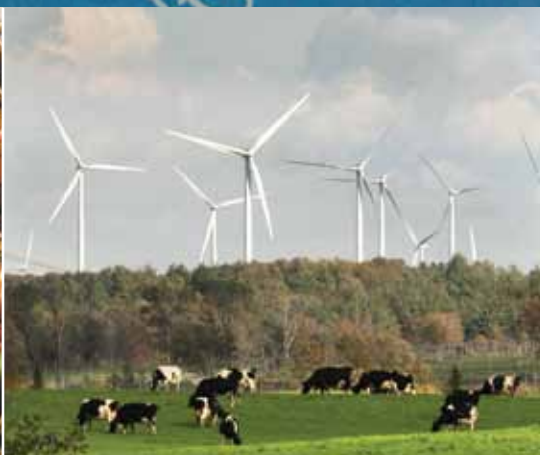


EXECUTIVE
SUMMARY

Climate 2030

A NATIONAL BLUEPRINT FOR A CLEAN ENERGY ECONOMY



Union of Concerned Scientists

Citizens and Scientists for Environmental Solutions

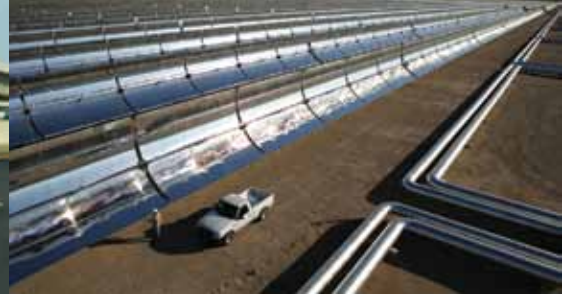
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CLIMATE 2030 BLUEPRINT EXECUTIVE SUMMARY

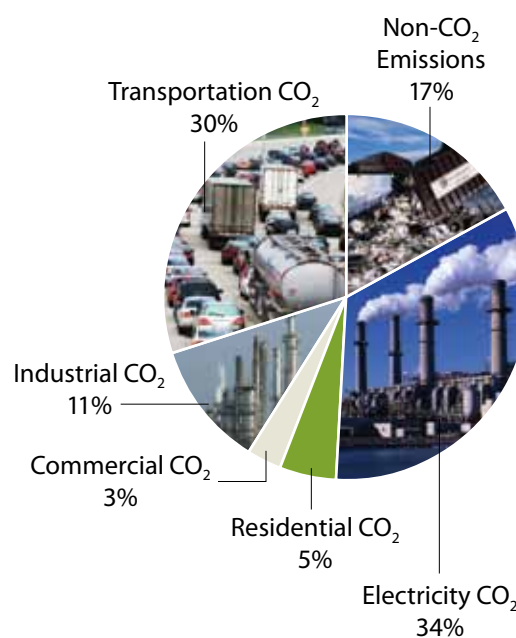
Building a Revitalized Clean Energy Economy

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 two 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 heat-trapping emissions 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. The Sources of U.S. Heat-Trapping Emissions in 2005



The United States was responsible for approximately 7,180 million metric tons CO₂ equivalent of heat-trapping emissions in 2005, the baseline year of our analysis. Most of these emissions occur when power plants burn coal or natural gas and vehicles burn gasoline or diesel. The transportation, residential, commercial, and industrial shares represent direct emissions from burning fuel, plus “upstream” emissions from producing fuel at refineries.

Data Source: EIA, 2008

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). The actual year-by-year emissions reductions differ from the levels set in the cap because firms have the flexibility to over-comply with the cap in early years, bank allowances, and then use them to meet the cap requirements in later years.

To meet the cap, the cumulative *actual* emissions must equal the cumulative tons

of emissions set by the cap. In 2030, we achieve this goal.

The nation achieves these deep cuts in carbon emissions while saving consumers and businesses \$465 billion annually by 2030. The Blueprint also builds \$1.7 trillion in net cumulative savings between 2010 and 2030.¹

Blueprint policies stimulate significant consumer, business, and government investment in new technologies and measures by 2030. The resulting savings on energy bills from reductions in electricity and fuel use more than offset the costs of these additional investments. The result is net annual savings for households, vehicle



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Climate 2030 Blueprint shows that deep emissions cuts can be achieved while saving U.S. consumers and businesses \$465 billion in 2030.

owners, businesses, and industries of \$255 billion by 2030.²

We included an additional \$8 billion in government-related costs to administer and implement the policies. However, auctioning carbon allowances will generate \$219 billion in revenues that is invested back into the economy.³ This brings annual Blueprint savings up to \$465 billion by 2030.⁴

Under the Blueprint, every region of the country stands to save billions (see Figure ES.3, p.5). Households and businesses—even in coal-dependent regions—will share in these savings.

The Blueprint keeps carbon prices low. Under the Blueprint, the price of carbon allowances starts at about \$18 per ton of CO₂ in 2011, and then rises to \$34 in 2020, and to \$70 in 2030 (all in 2006 dol-

lars). Those prices are well within the range that other analyses find, despite our stricter cap on economywide emissions.

In addition, the Blueprint achieves much larger cuts in carbon emissions *within the capped sectors* because of the tighter limits that we set on “offsets”⁵ and because of our more realistic assumptions about the cost-effectiveness of investments in energy efficiency and renewable energy technologies.

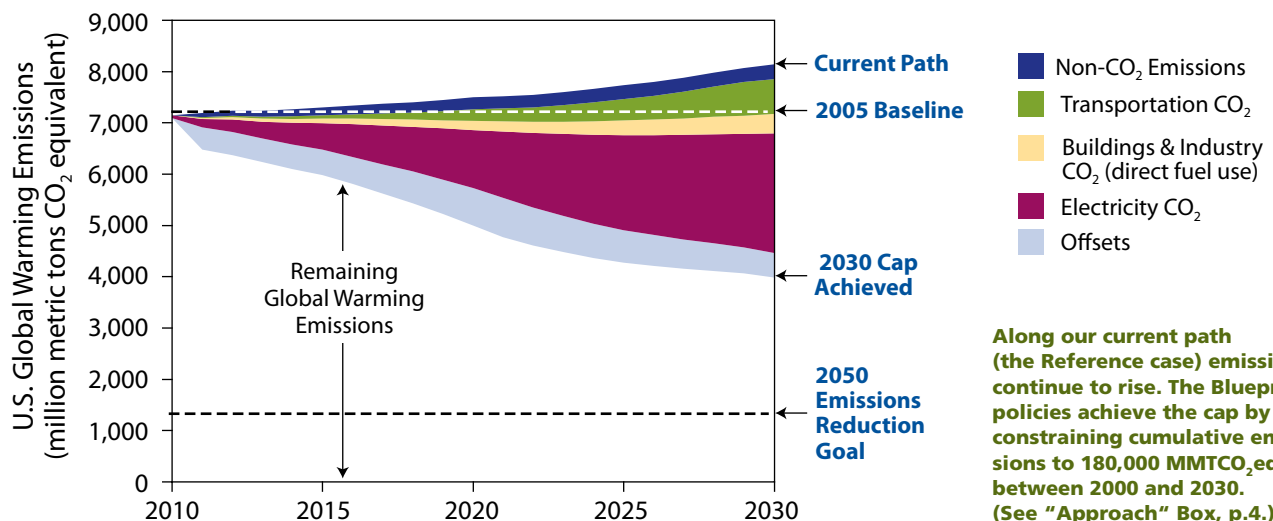
The economy grows by at least 81 percent by 2030 under the Blueprint. U.S. gross domestic product (GDP) expands by 81 percent between 2005 and 2030 under our approach—virtually the same as in the Reference case, which shows the U.S. economy growing by 84 percent. In fact, our model predicts that the Blueprint will slow economic growth by less

Roughly 85,000 people were employed in the wind industry in 2008. In general, renewable energy projects can create more jobs per kilowatt-hour than coal and natural gas power plants.



Suzlon Wind Energy Corporation

FIGURE ES.2. Net Cuts in Global Warming Emissions under the Climate 2030 Blueprint





AP Photo/Michael Dwyer



Dr. Timothy Volk



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The Climate 2030 Approach

This report analyzes the economic and technological feasibility of meeting stringent targets for reducing global warming emissions, with a cap set at 26 percent below 2005 levels by 2020, and 56 percent below 2005 levels by 2030. Meeting this cap means the United States would limit total emissions—the crucial measure for the climate—to 180,000 million metric tons carbon dioxide equivalent (MMTCO₂eq) from 2000 to 2030.⁶

The nation's 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. The 2000–2030 carbon budget in our analysis would put us on track to reach the mid-range of that long-term budget by 2050, if the nation continues to cut emissions steeply.

To reach the 2020 and 2030 cap and carbon budget targets, the Blueprint proposes a comprehensive policy approach (the “Blueprint policies”) that combines an economywide cap-and-trade program with complementary policies. This approach finds cost-effective ways to reduce fossil fuel emissions throughout our economy—including in 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 an analysis of the impact of greater en-

ergy efficiency in industry and buildings by the American Council for an Energy Efficient Economy. We also worked with researchers at the University of Tennessee to analyze the potential for crops and residues to provide biomass energy. We then combined our model with those studies 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 2008.⁷ The second—the Blueprint case—examines an economywide 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 third “sensitivity” scenario that strips out the policies targeted at those sectors, which we refer to as the No Complementary Policies case.

Our 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 shows that consumers and businesses reap significant net savings under the comprehensive Blueprint approach, while the nation sees strong economic growth.

than 1.5 percent in 2030—equivalent to only 10 months of economic growth over the 25-year period.⁸

The Blueprint also shows practically the same employment trends as the Reference case. In fact, nonfarm employment is slightly higher under the Blueprint than in the Reference case (170 million jobs versus 169.4 million in 2030).

We should note that there are significant limitations in the way NEMS accounts for the GDP and employment effects of the

Blueprint policies. NEMS does not fully consider the economic growth that would arise from investments in clean technology, or from the spending of the money consumers and businesses saved on energy due to these investments. And the Reference case does not include the costs of global warming itself.

The Blueprint cuts the annual household cost of energy and transportation by \$900 in 2030. The average U.S. household would see net savings on electricity, natu-

ral gas, and oil of \$320 per year compared with the Reference case, after paying for investments in new energy efficiency and low-carbon technologies.

Transportation expenses for the average household would fall by about \$580 per year in 2030. Those 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.

Businesses save nearly \$130 billion in energy-related expenses annually by 2030



New England Futures/Maine DOT



Dennis Marsico



Official U.S. Navy Photo

under the Blueprint. Neither the energy nor the transportation savings account for the revenue from auctioning carbon allowances 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

Blueprint policies reduce projected 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

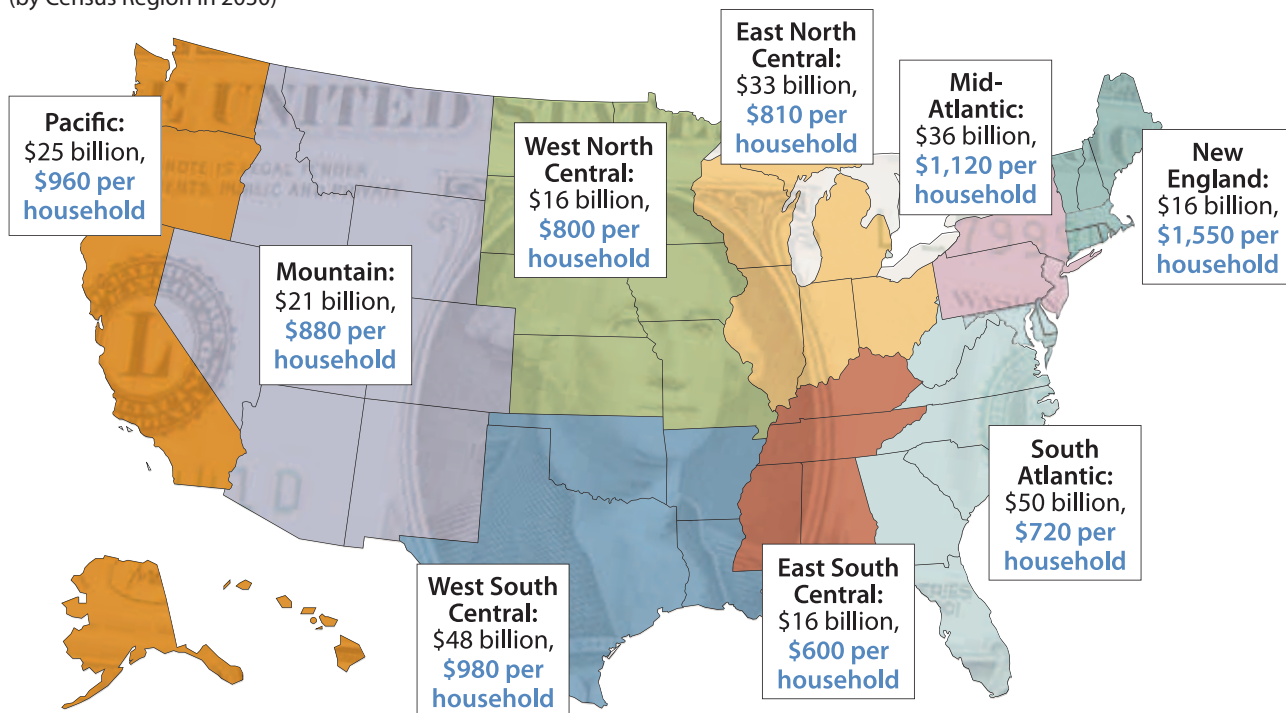
from wind, solar, geothermal, and bioenergy under the Blueprint. Carbon emissions are also kept low because the use of nuclear energy and hydropower—which do not directly produce carbon emissions—remain nearly the same as in the Reference case.

The Blueprint reduces U.S. dependence on oil and oil imports. By 2030,

In 2030, the Blueprint cuts the use of petroleum products by six million barrels a day—as much as we are currently importing from OPEC countries.

FIGURE ES.3. Net Consumer and Business Savings

(by Census Region in 2030)



Net Annual Savings in 2030	Total	\$255 billion
	Business	\$129 billion
	Consumers	\$126 billion
	Average Consumer	\$900 per household

Note: Values may not sum properly because of rounding.

Consumers and businesses in every region of the country save billions of dollars under the Blueprint. Household numbers do not include business savings.



Mark Kavanagh



LM Glasfiber



Jupiter Images

Climate 2030 Blueprint Policies

Climate Policies

- Economywide 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 for capped businesses to over-comply with the cap and bank excess carbon 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
- R&D on energy efficiency

Electricity Policies

- A renewable electricity standard for retail electricity providers
- R&D on 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 deployment of advanced vehicle technology
- Smart-growth policies that encourage mixed-use development, with more public transit
- Smart-growth policies that tie federal highway funding to more efficient transportation systems
- Pay-as-you-drive insurance and other per-mile user fees

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). 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 we remove these policies from the Blueprint, consumers and businesses will save much less money.¹⁰ Excluding the complementary policies we recommend for the energy and transportation sectors would reduce net cumulative consumer and business savings through 2030 from a total of \$1.7 trillion to \$0.6 trillion (see Figure ES.4).

Our No Complementary Policies case also shows that excluding the policies we recommend for the energy and transportation sectors will double the price of carbon allowances.

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Make It Right Foundation-Concordia



J. Miles Cary/Knoxville News Sentinel



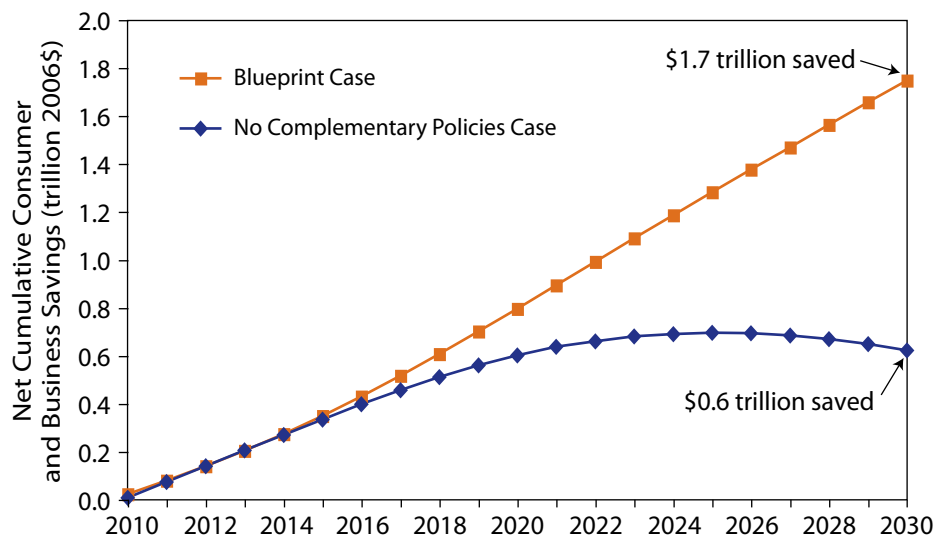
NYSERDA



Courtesy of ACCIONA

Low carbon electricity generation is essential if the United States is to meet a stringent cap (or limit) on carbon emissions. Electricity generated from the sun, for example, can power homes and businesses without releasing heat-trapping carbon emissions into the atmosphere. This concentrated solar power plant is one of several renewable energy technologies available to meet the country's electricity needs.

FIGURE ES.4. Net Cumulative Savings (2010–2030)



*Net present value using a 7% real discount rate

The 2010–2030 net cumulative savings to consumers and businesses are \$1.7 trillion under the Blueprint case. Under the No Complementary Policies case, which strips out all the energy and transportation policies, these savings are \$0.6 trillion.

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

Blueprint policies reduce projected U.S. energy use by one-third by 2030.

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 (16 percent). Carbon offsets provide 11 percent of the overall cuts in carbon emissions by 2030. 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 4 percent, respectively, of the reductions in emissions (see Figure ES.5, p.8).

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. As noted, these savings more than cover the costs of carbon allowances that utilities and fuel providers pass through to households and businesses in higher energy prices. The incremental costs of energy investments (expenditures on energy-consuming products such as homes, appliances, and vehicles) reach \$160 billion.



PPM Energy



AP Photo



Scott McDonald © Hedrich Blessing

The result is net annual savings of \$255 billion for households and businesses in 2030.

Households and businesses that rely on the transportation sector see nearly half of the net annual savings (\$119 billion) in 2030. However, Blueprint policies ensure that consumers and businesses throughout the economy save money on energy expenses. Lower electricity costs for industrial, commercial, and residential customers are responsible for \$118 billion in net annual savings (see Figure ES.6).

The Blueprint Cuts Emissions in Each Sector

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. Sulfur dioxide (SO₂), nitrogen oxides (NO_x), and mercury pol-

The Blueprint cuts carbon emissions from power plants by 84 percent below 2005 levels by 2030.

lution from power plants are also significantly lower, improving air and water quality and providing important public health benefits.

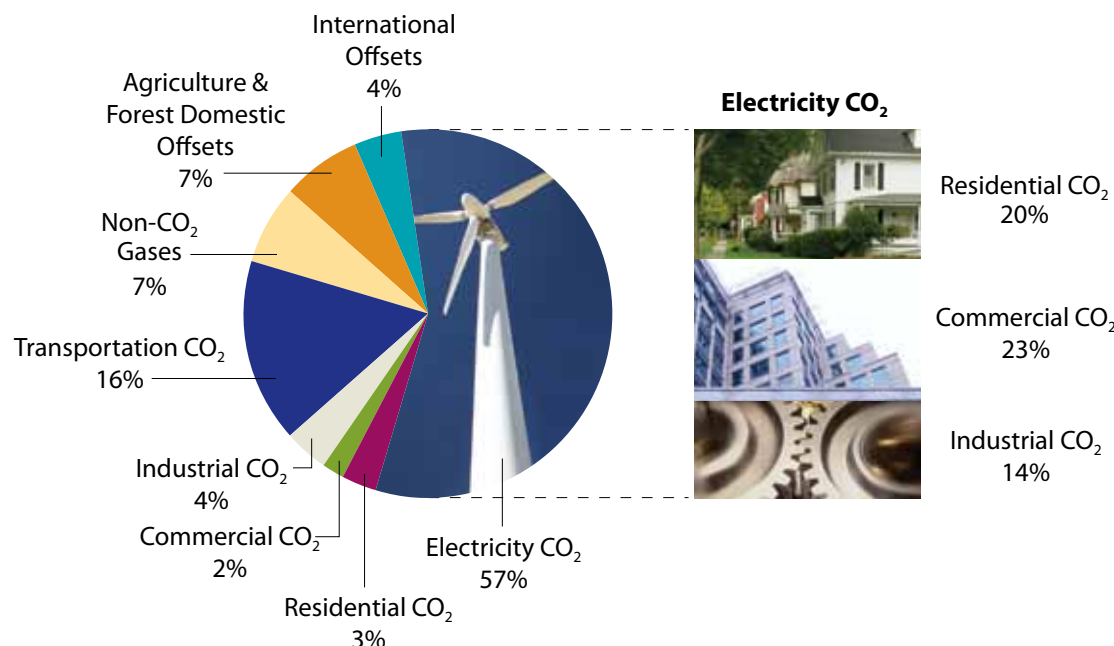
Most of these cuts in emissions come from reducing the use of coal to produce electricity through greater use of energy efficiency and renewable energy technologies. For example, energy efficiency measures—such as advanced buildings and industrial processes—and high-efficiency appliances, lighting, and motors reduce demand for electricity by 35 percent below the Reference case by 2030. The use of efficient combined-heat-and-power systems that rely on natural gas in the commercial and industrial sectors more than triples over current levels, providing 16 percent of U.S. electricity by 2030. And

largely because of a national renewable electricity standard, wind, solar, geothermal, and bioenergy provide 40 percent of the remaining electricity.

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

FIGURE ES.5. The Source of Cuts in Global Warming Emissions in 2030

(Blueprint case vs. Reference case)



The electricity sector leads the way in emissions reductions, but the Blueprint ensures that all sectors contribute. Emissions cuts in the electricity sector include reductions in demand from energy efficiency in the residential, commercial, and industrial sectors.



J. Tuason



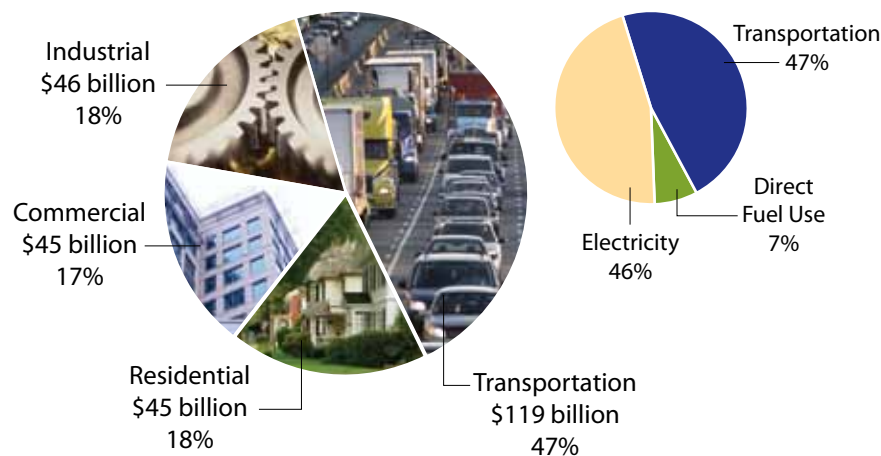
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FIGURE ES.6. The Source of Savings in 2030

(Blueprint case vs. Reference case)



Consumers and businesses see \$255 billion in net annual savings in 2030 under the Blueprint (in 2006 dollars). Consumers and businesses in the transportation sector reap 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.

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 9 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 hold steady despite a more than 80 percent growth in the nation's economy. However, 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

The MAX light rail system in downtown Portland, OR, helps residents avoid traffic while commuting to work or going shopping. With smart transportation policies, we can more than double the carbon emissions reductions projected from the 2007 Energy Independence and Security Act (EISA)—ensuring that people from Portland to Pensacola have greater access to mass transit as well as cleaner cars and fuels.



Travel Portland



Chicago Department of Environment



NREL



James Estrin/New York Times/Redux

Beyond the 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
- Wave and tidal 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

Sui-Setz

19 percent below 2005 levels by 2030—and more than 30 percent below the Reference case.

Much 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. Measures to encourage more efficient travel options—such as per-mile insurance and congestion fees, and more emphasis on compact development linked to transit—also provide significant reductions. Renewable electricity use in advanced vehicles such as plug-in hybrids begins to grow significantly by 2030.

These advances represent the second half of an investment in a cleaner transportation system that began with the 2007 Energy Independence and Security Act.¹¹ These investments provide immediate benefits and will be essential to dramatically cutting carbon emissions from the transportation sector by 2050.

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. 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.



David J. Moorhead, University of Georgia

If properly managed, forests and soils are able to store carbon and help reduce the atmospheric carbon overload. Numerous studies suggest significant potential for carbon storage in U.S. agricultural soils and forests. We were unable to analyze the full potential of this option for the Blueprint, suggesting that even greater emissions reductions and savings may be possible.

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, the nation will only realize the benefits of the Climate 2030 Blueprint if we quickly put the critical policies in place—some as soon as 2010. All these policies are achievable, but near-term action is essential.



NREL



PPM Energy



NREL

Cleaner vehicles, better transportation choices, and low-carbon fuels cut transportation emissions by 30 percent.

An important first step is science-based legislation that would enable the nation to cut heat-trapping emissions by at least 35 percent below 2005 levels by 2020,¹² 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 and provide incentives for cleaner cars, trucks, and fuels and better alternatives to car and truck travel.

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 technologies with

developing nations, and helping those nations adapt to the unavoidable effects of climate change.

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 such emissions continue to climb at their current rate, we could reach climate “tipping points” and face 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 human activities are the primary cause (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).

The most expensive thing we can do is nothing. One study also estimates that



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The Climate 2030 Blueprint demonstrates that the cost effective way to achieve quick and deep carbon emissions reductions in the United States is an approach that combines a well-designed cap-and-trade system with policies that promote energy efficiency, the development of renewable electricity, cleaner cars and fuels, and more options to help avoid traffic congestion. The cap ensures the necessary level of emissions reductions while the sector policies help consumers and businesses save more money.



Jupiter Images



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TABLE ES.1. **Annual Consumer and Business Savings**

(in billions of 2006 dollars)

THE UNITED STATES OF AMERICA				
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	\$ 1B	\$ 74B	\$147B	\$255B

Energy bill savings include the costs of renewable electricity, carbon capture and storage, and renewable fuels that are passed on to consumers and businesses on their energy bills. Energy investments costs include the cost of more efficient appliances and buildings, cleaner cars and trucks, and a more efficient transportation system.

Note: Values may not sum properly because of rounding.

Associated Press



The Earth's climate is warming and the effects are already being felt, including more extreme heat in many parts of the country. Because carbon emissions linger in the atmosphere for 100 years or more, the U.S. must act quickly to avert the worst effects of global warming.

Impact of the Blueprint Policies in 2020

A central insight from the Blueprint analysis is that the nation has many opportunities for making cost-effective cuts in carbon emissions in the next 10 years (through 2020). Our analysis shows that firms subject to the cap on emissions find it cost-effective to cut emissions more than required—and to bank carbon allowances for future years. Energy efficiency, renewable energy, reduced vehicle travel, and carbon offsets all contribute to these significant near-term reductions.

By 2020, we find that the United States can:

- Achieve, and go beyond, the cap requirement of a 26 percent reduction in emissions below 2005 levels, at a net annual savings of \$243 billion to consumers and businesses. The reductions in excess of the cap are banked by firms for their use in later years to comply with the cap and lower costs.
- Reduce annual energy use by 17 percent compared with the Reference case levels.
- Cut the use of oil and other petroleum products by 3.4 million barrels per day compared with 2005, reducing imports to 50 percent of our needs.
- Reduce annual electricity generation by almost 20 percent compared with the Reference case while producing 10 percent of the remaining 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 energy efficiency, conservation, and renewable energy solutions. Excluding those energy and transportation sector policies from the Blueprint would reduce net cumulative consumer savings through 2020 from \$795 billion to \$602 billion.

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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 Climate 2030 Blueprint demonstrates that we can choose to cut our carbon emissions while maintaining robust economic growth and achieving significant energy-related savings. While the Blueprint policies are not the only path forward, a near-term comprehensive suite of climate, energy, and transportation policies is essential if we are to curb global warming in an economically sound fashion. These near-term policies are also only the beginning of the journey toward achieving a clean energy economy. The nation can and must expand these and other policies beyond 2030 to ensure that we meet the mid-century reductions in emissions that scientists deem necessary to avoid the worst consequences of global warming.

**The most
expensive thing we
can do is nothing.**



Chicago Department of Environment

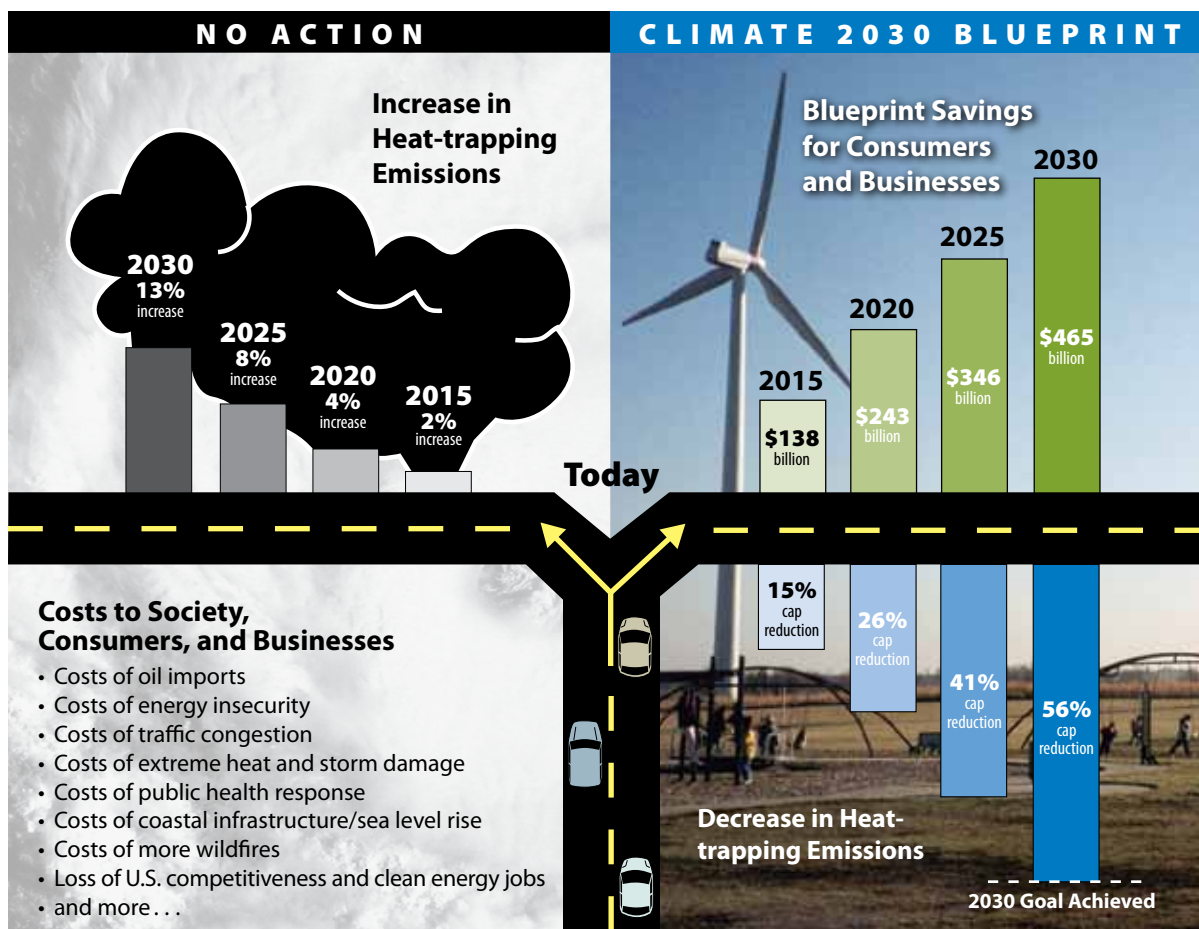


Puget Sound Energy



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Choosing a Clean Energy Economy



Emissions increases and decreases are relative to 2005; Blueprint savings are relative to the Reference case.

NREL

The United States is at a crossroads. We can choose to transition to a clean energy economy that addresses a multitude of challenges (oil dependency, energy security, global warming, air pollution) or we can choose to ignore these problems.

The Climate 2030 Blueprint shows that we can build a competitive clean energy economy that will save consumers money and give our children a healthy future.

Conversely, choosing to ignore our energy problems commits us to continued reliance on dirty fossil

fuels and to damaging costs associated with climate change. These costs include the consequences of sea level rise that threaten our coastal communities, disruptions in food production, and illnesses associated with extreme heat and diminished air quality.

This transition will certainly require some up-front investment costs. However, the Climate 2030 Blueprint will reduce energy use and consumer and business energy bills—even in the early years. These savings more than make up for the costs of building a clean energy economy.

The time to invest in our future is now.



Great River Energy



NREL



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ENDNOTES

- 1 Unless otherwise noted, all amounts are in 2006 dollars, and cumulative figures are discounted using a 7 percent real discount rate.
- 2 Net savings include both energy bills (the direct cost of energy such as diesel, electricity, gasoline, and natural gas) and the cost of purchasing more efficient energy-consuming products such as appliances and vehicles. The cost of carbon allowances passed through to consumers and businesses is also included in their energy bills.
- 3 We could not model a targeted way of recycling these revenues. The preferred approach would be to target revenues from auctions of carbon allowances toward investments in energy efficiency, renewable energy, and protection



Peter Beck/CORBIS

- 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.
- 4 Values may not sum properly due to rounding.
- 5 In a cap-and-trade system, rather than cutting their emissions directly, capped companies can “offset” them by paying uncapped third parties to reduce their emissions instead. The cap-and-trade program we modeled includes offsets from storing carbon in domestic soils and vegetation—set at a maximum of 10 percent of the emissions cap, to encourage “decarbonization” of the capped sectors—and from investing in reductions in other countries, mainly from preserving tropical forests, set at a maximum of 5 percent of the emissions cap.
- 6 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 and Gordon 2009).
- 7 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.

- 8 This means that under the Blueprint the economy reaches the same level of economic growth in October 2030 as the Reference case reaches in January 2030.
- 9 See endnote 3.
- 10 Some or all of the economic benefits of the complementary policies could also occur if policy makers effectively use the revenues from auctioning carbon allowances to fund the technologies and measures included in these policies. Our study did not address that approach.
- 11 Because our Reference case includes the policies in the 2007 legislation, the Blueprint’s 30 percent reduction from that case in 2030 represents benefits beyond those delivered from the fuel economy standards and renewable fuel standard in the act. If our Reference case did not include the provisions in the act, Blueprint transportation policies would deliver nearly a 40 percent reduction compared with the Reference case.
- 12 Note that this recommendation encompasses more possibilities for reducing emissions than we were able to model in UCS-NEMS. For example, investments in reducing emissions from tropical deforestation could help meet this 2020 target. The Blueprint reductions can and should be supplemented by these and other sources of emissions reductions.



Geoff Kuchera



Tim McCabe, USDA



AP Photo/Michael Dwyer

Climate 2030: A National Blueprint for a Clean Energy Economy

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CLIMATE 2030 BLUEPRINT

Your 2030 Year-end Summary

Account Number: 2030 535 0001

THE SMITH FAMILY
26 MAIN STREET
ANY TOWN, USA

Payment Due Date

12/31/2030

New Balance

Payment/Credit: **\$900.00**

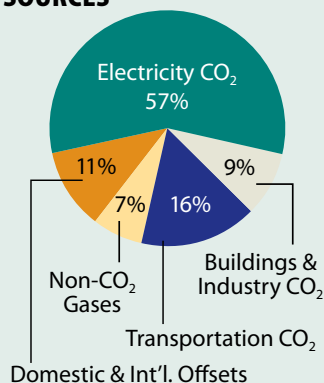
Energy and transportation service provided to:

The Smith Family
Any Town, USA

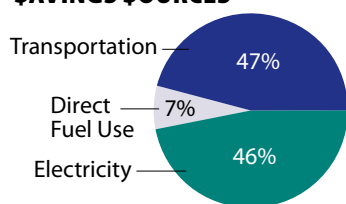
Savings Summary

Account number: 2030 535 0001

EMISSIONS REDUCTIONS SOURCES



\$AVINGS SOURCES



BLUEPRINT SAVINGS

(in billions of dollars)

Consumer and Business Savings:

National Energy Bill Savings	\$414B
Energy Investment Costs	- 160B

Net Savings **\$255B**

Allowance Revenue Generated + \$219B

Policy Implementation Costs - \$8B

Blueprint Savings **\$465B**

Cumulative net savings for consumers and businesses from 2010-2030 = \$1.7 trillion

Values may not sum properly because of rounding.

HOUSEHOLD NET SAVINGS

Electricity, Natural Gas, and Heating Oil	\$320
Transportation	+580

Total **\$900/household**

Consumer savings	\$126B
Number of U.S. households in 2030	÷140M

Total **\$900/hh**

BUSINESS NET SAVINGS

Commercial Energy	\$ 45B
Industrial Energy	\$ 46B
Commercial & Industrial Transportation	\$ 38B

Total **\$129B**

Smart climate, energy, and transportation solutions reap big \$\$ savings for consumers and businesses.



Union of Concerned Scientists

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