



Union of
Concerned
Scientists

FACT SHEET

A Bright Future for the Heartland

POWERING MINNESOTA'S ECONOMY WITH CLEAN ENERGY

As in most Midwest states, coal dominates Minnesota's power supply, posing serious risks to public health and the environment and leaving families and businesses vulnerable to price hikes. Like other Midwest states, Minnesota has also struggled to fully rebound from the recent deep recession.

Fortunately, practical and affordable ways are available to help revitalize the state's economy and ensure a clean, safe, and reliable power supply. Energy efficiency technologies and renewable resources such as wind, solar, and bio-power offer a responsible path away from the state's overreliance on polluting fossil fuels to generate electricity.

Minnesota has already taken important steps to promote these solutions. However, the Gopher State must go further to create a clean and sustainable energy economy and reduce the urgent threat of global warming. Doing

so would deliver many important economic and environmental benefits, such as keeping Minnesota competitive in the growing clean energy industry.

In 2009, the Midwestern Governors Association—a collaboration of 10 states (including Minnesota) working on key public policy issues—released the *Midwestern Energy Security and Climate Stewardship Roadmap*. The Energy Roadmap's policy recommendations outline a path to a clean energy economy that entails maximizing local resources while reducing global warming pollution.

The Energy Roadmap recommends producing 30 percent of the Midwest's power supply from renewable resources by 2030, and investing in energy efficiency technologies to reduce power consumption at least 2 percent annually by 2015 and thereafter. The Union of Concerned Scientists performed an analysis of these two recommendations, modeling them as a renewable electricity standard (RES) and an energy efficiency resource standard (EERS).

The RES and EERS have proven to be effective and popular tools for advancing renewable energy and energy efficiency. As of April 2011, eight Midwest states had adopted an RES (among 29 states nationwide, plus Washington, DC). Five of these states also have an EERS (among 26 states nationwide).

Minnesota expanded its RES in 2007 to require 25 percent of the state's power supply to come from renewable

The Benefits of a Clean Energy Economy for Minnesota by 2030



Job Creation:

Nearly 5,500 net new jobs from deploying renewable energy and energy efficiency technologies

Economic Development:

Nearly \$3.4 billion in new capital investment, \$30 million in new income for farmers and rural landowners, and \$280 million in new local tax revenues

Consumer Savings:

\$2.8 billion in lower electricity and natural gas bills by 2030 (\$141 for a typical family)

Diversified Energy Mix:

7,820 megawatts of capacity for generating electricity from non-hydro renewable resources (up from about 2,470 megawatts in 2010)

Climate Solutions:

Across the Midwest, reductions in global warming pollution from power plants equal to the annual emissions from 30 typical new coal plants

resources by 2025, with an even stronger goal of 30 percent by 2020 for the state's largest utility, Xcel Energy. Minnesota also has an efficiency goal similar to an EERS—called the Energy Conservation Improvement Program (CIP)—requiring annual reductions in electricity use of 1.5 percent by 2010 and thereafter.

We used a modified version of the U.S. Department of Energy's (DOE's) National Energy Modeling System (NEMS) to examine the long-term impact on Minnesota and the entire Midwest of achieving the Energy Roadmap targets. We modeled two



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policy scenarios to evaluate a reasonable range of possible technology pathways for meeting the regional renewable energy targets, which we call our *core policy case* and *alternative technology pathway*. The two scenarios differ only in that the core policy case includes more pessimistic assumptions about the technology and costs of biopower than the DOE assumes in the NEMS model, to reflect the significant uncertainties and constraints facing biomass development today and into the future. We compared our two scenarios with an *existing policies case*, or base case, which assumes no new state or federal policies.¹

Overall, our analysis shows that Minnesota and the entire Midwest would reap significant economic, consumer, and environmental benefits from achieving the targets in the Energy Roadmap.²

JOB CREATION AND OTHER ECONOMIC DEVELOPMENT BENEFITS

Under our core policy case, for example, we found that investments

in clean energy needed to achieve the renewable energy and energy efficiency targets in the Energy Roadmap would create 5,500 new jobs in Minnesota by 2030. These would be on top of the jobs created under Minnesota's existing policies, and would span numerous sectors of the economy, such as manufacturing, construction, operations, maintenance, agriculture, forestry, finance, and retail. Such investments would also yield \$330 million in new annual income in Minnesota by 2030, and \$260 million per year in new gross state product.

Our analysis of changes in employment found that job gains from investments in renewable energy and energy efficiency would far outweigh any job losses from displaced fossil fuel generation. Electricity produced from renewable resources and gains in energy efficiency typically delivers more jobs than power produced from fossil fuel because a larger share of the money remains in the regional economy and in labor-intensive sectors such as manufacturing, installation, and maintenance. Many of the expenditures

required to produce power from coal and natural gas flow to states outside the region, and support fuel extraction and transportation that is less labor-intensive.

Besides creating jobs, the stronger renewable electricity and energy efficiency standards in the Energy Roadmap would provide other important boosts to Minnesota's economy by 2030. These economic benefits include:

Constructing a Renewable Energy Economy in Minnesota

Minneapolis-based, family-owned Mortenson Construction entered the renewable energy business in 1995, erecting a single Vestas turbine in Adair, IA. Mortenson has since established itself as a premier contractor for building wind farms and other renewable energy projects, working on nearly 100 wind facilities in the United States and Canada.

Mortenson's Renewable Energy Groups employ about 250 people, providing engineering, procurement, and construction services for developers. The company's capabilities include pouring turbine foundations, erecting turbines, building access roads, and installing transmission lines, underground cables, and power substations.

As of 2010, Mortenson had installed more than 4,500 turbines and 10,000 MW of wind capacity in 23 states and provinces, making the company the eleventh-largest power contractor in the United States (Mortenson Construction 2011). Mortenson has installed more than 650 MW of wind capacity in Minnesota, in rural communities such as Trimont, Jackson, and Chandler. In 2009 Mortenson also built a 0.4 MW solar photovoltaics array at St. Johns Abbey and University in Collegeville.

- \$3.4 billion in new capital investment in renewable energy and energy efficiency
- \$30 million in new income for farmers and rural landowners who lease their land to wind developers



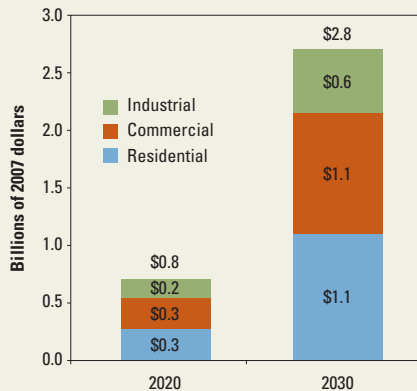
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¹ Existing policies include state-level RESs and EERSs adopted as of March 2010, and the federal renewable energy tax credits and incentives in the American Recovery and Reinvestment Act of 2009. It does not include recent changes in power plant regulations that the U.S. Environmental Protection Agency is using to enforce the Clean Air Act.

² To read our full report, fact sheets on other Midwest states, and a technical appendix describing our modeling approach and assumptions, see www.ucsusa.org/brightfuture.

³ Results are in cumulative 2007 dollars and use a 7 percent real discount rate.

Figure 1. Cumulative Savings on Minnesota's Consumer Energy Bills under the Energy Roadmap



- \$280 million in new property tax revenues, which can help communities pay for schools and vital public services³

CONSUMER SAVINGS

Consumers in Minnesota stand to realize big savings on their energy bills if the state implements the renewable energy and energy efficiency targets in the Energy Roadmap. Investments in energy efficiency deliver much of these savings by reducing demand for electricity in homes, businesses, and industry.

Greater reliance on renewable energy and energy efficiency adds to the savings by fostering competition in the regional energy market. That leads to slightly lower and more stable prices for the coal and natural gas used to generate electricity and provide heat for buildings and industrial uses. Annual consumer electricity prices would be 4.4 percent lower, on average, from 2010 to 2030 under the Energy Roadmap targets, and consumer natural gas prices would be 0.8 percent lower.

The savings from reduced energy consumption and lower prices for electricity and fossil fuels would more than offset the costs of investing in renewables and energy efficiency. Cumulative savings on electricity and natural gas

bills for Minnesota consumers would reach \$800 million by 2020, and grow to \$2.8 billion by 2030, with all sectors of the economy sharing in the savings (Figure 1). The typical Minnesota family would begin to see small savings in annual gas and electricity costs in 2011, with savings reaching \$35 by 2020, and \$141 by 2030. From 2010 to 2030, a typical household would save an average of \$61 on its electricity and natural gas bills each year.

DIVERSIFYING THE ELECTRICITY MIX

In 2009, about 7 percent of the electricity generated in Minnesota came from renewable resources. The rest of the state's power came primarily from coal, along with nuclear energy and other fossil fuels—with most of the fuel imported from out of state.

Yet the state is rich in untapped renewable energy resources. Minnesota has the technical potential to generate nearly 27 times its 2009 electricity demand from renewables—led primarily by wind and biopower—although economic and physical barriers will curb some of that potential.

Under the Energy Roadmap's renewable energy targets, Minnesota would diversify its coal-dependent mix of power, making its supply more reliable and secure. Minnesota would increase its home-grown generating capacity based on non-hydro renewable resources from some 2,470 megawatts (MW) today to 7,820 MW in 2030—primarily by adding wind and biopower. That

development represents a 45 percent increase over the renewable energy generation that would occur under existing policies (Figure 2).

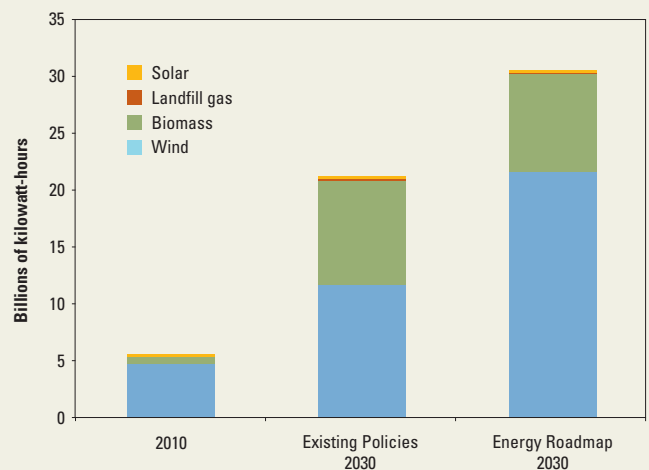
Minnesota also has a wealth of untapped potential to replace coal-fired power and diversify its electricity mix by relying more strongly on energy-efficient technologies. Investing in energy efficiency is one of the quickest and most cost-effective ways to transition to a clean energy economy.

Expanding Minnesota's CIP to match the energy efficiency targets in the Energy Roadmap would reduce electricity use by an additional 15.8 billion kilowatt-hours each year—equivalent to replacing the power output of nearly four new coal plants of a typical size (600 MW). Greater reliance on renewable energy and energy efficiency would reduce the need to generate power from coal by 11 percent in 2030 compared with existing policies.

ALTERNATIVE TECHNOLOGY PATHWAY

Given its abundant and diverse renewable resources, the Midwest could develop various mixes to meet the Energy Roadmap's targets. In our

Figure 2. Use of Renewable Resources to Generate Electricity in Minnesota, 2030: Existing Policies vs. Energy Roadmap



model, small changes in assumptions about the cost, performance, and siting and supply constraints of each technology affect the mix. In our alternative technology pathway, we assumed that some of the significant development constraints facing biomass can be overcome, leading to lower cost and better performance of the technology.

Under this alternative technology pathway, Minnesota's renewable energy resources make a similar overall contribution to achieving the regional Energy Roadmap targets. However, less power comes from wind, and more power comes from biomass. This finding primarily reflects the strong potential for co-firing biomass at existing coal plants in the state. Under the alternative technology pathway, nearly three times more electricity comes from such co-firing by 2030.

While the alternative technology pathway alters the mix of renewable resources used to generate electricity, Minnesota still achieves the Energy Roadmap targets while reaping new jobs, consumer savings, and other economic benefits similar to those under the core policy case (Table 1).

RESPONSIBLE ACTION ON CLIMATE CHANGE

If heat-trapping emissions are left unchecked, global warming—which already threatens our health and environment—will worsen. Minnesota will see significant consequences in the next few decades, and they will become more severe as the century progresses (Hayhoe et al. 2009).

Fortunately, renewable energy and energy efficiency are smart and affordable global warming solutions that cut

CO₂ emissions by reducing fossil fuel use. Under the core policy case, the Energy Roadmap targets would lower CO₂ emissions from Midwest power plants by 130 million metric tons annually by 2030 (16.7 percent below base-case levels)—equivalent to the annual emissions from 30 typical new coal plants.

THE BOTTOM LINE

As Minnesota and other Midwest states search for ways to help revitalize their economies, investing in clean energy is a smart and responsible course. Adopting the Energy Roadmap's goals for renewable energy and energy efficiency would spur innovation, create thousands of jobs in big cities and small towns across Minnesota, provide much-needed savings on energy bills for families and businesses, and diversify the state's power supply, making it more reliable and secure.

Minnesota has already taken important steps toward a clean energy future. However, the Gopher State should go further by increasing its renewable electricity requirement from 25 percent by 2025 to 30 percent by 2030 for all utilities, and by strengthening its CIP to match the Energy Roadmap target of 2 percent cuts in annual electricity use by 2015 and thereafter.

State and federal tax credits and other financial incentives, more

Table 1. Minnesota's Economic Benefits from Meeting the Energy Roadmap Targets: Core Policy Case vs. Alternative Technology Pathway

	Core Policy Case	Alternative Technology Pathway
Savings on Electricity and Natural Gas Bills (cumulative)		
2010–2020	\$0.7 billion	\$1.0 billion
2010–2030	\$2.8 billion	\$2.9 billion
Typical annual household savings, 2030	\$141	\$141
Net Job and Economic Benefits (in 2030)		
Net job creation	5,500	5,000
Income	\$330 million	\$280 million
Gains in gross state product	\$260 million	\$200 million
Other Net Economic Benefits (cumulative 2010–2030)		
New capital investment in renewable energy	\$1.9 billion	\$1.4 billion
New capital investments in energy efficiency	\$1.5 billion	\$1.5 billion
Wind land-lease payments	\$30 million	\$20 million
Property tax revenues	\$280 million	\$190 million

funding for research and development, stronger energy codes for buildings, and better processes for planning, siting, and approving power transmission lines are also needed. By doing its part to promote renewable energy and energy efficiency in the Midwest, Minnesota will reap significant economic and environmental benefits today while creating a clean and sustainable energy economy for future generations.

References

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The full text of this report is available on the UCS website at www.ucsusa.org/brightfuture.



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