



Union of
Concerned
Scientists

FACT SHEET

A Bright Future for the Heartland



POWERING MICHIGAN'S ECONOMY WITH CLEAN ENERGY

As in most Midwest states, coal dominates Michigan's power supply, posing serious risks to public health and the environment and leaving families and businesses vulnerable to price hikes. And like the rest of the Midwest, Michigan has 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.

Michigan has already taken important steps to promote these solutions. However, the Great Lakes 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 Michigan competitive in the growing clean energy industry.

In 2009, the Midwestern Governors Association—a collaboration of 10 states (including Michigan) 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 (UCS) performed an analysis of these two recommendations, which we modeled 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).

Michigan adopted an RES in 2008 requiring the state to generate 10 percent

The Benefits of a Clean Energy Economy for Michigan by 2030



Job Creation:

Nearly 15,300 net new jobs from deploying renewable energy and energy efficiency technologies

Economic Development:

Nearly \$5.7 billion in new capital investment, \$120 million in new income for farmers and rural landowners, and \$320 million in new local tax revenues

Consumer Savings:

\$9 billion in lower electricity and natural gas bills by 2030 (\$232 for a typical family)

Diversified Energy Mix:

5,470 megawatts of capacity for generating electricity from non-hydro renewable resources (up from about 560 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

of its power from renewable resources by 2015. That legislation also included an EERS requiring the state to reduce its annual electricity use 0.75 percent by 2011, and 1 percent by 2012 and each year 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 Michigan and the entire Midwest of achieving the Energy Roadmap targets. We modeled two policy scenarios, which we call our *core policy case* and *alternative technology pathway*. The two scenarios differ only



© L.M. Glasfiter



© iStockphoto.com/eliandric

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 Michigan 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 15,300 new jobs in Michigan by 2030. These jobs would be on top of those created under Michigan's existing policies, and would span numerous

sectors of the state's economy, including manufacturing, construction, operations, maintenance, agriculture, forestry, finance, and retail. Those investments would also yield \$710 million in new annual income in Michigan by 2030, and \$200 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 Michigan's economy by 2030. These economic benefits include:

- \$5.7 billion in new capital investment in renewable energy and energy efficiency
- \$120 million in new income for farmers and rural landowners who

A Bright Future for Michigan's Growing Solar Industry

The solar energy industry has been a bright spot in Michigan's otherwise struggling economy. Home to a highly trained workforce and a long tradition of strong manufacturing, electronics, and chemical industries, Michigan has attracted several major manufacturers of solar equipment.

Despite the economic downturn, many of these companies are planning to expand in anticipation of explosive growth in the solar industry, whose revenues rose 67 percent nationally in 2010 (SEIA 2010). For example, Dow Chemical Co. completed construction of a facility in Midland to produce its Dow Powerhouse Solar Shingle—a solar panel integrated into roofing material.

Hemlock Semiconductor, a Dow Chemical subsidiary based in Saginaw County, is the world's largest manufacturer of polycrystalline silicon, used in electronics and some types of solar panels. The company has invested more than \$2.5 billion over the last five years in its production facilities, creating 1,000 new jobs (Knake 2010).

produce biomass energy or lease their land to wind developers

- \$320 million in new property tax revenues, which would help communities pay for schools and vital public services³

CONSUMER SAVINGS

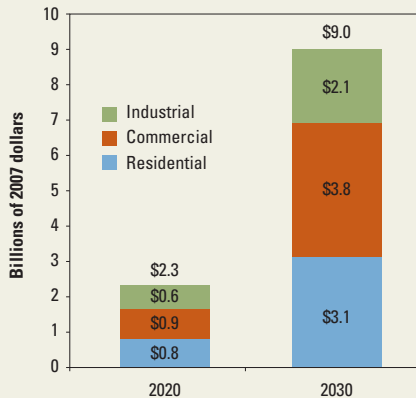
Consumers in Michigan stand to realize big savings on their energy bills if the state implements the renewable energy and energy efficiency targets in the Energy Roadmap. Investments

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 Michigan's Consumer Energy Bills under the Energy Roadmap



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 Michigan consumers would total \$2.3 billion by 2020, and grow to \$9 billion by 2030, with all sectors of the economy sharing in the savings (Figure 1). The typical Michigan family would begin to see small savings in annual gas and electricity costs in 2011, with savings reaching \$84 by 2020, and \$232 by 2030. From 2010 to 2030, a typical household would

save an average of \$96 on electricity and natural gas bills each year.

DIVERSIFYING THE ELECTRICITY MIX

In 2009, just 2 percent of the electricity generated in Michigan 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. Michigan has the technical potential to generate more than twice its 2009 electricity demand from renewables—led primarily by wind and bioenergy—although economic and physical barriers will curb some of that potential.

Under the regional renewable energy targets in the Energy Roadmap, Michigan would diversify its coal-dependent mix of power, making its supply more reliable and secure. Michigan would increase its home-grown generating capacity based on non-hydro renewable resources from some 560 megawatts (MW) today to 5,470 MW in 2030, primarily by adding wind power and biopower. That development represents nearly twice the renewable energy generation that would occur under existing policies (Figure 2).

Michigan also has a wealth of untapped potential for replacing coal-fired power and diversifying its electricity mix by relying more strongly on energy efficiency technologies. Investing in energy efficiency

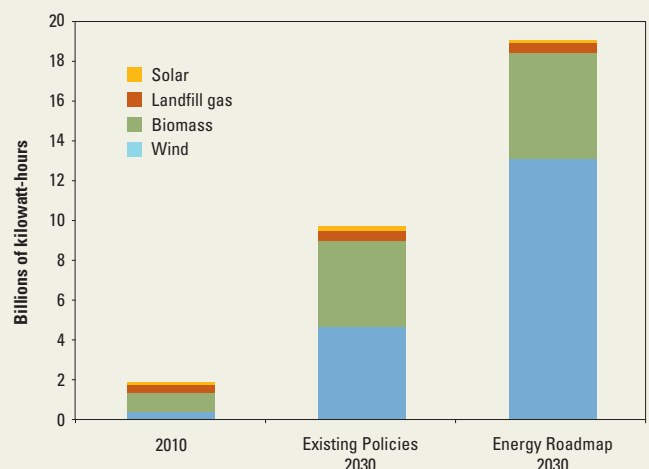
is one of the quickest and most cost-effective ways to transition to a clean energy economy.

By 2030, the energy efficiency targets in the Energy Roadmap would reduce electricity use by an additional 34.5 billion kilowatt-hours annually in Michigan—equivalent to replacing the power output from more than eight 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 model, small changes in assumptions about the cost, performance, and siting or supply constraints of each technology affect the mix. In our alternative technology pathway, we assume that some of the significant development constraints facing biomass can be overcome, leading to lower cost and better performance of the technology.

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



Under this alternative technology pathway, Michigan would generate 14 percent more electricity from renewables in 2030 than under the core policy case. This finding primarily reflects the state's strong potential for co-firing biomass at existing coal plants. Under the alternative technology pathway, nearly three times more electricity would come from such co-firing by 2030. The amount of electricity generated from wind and other renewable energy resources would be similar under both scenarios.

While the alternative technology pathway alters the mix of renewable resources used to generate electricity, Michigan still achieves the Energy Roadmap targets while reaping consumer savings, economic development, and jobs—in amounts similar to those under the core policy case (Table 1). However, greater reliance on biopower under the alternative technology pathway would put more money in the pockets of rural landowners from the harvest and sale of biomass products.

RESPONSIBLE ACTION ON CLIMATE CHANGE

If heat-trapping emissions are left unchecked, global warming—which already threatens our health and environment—will worsen. Michigan 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 Michigan 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 Michigan, provide much-needed savings on energy bills for families and businesses, and diversify the state's power supply, making it more reliable and secure.

Michigan has already taken important steps toward a clean energy future, and it should not retrench. Instead, the Great Lakes State should go further, increasing its renewable electricity requirement from 10 percent by 2015 to 30 percent by 2030. Michigan also needs to strengthen its energy efficiency resource standard to match the Energy Roadmap target of 2 percent annual cuts in electricity use by 2015 and thereafter.

State and federal tax credits and other financial incentives, more funding for research and development, stronger energy codes for buildings,

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

References

- Hayhoe, K., J. VanDorn, V. Naik, and D. Wuebbles. 2009. *Climate change in the Midwest: Projections of future temperature and precipitation*. Cambridge, MA: Union of Concerned Scientists.
- Knake, L. 2010. Hemlock semiconductor in midst of expansion, strong growth. *Saginaw News*, July 27. Online at http://www.mlive.com/news/saginaw/index.ssf/2010/07/hemlock_semiconductor_in_midst.html.
- Solar Energy Industries Association (SEIA). 2010. *U.S. solar market insight: 2010 year in review*. Online at <http://www.seia.org/galleries/pdf/SMI-Y1R-2010-ES.pdf>.

Table 1. Michigan'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	\$2.3 billion	\$2.6 billion
2010–2030	\$9.0 billion	\$8.9 billion
Typical annual household savings, 2030	\$232	\$216
Net Job and Economic Benefits (in 2030)		
Net job creation	15,300	16,400
Income	\$710 million	\$720 million
Gains in gross state product	\$200 million	\$280 million
Other Net Economic Benefits (cumulative 2010–2030)		
New capital investment in renewable energy	\$2.2 billion	\$1.3 billion
New capital investments in energy efficiency	\$3.5 billion	\$3.5 billion
Biomass payment	\$90 million	\$480 million
Wind land-lease payments	\$30 million	\$20 million
Property tax revenues	\$320 million	\$200 million

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



Union of Concerned Scientists

Citizens and Scientists for Environmental Solutions

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

National Headquarters
Two Brattle Square
Cambridge, MA 02138-3780
Phone: (617) 547-5552
Fax: (617) 864-9405

Washington, DC, Office
1825 K St. NW, Ste. 800
Washington, DC 20006-1232
Phone: (202) 223-6133
Fax: (202) 223-6162

West Coast Office
2397 Shattuck Ave., Ste. 203
Berkeley, CA 94704-1567
Phone: (510) 843-1872
Fax: (510) 843-3785

Midwest Office
One N. LaSalle St., Ste. 1904
Chicago, IL 60602-4064
Phone: (312) 578-1750
Fax: (312) 578-1751