Midwestern Energy Opportunities Report:
Low-Cost Energy in the Midwest

Maximizing Opportunities, Overcoming Common challenges, & Identifying Areas for Focused Cross-State Collaboration

MGA
50th Anniversary
Midwestern Governors Association

Introduction

The Midwestern Governors Association (MGA) helps its member states identify and pursue common goals in the areas of energy, agriculture and economic development. As one prong of Iowa Governor Terry Branstad's agenda as the 2012 Chair, the MGA is focusing on supporting efforts to increase domestic/Midwestern energy production across all types of energy to help maintain or achieve low-cost energy. Affordable energy is a key component of long-term economic competitiveness in a global economy. This report will focus the MGA's attention and resources on those issues that: a) its member states have already identified as priorities and b) would benefit most from cross-state collaboration (e.g., where working together can shorten the learning curve or otherwise improve cost-effective positive outcomes throughout the region).

This report lays the foundation for the MGA's work on energy by establishing a well-grounded information base for collaborative work among the states over at least the next year. Staff from various public offices and agencies were interviewed and surveyed for this report. The information in this report does not represent the official position of any state and is the culmination of many perspectives gathered from a range of respondents.

Summary of Key Opportunities for Productive Regional Collaboration

All MGA member states identified energy opportunities that fall into one of two general categories—electricity sector or transportation. Identified opportunities cover everything from building new transmission lines and natural gas development to energy efficiency, renewable energy-related manufacturing and alternative refueling infrastructure. Drawing from the list of potential cross-state collaborations outlined later in this report, below is a summary of those that seem most ripe for action, sorted into the two broad categories of electricity sector and transportation.

Energy technology investment and manufacturing is an overarching theme identified by all of the Midwestern states. All states discussed businesses within their state that are manufacturing energy technologies, including electric vehicles, solar or wind components and combined heat and power systems. In addition to supporting and growing these industries, all of the states discussed energy in the context of economic development and job creation. The reliable, low–cost and diversified generation mix necessary to fuel robust state and regional economies is a top priority for all.

ELECTRICITY SECTOR

This first set of opportunities for cross-state collaboration includes the impacts of a rapidly changing electric generation mix, energy efficiency, transmission, natural gas development and distributed generation. Two or more states expressed an interest in:

1. Information sharing on planning for future electric generation, due to the expected changes to the Midwest's electricity mix. Every MGA state is interested in the future electric generation mix and anticipates that some existing coal generators will be retired due to an aging fleet, rising coal prices, low natural gas prices and/or U.S. Environmental Protection Agency (EPA) air quality pollution control requirements. Falling prices for some forms of renewable energy are also expected to have an impact. Midwestern states face similar concerns regarding reliability, the cost to ratepayers of a changing electricity system and over-dependence on any one source for electricity, particularly given the likely increase in natural gas-based electric generation. These are all issues that states identified as benefitting from regional collaboration and information sharing.
2. Sharing information and best practices on achieving energy efficiency. Every MGA state is working on energy efficiency, which can lead to a decrease in electric generation. States are interested in improving the energy efficiency of public buildings, commercial buildings and state facilities. Many states are also interested in industrial energy efficiency (IEE), including combined heat and power (CHP) and waste energy recovery (WER). The MGA has completed previous work on IEE and those past efforts provide a foundation for continued regional collaboration on topics ranging from financing to program designs.

3. Continued work on a robust regional transmission system. Every MGA state identified transmission infrastructure for energy distribution as an important issue to the health of the region's energy economy. Many states also see transmission as an economic development lever. The MGA is currently working on transmission-related efforts, so states' continued interest in this topic provides renewed momentum for this cross-state effort.

4. Information exchange on distributed generation. A handful of MGA states identified distributed generation of renewable energy resources as an opportunity and an area that would benefit from regional collaboration. These states are interested in sharing their respective experiences and lessons learned from developing and implementing distributed generation policy, especially on the topics of interconnection standards, project permitting, incentives, and policies such as net metering, resource carve-outs and technology manufacturing.

5. Sharing information on a wide range of issues associated with natural gas development, including lessons learned from other regions with natural gas experience. Many MGA states pointed to the challenges and opportunities associated with the natural gas boom, including an over-reliance on gas down the road. States are interested in working together on the issues of economic and workforce development, ensuring adequate infrastructure and an appropriate regulatory environment, as well as effectively managing the local impacts of natural gas development.

TRANSPORTATION SECTOR

Almost every state is interested in diversifying the transportation fuel mix and developing the infrastructure necessary to support the use of non-gasoline fuels. Different types of fuels are prioritized in different states according to their inherent assets, including their natural resources and manufacturing base. There is a shared interest in making sure that the efforts of individual states add up to a coherent refueling network. The main alternatives of interest are electric vehicles, compressed natural gas vehicles and renewable fuels. States are interested in:

1. Working together to map alternative fuel infrastructure corridors and clusters. This could include collecting data on infrastructure deployment, identifying pilot projects in different cities, and perhaps discussing other issues that would benefit from a regional approach (e.g., common signage for various fuel types, or harmonized regulations that make the region more hospitable to fuel infrastructure developers).

2. Sharing ideas that will increase the penetration of biofuels in existing markets and develop access to new markets. Related to number one (above), this cross-state effort would "go deep" in exploring a regional approach to biofuels infrastructure development that would help to increase biofuel use in the region. Share approaches and best practices for removing barriers to increased biofuel blends, such as encouraging the implementation of 15 percent ethanol (E15) and 20 percent biodiesel (B20).

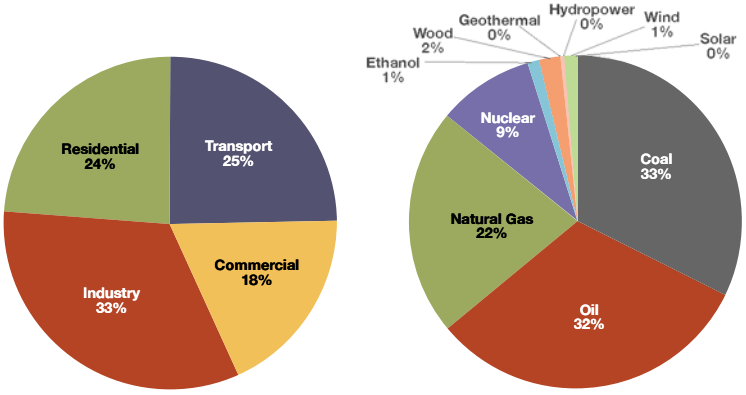
Midwestern Energy Today – Background and Context

The national and regional energy systems have always been dynamic, fueling the economy while also interacting in complex ways with public interests. Emerging global markets create a host of opportunities and challenges to the economics of today's energy infrastructure. For example, relatively low energy prices have historically helped draw energy-intensive industries to Midwestern states, creating economic opportunities that are increasingly challenged by international competition. Growing demands for energy in Asia are fueling high prices for petroleum and a new trend of rising U.S. coal exports, which in turn is driving up domestic prices for coal. In addition, current and proposed U.S. EPA air and water regulations will require some facilities to install new pollution controls.

Even as oil and coal prices have risen in recent years, the costs of some energy sources are dropping. In particular, rapidly rising shale gas development has lowered natural gas prices to a 10-year low, undercutting all other electric power generation sources in recent months. Also, the growth of wind power, falling solar costs and expanding electric vehicle markets have contributed to a tech sector that topped $263 billion in 2011.[1] While integrating new energy resources into current infrastructure is not without its risks or costs, it creates new investment opportunities throughout affected supply chains.

States and regions continue to play a central role in developing and implementing U.S. energy policy. By promoting energy diversity and efficient energy use across all sectors of the economy, Midwestern states have an opportunity to enhance national and regional energy security and keep costs down in the long-term, while attracting investments that support much-needed economic development across the region.

Total Midwestern[2] Energy Use by Sector and Fuel, 2010



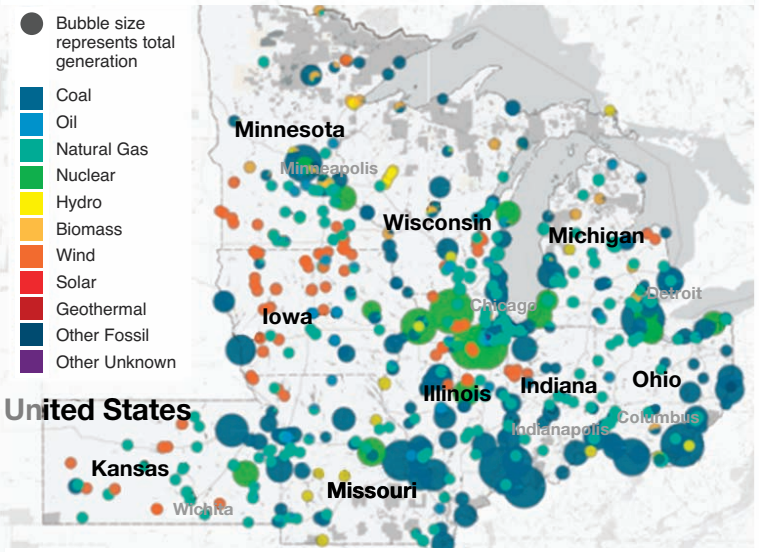
Source: U.S. Energy Information Administration

[1] http://www.pewenvironment.org/news-room/reports/whos-winning-the-clean-energy-race-2011-edition-85899381106

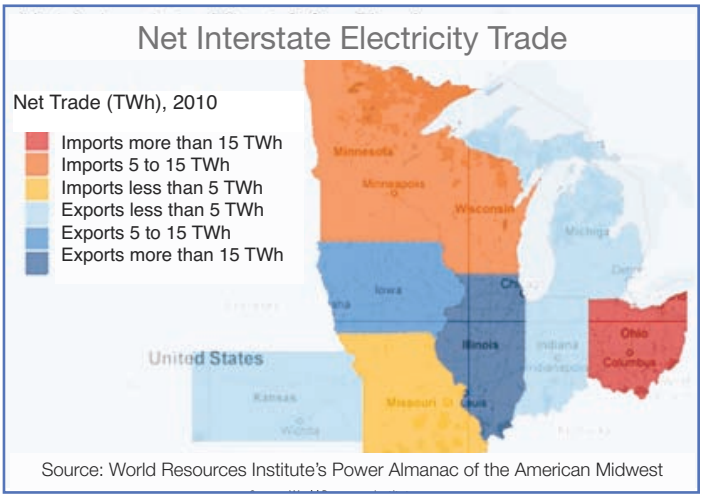
[2] In this figure, and all subsequent figures, "Midwest" refers to the nine states of the Midwestern Governors Association (Ill., Ind., Iowa, Kan., Mich., Minn., Mo., Ohio and Wis.).

ELECTRIC GENERATION

The Midwest consumes nearly 800 million megawatt-hours (MWh) of electricity per year to power homes, schools, businesses and industry. This is approximately 22 percent of total electricity consumed in the U.S. and requires the operation of more than 1,800 power plants and tens of thousands of miles of high-voltage transmission lines.[3]



Source: World Resources Institute's Power Almanac of the American Midwest



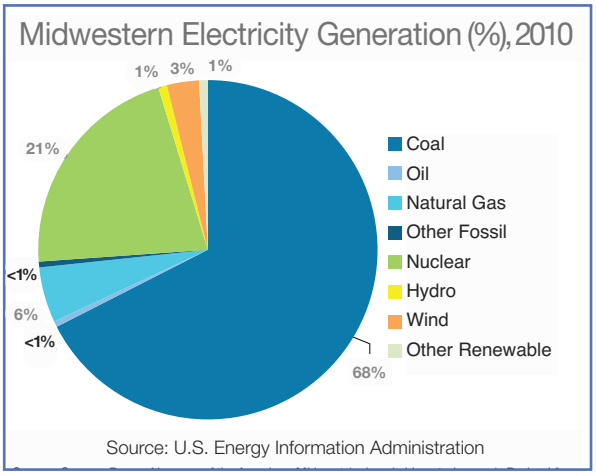
Source: World Resources Institute's Power Almanac of the American Midwest

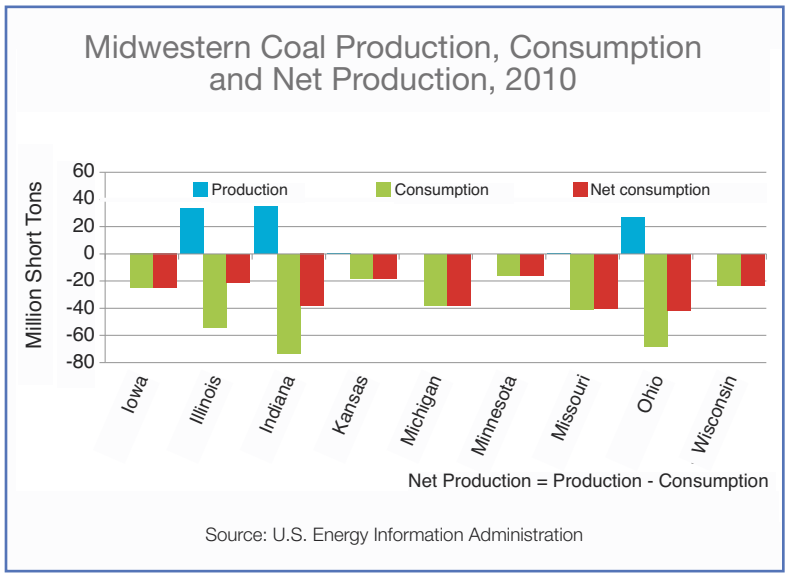
While the region is a net exporter of electricity, imports and exports varied state by state. Ohio was the largest net electricity importer in the Midwest, 20 terawatt-hours (TWh) in 2010, while Illinois was the largest net electricity exporter, 45 TWh in 2010. Indiana and Illinois exported more than 15 percent of their electricity, while Minnesota and Wisconsin imported more than 15 percent.[4]

[3] U.S. Energy Information Administration, State Electricity Profiles

[4] Ibid.

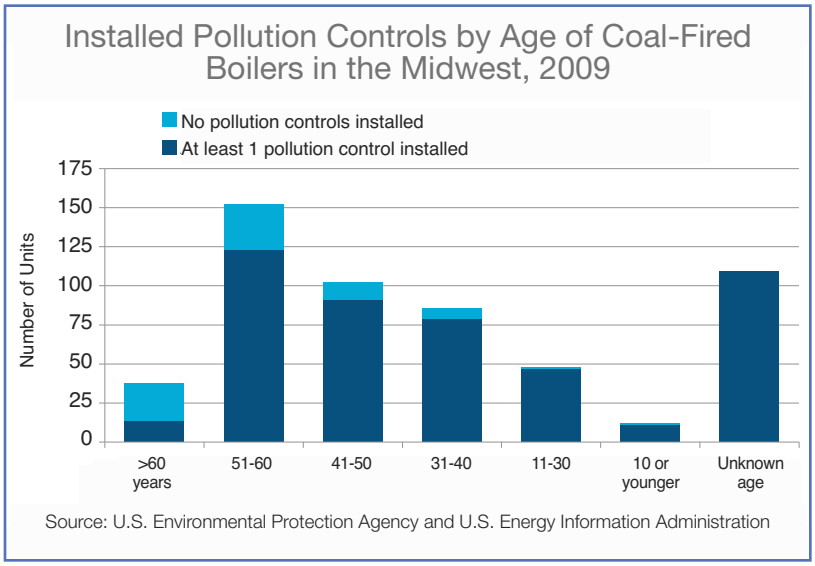
Coal is the leading source of electric generation in the Midwest, accounting for 65 percent of electricity generated in the region in 2011. Almost 30 percent of the remaining generation was natural gas and nuclear. In 2011, renewable sources accounted for 6 percent of generation region-wide.[5]



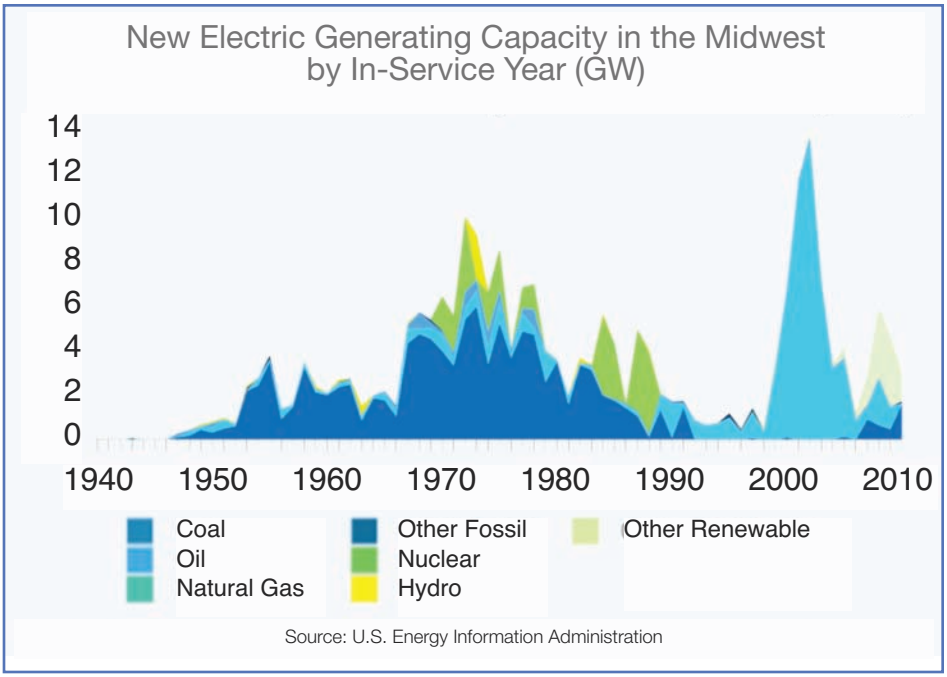


However, over the past decade, the Midwest consumed more than three times more coal than it produced. In 2010, 95 million short tons of coal were produced by five Midwestern states. This amounts to about 9 percent of total U.S. coal production.6 However, in 2010 the Midwest consumed 355 million short tons of coal. The vast majority of that coal is used to generate electricity (90 percent) and in industrial facilities (9 percent).[7]

Moving forward, some electric generators may be retired, particularly in light of high coal prices, low natural gas prices and new U.S. EPA pollution control requirements. More than 290 coal plants are 40 years of age or older[8] and some will be impacted by these federal regulations.

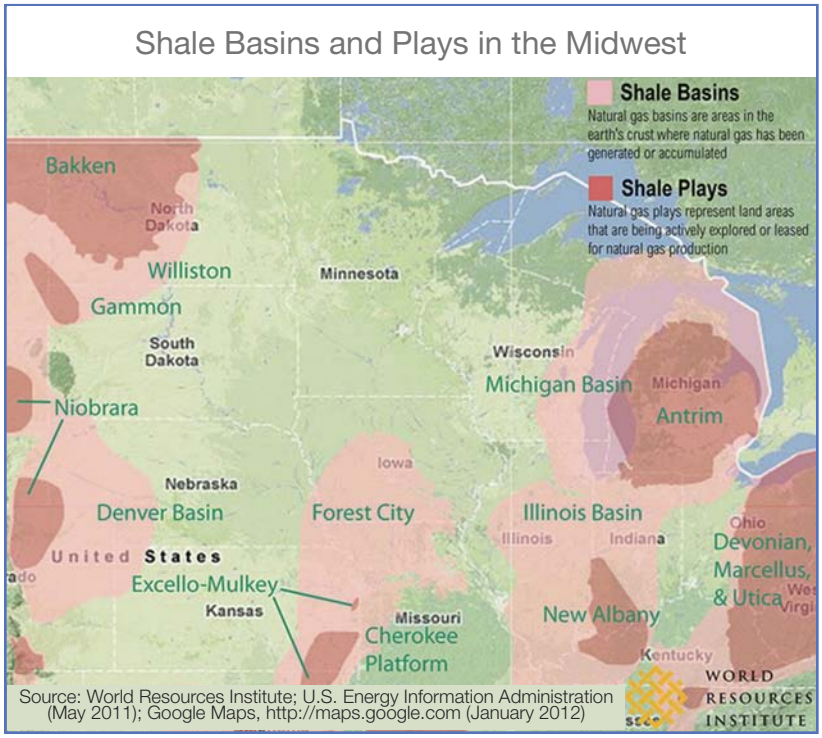


[5] U.S. Energy Information Administration, Net Generation by State, Type of Producer, Energy Source
[6] U.S. Energy Information Administration, State Electricity Profiles
[7] Ibid.
[8] U.S. Environmental Protection Agency, eGRID2012



This raises the question of what will be built in its place. The vast majority of new generation since 1990 has been natural gas and renewables. However, approximately four gigawatts (GW) of new coal generation has been built since 2005.[9]

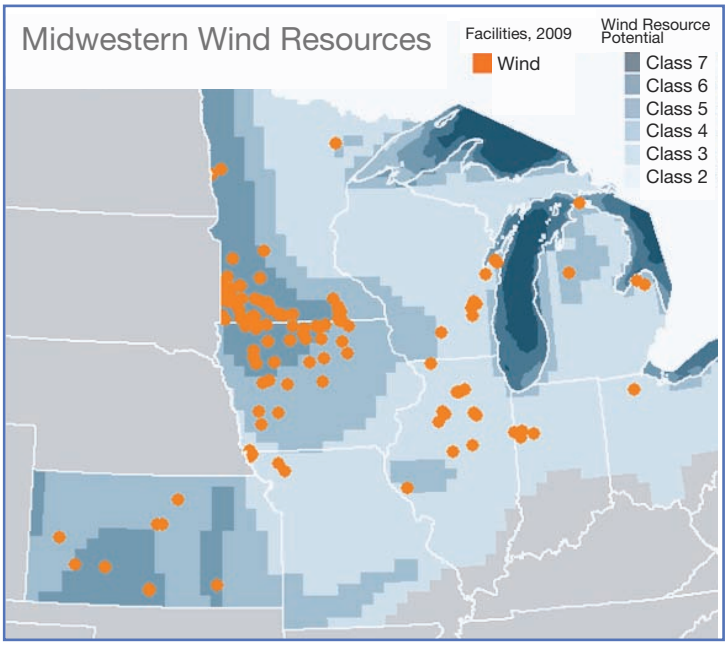
The region has been a net importer of natural gas.[10] However, that could change with the spread of hydraulic fracturing. Shale gas plays underlie a number of the Midwestern states. As of January 2012, the New Albany, Devonian, Utica and Antrim plays are all being explored for commercial potential or are in varying stages of commercial development.

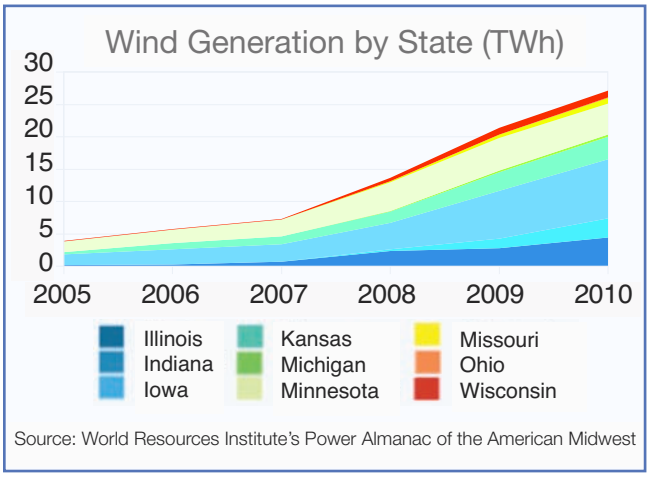


[9] U.S. Energy Information Administration, Form EIA-860

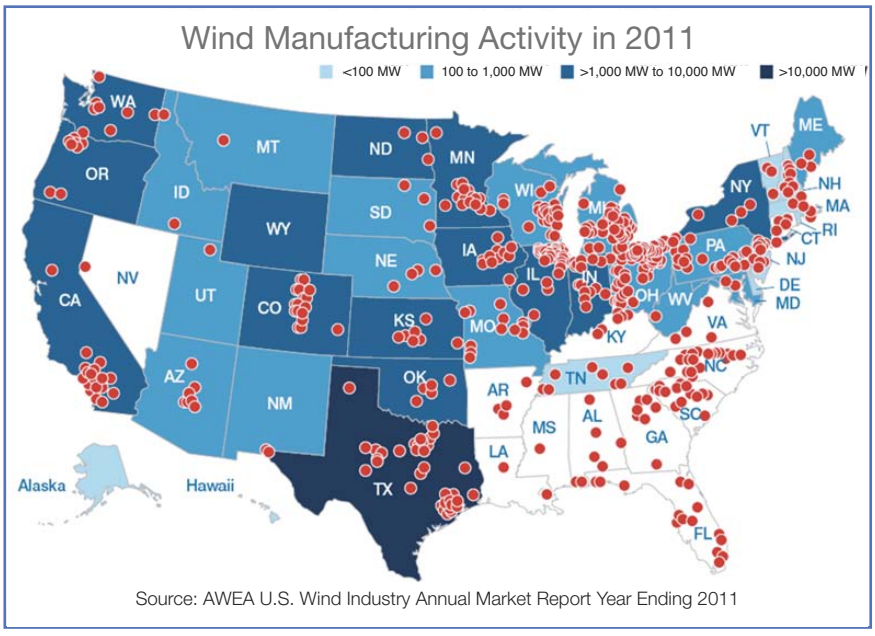
[10] U.S. Energy Information Administration, State Energy Data System

The Midwest produced more than a quarter of the total wind-powered electricity generated in the entire United States in 2010. That amounts to 27,000 GW-hours, or 3 percent of electricity generation in the Midwest.[11] The American Wind Energy Association (AWEA) reported that wind power generated 19 percent of Iowa's electricity in 2011 and 13 percent of electricity in Minnesota. The National Renewable Energy Laboratory (NREL) estimates that the Eastern Interconnection could supply between 20 and 30 percent of projected electricity demand from wind resources by 2024, with upgrades and investment in transmission infrastructure. According to a study by MISO, renewable portfolio standards in the Midwest will lead to a threefold increase from current generation.





Source: World Resources Institute's Power Almanac of the American Midwest



Source: AWEA U.S. Wind Industry Annual Market Report Year Ending 2011

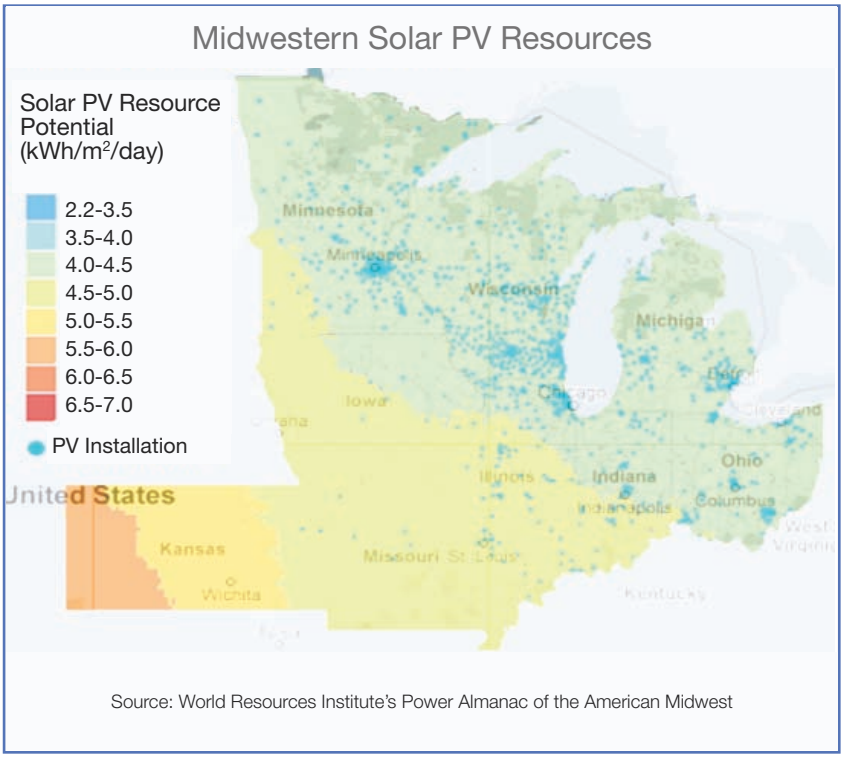
Increased use of wind energy has helped fuel manufacturing activity in the Midwest, which is currently home to at least 188 companies contributing to the wind energy industry.[12] These facilities include major wind technology manufacturers, as well as smaller companies that supply the industry with components necessary for wind turbine development.

[11] U.S. Energy Information Administration, Electric Power Annual. Net Generation by State, Type of Producer, by Energy Source

[12] American Wind Energy Association

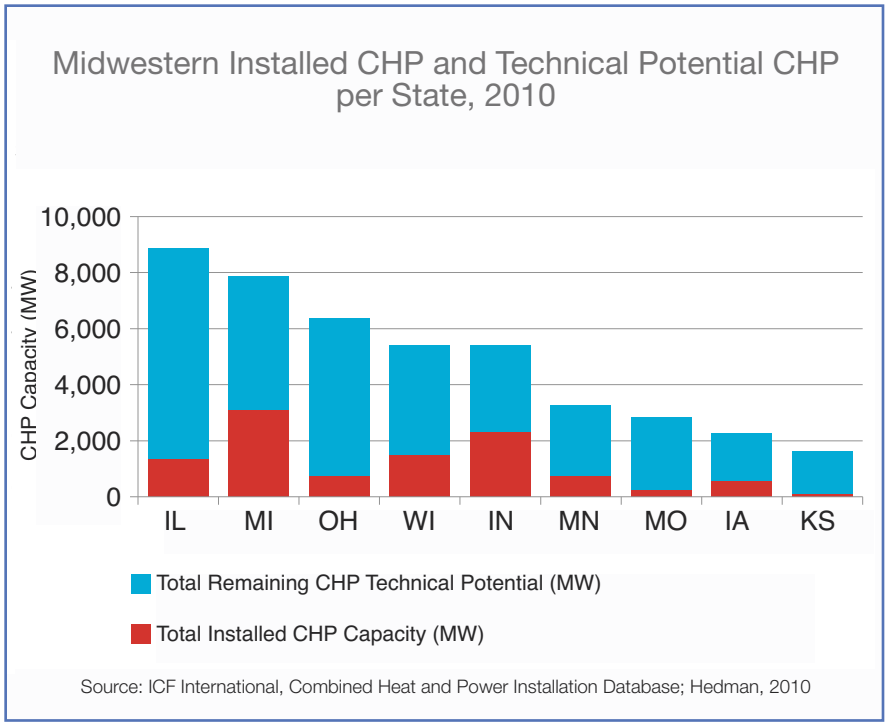
Solar accounts for less than 0.01 percent of total electric generation in the Midwest.

However, its use has also been expanding. The entire Midwest can generate electricity from photovoltaics (PV), and portions of Kansas have sufficient solar resources for concentrating solar power. In 2010, the average installed cost of PV was around $6 per watt. This price is higher than wind- or fossil-based generation. However, costs have dropped by almost 40 percent over the past decade, and some have projected these cost reductions to continue.[14]



In addition, the Midwest also has tens of thousands of megawatts of untapped combined heat and power (CHP) resources.

Conventional electricity generation wastes two-thirds of the input fuel's energy potential during combustion Even the most efficient combined-cycle natural gas power plants waste about one-half of the energy it consumes.



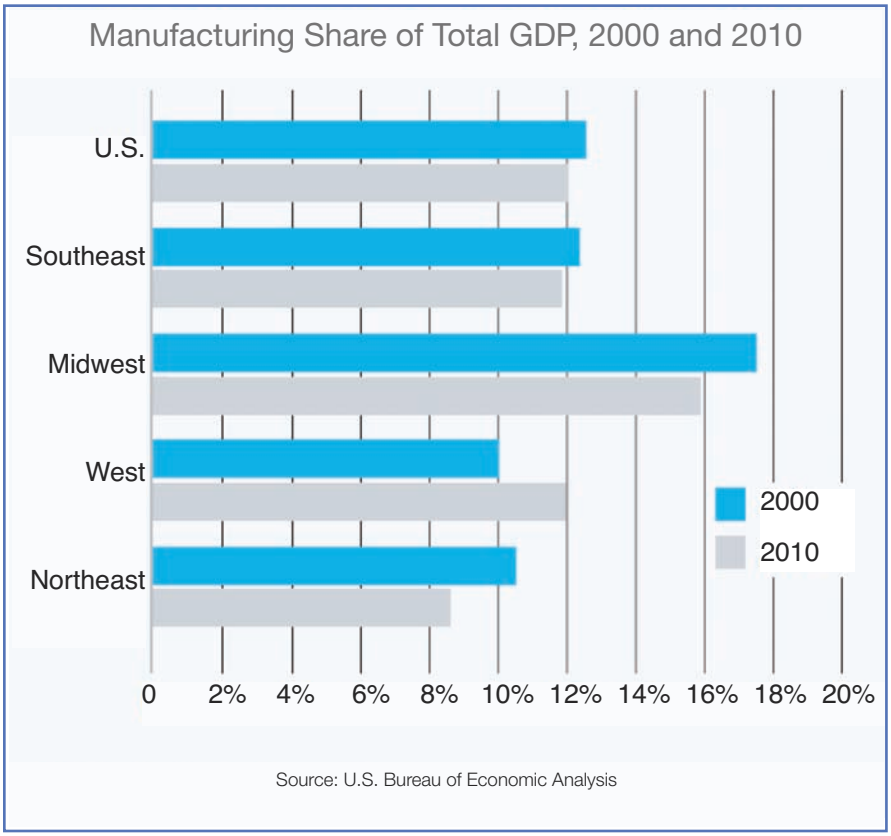
[13] U.S. Energy Information Administration, Electric Power Annual. Net Generation by State, by Type of Producer, by Energy Source

[14] Lawrence Berkeley National Laboratory, Tracking the Sun IV: An Historical Summary of the Installed Cost of Photovoltaics in the United States from 1998 to 2010. LBNL-5047E. September 2011.

Combined heat and power (CHP, or cogeneration) systems capture this otherwise wasted heat energy and use it to generate electricity and/or useful thermal energy.
Due to its utilization of waste heat, CHP uses approximately 40 percent less energy than conventional production of heat and electricity.

Moving forward, the Midwest will need to decide how best to deploy the considerable wealth of fossil fuel and renewable resources, as well as energy efficiency opportunities. While these resources vary by state, in some cases there may be much to gain through concerted regional efforts.

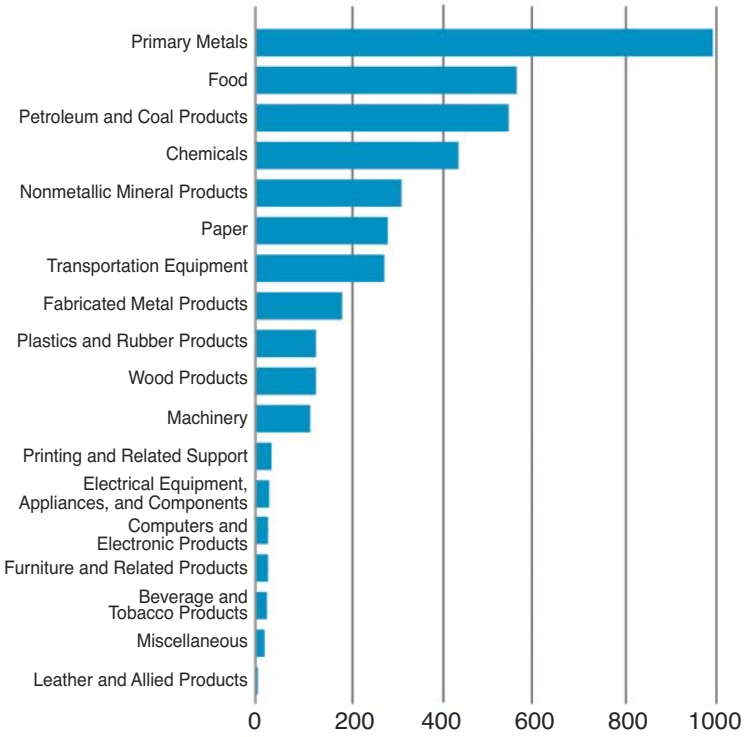
MIDWESTERN MANUFACTURING AND REGIONAL ENERGY USE



The Midwestern economy is rooted in manufacturing. While manufacturing's share of total Midwestern gross domestic product (GDP) declined between 2000 and 2010, it remained significantly higher than the U.S. national average. In 2010, the Midwest accounted for 30 percent of total U.S. manufacturing, while the regional manufacturing workforce represented 10 percent of the region's total employment, more than in any other region.

Within Midwestern manufacturing, energy-intensive subsectors contribute very significantly to total regional energy use,[15] led by primary metals (iron, steel, and aluminum), food processing, petroleum and coal products (refineries), and chemical manufacturing. In 2006, energy-intensive sectors generated 42 percent of Midwest manufacturing value added, while those same subsectors accounted for 80 percent of regional manufacturing fuel use. By including industrial energy efficiency (IEE) as a core component of economic development strategies, policymakers may help steer capital investments toward manufacturing process improvements and energy infrastructure that leaves U.S. manufacturers better positioned to compete in the 21st century.

Midwest Manufacturing Fuel Use by Subsector, 2006



Source: U.S. Energy Information Administration

Between 2000 and 2010, average Midwestern industry electricity prices increased by 43 percent. This increase helps to explain the growing interest in IEE investments as a strategy for reducing energy costs. Natural gas and electricity provided more than 60 percent of the total energy consumed by Midwestern manufacturing in 2006[16]; illustrating that energy efficiency programs run by natural gas and electric utilities could have a substantial impact on industrial energy use. Total energy consumption by Midwest manufacturing is influenced by a range of factors, including the mix of industries located in the region, the age of facility

Annual Average Prices for Energy Delivered to Industrial Customers, 2010

	ELECTRICITY (cents/kWh)	NATURAL GAS ($/1,000 FT^3)	COAL ($/short ton)
Midwest average	6.19	6.66	50.68
U.S. average	6.77	5.49	59.28

Source: U.S. Energy Information Administration

[15] This only includes energy used as a fuel source, not energy used as a feedstock. For example, natural gas used as a feedstock for chemical manufacturing is not included in this measure of energy use.

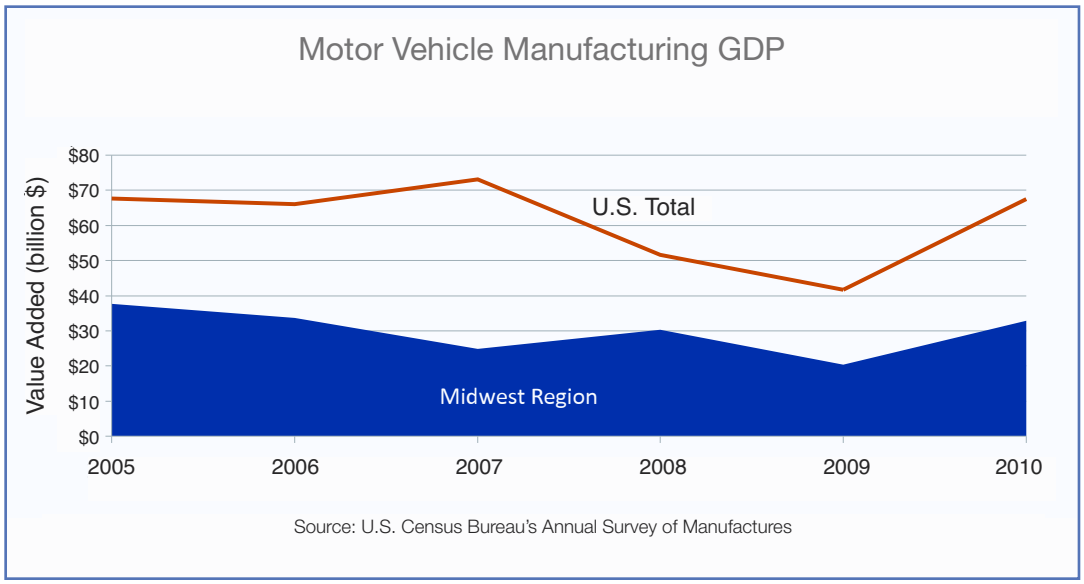
[16] 2006 Manufacturing Energy Consumption Survey

equipment, the utilization of energy efficient technologies and regional energy prices. In 2010, Midwestern industry electricity and coal prices were, on average, lower than the national average. Meanwhile, Midwestern natural gas prices were higher than the national average.

ALTERNATIVE TRANSPORTATION FUELS, INFRASTRUCTURE AND VEHICLES

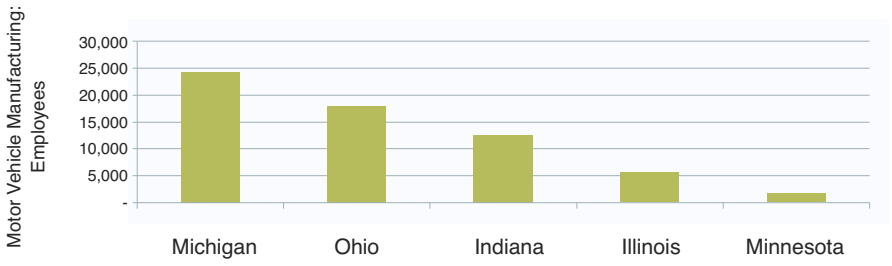
Midwestern states are increasingly at the center of national efforts to reduce oil imports through the manufacturing of cleaner, more fuel-efficient vehicles and through the production of fuels that diversify the nation's transportation fuel mix. While these trends have been driven largely by federal policies, including vehicle emissions standards and renewable fuel standards, Midwestern states host critical agricultural, manufacturing and skilled workforce capacities that position it to lead in the global competition to develop next-generation vehicles and fuels.

In 2010, MGA states were responsible for half of the national GDP generated by the manufacturing of motor vehicles, according to the U.S. Bureau of Economic Analysis. In employment terms, the Midwest accounted for 46 percent of U.S. motor vehicle manufacturing jobs in 2010. Though the recent recession hit the auto manufacturing sector very hard, resulting in significant job losses and declines in production, the industry has rebounded considerably since 2009.



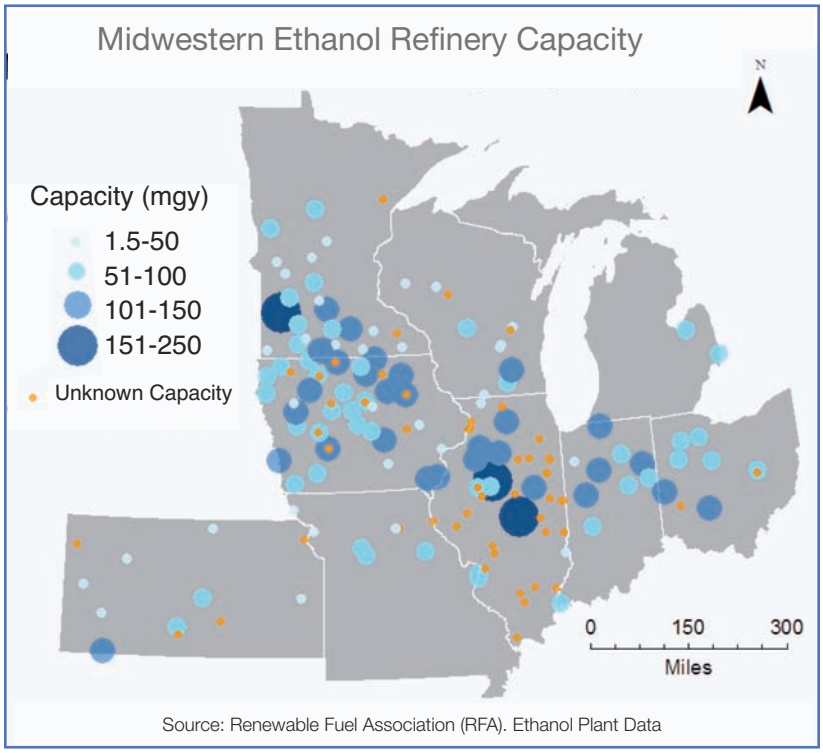
Source: U.S. Census Bureau's Annual Survey of Manufactures

Michigan, Indiana and Ohio still lead the nation in motor vehicle manufacturing. Given the cross-state supply chains for vehicles, significant opportunities exist for Midwestern states as domestic and global markets expand for alternative fuel vehicles, including cleaner-burning natural gas and electric vehicles.



Source: U.S. Census Bureau's Annual Survey of Manufactures

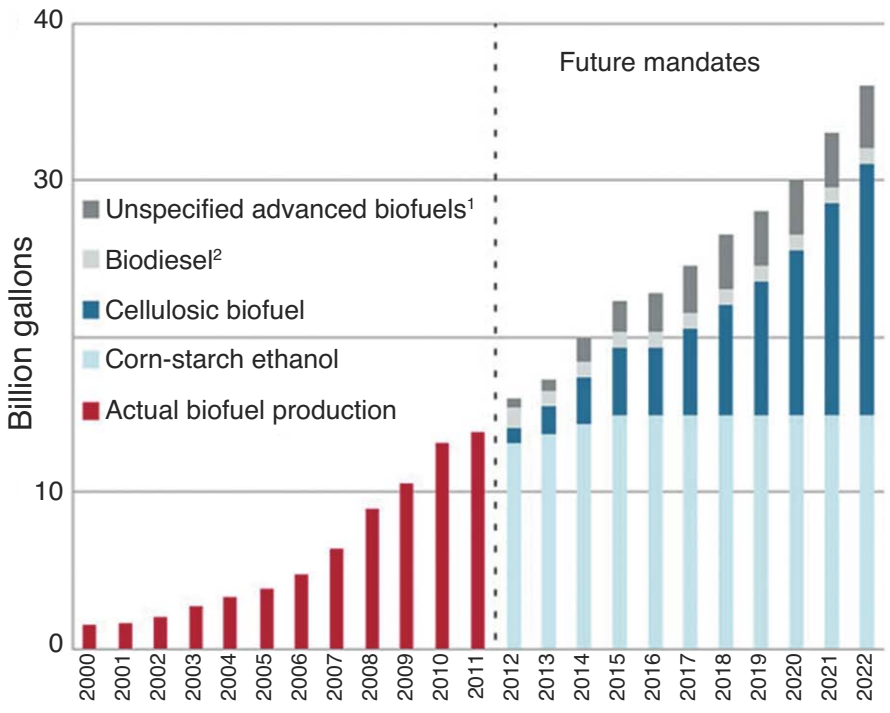
Midwestern states were responsible for 70 percent of U.S. ethanol production in 2009, with Iowa producing almost 30 percent. The foundation for the U.S. market lies with the federal renewable fuel standard (RFS), which requires gasoline and diesel refiners to blend specific quantities of biofuels into their products sold domestically. The vast majority of biofuels being produced today is corn-derived ethanol, which the RFS places a cap of 15 billion gallons by 2015. The federal tax credits for ethanol blending expired at the end of 2011. U.S. ethanol plants are now transitioning to be competitive, but the short-term transition has presented some hurdles. According to data presented at the 2012 Fuel Ethanol Workshop and Expo[17], roughly three-fourths of U.S. ethanol plants either lost money or merely broke even in the first quarter of 2012.



Source: Renewable Fuel Association (RFA). Ethanol Plant Data

[17] The Fuel Ethanol Workshop and Expo was put on by Ethanol Producer Magazine and BBI International in early June at the Minneapolis Convention Center. Source: http://www.startribune.com/business/157370285.html

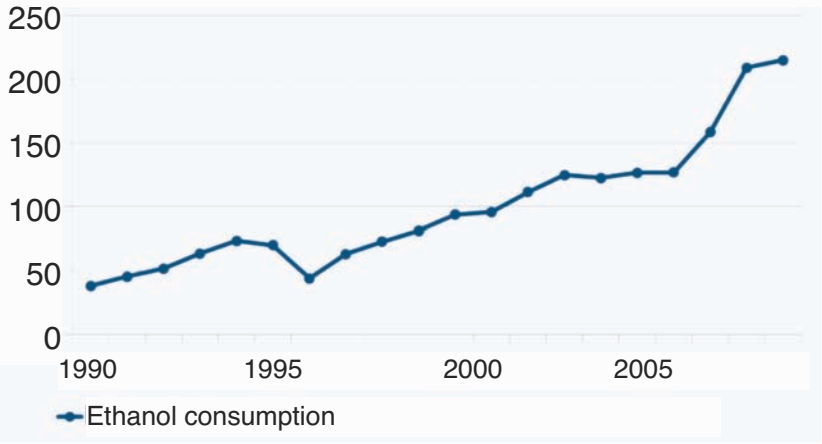
Moving forward, the U.S. biofuels industry will increasingly have to produce a substantial amount of other types of biofuels to meet the federal mandate of 36 billion gallons of biofuels by 2022. This is especially true for cellulosic biofuels, which can be made from wood chips or grasses. Estimated 2012 production of cellulosic biofuel is only 10.5 million gallons, well below the statutory goal of 500 million.[18]



[1]Excludes corn-starch ethanol and could include fuels made from a variety of feedstocks, including grains like sorghum and wheat, as well as Brazilian sugarcane ethanol, biomass-based biodiesel, and biofuels made from cellulosic materials.

[2]Mandates to be determined by the EPA, but will be no less than one billion gallons.

Source: Congressional Research Service



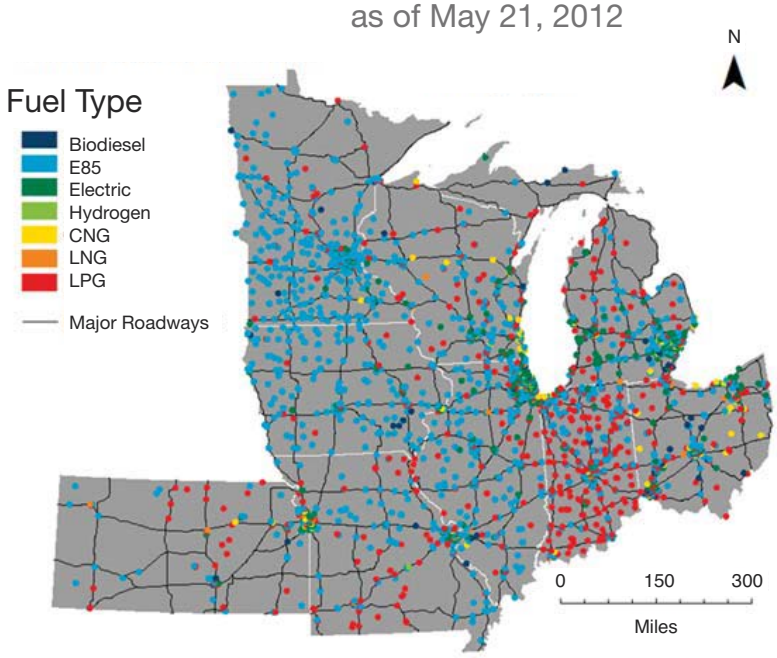
Source: U.S. Energy Information Administration

The region is not just a major producer of biofuels, but it is also a major consumer. In 2010, the nine MGA states consumed 64 million barrels of ethanol, which accounted for more than 21 percent of the total national consumption in the same year.

[18] The U.S. EPA is responsible for administering the program and has the authority to alter annual targets to more reflect volumes that the market is able to realistically produce.

To support the consumption of biofuels and other alternative fuels, the region has a network of more than 3,000 alternative fueling stations, including more than 1,400 stations for biodiesel and E85.

Midwestern Alternative Fuel Stations
as of May 21, 2012



Sources: U.S. Department of Energy, Energy Efficiency and Renewable Electricity's Alternative Fuels and Advanced Vehicles Data Center; U.S. Geological Survey

Options for Cross-State Collaboration

This section summarizes possible areas of collaboration identified by MGA member states via electronic surveys and in-person or telephone interviews. A detailed collection of all input received by MGA member states can be found in Appendix A. This section includes the possible areas of collaboration in the following energy topics:

1. Impacts of a Rapidly Changing Electric Generation Mix
2. Energy Efficiency
3. Transmission
4. Renewable Energy Development, Including Distributed Generation
5. Natural Gas Development
6. Diversifying the Transportation Fuel Mix and Building the Needed Infrastructure
7. Enhanced Oil Recovery (EOR)
8. Energy Technology Investment and Manufacturing

IMPACTS OF A RAPIDLY CHANGING ELECTRIC GENERATION MIX

The implementation of recent and proposed rules from the U.S. Environmental Protection Agency (EPA), combined with an aging coal generation fleet, low natural gas prices and falling prices for some forms of renewable energy, are expected to result in significant changes to the region's electric generation portfolio. Reflecting this reality, every state cited these likely changes in the future electric generation mix as a source of both challenge and potential opportunity for the Midwestern region.

Since 2000, more than 90 percent of new generating capacity has been natural gas and renewables. However, these sources still account for only 10 percent of total generation in the

region. More than 290 coal-fired units are 40 years of age or older. The low cost of natural gas, coupled with the implementation of U.S. EPA rules, could expedite the retirement of many older, smaller and intermediate coal-fired power plants across the MGA region. Coal-plant retirements could result in a switch to natural gas generation.

Options Identified for Focused Cross-State Collaboration

Anticipating changes in electric generation, states suggested areas where they could benefit from cross-state collaboration. Midwestern states face similar decisions for long-term resource planning and share concerns about system reliability, the fuel resource mix in the wake of coal plant retirements and increased natural gas-based electric generation, as well as the cost to ratepayers.

States highlighted the value of information sharing on their planning efforts in the context of future shifts of the Midwestern electric generation mix. States could usefully share information on their respective answers to the following questions:

1. How will a shift in the energy mix impact Midwestern industry involved with electric generation and energy production?
2. How are states addressing coal plant retirements? Where are the coal retirements going to create the most impact and how can Midwestern states address such impacts?
3. What strategies are states using to maintain a diversified energy portfolio (e.g., avoid over-reliance on any particular fuel, such as natural gas)?
4. What strategies are states using to reach state energy policy, economic and jobs goals?
5. How can states work together to make better long-term resource decisions within the broader regional and even national marketplace?
6. What kind of new institutions or partnerships must develop or evolve to address these (above) issues, and what might they look like?

All the parties involved in building, managing and regulating the electric system, including state agencies, utility commissions, regional transmission operators and the Federal Energy Regulatory Commission (FERC), are expressing the desire for a collaborative effort to respond to the U.S. EPA's expected rules. This collaborative effort would ensure that solutions meet long-term state energy needs, while providing a secure regional transmission grid with the proper mix of renewables, gas generation and demand response necessary for concrete problem solving related to the timing and implementation of new air quality regulations. Several states discussed challenges of managing uncertainty around which plants might close, construction contracts and labor demands for necessary plant upgrades, and the future of critical, must-run plants.

ENERGY EFFICIENCY

Energy efficiency was highlighted by most of the MGA states as an important opportunity across the industrial, commercial and residential sectors, as well as for public buildings. These states all identified public buildings as a common priority.

Most of the states also identified industrial energy efficiency (IEE), including combined heat and power (CHP) and waste energy recovery (WER), as strategically important for a range of reasons. The Midwest has strong manufacturing, significant energy production potential and a skilled workforce. Improved energy efficiency can help insulate domestic manufacturers from future spikes by reducing fuel input requirements. The Midwest can communicate these strengths and better coordinate to promote the region (instead of competing within) to attract capital and create more jobs.

Specific interests in IEE vary, but all are rooted in common goals of increasing energy productivity and improving manufacturing competitiveness. IEE rose to the top for many states because of the importance of a strong manufacturing sector to the regional economy, IEE's potential as a compliance strategy for new air quality regulations and because CHP and WER are potential sources for new base load energy generation (in the context of a changing electric generation mix).

Options Identified for Cross-State Collaboration

Specific ideas for cross-state collaboration and desired outcomes include:

1. Share information and best practices on achieving energy efficiency in state facilities and public buildings. This could include experiences relating to energy performance contracting, building benchmarking, tracking energy consumption, managing contracts, implementing employee behavioral change programs and financing state and local government building retrofits.
2. Compare best practices, policies and other tools for advancing IEE. This could include states' experiences with industrial opt-outs and self direct programs; leading state, university, utility and business association programs; inclusion of IEE as compliance strategies for existing and pending U.S. EPA rules; and financing tools that work for industry and cost-effectively attract private financing for IEE projects. States also expressed interest in sharing experiences in removing barriers to CHP and mapping out how CHP could provide baseload generation.
3. Information sharing on how states are using software and information technology solutions to advance energy efficiency programs. For example, an Illinois utility, Commonwealth Edison (ComEd.), put in place a common customer relationship management platform for marketing subcontractors to track approaches implemented by other contractors who are working with industrial clients.

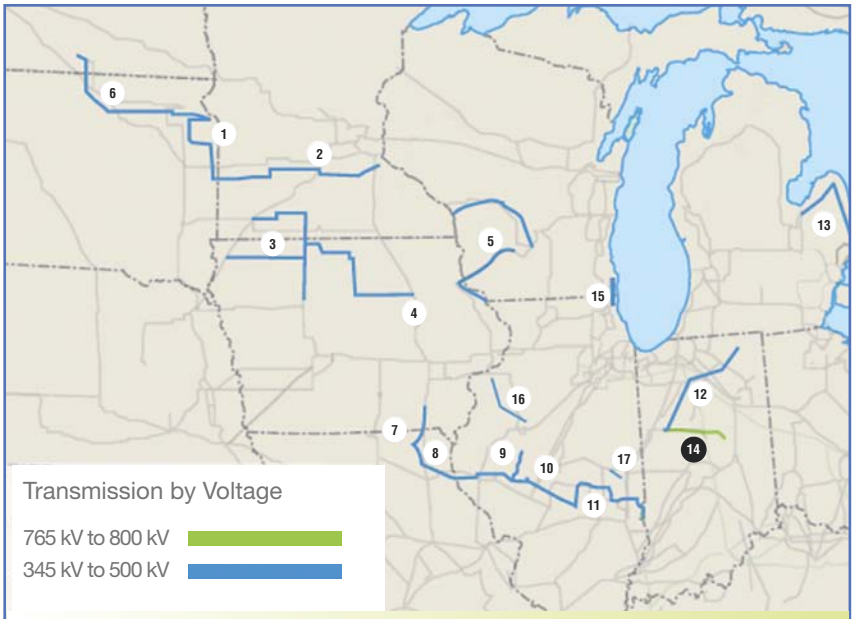
4. Share examples of model programs and creative approaches for energy efficiency financing. What are other states doing to encourage private-sector investments and optimize public investments? What are some examples of innovative financing mechanisms? What metrics do states use to gauge success?

TRANSMISSION

Ensuring that the region has a modern, reliable electric grid for energy distribution is an important, on-going issue for Midwestern states. The build-out of transmission, both within the Midwest and with interconnections to other regions, is essential to meeting the energy demands of residential, commercial and industrial customers as well as connecting new Midwestern energy production. Transmission projects are also an opportunity for many Midwestern states to export energy, create jobs and attract investment in energy infrastructure and production.

The planning and siting of regional transmission lines as well as the distribution of cost for regional transmission projects are issues that Midwestern states are working to address. States in the region have different perspectives on the role of a regional transmission system and the distribution of costs to pay for building this infrastructure.

Several transmission lines have been proposed for construction within the MGA footprint (see MISO map at right for an example).



Proposed Multi-Value Projects

Project Name	State(s)	Voltage
1. Big Store-Brookings	SD	345 kV
2. Brookings-SE Twin Cities	SD/MN	345 kV
3. Lakefield Jct. - Winnebago - Winco - Burt area & Sheldon - Burt area - Webster	MN/IA	345 kV
4. Winco - Lime Creek - Emery - Blackhawk - Hazleton	IA	345 kV
5. N. LaCrosse - N. Madison - Cardinal & Dubuque Co. - Spring Green - Cardinal	WI	345 kV
6. Elendale - Big Stone	ND/SD	345 kV
7. Adair - Ottumwa	IA/MO	345 kV
8. West Adair - Palmyra Tap	MO	345 kV

Project Name	State(s)	Voltage
9. Palmyra - Quincy - Meredosia - Ipava & Meredosia - Pawnee	MO/IL	345 kV
10. New Pawnee - Pana	IL	345 kV
11. Pana - Mt. Zion - Kansas - Sugar Creek	IL	345 kV
12. Reynolds - Burr Oak - Hiple	IN	345 kV
13. Michigan Thumb Loop Expansion	MI	345 kV
14. New Reynolds - Greentown	IN	765 kV
15. Pleasant Prairie - Zion Energy Center	WI/IL	345 kV
16. Fargo - Oak Grove	IL	345 kV
17. Sidney - Rising	IL	345 kV

MISO

Options Identified for Cross-State Collaboration

The MGA is currently working to address transmission-related issues including cost allocation, siting and resolving "boundary issues" with neighboring regional grid operators so that states can realize their economic development potential from power generation (e.g., renewables).

RENEWABLE ENERGY DEVELOPMENT, INCLUDING DISTRIBUTED GENERATION

Renewable energy development was an issue identified at some level by all MGA states. For example, many states see opportunity in improving the supply chain for renewable energy manufacturing, especially in the face of growing foreign competition and the potential loss of federal tax benefits. The issue of distributed generation, defined as small-scale electricity generation (less than 10 megawatts) that is connected to the distribution system, rose to the top among states as an area ripe for cross-state collaboration.

Options for Cross-State Collaboration on Distributed Generation

Specific ideas for collaboration on distributed generation include:

1. Information sharing on lessons from other states in developing and implementing distributed generation policy. What are some of the lessons learned or best practices related to interconnection standards and permitting projects? How can incentives for distributed generation be created within existing state renewable portfolio policies? What has been the impact of distributed generation policy? Identify best practices and standardize policies and regulatory practices across states.
2. Opportunities for increasing renewable energy manufacturing. A number of states have been researching and supporting the build out of robust, state-specific and regional renewable energy supply chains. Many states have strength in solar, wind, advanced battery and other renewable energy businesses. Information sharing across states on this topic could be beneficial.
3. Minnesota has been facilitating a stakeholder process to examine changes to existing net metering policy. Other states could benefit from the input gathered through this process. A group of stakeholders in Illinois has been examining solar and distributed generation carve-outs and different generation tiers within state renewable renewable portfolio standards and could have useful information for other states.

Additional areas identified for cross-state collaboration relating to renewable energy generation include:

1. Increasing penetration of renewable energy in existing markets and developing access to new markets. The MGA's on-going work to improve the region's transmission system will improve access to existing and new markets, but there may be other issues that interested states could work on together that would further improve market access.
2. Compare definitions of renewable energy in the region. Review and compare renewable energy definitions across Midwestern states to identify different types of generation that could qualify for renewable energy credit trading among states.

NATURAL GAS DEVELOPMENT

Midwestern states are involved in different aspects of natural gas development, transport and storage. The recent increase in the domestic natural gas resource potential brings both economic opportunity and potential challenges to the region.

Options Identified for Cross-State Collaboration

Several states discussed opportunities for cross-state collaboration related to natural gas development. States suggested sharing information within the Midwest and gathering information from other regions with experience on natural gas development on a range of issues, including:

1. Economic and workforce development. States can share information and generate strategies on how the region's economy and workforce can benefit from natural gas development.
2. Infrastructure development (e.g., pipelines and storage). A few states and regional stakeholders are already identifying ways to coordinate infrastructure development. A regional transmission operator, MISO, is an example of multi-state coordination and energy infrastructure planning.
3. Regulatory development. Midwestern states can learn from other states that have natural gas development experience, both within and outside the region. Ohio, in particular, highlighted the opportunity to learn from other states, business experts and regulators' experience in states with more mature natural gas development industries.
4. Local impacts (e.g., sand mining). Midwestern states can learn from each other about how states are working with local communities on topics such as sand mining for hydraulic fracturing.

DIVERSIFYING THE TRANSPORTATION FUEL MIX AND BUILDING THE NEEDED INFRASTRUCTURE

Transportation is an important issue for all Midwestern states, but areas of interest and specific strategies to address future transportation challenges vary from state-to-state. The current transportation issues identified by MGA states fall under electric vehicles (EVs), renewable fuel development and compressed natural gas (CNG) vehicles. Each of these transportation areas requires some level of additional infrastructure to deploy the alternative vehicle technology.

Options Identified for Focused Cross-State Collaboration

1. How are states approaching alternative transportation fuels? How are states addressing the issues of infrastructure deployment, technology manufacturing, and rules and regulations related to alternative fuels? Data collection on infrastructure deployment for alternative fuels.

2. Map alternative transportation infrastructure corridors (CNG and EVs). Identify pilot projects in different cities for making connections to alternative fueling infrastructure. Will the efforts that are currently underway add up to a coherent refueling infrastructure at the end of the day? How are states assessing consumer demand for alternative fuels/vehicles? Identify gaps between demand and alternative transportation deployment.

3. Information sharing. What specific steps are states taking to prepare for the arrival of EVs? Examples include types of charging stations installed or planned, software to assist consumers with locating public charging stations and rebate programs to drive adoption.

4. Sharing best practices and addressing barriers to future biofuels development. This might mean taking a regional approach to biofuels infrastructure development, sharing ideas about how best to increase penetration of biofuels in existing markets and developing access to new markets. Share approaches and best practices for removing barriers to increased biofuel blends such as encouraging the implementation of E15 and B20.

5. Increase collaboration and develop regional branding for biorenewables. Several state universities are engaging in biorenewable research (biofuels, biobased products, biobased chemicals) and it would be helpful to share information about specific bio-related research initiatives and link research initiatives in the region. Branding regional bio resources could provide access to new markets for biorenewables produced in the region.

6. Explore opportunities to enhance the alternative vehicle manufacturing supply chain. The current vehicle manufacturing supply chain is regional and parts of the alternative vehicle manufacturing supply chain are already developing in different states.

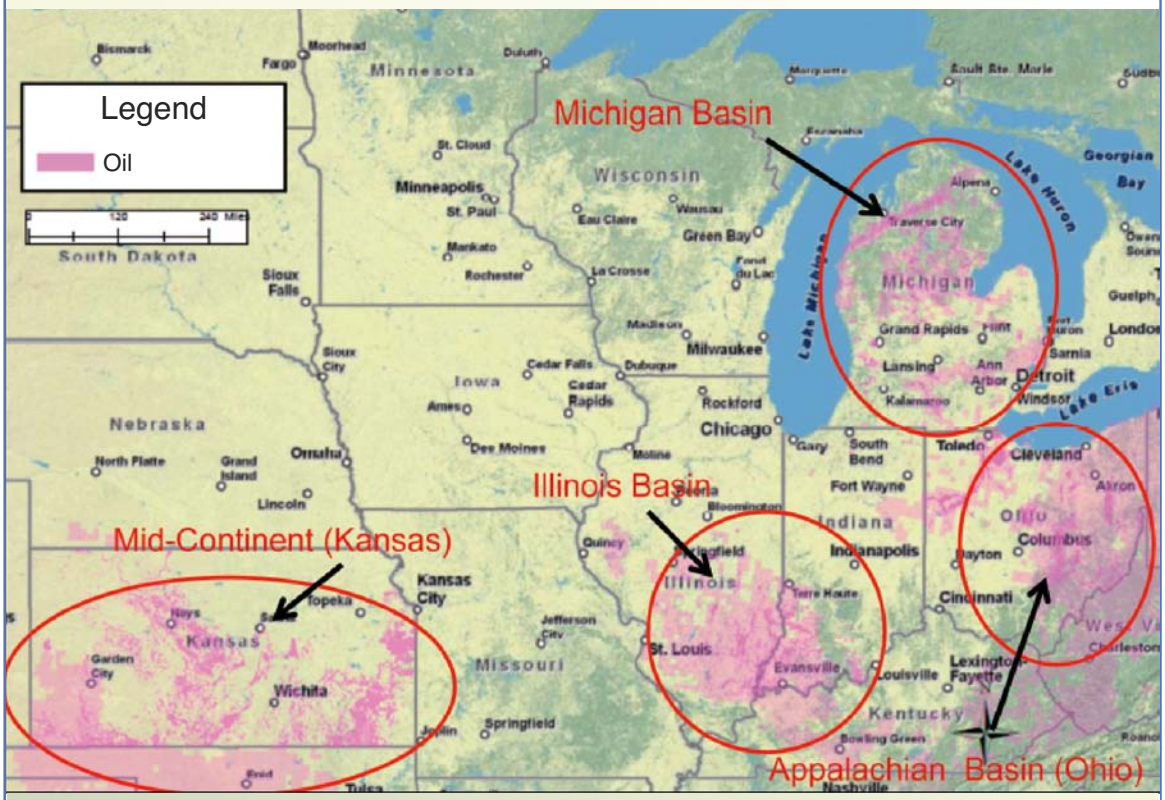
ENHANCED OIL RECOVERY

Deployment of infrastructure and technologies for enhanced oil recovery (EOR) will contribute to Midwestern leadership in increasing domestic energy production.

Through EOR, the Midwest can translate its emissions from a range of industrial sources into a domestic energy security solution that also yields environmental benefits. EOR provides a pathway for the Midwest to produce more domestic oil, create high-paying jobs and develop expertise in key energy technologies.

Previous regional efforts on EOR provide a significant resource for states to draw upon moving forward, including policy ideas, EOR potential studies and analysis.

EOR Potential in the MGA Region - Oil and Gas Basins



Source: Clinton Climate Initiative in collaboration with the MGA and the Great Plains Institute

ENERGY TECHNOLOGY INVESTMENT AND MANUFACTURING

Midwestern states are keenly focused on attracting investment, creating and sustaining jobs, and fostering a thriving economy. The Midwest has opportunities to attract additional investment, particularly in the area of venture capital. States are working to identify how to attract and foster investment in energy from within and outside their states. For example, Minnesota is working with angel investment firms and private equity firms to gain a better understanding of capital shortfalls. Illinois is looking at how the regulatory framework for small banks can support investment in small business involved in advanced energy technology.

Options Identified for Focused Cross-State Collaboration

1. State Small Business Credit Initiative. How are MGA states making use of this credit? Are states using other approaches to support energy entrepreneurs?
2. Regional marketing and branding to make the Midwest region an energy and bio hub. The Midwest needs to market the region and our significant energy assets. This could tie into MGA's current effort to renew the Midwestern brand.
3. Workforce development: What best practices can states learn from each other on workforce development to better align educational training with the skills the energy production industry needs?
4. Commercialization research and technology centers. States have expressed interest to learn from other states that have been successful at moving research from the university into commercialization.
5. Identify ways to attract more venture funding into the region. How do you extract intellectual property from universities to make it attractive to venture capitalists?
6. Strengthening the supply chain. Identify which industries are involved in energy-related manufacturing, particularly those that are less known but have a large impact (e.g., component parts) and discuss how states can support those industries across the region.

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