AWEA AMERICAN WIND ENERGY ASSOCIATION

WINDENERGY FOUNDATION

A WIND VISION FOR NEW GROWTH IN MICHIGAN

New research shows how expanding wind energy will benefit state economy

Wind Vision

A New Era for Wind Power in the United States

U.S. Department of Energy Wind Vision report shows potential benefits for Michigan with continued expansion of wind power in the state.

A definitive new report recently released by the U.S. Department of Energy (DOE) shows huge potential for wind power in Michigan and throughout the United States. The DOE's "Wind Vision: A New Era for Wind Power in the United States" finds wind energy could grow from supplying over 3.66% of the electricity generated in Michigan today to 4.8% by 2020 and more than 6.8% by 2030 – producing electricity for the equivalent of 710,000 average American homes.*

Achieving the Wind Vision in Michigan would provide the state with numerous benefits, including

$3.59 billion dollars in total electricity bill savings through 2050.

With the continued expansion of wind power, Michiganders would also benefit from the addition of new well-paying jobs and added revenues flowing into state coffers. Property tax revenues could exceed $11.62 million dollars annually by 2020, and more than $17.09 million dollars annually by 2030 due to new wind farm development.

Farmers and other rural Michigan landowners currently receive an estimated $4.59 million dollars a year in land lease payments for hosting wind turbines. Further expansion of wind energy under the Wind Vision scenario would result in Michigan landowners receiving over $4.71 million dollars in annual payments by 2020, increasing to over $7.65 million dollars annually by 2030.

Michigan farmers and families stand to benefit from significant freshwater savings and cleaner air by harvesting even more electricity from wind energy.

Continuing to grow Michigan-made wind power offers tremendous water conservation and clean air benefits as well. Meeting the Wind Vision scenario would result in more than 616.33 million gallons of annual water savings by 2020, and by 2030 those savings grow to over 4.4 billion gallons a year. Generations of Michigan families also stand to benefit from added clean air benefits by harvesting more of the state's electricity from wind energy. By 2030 wind energy produced in Michigan would avoid over 9.6 million metric tons of carbon pollution a year, or 2.02 million cars' worth of emissions.

Homegrown Michigan wind energy can save consumers money and boost local economies for years to come.

With a wind resource rich enough to supply 163% of Michigan's current electricity needs – at prices increasingly competitive with conventional fuels - expanding this clean, abundant form of homegrown energy is a win-win solution for Michigan to boost economic development well into the future.

* While the DOE projections are encouraging, they do not include projections for the expected growth of wind power in the state resulting from the Clean Power Plan (CPP). In analyzing the draft CPP rules, the U.S. Energy Information Administration found that Michigan could add an additional 5,724 megawatts of low-cost wind by 2025 to help meet emission reduction requirements. See, e.g. American Wind Energy Association, EIA analysis shows wind is most cost-effective option for Clean Power Plan compliance, available at http://awea.files.cms-plus.com/AWEA%20report%20on%20EIA%20CPP%20analysis%20July%202015.pdf

$11.6 MILLION IN ANNUAL PROPERTY TAX REVENUE BY 2020

ENOUGH ELECTRICITY TO POWER 710,000 HOMES BY WIND BY 2030

Wind Vision
A New Era for Wind Power in the United States

DOE report: Wind can become one of the leading sources of U.S. electricity by 2050

The DOE's Wind Vision report finds that wind power could supply 10% of the entire U.S. electricity mix by 2020, 20% by 2030, and 35% by 2050 – making wind energy one of the leading sources of electricity in the country. That growth would widely benefit the U.S. economy and environment.

Meeting Wind Vision scenarios could create 380,000 well-paying jobs by 2030 and bring billions of dollars in consumer savings to the U.S. by 2050.

The positive benefits that wind energy's growth can bring to the American economy are significant – especially in the increasingly competitive global wind energy market. The U.S. currently ranks number one in the world in wind energy production, ahead of China and Spain, providing enough electricity to power the equivalent of 18 million average American homes. Today, American wind power supports 73,000 well-paying jobs, including nearly 20,000 manufacturing jobs at over 500 factories in 43 states.

By reaching 20% of the nation's electricity mix by 2030, wind energy could create an additional 380,000 well-paying jobs across the country, increasing to 600,000 by 2050. Beyond job growth, by 2050 wind could provide $14 billion a year in consumer savings and cumulative savings on U.S. electric bills totaling $149 billion. If fossil fuel prices increase more than expected, electric consumers would start to see direct savings even sooner.

Expanded use of wind power would benefit public health and prevent 22,000 premature deaths.

The positive clean air benefits of powering Michigan and the U.S. with more wind energy creates an economic opportunity as well. Cumulatively through 2050, wind's pollution reductions would avoid $400 billion in climate change damages and would save an additional $108 billion in public health costs by cutting other air pollutants, including the prevention of 22,000 premature deaths. In some years drought conditions affect many Michigan farmers and rural landowners across the state. According to DOE's Wind Vision, wind energy has the ability to conserve 260 billion gallons of freshwater annually by 2050, displacing 23% of total U.S. power plant water usage.

The benefits of America's wind energy are of national importance. By highlighting several case studies, this report shares the success story of wind energy in the Great Lake State and for the first time ever releases new state-specific data from the DOE's Wind Vision report that shows what's possible with wind power's continued rise.

$7.6 MILLION IN ANNUAL LEASE PAYMENTS TO MICHIGAN FARMERS AND OTHER RURAL LANDOWNERS BY 2030

4.4 BILLION GALLONS OF FRESH WATER CONSERVED EVERY YEAR BY 2030

$3.59 BILLION IN TOTAL ELECTRICITY BILL SAVINGS FOR MICHIGAN CONSUMERS THROUGH 2050

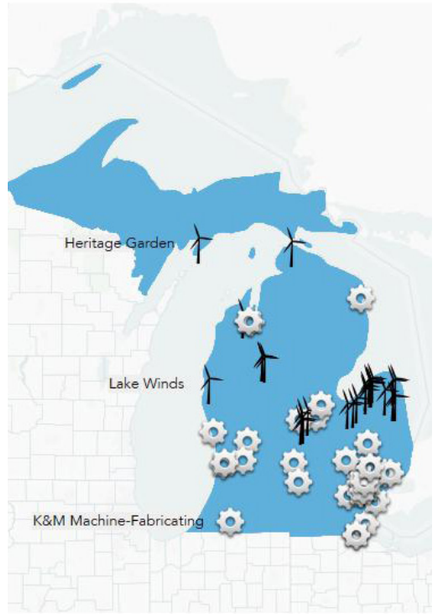
“Growing wind power in Michigan helps protect the Great Lakes for future generations. Further tapping into our state’s wind energy resources will foster and enable innovation, while creating a career path for young people. By growing wind power nationwide, America will gain financial, energy, and environmental security.”

RICH VANDER VEEN,
PRESIDENT, MACKINAW POWER

Wind power in Michigan today

Wind energy capacity

Wind farms provided over 3.6% of the electricity generated in Michigan at the end of 2014, ranking the state 14th in the country. Michigan has 887 wind turbines currently installed, comprising 1,531 megawatts (MW) of wind power capacity - enough to power 355,000 homes. That total ranks the state 15th in the country, with an additional 30 MW of capacity under construction.



Economics

Michigan is a leader in wind turbine and component manufacturing with 33 factories spread across the state. These facilities have attracted significant investment as part of the wind energy supply chain, including the arrival of Monroe-based Ventower Industries, Michigan’s first wind tower manufacturing facility.

Current benefits from Michigan-made wind power include: (1) $2.9 billion in total wind farm investment; (2) $4.6 million dollars a year in land lease payments to Michigan landowners; and (3) up to 4,000 well-paying Michigan jobs.

Environment + public health benefits

Generating wind power does not create pollution or use water. The wind power produced in Michigan currently saves 799.1 million gallons of water every year, equivalent to 6.1 billion bottles of water, and avoids 1.3 million metric tons of carbon pollution annually, or the equivalent of 268,000 cars’ worth of carbon emissions.

Ventower

Founded in 2008, Monroe-based wind tower manufacturer Ventower is a full service fabricator and supplier of utility and distributed-scale wind turbine towers. The company has recently experienced rapid growth, expanding their workforce by adding 51 new employees over the past year.

Working with industry leaders GE, Gamesa, and Siemens, Ventower's 115,000 square foot facility produces 90 meter and taller towers (300 feet) that are shipped to Michigan-based projects and beyond.

"We've seen advances in technology – taller towers paired with higher efficiency and energy output due to longer blades and improved nacelle design – driving down the cost of wind power in the last few years," said Scott Viciana, Vice President at Ventower. "The result is that wind power is more affordable than ever, and our business keeps growing."

Ventower recently supplied all 62 towers for the Consumers Energy Crosswinds Energy Park project in Tuscola County, and supplied all 10 towers for the Heritage Sustainable Energy Big Turtle project in eastern Huron County. The company also continues to build their inventory in anticipation of increased demand in coming years with the implementation of the Clean Power Plan and 40 gigawatts of new wind power projected for the MISO region.

Gratiot County Wind Park

Key facts

- **Job Creation:** 200 full-time jobs during construction, with 17 full-time permanent workers.
- **Private investment:** $30 million in direct payments to Michigan contractors during construction.
- **Amount of wind installed:** The 212.8 MW project provides enough electricity to power more than 57,000 average American homes.
- **Community benefits:** The wind farm provides a significant increase to the tax base of the county, new jobs in highly skilled technical positions and a steady, reliable income stream to the landowners who host the turbines.

Project description

Located along U.S. route 127 north of Lansing, the Gratiot County Wind Park is one of the most recognizable wind power projects in the state. Completed in 2012 by renewable power developer Invenergy, about half of this 212.8 MW project is now owned by the local utility DTE Energy. The project generated more than $30 million in direct payments to Michigan construction contractors and material and equipment suppliers during construction. The project also generated an additional estimated $750,000 in local revenue for food, lodging, and other expenses.

Livonia-based Aristeo Construction led the on-site construction of the project, including the civil sitework, concrete foundation placement, and tower and wind turbine generator erection. In total, the project created 200 full-time jobs during construction, and now employs 17 full-time workers for operations and maintenance.

"Michigan has terrific wind resources. This was our first project in the state, and as the cost of wind power continues to decline, we expect the state will increasingly rely on low-cost wind to meet its future electricity needs," Kevin E. Parzyck, Vice President, Development, Invenergy.

"Wind power development is a great way to bring added tax revenue to rural communities while also providing price stability for consumers."

KEVIN E. PARZYCK, VICE PRESIDENT, DEVELOPMENT, INVENERGY

EDF RENEWABLES SERVICES FOUR OF THE LARGEST WIND PROJECTS IN MICHIGAN

Key facts

- **Local jobs, local education:** EDF employs 25 fulltime O&M workers, all of whom live in-state and many of which were trained at local community colleges and technical schools.
- **Growing sector:** EDF has seen its O&M business grow 418% since 2007, and its O&M division now employs 600 workers across North America.

In-state operations

Wind farms, like all utility-scale power sources, require ongoing operations and maintenance (O&M) services to ensure that the facilities are performing at their full potential. EDF Renewable Services, Inc. (EDF RS) is contracted to service four of Michigan's largest wind projects, and employs 25 in-state workers. The company has seen the O&M side of its business rapidly expand in recent years, growing 13% from 2013 to 2014, and an incredible 418% since 2007. In total, EDF RS now employs 600 O&M workers across North America.

As the largest third-party provider of O&M services in North America, EDF RS typically looks to hire locally, and many of the workers employed at the Michigan projects were trained at local community colleges and technical schools. As part of its services, EDF RS provides project oversight and constant remote monitoring from its operations control center.

Onsite O&M workers typically have expertise with mechanical and electrical work, and are often tasked with climbing the tall towers, equipped with heavy tools and high voltage equipment.

Responsible for maintaining and supervising the Brookfield, Thumb, Echo, and Gratiot wind parks, EDF RS oversees 400 MW of power in the state. These projects are capable of producing enough electricity to power nearly 109,000 average American homes.

"The operations and maintenance of wind projects is a rapidly growing sector in the renewable power industry. Since developing more low-cost wind power is one of the best ways to meet the requirements of the Clean Power Plan and state Renewable Portfolio Standards, we expect to see continued growth and new job creation in this sector for years to come."

DALEN COPELAND, VICE PRESIDENT,
BUSINESS DEVELOPMENT, EDF RENEWABLE SERVICES

ENORMOUS BENEFITS TO BE REALIZED

Achieving the wind vision in Michigan

Michigan has an opportunity to lower electricity bills, create jobs, increase community investment, and enjoy cleaner air by expanding the use of wind energy, according to a recently released DOE Wind Vision report. The 2015 DOE Wind Vision report projects that nationwide, wind power can supply 10% of America's electricity by 2020, 20% by 2030 and 35% by 2050, while delivering consumer savings worth tens of billions of dollars a year.

How will Michigan benefit from expanding wind power?

The latest data from DOE finds wind energy could provide 4.8% of Michigan's electricity by 2020 and more than 6.8% by 2030. The wind energy produced in Michigan alone would power the equivalent of 710,000 average American homes by 2030. The following tables outline many of the benefits that would come to Michigan by achieving Wind Vision:

Consumer Benefits	Cumulative through 2050
Electricity Bill Savings	$3.59 billion
Added Savings through Lower Natural Gas Prices*	$10.90 billion

Other Economic Benefits	By 2020	By 2030
Annual Property Tax Revenue	$11.62 million	$17.09 million
Annual Land Lease Payments	$4.71 million	$7.65 million

**Achieving the Wind Vision scenario would reduce overall natural gas demand, resulting in lower prices and consumer savings beyond their electricity bills.*

Wind Vision Scenario: Environmental Benefits	By 2020	By 2030
Water Use Avoided, in Gallons	616.33 million	4.4 billion
Carbon Pollution Avoided, in Metric Tons	-423,000*	9.6 million
Carbon Pollution Avoided, in Equivalent Cars Worth of Emissions	-89,000*	2.02 million

The Wind Vision report estimates expanding wind power production will support a national total of 142,000 manufacturing jobs by 2030.

** According to the DOE Wind Vision Study Scenario, carbon emissions in Michigan are projected to increase by 2020 due to increased production from fossil fuel generators in the state. By 2030, increased wind production contributes to an overall decrease in carbon emissions.*

The economic and environmental benefits have been calculated by AWEA using data from the U.S. Department of Energy's Wind Vision report.

Wind Vision
A New Era for Wind Power in the United States

"Keeping the air and water resources clean in the Great Lakes region now, and for future generations, is what is at stake here. We can do that and save consumers money by tapping into more of Michigan's low-cost wind energy resource. This report tells a story that's being repeated in states all across the country – how both our environment and our local economies improve when we develop Made-in-America wind energy."

JOHN KOSTYACK, EXECUTIVE DIRECTOR, WIND ENERGY FOUNDATION

CONCLUSION

Extending federal clean energy tax incentives good for Michigan, the U.S.

Michigan-made wind power is a true American success story. The wind industry has helped revitalize rural economies in many counties in the state, becoming a new drought-resistant cash crop for farmers and other landowners. Added tax revenues have also benefitted schools, emergency services, and key infrastructure projects. Keeping this success story going will result in expanded economic benefits for Michigan workers, landowners, and all electricity consumers.

The wind industry also continues to gain momentum nationwide, delivering tremendous economic and environmental benefits for all 50 states. But like all business, the wind industry needs stable, predictable federal tax policy to continue to create jobs, invest capital, and deploy new projects.

To keep the expanded benefits for Michigan on track, Congress must extend the renewable energy Production Tax Credit - a federal tax incentive for producing clean power - as well as the Investment Tax Credit.

These two successful tax policies combined have helped the wind industry to rapidly improve wind power technology and lower the cost of wind power. American wind power has attracted $100 billion in private investment to the U.S. economy since 2008 and stable tax policy helps to provide certainty to the 73,000 jobs being provided by the U.S. wind industry today.

The U.S. produces more wind energy than any other country in the world. Hard working Americans, innovation, and a successful federal tax policy have driven this success. With long-term certainty and stable policy, the U.S. can retain our global leadership role, keep well-paying jobs and investment in Michigan and other rural communities across the nation.

Wind power is a good deal and Americans want more of it

Recent polls show nine out of 10 voters - Republicans, Democrats, and Independents - believe growing wind power is a good idea. There's good reason for those opinions: wind power is a cost-competitive, reliable power source that does not create air or water pollution from generation.

American innovation and advances in technology continue to drive down the cost of wind power – 66% in just the last six years, according to the DOE. Taller towers, longer blades, improved gearboxes, and over 30 years of experience in siting wind turbines to maximize their power output are all responsible for the recent cost declines. Those savings are then passed onto consumers.

Michigan benefits from a more diverse electricity mix, thanks to wind

In states like Michigan, wind-friendly policies that encourage utilities to invest in wind power have helped create a more diverse energy mix and kept money in the pockets of consumers.

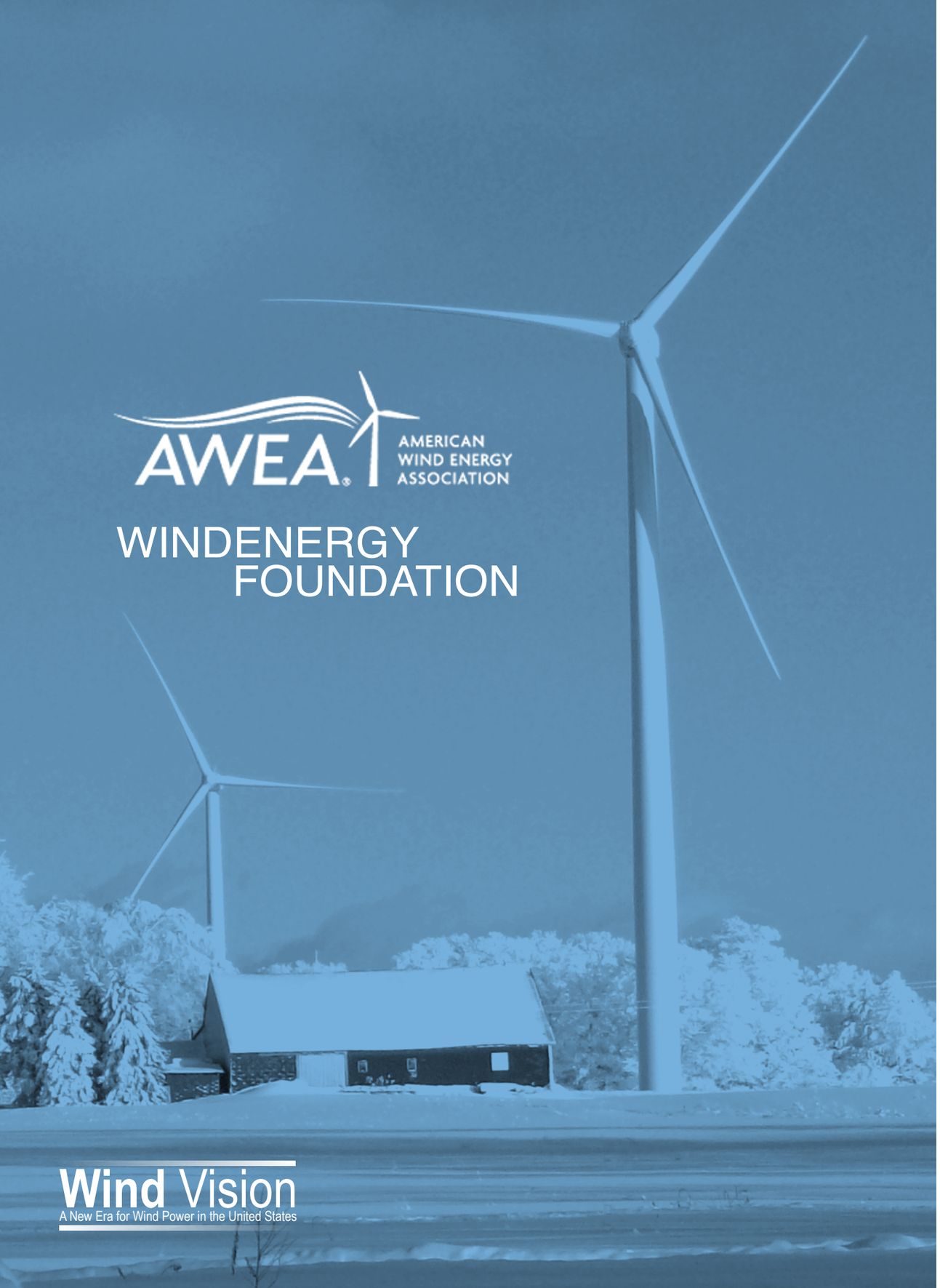
Although it is set to expire at the end of 2015 - Michigan's renewable portfolio standard requires the state's investor-owned utilities, alternative retail suppliers, electric cooperatives, and municipal electric utilities to generate 10% of their retail electricity sales from renewable energy resources by 2015. This policy helped jump-start the wind industry in the state.

Wind power is also an attractive investment for companies that consume large amounts of power, which is a big reason why local chambers of commerce throughout the Midwest and Great Plains states support clean energy standards and the growth of wind energy.

New wind opportunities on the horizon for Michigan

Wind power is one of the most rapidly deployable, least expensive ways for states to comply with the U.S. Environmental Protection Agency's Clean Power Plan rules. The Clean Power Plan requires states reduce carbon emissions from existing power plants to mitigate the effects of climate change and help clean our air.

Michigan's experience with its existing wind farms, along with its untapped wind potential, make it well positioned to meet the Clean Power Plan standards.



APPENDIX

Report, **Wind Vision: A New Era for Wind Power in the United States, U.S. Department of Energy**

Resources for the Wind Vision report, American Wind Energy Association (AWEA)

Fact sheet on wind power in Michigan, AWEA

Overview of wind energy in America, AWEA

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