

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 Michigan 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 23 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 Michigan. 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 Michigan Benefits from a National Renewable Electricity Standard

Job Creation

4,800 new jobs from renewable energy development

Economic Development

\$818 million in new capital investment, \$377 million in income to farmers and rural landowners, and \$24 million in new local tax revenues

Consumer Savings

\$160 million in lower electricity and natural gas bills by 2020 (growing to \$540 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 Michigan's economy would experience a reduction in both their cumulative electricity and natural gas costs compared with business as usual. Cumulative savings would reach \$160 million by 2020 and, by 2030, would grow to \$540 million (\$200 million for households, \$130 million for commercial customers, and \$210 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 Michigan'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.

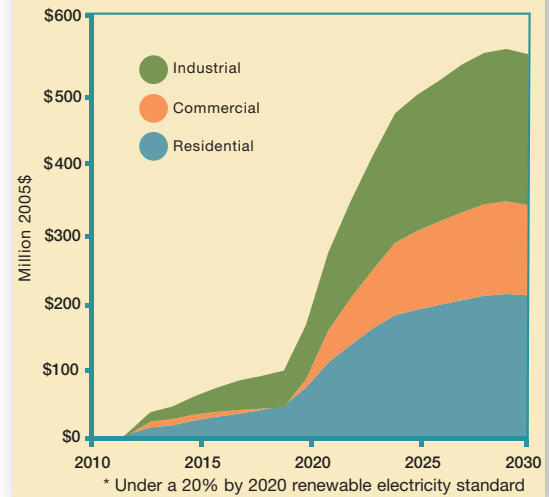
By 2020, the total new renewable energy development needed to meet a 20 percent national standard would generate 4,800 new jobs in Michigan. State level policies—primarily renewable electricity standards—would make an important contribution toward this job creation as well as spur other economic benefits. 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 3,540 jobs. These additional jobs would generate an additional

\$226 million in state income and \$297 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 Michigan, a 20 percent national standard would create 1,625 jobs in manufacturing

Cumulative Natural Gas and Electricity Bill Savings in Michigan*



components for wind turbines, solar photovoltaic panels and films, biomass facilities, and geothermal power plants—ranking Michigan seventh 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 Michigan's economy in the following ways:

- \$818 million in new capital investment in renewable energy
- \$377 million in new income for farmers and rural landowners who produce biomass energy and/or lease their land to wind developers
- \$24 million in new property tax revenues to help local communities pay for schools and vital public services

ENERGY DIVERSITY

In 2005, 96 percent of Michigan's electricity was generated from just three sources: coal, natural gas, 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 manipula-

Michigan Manufactures Jobs from the Sun and Wind

Michigan's reputation for a strong work ethic and robust manufacturing infrastructure is attracting quality jobs from the clean energy industry. In Auburn Hills, for example, United Solar Ovonic produces three miles' worth of solar panels per day at two plants, making it one of the world's largest manufacturers of thin film photovoltaic cells. The 2007 opening of a third plant in Greenville will create more than 560 jobs—filling a void left by the closing of an Electrolux plant in 2006. The Greenville plant will help move the company toward its goal of 300 MW of annual output by 2010—a growth path that would create 1,000 additional jobs.

Michigan manufacturing companies are also benefiting from renewable energy development. One example is Cassopolis-based K&M Machine-Fabricating, which makes nacelle mainframes, rotor hubs, gearboxes, and bearing blocks for several wind power companies including General Electric, Clipper, and Gamesa. The jobs needed to produce these parts are not only limited to welding and machining, but also include high-skilled engineering, quality assurance, and supervisory positions.

tion. Increasing the use of renewable energy helps diversify the energy mix by meeting a larger portion of Michigan'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, Michigan would increase its total home-grown renewable power generating

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.

capacity to 1,840 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 1.5 million typical homes, and supply 8.4 percent of state electricity sales that are covered by the national standard.³ It would also reduce the need to import fossil fuels; in 2005, Michigan imported

all of the coal delivered to its electric utilities, sending nearly \$1.1 billion 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.

Solar energy helps create new high-skilled jobs in Michigan for photovoltaic cell design, manufacturing, and installation.



Photo: Wind Capital Group

BENEFITS UNDER THE EIA CASE

The EIA case 20 percent standard, which has higher cost and worse performance assumptions for most renewable energy technologies, would still provide significant—and in some instances, greater—consumer and environmental benefits for Michigan (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: Craig Miller Productions and DOE, NREL

A CLEANER, SAFER ENERGY FUTURE

A national renewable electricity standard would make Michigan'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 Michigan'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: ©iStockphoto

Comparison of Michigan Benefits, UCS and EIA Cases

	20% by 2020 UCS case	20% by 2020 EIA case
New capital investment in renewable energy	\$818 million	\$634 million
Consumer energy bill savings (through 2030)	\$540 million	\$540 million
Biomass energy payments	\$372 million	\$519 million
Property tax revenues	\$24 million	\$14 million
Wind power land lease payments	\$5 million	\$5 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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