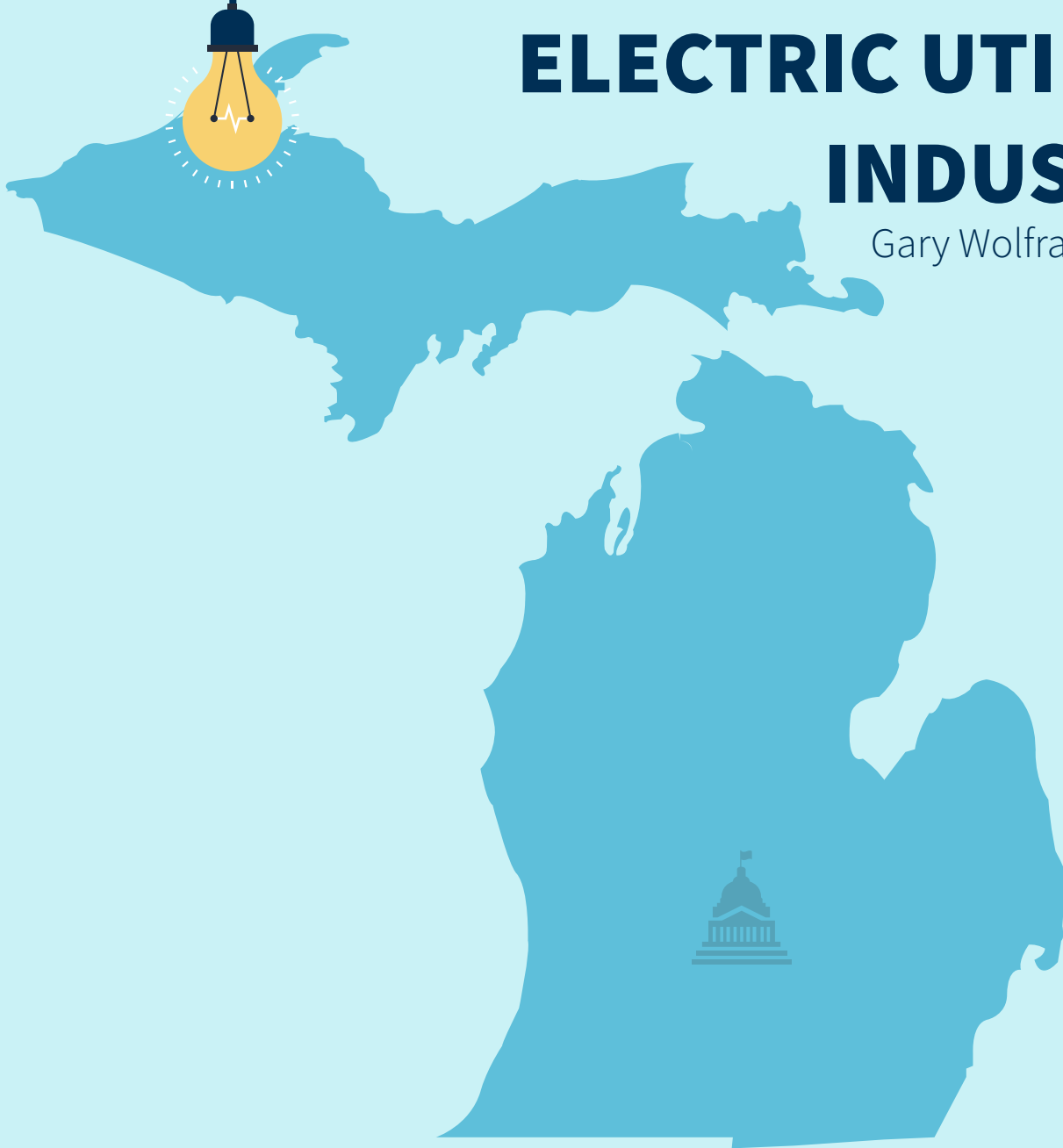


IMPROVING MICHIGAN'S ELECTRIC UTILITY INDUSTRY

Gary Wolfram, Ph.D.



ABOUT THE AUTHOR:

Gary Wolfram is President of Hillsdale Policy Group, Ltd, and the William E. Simon Professor of Economics and Public Policy and the Director of Economics at Hillsdale College. He is the author of *A Capitalist Manifesto: Understanding Market Economy and Defending Liberty*, and has published numerous works on public policy issues. He has served in several policy positions, including Michigan's Deputy State Treasurer, member of the Michigan State Board of Education, President of the Board of Trustees of Lake Superior State University and Congressman Nick Smith's Washington Chief-of-Staff. Dr. Wolfram received his Ph.D. in Economics from the University of California at Berkeley and has taught at the University of California at Davis, Mount Holyoke College, Washington State University, and the University of Michigan at Dearborn.



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I. INTRODUCTION

The electric utility market has some defining characteristics that set it apart from what one thinks of when discussing a market-based economy. The most important of these is that it developed as a regulated monopoly, thus creating certain inefficient incentives for both producers and consumers. Because of the barriers to entry, electric utilities that deliver the power to the customer do not respond to the marketplace in the same way that producers in a competitive market do.

In most cases government intervention in a market will cause unintended consequences that result in a state of the world that is inferior to what would be the case if individuals and firms were allowed to operate according to their own plan. However, the **electric utility industry as structured today can be improved by government activities that require the providers and distributors of electricity to undertake certain actions that make them more responsive to consumer demand** and that move the industry towards competition. Indeed, legislation is being considered that would attempt to address the inefficiencies in the current incentive structure.

Most Americans are aware that **Thomas Edison** developed the light bulb, but not nearly as many are aware of the battle between the use of direct current and alternating current in the generation and distribution of electricity. In the late 19th century there was a battle between direct current and alternating current, which was won by the alternating current. Direct current basically required generators to be close to the distribution point, whereas alternating current is based upon larger generation and higher voltage.



Nikola Tesla

THE CURRENT WAR

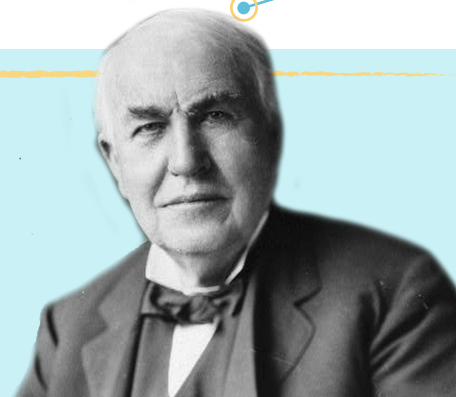
Alternating Current **VS.** Direct Current

WINNER

Alternating Current

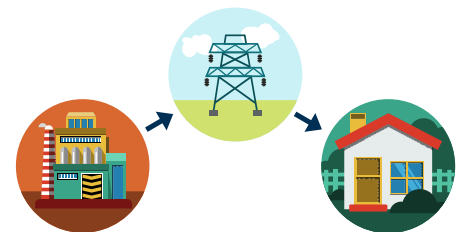
REASON

Direct current basically required generators to be close to the distribution point, whereas alternating current is based upon larger generation and higher voltage.



Thomas Edison

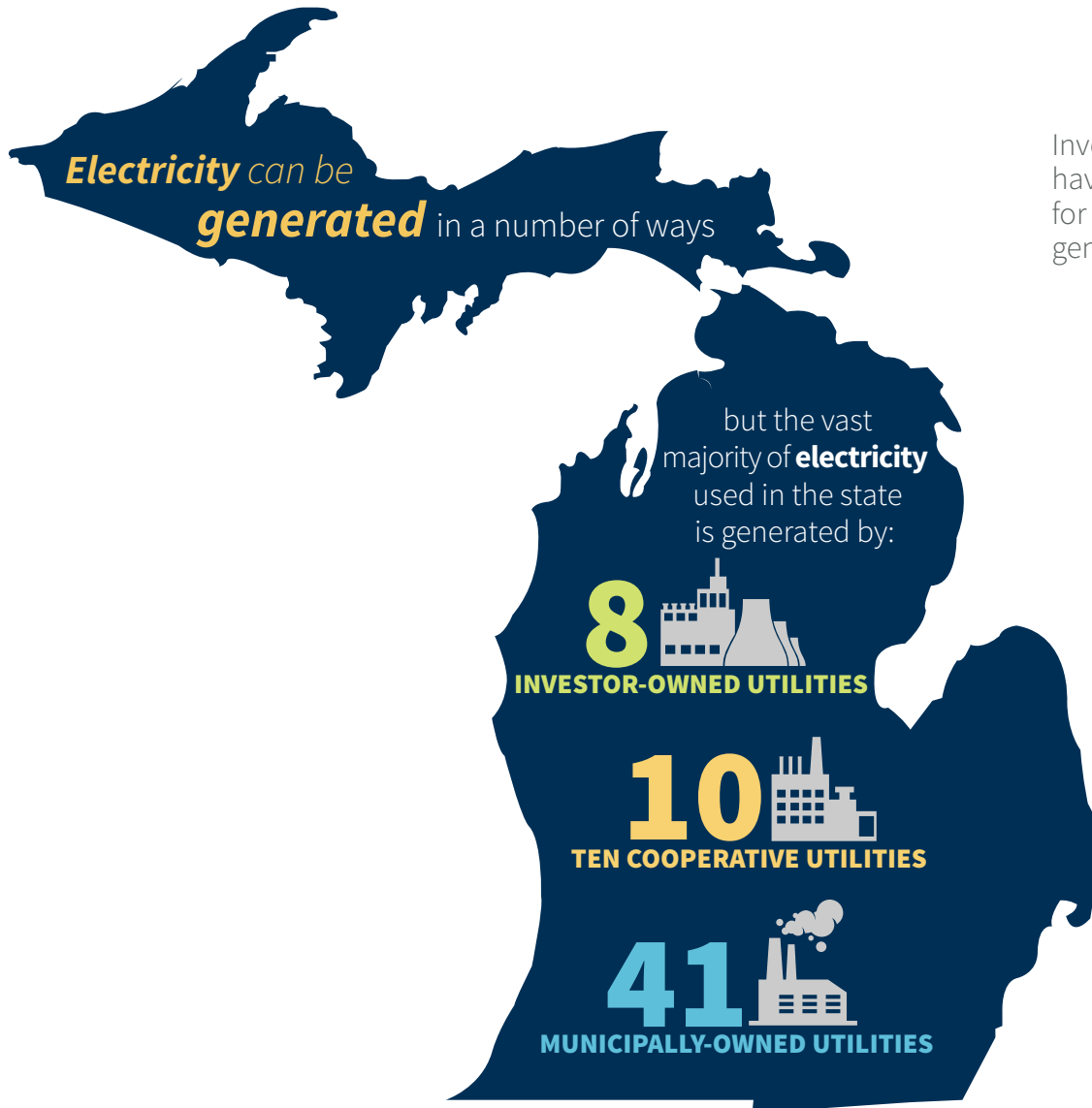
While the details of the “current war” are interesting, the main point is that it became economically efficient to have large generating facilities. Combined with the opposition to having lots of different electric lines distributing power from various companies, the electric utility market became a regulated monopoly, with only certain companies being allowed to generate, transmit and distribute electricity.



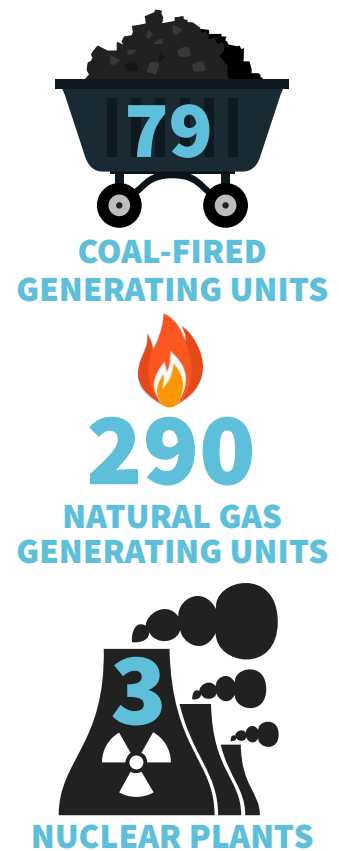
While it was long held that electricity was a “natural monopoly” due to the unique characteristics of generation and distribution, innovations in generation, transmission and distribution have resulted in the ability of the industry to become competitive and the theory of regulation has developed to point out the **inefficiencies in the incentives** of companies that are **regulated monopolies**.

While one might reasonably ask the equivalent of the question: “If it ain’t broke, why fix it?” regarding the current state of the industry, **the fact that electricity costs in Michigan are significantly higher than in surrounding states should spur the Legislature** and the Michigan Public Service Commission to examine ways in which Michigan’s market can become more efficient. Those who are reluctant to place regulations on the firms that generate and distribute electricity should keep in mind that these firms did not gain their market position by outcompeting other firms. But rather through government regulation itself. Since electricity is a direct or indirect input into a major portion of the state’s economy, reductions in energy costs will result in greater economic activity as well as benefits to the state’s producers and consumers.

II. BRIEF DESCRIPTION OF THE ELECTRIC UTILITY MARKET



Investor-owned utilities produce or have power purchase agreements for approximately 85% of power generated in the state. There are...



Electricity is transported through transmission lines at high voltage from the generating plants to substations near the end consumer. It is transmitted at high voltage to reduce the loss that occurs in transmitting the electricity. The substation brings the voltage down to a level that can be used by the consumer. The electricity is then distributed to consumers.

Historically the generation, transmission, and distribution of electricity was a vertical monopoly, that is, the generating utility also transmitted the electricity and distributed it to its customers. Consumers of electricity were not free to purchase electricity from alternative producers. As other industries, such as telecommunications and the airline industry, were deregulated, the Federal Energy Regulatory Commission gradually moved to separate the transmission and generation of electricity. In 1996, Order 888 effectively required utilities to functionally separate generation and transmission by either divesting their transmission lines or forming a separate corporate affiliate for the transmission of electricity.

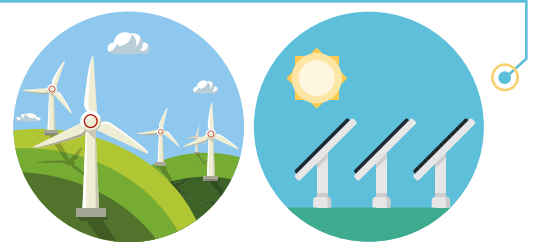
In Michigan electricity is transmitted through a number of transmission companies that are separate from the companies that generate and distribute electricity. The transmission of electricity in Michigan and throughout the upper middle of the US is overseen by Midcontinent Independent System Operator (MISO). This is what is known as a Regional Transmission Organization (RTO) that ensures the interconnection and reliability of the transmission system. Another RTO, PJM Interconnection serves a portion of southwestern Michigan.

The Michigan electricity industry remains basically a regulated monopoly. While the transmission of electricity has been separated from the generation and distribution of electricity, the distribution of electricity generally remains with the generator. For example, DTE generates electricity and also retails it to customers in its area and owns the lines that move from the substation to the customer. The obvious economic incentive for DTE is to use its distribution system to favor the company's generation.

In 2000, the legislation was passed that effectively opened up the retail market to competition by allowing customers to purchase electricity from a firm other than the generator that owned the line from the substation to the customer. This opened up the wholesale market as well, since a customer might purchase electricity from another generator, or wholesale firms might purchase electricity from a generator and retail it to the consumer. For example, a customer might purchase electricity from a firm that purchases power from a generator in another state with lower costs of generation and retails it in Michigan. For this to occur, of course, requires the utility that controls the line to the consumer to make available its distribution system to other generators and wholesalers.

In 2008 legislation, PA 286, was enacted that limited the loss of customer base for DTE and Consumers to 10%. Once these investor-owned utilities have lost 10% of their customer base, any customer that wishes to switch to another electricity retailer must get on a waiting list. This, obviously, severely limits the power of competition to provide consumers with the electricity at the lowest price.

Michigan does have modest provisions for market access by renewable generation. PA 295, also adopted in 2008, requires 10 percent of electricity to be generated by renewable sources, **such as wind and solar power, by 2015.** It further requires that at least half of that renewable generation be purchased from independent power producers. Most observers believe this requirement was successful in bringing specialists in renewable generation to Michigan and using competition to drive down costs. Since utilities have met this requirement, there are no provisions in Michigan law for further market access by such independent producers.



In addition, PA 295 established **“net metering”** for utility retail customers with on-site renewable generation systems, subject to a number of limits on system size and level of participation. Most Michigan utilities have only a few customers participating because the terms of participation are unfavorable for commercial customers and solar, the primary technology for net metering, is just becoming cost-competitive in Michigan. However, the participation caps are likely to be reached within a couple of years for some Upper Peninsula utilities where rates are high, making net metering financially attractive.

III. INEFFICIENCIES INHERENT IN THE ELECTRIC UTILITY INDUSTRY IN MICHIGAN

A fundamental point of economic theory is that people and firms respond to incentives. It is important to think through the incentives of regulated monopolies, such as the electric utility industry, and determine whether the result will be an efficient allocation of resources and what action can be taken to improve these incentives.

First, because the regulated monopoly has governmentally imposed barriers to entry, the economy is burdened by a misallocation of resources. Resources remain in their current use or are unused instead of flowing into the industry that earns monopoly profits. For instance, in the face of high electric rates we would normally expect resources to enter that market, increasing supply or using more efficient means of production. This is not fully possible in Michigan due to governmentally-produced barriers to entry and so rates remain higher than otherwise would be the case.

Second, there is a reduction in entrepreneurial activity and innovation, as it is not possible for someone who takes on the risk of innovating to capture the benefits of such innovation. Since the utility generating the electricity owns the access lines to customers, **there is little or no incentive to allow competitors to have access to its customers.** As a consequence, entrepreneurs have little incentive to take on the risk of innovating and developing alternative or less expensive means of generating electricity. As an example, an entrepreneur may wish to take on the risk of developing a new solar power panel that is more effective than those in current use, but if she cannot have access to customers then she is unlikely to undertake such a venture.

Third, regulated monopolies are subject to what is termed “regulatory capture,” in the public choice literature. In a famous body of work, **Nobel Laureate economist George Stigler pointed out that the regulated companies have strong incentives to craft regulation that is in their favor**, while the general public is what is called “rationally ignorant” in that it has little or no incentive to be informed about or monitor regulations. As a consequence, despite attempts to set up a regulatory agency that is transparent and independent, the regulated firms are likely to have considerable influence in what regulations are enacted. The fact that the regulatory body is often reliant upon the regulated firms for information on costs of production, feasibility of methods of production, etc., makes it difficult to eliminate all forms of regulatory capture. This problem can apply to both administrative bodies and legislatures.

Fourth, because utilities are awarded rates based upon the concept that they will be able to recover their costs including an authorized rate of return, combined with the inability of their customers to seek other providers, **there is certainly a dampened incentive to produce electricity in the most cost efficient manner or to quickly adopt new technologies.** The authorized rate of return is intended to reflect market rates for capital, but is set by regulators who are subject to regulatory capture. If the authorized rate of return is too large, the utility is incented to invest in excess of the needs of its customers ¹, a phenomenon that is common in electric utilities.

Fifth, when there are regulatory barriers to entry firms may use resources directly in an attempt to overcome the barriers (and by utilities to defend them). These resources are used less efficiently than would otherwise be the case when firms can simply enter the industry. For example, an **independent power producer may face significant legal costs and delays in getting a fair price from monopoly utilities who control access to customers.**

Sixth, it is difficult for the average consumer to estimate the benefits and costs of actions that reduce electricity usage, such as purchasing a new water heater that uses less electricity than the existing one, and **there is little incentive for the utilities to encourage their customers to conserve electricity since that would reduce their revenue.** Energy service companies assist firms and households in undertaking measures to reduce the consumption of electricity.

When there is a strong market with competition, there is an incentive for these firms to find new and innovate ways to reduce energy consumption.

Monopoly utilities have an incentive to control information and access to customers to block market activities of energy service companies. Further, the inability of competing alternative energy suppliers to jointly offer power and efficiency programs stands as a barrier to on-bill and other more economically efficient financing as well as to guarantees of results from energy efficiency.

Seventh, another feature of the industry is that the generation of electricity must be capable of meeting peak-load demand. There would be brown-outs and black-outs if, for example, the demand at its daily peak were 5000 kw and the generating capacity were only 4000 kw. If electricity usage would be spread out during the day rather than at peak periods, the generating capacity could be smaller, reducing the cost of generation.

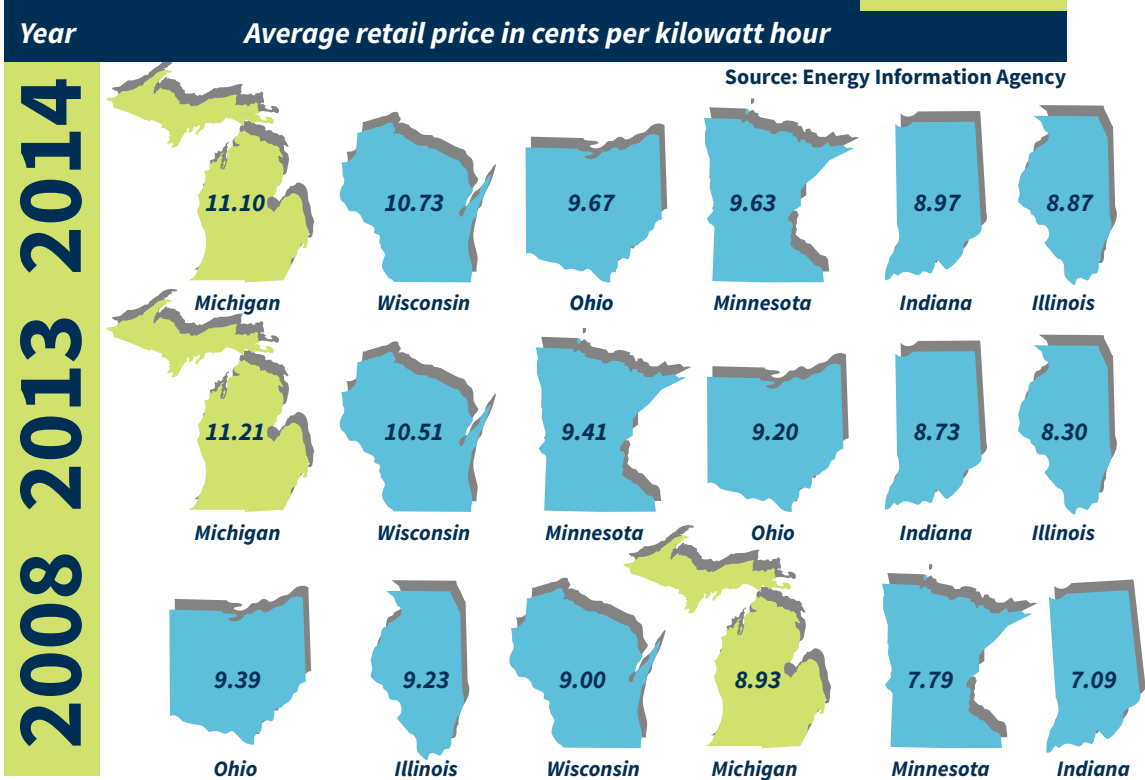
However, there is little incentive for the utility to encourage consumers to alter their utility usage to reduce peak-load demand. In fact, since a higher than peak load requires greater generating capacity on which the utility can receive a rate of return, a utility may be incented to resist peak-load demand reduction. If consumers are provided an incentive to move their usage to off-peak load times the resources used up to provide electricity will be smaller and more efficiently used, but the utility may be less well off financially.

As noted above the need for improvement can be readily seen by comparing the price of electricity across Michigan and its surrounding competitor states. Table 1 provides the average retail price of electricity in cents per kilowatt hour in Michigan and its surrounding states in the years 2014, 2013 and 2008. **It should be clear that retail prices in Michigan are substantially higher than in its competitor states.** The price in Michigan in 2014 (latest data available from U.S. Energy Information Administration) was 25% higher than the lowest price state, Illinois, and 3.5% higher than the closest priced state, Wisconsin. It is notable that prices have risen substantially more in Michigan than the surrounding states since the 2008 legislation that severely limited retail choice.

The price of electricity in Michigan in 2014 was 25% higher than the lowest price surrounding state, Illinois.

¹ See Averch, Harvey; Johnson, Leland L. (1962). "Behavior of the Firm Under Regulatory Constraint". American Economic Review 52 (5): 1052–1069

Table 1



Reducing the cost of electricity would reduce the cost of production in most industries and services as there are few that do not use electricity in some fashion. Reducing what economists refer to as the marginal cost of production would increase the supply of goods and services, both lowering prices and increasing the number of jobs. The benefits of lowering the cost of electricity would be widespread.

Michigan utilities also do not provide better service nor meet higher environmental standards for their higher costs. Table 2 shows that Michigan utilities provide lower reliability than nearby states. Comprehensive national statistics on reliability are only available for 2013. Other data sources show that while Michigan’s results in 2013 were particularly bad, our utilities have persistently been less reliable than most utilities elsewhere in the country.

Table 2

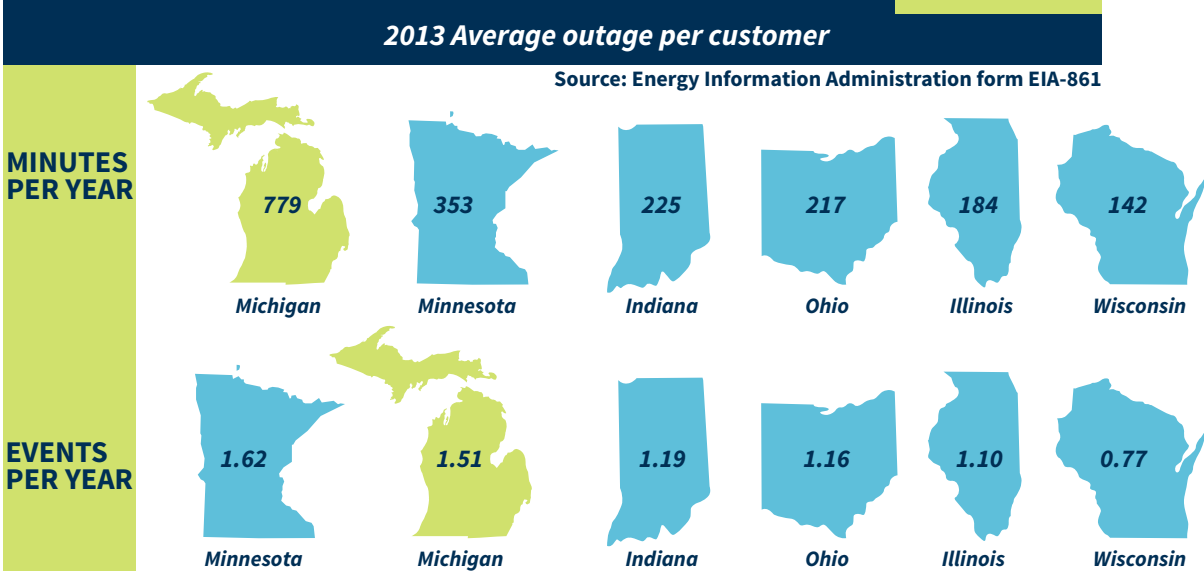


Table 3 shows that Michigan utilities are not less polluting per unit power generation than are utilities in most nearby states.







2012 Average Emissions				Table 3
State	Sulfur Oxide (tons/TWh)	Nitrous Oxide (tons/TWh)	Mercury (lbs/TWh)	Carbon Dioxide (1000 tons/TWh)
	1987	747	20.8	628
	1531	617	20.8	646
	2735	701	32.4	736
	637	687	16.8	546
	2264	936	27.7	870
	873	309	10.0	478

Table 4 shows that Michigan utilities were not recently subject to generally more stringent performance standards than are utilities in most nearby states.







Energy Standards		Table 4
State	Renewable Energy Standard	Energy Efficiency Standards
	10% by 2015	1% per year
	10% by 2015	1.2% spending requirement
	12.5% Renewable by 2025 12.5% Advanced by 2025	22% by 2027
	31.5% by 2020 (Xcel) 26.5% by 2025 (Others)	2.0% per year (Xcel) 1.5% per year (Others)
	10% by 2025 (goal)	Ramp up to 1.1% in 2014, repealed thereafter
	25% by 2025	Ramping up to 2% per year

Table 3 Source: Energy Information Agency at http://www.eia.gov/electricity/data/state/emission_annual.xls

Table 4 Source: DSIREUSA.org

²Suspended in 2014, pending legislative review.

IV. APPROACHES TO OFFSETTING THE INCENTIVE PROBLEMS OF A REGULATED MONOPOLY IN THE ELECTRICITY INDUSTRY

*There are several approaches that legislation and regulation may take to improve the incentives and performance of Michigan's electric power industry. Broadly, these may provide **increased competition**, reduce the perverse incentives of monopoly, **or** impose performance standards **by regulation that might otherwise be obtained through competition.***

1. Expanding retail competition
2. Structural separation
3. Allowing Consumers a Choice to Purchase Renewable Energy Specifically
4. Require Purchase of Renewable, Co-Generation, and Waste-to-Energy Energy Sources
5. Peak load pricing and Other Mechanisms to Encourage Consumer Efficiency

1. Expanding retail competition

Expanding retail choice would alter the incentives of the existing utilities as they would have to compete with new entrepreneurs and existing generators and wholesalers. The added supply of electricity would put pressure on the utilities to **improve their production and reduce rates or face the loss of their customer base**. The risk of losing customers if costs are too high would discourage utilities from owning excess capacity or building overly large plants when new capacity is required.

A good deal has been written on the benefits of the deregulation of the electric industry and there is not space in this paper to delve into the full arguments in favor of competition other than to note that **it is clear that competition will lower prices in the electric industry as it does in every other industry.**³

This is also not the place to consider in any detail the manner in which competition should be established. However, an obvious mechanism that would expand choice would be to increase the limit on the market share that the utilities may lose that was put in place in 2008. An example would be to increase this by a certain percentage a year over some given number of years.

Expansion of customer choice is not without its difficulties. One of the major questions surrounding the introduction of competition is whether to or how to deal with issues such as stranded costs. Michigan ratepayers have already compensated utilities for stranded costs as part of the 2000 legislation but further consideration might be necessary for investments made since reregulation in 2008. Traditional electricity generation has high fixed costs, so there must be some certainty to invest in increased generating capacity. For example, suppose ACME Energy has just spent \$700 million building a new power plant and its customer base is then opened up to competition.

How legislation that improves the efficiency of the industry through the introduction of retail competition should address these issues is also well beyond the scope of this paper. However, even though there are difficulties it is important that a legislative debate be taken up in the near future to examine the details of how to move the industry towards a competitive one.

2. Structural separation

Because there is little incentive for a utility that generates electricity to provide access to another generator or a wholesaler to the line to their customer's home or business, one approach to change the incentives would be to **structurally separate the ownership of generation from the ownership of distribution**, in the same way that transmission was separated from generation. This would require the utilities to either sell their distribution network or their generating facilities.

³ See for example, Markiewicz, et al., "Does Competition Reduce Costs: Assessing the Impact of Regulatory Restructuring on U.S. Electric Generation Efficiency," MIT Department of Economics Working Paper 04-37, November 2004, and O'Connor, "Retail Electric Choice: Proven, Growing, Sustainable," Compete Coalition, April 2012.

Under structural separation the company distributing electricity to the final customer would not have an incentive to exclude a particular supplier nor favor a different supplier. The incentive would be to provide access to its distribution network to any supplier of electricity willing to pay the access fee. **This would create incentives for new and existing generators to innovate, in particular those in the renewable energy fields**, as they would have access to the full customer base. It would also eliminate incentives of distribution utilities to resist energy efficiency, since they would no longer be concerned about preserving demand for generation.

3. Allowing Consumers a Choice to Purchase Renewable Energy Specifically

Just as some consumers would rather purchase organically-grown vegetables even if the cost of these vegetables is greater than those grown conventionally, there are consumers that would rather purchase energy that is produced from renewable sources. Again, this paper is a general overview and not the place to detail how this would come about. There already exist renewable energy certificates that consumers may purchase supporting the production of renewable energy. But one could consider **allowing consumers to specifically purchase power generated by renewable sources**.

To the extent that the demand for such energy exceeds the supply produced by the incumbent generator, the utility could be required to purchase renewable energy from other sources. This would provide an **incentive for innovation in the production of renewable energy**, possibly leading to an energy source, such as solar, becoming price competitive with natural gas and certainly coal-fired plants.

Since the cost of renewable energy has been falling rapidly and is approaching the same cost as traditional generation, particularly for peak-load⁴, we can reasonably expect that it will in the foreseeable future be cheaper. This is especially likely as environmental regulations continue becoming more stringent. However, an incumbent utility providing the opportunity for customers to purchase renewable power will have the incentive to discourage such purchases if the volume of such purchases starts to cut into the sales of its traditional generation. This process of replacement of old production methods and investments by newer ones is handled well by competitive markets but is challenging within a regulated monopoly. This form of customer choice would be more effective if served by competing suppliers or at least regulated through structural separation from the producer of traditional power.

4. Require Purchase of Renewable, Co-Generation, and Waste-to-Energy Energy Sources

As noted above, entrepreneurs have reduced incentives to take on the risk of innovating in the generation of electricity from renewable sources such as solar power, or other cutting-edge methods like co-generation and waste-to-energy, as they may not have access to a final consumer or the mass of consumers. Suppose you were considering investing \$100 million developing a technique for capturing energy from the sun in a way that is 20 times more efficient than current technology. If you did not have a way to get the energy you produced to firms or households because the distribution network was owned by a company with little incentive to allow you access as a competitor to their power generation, you would not undertake the innovation.

Requiring the utility that distributes electricity to the customer base to purchase alternative power at an economically efficient rate would lead to innovations in power production that will lead to lowered costs throughout the economic system. Michigan's 2008 renewable energy requirement that each utility acquire half of renewable generation from independent producers is an example of such a policy and appears to have had the effect of driving costs down.

Some consumers will be willing to generate a portion of their electricity on their own, most likely through the use of solar power. As power that is generated at the current time cannot be stored (although innovations in battery storage may be on the horizon that would allow consumers to generate solar power during the day, store it, and use it in the evening) the consumer cannot garner benefits from excess solar production. If utilities are required to purchase excess solar power from consumers then they would have more incentive to reduce their usage of power generated from traditional sources such as coal. However, **the full benefit of customer generation is only achieved if the customer is paid the "market price" of power**, which is effectively the cost of power if supplied by the monopoly utility at the same time and place as customer generation. If it costs a utility 8 cents per kWh to supply power and a customer can supply power for 7 cents a kWh, but the utility influences its regulators to limit customer payments to 4 cents per kWh, then the customer won't generate and the cost to society is 1 cent per kWh that the customer did not choose to generate.

⁴ For example, the Levelized Cost of Energy for solar has fallen by 78% from 2009 to 2014 from \$323 per MWh to \$72 MWh. Currently the Levelized Cost of Energy for solar is below that of coal with CCS and peaker natural gas, while geothermal and land-based wind are below even natural gas combined cycle. Of course, Levelized Cost of Energy does not reflect all aspects of power sources, see for example GE's June 25, 2012 comments to EPA in Docket EPA-HQ-OAR-2011-0660, but the comparison of Levelized Cost of Energy does provide an indicator of cost trends.

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5. Peak load pricing and Other Mechanisms to Encourage Consumer Efficiency

As noted above, electric utility generators have little incentive to encourage their customers to reduce electricity usage from the utility or to move their consumption to times that are lower costs to produce. As a consequence there will be inefficiencies not just in the production of electricity, but in its consumption as well.

In the context of a utility having the obligation to reliably serve customers on demand, it may be cheaper for a utility to serve some customers by arranging for and even compensating other customers to use less power overall or at particular times rather than to provide additional power supply. This has traditionally been done through interruptible services to industrial customers, but the concept can be extended to all customers and long-run efficiency as well.

There are at least two ways to change this incentive. The first is to **require utilities to set rates that reflect the added cost of production**. The use of electric power at peak load requires an added cost of an increased size of generating facility, since the facility must be built for peak load demand, so the consumer should be charged more for the use of electricity at this time than at times where load is below peak. This differential pricing will provide the consumer with an incentive to, for example, run their dryer in the evening rather than in the afternoon when the load is at peak. This will reduce the size of generating facilities which, as noted have high fixed costs.

Reduction in energy consumption even in off-peak periods can reduce the costs of owning facilities needed to generate electricity, since base load plants are significantly more expensive than peaking plants. Less resources are used in electricity production allowing greater production in other areas of the economy. It should be noted that **in a competitive market, individuals become more price conscious and are better able to make the comparison of benefits and costs of energy-saving actions. Increased customer efficiency to avoid power supply costs can be achieved through utility offers to customers**, and such offers can help overcome information deficits and other barriers to customer adoption of efficiency measures.

V. CONCLUSION

The current structure of Michigan's electricity industry results in inefficient use of resources, higher prices for electricity, and reduced economic activity due to the incentives of both producers and consumers inherent in the current regulated monopoly structure. Michigan's economy could be improved and consumers would benefit from introducing a fully competitive industry and/or through regulations that correct the improper incentives and add to incentives to innovate. Given the high price of electricity and relatively poor performance of Michigan utilities compared to its surrounding competitor states, it is the responsibility of the Legislature and Michigan Public Service Commission to fully address these issues either by creating a competitive market or creating regulatory incentives for better performance.



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