

**Testimony of
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UNION OF CONCERNED SCIENTISTS**

**Before the
HOUSE COMMITTEE ON
ENERGY AND COMMERCE**

April 22, 2009



**Union of
Concerned
Scientists**

Citizens and Scientists for Environmental Solutions

Chairmen Waxman and Markey and distinguished Members of the Committee, thank you for this opportunity to speak with you today on behalf of the Union of Concerned Scientists. I am President of UCS, a national science-based nonprofit organization that's been working for a healthy environment and a safer world for 40 years. I applaud the leadership of this subcommittee and the full committee for moving this issue forward at this critical time. And I'd like to thank Mr. Dingell and Mr. Boucher for getting the ball rolling in a thoughtful, knowledgeable and comprehensive way in the last Congress.

Today I am pleased to share the results of a major study we've conducted to examine the energy and economic implications of a comprehensive suite of energy, transportation and climate policies that we call the Climate 2030 Blueprint. We used a modified¹ version of the U.S. Department of Energy's National Energy Modeling System for our analysis, with a baseline reference case that shows global warming emissions rising 13 percent above 2005 levels by 2030, and a clean energy blueprint case that leads to deep emissions reductions which put us on a path to stabilizing our climate and preventing catastrophic climate change.

The results of this analysis show that we can build a comprehensive and competitive 21st century clean energy economy that saves consumers money and gives our children a future without huge, damaging costs of unchecked climate change. A future of clean energy and cars, smart houses and clear skies is well within our technological and financial abilities.

To highlight just a few of our major findings, our analysis found that by 2030:

- 1) Under the Blueprint, our nation meets a carbon cap of 26% below 2005 levels by 2020 and 56% below 2005 levels by 2030. We can achieve these emissions cuts cost-effectively by implementing a comprehensive set of smart energy, transportation, and cap policies. This comprehensive approach is similar to the one proposed by Chairman Waxman and Subcommittee Chairman Markey in their draft legislation.
- 2) We can achieve these deep cuts in carbon emissions while saving American consumers and businesses \$465 billion annually in 2030. The Blueprint also builds \$1.6 trillion in cumulative net savings between 2010 and 2030.
- 3) We can both reduce emissions on that scale and expand our economy between now and 2030, while keeping jobs growing at the same rate as in the reference case.
- 4) We can cut the use of oil and petroleum products by 6 million barrels a day in 2030 – as much oil as we currently import from OPEC and 30 percent of our nation's current total daily oil consumption.
- 5) We can save consumers money on their energy bills because of increased energy efficiency, even though electricity rates and gasoline prices go up slightly. That means families will see average household savings of \$900 a year in 2030, while businesses will, all together, save nearly \$130 billion a

¹ Specifically, we updated the reference case in the model to include the tax provisions from the October stimulus bill, nuclear loan guarantees, and the updated projections from all the state renewable electricity standards. We also updated cost and performance assumptions for energy efficiency in buildings, electricity generating technologies, and vehicle and fuel technologies, based on data from actual and proposed projects, and studies by industry experts.

year. Households and businesses in every region in the nation - even coal-dependent regions - will see lower energy bills.

- 6) The electricity sector contributes more than half of the emissions cuts in 2030. We can reduce power plant carbon emissions 84% below 2005 levels by 2030. The Blueprint policies will also cut mercury, acid rain, smog and soot pollution, improving air and water quality and saving lives.
- 7) We can cut emissions from cars and trucks by 40% compared to their 2005 levels and freeze emissions from freight trucks at 2005 levels even as the economy undergoes significant growth. The transportation sector contributes the second largest area of emissions reductions and accounts for one-half of the net consumer and business energy cost savings in 2030.

The key to this success is the comprehensive policy approach we modeled. The transportation policies get us cleaner cars, cleaner fuels and better transportation options. The energy policies get us more efficient appliances and buildings, renewable energy and more efficient natural gas generation. A transparent and smartly-designed cap and trade policy assures the emissions reductions the U.S. needs to help avoid the worst effects of global warming.

This comprehensive approach is so critical that when we stripped out the sector-specific energy and transportation policies in our analysis, the cumulative savings for households and businesses by 2030 were reduced dramatically -- from \$1.6 trillion to \$600 billion.

We did not find that all of these benefits will come for free. Energy costs may be slightly higher in the very early years as we make investments in the clean energy economy, but those investments will reap much higher savings for Americans in every region later on. Under the Blueprint policies, households and businesses will actually start paying less on their energy bills by 2013, because reductions in usage from energy efficiency more than offset the modest increase in energy prices. In transportation, there will be more upfront investment, but consumers and businesses will get even more back later as they save money on gas. Overall, the investments made early on (from 2010 to 2015) for efficiency, renewables, cars, and so on will start saving us money by 2015.

We have an historic opportunity to reinvent our economy, to make it more resilient and efficient – and to produce a bow wave of new high quality, well paying jobs, especially in regions that have strong manufacturing capacity, a seasoned, able labor force, and needed resources and infrastructure. In this new homegrown economy, we need people to build wind turbines, weatherize and retrofit homes, install solar panels and manufacture advanced cars and fuels, as well as to design, transport, maintain, repair, market and sell all of the above.

In my travels around the country, I hear a growing call for a new clean energy economy that is designed to also solve large, stubborn problems by reducing our dependence on oil, making us less vulnerable to blackouts, creating jobs, tackling climate change, and improving our families' health. We know that if we continue down a path of no action

our risks and vulnerabilities will increase, leading to significantly higher costs than if we act boldly today.

The status quo is not an option. Our analysis makes a compelling case that a forward-looking, comprehensive set of policies will jump-start the transition to a clean energy economy. The Waxman-Markey draft legislation capably starts us down that path.

Climate 2030: A National Blueprint for a Clean Energy Economy

Based on Climate 2030 Executive Summary

Building a Revitalized Clean Energy Economy

Reducing oil dependence. Strengthening energy security. Creating jobs. Tackling global warming. Addressing air pollution. Improving our health. The United States has many reasons to make the transition to a clean energy economy. What we need is a comprehensive set of smart policies to jump-start this transition without delay and maximize the benefits to our environment and economy. *Climate 2030: A National Blueprint for a Clean Energy Economy* (“the Blueprint”) answers that need.

Recent rapid growth of the wind industry (developers have installed more wind power in the United States in the last 2 years than in the previous 20) and strong sales growth of hybrid vehicles show that the U.S. transformation to a clean energy economy is already under way. However, these changes are still too gradual to address our urgent need to reduce emissions of carbon and other heat-trapping gases to levels that are necessary to protect the well-being of our citizens and the health of our environment.

Global warming stems from the release of carbon dioxide and other heat-trapping gases into the atmosphere, primarily when we burn fossil fuels and clear forests. The problems resulting from the ensuing carbon overload range from extreme heat, droughts, and storms to acidifying oceans and rising sea levels. To help avoid the worst of these effects, the United States must play a lead role and begin to cut its heat-trapping emissions today—and aim for at least an 80 percent drop from 2005 levels by 2050.

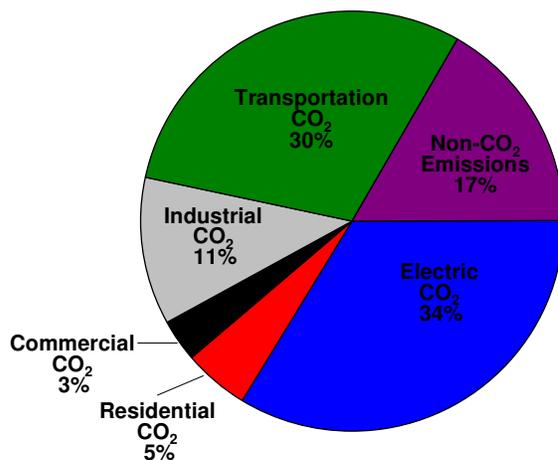


Figure ES 1. Where U.S. Heat-Trapping Emissions Come From (2005)

The U.S. emitted more than 7,180 million metric tons of carbon dioxide equivalent heat trapping emissions in 2005, the baseline year of our analysis. Burning coal in power plants and gasoline in vehicles releases most of these emissions, but every sector of the economy contributes. Note: The transportation, commercial, and industrial sector shares represent direct emissions from burning fuel plus “upstream” emissions from producing fuels at refineries.

The Climate 2030 Approach

This report analyzes the economic and technological feasibility of meeting stringent targets with an emissions cap set at: 26 percent below 2005 levels by 2020, and 56 percent below 2005 levels by 2030. Meeting this cap means we will limit total emissions—the crucial measure for the climate—to 180,000 million metric tons of carbon dioxide equivalent (MMTCO₂eq) from 2000 to 2030.² Our long-term carbon budget for 2000 to 2050, as defined in a previous UCS analysis (Luers et al. 2007) is 160,000 to 265,000 MMTCO₂eq. Assuming continued steep emissions reductions, the 2000-2030 carbon budget set in this analysis would put us on track to be in the mid-range of the long-term budget by 2050.

To reach those targets, the Blueprint proposes a comprehensive policy approach (“the Blueprint policies”), which combines an economy-wide cap-and-trade program with complementary, sector-based policies. This approach finds cost-effective ways to reduce fossil fuel emissions in all sectors of our economy—including industry, buildings, electricity, and transportation—and to store carbon through agricultural activities and forestry.

Our analysis relies primarily on a modified version of the U.S. Department of Energy’s National Energy Modeling System (referred to as UCS-NEMS). We supplemented that model with analyses of the impact of greater energy efficiency in industry and buildings by the American Council for an Energy Efficient Economy, and of the potential for crops and residues to provide biomass energy by researchers at the University of Tennessee. We combined the model with these analyses to capture the dynamic interplay between energy use, energy prices, energy investments, and the economy while also considering competition for limited resources and land.

Our analysis explores two main scenarios. The first—which we call the Reference case—assumes no new climate, energy, or transportation policies beyond those already in place as of October 2008.³ The second—the Blueprint case—examines an economy-wide cap-and-trade program, plus a suite of complementary policies to boost energy efficiency and the use of renewable energy in key economic sectors: industry, buildings, electricity, and transportation. Our analysis also includes a “sensitivity” scenario that strips out the policies targeted at these sectors—we refer to this as the “no complementary policies” case.

This analysis shows that the technologies and policies pursued under the Blueprint produce dramatic changes in energy use and cuts in carbon emissions. The analysis also

² This amount is equivalent to the emissions from nearly 1 billion of today’s U.S. cars and trucks over the same 30-year period. The nation now has some 230 million cars and trucks, and more than 1 billion vehicles are on the road worldwide. Given today’s trends, we can expect at least 2 billion vehicles by 2030 (Sperling 2008).

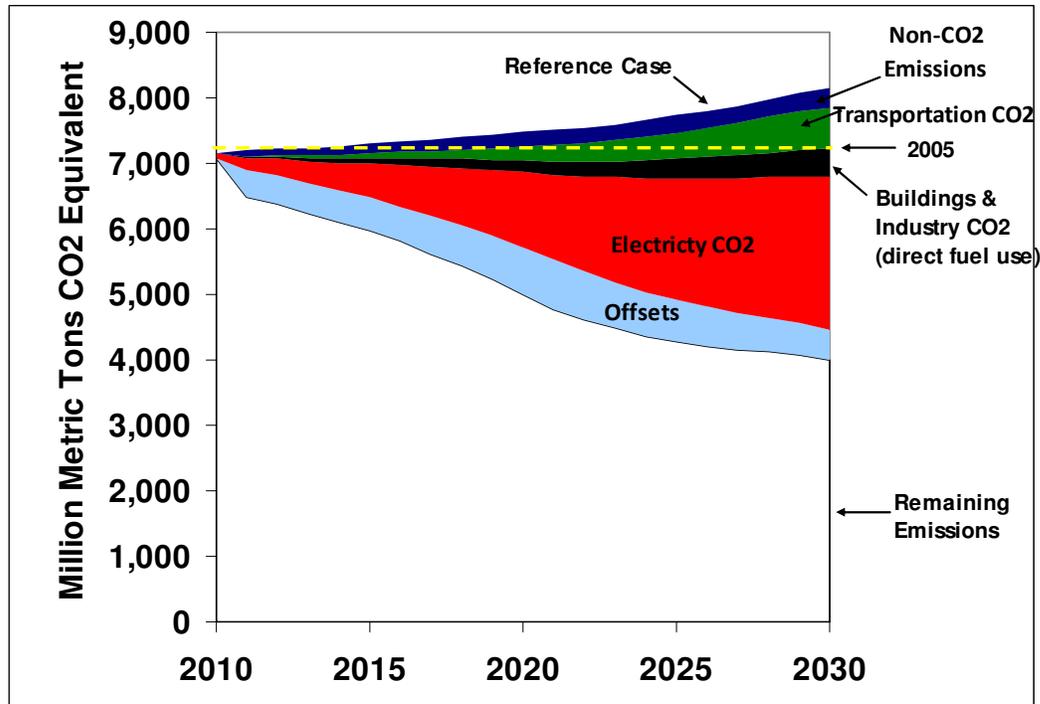
³ Our analysis includes the tax credits and incentives for energy technologies included in the October 2008 Economic Stimulus Package (H.R. 6049), as well as the transportation and energy policies in the 2007 Energy Independence and Security Act. However, the timing of the February 2009 American Recovery and Reinvestment Act did not allow us to incorporate its significant additional incentives.

shows that consumers and businesses reap significant net savings on their energy bills each year under the comprehensive Blueprint approach, while the nation sees strong economic growth.

The Blueprint Cuts Carbon Emissions and Saves Money

Blueprint policies lower U.S. heat-trapping emissions to meet a cap set at 26 percent below 2005 levels in 2020, and 56 percent below 2005 levels in 2030 (see Figure ES.2).

Figure ES.2: Net Cuts in Global Warming Emissions under the Blueprint



The nation achieves these deep cuts in carbon emissions while saving consumers and businesses \$465 billion annually by 2030. The Blueprint also builds \$1.6 trillion in cumulative savings between 2010 and 2030.⁴

Blueprint policies stimulate significant consumer, business, and government investment in new technologies and measures by 2030. The resulting energy bill savings from reductions in electricity and fuel use more than offset the additional energy investment costs, producing net consumer savings on energy for households, vehicle owners, businesses, and industries.⁵ These net savings also more than cover the costs of carbon allowances that utilities and fuel providers pass through to households and businesses in energy prices, leading to annual net savings on energy of \$255 billion in 2030. On top of

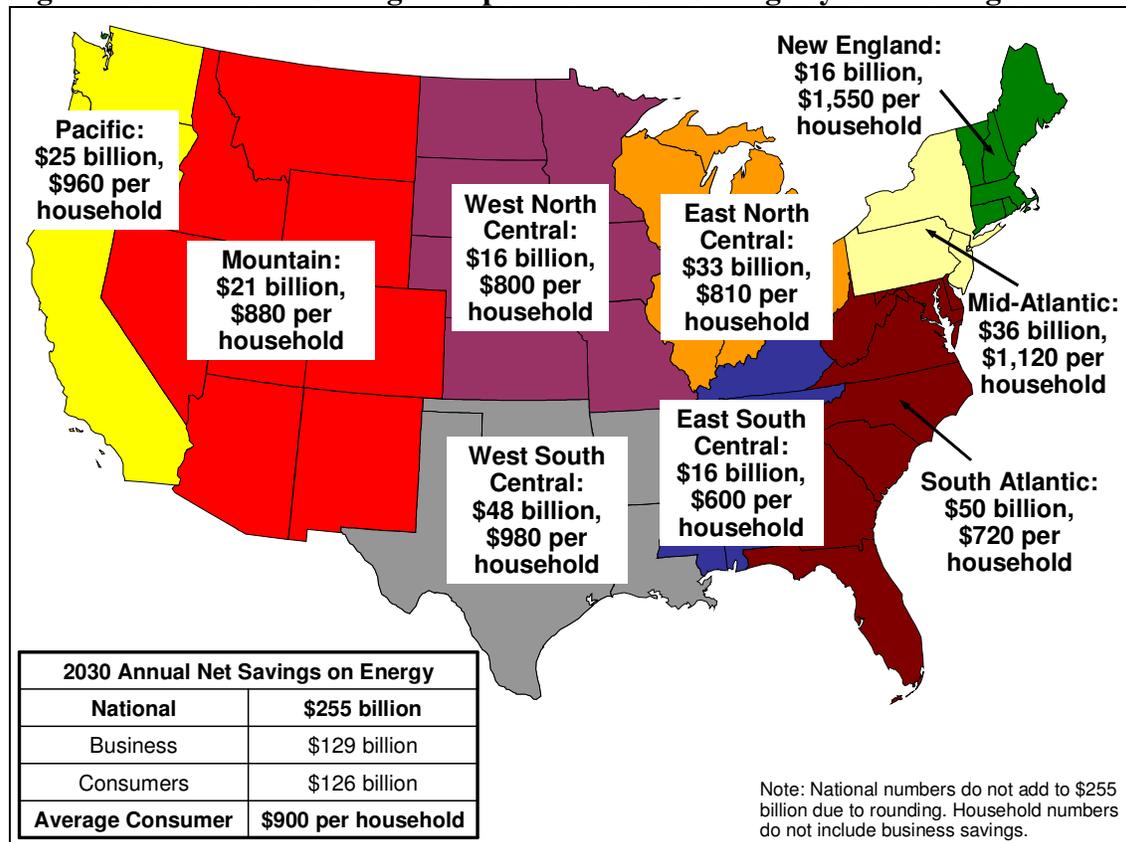
⁴ Unless otherwise noted, all dollar amounts are in 2006 dollars, and cumulative figures are discounted using a 7 percent real discount rate.

⁵ Energy savings include both energy bills (the direct cost of energy such as electricity, gasoline, and natural gas), and the costs of purchasing more efficient energy-consuming products such as appliances and vehicles.

this, \$219 billion in allowance revenue generated under the cap is invested back into the economy, though government and business will see another \$8 billion in added policy costs, bringing annual Blueprint savings up to \$465 billion by 2030.⁶

Under the Blueprint, every region of the country stands to gain billions in energy savings (see Figure ES.3). Households and businesses in every region in the nation - even coal-dependent regions - will see lower energy bills.

Figure ES.3. National Savings and per Household Savings by Census Region in 2030



Consumers and Businesses in every region of the country see billions of dollars of energy savings. The portion of these savings that accrues to consumers is apportioned to households in each region.

The Blueprint keeps carbon prices low

Under the Blueprint, the price of carbon allowances—permits for industry to emit carbon under the cap-and-trade program—start at about \$18 per ton of CO₂ in 2011, and then rise to \$34 in 2020, and \$70 in 2030 (all in 2006 dollars). Those prices are well within the range that other analyses find despite our stricter cap. At these prices, the Blueprint achieves much larger cuts in carbon emissions within the capped sectors because of the tighter limits we assumed on offsets and because of our more realistic assumptions about the cost-effectiveness of investments in efficiency and renewable energy technologies.

⁶ Blueprint savings are net consumer savings on energy plus allowance revenue invested in the economy minus policy costs not borne by consumer. Values may not add precisely due to rounding.

The economy grows by at least 81 percent by 2030 under the Blueprint. U.S. gross domestic product (GDP) expands by 81 percent between 2005 and 2030 under our approach—virtually the same as in the Reference case, which shows the U.S. economy growing by 84 percent. In fact, the model predicts that Blueprint would slow economic growth by less than 1.5 percent in 2030—equivalent to only 10 months of economic growth over the 30-year period.⁷

The Blueprint also shows practically the same employment trends as the Reference case. Non-farm employment is slightly higher under the Blueprint than in the Reference case (170 million v 169.4 million in 2030).

We should note that there are significant limitations in the way NEMS accounts for GDP and employment effects. NEMS does not properly consider the economic growth that would arise from clean technology investments and the re-spending of the consumer energy savings that arise from these investments. Also, the reference case does not include the costs of climate change itself.

The Blueprint cuts the cost of household energy and transportation in 2030 by \$900 per year while saving businesses nearly \$130 billion on energy expenses. By 2030, the average U.S. household would see net energy savings on electricity, natural gas, and oil expenses of \$320 per year compared with the Reference case, after paying for investments in new energy efficiency and low-carbon technologies. In 2030, transportation expenses for the average household would fall by about \$580 per year. These savings take into account the higher costs of cleaner cars and trucks, new fees used to fund more public transit, and declining use of gasoline. Neither the energy nor the transportation savings account for the allowance revenue that will be invested back into the economy, lowering consumer and business costs (or increasing consumer and business savings) even further.

The Blueprint Changes the Energy We Use

Efficiency and reduced travel stemming from Blueprint policies cut overall U.S. energy use by one-third by 2030. Significant increases in energy efficiency across the economy and reductions in car and truck travel drive down energy demand and carbon emissions.

Carbon-free electricity and low-carbon fuels together make up more than one-third of the remaining U.S. energy use by 2030. A significant portion of U.S. reductions in carbon emissions in 2030 comes from a 25 percent increase in the use of renewable energy from wind, solar, geothermal, and bioenergy under the Blueprint. Carbon emissions are also kept low because the use of nuclear energy and hydropower, which don't directly produce carbon emissions, remain nearly the same as in the reference case.

⁷ This means that we achieve the growth we would have seen in January 2030 in the Reference case in October 2030 in the Blueprint case.

The Blueprint reduces U.S. dependence on oil and oil imports. By 2030, the Blueprint cuts the use of oil and other petroleum products by 6 million barrels per day, compared with 2005. That is as much oil as the nation now imports from the 12 members of OPEC (the Organization of Petroleum Exporting Countries). Those reductions will help drop imports to less than 45 percent of the nation’s oil needs, and cut projected expenditures on those imports by more than \$85 billion in 2030, or more than \$160,000 per minute.

Smart Energy and Transportation Policies Are Essential for the Greatest Savings

Many of the Blueprint’s complementary policies have a proven track record at state and federal levels. These policies include emission standards for vehicles and fuels, energy efficiency standards for appliances, buildings and industry, and renewable energy standards for electricity (see Box ES.1). The Blueprint also relies on innovative policies to reduce the number of miles people travel in their cars and trucks.

These policies are essential to delivering significant consumer and business savings under the Blueprint. Our “no-complementary policies” case shows that if these policies are removed from the Blueprint, consumers and businesses will save much less money.⁸ Excluding the complementary policies we recommend for the energy and transportation sectors would reduce cumulative net consumer and business savings through 2030 from a total of \$1.6 trillion to \$0.6 trillion (see Figure ES.4).

⁸ Some or all of the economic benefits of the complementary policies could also be achieved if policy makers effectively use the revenues from auctioning carbon allowances to fund the technologies and measures included in these policies, but this approach was not addressed in this study.

Box ES.1. Climate 2030 Blueprint Policies

Climate Policies

- Economy-wide cap-and-trade program with:
 - Auctioning of all carbon “allowances”
 - Recycling of auction revenues to consumers and businesses⁹
 - Limits on carbon “offsets,” to encourage decarbonization of the capped sectors
 - Flexibility to over-comply and bank excess allowances for future use

Industry and Buildings Policies

- An energy efficiency resource standard requiring retail electricity and natural gas providers to meet efficiency targets
- Minimum federal energy efficiency standards for specific appliances and equipment
- Advanced energy codes and technologies for buildings
- Programs that encourage more efficient industrial processes
- Wider reliance on efficient systems that provide both heat and power

Electricity Policies

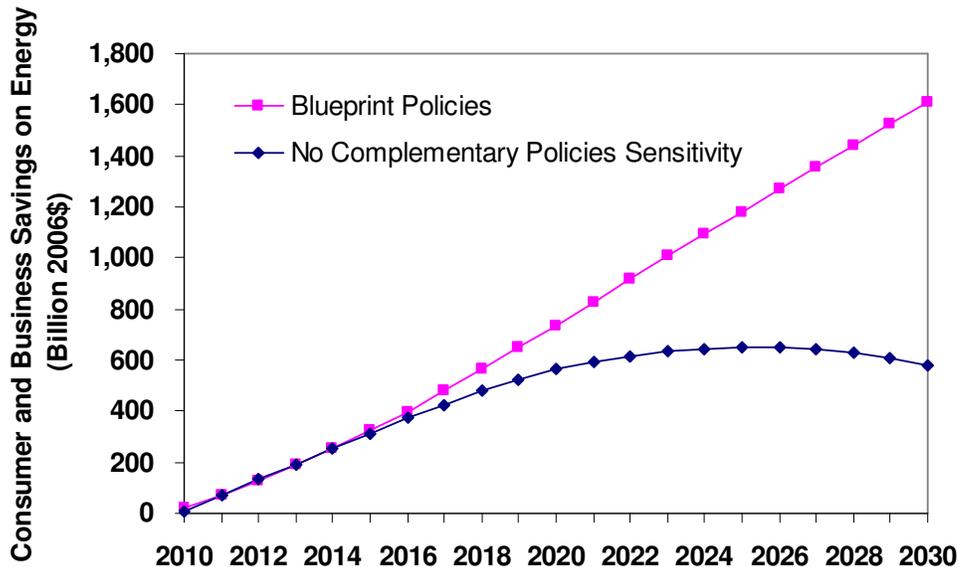
- A renewable electricity standard for retail electricity providers
- R&D on energy efficiency and renewable energy
- Use of advanced coal technology, with a carbon-capture-and-storage demonstration program

Transportation Policies

- Standards that limit carbon emissions from vehicles
- Standards that require the use of low-carbon fuels
- Requirements for advanced vehicle technology
- Smart-growth policies that encourage mixed use development with more public transit
- Smart-growth policies that tie federal highway funding to increasing transportation system efficiency
- Pay-as-you-drive insurance and other per-mile user fees

⁹ The preferred approach would be to target revenues from auction of carbon allowances toward investments in energy efficiency, renewable energy, and protection for tropical forests, as well as transition assistance to consumers, workers, and businesses in moving to a clean energy economy. However, limitations in the NEMS model prevented us from directing auction revenues to specific uses. Instead, we could only recycle revenues in a general way to consumers and businesses.

Figure ES.4: Cumulative Savings: Blueprint and without Complementary Policies



*Net present value using a 7% real discount rate

Our “no-complementary policies” case also shows that excluding the policies we recommend for the energy and transportation sectors will double allowance prices¹⁰.

Where the Blueprint Cuts Emissions and Saves Money

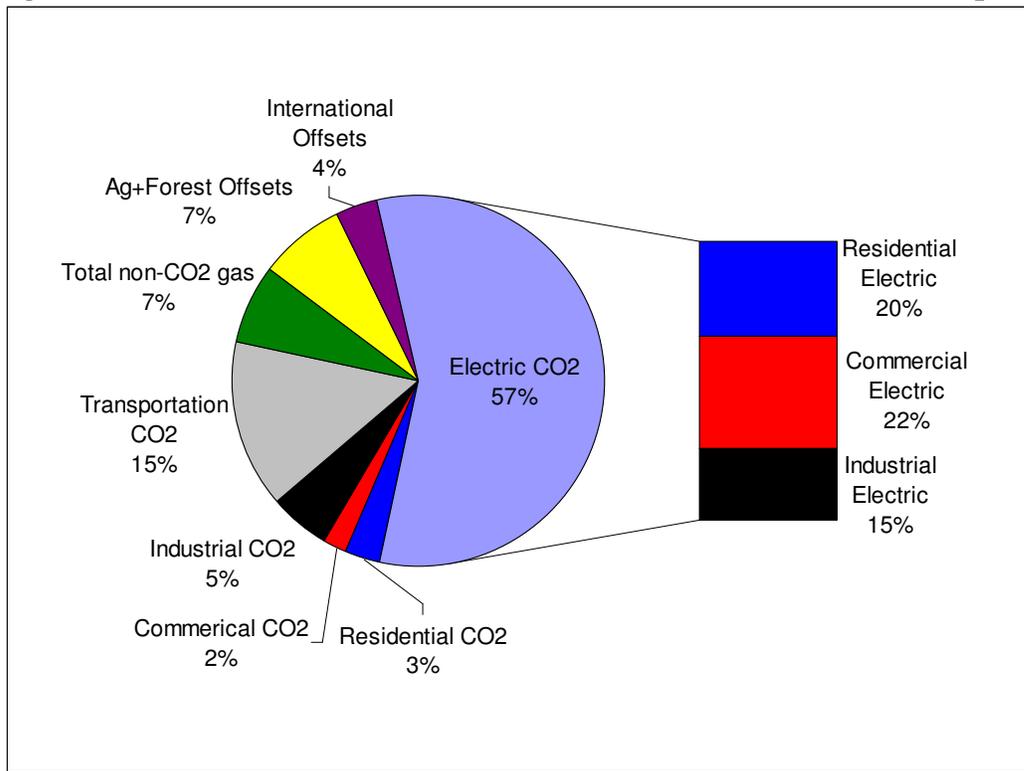
Five sectors of the U.S. economy account for the majority of the nation’s heat-trapping emissions: electricity, transportation, buildings (commercial and residential), industry, and land use. Blueprint policies ensure that each of these sectors contributes to the drop in the nation’s net carbon emissions.

The electricity sector—with help from efficiency improvements in industry and buildings—leads the way by providing more than half (57 percent) of the needed cuts in heat-trapping emissions by 2030. Transportation delivers the next-largest cut (15 percent). Carbon offsets provide 11 percent of the overall cuts in carbon emissions by 2030.¹¹ Reduced emissions of heat-trapping gases other than carbon dioxide (Non-CO₂ emissions) deliver another 7 percent of the cuts. Savings in direct fuel use in the residential, commercial and industrial sectors are the final pieces, contributing 3 percent, 2 percent and 5 percent of the emission reductions. (See Figure ES.5)

¹⁰ See footnote 7.

¹¹ Under a cap-and-trade program, capped entities can meet their compliance obligations by directly cutting emissions, by purchasing allowances, or by purchasing “offsets” from third (non-capped) parties that cut their carbon emissions. The Carbon offsets we included are: carbon storage in the domestic agriculture and forest sectors —capped at 10 percent of U.S. emissions, to encourage decarbonization of the capped sectors—and offsets from international sources, capped at 5 percent of U.S. emissions and focused mainly on preventing tropical deforestation.

Figure ES.5: Where 2030 Annual Emission Cuts Come from in the Blueprint



Emission cuts in the electricity sector include reductions in demand from residential, commercial, and industrial consumers. The transportation, commercial, and industrial sector shares represent direct emissions from burning fuel plus “upstream” emissions from producing fuels at refineries.

National savings on annual energy bills (the money consumers save on their monthly electricity bills or gasoline costs, for example) total \$414 billion in 2030. These energy bill savings more than cover the costs of carbon allowances that utilities and fuel providers pass through to households and businesses in energy prices. Incremental energy investment costs (consumer expenditures on energy-consuming products like homes, appliances and vehicles) reach \$160 billion. The result is net annual energy-related savings of \$255 billion for households and businesses in 2030.

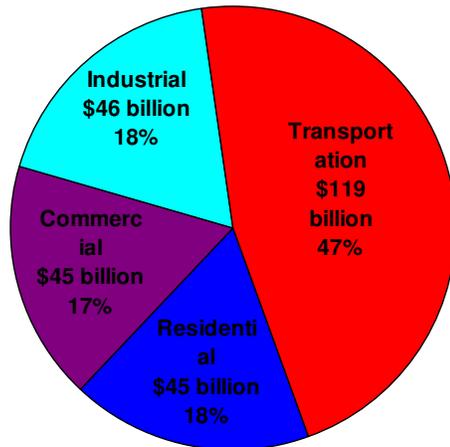
Table ES.1 Adding Up Annual Consumer and Business Energy Savings under the Blueprint (Billions of 2006\$)

ENERGY SAVINGS	2015	2020	2025	2030
Energy Bill Savings	39	152	271	414
Energy Investment Costs	38	78	123	160
Net Consumer and Business Savings on Energy	1	74	147	255

Note: values may not sum properly due to rounding.

Consumers in the transportation sector see nearly half of the annual energy savings (\$119 billion), though the Blueprint policies ensure that consumers and businesses throughout the economy save money on energy expenses (see Figure ES.6).

Figure ES.6. Which Sectors Reap Savings in 2030 from Lower Energy Expenses under the Blueprint



The U.S. economy sees \$255 billion in net energy savings in 2030 under the Blueprint (in 2006 dollars). The transportation sector—including all users—reaps the largest share. Residential, commercial, and industrial consumers each gain just under 20 percent of the net savings, with nearly 90 percent of that amount—or \$118 billion—stemming from lower electricity costs.

Where the Blueprint Cuts Emissions Within Sectors

Blueprint policies dramatically reduce carbon emissions from power plants. Under the Blueprint, carbon emissions from power plants are 84 percent below 2005 levels by 2030. Power plant sulfur dioxide (SO₂), nitrogen oxide (NO_x), and mercury pollution are also significantly lower, which would improve air and water quality and provide important public health benefits.

Most of the emission reductions occur from replacing coal generation with energy efficiency, more efficient natural gas generation, and renewable energy. By 2030, energy efficiency measures, such as advanced buildings and industrial processes, and high efficiency appliances, lighting, and motors reduce electricity generation by 35 percent below the reference case. Efficient natural gas combined-heat-and-power generation in the commercial and industrial sectors increases to 16 percent of U.S. electricity generation by 2030. Largely because of the national renewable electricity standard, wind, solar, geothermal and bioenergy provide 40 percent of the remaining power.

Hydropower and nuclear power continue to play important roles, generating slightly more carbon-free electricity in 2030 than they do today. Efforts to capture and store carbon from advanced coal plants, and new advanced nuclear plants, play a minor role, as our analysis shows they will not be economically competitive with investments in energy

efficiency and many renewable technologies. However, carbon capture and storage and advanced nuclear power could play a more significant role both before and after 2030 if their costs decline faster than expected, or if the nation does not pursue the vigorous energy efficiency and renewable energy policies and investments we recommend.

Industry and buildings cut fuel use through greater energy efficiency. By 2030, a drop in direct fuel used in industry and buildings accounts for 10 percent of the cuts in carbon emissions from non-electricity sources under the Blueprint.

Transportation gets cleaner, smarter, and more efficient. Under the Blueprint, carbon emissions from cars and light trucks are 40 percent below 2005 levels by 2030. Global warming emissions from freight trucks are held steady despite a more than 80 percent growth in the nation's economy. Carbon emissions from airplanes continue to grow nearly unchecked, pointing to the need for specific policies targeting that sector. Overall carbon emissions from the transportation sector fall to 19 percent below 2005 levels by 2030—and more than 30 percent below the Reference case.

Many of the improvement in this sector comes from greater vehicle efficiency and the use of the lowest-carbon fuels, such as ethanol made from plant cellulose, and renewable electricity (through investments in advanced vehicles such as plug-in hybrids). Measures to reduce travel—such as per-mile insurance and congestion fees, and more emphasis on compact development linked to transit—provide the remaining reductions.

These advances represent the second half of an investment in a cleaner transportation system that began with the 2007 Energy Independence and Security Act.¹² These investments provide immediate benefits and will be essential to dramatically cutting carbon emissions from the transportation sector by 2050.

¹² Because our reference case includes the policies contained in 2007 bill, the Blueprint's 30 percent reduction from the reference case in 2030 represents incremental benefits above and beyond those delivered from the fuel economy standards and renewable fuel standard contained in the bill. If the 2007 bill were not included in our reference case, the Blueprint's transportation policies would deliver nearly a 40 percent reduction relative to the new reference case.

Box ES.2. 2020 Implications of the Blueprint

A central insight from the Blueprint analysis is that there are many opportunities for cost-effective reductions, even in the next ten years (through 2020). The results show that capped firms find it cost-effective to cut emissions more than required by the cap and bank allowances for future years. Efficiency, renewable energy, reduced vehicle travel and offsets all contribute to these significant near term reductions.

By 2020, we find that the U.S. can:

- Achieve a 30 percent reduction in emissions from 2005 levels at a net annual savings of \$346 billion to consumers and business. The added reductions are banked and used to comply with the cap and lower costs in later years.
- Reduce annual energy use by 17 percent compared to reference case levels.
- Cut the use of oil and other petroleum products by 3.4 million barrels per day compared to 2005, reducing imports to 50 percent of our needs.
- Reduce annual electricity generation by almost 20 percent compared to the reference case while producing 10 percent of electricity with combined heat and power and 20 percent with renewable energy sources, such as wind, solar, geothermal, and bioenergy.
- Rely on complementary policies to deliver cost effective efficiency, conservation and renewable energy solutions. Excluding energy and transportation sector policies from the Blueprint would reduce net cumulative consumer savings through 2020 from \$735 billion to \$560 billion.

Blueprint Cuts Are Conservative and Practical

The Blueprint includes only technologies that are commercially available today, or that will very likely be available within the next two decades. Our analysis excludes many promising technologies, or assumes they will play only a modest role by 2030 (see box ES.3). We also did not analyze the full potential for storing more carbon in U.S. agricultural soils and forests, although studies show that such storage could be significant.

Our estimates of cuts in carbon emissions are therefore conservative. More aggressive policies and larger investments in clean technologies could produce even deeper U.S. reductions.

Box ES.3. Beyond Climate 2030 Blueprint - Technologies for Our Future

Our analysis did not include several renewable energy and transportation sector technologies that are at an early stage of development, but offer promise. These include:

- **Thin film solar**
- **Biopower with carbon capture and storage**
- **Advanced geothermal energy**
- **Hydrokinetic power**
- **Renewable energy heating and cooling**
- **Advanced storage and smart grid technologies**
- **Dramatic expansion of all-electric cars and trucks**
- **High-speed electric rail**
- **Expanded public transit-oriented development**
- **Breakthroughs in third-generation biofuels**

Recommendations: Building Blocks for a Clean Energy Future

Given the significant savings under the Blueprint, building a clean energy economy not only makes sense for our health and well-being and the future of our planet but is clearly also good for our economy. However, we cannot realize the benefits of the Climate 2030 Blueprint if we do not put in place the critical policies to get us there—some as soon as 2010. All these policies are achievable, but near-term action is essential.

An important first step is science-based legislation that would enable the nation to cut heat-trapping emissions by at least 35 percent below today's levels by 2020¹³, and at least 80 percent by 2050. Such legislation would include a well-designed cap-and-trade program that guarantees the needed emission cuts and does not include loopholes, such as “safety valves” that prevent the free functioning of the carbon market.

Equally important, policy makers should require greater energy efficiency and the use of renewable energy in industry, buildings, and electricity. Policy makers should also require cleaner cars, trucks, and fuels and reduced car and truck travel through pricing and by providing better alternatives.

U.S. climate policy must also have an international dimension. That dimension should include funding the preservation of tropical forests, sharing energy efficiency and renewable energy technology with developing nations, and funding adaptation to the unavoidable effects of climate change.

¹³ Note that this recommendation encompasses more possibilities for emissions reductions than we were able to model in UCS-NEMS (such as reduced tropical deforestation). The reductions from the Blueprint can and should be supplemented by emissions reductions from these other sources.

Conclusion

We are at a crossroads. The Reference case shows that we are on a path of rising energy use and heat-trapping emissions. We are already seeing significant impacts from this carbon overload, such as rising temperatures and sea levels and extreme weather events. If heat-trapping emissions continue to climb at their current rate, we could reach climate “tipping points” and be faced with irreversible changes to our planet.

In 2007 the Intergovernmental Panel on Climate Change (IPCC) found it “unequivocal” that the Earth’s climate is warming and that this is primarily caused by human activities (IPCC 2007). The IPCC report concludes that unchecked global warming will only create more adverse impacts on food production, public health, and species survival. .

The climate will not wait for us. More recent studies have shown that the measured impacts—such as rising sea levels and shrinking summer sea ice in the Arctic—are occurring more quickly, and often more intensely, than IPCC projections (Rosenzweig et al 2008; Rahmstorf et al. 2007; Stroeve et al. 2007). One study also shows that if climate trends continue, the total cost of global warming in the United States could be as high as 3.6 percent of GDP by 2100 (Ackerman and Stanton 2008).

The most expensive thing we can do is nothing. The Climate 2030 Blueprint shows that pursuing a clean energy economy is a sensible, responsible, and affordable path. By choosing this path we cut our carbon emissions, maintain robust economic growth, achieve significant energy savings and help preserve the future health and well-being of our children. The Blueprint policies—although an essential step forward—are only a beginning. The nation can and must expand these and other policies beyond 2030 to ensure that we meet the mid-century emissions reductions called for by science.