

America's current energy system is dominated by fossil fuels, which pose serious threats to our health and environment and leave us vulnerable to price spikes and supply shortages. With the threat of global warming becoming increasingly urgent, we must make responsible energy choices today that ensure a safe, reliable power supply *and* a healthy environment for future generations.



Photo: PPM Energy

Fortunately, there are practical and affordable ways to achieve this goal. Homegrown renewable energy resources—such as wind, solar, bioenergy, and geothermal—can help reduce our dependence on polluting fossil fuels. These clean energy sources can also help stabilize energy prices, stimulate the development of innovative new technology, and create high-quality jobs and other economic benefits for Minnesota and the nation.

Strong national policies can ensure these benefits are fully realized. The

policy that has proven most effective and popular at the state level is a renewable electricity standard (also known as a renewable portfolio standard or RPS), which requires electricity providers to supply a minimum percentage of their power from clean energy sources. As of June 2007, renewable electricity standards have been adopted in Minnesota and 22 other states. At the national level, the U.S. Senate has passed a 10 percent by 2020 national renewable electricity standard three times since 2002—most recently in June 2005.

Momentum continues to grow for a strong national standard. A 20 percent by 2020 standard was introduced in the House of Representatives in February 2007, and a 15 percent by 2020 standard is under consideration in the Senate.¹ Using a model from the Energy Information Administration (EIA), the Union of Concerned Scientists (UCS) examined the long-term effects that a national 20 percent by 2020 standard would have on the economy and the environment, under two different scenarios: an “EIA case,” which assumes no changes to the model, and a “UCS case,” which makes several modifications (described in the “Modeling Methods” on the back page). Our analysis found that, under both cases, a national standard would provide significant benefits for Minnesota. The findings from the UCS case 20 percent national standard are presented below, followed by findings for the EIA case 20 percent standard.

20 Percent by 2020: How Minnesota Benefits from a National Renewable Electricity Standard

Job Creation

3,100 new jobs from renewable energy development

Economic Development

\$1.8 billion in new capital investment, \$332 million in income to farmers and rural landowners, and \$64 million in new local tax revenues

Consumer Savings

\$118 million in lower electricity and natural gas bills by 2020 (growing to \$259 million by 2030)

Climate Solutions

Reductions in U.S. global warming pollution equal to taking 36.4 million cars off the road

CONSUMER SAVINGS

Under a 20 percent national standard, consumers in all sectors of Minnesota's economy would experience a reduction in both their cumulative electricity and natural gas costs compared with business as usual. Cumulative savings would reach \$118 million by 2020 and, by 2030, would grow to \$259 million (\$79 million for households, \$66 million for commercial customers, and \$114 million for industrial customers).²

The national renewable standard saves consumers money by reducing the demand for fossil fuels and creating new competitors in the U.S. energy market. As a result, energy companies are limited in their ability to raise fossil fuel prices in the future. Compared with business as usual, natural gas (and coal) therefore cost less for electricity generation, as well as for other purposes, benefiting both electricity consumers and natural gas consumers.

JOBS AND OTHER BENEFITS TO LOCAL ECONOMIES

A renewable electricity standard would benefit Minnesota's economy in other significant ways. For example, dollars invested in clean energy go toward high-quality jobs in manufacturing and construction, as well as jobs in operations, maintenance, finance, sales, shipping, and other industries. Jobs are also created when these workers spend their income on goods and services and when consumer energy bill savings are spent in the local economy.

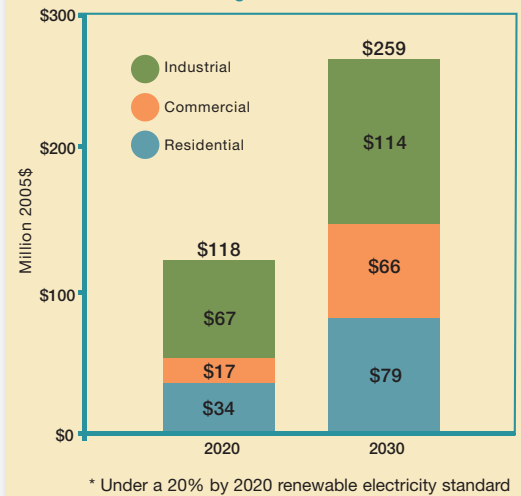
By 2020, the total new renewable energy development needed to meet a 20 percent national standard would generate 3,100 new jobs in Minnesota. State level policies—primarily renewable electricity standards—would make an important contribution toward this job creation as well as spur other economic benefits. Excluding the development from full compliance with state standards and including the effects of displacing fossil fuel generation, the national standard would result in a net benefit of more than 2,080 jobs. These additional jobs would generate an addi-

tional \$132 million in state income and \$162 million in gross state product.

Renewable energy technologies tend to create more jobs than fossil fuel technologies because a larger share of the expenditures for renewable energy is spent on 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 export cash to import fuel from other states, regions, or countries (with bioenergy, money is spent on locally produced fuel), keeping money circulating in the local economy.

Many of the new jobs would be located in rural areas where the renewable energy generating facilities would be sited. However, a national standard can also provide the opportunity to manufacture and assemble components for renewable energy facilities. For example, based on an analysis by the Renewable Energy Policy Project completed for this study, we found that, in Minnesota, a 20 percent national standard would

Cumulative Natural Gas and Electricity Bill Savings in Minnesota*



create 780 new long-term jobs in manufacturing components for wind turbines, solar photovoltaic panels and films, biomass facilities, and geothermal power plants—ranking Minnesota 14th among all states. Developing a strong manufacturing base can also create promising export opportunities, given the rapidly growing commitment of the rest of the world to expand renewable energy use.

In addition to creating jobs, a 20 percent by 2020 national standard would provide an important boost to Minnesota's economy in the following ways:

- \$1.8 billion in new capital investment in renewable energy
- \$332 million in new income for farmers and rural landowners who produce biomass energy and/or lease their land to wind developers
- \$64 million in new property tax revenues to help local communities pay for schools and vital public services

Minnesota Harvests Wind for Rural Economic Prosperity

With nearly 900 MW of wind power capacity installed, and more on the way thanks to one of the country's most aggressive renewable electricity standards, Minnesota is demonstrating that tapping into the state's abundant wind resources can translate directly into economic benefits for local communities. South-central Minnesota's Trimont Area Wind Farm, which began operation in June 2006, is just one example. Forty-three landowners partnered with PPM Energy and Great River Energy to develop the 100 MW project, which generates enough electricity to power 29,000 homes. This generation also helps Great River Energy meet its state requirements.

Jackson and Martin counties, which contain portions of the project, expect to see annual tax revenues of up to \$400,000. Farmers involved with the project will receive a total of \$300,000 annually from land lease payments, and potentially up to twice as much in additional annual income from the revenue-sharing structure established with PPM Energy. Trimont's 67 wind turbines are also spread out across 8,970 acres, which leaves 98 percent of the land available for farming.

ENERGY DIVERSITY

In 2005, 86 percent of Minnesota's electricity was generated from just two sources: coal and nuclear. This heavy reliance on fossil and nuclear fuels makes the state's consumers and economy vulnerable to potential energy supply shortages and interruptions, as well as

price spikes and price manipulation. Increasing the use of renewable energy helps diversify the energy mix by meeting a larger portion of Minnesota's power demand and reducing the projected growth in coal and natural gas use for electricity. Our analysis found that under a 20 percent standard, Minnesota would increase its total

Dollars invested in clean energy go toward high-quality jobs in manufacturing and construction, as well as jobs in operations, maintenance, finance, sales, shipping, and other industries.

homegrown renewable power generating capacity to 4,070 megawatts (MW) by 2020. This development would come from the state's wind and bioenergy resources, producing enough electricity to serve the needs of more than 2 million typical homes, and supply 24 percent of state electricity sales that are covered by the national standard.² It would also reduce the need to import fossil fuels; in 2005, Minnesota import-

ed all of the coal delivered to its electric utilities, sending \$391 million out of the state, primarily to Wyoming and Montana.

A SMART CLIMATE SOLUTION

If left unchecked, heat-trapping emissions such as carbon dioxide (CO₂) are expected to cause dangerous global warming that threatens our health and environment. Increased renewable energy use would provide an affordable global warming solution by reducing fossil fuel demand, thereby reducing CO₂ emissions from the largest U.S. source: power plants. The 20 percent standard would reduce power plant CO₂ emissions nationally by 223 million metric tons per year by 2020 (8 percent below business as usual and a 63 percent reduction in the EIA's projected growth of power plant CO₂ emissions from today's levels), equivalent to taking 36.4 million cars off the road.

In addition to cutting CO₂ emissions, lower fossil fuel demand 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, conserving natural resources for future generations.

BENEFITS UNDER THE EIA CASE

The EIA case 20 percent standard, which has higher cost and



Photo: Wind Capital Group

worse performance assumptions for most renewable energy technologies, would still provide significant—and in some instances, greater—consumer and environmental benefits for Minnesota (see table). For example, the EIA's more optimistic cost projections for biomass technologies results in additional biomass development (and its associated benefits) compared with the UCS case. In addition, because the EIA projects more coal development in its reference case forecast, the EIA case 20 percent standard displaces a larger amount of coal generation, leading to more CO₂ emission reductions compared with the UCS case.



Photo: Minnesota Project

Anaerobic digesters convert food or animal wastes (such as cow manure at this Minnesota dairy farm) into a biogas that can be used to generate electricity.

A CLEANER, SAFER ENERGY FUTURE

A national renewable electricity standard would make Minnesota's—and the nation's—energy supply more reliable and secure. It would use local energy sources to create high-skilled jobs in the state, improve local economies, put energy dollars back into the pockets of Minnesota's consumers, and reduce the dangers of global warming and air pollution. Using existing technologies, we can shift away from our dependence on an unstable, dirty fossil fuel supply, and 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 America's national energy policy.



Photo: Warren Gretz, NREL

Comparison of Minnesota Benefits, UCS and EIA Cases

	20% by 2020 UCS case	20% by 2020 EIA case
New capital investment in renewable energy	\$1.8 billion	\$2.4 billion
Consumer energy bill savings (through 2030)	\$259 billion	\$230 million
Biomass energy payments	\$289 million	\$385 million
Property tax revenues	\$64 million	\$67 million
Wind power land lease payments	\$43 million	\$43 million
Annual CO ₂ emission savings from U.S. power plants	223 million metric tons	310 million metric tons

MODELING METHODS

UCS conducted its analysis using the EIA's National Energy Modeling System. We examined the economic and environmental benefits under a 20 percent by 2020 standard using two scenarios. The "EIA case" assumes no changes to EIA's model, while the "UCS case":

- uses costs and performance assumptions for wind, coal, natural gas, and nuclear technology developed by Black & Veatch (a global engineering, consulting, and construction company) as part of a broad stakeholder process for the U.S. Department of Energy's (DOE) National Wind Collaborative;
- uses costs and performance assumptions for solar, geothermal, and biomass technologies that are more in line with projections by the DOE's Office of Energy Efficiency and Renewable Energy, and National Renewable Energy Laboratory; and
- takes into account recent cost increases from actual conventional and renewable energy projects.

We also evaluated the contribution made by states with renewable electricity standards that fully achieve their annual targets. (The EIA assumed that states will only achieve a fraction of their annual targets.)

ENDNOTES

- ¹ H.R. 969, introduced by Representatives Tom Udall (D-NM), Todd Platts (R-PA), and 13 original co-sponsors.
² Unless otherwise noted, results are presented in 2005 dollars using a 7 percent real discount rate.
³ Under H.R. 969, electricity sales from small utilities and hydroelectric facilities are exempt from the national renewable electricity standard.

A fully referenced version of this fact sheet is available online at www.ucsusa.org/clean_energy.

The Union of Concerned Scientists is the leading science-based nonprofit organization working for a healthy environment and a safer world.



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