

BARRIERS TO ADVANCED ENERGY IN MICHIGAN

Executive Summary





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The global energy system is undergoing a dramatic transformation. Consumers, for the first time in history, have meaningful choices in how they power, heat and cool their homes and businesses, as well as a broader range of transportation options.

Energy efficiency measures and advanced energy management systems are reducing energy costs at homes and businesses while improved industrial processes are cutting energy intensity. A modernized grid, powered by renewable energy and electric storage and offering customers more control over where they get their energy and how it's used, can dramatically reduce outages, hold electricity prices in check, and offer greater adaptability to accommodate future energy developments. Electric transportation is nearing a market inflection point, and the total cost of ownership for electric vehicles is already below traditional vehicles using internal combustion engines.

In short, advanced energy systems, defined as the “broad range of products and services that constitute the best available technologies for meeting energy needs today and tomorrow,” provide the opportunity to create not just a cleaner, lower carbon energy system, but a better one.

Despite these advantages, the path forward has many potential pitfalls. Utilities that have served society well for nearly a century delivering safe, reliable and affordable power are confronted with sudden and unanticipated challenges. Flat or declining electricity sales, escalating fossil-fuel costs, environmental regulations and aging infrastructure are reducing revenues and putting upward pressure on energy costs just as new energy products, services and business models are increasingly being integrated into wholesale and retail energy markets.

To effectively address these dynamic changes, Michigan market participants and policy leaders must overcome a number of barriers that stand in the way of unlocking the economic benefits of an advanced energy future. Identifying those barriers, understanding why they exist, and determining how they relate to one another will help policymakers, communities, business leaders, and investors develop strategies to surmount these barriers in order to take full advantage of the many benefits of advanced energy deployment.

Some of the most pressing barriers include:

TRANSACTIONAL BARRIERS, including a lack of uniformity in permitting and interconnection and limited use of business models that could accelerate deployment;

ORGANIZATIONAL BARRIERS, including the need to overcome corporate separation between energy managers and financial operations managers, as well as challenges in integrating advanced energy within organizational processes;

ECONOMIC BARRIERS, such as disincentives for new technologies and business models, differences in tax treatment between different technologies, access to capital, and lack of financing for improvements requiring significant up-front capital outlays;

UTILITY BARRIERS, including rate and tariff designs that incentivize the status quo and limit innovation

POLICY BARRIERS, such as statutory limitations on deployment, uncertainty about future requirements, and definitional issues that fail to consider emerging technologies;

TECHNOLOGY BARRIERS relating to the gap between the current state of technology and what's necessary to be cost competitive; and

NETWORK, COMMUNICATION, AND EDUCATIONAL BARRIERS, including a lack of data availability to assist in the development of new business models and limited awareness among the public around the benefits of advanced energy deployment.

Overcoming these barriers is critically important to encouraging advanced energy in three key areas:

- Reducing energy waste in Michigan, including maximizing energy efficiency and improving the energy intensity of Michigan's industrial sector, and the state economy as a whole;
- Modernizing electric generation and delivery, including moving to replace Michigan's aging fleet of coal-fired power plants with cleaner, more cost effective renewable energy and energy storage technologies while improving the reliability of electricity distribution grids; and
- Electrifying transportation, including much broader adoption of electric vehicles, as well as building out the infrastructure necessary to support this transition.

Such a future holds numerous advantages for Michigan. First, as Michigan struggles with electricity prices significantly above the national average and the highest in the Midwest, advanced energy technologies are now cheaper than conventional electricity generation technologies. Conserving energy remains the most economically efficient option available, and in Michigan, as well as many other states, wind energy is now the least expensive generation resource available. Long-term economic trends are shifting significantly in favor of these advanced energy technologies and the economics of "fuelless" renewable energy sources are likely to become even more favorable as innovation, scaling, new materials and advanced manufacturing processes continue to improve performance and reduce costs.

As a result, firms are increasingly investing in advanced energy projects to meet their operational needs. Large energy users are building utility scale wind and solar farms to power energy intensive facilities like data centers and server farms while retailers are finding solar PV systems increasingly cost competitive. In 2013, 60 percent of the Fortune 100 companies - and 43 percent of Fortune 500 firms - had set renewable energy, energy efficiency, and GHG reduction targets. As of April 2014, more than 500 U.S. businesses derived 100 percent of their electricity from clean energy sources, including six based in Michigan.

The combination of these rapid cost declines, advances in technology, growing consumer demand for advanced energy options, and innovations in energy business models, energy finance and policy has resulted in an explosion of renewable energy deployment. The amount of wind energy deployed in the United States tripled between 2008 and 2012, and as President Obama remarked in the 2015 State of the Union address, "every three weeks, we bring online as much solar power as we did in all of 2008". Innovative energy products and services are also being introduced into energy markets in ways that lower energy demand, shift energy loads, improve power quality, strengthen the grid, and store intermittent energy from wind turbines and solar energy.

At the same time, the disruptive effects of climate change from fossil fuels are lending urgency to the need to transition to energy sources with lower carbon profiles. Climate science is stating with greater certainty that unless we substantially reduce global greenhouse gas emissions in the coming decades, future temperatures will exceed 2°C. The recently released National Climate Assessment indicates that climate changes are already apparent in Michigan and that the Great Lakes Region is likely to experience temperature increases well in excess of 2°C by mid-century.

Add to these factors a growing concern over the economic risks of conventional fuels, the looming threat of large-scale stranded economic assets, and national security considerations tied to our current energy mix, and it's clear that the status quo in energy must be transformed.

Fortunately, Michigan is well placed to prosper in a world transitioning from the fossil-fuel based energy sources of the 20th century to the advanced energy technologies that will power the century ahead. Currently, Michigan imports 97 percent of our transportation fuels, 82 percent of our natural gas, and 100 percent of our coal and nuclear fuels, and spends \$22.6 billion each year on energy imports.

A transition away from these imported fuels to an energy system built on manufacturing and innovation plays much more favorably to Michigan's strengths in advanced manufacturing, engineering, and materials science, the state's world class universities, colleges and research facilities, and its skilled labor force and training facilities. These strengths position Michigan to lead in producing and deploying the advanced energy technologies that global markets are demanding. Manufacturing related to biomass, energy storage, solar and wind contributes \$4.9 billion each year to the Michigan economy, while manufacturing of energy efficiency products adds an additional \$2.3 billion in annual economic activity⁸ - a total annual economic impact of \$7.2 billion from advanced energy manufacturing alone. Opportunities to expand global markets for these Michigan manufactured goods provide real opportunities for the Michigan economy.

Finally, communities across the state are taking the lead in pioneering innovative approaches and developing solutions to unlock advanced energy in Michigan. These include:

- Wind development in Gratiot County, and how proactive zoning and community engagement has helped spur economic benefits for local residents
- The "Battle of the Buildings" competition organized by the West Michigan chapter of the U.S. Green Buildings Council, which has businesses compete to reduce the energy consumption of their buildings
- How the City of Battle Creek partnered with an energy services company to use performance contracting to reduce energy costs
- An innovative energy efficiency loan program organized and administered by the Traverse City Area Chamber of Commerce
- How district energy and combined heat and power are saving both energy and money for Grand Rapids Community College and Oakland University
- A community energy plan developed in the Keweenaw that aims to tackle high energy costs through energy efficiency and distributed electrical generation
- The Michigan Public Service Commission's use of Property Assessed Clean Energy to finance improvements to its new headquarters
- The City of Auburn Hills' Electric Vehicle Ready Project, which aims to use zoning and building codes to encourage EV ownership
- Smart Grid collaborations between the private sector, universities and the federal government, organized by Detroit-based NextEnergy

Learning from these best practices and understanding how local efforts are overcoming the various barriers to advanced energy are key elements in seizing the opportunities that advanced energy can deliver for the state.

Whether it's addressing high energy costs, hedging against long-term price risks, or working to address how global climate change will affect the state, Michigan has much to gain from a transition to advanced energy technologies and much to lose if it fails to take action. An energy system in transformation is latent with both opportunities and challenges.

Notably, while this report focuses primarily on barrier identification and does not fully identify solutions, each of the three areas of focus - reducing energy waste, modernizing electric generation and distribution, and electrifying transportation - concludes with a series of recommendations for overcoming the various barriers identified. Some of these recommendations include:

REDUCING ENERGY WASTE It is estimated that 59 percent of primary energy consumed is wasted. Among the recommendations to reduce energy waste:

- Increase Michigan's natural gas and electric energy optimization standard and eliminate the cap on utility expenditures for energy optimization programs.
- Recognize demand response and energy efficiency as energy system resources, allowing full participation in energy markets.
- Expand financing options for energy upgrades, including Property Assessed Clean Energy (PACE), on-bill financing (OBF) and on-bill repayment (OBR) programs, revolving loan funds, credit enhancements, performance contracting, and other tools.

MODERNIZING ELECTRIC GENERATION AND DELIVERY Michigan spends \$22.6 billion annually on energy imports. Recommendations to reduce this expenditure include:

- Increasing Michigan's renewable portfolio standard, setting new medium-term and long-term targets for advanced energy at levels equal to leading states.
- Establishing a comprehensive, adaptive process for forecasting Michigan's future electric demand and assessing electric generation technologies taking into account capital, operating and fuel costs, environmental concerns, anticipated regulations, and the adoption of distributed energy resources by utilities and end users.
- Allowing distributed energy resources to compete head-to-head with conventional resources; create a level playing field for all energy resources and energy services by limiting fees and charges associated with interconnection, standby services, load firming, and other administrative costs
- Enabling individuals, businesses and industries that want to obtain a greater share of their energy from renewable energy sources to be able to do so.

ADVANCED ENERGY IN THE TRANSPORTATION SECTOR Electrifying transportation would fortify U.S. national and energy security while taking advantage of Michigan's many strengths in the auto sector, providing opportunities for higher-skilled, better paying jobs in advanced manufacturing. Recommendations include:

- Policies and incentives that accelerate electric vehicle penetration and the availability of electric vehicle supply equipment (EVSE).
- Collaborations between Michigan automobile manufacturers, advanced energy storage companies, and universities and national laboratories to develop next generation energy storage technologies, control systems and power electronics for electric vehicles.
- Support for vehicle to grid (V2G) and vehicle to home (V2H) technologies to integrate electric vehicles into the smart-grid and to provide ancillary services and demand management capabilities.

The intent behind these recommendations - and indeed, behind the report as a whole - is to identify the areas where business innovation, policy intervention, education, and consensus building efforts should be directed.

Ultimately, deployment of advanced energy at scale is critical to Michigan's long-term prosperity and intergenerational equity - providing future generations with a livable, sustainable world. Transforming Michigan's energy system will yield a broad array of economic and other benefits. Optimizing Michigan's legacy strengths, catalyzing innovation, supporting new energy business and financial models, and building consensus on advancing the right policies, are imperatives to move Michigan forward. Removing the roadblocks is the first step.

Funding for Barriers to Advanced Energy in Michigan was provided by the C.S. Mott Foundation with additional financial support from The Energy Foundation. The Institute for Energy Innovation contracted with 5 Lakes Energy for the development of this report. Barriers to Advanced Energy in Michigan was published in January 2015.