Electric Reliability in Michigan: *The Challenge Ahead*

Public Sector Consultants' research on electric reliability in Michigan is composed of two major works: this report and analysis, and a summary of findings titled "Electric Reliability in Michigan: A Policy Brief," which is intended to highlight the important elements of the full report. Both were released on Wednesday, November 19, 2014.

Contents

Executive Summary

Michigan faces a near-term challenge of ensuring an adequate supply of electricity for its residents and businesses. This is not just an issue in Michigan; across the country, potential shortfalls in generation supplies are impacting more that 66 million customers (1). This issue is caused by a lack of adequate resources to meet consumer demand at all times. As soon as 2016, the retirement of aging coal plants (driven by federal environmental regulations and high costs) will cause Michigan's electric reserve margins to dip below target levels. Federally regulated wholesale markets established over a decade ago have failed to ensure adequate resources to meet customer needs in Michigan, the Midwest, and throughout many parts of the country.

Michigan's hybrid market structure[1] complicates the state's ability to address its capacity needs. The current regulatory framework creates uncertainty for energy providers as to which customers need to be served and when. Due to the hybrid market structure, some customers avoid paying the utilities' resource planning costs, which makes it difficult to ensure adequate energy supply. While reforms were made to Michigan's retail electric market in 2008 to mitigate some of these concerns, a fundamental flaw in the state's electricity market structure remains: no entity has been clearly assigned the responsibility for ensuring adequate, long-term supplies for customers participating in electric retail open access. An incumbent utility[2] is obligated to provide service in a nondiscriminatory manner to customers that return to their service from retail open access.[3] But in order to ensure that generating capacity for such customers is actually available when needed (while maintaining reliability), the utility has to purchase or build new capacity—potentially years in advance and at a substantial cost. The planning, permitting, and construction of new base load generation[4] could take as long as six years by some estimates (2). Additionally, purchasing capacity may become difficult because the cushion of excess generating supply in the Midwest region will begin to disappear in 2016. The requirement to serve an unknown customer base inhibits accurate planning and causes the regulated utility to operate at a higher cost. Absent reform, the current hybrid market structure will either place reliability at risk (assuming the utility does not plan generation to meet the needs of current retail open access customers) or unfairly shift additional costs of new capacity to the utility's existing customers, while a small fraction of customers served by retail energy marketers get a free ride.[5] This flaw has existed since PA 141[6] was enacted, but it has become a more pronounced and direct threat to reliability, given the significant number of imminent power plant retirements in the region and the resulting impact on capacity supplies and prices. The challenges created by Michigan's market structure is especially evident in the Upper Peninsula (see Issue in Focus on page 17).

Although greater reliance on energy efficiency, strategic reductions in energy demand, out-of-state energy purchases, and renewable sources can help bridge the supply gap, even aggressive efforts in those areas will not eliminate the need for new base load power plants to replace lost capacity. Given the long lead times and large capital investments required to plan and build base load plants, the state needs to establish the policy framework to address this impending supply problem in a way that is reliable, affordable, and fair

[1] Combining elements of traditional regulated utilities with aspects of retail electric competition.
[2] Incumbent utilities are those that supplied electricity to customers located in an exclusive service territory prior to passage of the reforms in PA 141 and PA 142.
[3] Subject to any return-to-service provisions (such as a 12-month notice requirement) in the utility's tariff, as applicable.
[4] The amount of electricity needed to sustain the basic energy demands, henceforth referred to as "generation."
[5] According to the MPSC Commissioner John Quackenbush, "The nearly 11 percent load participation in the choice market today translates into 0.3 percent of total customers for DTE and 0.06 percent for Consumers Energy. The current rate structure essentially transfers fixed costs no longer recoverable from customers participating in choice to all remaining customers." (See *Readying Michigan to Make Good Energy Decisions: Electric Choice.* Available at www.michigan.gov/documents/energy/electricc_report_440539_7.pdf, accessed 10/14/14)
[6] Michigan Public Act 141 of 2000, "Michigan Customer Choice and Electricity Reliability Act."

for Michigan residents and businesses. For a brief summary of highlighted elements of this report, see the policy brief version of "Electric Reliability in Michigan," available online at www.pscinc.com.

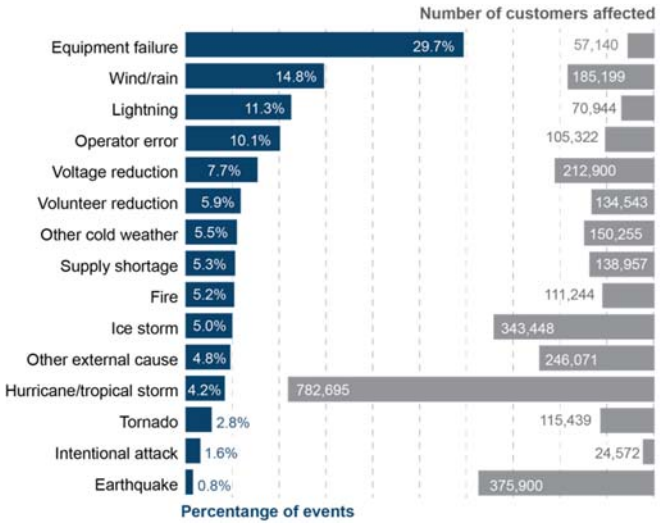
The Importance of Reliability

Electricity is such a fundamental aspect of everyday life that its importance and accessibility are often taken for granted—until it isn't available. It is during those times of crisis that we can clearly see our dependence on electricity and our expectations about its essential reliability.

Disruptions to the availability of electricity are not mere inconveniences—they can cause suffering, fatalities, and financial losses, as well as lasting effects on the overall economy. The Northeast Blackout of 2003, which originated in Ohio, was caused by a software problem that left operators unaware of the need to redistribute power after overloaded transmission lines hit unpruned foliage. Fifty million people in eight U.S. states—including Michigan—and ten million people in Ontario were affected as 508 generating units at 265 power plants shut down. It resulted in the loss of power to six million Michigan residents for up to two days (3,4). Michigan's economy also lost an estimated $1 billion when businesses were forced to shut down and industrial production stopped. Detroit Metropolitan Wayne County Airport halted operations; General Motors was forced to close its warehouses; Ford Motor Company's production offices, engineering, and product development facilities ground to a halt; and Marathon Oil Corporation's Detroit refinery lost 76,000 barrels per day of output (5).

There are many possible reasons for power outages, as shown in Exhibit 1. Weather-related incidences are the most common cause of electric outages. Michigan residents and businesses recently experienced a series of severe storms in the summer of 2014 that downed local distribution lines, causing outages, as did ice storms in December 2013.

EXHIBIT 1. Major Causes of Power Outages



SOURCE: Paul Hines, Jay Apt, and Sarosh Talukdar, n.d. *Trends in the History of Large Blackouts in the United States.* Available at http://wpweb2.tepper.cmu.edu/ceic/PDFS/CEIC_08_01_thl.pdf. (accessed 10/13/14)
NOTE: The totals are greater than 100 percent because some records fall into multiple initiating-event categories.

Supply shortages represent a relatively small percentage of all the causes of power outages. This is not an accident. Utilities are required to plan for adequate supply to meet consumer demand at virtually all times. This is known as "resource adequacy." This planning is challenging, given that electricity must be produced as needed, since storage capacity is both costly and limited.[7] Moreover, the quantity of electricity needed varies depending on the time of day, time of year, weather, economic conditions, and other factors. Operators must consider these diverse factors to plan and operate power plants and the transmission grid so that demand and supply match exactly at all times, in all places. To accomplish this, a reserve margin, or "cushion," is calculated to generate supplies above forecasted demand. Typical reserve margins are set at 14–15 percent; these are determined through annual reliability studies.[8]

While uncommon, outages caused by supply shortages can be serious. In Texas, in February 2011, an adequate supply of power was not available to overcome the combination of a cold snap and unplanned generation shutdowns. In the same year, Texas experienced a "supply emergency" due to record-setting heat and high-peak demand during the month of August. The multiple blackouts of California during its energy crisis of 2000–2001 were also caused by supply shortages. Those supply shortages in California were influenced by many factors, including a severely flawed attempt at industry deregulation, market manipulations by Enron, and historical difficulties in building new generation facilities in a state experiencing rising demand for electricity (6).

The Evolution of Regulatory Policy and Its Impact on Ensuring Adequate Electricity Supply

The regulatory framework and market structure in which electric utilities operate impacts their ability to ensure adequate capacity to meet demand. Changes in energy law, policy, and regulation over the past century have moved the electric utility industry toward more competition, less regulation, and increased federal influence (7).

State Oversight of Utility Resource Planning

For most of the 20th century, utilities were regulated monopolies that were vertically integrated—meaning the utility owned and operated generation assets, the transmission network, and the local distribution network required to deliver electricity throughout its geographic service area. In return for their monopoly status, utilities accepted an obligation to serve all customers who requested service and were willing to pay the regulated rates. This is commonly referred to as the regulatory compact.[9] This regulatory framework made ensuring resource adequacy fairly straightforward: utilities would forecast future demand, request approval from the state regulator to recover any new generating capacity costs through rates (in advance of construction or after), and be eligible to earn a return based on the cost of service.

When generation exceeded or fell short of local demand, utilities could sell or purchase power at wholesale to or from neighboring utilities, with rates also based on the cost of service (1, p. 26–27). This was true

[7] While technologies continue to advance, the only economic, grid-scale storage technology available is hydroelectric pumped storage. In most cases, constructing significant storage facilities requires substantial upfront costs and consumes more than one megawatt hour (mwh) of energy to store one mwh of energy (See Frank Wolak, March 31, 2013, *Regulating Competition in Wholesale Electricity Supply*, 17. Available at http://web.stanford.edu/group/fwolak/cgi-bin/sites/default/files/files/regulating_wholesale_electricity_wolak_mar08-final.pdf, accessed 10/10/14)

[8] In accordance with the Midcontinent Independent System Operator (MISO) Tariff, the reliability objective of a Loss of Load Expectation (LOLE) study is to determine a minimum planning reserve margin that would result in the MISO system experiencing a less-than-one-day loss of load event every ten years. (See MISO Resource Adequacy Studies, available at www.misoenergy.org/Planning/ResourceAdequacy/Pages/ResourceAdequacyStudies.aspx, accessed on 10/10/14)

[9] In 1914, the Michigan Supreme Court affirmed the right of a public utility to use the streets in exchange for the corollary obligation to serve the public. (See City of Lansing v Michigan Power Co., 183 Mich 400, 410; 150 NW 250 (1914).)

across the country and in Michigan. During this time, Michigan's two largest utilities, Consumers Power and Detroit Edison (currently Consumers Energy and DTE Energy), procured generation resources and collaborated to dispatch generation and transmission systems. Preparing for the possibility of short-term capacity shortages or high generating costs, they purchased energy from utilities in Ohio, other neighboring states, and Canada.

State level regulation left a large gap in transactions that occurred across state lines (7, p. 33). Amendments made in 1935 to the Federal Power Act (FPA) addressed this gap. These amendments gave jurisdiction to regulate interstate transactions (transmission of electricity and sale of electricity wholesale) to the Federal Power Commission (now the Federal Energy Regulatory Commission, or FERC). While this created a role for the federal government in utility regulation, the FPA made it clear that the preexisting regulatory authority of the states over generation and distribution facilities was preserved. More specifically and germane to this paper, ensuring generation resource adequacy and reliability was the states' responsibility. The FPA is still the primary federal law governing the electric utility industry.

Increased Federal Intervention

Rapidly increasing global oil prices in the 1970s contributed to higher operating costs for utilities, causing them to petition state regulators to approve rate increases. Economic forecasters anticipated that fuel prices would continue to rise over subsequent years, resulting in new investments by utilities in nonfossil fuel generation. During the 1970s and 1980s, utilities built more than 50 nuclear plants responsible for generating over 100 gigawatts (GWs)[10] under the assumption that fossil fuel prices would continue to rise (8). Investments in capital-intensive nuclear power plants created significant rate increases for consumers, and despite declining global oil prices, rates remained high (9, p. 37).

Political pressures mounted in response to high electricity costs, leading to more regulatory scrutiny of proposed generation. Some state and federal regulators—following a general trend at that time toward deregulation of industries like railroads, airlines, finance, and natural gas—envisioned that competition in both wholesale and retail electricity markets would yield lower costs to achieve the same service. To this end, in 1978, Congress passed the Public Utility Regulatory Policies Act. Among other things, it mandated that utilities purchase energy from qualifying facilities[11] owned by entities other than the vertically integrated incumbent utilities (7, p. 34). The introduction of new electric generators through wholesale electric utility restructuring created an issue of access to regional transmission networks. In an effort to ensure nondiscriminatory access to existing transmission lines owned by utilities, FERC suggested the creation of independent system operators (ISOs) (10). FERC expanded the ISO model to regional organizations, creating the regulatory framework for new regional transmission organizations (RTOs) (11). FERC outlined specific goals for RTOs, including improving efficiencies in grid management, grid reliability, and market performance, as well as removing discrimination in transmission systems. Exhibit 2 shows the different RTOs across North America.

[10] Depending on various factors, 1 GW would typically provide power to 750,000 homes. Consumers Energy, for example, lists the Electric Generating Capacity at its Campbell plant in west Michigan as providing 1,450 megawatts—or 1.45 GWs—enough to meet the energy needs of a million people.

[11] There are two types of qualifying facilities: (1) a small power production facility (generating facility) of 80 MW or less whose primary energy source is renewable (hydro, wind, or solar), biomass, waste, or geothermal resources, and (2) a cogeneration facility is a generating facility that sequentially produces electricity and another form of useful thermal energy (such as heat or steam) in a way that is more efficient than the separate production of both forms of energy.

EXHIBIT 2. Regional Transmission Organizations

SOURCE: Sustainable FERC Project, n.d., "ISO RTO Operating Regions." Available at http://sustainableferc.org/wp-content/uploads/2013/10/ISO-RTO-Operating-Regions.jpg. (accessed 10/13/14)

States Implement Retail Restructuring

The deregulation of retail energy markets at the state level followed the federal move to deregulate, but in a less uniform manner. Industry restructuring was first adopted in 1996 by states with high retail electricity rates, including California, New York, New Hampshire, Rhode Island, and Pennsylvania (9, p. 48). Soon, states across the country began evaluating the potential for restructured electricity markets. By 1999, the District of Columbia and 20 states had undertaken the process to restructure their electricity markets (9, p. 44). Deregulation models shared several common characteristics across states, including: allowing for the recovery of utility stranded costs[12]; market pricing for wholesale electricity; unbundling traditional utility services; and creation of wholesale markets to support competition in supply markets. Despite similar design elements, each state's experience with industry restructuring has been unique. To date, 13 states and the District of Columbia have maintained their model of electric deregulation. Meanwhile, five states—Arizona, Arkansas, Nevada, New Mexico, and Virginia—have opted to suspend their deregulated markets (12). Three states—California, Michigan, and Montana—have opted for a hybrid electricity market, combining elements of traditional regulated utilities with aspects of retail electric competition (13).

Michigan's Unique Approach to Restructuring

Michigan entered into the world of retail open access with the passage of PA 141 in 2000, which allowed customers to purchase their generation needs from an alternative energy supplier—often referred to as retail energy marketers—at a market rate. Michigan approached deregulation differently than other states in that it did not force separation of utility-owned generation from their regulated distribution system during the restructuring process. The incumbent utilities continued to operate regulated generation and provide distribution service, but had to allow unregulated retail energy marketers access to their distribution system. As a result, Michigan exhibits characteristics of both a regulated market and a deregulated market. PA 141 also required regulated utilities to divest their transmission facilities or join an RTO (14).[13] In 2002,

[12] Stranded costs are utility charges that were to be recovered over time through regulated rates that would not otherwise be collected from customers served by retail energy marketer.
[13] Although utilities were required to do only one, both occurred.

Michigan's major transmission systems joined the Midcontinent Independent System Operator (MISO) RTO; however, a small portion of southwest Michigan served by American Electric Power Ohio (AEP Ohio), joined MISO's neighboring RTO, PJM Interconnection (PJM).

Michigan Reevaluates its Energy Policy

Following summers with a tightly constrained power supply market and the Northeast blackout in August 2003—among other factors—the Michigan Public Service Commission (MPSC) initiated an investigation in late 2004 to examine future electric generation capacity requirements and, specifically, "the need for additional generation capacity, transmission upgrades, and other supply- and demand-side resources to supplement current Michigan-based generating facilities and out-of-state power sources" (15, p. 2). The investigation resulted in *Michigan Capacity Need Forum: Staff Report to the Michigan Public Service Commission,* which found Michigan would need additional electric supply to meet its needs beginning in 2009, and recognized the institutional barriers referenced above that impede the development of reliable electric supplies. Specifically, the report said:

> The electric energy industry has experienced several major changes during the past ten years. These include the creation of an open access transmission system, the development of independent transmission companies, the implementation [of] Midwest Markets, and provision of retail customer choice in Michigan. These changes, **especially the advent of retail customer choice**, have added uncertainty to any load serving entity's customer base. The uncertainties created by customer choice and changes in the wholesale markets have made generation construction, especially base load, more difficult to finance. It is unlikely that either traditional utilities or independent power producers (IPPs) will build additional base load generation without some departure from past practices for regulatory approval and rate treatment (16).

Following the release of that report, Governor Jennifer Granholm issued Executive Directive 2006-2, which directed the chairman of the MPSC to prepare an energy plan for the State of Michigan. The resulting *Michigan's 21st Century Electric Energy Plan* echoed the findings of the Capacity Needs Forum report with regard to the challenges presented by Michigan's market structure and recommended policy changes to overcome them (17). To stabilize the utilities' customer base and provide regulatory certainty for utilities to plan and finance new generation, the plan recommended a new regulatory framework that allowed electric utilities to file an application with the MPSC to obtain a "Certificate of Need" for construction of a new power plant before it is built. Once the MPSC granted the certificate, the necessity of the new power plant could not be challenged. It was the MPSC's determination that all customers contributing to the need for a new plant be required to pay their share of the costs. To ensure this, incumbent utility customers that later elect service from a retail energy marketer would be required to take their share of the plant's fixed cost with them as a non-bypassable distribution charge. For retail energy marketer customers wishing to return to the incumbent utility, the plan recommended the MPSC require a returning customer give the utility 60 days' notice before they could be returned to regulated service. Finally, the plan recommended that the MPSC have the authority to require planning reserves for all jurisdictional utilities, electric cooperatives, and retail energy marketers in the state, and the ability to penalize these entities if they fail to meet reserves.

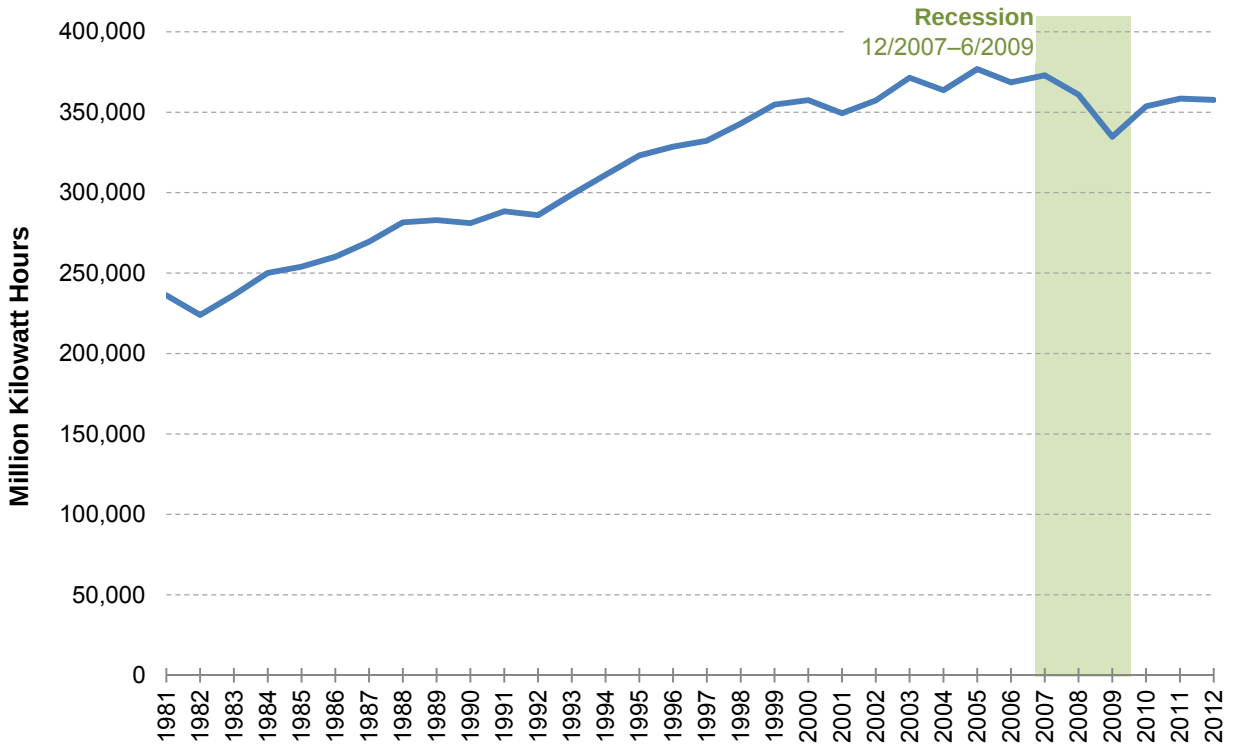
Retail Restructuring Reforms Attempt but Fail to Address the Challenge

In response to the findings of this report, the Michigan Legislature passed reforms to Michigan's energy policy as part of comprehensive energy package. Included in these reforms was Public Act 286 of 2008, which partially included the Certificate of Need approach recommended in the plan—requiring approval for construction of a new power plant before it is built. Absent from this approach was the inclusion of the non-bypassable distribution charge for customers moving to retail open access after approval or extended lead

times for those returning. In addition, in an effort to improve stability for energy providers, Public Act 286 placed a cap on the number of customers served by retail marketers, limiting it to 10 percent of the state's electric load.

While these reforms drastically reduced the percentage of a utilities load that could switch back and forth between retail energy marketers and regulated utilities (from 100 percent to 10 percent), the challenges of ensuring reliability within this hybrid market structure remained. In other words, the problem was not solved, only minimized. Until now, this has been less of a concern because, at the same time that these reforms were passed, a national economic recession hit that dramatically reduced demand for electricity, as shown in Exhibit 3. The predicted capacity shortfalls that drove the reforms did not transpire and, therefore, there has not been a need to invest in new generation. This is no longer the case. A number of factors currently are creating the need for new generation, driven in large part by significant retirements of coal-fired power plants across the Midwest.

EXHIBIT 3. Electricity Consumption in Michigan



SOURCE: U.S. Energy Information Administration. *State Energy Data System (SEDS): 1960-2012 (Complete).* Available at: www.eia.gov/state/seds/seds-data-complete.cfm?sid=US#CompleteDataFile. (accessed on 10/28/14)

Factors Threatening Reliability in Michigan

While many factors can influence reliability, the pressing challenge that Michigan faces is the need to ensure it has adequate generation resources. The shift away from coal as the primary fuel source for electricity generation, due to environmental regulations, is driving near-term supply shortages.

Environmental Regulations and Aging Infrastructure Impacting the Coal Industry

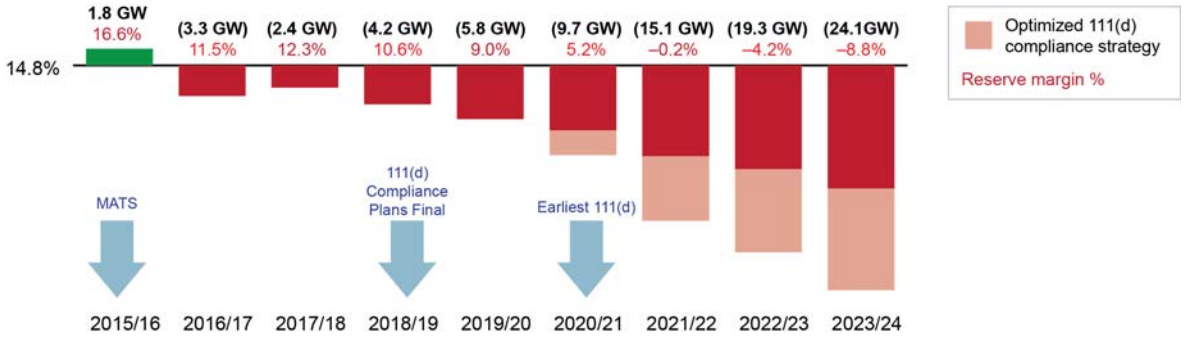
A primary factor in the changing landscape for electric generation is environmental regulations, both existing and proposed. For example, in 2015, the new Mercury and Air Toxins Standards (MATS) of the Environmental Protection Agency (EPA) will require coal plants to have pollution mitigation technologies in place to limit emissions.[14] In fact, the Energy Information Administration's *Annual Energy Outlook 2014* reports that 90 percent of coal retirements over the next six years will coincide with the first year of MATS enforcement (18). The MATS rule is having by far the largest impact on electric generators, but other regulations are also affecting the industry in the near term. New standards for the Cross-State Air Pollution Rule (CSAPR), Coal Combustion Residuals (CCR), and Cooling Water Intake Structures (CWIS) are expected to impact existing power generators.

The uncertainty caused by regulation increases with the potential for new carbon emission standards proposed under Section 111 of the Clean Air Act. The EPA's Clean Power Plan[15] standards would impact emissions from new and existing power plants. The proposed 111(d) rule would establish guidelines to reduce emissions, and states would subsequently need to design programs based on those guidelines to achieve the necessary reductions. While the specifics of the EPA's carbon proposal are subject to change when a final rule is issued, it is clear that any carbon emission limitations will negatively impact MISO's coal generation fleet. A recent assessment published by MISO shows that the proposed EPA rule could lead to an additional 14 GW of generation retiring over the next decade (2). Overall, 298 coal units in MISO are being impacted by environmental regulations, resulting in a projected 7 percent reduction in generation by 2016 (19). The potential reliability impacts due to the shift away from coal are startling. As planning reserves dissipate, the possible challenges to reliability increase exponentially. Exhibit 4 shows resource adequacy shortfalls projected by MISO over time.

> "Based on MISO's current awareness of projected retirements and the resource plans of its membership, Planning Reserve Margins will erode over the course of the next couple of years and will not meet the 14.2 percent requirement. The impacts of environmental regulations and economic factors contribute to a potential shortfall of 6,750 MW, or a 7.0 percent Anticipated Reserve Margin… by summer 2016. Accordingly, certain existing resources are projected to be reduced by 10,382 MW due to retirement and suspended operation."
>
> *—2013 Long-term Reliability Assessment, Page 54*

[14] Many utilities have received extensions until April 2016 to comply with MATS.
[15] On June 2, 2014, the U.S. Environmental Protection Agency, under President Obama's Climate Action Plan, proposed a plan to cut carbon pollution from power plants.

EXHIBIT 4. Projected Capacity Surplus/Shortfall, by Planning Year for MISO North/Central Region

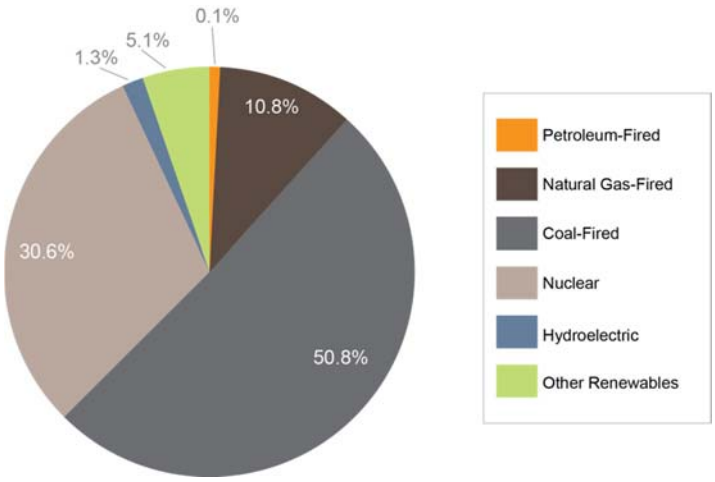


SOURCE: MISO, October 22, 2014, *Long Term Resource Adequacy Update.* Available www.misoenergy.org/Library/Repository/Meeting%20Material/Stakeholder/BOD/System%20Planning%20Committee/2014/2014102/20141022%20System%20Planning%20Committee%20of%20the%20BOD%20Item%2004%20Long%20Term%20Resource%20Adequacy%20Assessment.pdf. (accessed 10/17/14)

EPA regulations are hitting states with high proportions of coal generation harder than other regions.[16] As shown in Exhibit 5, these regulations are going to have a significant impact on Michigan, where more than 50 percent of energy generation in 2013 came from coal power plants (20). Compounding the issue presented by EPA regulations is the age of Michigan's current coal generating fleet. Most of Michigan's coal plants came online in the 1960s and '70s, as illustrated in Exhibit 6. In fact, the average age of a coal generation facility in Michigan is 52 years old (21). In order to comply with new emissions targets, coal plants are faced with the decision to invest in costly retrofits or retire from operation. In many cases, aging small and midsized plants are unable to justify the investment needed to continue operation because the new equipment is expensive and results in lost generating capacity (22).

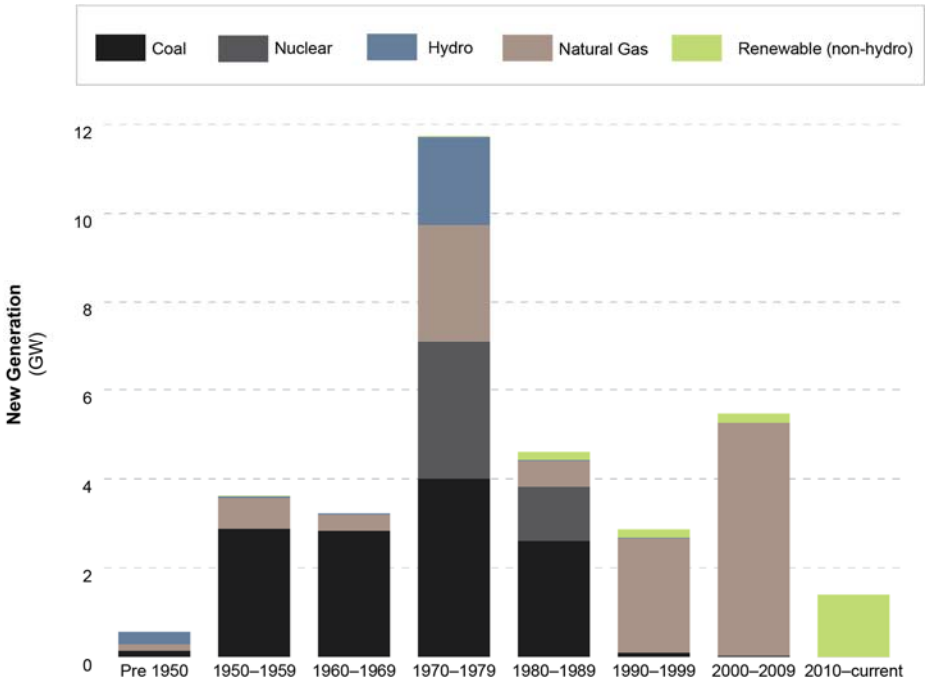
[16] PJM (RTO for Ohio River Valley and Mid-Atlantic States) and MISO are projected to have the largest amounts of coal plant retirements: 21 GW of coal capacity to retire in the next five years or so, compared to about 20 GW of capacity whose retirement has already been announced. (See Brattle Group, November 2013, *Coal Plant Retirements: Feedback Effects on Wholesale Electricity Prices.* Available at: www.brattle.com/system/news/pdfs/000/000/584/original/Coal_Plant_Retirements_-_Feedback_Effects_on_Wholesale_Electricity_Prices.pdf?1386628173, accessed 10/10/14)

EXHIBIT 5. Michigan's Current Electric Generation Fuel Mix



SOURCE: U.S. Energy Information Administration, June 2014, *State Profile and Energy Estimates.* Available at www.eia.gov/state/data.cfm?sid=MI. (accessed on 10/13/14)

EXHIBIT 6. New Electric Generation in Michigan by Fuel Source



SOURCE: Reported by MPSC Commissioner Sally Talberg, July 31, 2014, at the Michigan Energy Providers Conference during presentation entitled *Resource Adequacy: Not Just Keeping the Lights On.*

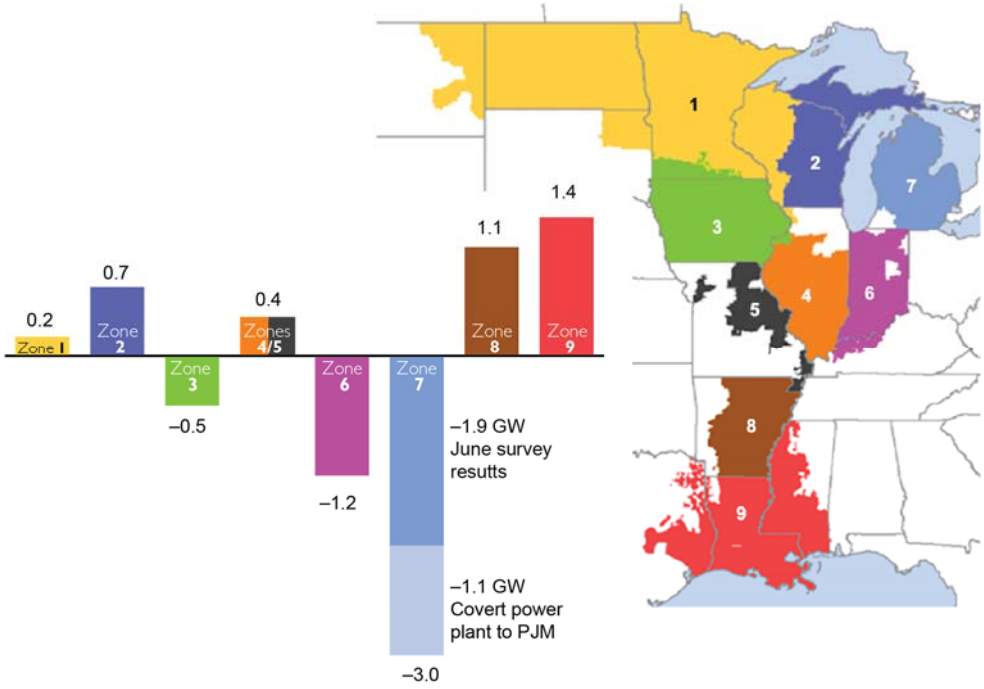
Impacts from Retirements in Michigan

MISO consists of nine local resource zones. These zones were designed to encourage the right amount of planning resources located in each zone, to meet reliability goals. The zone's boundaries account for the limitations that exist due to transmission constraints. Import and export limitations are defined for each zone through MISO. These limits establish the amount of resources each zone can rely on outside of its boundaries for its planning purposes.

MISO conducts an annual study of the approximately 140 load serving entities[17] in its service territory to determine the ability of their system to meet its load demand requirements as well as the planned reserve margin (PRM).[18] These assessments are based on information provided by utilities and other plant owners about facilities being removed from service. When looking at resource adequacy for each zone, as shown in Exhibit 7, it is clear that the shortfall is driven in large part by Zone 7, the Lower Peninsula of Michigan. Beginning as soon as 2016, Michigan will be short nearly 3 GWs of generation necessary to maintaining adequate reserve margins (23). Both Consumers Energy and DTE Energy, which collectively provide more than 76 percent of the state's electricity have made recent announcements about plant retirements (24). In a February 2014 news release, Consumers Energy reported that its power plants being decommissioned had each operated more than 60 years and represent nearly 1 GW of generating capacity, which will only be partially offset by the purchase of a merchant generating plant[19] in Jackson, Michigan. DTE Energy expects to retire 0.2 GW of coal generation by April of 2016 and additional unannounced coal retirements anticipated between 2019 and 2025 (25). Other municipal power plants expect to retire an additional 0.16 GW by April 2016. In total the Lower Peninsula, will lose 1.3 GW of coal-fired generation (26). Sometimes merchant generators continue to operate but leave the MISO market. The 1.2 GW New Covert Generation Station, located in West Michigan, has entered into agreements for transmission upgrades to allow it to leave the MISO market and join the PJM market.

[17] A load serving entity secures energy and transmission service to serve the electrical demand and energy requirements of its end-use customers.
[18] This is called a Loss of Load Expectation (LOLE) study, which is a probabilistic analysis to set the Planning Reserve Margin Requirement for the load serving entities in the upcoming Planning Year (June 1 through May 31).
[19] Merchant generators are facilities not operated by a utility, but that participate in the wholesale electric market.

EXHIBIT 7. 2016 Resource Adequacy Forecast, Local Resource Zone Summary



SOURCE: MISO. October 22, 2014. *Long Term Resource Adequacy Update.* Available https://www.misoenergy.org/Library/Repository/Meeting%20Material/Stakeholder/BOD/System%20Planning%20Committee/20141022/20141022%20System%20Planning%20Committee%20of%20the%20BOD%20Item%2004%20Long%20Term%20Resource%20Adequacy%20Assessment.pdf. (accessed 10/17/14)

Regional Entities' Role in Resource Planning

RTOs play a role in planning for adequate resources but they do not have the authority to enforce planning requirements through construction of new generation. In most cases, the RTO administratively sets the demand for capacity based on expected load—with a sufficient reserve margin to achieve reliability standards—and allows market-based mechanisms to provide adequate resources.

Capacity Markets

Without the authority to determine where and when generation is built, RTOs have to rely on market prices to ensure investment in adequate resources. This has yet to be a concern for MISO because it has operated with more than 20 percent reserve margins, due to a surplus of capacity (2). Responding to diminishing reserve margins, some RTOs have employed "capacity markets" to attract the generation resources needed to meet their reliability standards. These markets emerged to supplement the price that power producers earn through energy markets. The price of electricity is based on variable operating costs, meaning that energy markets only compensate an electricity generator if they are actually generating power. Due to the high cost and long life of generation investments, "energy only" payments made it difficult for power generating plants to recover their total costs through the market. This is often referred to as the "missing money" problem—that is, the money necessary for the investment required for long term capacity needs is missing from the regional wholesale markets (27).

Capacity market structures vary among RTOs. MISO operates a voluntary capacity market designed to ensure each energy provider has adequate resources to meet the upcoming year's anticipated need. This creates a price signal to encourage building new energy generation and retaining existing energy generation within the RTO.

Capacity Markets Have Failed to Ensure Resource Adequacy

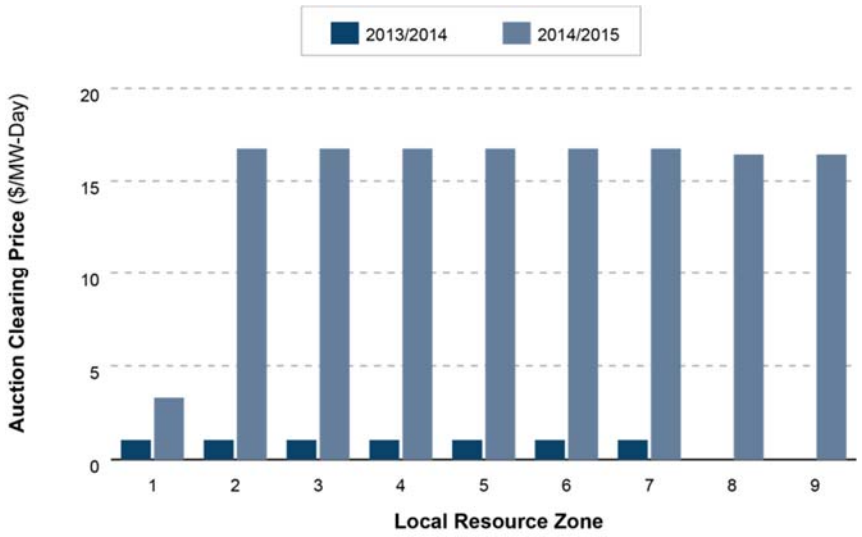
Regional transmission organizations are attempting to utilize capacity markets because, unlike state public service commissions, they have no direct authority to actually require or approve the building of new generation resources. MISO's Independent Market Monitor's (IMM)[20] annual report detailing performance and determining future planning goals found not only that MISO is expected to be capacity deficient in 2016, but also that its capacity market simply does not provide proper incentive to ensure the availability of adequate resources or encourage investment in new resources—primarily generation.

MISO's first year of administering its capacity auction resulted in very low capacity prices, due in part to overabundant supply. But as excess generation disappears over the next few years, capacity prices are expected to continue rising (28). As Exhibit 8 shows, prices have already increased in anticipation of capacity shortfalls throughout MISO.

> "This report shows that MISO's economic signals in 2013 would not support private investment in new resources, which is partly due to the modest capacity surplus that currently exists in MISO. However, we believe the economic signals would continue to be inadequate even under little or no surplus because of the shortcomings of MISO's current capacity market described in this report. This resource adequacy concern is likely to rise as environmental regulations, increasing wind output, and low natural gas prices accelerate the retirements of many coal-fired resources in the next two years."
>
> *—2013 State of the Market Report*

[20] The Independent Market Monitor is an impartial entity responsible for reviewing and reporting on RTO functions pursuant to FERC Order No. 179.

EXHIBIT 8. MISO Capacity Price—Auction Results



SOURCE: MISO 2013/2014 and 2014/2015 Auction Results. Available at www.misoenergy.org/Library/Repository/Report/Resource%20Adequacy/AuctionResults/2013-2014%20MISO%20Planning%20Resource%20Auction%20Results.pdf and www.misoenergy.org/Library/Repository/Report/Resource%20Adequacy/AuctionResults/2014-2015%20PRA%20Summary.pdf. (accessed 10/14/14)

Despite the use of mechanisms like capacity markets to incent new generation, MISO specifically recognizes states' obligation to ensure adequate resources.[21] This was recently emphasized by comment from a MISO representative to the Michigan Energy Providers Conference, a group that included state regulators and others when he noted that although he worried about resource adequacy, it was the responsibility of states and energy providers to "fix it."[22] The implication for Michigan as it decides how best to meet its future capacity needs is quite clear: relying upon the regional transmission organization to ensure the availability of adequate capacity is—at best—questionable.

Difficulties with Regional Coordination

By relying upon MISO and the regional wholesale market system for ensuring Michigan's future capacity needs, another challenge emerges—the difficulty that MISO and PJM currently have with trading available capacity resources. The selection of PJM by AEP Ohio and others created a trading roadblock in the Midwest. This effectively limited Michigan's ability to interact with Ohio power generators, who had traditionally been electricity trading partners.

The FERC has ordered each RTO to develop mechanisms to address interregional coordination.

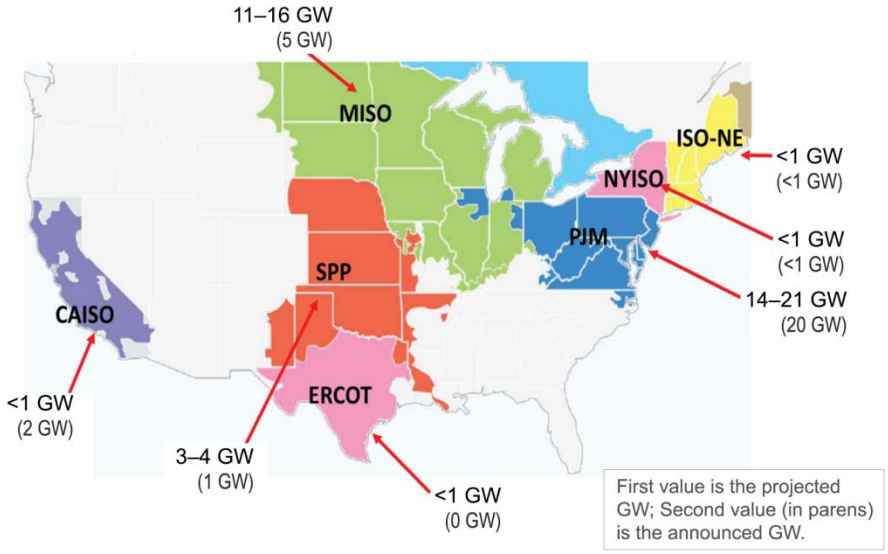
> "The second issue with MISO's current capacity market is the prevailing barriers to capacity trading between PJM and MISO. Capacity prices in both markets will only be efficient if participants can freely import and export capacity to arbitrage capacity price differences between markets to the extent that the physical transmission capability allows."
>
> *—2013 State of the Market Report, Page 38*

[21] The MISO Module- E Tariff on Resource Adequacy states, "Nothing in this (tariff) affects existing state jurisdiction over the construction of additional capacity or the authority of states to set and enforce compliance with standards for adequacy." (Available at www.misoenergy.org/_layouts/MISO/ECM/Download.aspx?ID=152746, accessed on 10/14/14)

[22] Reported by MPSC Commissioner Sally Talberg on July 31, 2014, at the Michigan Energy Providers Conference during presentation entitled *Resource Adequacy: Not Just Keeping the Lights On.*

While both MISO and PJM are currently working to address this problem, it has yet to be resolved. Even assuming excess resources in PJM—a generous assumption, given that the same factors accelerating the retirement of coal plants are impacting that area of the country as well as the Midwest and the MISO region (see Exhibit 9)—such an excess doesn't help Michigan meet its needs if those resources cannot be effectively and efficiently brought to the state.

EXHIBIT 9. RTO Coal Retirements Map



SOURCE: Brattle Group, November 2013, *Coal Plant Retirements: Feedback Effects on Wholesale Electricity Prices.* Available at www.brattle.com/system/news/pdfs/000/000/584/original/Coal_Plant_Retirements_-_Feedback_Effects_on_Wholesale_Electricity_Prices.pdf?1386628173. (accessed 10/10/14)

Attempts to Regain State Control

Retail market deregulation at the state level effectively forces a state to rely on the federally regulated regional transmission organizations for most of its capacity needs. As noted earlier in this report, MISO's current capacity market structure has failed to produce the necessary investment in new, long-term generation capacity. Some states that have fully deregulated their retail markets are also experiencing inadequate capacity market structures and pricing systems in their regional transmission organizations. As a result, some are reacting by attempting to reassert some state control over capacity decisions. For example, both New Jersey and Maryland—fully deregulated states that are operating in the PJM regional market—expressed dissatisfaction with the results of their dependence upon the RTO capacity market system, primarily because it has not created the generation they want and believe they need. Shortly after, new legislation and regulations were passed in both states in an attempt to incent and support this new in-state generation. As reported in the May 18, 2012, issue of the *Chicago Tribune*: "The states want the new generation to create construction jobs, spur economic growth, lower prices, allow for the retirement of older, dirtier plants and ensure a reliable supply of in-state generation" (29).

The initiatives in New Jersey and Maryland have caused great tension—and litigation—between the state and the federal governments. In both cases, FERC or PJM have successfully contested these state attempts to reassert control over capacity decisions (30).

Addressing Capacity Needs in Michigan

One of the issues that Michigan needs to address as it decides how best to address its capacity shortfall is how much control it wants to maintain over its own energy policy regarding the amount, mix, and cost of future generation, and how much it wants to relinquish to the federal government. The federal government already has the authority over some matters that clearly impact state energy policy, such as air emissions. This is not the case, however, when it comes to resource adequacy. Michigan has the responsibility to ensure that an adequate supply of electricity is available, the market and regulatory structure it adopts will significantly impact the extent of its control. While improvements have been made to the regulatory environment to support adding new generation, issues surrounding time and investment keep this from happening.

Complications Presented by Michigan's Market Structure

Michigan's unique hybrid retail market structure for electricity allows 10 percent of the electric load in the state to be served by retail energy marketers under retail open access. This market structure creates challenges for ensuring reliability and resource adequacy, since customers of these retail energy marketers—primarily large industrial and commercial customers[23]—can switch back and forth between the retail market and the regulated utility that services their area. Without customer base certainty, utilities are not going to make long-term investments in new generation.

In addition, Michigan's market structure also results in higher operating costs for regulated utilities. Under Michigan's energy choice law, retail energy marketers are not regulated and do not have an obligation to serve customers, but incumbent utilities do. If a customer chooses to leave a retail energy marketer, the MPSC requires that regulated utilities accept the customer back under "return-to-service rules." This ability to switch between a regulated utility and a retail energy marketer, combined with the state requirement that its utilities serve as "default service providers," means that regulated utilities must be prepared to serve a customer base with an unknown number of actual customers on a year-to-year basis. If a customer chooses to return to a utility, there must be adequate capacity to provide service. Retail energy marketers provide 2.4 GWs of electricity under the 10 percent cap; this load could potentially return to utility service providers with limited notice (32, p. 19). Utilities either have to maintain this excess capacity, or purchase electric power at market prices to cover the needs of customers that may or may not return. This spreads the costs of excess generating capacity across their remaining customers. Either way, regulated utilities are required to operate at a higher cost that is not passed on to the returning customer, thus disrupting the ability of the market to send signals through prices. Before Michigan placed a cap on retail open access in 2008, nearly 4 GWs shifted between utility service and retail energy marketers as wholesale prices fluctuated.[24] The inability to determine which customers might return, when they may do so, and what their electricity needs will be creates uncertainty. This uncertainty seriously compromises the ability of utilities to accurately plan for the future energy needs of the state.

[23] Commercial and industrial customers accounted for all of the participation in the electric choice programs during 2013.
[24] Four GWs is the equivalent to approximately six large power plants. (See Readying Michigan to Make Good Energy Decisions, www.michigan.gov/documents/energy/electricc_report_440539_7.pdf, accessed 10/10/14)

Issue in Focus:
Michigan's Upper Peninsula

Across the state, the problems created by Michigan's current market structure are clear—the uncertainty in planning for future reliability needs, the involvement of federal agencies, the tension between federal and state regulators, and the shifting of fixed costs to remaining residential and small business customers. Nowhere is it being demonstrated more clearly, however, than in Michigan's Upper Peninsula.

In 2008, the Michigan Legislature reduced the level of retail open access participation from 100 percent to 10 percent of an electric utility's average retail sales. One industry was specifically exempt from the 10 percent cap, though: iron ore mining and processing facilities. These facilities were allowed to receive service from an alternate supplier regardless of whether their load exceeded that 10 percent cap. In June 2013, Cliffs Natural Resources, which operates two mines in the Upper Peninsula, notified Wisconsin-based We Energies that it would be leaving their service for an alternative electric supplier (33). Following that loss of more than 80 percent of their customer base, We Energies announced their plans to retire the 431 MW Presque Isle Power Plant (PIPP) in Marquette, Michigan.

> "[The Presque Isle crisis] is an example of what happens when the federal government makes [energy] decisions for you."
>
> —Valerie Brader, *Senior Policy Advisor to Governor Rick Snyder*

Closing the Presque Isle Power Plant, however, would threaten reliability across the Upper Peninsula. Both the state and federal government are attempting to control the situation, by insisting that PIPP remain in service despite the economic implications. We Energies entered into an agreement to keep the plant open with the Midcontinent Independent System Operator (MISO)—the federally regulated entity in charge of ensuring reliability for the regional electric grid. This agreement would require Upper Peninsula customers to pay $97 million per year to maintain PIPP (34). The Michigan Public Service Commission (MPSC) is contesting this decision and attempting to reassert control over the situation in the Upper Peninsula. The MPSC claims MISO's intervention was unjustified because PIPP cannot retire without the MPSC's permission (35). The MPSC continues to work with various parties to seek other solutions to the Upper Peninsula's long-term energy needs (36).

> "If the MPSC were to spread the costs of the loss in load in [We Energies] territory (85% load loss)… to Michigan full-service customers, the increase in rates could be greater than 70%."
>
> —*Readying Michigan to Make Good Energy Decisions: Electric Choice* pg. 13.

The planned retirement of PIPP exposes another major challenge created by Michigan's "hybrid" energy market: utilities in Michigan are required to have the capacity to serve all customers in their service territory, even those who choose a different supplier. Despite no longer selling power directly to the mines, We Energies must maintain PIPP in order to serve them if they decide at any time to return to regulated service. The obligation to serve forces utilities to operate with higher costs that are not paid by customers served by alternative energy suppliers. Instead, the added costs are passed on to the utility's existing customers.

Because of Michigan's hybrid market structure, residents and businesses in the state's Upper Peninsula are absorbing the costs to maintain an outdated plant. These significant price hikes, along with the problems of state and federal tension and planning for future reliability needs, are evidence enough that the state needs to take concrete steps to address its energy challenges as soon as possible.

Update as of January 13, 2015

Residents of the U.P. will avoid significant and prolonged increases in their utility bills following a plan announced by Governor Snyder, on Tuesday, January 13, 2015. The designation of the Presque Isle Power Plant as an SSR set off a flurry of activity as state officials, energy providers, and residents tried to find a solution that would allow them to avoid the $97 million cost FERC imposed on them.

The proposed agreement between We Energies, Upper Peninsula Power Company (UPPCO), Cliffs Natural Resources, Invenergy, and the State of Michigan has four primary components.

- We Energies and the Wisconsin Public Service Corporation will sell their utility service territory and electric generation in Michigan, including PIPP, to UPPCO. UPPCO will serve their new customers using the rates already approved by the Michigan Public Service Commission and continue operating the PIPP.
- UPPCO will be required to terminate the plant's SSR agreement by July 2015, and Cliffs has agreed to return to purchasing power directly from the plant until it is retired.
- Cliffs will partner with the Invenergy to build and operate a combined heat and power facility to supply their energy needs. Excess energy produced at the new facility can be sold to local utilities.
- Governor Snyder, Attorney General Bill Schuette, and Cliffs Natural Resources have agreed to rescind their opposition to the planned merger of We Energies and Integrys Energy Group.

In his statement, Governor Snyder said, "The solution these agreements advance ensures reliability, rids the U.P. of years of unaffordable charges, improves the environment, and most of all gives the U.P. the power and ability to adapt to the future (37)."

Determining the Right Resource Mix

Different resources to meet Michigan's future capacity needs include new generating plants, long-term contracts with independent power producers, short-term market purchases, renewable energy resources (such as wind), energy efficiency programs, transmission improvements, and demand-side options, as well as emerging technologies such as distributed generation. Several factors will impact the role of each of these resources, including federal environmental regulations (both existing and proposed); state resource portfolio standards; projections for demand; fuel prices; prices for various construction materials and different kinds of generating equipment, such as wind turbines, gas turbines, and their components; and resulting electric rates for customers, both residential and business.

Natural gas is currently the fuel of choice, primarily because it is a relatively clean, inexpensive, and abundant fuel source. Although natural gas prices are historically volatile, Michigan does have abundant storage capacity to potentially soften price increases, at least in the short term. Wind energy will certainly continue to play a role in the overall generation portfolio, but its intermittent nature limits its responsiveness. As a result, only 13 percent of the installed capacity of a wind turbine can be counted toward meeting the electric load plus PRM requirement.

Conclusion

Ensuring adequate electricity supply has emerged recently as one of the most critical issues facing Michigan. The abundant supplies of the past few years—magnified by declining demand due to the economic slowdown of the Great Recession—are rapidly coming to a close as aging coal plants retire in the face of federal environmental regulations. Although changes to the regulatory structure at both the national and state level will impact this issue, the fact remains: the state maintains the responsibility to ensure resource adequacy and address the looming capacity challenges Michigan faces. A number of decisions must be made about the right mix of the available resources and how much to depend on energy efficiency, renewable energy, more generating facilities, and other ways to address the capacity shortfall. The complications presented by Michigan's current market structure must also be addressed, and the state needs to recognize the lack of success that the federally regulated regional transmission organizations have thus far had in supporting new capacity investments. Finally, the state needs to decide how much to relinquish to the federal government by depending on the regional transmission organization and how much control to maintain over its energy future.

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