CLEAN POWER
GREEN JOBS

A National Renewable Electricity Standard Will Boost the Economy and Protect the Environment

RENEWABLE ENERGY HAS BEEN ONE OF THE BRIGHT SPOTS FOR THE STRUGGLING U.S. ECONOMY.

In 2007 and 2008, more wind power was installed in the United States than in the previous 20 years combined, representing a $27 billion investment. More than 70 wind turbine component manufacturing facilities opened, expanded, or were announced. Moreover, according to their respective trade associations, the U.S. wind industry employed 85,000 people in 2008, up 35,000 from 2007, and the solar energy industry employed more than 80,000 people, up more than 15,000 from 2006.

According to new analysis by the Union of Concerned Scientists (UCS), a national standard that would require all electric utilities to increase their use of renewable electricity to at least 25 percent by 2025 would create more "green" jobs, lower consumer energy bills in every region of the country, and reduce carbon dioxide (CO_2) and other harmful emissions from power plants—the biggest source of global warming pollution in the United States.

UCS used a modified version of the U.S. Energy Information Administration's (EIA's) National Energy Modeling System to examine the long-term economic and environmental costs and benefits of a national 25 percent by 2025 standard.

Jobs and Other Benefits to Local Economies

We found that such a standard would support significant new investments in clean energy facilities and create 297,000 U.S. jobs in manufacturing, construction, operations, maintenance, agriculture, forestry, and many other industries by 2025.

Renewable energy development from existing state-level policies—primarily renewable electricity standards—would make an important contribution to this total and spur other economic benefits as well.

The national standard would create more than three times as many jobs as producing an equivalent amount of electricity from fossil fuels—resulting in a net benefit of 202,000 new jobs in 2025. It would also generate an additional $9.9 billion in income and $7.3 billion in U.S. gross domestic product (GDP) in 2025.

Renewable energy creates more jobs than fossil fuels because a larger share of renewable energy expenditures go to manufacturing equipment, installation, and maintenance (all of which are typically more labor-intensive than extracting and transporting fossil fuels). Renewable energy facilities also do not need to import fuel from other states, regions, or countries. For example, instead of investing in solutions such as bioenergy from local farms and forests, the Southeast states spent more than $1 billion in 2006 to import coal from Colombia, Indonesia, Poland, and Venezuela. They also spend billions of dollars each year to import coal and natural gas from other states.

Many of the new green jobs would be located in rural areas where renewable electricity generating facilities would be sited. However, a national

25% by 2025:
The Benefits of a National Renewable Electricity Standard

Job Creation
297,000 new jobs from renewable energy development

Economic Development
$263.4 billion in new capital investment; $13.5 billion in income to farmers, ranchers, and rural landowners; and $11.5 billion in new local tax revenues

Consumer Savings
$64.3 billion in lower electricity and natural gas bills by 2025 (growing to $95.5 billion by 2030)

Climate Solutions
Two percent reduction in power plant global warming pollution from today's levels by 2025—the equivalent of taking 45.3 million cars off the road

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standard can also benefit other states that manufacture and assemble components for wind turbines, solar photovoltaic panels and films, biomass facilities, and geothermal power plants. For example, we found that a 25 percent national standard would create 44,500 long-term manufacturing jobs representing an additional $8.9 billion in GDP. Other studies have found that many of these jobs will likely be located in the Southeast and industrial Midwest.[1]

In addition to creating jobs, a 25 percent by 2025 national standard would boost the U.S. economy in the following ways:

- $263.4 billion in new capital investment for renewable energy technologies[2]
- $13.5 billion in new income for farmers, ranchers, and rural landowners who produce biomass energy and/or lease their land to wind developers
- $11.5 billion in new property tax revenue for local communities

Consumer Savings

Increasing renewable energy use diversifies the electricity mix and increases competition in the U.S. energy market. This insulates the economy from shortages and price spikes associated with our overdependence on fossil fuels. Reducing demand for fossil fuels also leads to lower and more stable natural gas and coal prices for electricity generation as well as for other purposes such as heating and manufacturing. Under the 25 percent national standard, annual consumer natural gas prices would be as much as 4.1 percent lower compared with business as usual, with an average annual reduction of 2.3 percent from 2010 to 2030. Average consumer electricity prices would be as much as 7.6 percent lower, with an average annual reduction of 4.3 percent during the same period.

As a result, cumulative electricity and natural gas savings for consumers in all sectors of the economy would reach $64.3 billion by 2025 and would grow to $95.5 billion by 2030

($29.2 billion for households, $41.1 billion for businesses, and $25.2 billion for industrial customers). These savings would extend to consumers in every state (see the table on page 4).

The typical household would save more than $67 in annual gas and electricity costs by 2025. Between 2010 and 2030, the average annual savings for a typical household would be about $44.

Energy Diversity

Our nation currently relies on coal, natural gas, and nuclear power for nearly 90 percent of its electricity needs. Under the 25 percent national standard, the United States would diversify its electricity mix by way of a greater than eight-fold increase in homegrown renewable power generating capacity—from about 28,000 megawatts (MW) in 2007 to 248,000 MW by 2025 (more than double the capacity of business as usual, which includes compliance with existing state renewable electricity standards). This new capacity would come primarily from wind, solar (both photovoltaics and concentrating solar), bioenergy, and geothermal, with more modest contributions from landfill methane and increased hydropower generation at existing dams. The resulting renewable energy would meet the needs of more than 60 percent of the U.S. residential sector.

All regions of the country would see an increase in renewable energy development, including the Southeast, where capacity levels would reach 25,300 MW by 2025—a six-fold increase over 2007. The use of local, renewable resources will reduce the need to import fossil fuels: by 2025, a 25 percent standard would cumulatively displace 12.4 trillion cubic feet (tcf) of natural gas—including 0.9 tcf of liquefied natural gas (LNG) imports—and 547 million short tons of coal compared

Cumulative Electricity and Natural Gas Bill Savings, by Sector*
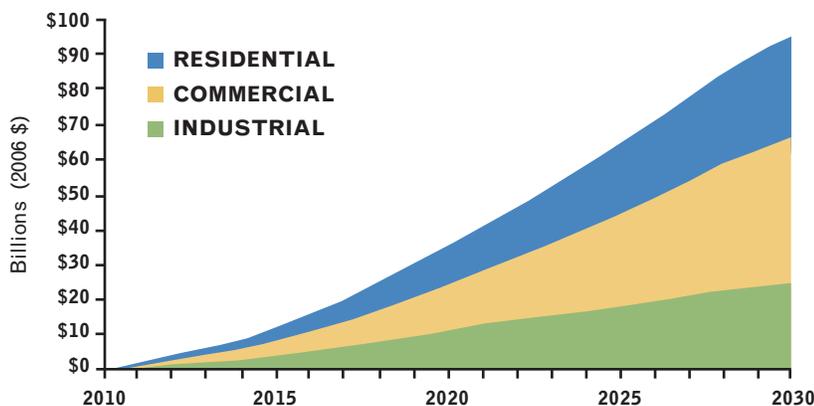
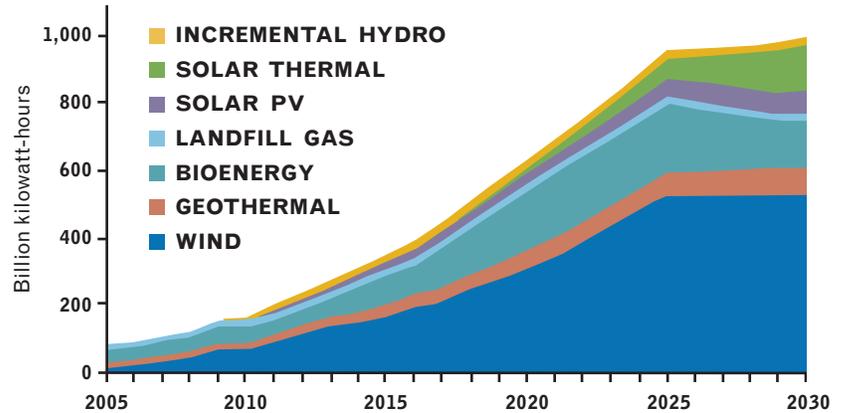*Under a 25% by 2025 national renewable electricity standard

with business as usual. That amount of coal would fill a train nearly 56,000 miles long (more than twice Earth's circumference). The amount of LNG imports saved would eliminate the need for 323 super-tanker deliveries into the United States.

A Smart Climate Solution

Increased renewable energy use would provide an affordable global warming solution by reducing fossil fuel use, in turn reducing CO_2 emissions. The 25 percent national standard would lower power plant CO_2 emissions 277 million metric tons annually by 2025 (more than 2 percent below 2007 levels and 10.6 percent below business as usual)—the equivalent of the annual output from 70 typical (600 MW) new coal plants or taking 45.3 million cars off the road.

A national renewable electricity standard is no substitute for a comprehensive policy for reducing global warming emissions, but it is a smart and cost-effective part of such a policy because it delivers significant emissions reductions at a net savings to consumers. For example, the emissions reductions under the 25 percent standard would also create important savings once CO_2 emissions are regulated by the federal government.

Renewable Energy Generation Mix*

*Under a 25% by 2025 national renewable electricity standard

Assuming a mid-range projection for CO_2 allowance prices (starting at $13/metric ton in 2013 and gradually increasing to $37/metric ton in 2030),[3] the 25 percent standard would generate $19.4 billion in cumulative savings by 2025 from allowances that would not have to be purchased.

Along with CO_2, lower fossil fuel use would reduce other harmful air pollutants from power plants such as mercury and sulfur dioxide, and would limit the damage done to our water and land by fossil fuel extraction and transport. For example, the amount of coal displaced under the 25 percent standard would eliminate the need to deposit 511 million gallons of coal waste in toxic slurry ponds around the United States.

A Cleaner, Safer Energy Future

A national renewable electricity standard would make the U.S. energy supply more reliable and secure. It would use local energy resources to improve local economies, creating skilled jobs and putting energy dollars back into consumers' pockets, while also reducing the dangers of global warming and air pollution. Using existing technologies, we can shift away from our dependence on an unstable supply of dirty fossil fuels toward a future built on clean, renewable energy. We have a responsibility and a compelling financial interest to make the renewable electricity standard a cornerstone of our national energy policy.

Modeling Methods

UCS conducted its analysis using a modified version of the EIA's National Energy Modeling System, which the EIA used to produce its *Annual Energy Outlook* (AEO) *2008*. We examined economic and environmental benefits under a national standard that takes effect in 2010 and rises gradually to 25 percent by 2025.

We assumed that all electric service providers are obligated to meet the requirement, and that existing hydroelectric and municipal solid waste generation is excluded from the baseline. Eligible technologies include wind, solar, bioenergy, geothermal, landfill methane, and incremental hydro. Electricity output from residential and commercial photovoltaic systems is eligible to receive triple credit toward the compliance total. In addition, we made the following changes to the EIA model:

- We updated cost and performance assumptions for renewable and conventional generating technologies to account for recent cost increases, based on data from actual projects, recent studies, input from experts, and power plant cost indices.
- We used assumptions from the AEO 2008 high-commodity-cost case to account for recent cost increases experienced by other energy technologies.
- We used assumptions from the AEO 2008 high-energy-price case consistent with or lower than the energy prices projected by the AEO 2009 reference case.

We also updated the EIA's projections for state renewable electricity standards, assuming some states (e.g., several Northeast states, California) meet their targets on a delayed schedule. In addition, we included the extension and expansion of tax credits for renewable and conventional energy technologies that were part of the economic stimulus package (H.R. 6049) passed by Congress in October 2008, and the construction of a limited number of advanced nuclear plants encouraged by the $18.5 billion in incentives available through the Department of Energy's loan guarantee program.

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Endnotes

1 Sterzinger, G., and M. Svrcek. 2004. Wind turbine development: Location of manufacturing activity. Renewable Energy Policy Project (REPP). September. Online at *www.repp.org/articles/static/1/binaries/WindLocator.pdf*. And: Sterzinger, G., and M. Svrcek. 2005. Solar PV development: Location of economic activity. Renewable Energy Policy Project (REPP). January. Online at *www.repp.org/articles/static/1/binaries/SolarLocator.pdf*.

2 Unless otherwise noted, results are presented in cumulative 2006 dollars using a 7 percent real discount rate.

3 Schlissel, D., L. Johnston, B. Biewald, D. White, E. Hausman, C. James, and J. Fisher. 2008. Synapse 2008 CO_2 price forecasts. Cambridge, MA: Synapse Energy Economics Inc. July. Online at *www.synapse-energy.com/Downloads/Synapse Paper.2008-07.0.2008-Carbon-Paper.A0020.pdf*.

Cumulative Electricity and Natural Gas Bill Savings by State
(under a 25 percent by 2025 national renewable electricity standard)

State	Savings
Alabama	$360 million
Arizona	$1.27 billion
Arkansas	$1.65 billion
California	$10.72 billion
Colorado	$1.23 billion
Connecticut	$1.17 billion
Delaware	$130 million
Florida	$1.77 billion
Georgia	$1.07 billion
Idaho	$380 million
Illinois	$3.28 billion
Indiana	$2.12 billion
Iowa	$330 million
Kansas	$250 million
Kentucky	$320 million
Louisiana	$5.37 billion
Maine	$470 million
Maryland	$620 million
Massachusetts	$2.06 billion
Michigan	$2.78 billion
Minnesota	$440 million
Mississippi	$210 million
Missouri	$450 million
Montana	$360 million
Nebraska	$160 million
Nevada	$760 million
New Hampshire	$390 million
New Jersey	$4.17 billion
New Mexico	$450 million
New York	$8.58 billion
North Carolina	$970 million
North Dakota	$90 million
Ohio	$3.56 billion
Oklahoma	$2.18 billion
Oregon	$1.14 billion
Pennsylvania	$5.95 billion
Rhode Island	$290 million
South Carolina	$550 million
South Dakota	$70 million
Tennessee	$390 million
Texas	$21.13 billion
Utah	$530 million
Vermont	$190 million
Virginia	$810 million
Washington	$1.84 billion
West Virginia	$280 million
Wisconsin	$1.67 billion
Wyoming	$330 million