the need for existing conventional coal-fired power plants.

## Conclusions

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There is a clear, simple, realistic and achievable solution to climate change that also offers significant additional benefits: building energy efficiency. Of the energy and climate change solutions proposed today, building energy efficiency is the one that can be implemented immediately, costs the least and offers the greatest benefits to both the planet and the economy. With a single action, the U.S. can begin replacing coal, reduce CO<sub>2</sub> emissions, strengthen the US economy, save consumers billions of dollars and create jobs.

The clear winner in the energy solutions comparison being considered today is building energy efficiency. The clear winner in building energy efficiency is the U.S. worker and citizen. Because the call for a moratorium on conventional coal plants allows for the phasing out of existing plants, there will be time to retrain coal workers for new jobs.

By addressing several key factors, the 2030 Challenge offers a comprehensive, effective approach to the Building Sector's role in the climate change crisis. The Challenge calls for the necessary reductions required to avert dangerous climate change, is achievable within the timeline set by scientists, centers on building energy efficiency and renewable energy as the preferred means to achieve the reductions called for, and is already widely adopted.

To bring about the demand-side reductions of CO<sub>2</sub>-emissions in the Building Sector necessary to meet a complete phase out of conventional coal-fired power plants by 2030, updating the National Energy Conservation Code Standard to meet the 2030 Challenge targets should be implemented immediately along with a federally-funded building energy efficiency investment package.

## Recommendations

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To make the 2030 Challenge and building energy efficiency solution a reality, Architecture 2030 recommends the implementation of the following plan of action, titled the '2030 Blueprint':

### **The 2030 Blueprint**

1. Implement an immediate moratorium on the construction of any new conventional coal plants, and the gradual phasing out of all existing conventional coal plants by 2030 to:

- place an immediate cap on coal plant emissions while allowing time to retrain coal workers for new jobs.

2. Require that all developments using federal funds meet the 2030 Challenge targets to:

- create additional models of building energy efficiency for the marketplace.

3. Upgrade the National Energy Conservation Code Standard to the 2030 Challenge targets for residential and commercial buildings to:

- immediately stabilize and begin reducing energy demand in the Building Sector.

4. Invest \$21.6 billion each year for five years in building energy efficiency measures through existing federal programs (i.e. New Markets Tax Credits; Low Income Housing Tax Credits; a five-year extension and increased funding for efficiency in the Energy Policy Act) and new energy efficiency incentives, tax credits and programs to:

- stimulate building construction
- reduce annual Building Sector energy consumption by 5 QBtu
- reduce annual U.S. CO<sub>2</sub> emissions by 433.5 MMT
- save consumers \$128 billion (which more than covers the cost of this solution), and
- create more than one million permanent new jobs

5. Fund and implement a joint labor-management job training program for displaced coal industry jobs based on successful models developed over the past two decades in the tire/rubber, steel, automobile and communications industries.

Congress is currently 'casting about' for solutions to both the climate crisis and the U.S. economic crisis. The 2030 Blueprint tackles both crises at once. For just a small portion of the \$168 billion that Congress recently earmarked to inject into the struggling economy, the U.S. can reduce its greenhouse gas emissions and create jobs and an economic stimulus package that ripples throughout the U.S. economy.