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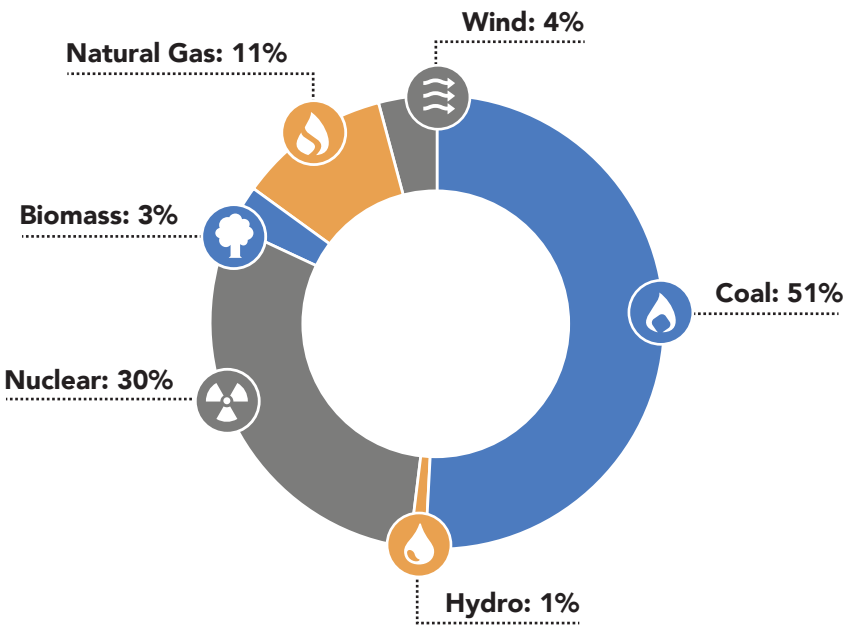
# MICHIGAN'S ELECTRIC POWER SYSTEM AND THE CLEAN POWER PLAN

The U.S. Environmental Protection Agency (EPA) will soon release the final rule for carbon emissions from existing power plants, called the Clean Power Plan (CPP). The rule represents the next step in the process of carbon regulation that began with the Supreme Court's determination in 2007 that carbon dioxide ($CO_2$) qualifies as an air pollutant subject to regulation by EPA under the Clean Air Act.[1]

Under Section 111(d) of the Clean Air Act, EPA will set air pollutant standards for each state based on what EPA determines to be the "best system of emission reduction" (BSER). In its proposal, EPA determined the BSER based on state specific potentials for emission reductions from four "Building Blocks" that include both traditional smokestack controls as well as "beyond the fence line" measures, namely, improving the efficiency of coal plants, increasing dispatch of existing natural gas plants, deploying renewable and nuclear power generation, and reducing demand by means of energy efficiency.[2]

**Michigan's Generation Mix (2014)**




Source: AEE PowerSuite

Although Michigan's emission rate target is set by the Building Blocks, there is no requirement that the state use those specific measures for compliance. Rather, in developing a compliance plan to achieve the interim (2020-2029) and final (2030-2032) targets, the state is free to use other technologies and policy tools. This gives Michigan an opportunity to design a plan that is best suited to the resources and needs of its unique power system.

## A Strong Foundation

Michigan has a strong foundation for a compliance plan. While coal makes up the bulk of its generation mix, Michigan has a diverse set of resources to utilize. In recent years, the state has increased its use of renewables, natural gas, and efficiency. Following price declines, natural gas's share of Michigan's generation mix rose from 11% to 20% between 2005 and 2012.[3] As a result, carbon emissions are already declining, down 15% from 2005 to 2012.[4] By simply continuing these trends, Michigan will achieve significant progress towards its CPP emission target.

Still, the state's power system faces significant challenges. The state has been ranked in the top 10 for electricity outages for the past three years, taking the number 3 spot in both 2014 and 2013.[5] Outages are not only disruptive but also expensive, with an annual estimated cost to the U.S. economy of $150 billion.[6] At the same time, Michigan currently faces potential capacity shortfalls due to the expected retirement of 3 GW of coal-fired generating capacity—an enormous challenge, especially because Michigan is already a net importer of electricity, with out-of-state electricity imports totaling over 7 million MWh in 2012.[7,8] At an average retail price of 10.98 cents/kWh in 2012, electricity in Michigan costs more than the national average, so the state faces the additional challenge of maintaining affordability while adding capacity.[9]

### Michigan's Geographic Challenge

**Both the Upper and Lower Peninsulas lie under the purview of the Midcontinent Independent System Operator (MISO), a Regional Transmission Organization (RTO) responsible for maintaining reliable electricity. However, the two peninsulas are in different MISO resource adequacy zones and are not connected by shared transmission, adding an extra layer of complexity to Michigan's energy decisions.[10,11]**

| Proposed Targets for Michigan (from draft Clean Power Plan) | | | |
|---|---|---|---|
| **Adjusted Starting Rate[12]** | **Interim Target (average 2020 – 2029)** | **Final Target (2030 – 2032)** | **Total Reduction Required (2032)** |
| 1,690 lbs $CO_2$/MWh | 1,277 lbs $CO_2$/MWh | 1,161 lbs $CO_2$/MWh | 529 lbs $CO_2$/MWh (31%) |

To bolster the reliability, affordability, and resilience of Michigan's electricity system, the state must continue to invest in 21st century electricity generation and grid technologies. Luckily, these same technologies will also lower the state's carbon emissions. With a flexible design that allows states to select the technologies and services for compliance to suit the needs of the state, the Clean Power Plan presents Michigan with an opportunity to modernize its electric grid for the benefit of consumers and the economy. In designing its compliance plan, Michigan can further reduce emissions, maintain affordability, and increase reliability.

**A regional approach to compliance that includes Michigan's neighbors could help solve the state's geographic challenges. MISO recently conducted an analysis that found a regional approach within its territory could reduce compliance costs by $3 billion annually.[13] The Analysis Group has also released a report finding that the MISO region is well-positioned to comply without hurting reliability of the Midwestern grid.[14]**

## On Track to 81% of Proposed Reductions

The interim and final emission rate targets for Michigan may change in the final rule, but the options for compliance will largely stay the same. Many of the things that the state is already doing will help it meet the final target emission rate set by EPA.

**Michigan is on track to achieve 81% of total proposed reductions simply by what it is already doing.**

Michigan has already made changes to its power system that will reduce its carbon emissions from the 2012 baseline used by EPA. Coal plant retirements already planned in the state will achieve 22% of Michigan's proposed reductions.[15] In 2013, Michigan generated over 1,700 GWh more electricity from renewable energy than in 2012.[16] Merely adding this additional generation to the 2012 baseline will achieve nearly 6% of the state's proposed final target. The state's Energy Optimization Standard (EOS), which is being reviewed by the legislature, requires utilities to reduce electricity sales by 1% annually. If utilities were to maintain this current savings rate through 2030, the state would achieve 53% of its proposed final target.[17] All of these planned changes already under way would get the state 81% of the way towards meeting its goal in the draft plan, so whatever the final target, Michigan will have a good start.

**Impact of Planned Changes on Michigan's Emission Rate**

| Planned Activity | New Emission Rate (lbs $CO_2$/MWh) | % of Total Required Reduction Achieved[18] |
|---|---|---|
| Planned Coal Retirements | 117 | 22% |
| Existing 2013 Renewables | 30 | 6% |
| Maintain EOS goal of 1% through 2030 | 281 | 53% |
| **Total** | **428** | **81%** |

## How Advanced Energy Can Help

As Michigan develops its compliance plan, it can consider a host of options provided by advanced energy technologies and services to reduce its carbon emissions and help the state achieve other electric system and economic objectives. Many of these strategies are already being successfully implemented in Michigan, and could be scaled up to achieve further emission reductions.

Michigan has both a Renewable Energy Standard (RES) and an EOS, both of which have driven growth in the advanced energy market.[19] The state legislature is considering several major energy policy changes, including changes to the RES and EOS, as well as the reversal of Michigan's partially de-regulated electricity market under the Electric Customer Choice Program. Any of these proposed changes could impact the state's compliance strategy.[20]

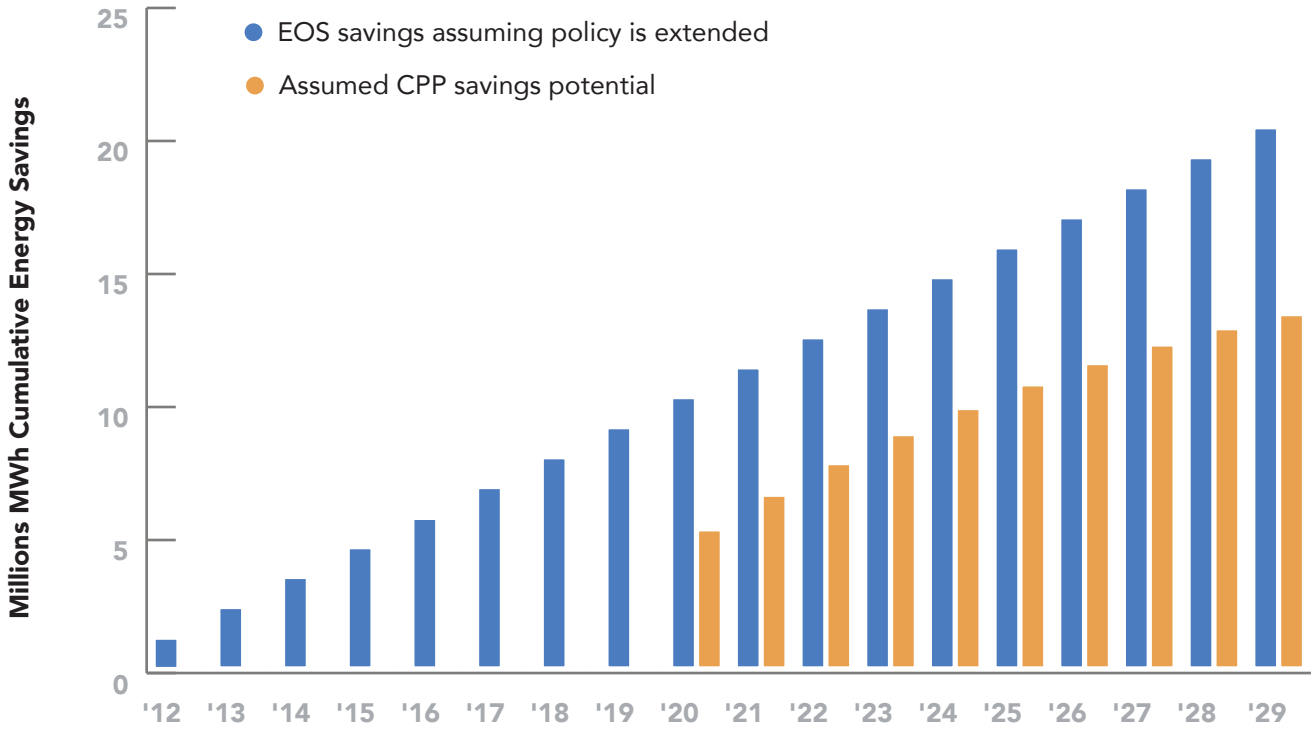
Michigan's progress in advanced energy deployment has already brought significant economic activity to the state. As of 2014, there were an estimated 31,000 jobs in Michigan in the renewable energy and energy efficiency fields.[21] Michigan's energy efficiency and renewable energy investments have saved consumers an estimated $1.2 billion on their energy bills.[22] These trends can be amplified in the future as Michigan makes policy decisions about how to comply with the Clean Power Plan.

| Renewable Energy | | |
|---|---|---|
| **Wind** | Driven by its RES, Michigan has installed 1.54 GW of wind capacity and was ranked seventh nationally for wind-related jobs in 2014.[23] The industry supports 3,000-4,000 jobs, 33 manufacturing facilities, and brought the state $2.9 billion in capital investment and over $4.6 billion in annual land lease payments in 2014.[24] The state has the technical potential for 59 GW of wind power, enough to meet the state's current electricity needs one and a half times over.[25] | **Renewable Energy Policies**<br><br>**Michigan's RES, which expires this year, has been in place since 2008 and has a target of 10% renewable energy generation by 2015. The RES applies to all Michigan utilities, including investor-owned utilities, electric cooperatives, municipal utilities, and alternative retail suppliers.[28] The state is on track to achieve its goal. As of 2013, Michigan had nearly 1,500 MW of non-hydro renewable energy capacity, mostly wind and biomass.[29] This amounts to 7% of the state's total generation.**<br><br>**In addition to the RES and EOS, Michigan also has various tax incentives, grants, and rebates in place.[30]** |
| **Solar** | While Michigan has only 20 MW of installed solar PV capacity, its technical potential is nearly 3,500 GW, even a fraction of which could completely replace the state's generation fleet.[26] The Michigan Public Service Commission and National Renewable Energy Laboratory have identified permitting and tax treatment—which could be reformed by the state legislature—as the two biggest obstacles to solar deployment in the state.[27] | |

| Some Grid Modernization Technologies | |
|---|---|
| **Demand Response** | Michigan's RES incentivizes on-peak renewable production. However, its EOS does not include annual peak demand reduction or credit demand response. Demand response brings down peak load, which can directly reduce emissions by over 1% nationally, and moderates energy prices for everyone.[31,32] |
| **Advanced Metering Infrastructure (AMI)** | Michigan's two largest utilities, Consumers Energy and Detroit Edison Co., began smart meter pilot installations in 2007 and 2008, respectively.[33] Both utilities plan to bring smart meters to their entire service territory by 2017.[34] These meters will improve reliability and reduce operating costs for the utility. The data and control provided by AMI enables utilities and consumers to better manage energy use. |
| **Energy Storage** | Energy storage allows higher penetration of variable renewables, offsets emissions from older, dirtier plants for meeting peak demand, and relieves grid congestion when demand is high and transmission and distribution equipment losses are highest. |
| **Distribution Automation** | Distribution automation helps optimize voltage conservation and reactive power (needed for motors and transformers to start up), integrate more distributed generation, and increase energy efficiency throughout the system without action on the part of customers, all of which helps to reduce emissions. This has the added benefit of better reliability of the grid.[35] |

| Energy Efficiency | | |
|---|---|---|
| **Behavioral Efficiency** | Using AMI combined with behavioral efficiency services has been shown to reduce energy usage and drive down prices for everyone. Behavioral efficiency in Michigan can achieve 1% of the state's required reduction and save consumers $606 million by 2030.[36] | **Michigan's Energy Optimization Standard**<br><br>**Michigan's EOS was enacted in 2008 and set energy efficiency targets based on the previous year's electricity sales. These targets have risen progressively, from 0.3% in 2008-2009 to 1% in 2012 and thereafter.[42]**<br><br>**A recent report estimates that ramping up certain energy efficiency programs in Michigan would result in approximately 13,800 jobs and $7.1 billion in net energy savings by 2030 while also reducing electricity use by 21% (relative to 2012).[43]** |
| **Utility Energy Efficiency** | Michigan is quickly becoming a leader in energy efficiency, ranking sixth nationally with over 1.5% net incremental savings of retail sales in 2013.[37] The state's EOS has been successful in deploying efficiency, with utilities exceeding their goals. If the state extends its current EOS, without increasing its current goal of 1%, it will far surpass what EPA assumed was achievable for the state in setting the proposed target and achieve 53% of its total proposed reductions. | |
| **Energy Service Company (ESCO) services** | Michigan has an Energy Services Coalition dedicated to removing barriers to energy efficiency performance contracting.[38] Non-utility sponsored efficiency savings from the ESCO market, which are nearly equal in size to utility programs nationally.[39] Continuing current trends, ESCO services could achieve 10% of Michigan's proposed reductions and save consumers $1.9 billion by 2030.[40] | |
| **Building Codes** | Through adoption of the most modern codes with higher compliance rates, Michigan could reduce energy use by 3,877 GWh annually, save $4.3 billion by 2030, and achieve 13% of its proposed emission target.[41] | |

## Michigan's Existing Energy Efficiency Policy Exceeds CPP Requirements




Source: EPA GHG Abatement Measures TSD and AEE PowerSuite

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# ENDNOTES


1. In the landmark 2007 case Massachusetts vs. EPA, the Supreme Court ruled that carbon dioxide is an air pollutant subject to regulation under the Clean Air Act, and EPA is therefore required to administer guidelines for emission reduction, http://www.supremecourt.gov/opinions/06pdf/05-1120.pdf. Since that ruling, the Supreme Court has upheld EPA's authority to regulate carbon emissions on two separate occasions: American Electric Power Company vs. Connecticut and in Utility Air Regulatory Group vs. EPA, which upheld EPA's authority to regulate emissions from stationary sources, http://www.supremecourt.gov/opinions/13pdf/12-1146_4g18.pdf and http://www.nytimes.com/2014/04/30/us/politics/supreme-court-backs-epa-coal-pollution-rules.html.
2. For a more in depth look at how the Building Blocks were established and applied to individual states in the Proposed Rule, see EPA TSD: GHG Abatement Measures. http://www2.epa.gov/sites/production/files/2014-06/documents/20140602tsd-ghg-abatement-measures.pdf
3. http://powersuite.aee.net/portal/states/MI/energy_data
4. U.S. Electric Power Industry Estimated Emissions by State (EIA-767, EIA-906, EIA-920, and EIA-923) http://www.eia.gov/electricity/data/state/
5. In 2014, a total of 164 outages affected 1.3 million Michiganders. http://powerquality.eaton.com/blackouttracker/default.asp?id=&key=&Quest_user_id=&leadg_Q_QRequired=&site=&menu=&cx=3&x=19&y=3
6. http://powerquality.eaton.com/blackouttracker/default.asp?id=&key=&Quest_user_id=&leadg_Q_QRequired=&site=&menu=&cx=3&x=19&y=3
7. This year, Consumers Energy announced that it will close "the classic seven," a group of coal fired power plants representing 950 MW of power, due to the Mercury and Air Toxics Standard (MATS) and other energy regulations in 2016. http://thedailynews.cc/2015/01/21/7-consumers-energy-coal-plants-to-close-in-michigan-by-2016/
8. http://www.eia.gov/state/seds/data.cfm?incfile=/state/seds/sep_sum/html/sum_btu_1.html&sid=US
9. http://www.eia.gov/electricity/state/
10. http://www.midwestenergynews.com/2014/11/20/the-upper-and-lower-peninsulas-in-one-miso-region/
11. Legislation is currently being considered to build transmission that would connect the UP and LP. http://www.midwestenergynews.com/2015/05/21/michigan-considers-electric-connection-between-peninsulas/
12. Includes 5.8% of existing nuclear generation that EPA deems to be at-risk of retirement, and existing 2012 renewable generation.
13. http://www.eenews.net/assets/2014/09/18/document_ew_01.pdf
14. http://www.analysisgroup.com/uploadedfiles/content/insights/publishing/analysis_group_clean_power_plan_miso_reliability.pdf
15. Planned unit-level coal plant retirements are taken from EIA Monthly, http://www.eia.gov/electricity/monthly/pdf/epm.pdf. The capacity factor for each unit was assumed to be the same as the capacity factor for the entire plant in 2012, the baseline year used by EPA. The average emission rate for the state's coal fleet was recalculated without these units and substituted for the starting average coal emission rate in EPA's formula for BSER. Retired coal plant capacity was assumed to be replaced by a combination of energy efficiency and zero-emission resources. For Michigan, this amounted to a total of 5,740 GWh of electricity, replacing BC Cobb Units 4 and 5, JC Weadock Units 7 and 8, JR Whiting Units 1, 2, and 3, and Presque Isle Units 5, 6, 7, 8, and 9.
16. http://powersuite.aee.net/portal/states/MI/energy_data
17. The calculation used here assumes 1% annual energy savings from 2012 to 2030, for a total cumulative savings of 20,284 GWh in 2029. This simplified calculation does not account for exports or line losses and may differ from actual compliance plan for the final rule.
18. The required reductions referenced here are from the starting adjusted emission rate minus the proposed final target under the proposed Clean Power Plan. The targets are likely to change when the rule is finalized, but percent contributions depicted here are still a good indicator of how big of a contribution the state's already planned activities are likely to make.
19. http://powersuite.aee.net/portal/states/MI/energy_policies
20. HB 4297, HB 4298, HB 4299, HB 4300, HB 4301, and HB 4302. HB 4297 repeals the EOS entirely and replaces utility energy efficiency targets with a requirement for energy efficiency programs through integrated resource planning (IRP). http://powersuite.aee.net/bills
21. http://cleanenergyworksforus.org/wp-content/uploads/2014/07/Michigan-Fact-Sheet-Web1.pdf
22. http://cleanenergyworksforus.org/wp-content/uploads/2014/07/Michigan-Fact-Sheet-Web1.pdf
23. http://awea.files.cms-plus.com/FileDownloads/pdfs/Michigan.pdf
24. http://awea.files.cms-plus.com/FileDownloads/pdfs/Michigan.pdf
25. http://www.nrel.gov/gis/re_potential.html
26. http://www.nrel.gov/gis/re_potential.html
27. http://www.nrel.gov/docs/fy12osti/54574.pdf
28. http://powersuite.aee.net/portal/states/MI/energy_policies
29. http://www.acore.org/interactive-report-renewable-energy-in-america
30. http://michigansaves.org/
31. http://www.coned.com/energyefficiency/PDF/DemandResponseProgramsDetails.pdf
32. Navigant Consulting, Carbon Dioxide Reductions from Demand Response (Nov. 25, 2014), prepared for the Advanced Energy Management Alliance (AEMA) and included in AEMA's comments to EPA on the Clean Power Plan. http://aem-alliance.org/study-finds-significant-greenhouse-gas-savings-demand-response-group-urges-epa-incorporate-clean-power-plan/

33. http://www.michigan.gov/mpsc/0,4639,7-159-56137-257108--,00.html
34. https://www.consumersenergy.com/content.aspx?id=7778 and www2.dteenergy.com (Billing/Payment > Advanced Metering Program > Installation Map).
35. https://www.smartgrid.gov/sites/default/files/doc/files/Distribution Reliability Report - Final.pdf
36. ACEEE State and Utility Pollution Reduction (SUPR) Calculator http://aceee.org/state-and-utility-pollution-reduction-supr Assumes a residential feedback program savings 2% from program participants and 50% participation rate.
37. ACEEE 2014 scorecard – http://aceee.org/research-report/u1408
38. http://www.michiganbusiness.org/cm/Files/Fact-Sheets/EnergyPerformanceContracting.pdf
39. Up 10% from 2013, the U.S. ESCO market produced approximately $611.2 million in revenue in 2014, not including HVAC equipment ($4 billion nationally). The entire ESCO market is expected to continue growing at a rapid pace, reaching $10.6-$15.3 billion in total revenue by 2020. See Advanced Energy Now 2014 Market Report, http://info.aee.net/advanced-energy-now-2014-market-report
40. ACEEE State and Utility Pollution Reduction (SUPR) Calculator http://aceee.org/state-and-utility-pollution-reduction-supr Based on historic market growth rate of 8.3% annually.
41. Assumes adoption of recent model codes: IECC 2015 and ASHRAE 90.1 2013 and updates every three years. Also assumes a better compliance rates with current building codes. ICF International, Clean Power Plan Energy Code Emissions Calculator http://energyefficientcodes.com/energy-codes-make-sense-with-or-without-the-clean-power-plan/
42. http://www.michigan.gov/mpsc/0,4639,7-159-52495_53472---,00.html
43. http://aceee.org/sites/default/files/publications/researchreports/e1401.pdf