REPORT ON THE IMPLEMENTATION OF THE P.A. 295 RENEWABLE ENERGY STANDARD AND THE COST-EFFECTIVENESS OF THE ENERGY STANDARDS

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MICHIGAN PUBLIC SERVICE COMMISSION
Department of Licensing and Regulatory Affairs
In compliance with Public Act 295 of 2008

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LICENSING AND REGULATORY AFFAIRS
CUSTOMER DRIVEN. BUSINESS MINDED.

Table of Contents

Appendices

Introduction

Report Criteria

In October 2008, Public Act 295 of 2008 (PA 295 or the Act) was enacted. Section 51(5) (MCL 460.1051(5)) requires that by February 15, 2011, and each year thereafter, the Michigan Public Service Commission (MPSC or Commission) submit to the standing committees of the Senate and House of Representatives with primary responsibility for energy and environmental issues a report that does all of the following:

a) Summarizes data collected under this section.

b) Discusses the status of renewable energy and advanced cleaner energy in this state and the effect of Subparts A and B on electricity prices.[1]

c) For each of the different types of renewable energy sold at retail in this state, specifies the difference between the cost of the renewable energy and the cost of electricity generated from new conventional coal-fired electric generating facilities.

d) Discusses how the Commission is ensuring that actions taken under this Act by electric providers serving customers in the same distribution territory do not create an unfair competitive advantage for any of those electric providers.

e) Evaluates whether Subpart A has been cost-effective.

f) Provides a comparison of the cost effectiveness of the methods of an electric utility with one million or more retail customers in this state as of January 1, 2008, obtaining renewable energy credits from renewable energy systems owned by the electric provider and from contracts that do not require the transfer of ownership of the renewable energy system.

g) Describes the impact of Subpart A on employment in this state. The Commission shall consult with other appropriate agencies of the department of labor and economic growth in the development of this information.[2]

h) Describes the effect of the 10% limit on using energy optimization credits or advanced cleaner energy credits to meet the renewable energy credit standards.

[1] Subpart A (MCL 460.1021-1053) deals with renewable energy standards. Subpart B (MCL 460.1071-1097) deals with energy optimization standards.

[2] A State government reorganization took place in 2011 that moved employment-related agencies outside the newly-formed Department of Licensing and Regulatory Affairs (LARA). Consultation with the appropriate agencies is continuing.

i) Makes any recommendations the Commission may have concerning amendments to Subpart A, including changes in the 10% limits described in (h) or changes in the definition of renewable energy resource or renewable energy system to reflect environmentally preferable technology.

This seventh annual report provides information on the Commission's renewable energy activities related to the Act through calendar year 2016 and summarizes data from the electric provider annual reports through the 2015 calendar year.[3] This report also includes 2015 renewable energy credit compliance data showing that all of Michigan's electric providers met the 10% renewable energy standard.

In December 2016, Governor Snyder signed Public Act 342 (PA 342) into law.[4] PA 342 amends Act 295, increasing the renewable portfolio standard from 10% in 2015 to 12.5% in both 2019 and 2020 with a final requirement of 15% in 2021. The new Act becomes effective on April 20, 2017.

Renewable Energy Plans and Commission Approval

Subpart A of the Act requires electric providers to meet a 10% renewable energy standard based on retail sales by the end of 2015. The Act included interim compliance steps for 2012, 2013 and 2014. PA 342 requires electric providers to achieve the same number of renewable energy credits (RECs) needed to meet the standard in 2015 for 2016, 2017 and 2018. PA 342 has an interim requirement of 12.5% for 2019 and 2020 and increases to 15% by the end of 2021.

The renewable energy standard is applicable to Michigan's investor-owned electric utilities, cooperative electric utilities, municipal electric utilities and alternative electric suppliers (AESs). The Act directed electric providers to file initial renewable energy plans (REPs) in 2009.[5] The 74 initial

[3] *See:* the Commission's February 12, 2016 report: http://www.michigan.gov/documents/mpsc/PA_295_Renewable_Energy_Report_2-12-16_514511_7.pdf

[4] See https://www.legislature.mi.gov/(S(sv1uc2hkoxc3xdiz4liseava))/mileg.aspx?page=getObject&objectName=2015-SB-0438

[5] There are currently a total of 83 electric providers. Of those 83, 15 are AESs not serving customers and therefore are not required to file annual reports or register in MIRECS, the REC tracking system. Sixty-eight electric providers are required to meet the REC standard in the Act.

REPs described how each electric provider intended to meet the renewable energy standard requirements. The Act also directs electric providers to file REPs biennially for Commission review. PA 342 directs the Commission to review each electric provider's REP within one year of the Act's effective date. Biennial REP filings are no longer required under PA 342.

A listing of renewable energy case numbers and electric provider names can be found in ***Appendix A***.

The Act allows providers to recover the incremental costs of compliance with the renewable energy standard requirements through a renewable energy surcharge on customer bills. Commission approval of the renewable energy surcharge is only required for rate-regulated electric providers. Section 45 of the Act limits the retail rate impact (surcharge amount) of the renewable energy standard to the following:

(a) $3.00 per month per residential customer meter.

(b) $16.58 per month per commercial secondary customer meter.

(c) $187.50 per month per commercial primary or industrial customer meter.

At the end of 2016, only two rate-regulated providers, Indiana Michigan Power Company and Wisconsin Electric Power Company,[6] continue collecting renewable energy surcharges on customer bills. Additionally, there are seven non-rate-regulated electric providers with revenue recovery mechanisms. Forty-nine non-AES providers do not collect surcharges. Surcharge details can be found in ***Appendix B***.

Renewable Energy Cost Reconciliation Cases and Commission Approval

Per Section 49(1) of PA 295, nine rate-regulated electric providers filed annual renewable energy cost reconciliation cases for 2015. Commission staff audits the pertinent revenues and

[6] Effective January 1, 2017, customers of Wisconsin Electric Power Company and Wisconsin Public Service Corporation are served by a new stand-alone utility, Upper Michigan Energy Resources Corporation (UMERC).

expenses, determines the electric provider's compliance with its filed REP and assesses whether the provider has met its compliance targets. Thumb Electric Cooperative's reconciliation filing was dismissed on November 22, 2016 because the cooperative became member-regulated. Case numbers for each renewable energy cost reconciliation case for the reporting period can be found in ***Appendix A.***[7]

Summary of Renewable Energy Data Collected

Electric providers are directed by Section 51(1) of PA 295 to file annual reports for each plan year beginning with 2009. Michigan electric provider annual reports for 2009 through 2015 are available on the Commission's website.[8] Commission staff worked with electric providers to develop an annual report template based on Section 51 of the Act. A summary of data from annual reports is shown in ***Appendix C***.

Renewable Energy Credit Requirements – 2015 Compliance

For 2015, electric providers were required to meet the full 10% standard. The number of renewable energy credits required for 2015 compliance varies by electric provider and is calculated by multiplying the applicable sales figure by the 10% compliance requirement. All of Michigan's 68 electric providers (alternative electric suppliers not serving customers are not included in this total) met the 2015 requirements and retired[9] a total of 10,336,892 energy credits.[10] **Figure 1** shows the different renewable energy technology types used to generate the credits for compliance by all electric providers in 2014 and 2015 as well as separately for both Consumers Energy's and DTE Electric's 2015 compliance.

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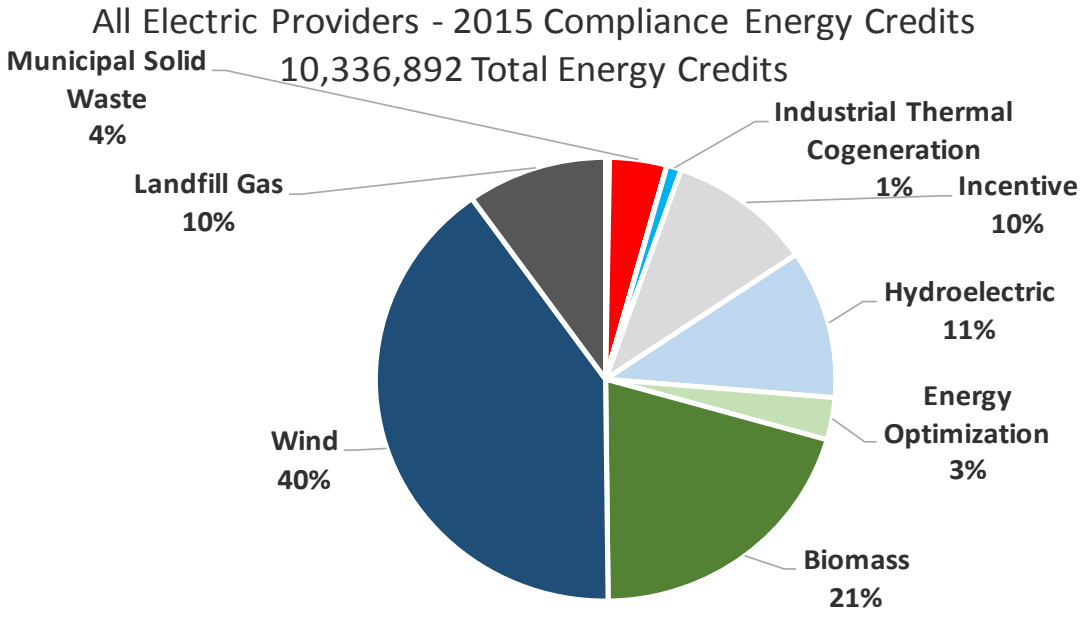
[7] *See:* http://www.michigan.gov/mpsc/0,4639,7-159-16393_53570-240178--,00.html
[8] *See:* http://www.michigan.gov/mpsc/0,1607,7-159-16393_53570-240179--,00.html.
[9] Energy credits are "retired" when used for compliance.
[10] The term "energy credit" includes renewable energy credits, Michigan incentive renewable energy credits, advanced cleaner energy credits and energy optimization credits.

Figure 1: Compliance Energy Credit Breakdown



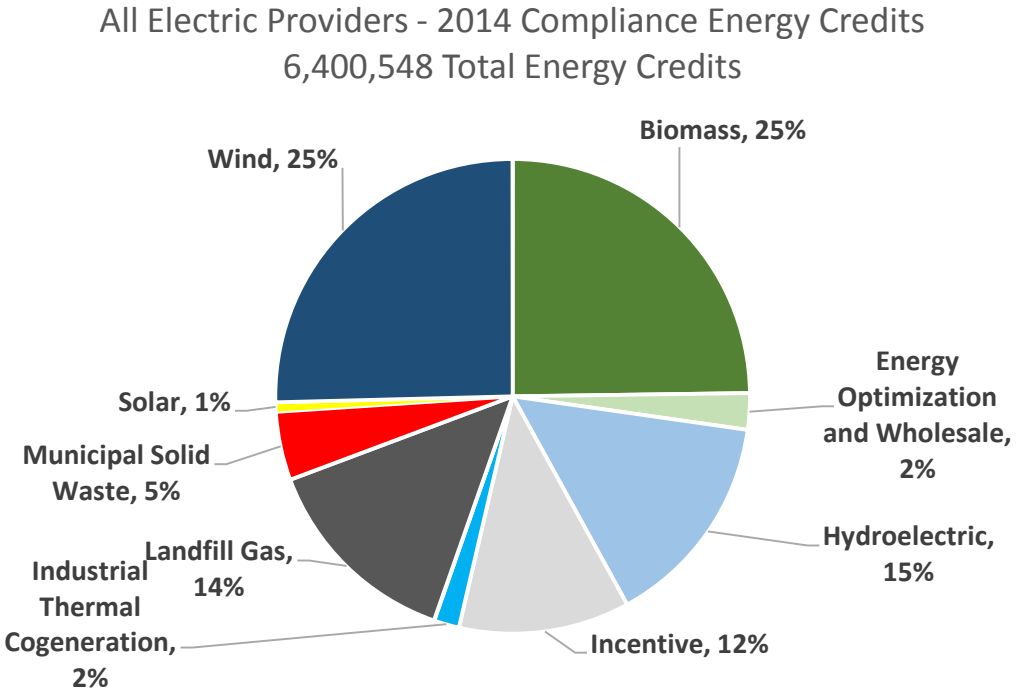
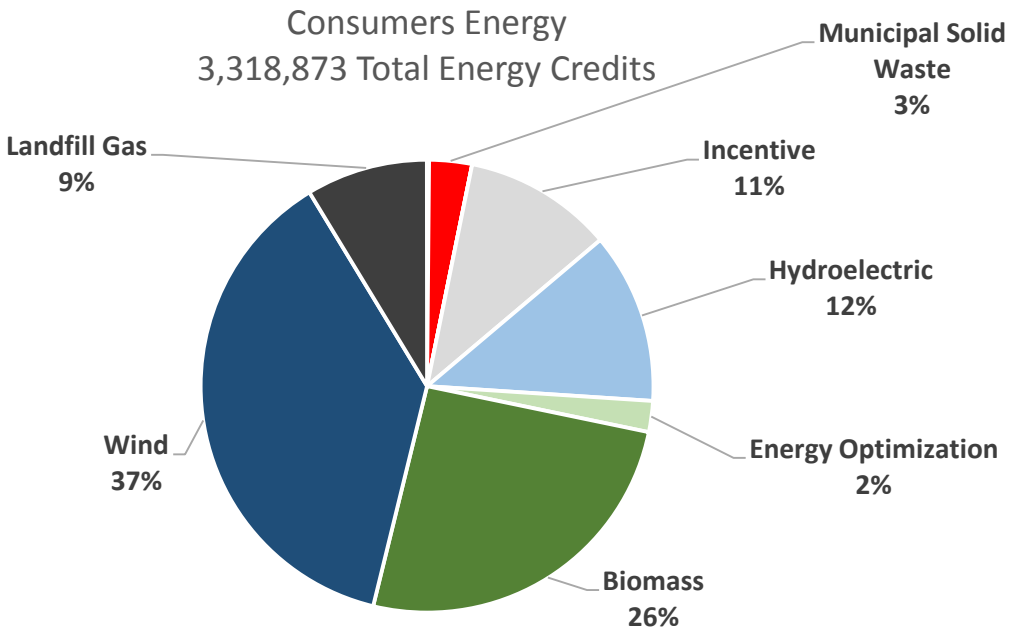
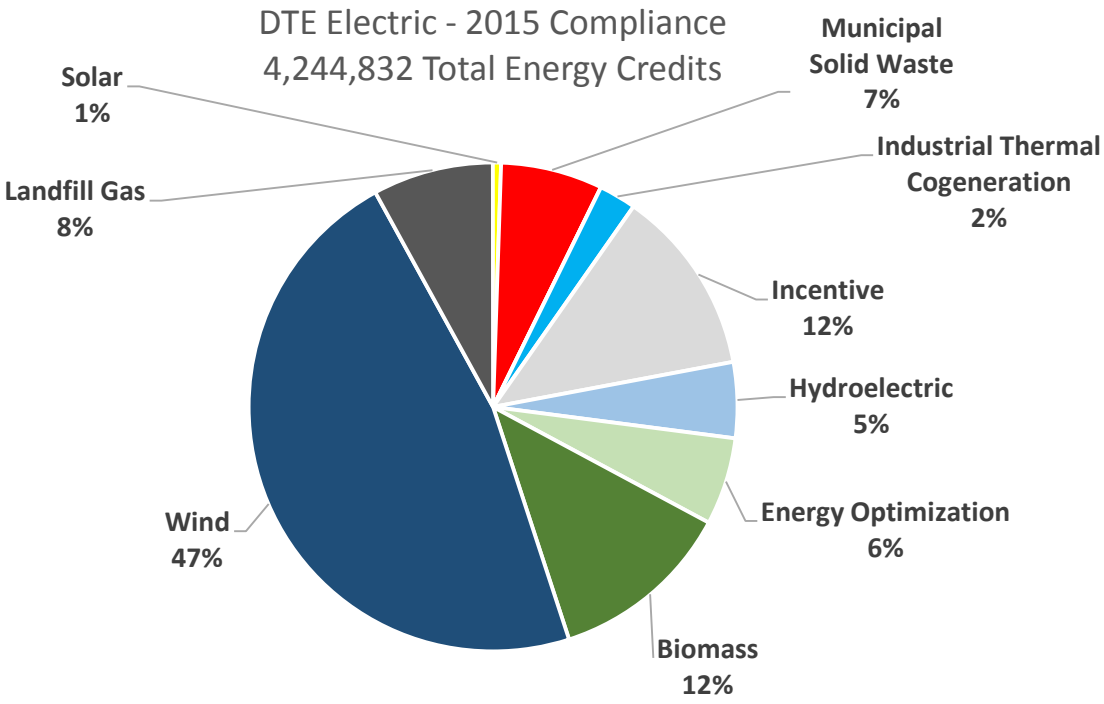


Figure 1: Compliance Energy Credit Breakdown (continued)

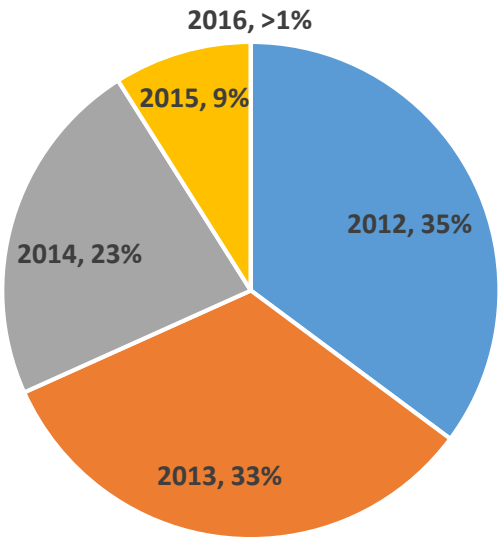




Section 29 of the Act includes provisions for determining whether the location of a renewable energy system is eligible for Michigan's RPS. Ninety-five percent of the energy credits used for 2015 compliance were from renewable energy generated in Michigan. Indiana was the source for over three percent and the remaining credits came from renewable energy generated in Iowa, Minnesota and Wisconsin. Michigan's multi-state utilities and electric providers with out-of-state wholesale suppliers are most likely to use energy credits from states other than Michigan.

Section 39 of the Act includes a provision that allows energy credits to be "banked" up to 36 months.[11] **Figure 2** shows a breakdown of energy credits retired for compliance by vintage year of generation. The data shows that providers are utilizing the 36-month energy credit banking provision in the Act. Approximately 70% of the energy credits used to comply in 2015 were from renewable energy generated in 2012 or 2013. Michigan Renewable Energy Certification System (MIRECS) data shows that, to date, approximately 3.1 million energy credits have expired without being used for compliance.

Figure 2: 2015 Compliance Energy Credits – Year of Generation



[11] PA 342 extends the life of a REC to five years after the end of the month in which the REC was generated.

Status of Renewable Energy

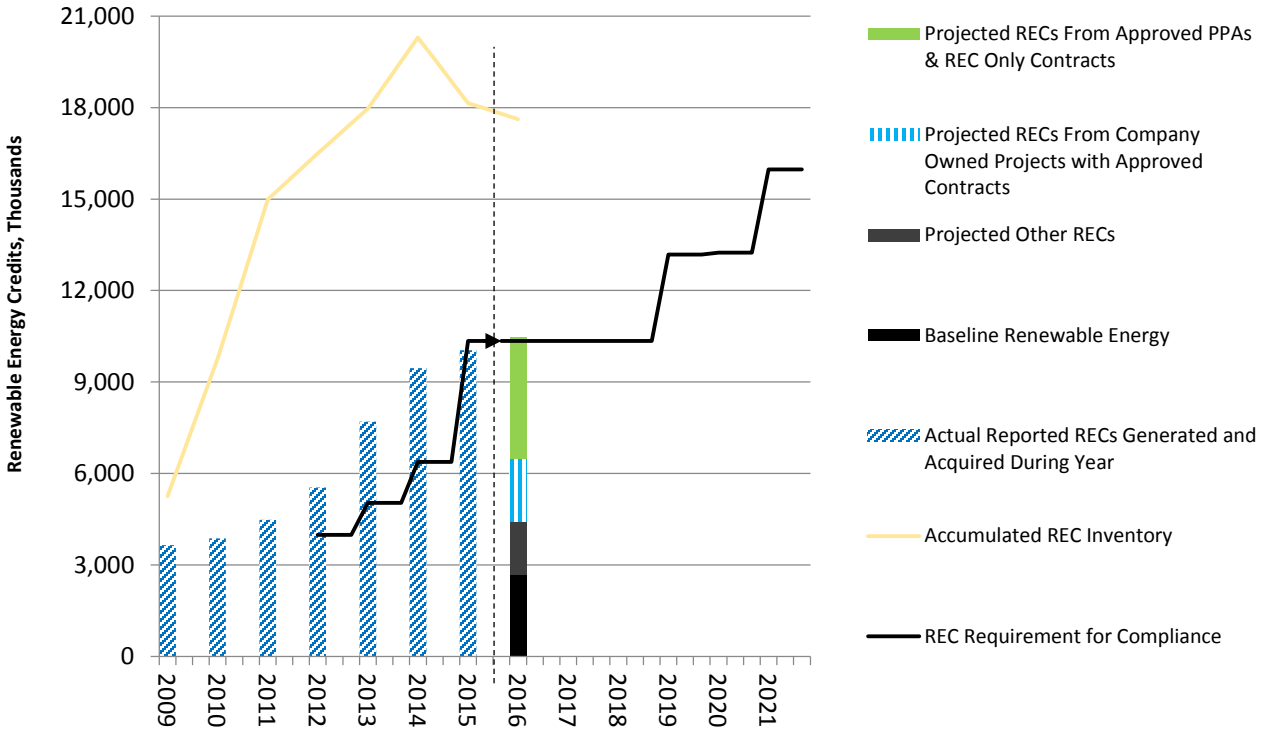
Based on the number of energy credits generated or acquired during 2015, as reported by electric providers, the number of energy credits generated is equal to 9.6% of retail sales as shown in ***Appendix C.*** As allowed by the Act, electric providers used banked energy credits and excess energy optimization credits to achieve the full 10% requirement. Michigan's annual energy credit generation percentage is expected to remain stable around the 2015 generation level of 9.6% as new renewable energy projects are not expected to materially increase renewable energy generation until 2017.

A projection of Michigan's energy credits for 2016 is shown in **Figure 3** along with the annual REC compliance requirement and accumulated RECs. In order to reflect only renewable energy generated or acquired in each year, accumulated RECs from previous years are not included in the yearly renewable energy totals but are shown separately by the line labeled "Accumulated REC Inventory." The projected renewable energy includes: i) baseline renewable energy (renewable energy that was operational prior to the passage of PA 295); ii) a projection of other RECs from non-rate regulated providers and contracts that do not require Commission approval under PA 295; iii) an estimate of RECs from PA 295 approved contracts for company-owned renewable energy projects; and iv) power purchase agreements (PPA) and REC-only contracts.

The accumulated REC inventory for 2015 reflects the deduction of energy credits that were retired for 2015 compliance, voluntary retirements, and 2012 energy credits that expired, due to the 36-month banking provision, without being used.

Figure 3 incorporates Michigan's current renewable energy status and projects that providers are on track to comply in 2016 with the same amount of RECs as were needed in 2015.

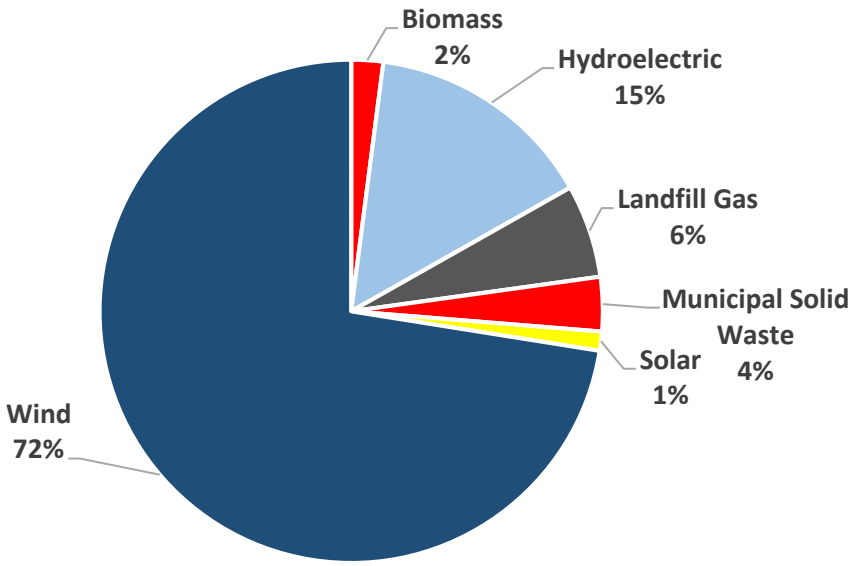
Figure 3: Michigan Renewable Energy Credit Projection



Source: Electric provider annual reports, PA 295 contracts, MIRECS and Commission staff projections.

Figure 4 provides the technology type and total nameplate capacity for 2,500 MW of renewable energy generators operating in Michigan. Additional renewable energy generators exist within Michigan that are not used to meet the energy credit nor capacity requirements of the RPS. These renewable generators may be used for green pricing programs or for compliance with another state's RPS. There are renewable energy generators currently under development and/or contracted for, which are not yet operational, that are not included within this figure. Further, renewable energy generators that are outside of Michigan are also not included within **Figure 4.**

Figure 4: Renewable Energy Generators in Michigan, by Technology Type
Approximately 2,500 MW Nameplate Capacity

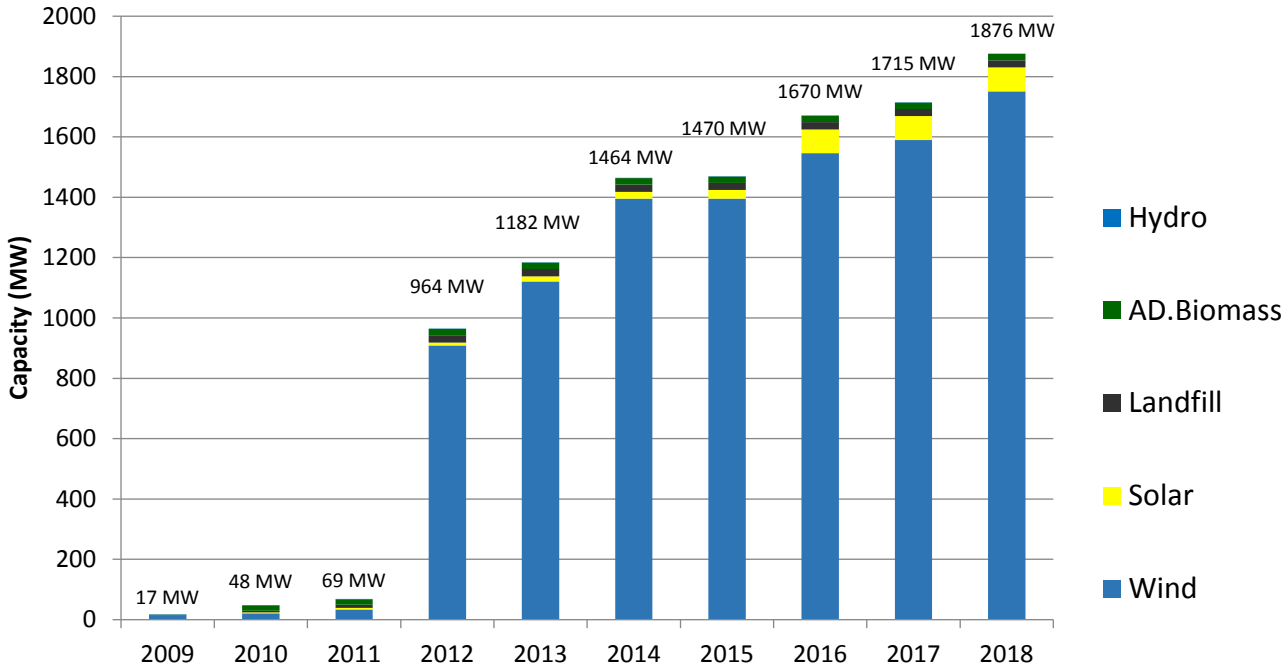


Source: MIRECS Project Registrations & Electric Provider Annual Reports

As of January 2017, 66 renewable contracts and amendments have been approved by the Commission pursuant to PA 295. **Figure 5** shows the expected commercial operation dates for renewable energy projects through 2018 based on the contracts and solar programs approved by the Commission.[12] Renewable projects developed by non-rate-regulated electric providers, where contracts are not filed for approval with the MPSC, are not reflected in **Figure 5.**

[12] Assumes all of DTE Electric's 22 MW SolarCurrents program and Consumers Energy's 7 MW Experimental Advanced Renewable Program were commercially operational by the end of 2016.

Figure 5: Cumulative PA 295 Renewable Energy Capacity by Commercial Operation Date



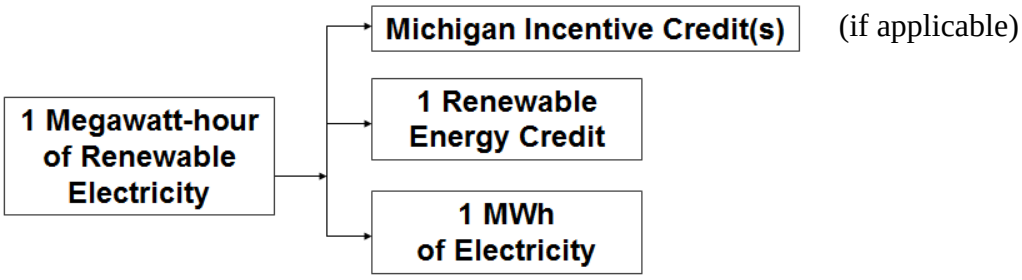
Consumers Energy and DTE Electric both implemented solar photovoltaic (PV) programs in the early phase of the 20-year plan period. During 2016, Consumers Energy awarded the final capacity of its approximately 7 MW solar customer-owned Experimental Advanced Renewable Program. In 2015, Consumers Energy implemented a Community Solar program, Solar Gardens, which resulted in 4 MW in 2016 and could grow to a total of 10 MW in future years. DTE Electric is continuing development under its 15 MW Company-owned SolarCurrents program. In addition, DTE Electric is currently constructing up to 50 MW of company-owned solar which was approved by the Commission in December 2015.

Electric providers have secured all of the renewable energy necessary for compliance with the 10% standard.[13]

Michigan Renewable Energy Certification System (MIRECS)

Compliance with the renewable energy standard is demonstrated through the use of energy credits. One renewable energy credit is created for each megawatt-hour (MWh) of renewable energy generated. Additionally, the Act provides for Michigan incentive renewable energy credits (IRECs) and the substitution of energy optimization credits (EOCs)[14] and advanced cleaner energy credits (ACECs) for RECs. RECs may be sold separately from energy as shown in **Figure 6**.

Figure 6: Renewable Energy Credits



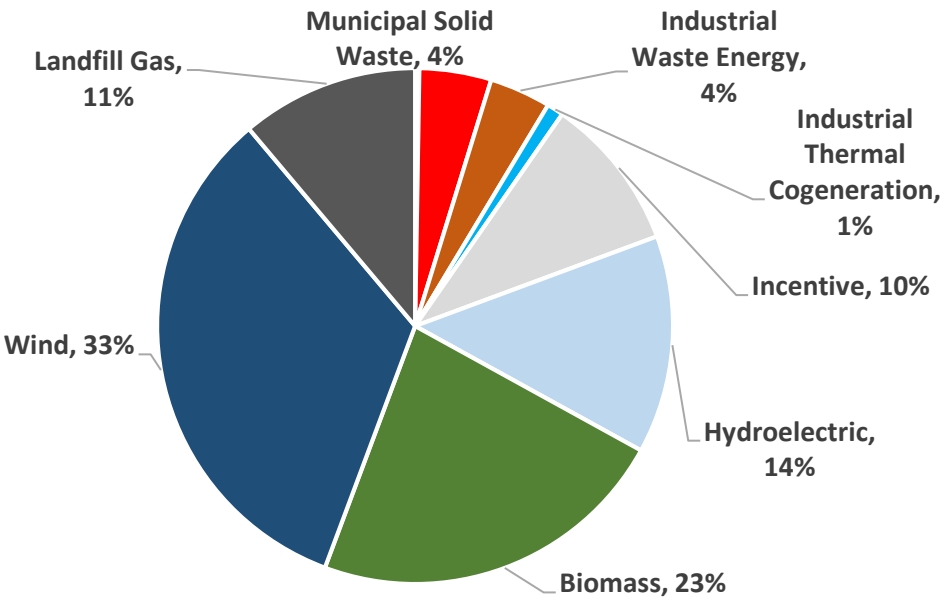
Section 41 of PA 295 directed the Commission to "establish a renewable energy credit certification and tracking program." On August 11, 2009, the Commission approved the contract between the Department of Energy, Labor and Economic Growth (now Licensing and Regulatory Affairs or LARA) and APX, Inc., that designates APX, Inc. as the State of Michigan Administrator of

[13] Nearly all AESs are purchasing unbundled renewable energy credits to meet the renewable energy credit portfolio requirements. The terms and conditions of these purchases are unknown.
[14] At this time, energy optimization credits are not transferable from one electric provider to another, meaning that they cannot be sold or otherwise traded.

the renewable energy credit and tracking program.[15] MIRECS was launched on October 30, 2009.[16]

As of January 23, 2017, a total of 57,340,328 energy credits have been created in MIRECS from 2009 through 2016. **Figure 7** shows the categorization of Michigan's energy credits by technology type. A yearly breakout of energy credits is available in ***Appendix D***. Analysis of these breakouts shows the significant growth of wind in Michigan's REC portfolio, from 7% in 2009 to greater than 50% in both 2015 and 2016. The 33% wind figure shown in **Figure 7** represents total credits created over the 2009 – 2016 period. This data differs from **Figure 1** because all energy credits created in MIRECS since its inception are reflected, while **Figure 1** shows only energy credits used for 2015 compliance.

Figure 7: MIRECS 2009-2016 Vintage Energy Credits – 57,340,328 Total Credits



[15] The initial contract between the State of Michigan and APX was extended for another 2 years in July 2014 and extended again until July 2017 in fourth quarter 2016.
[16] MIRECS may be accessed at http://www.mirecs.org.

The number of generating units within MIRECS continues to grow. As of January 2017, there were 308 registered projects (generators) in MIRECS. MIRECS has 137 account holders which include electric service providers, generator owners, and others.

MIRECS is able to fully integrate with other tracking systems such as the Midwest Renewable Energy Tracking System (M-RETS), North American Renewables Registry (NAR) and, to a lesser extent, the North Carolina Renewable Energy Tracking System (NC-RETS) and PJM-Generation Attribute Tracking System (PJM-GATS) which allow energy credit imports from and exports to MIRECS. This integration allows both businesses and individual citizens to sell their product to a wider market. Generators registered with other tracking systems have, as of January 2017, registered 58 projects for the purpose of importing energy credits into MIRECS. Commission staff assists electric providers with the compliance process and will continue to hold training/information meetings.

Competition in Areas Served by Multiple Providers

Consumers Energy and DTE Electric have made substantial progress toward complying with the renewable energy standard. Consumers Energy has filed renewable energy contracts with the Commission totaling approximately 650 MW, and DTE Electric totaling approximately 1150 MW, as shown in ***Appendix E.*** In addition to meeting the requirement in PA 295 for RECs that is applicable to all electric providers, both Consumers Energy and DTE Electric had renewable capacity requirements pursuant to Section 27 of PA 295. By the end of 2013, Consumers Energy was required to obtain 200 MW of nameplate capacity that was not in commercial operation before the effective date of the Act. Similarly, DTE Electric's capacity portfolio requirement for 2013 was 300 MW. At the end of 2015,

Consumers Energy and DTE Electric surpassed their 500 MW and 600 MW capacity requirements, respectively.

Cost-Effectiveness of Power Purchase Agreements and Owned Generation

Section 33 of PA 295 includes a provision related to competitive bidding and unsolicited contracts for electric providers who served more than one million electric customers in this state as of January 1, 2008. Consumers Energy and DTE Electric fall under this provision.

Pursuant to Section 33, the companies are required to obtain RECs necessary to meet the REC standard in 2015 by one or more of the following methods:

> (i) Renewable energy systems that were developed by and are owned by the electric provider. An electric provider shall competitively bid any contracts for engineering, procurement, or construction of any new renewable energy systems…
>
> (ii) Renewable energy systems that were developed by 1 or more third parties pursuant to a contract with the electric provider under which the ownership of the renewable energy system may be transferred to the electric provider, but only after the renewable energy system begins commercial operation. Any such contract shall be executed after a competitive bidding process conducted pursuant to guidelines issued by the commission.

Additionally:

> (b) At least 50% of the renewable energy credits shall be from renewable energy contracts that do not require transfer of ownership of the applicable renewable energy system to the electric provider or from contracts for the purchase of RECs without the associated renewable energy. A renewable energy contract or contract for the purchase of RECs under this subdivision shall be executed after a competitive bidding process conducted pursuant to guidelines issued by the commission. However, an electric provider may consider unsolicited proposals presented to it outside of a competitive bid process by a renewable energy system developer that is not affiliated with the electric provider. If the provider determines that such an unsolicited proposal provides opportunities that may not otherwise be available or commercially practical, the provider may enter into a contract with the developer.

The companies have conducted 32 requests for proposals (RFPs) in total. Consumers Energy has conducted 12 RFPs and four requests for qualifications. DTE Electric has conducted 20 RFPs, two

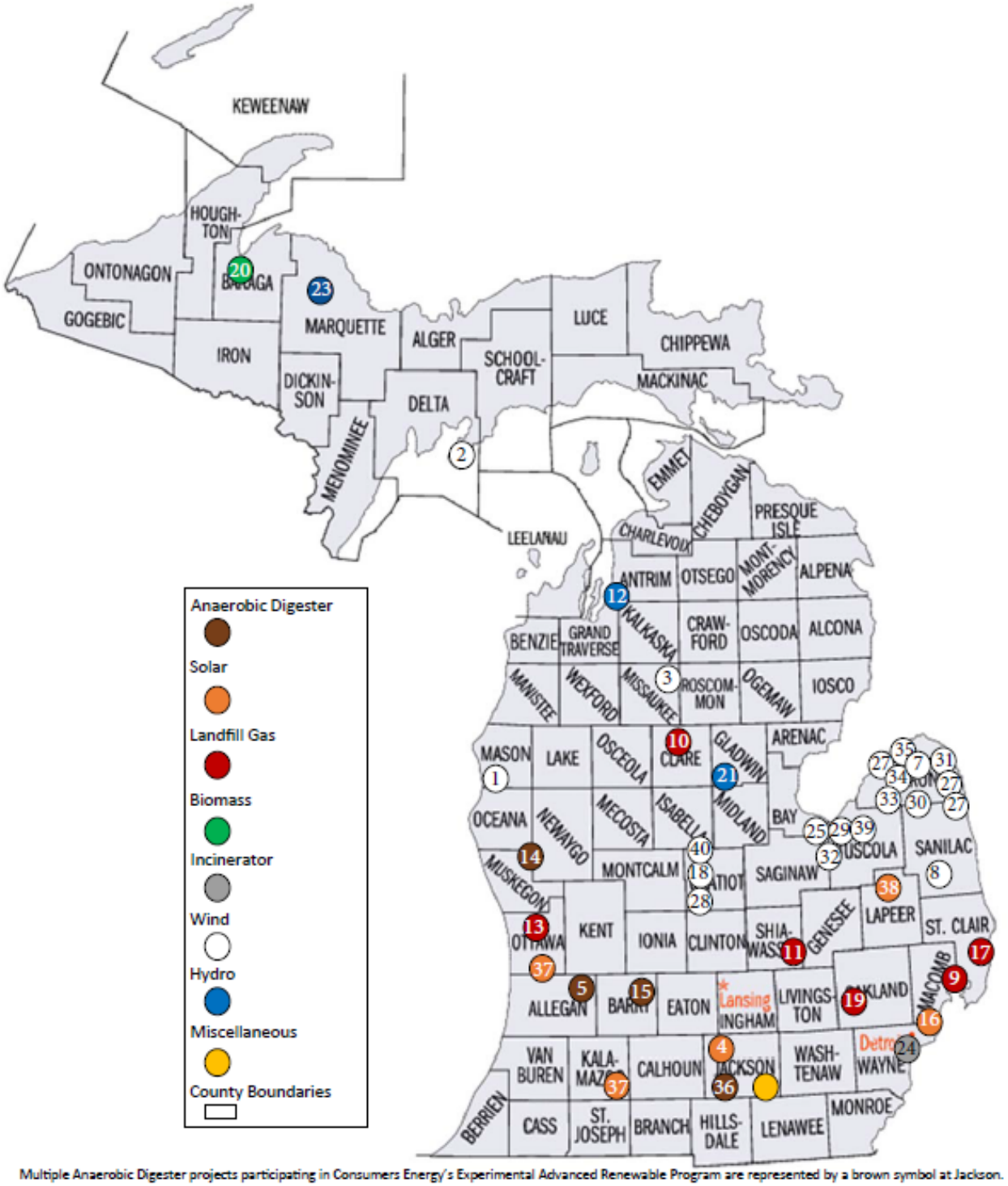
pre-qualification events, one solar solicitation of interest, a request for information, and an auction for 2009 and 2010 vintage RECs. In response to the majority of the companies' RFPs, Commission staff has reviewed competitive bidding activities through process audits. The purpose and design of the audits was to ensure that the companies followed the processes and procedures outlined in the Commission's December 4, 2008 Temporary Order in MPSC Case No. U-15800, Attachment D[17] and pursuant to Section 33 of PA 295. Details about each company's competitive bidding activities are shown in ***Appendix F***.

Pursuant to Section 37 of the Act, renewable energy power purchase and REC-only agreements entered into by any electric provider whose rates are regulated by the Commission must be submitted to the Commission for determination of whether the terms are reasonable and prudent. ***Appendix E*** lists all renewable energy contracts that have been approved by the MPSC under PA 295 to date.

There has been significant renewable energy development as a result of PA 295. ***Appendix G*** lists all of the renewable energy projects that have approved PA 295 contracts. The ***Appendix E*** and ***Appendix G*** map keys correspond to the map in **Figure 8**. Wind energy has been the primary source of new renewable energy in Michigan. At the end of 2016, including wind projects developed shortly before Act 295 and wind projects developed by non-rate regulated electric providers and under the PA 295 contract approval and cost recovery mechanisms, there were 1,575 MW (total includes 127 MW of utility scale projects that began operating prior to the Act) of utility scale wind projects in operation in Michigan as indicated in ***Appendix H***. Seven wind farms with over 760 MW of new wind capacity (333 MW will be developed by non-rate-regulated providers) are expected to begin operating in the next several years. All known wind farms in Michigan are listed on ***Appendix H***.

[17] *See:* http://efile.mpsc.state.mi.us/efile/docs/15800/0001.pdf.

Figure 8: Locations of Renewable Energy Projects



Multiple Anaerobic Digester projects participating in Consumers Energy's Experimental Advanced Renewable Program are represented by a brown symbol at Jackson.
Multiple Solar projects participating in Consumers Energy's Experimental Advanced Renewable Program are represented by a solar symbol placed at Jackson.
Multiple Solar projects participating in DTE's SolarCurrents Program are represented by a solar symbol placed at Detroit.
Alpena Power Company purchasing "bulk of RECs" from Consumers Energy represented by a yellow symbol placed at Jackson.
DTe purchasing misc RECs from UPPCo represented by a blue symbol placed at UPPCo's headquarters.
Map shows renewable energy projects based on PA 295 contracts filed at the Michigan Public Service Commission.

*Numbers shown on map correspond to the Map Key Column provided on ***Appendices E and G***.

The MWh contract prices shown in ***Appendix E*** are levelized cost calculations and reflect the prices over the contract term for all power purchase agreements or, in the case of a company-owned project, the depreciable composite life.[18] The levelized cost value is used to compare multiple contracts with varying terms and conditions. Of the 71 contracts and amendments from five electric providers approved by the Commission to date, all but four have been from Consumers Energy or DTE Electric and 20 have been unsolicited. With the exception of several early contracts for small renewable energy projects, the contract prices have been much lower than expected and have continued to decline.

Pricing for wind farms declined rapidly in Michigan. A comparison of the actual costs of the renewable energy resource acquired through power purchase agreements using the methods described in Section 33 of the Act to company-owned projects, shows that company-owned projects and power purchase agreements have been competitive when costs are compared. Many of the power purchase agreements were entered into in the first few years of implementation of the renewable energy standard, whereas many of the company-owned projects became operational later and benefited from the decline in prices over time. Consumers Energy filed three applications for approval of company-owned wind farms totaling 250.2 MW. DTE Electric has seven Company-owned wind farms totaling up to 608.9 MW, applications for 15 MW of company-owned solar through its SolarCurrents program and up to 50 MW of company-owned solar outside of the SolarCurrents program. Since no large scale solar installations have been contracted through power purchase agreements (only company-owned facilities have been

[18] MPSC staff performed audits of the companies' levelized cost calculations starting in the early part of 2011. Additionally, through RFP process audits, staff reviewed actual costs of contracts obtained through most of the companies' competitive solicitations. Staff reviewed the actual costs of all contracts listed in ***Appendix E***.

proposed), only the above-mentioned wind contracts are compared for purposes of this section of the report.

An annual comparison of the weighted-average levelized cost (dollars per MWh) of commission-approved company-owned project costs to power purchase agreements is tabulated below.

Weighted Average Cost Comparison		
Commission Approval	**Company Owned**	**Power Purchase**
2016	$55.58	N/A
2015	$50.00	$45.00
2014	N/A	N/A
2013	$55.95	$50.04
2012	$52.50	$49.25
2011	$67.16	$60.90
2010	$104.00	$97.33
2009	N/A	$115.00
Total	**$69.73**	**$73.58**

In aggregate, over the 2009-2016 time period, the weighted average cost of power purchase agreements has been slightly higher than the weighted average of company-owned projects. This is due in part to the fact that more of the company-owned projects became operational more recently as costs declined due to technology advancements. As the table above shows, for each year in which there were both company-owned projects and purchased power agreements, the weighted average cost of the purchased power agreements was lower than the company-owned projects in that respective year.

Impact of the Renewable Energy Standard on Employment

One purpose of PA 295 is to "provide improved air quality and other benefits to energy consumers and citizens of this state." The clean and renewable energy sector continues to contribute to employment opportunities in Michigan. During the next several years, the

following utility scale wind farms are expected to become commercially operational in Michigan:

- Apple Blossom – 100 MW, Huron County
- Big Turtle II – 30 MW, Huron County
- Cross Winds II – 44 MW, Tuscola County
- Deerfield – 150 MW, Huron County
- Michigan Wind III – 153 MW, Sanilac County
- Pine River Wind – 161.3 MW, Gratiot and Isabella Counties
- Tuscola Wind III – 125 MW, Tuscola County

These projects will result in over 760 MW of new, utility scale wind generation.

Section 39 of PA 295 provides for Michigan Incentive Renewable Energy Credits for renewable energy systems that meet certain criteria. For renewable energy systems constructed using a threshold level of Michigan labor, the amount of the incentive is one-tenth of a REC for each MWh generated during the first three years of commercial operation. The incentive for Michigan equipment is calculated in a similar manner. The Michigan specific incentive credits are shown in **Figures 9** and **10** below.

Figure 9: Michigan Equipment Incentive Credits 2009-2016

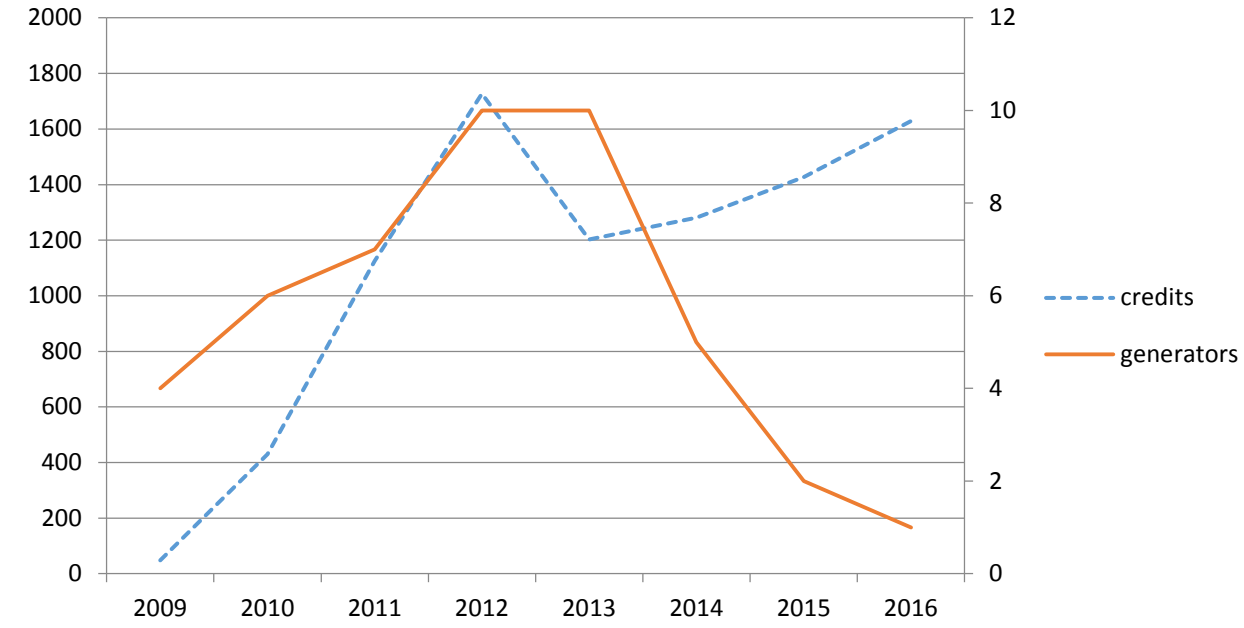
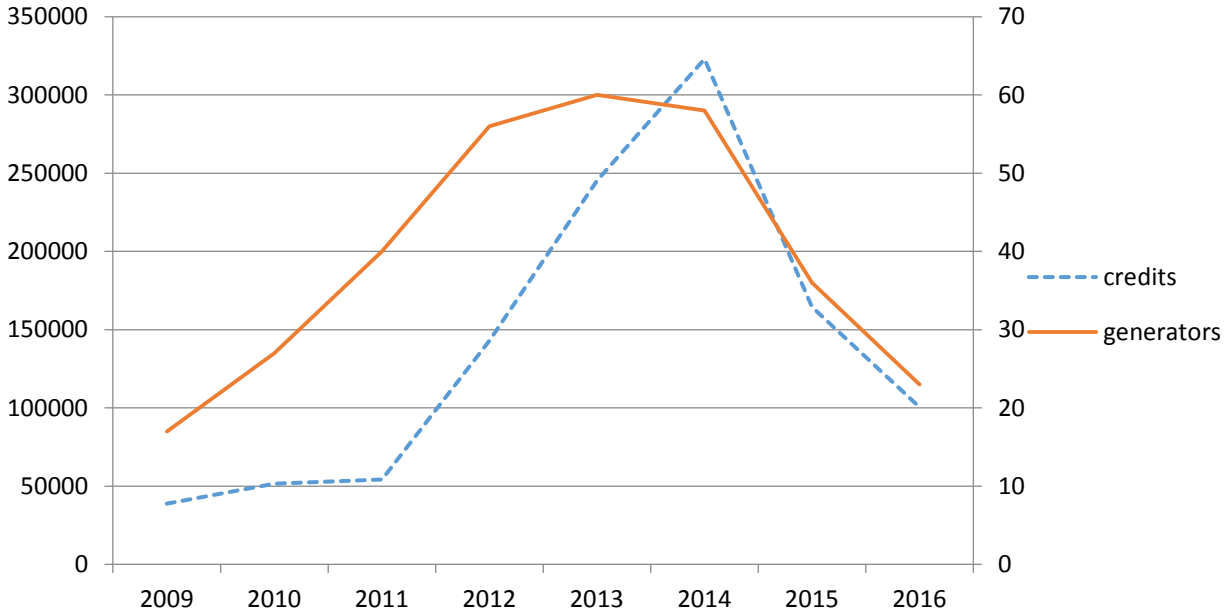


Figure 10: Michigan Labor Incentive Credits 2009-2016



Statewide, there has been significant investment in the renewable energy sector since the passage of PA 295 in 2008. Assuming an installed cost of $2,000 per kW[19] for new renewable energy projects, $3.3 billion has been invested to bring approximately 1,670 MW[20] of new renewable energy projects on-line through 2016 in Michigan. The $3.3 billion includes both incremental cost of compliance and the portion of costs recovered as energy costs.

In September 2014, the Michigan Workforce Development Agency in partnership with the Bureau of Labor Market Information and Strategic Initiatives issued a 2014 Energy Cluster Workforce Updates report. The 2014 report is an update to the 2013 Cluster Workforce Analysis which tracked eight detailed industry sectors as a proxy for employment trends in the Renewable and Alternative Energy cluster. That analysis found the cluster grew from 6,775 jobs in 2005 to 7,700 jobs in 2013.[21] The 2014 Cluster Workforce Update found that overall, the Energy Cluster is expected to grow 7.1% between 2010 and 2020.[22] An additional update for the second quarter of 2016 showed 9,100 jobs among Michigan industries related to the Renewable and Alternative Energy cluster.[23]

Michigan is continuing to build on its position as a regional leader in the development and manufacturing of renewable energy systems, drawing on the state's engineering expertise, modernized machining, and RPS compliance efforts. It appears that Michigan's incentive REC provision is meeting its intended purpose to encourage developers to maximize utilization of

[19] DTE Electric reported an installed cost of $2,225 to $2,438 per kW for its Echo Wind Park contract approval application filed on August 10, 2012.
[20] Reflects the projects developed under Act 295 by MPSC rate-regulated electric providers. This number does not include 67.5 MW of wind generation attributable to contracts filed by Indiana Michigan Power Company as these projects are outside of Michigan or 1.05 MW of hydro and anaerobic bio-digestion projects that were commercially operational prior to PA 295.
[21] See http://milmi.org/research/artmid/40930/articleid/3199/michigan-industry-cluster-workforce-reports
[22] See 2014 Cluster Workforce Updates – Energy: http://milmi.org/research/artmid/40930/articleid/3194/cluster-workforce-updates-2014
[23] The report's author provided additional information to MPSC staff showing job data for 2016.

Michigan equipment and labor. The Commission will continue to monitor data on the impact of the renewable energy standard on employment in Michigan.

Impact of Percentage Limits on the Use of Advanced Cleaner Energy Credits

Advanced cleaner energy (ACE) is defined in PA 295 as any of the four following facilities: 1) gasification, 2) industrial cogeneration, 3) coal-fired electric generating if at least 85% of the carbon dioxide emissions are captured and permanently geologically sequestered, or 4) electric generating that uses technologies not in commercial operation on the effective date of PA 295. Energy produced from these facilities is eligible for ACE credits (ACEC); the credits are tracked within MIRECS. Electric providers may substitute ACECs for RECs to meet the renewable energy standard. However, there are conditions on the substitution and there is a statutorily imposed limit on the percentage of ACECs eligible to be used each year for the renewable energy standard.

Section 27(7) of PA 295 describes the conditions and substitution limits. ACECs from industrial cogeneration may be substituted for RECs without Commission approval. For other types of ACECs, substitution may only be made with Commission approval and if the advanced cleaner energy is both cost effective and provides a carbon dioxide emission benefit. The combination of energy optimization credits and ACECs may not account for more than 10% of the total energy credits used to meet the standard in a given year. Older non-plasma arc gasification advanced cleaner energy systems (in existence on January 1, 2008) cannot be used to meet more than 70% of the 10% limit. The substitution ratio of plasma arc gasification or industrial cogeneration is one ACEC to one REC while the ratio for other forms of advanced cleaner energy is 10 ACECs to one REC.

The Commission has found no negative impact on advanced cleaner energy development based on the above-described percentage limits. To better answer this question, the MPSC staff asked the question "Did the percentage limits in Section 27(7) affect development of advanced cleaner energy by the electric provider? How so?" in the annual reports required under Section 51. No electric provider indicated the percentage limits in Section 27(7) affected development of advanced cleaner energy. Three electric providers utilized a total of 107,016 ACECs for 2015 compliance which is just over one percent of the total energy credits used for 2015 compliance. The same single facility generated all of Michigan's advanced cleaner energy for both 2016 and 2015 when 336,011 MWh and 266,274 MWh were generated respectively. The percentage limits do not appear to be affecting the development of advanced cleaner energy in Michigan.

The Cost of Renewable Energy Compared to the Cost of New Coal Energy

Pursuant to Section 21(6)(b) of the Act, rate-regulated electric providers' REPs were required to show that the life cycle cost of renewable energy acquired, less the life cycle net savings associated with Energy Optimization Plans, did not exceed the life cycle cost of electricity generated by a new conventional coal-fired facility. The Commission staff filed a letter in MPSC Case No. U-15800 to provide the required life cycle cost of electricity generated by a new conventional coal plant:

> The Commission's temporary order implementing 2008 PA 295, Case Number U-15800, directed the staff to work with the providers to develop the required life cycle cost of electricity generated by a new conventional coal-fired facility in terms of a guidepost consisting of a levelized busbar rate, in $/MWh, of an advanced-supercritical pulverized coal plant with a life cycle of 40 years. The Commission directed the staff to submit the number to the Commission by January 30, 2009. The staff has diligently

worked with the providers to develop the guidepost rate and finds that the number is $133 per MWh.[24]

This guidepost rate was derived from data provided to Consumers Energy as a result of the Company's inquiry into building a new 830 MW coal fired power facility, and was adopted by all electric providers. The Commission continues to find that the $133 per MWh guidepost is reasonable.

By comparing the levelized cost of $133 per MWh for a new conventional coal-fired power facility with the combined weighted average levelized contract prices in **Table 1**, the cost of all renewable energy projects using multiple renewable energy technologies is less than the coal guidepost rate with the exception of 14 MW of total capacity.

Table 1: Weighted Average Levelized Renewable Energy Contract Prices

Consumers Energy						
Technology	**Wind**	**Digester**	**Biomass**	**Landfill**	**Hydro**	**Solar**
Weighted Average	$84.11	$137.77	NA	$106.21	$121.31	$160.00
Detroit Edison						
Technology	**Wind**	**Digester**	**Biomass**	**Landfill**	**Hydro**	**Solar**
Weighted Average	$68.16	NA	$98.94	$98.97	NA	$113.52
Combined Weighted Average	**$71.55**	**$137.02**	**$98.94**	**$104.05**	**$121.31**	**$121.27**

While the Commission is required to make a determination about the cost effectiveness of the renewable energy standard as compared to the life-cycle cost of electricity of coal-fired

[24] *Source:* Excerpt from Commission staff January 30, 2009 Guidepost Rate Letter, http://efile.mpsc.state.mi.us/efile/docs/15800/0023.pdf.

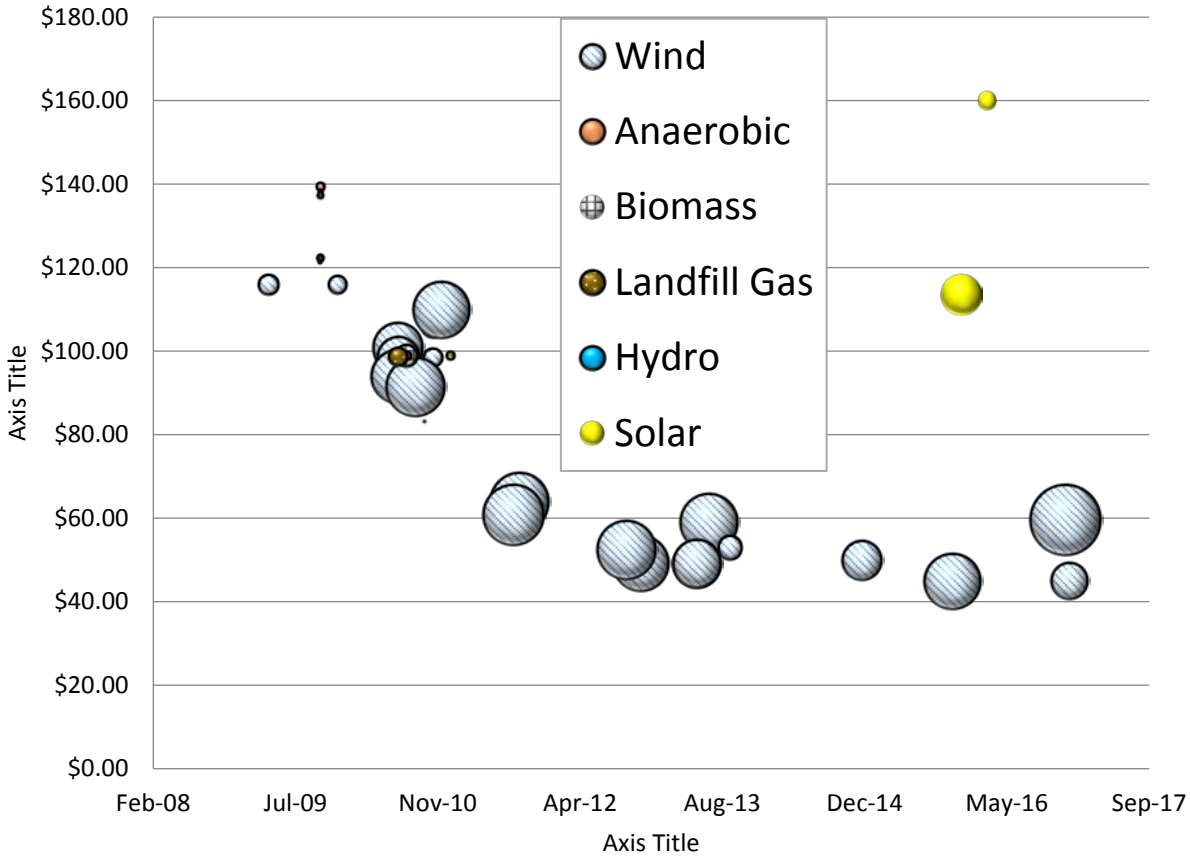
generation, it should be noted that renewable energy wind resources are not equivalent on a capacity basis when compared to coal-fired or other base load generation. The differences in energy availability during peak loads can be significant. For example, regional transmission organizations such as Midcontinent Independent System Operator (MISO) discounted the capacity value of wind resources during the peak load to as low as 15.6% for the 2016 – 2017 planning year,[25] compared to an availability ranging as high, or higher than 80% for base load generation plants.[26] Comparing per unit energy costs of different generation types may not reflect the true value of the resource to the reliability of the electric system as a whole.

Cost-Effectiveness of Renewable Energy and Energy Optimization Standards

Section 51(5)(e) of PA 295 requires an evaluation of the cost-effectiveness of the renewable energy standard. In a similar vein, Section 97 of PA 295 requires the Commission to evaluate and determine whether the energy optimization and renewable energy standards have been cost-effective. The actual cost of renewable energy contracts submitted to the Commission to date continues to show a downward pricing trend. The most recent wind contracts approved by the Commission have levelized costs in the $45 - $69 per MWh range, approximately half of the levelized cost of the first renewable energy contracts approved in 2009 and 2010. Weighting the levelized costs of all contracts by the generation in MWh results in an average cost of $73.83 per MWh. With the exception of 14 MW of capacity, all renewable energy contract prices are lower than the $133 per MWh coal guidepost rate as shown in **Figure 11**.

[25] https://www.misoenergy.org/Library/Repository/Report/2016%20Wind%20Capacity%20Report.pdf
[26] The availability on-peak for base load generators is unit-specific. Older units may have capacity values significantly lower than 80%, however, newer units, especially newer nuclear units may have capacity values on-peak above 90%.

Figure 11[27]: Levelized Cost of MPSC Approved Contracts



Factoring in the cost per MWh of energy optimization programs, as required by Section 21(6)(b) of PA 295, **Table 2** demonstrates the cost-effectiveness of the renewable energy and energy optimization standards on a combined basis using the state's two largest electric providers. The levelized cost of conserved energy of the energy optimization programs was weighted by the life cycle energy savings, through 2029, expected from the companies' Energy Optimization Programs. For renewable energy, the levelized costs of all DTE Electric and Consumers Energy contracts approved by the Commission were weighted by the generation

[27] Circle size denotes project capacity size.

anticipated over the term of the contract.[28] To determine the anticipated generation for the company-owned projects, the depreciable composite life of the project was used. For Consumers Energy's company-owned projects, the present value of the generation based on a 31.2-year life was used. For DTE Electric-owned projects, the present value of the generation based on a 22-year life was used. IRECs were not factored into the weighting of any of the renewable energy projects; however, doing so would increase the cost effectiveness of renewable energy. The combined cost of $34.65 per MWh for both Subpart A (Renewable Energy Standard) and Subpart B (Energy Optimization Standard) of 2008 PA 295 is approximately 25% of the cost of a new conventional coal plant, using $133 per MWh as the coal plant cost. On a stand-alone basis, the $73.83 per MWh cost of the renewable energy standard is substantially lower than the cost of a new coal-fired plant, but the combined cost of $34.65 per MWh, is less than any new generation, including new natural gas combined cycle plants, when compared to the Energy Information Administration levelized plant costs for 2016.[29]

[28] Solar pilot programs were excluded because levelized cost data is not available and the solar pilot programs would contribute minimally to the weighted average because they are very small compared to the total. DTE Electric's 50 MW solar project and Consumers Energy's 10 MW solar project are included.

[29] *See:* http://www.eia.gov/outlooks/aeo/pdf/electricity_generation.pdf

Table 2: Cost Effectiveness of Energy Optimization and Renewable Energy Standards

Energy Optimization Cost of Conserved Energy Weighted Average ($/MWh)	**$15.37[30]**
Renewable Energy Weighted Average Cost ($/MWh)	**$73.83**
Combined Weighted Average Cost of Energy Optimization and Renewable Energy ($/MWh)	**$34.65**
Source: EO cost data assumes EO plans renew similar measures on a yearly basis through 2029 (corresponding to the 20 year period of the initial 2009 renewable energy plans). Renewable energy cost data is based on levelized costs provided as part of the renewable energy contract approval process.	

Effect of the Renewable Energy and Energy Optimization Standard on Electricity Prices

PA 295 provides for the recovery of costs associated with complying with both the renewable energy standard and the energy optimization standard. As described in the 2013 report on renewable energy released as part of the *Readying Michigan to Make Good Energy Decisions* information gathering process:

> Act 295 renewable energy costs are recovered in two ways: the energy and capacity portion of the renewable energy is recovered pursuant to Sections 47 and 49 of the Act through the Power Supply Cost Recovery (PSCR) mechanism utilizing a transfer price schedule while the remaining or incremental portion of the renewable generation costs is recovered through a surcharge. The incremental cost of compliance represents the cost of renewable energy above and beyond the costs defined by transfer price schedules and recovered through the PSCR process. PSCR recovery is generally reserved for power purchase agreement recovery, fuel purchases and some Environmental Protection Agency regulation compliance costs. Sections 47 and 49 of the Act expanded the use of the PSCR mechanism to include the projected capacity, energy, and maintenance and operation costs, which is now called the transfer price. Transfer price schedules are representative of what a Michigan electric provider would pay had it obtained the energy and capacity (the non-renewable market price component) through a new long term power purchase agreement for traditional fossil fuel electric generation. To best determine the value of the non-renewable component of Act 295 compliant generation, Commission

[30] Based on data that is one year newer than the number reported in the November 2016 2016 Report on the Implementation of the Act 295 Utility Energy Optimization Programs.

> staff determined, for purposes of developing a uniform Transfer Price Schedule, that the levelized cost of a new natural gas combined cycle (NGCC) plant would likely be analogous to the market price mentioned above.[31]

In 2015, the average annual transfer price for DTE Electric was $64.53 per MWh and the average annual transfer price for Consumers Energy was $77.09 per MWh. Renewable energy surcharge amounts are listed in ***Appendix B***.

In addition, all investor-owned, cooperative and municipal electric providers (as well as Commission-regulated natural gas utilities) implement energy optimization programs, and are able to recover costs associated with running those programs in a cost-effective manner through energy optimization surcharges. Detailed information about electric provider energy optimization programs are found in the Commission's *2016 Report on the Implementation of the P.A. 295 Utility Energy Optimization Programs*, issued on November 30, 2016.[32]

Spending on renewable energy and energy optimization has had an impact on electric rates, but should be considered in context of other rate drivers as well. Information submitted as part of the *Readying Michigan to Make Good Energy Decisions* process indicates that several factors, including load loss, fuel costs, environmental investment, and base system investment, have contributed to electric rate increases since 2008, most more significantly than spending on renewable energy or energy optimization.[33] There are also benefits attributable to an increase in renewable energy generation sources and improved energy efficiency. Wind and solar generation have zero fuel costs and the integration of zero fuel-cost generation into the regional market can

[31] For more detailed information on the staff Transfer Price Schedule see: http://efile.mpsc.state.mi.us/efile/docs/15800/0042.pdf

[32] *See:* http://www.michigan.gov/documents/mpsc/2016_Energy_Optimization_Report_to_the_Legislature_with_Appendix_Nov_30_543919_7.pdf

[33] See: http://michigan.gov/documents/energy/Additional_Areas_final_440032_7.pdf, Figures 6 and 7, pp. 24-25.

results in lower locational marginal prices in the energy market. In addition, the Commission's *2016 Report on the Implementation of the P.A. 295 Utility Energy Optimization Programs* found that for every dollar spent on energy optimization, customers realize a cost benefit of $4.35.[34] And, as noted in previous sections, the cost of energy generated by renewable sources continues to decline and is cheaper than new coal-fired generation.

Conclusion

The Commission is pleased to note that the 10% renewable energy standard for 2015 was accomplished successfully by all Michigan electric providers. The combined efforts of the electric providers, renewable energy project developers, communities hosting renewable energy projects, renewable energy advocates and many others have contributed to the effective implementation of Michigan's renewable energy standard. The renewable energy standard can be credited with the development of over 1,670 MW of new renewable energy projects. The weighted average price of existing renewable energy contracts over the 2009 – 2016 time period is $73.83 per MWh, which is considerably less than forecasted in the initial REPs. The combined weighted average cost of the energy optimization and renewable energy programs is $34.65 per MWh, significantly lower than the cost of all types of new fossil fuel generation plants.

The process is underway to implement the provisions in the new renewable energy standard as enacted in PA 342 of 2016. The Commission intends to build on the successful activities already in place to guide Michigan's path to meeting the 15% renewable energy standard in 2021.

[34] *See:* http://www.michigan.gov/documents/mpsc/2016_Energy_Optimization_Report_to_the_Legislature_with_Appendix_Nov_30_543919_7.pdf

Appendix A - Renewable Energy Case Numbers and Electric Providers

	COMPANY	Initial RE Plan Case #	Most Recent Plan Case #	2015 Reconciliation Case #	2016 Reconciliation Case #
	IOUs				
1	Alpena Power Company	U-15804	U-17791	U-18080	U-18203
2	Consumers Energy Company	U-15805	U-17792	U-18081	U-18231
3	DTE Electric Company	U-15806	U-17793	U-18082	U-18232
4	Indiana Michigan Power Company	U-15808	U-17794	U-18083	U-18233
5	Northern States Power Company-Wisconsin	U-15809	U-17795	U-18084	U-18234
6	Upper Peninsula Power Company	U-15810	U-17796	U-18086	U-18235
7	Wisconsin Public Service Corporation	U-15811	U-17797	U-18088	U-18236
8	Wisconsin Electric Power Company	U-15812	U-17798	U-18087	U-18237
	Cooperatives - Member Regulated			**Not Required**	
9	Alger Delta Cooperative Electric Association	U-15813	U-16589		
10	Bayfield Electric Cooperative	U-15814	U-16590		
11	Cherryland Electric Cooperative	U-15815	U-16591		
12	Cloverland Electric Cooperative/Edison Sault	U-15816	U-17799		
13	Great Lakes Energy Cooperative (2012)	U-15817	U-16593		
14	Midwest Energy Cooperative	U-15818	U-16594		
15	Ontonagon Co. Rural Electricification Assoc. (2012)	U-15819	U-16595		
16	Presque Isle Electric and Gas Co-op (2012)	U-15820	U-16596		
17	Thumb Electric Cooperative	U-15821	U-16598		
18	Tri-County Electric Cooperative	U-15822	U-17801		
	Municipals			**Not Required**	
19	Village of Baraga	U-15848			
20	City of Bay City	U-15849			
21	City of Charlevoix	U-15850			
22	Chelsea Department of Electric and Water	U-15851			
23	Village of Clinton	U-15852			
24	Coldwater Board of Public Utilities	U-15853			
25	Croswell Municipal Light & Power Department	U-15854			
26	City of Crystal Falls	U-15855			
27	Daggett Electric Department	U-15856			
28	City of Dowagiac	U-15858			
29	City of Eaton Rapids	U-15859			
30	City of Escanaba	U-15860			
31	City of Gladstone	U-15861			
32	Grand Haven Board of Light and Power	U-15862			
33	City of Harbor Springs	U-15863			
34	City of Hart Hydro	U-15864			
35	Hillsdale Board of Public Utilities	U-15865			
36	Holland Board of Public Works	U-15866			
37	Village of L'Anse	U-15867			
38	Lansing Board of Water & Light	U-15868			
39	Lowell Light and Power	U-15869			
40	Marquette Board of Light and Power	U-15870			
41	Marshall Electric Department	U-15871			
42	Negaunee Department of Public Works	U-15872			
43	Newberry Water and Light Board	U-15873			
44	Niles Utility Department	U-15874			
45	City of Norway	U-15875			
46	City of Paw Paw	U-15876			
47	City of Petoskey	U-15877			
48	City of Portland	U-15878			
49	City of Sebewaing	U-15879			
50	City of South Haven	U-15880			
51	City of St. Louis	U-15881			
52	City of Stephenson	U-15882			
53	City of Sturgis	U-15883			
54	Traverse City Light & Power	U-15884			
55	Union City Electric Department	U-15885			
56	City of Wakefield	U-15886			
57	Wyandotte Department of Municipal Service	U-15887			
58	Zeeland Board of Public Works	U-15888			

NL = New License
LVR = License Voluntarily Relinquished
LR = License Revoked

Appendix A - Renewable Energy Case Numbers and Electric Providers

	COMPANY	Initial RE Plan Case #	Most Recent Plan Case #	2015 Reconciliation Case #	2016 Reconciliation Case #
	Alternative Electric Suppliers (AES) Serving Customers			**Not Required**	
59	CMS ERM Michigan LLC	U-15826	U-16640		
60	Commerce Energy Inc	U-15828	U-16641		
61	Constellation Energy Services, Inc (formally Integrys)	U-15833	U-16646		
62	Constellation NewEnergy Inc	U-15829	U-16642		
63	Direct Energy Business LLC	U-15845	U-16643		
64	FirstEnergy Solutions Corp	U-15832	U-16644		
65	Noble Americas Energy Solutions LLC	U-15843	U-16650		
66	Spartan Renewable Energy Inc	U-15844	U-16651		
67	U.P. Power Marketing LLC	U-16586	U-16652		
68	Wolverine Power Marketing Cooperative Inc	U-15847	U-16653		
	Alternative Electric Suppliers (AES) Not Serving Customers			**Not Required**	
69	AEP Energy, Inc	U-15825	U-15825		
70	Dillon Power, LLC	U-17769	U-17769		
71	Direct Energy Services LLC	U-15830	U-15830		
72	EDF Energy Services	U-18037	U-18037		
73	Eligo Energy MI, LLC	U-17885	U-17885		
74	Energy Int'l Power Marketing d/b/a PowerOne	U-15831	U-15831		
75	Energy Services Providers, Inc. d/b/a Michigan Gas & Electric	U-17010	U-17010		
76	Interstate Gas Supply, Inc d/b/a IGS Energy	U-17338	U-17338		
77	Liberty Power Delaware	U-15834	U-15834		
78	Libery Power Holdings LLC	U-15835	U-15835		
79	MidAmerican Energy Services	U-17934	U-17934		
80	Nordic Energy Services, LLC	U-18066	U-18066		
81	Plymouth Rock Energy LLC	U-17549	U-17549		
82	Premier Energy Marketing LLC	U-15841	U-16648		
83	Texas Retail Energy, LLC	U-17168	U-17168		
	Alternative Electric Suppliers (AES) Licenses Rescinded			**Not Required**	
	Dynegy Energy Services (East), LLC (Formally Duke Energy	License Rescinded 05/2016			
	Energy.me Midwest, LLC d/b/a energy.me	License Rescinded 04/2016			
	Glacial Energy of Illinois	License Rescinded 02/2016			
	Lakeshore Energy Services, LLC d/b/a CenterPoint Energy Service Retail	License Rescinded 05/2016			
	MidAmerican Energy Company	License Rescinded 08/2016			
	Santanna	License Rescinded 03/2016			
	Term Power & Gas, LLC d/b/a ENCOA	License Rescinded 11/2014			

NL = New License
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LR = License Revoked

Appendix B - Renewable Energy Credit Requirements and Renewable Energy Plan Summary

Company	Initial Plan	2015 Plan Docket	2015 Compliance Year Sales*	Retail Sales Method**	2007/2008 Baseline RECs	2014 REC Requirement	2015 - 2018 REC Requirement	2015 Excess RECs Retired	2015 EO Credit Substitutions	Met the 2015 10% Standard	Current Residential Surcharge $/Month
Rate Regulated Utilities											
Alpena Power	U-15804	U-17791	339,929	3Y	0	16,522	33,993	0		Yes	0.00
Consumers Energy	U-15805	U-17792	33,188,734	3Y	1,549,840	2,440,174	3,318,873	0	73,117	Yes	0.00
DTE Electric	U-15806	U-17793	42,448,318	W	566,819	2,409,028	4,244,832	0	245,148	Yes	0.00
Indiana Michigan	U-15808	U-17794	2,828,387	W	17,450	149,247	282,839	0		Yes	3.00
NSP-Wisc (Xcel)	U-15809	U-17795	141,181	3Y	12,679	13,376	14,118	0		Yes	0.00
Upper Peninsula Power	U-15810	U-17796	838,609	3Y	98,521	84,710	83,861	0		Yes	0.00
Wisc. PSC	U-15811	U-17797	277,498	3Y	11,145	19,841	27,750	0		Yes	0.00
Wisc. Elec Co	U-15812	U-17798	384,000	W	53,196	110,755	38,400	1		Yes	1.20
Member Regulated Cooperatives											
Alger Delta Coop Elec	U-15813	U-16589	69,691	3Y	920	3,706	6,969	0		Yes	0.00
Bayfield Elec. Coop	U-15814	U-16590	167	3Y	4	11	17	0		Yes	0.00
Cherryland Elec Coop	U-15815	U-16591	383,527	3Y	0	18,923	38,353	0		Yes	0.00
Cloverland Electric Coop	U-15816	U-17799	809,686	3Y	301,126	80,028	80,969	0		Yes	0.00
Great Lakes Energy Coop	U-15817	U-16593	1,399,433	3Y	0	68,981	139,943	0		Yes	0.00
Homeworks Tri-County Elec. Coop	U-15822	U-16598	334,324	3Y	0	16,547	33,432	0		Yes	0.00
Midwest Energy Coop	U-15818	U-17800	592,064	3Y	0	29,312	59,206	0		Yes	0.00
Ontonagon Co. Rural Elec.	U-15819	U-16595	25,402	3Y	2,246	2,389	2,540	0		Yes	0.00
Presque Isle Elec & Coop	U-15820	U-16596	238,663	3Y	0	11,850	23,866	0		Yes	0.00
Thumb Elec. Coop	U-15821	U-17801	165,645	3Y	1,562	8,815	16,565	0		Yes	0.00
Alternative Electric Suppliers											
CMS ERM Michigan	U-15826	U-16640		3Y				0		Yes	0.00
Commerce Energy	U-15828	U-16641		W				0		Yes	0.00
Constellation Energy Services, Inc (Formally Integrys)	U-15833	U-16646		W				0		Yes	0.00
Constellation NewEnergy	U-15829	U-16642		W				0		Yes	0.00
Direct Energy Business	U-15845	U-16643		W				0		Yes	0.00
First Energy Solutions	U-15832	U-16644		W				0		Yes	0.00
Noble Americas Energy Solutions f/k/a Sempra Energy Solutions	U-15843	U-16650		W				0		Yes	0.00
Spartan Renewable Energy	U-15844	U-16651		3Y				0		Yes	0.00
U.P. Power Marketing	U-15846	U-16652		W				0		Yes	0.00
Wolverine Power Marketing Cooperative	U-15847	U-16653		3Y				0		Yes	0.00
Aggregated Totals* **			**11,665,909**		**0**	**499,244**	**1,166,591**	**0**			

Appendix B - Renewable Energy Credit Requirements and Renewable Energy Plan Summary

Company	Initial Plan	2015 Plan Docket	2015 Compliance Year Sales*	Retail Sales Method**	2007/2008 Baseline RECs	2014 REC Requirement	2015 - 2018 REC Requirement	2015 Excess RECs Retired	2015 EO Credit Substitutions	Met the 2015 10% Standard	Current Residential Surcharge $/Month
Municipal Utilities											
Village of Baraga	U-15848	U-16599	18,796	3Y	0	937	1,880	0		Yes	0.00
City of Bay City	U-15849	U-16600	316,642	3Y	0	15,947	31,664	0		Yes	0.00
City of Charlevoix	U-15850	U-16601	59,664	3Y	0	2,994	5,966	0		Yes	0.00
Chelsea Dept. of Electric & Water	U-15851	U-16602	98,876	3Y	0	4,908	9,888	0		Yes	0.00
Village of Clinton	U-15852	U-16603	23,397	3Y	0	1,137	2,340	0		Yes	0.00
Coldwater Board of Public Utilities	U-15853	U-16604	347,917	3Y	0	16,115	34,792	0		Yes	0.00
Croswell Municipal Light & Power Dept.	U-15854	U-16605	38,772	3Y	0	1,848	3,877	1		Yes	0.11
City of Crystal Falls	U-15855	U-16606	16,340	3Y	4,400	1,627	1,634	0		Yes	0.00
Daggett Electric Department	U-15856	U-16607	1,351	3Y	0	63	135	0		Yes	0.00
City of Dowagiac	U-15858	U-16609	65,057	3Y	0	3,242	6,506	0		Yes	0.00
City of Eaton Rapids	U-15859	U-16610	93,846	3Y	2,263	5,845	9,385	0		Yes	0.57
City of Escanaba	U-15860	U-16611	141,667	3Y	0	7,178	14,167	0		Yes	0.00
City of Gladstone	U-15861	U-16612	32,396	3Y	0	1,627	3,240	0		Yes	0.00
Grand Haven Board of Light & Power	U-15862	U-16613	284,808	3Y	0	13,953	28,481	0		Yes	0.00
City of Harbor Springs	U-15863	U-16614	37,723	3Y	0	1,895	3,772	0		Yes	0.48
City of Hart	U-15864	U-16615	45,047	3Y	804	2,652	4,505	0		Yes	0.63
Hillsdale Board of Public Utilities	U-15865	U-16616	118,990	3Y	0	5,999	11,899	0		Yes	0.00
Holland Board of Public Works	U-15866	U-16617	1,041,000	3Y	0	51,091	104,100	0		Yes	0.00
Village of L'anse	U-15867	U-16618	11,954	3Y	0	611	1,195	0		Yes	0.00
Lansing Board of Water & Light	U-15868	U-16619	2,144,607	3Y	6,655	111,992	214,461	0		Yes	0.75
Lowell Light & Power	U-15869	U-16620	70,011	3Y	0	3,353	7,001	0		Yes	3.00
Marquette Board of Light & Power	U-15870	U-16621	306,095	3Y	14,016	22,337	30,610	41		Yes	0.00
Marshall Electric Department	U-15871	U-16622	105,224	3Y	1,318	6,005	10,522	1		Yes	0.00
Negaunee Dept. of Public Works	U-15872	U-16623	22,692	3Y	0	1,128	2,269	0		Yes	0.00
Newberry Water and Light Board	U-15873	U-16624	17,850	3Y	4,931	1,805	1,785	562		Yes	0.00
Niles Utilities Department	U-15874	U-16625	131,018	3Y	0	6,574	13,102	0		Yes	0.00
City of Norway	U-15875	U-16626	28,664	3Y	21,080	2,919	2,866	0		Yes	0.00
Village of Paw Paw	U-15876	U-16627	40,833	3Y	0	1,993	4,083	0		Yes	0.00
City of Petoskey	U-15877	U-16628	105,849	3Y	0	5,259	10,585	0		Yes	0.00
City of Portland	U-15878	U-16629	35,397	3Y	1,746	2,689	3,540	0		Yes	0.00
City of Sebewaing	U-15879	U-16630	42,492	3Y	0	2,054	4,249	4		Yes	0.19
City of South Haven	U-15880	U-16631	134,959	3Y	0	6,712	13,496	0		Yes	0.00
City of St. Louis	U-15881	U-16632	39,988	3Y	680	2,316	3,999	0		Yes	0.00
City of Stephenson	U-15882	U-16633	6,091	3Y	0	306	612	47		Yes	0.00
City of Sturgis	U-15883	U-16634	223,562	3Y	11,232	16,753	22,356	0		Yes	0.00
Traverse City Light & Power	U-15884	U-16635	322,971	3Y	778	16,545	32,297	0		Yes	0.00
Union City Electric Department	U-15885	U-16636	15,888	3Y	1,625	1,589	1,589	0		Yes	0.00
City of Wakefield	U-15886	U-16637	13,125	3Y	0	626	1,313	0		Yes	0.00
Wyandotte Dept. of Muncipal Service	U-15887	U-16638	292,164	3Y	0	14,640	29,216	0		Yes	0.00
Zeeland Board of Public Works	U-15888	U-16639	337,397	3Y	0	16,408	33,740	0		Yes	0.00
		***Total	**103,362,287**		**2,685,474**	**6,358,316**	**10,336,231**	**657**	**318,265**		

*Sales from Annual Report

** 3Y = 3 Year Average W = Weather Normalized

***AES totals are aggregated.

Appendix C - ELECTRIC PROVIDER RENEWABLE ENERGY ANNUAL REPORT SUMMARY

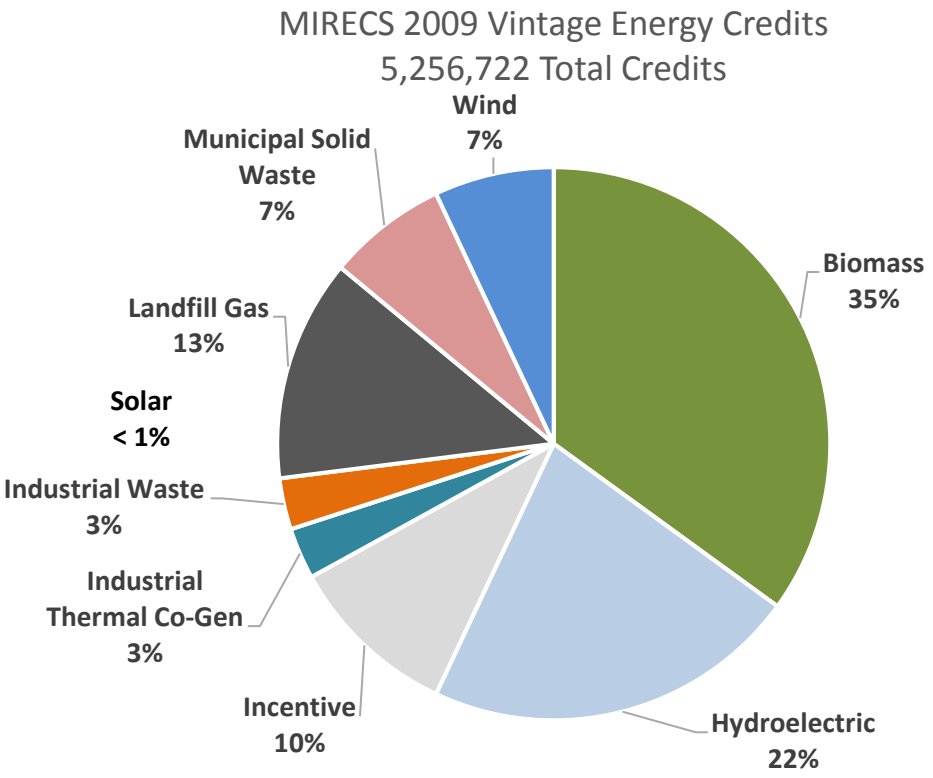
2015 Reporting Year

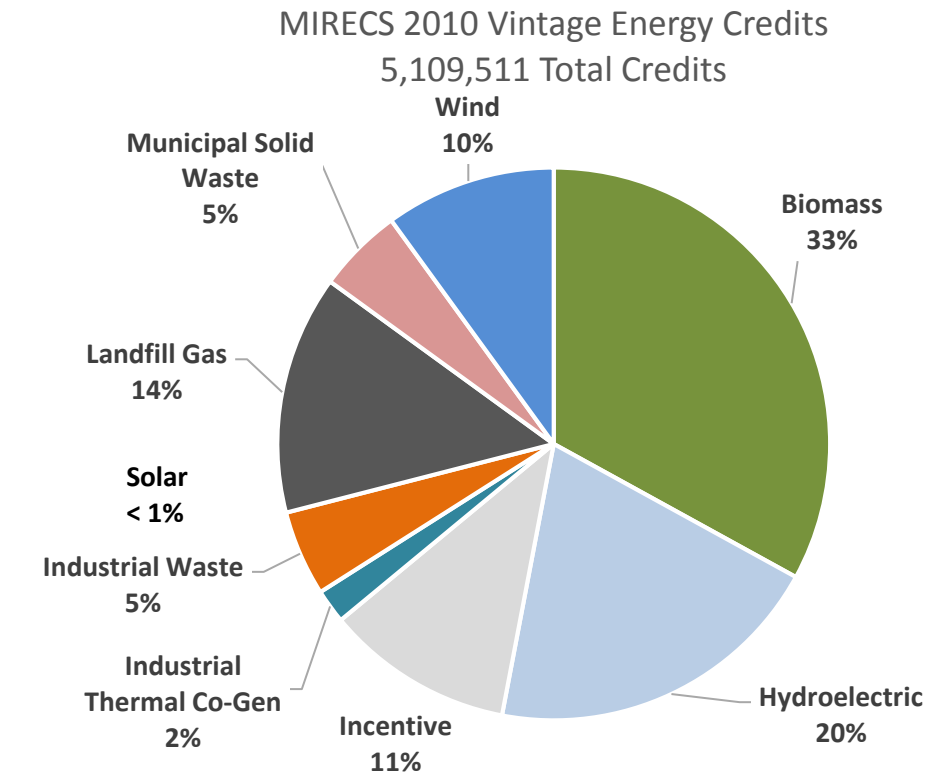
Company Name	2015 Generated or Aquired (RECs)	2015 Generated or Aquired (ACECs)	Energy Credits Sold in 2015 (RECs)	2009-2014 Reported Incremental Cost of Compliance ($)	2015 Reported Incremental Cost of Compliance ($)	Remaining Anticipated Incremental Cost of Compliance ($)	Total Plan Period Anticipated Incremental Cost of Compliance (Prior Years plus Anticipated) ($)
Investor Owned Utilities:							
Alpena Power Company	31,358	0	0	2,643,514	262,618	250,000	3,156,132
Consumers Energy Company	3,109,384	0	4,643	91,468,171	26,700,000	174,100,000	292,268,171
Detroit Edison Company	3,952,010	0	0	232,121,433	43,618,473	168,875,024	444,614,930
Indiana Michigan Power Company	275,330	0	60,033	1,303,498	0	18,854,000	20,157,498
Northern States Power Company	28,192	0	0	0	0	0	0
Upper Peninsula Power Company	197,037	0	60,000	0	0	0	0
Wisconsin Public Service Corporation	181,559	0	0	0	0	0	0
Wisconsin Electric Power Co	25,451	0	0	493,168	1,457,910	10,046,695	11,997,773
	7,800,321	**0**	**124,676**	**328,029,784**	**72,039,001**	**372,125,719**	**772,194,504**
Member Regulated Electric Cooperatives:							
Alger Delta Cooperative Electric Association	3,706	0	0	0	0	0	0
Bayfield Electric Cooperative	11	0	0	51	51	0	102
Cherryland Electric Cooperative	12,742	0	0	0	0	0	0
Cloverland Electric Cooperative	410,360	0	844	0	0	0	0
Great Lakes Energy Cooperative	46,555	0	0	0	0	0	0
Homeworks Tri-County Electric Cooperative	11,076	0	0	0	0	0	0
Midwest Energy Cooperative	19,467	0	0	0	0	0	0
Ontonagon County Rural Electricification Association	0	0	0	0	0	0	0
Presque Isle Electric and Gas Co-op	7,949	0	0	0	0	0	0
Thumb Electric Cooperative	15,405	1,160	0	0	0	0	0
	527,271	**0**	**844**	**51**	**51**	**0**	**102**
Municipally-Owned Electric Utilities:							
City of Bay City	39,183	0	0	1,288,143	0	0	1,288,143
City of Charlevoix	4,984	0	0	181,334	108,015	2,650,969	2,940,318
City of Crystal Falls	7,332	0	4,358	0	0	0	0
City of Dowagiac	6,506	0	0	7,146	0	0	7,146
City of Eaton Rapids	2,493	0	0	329,385	118,284	387,204	834,873
City of Escanaba	15,000	0	0	0	0	262,918	262,918
City of Gladstone	1,627	0	0	0	0	0	0
City of Harbor Springs	4,986	0	0	21,190	0	0	21,190
City of Hart Hydro	3,363	0	0	10,595	0	0	10,595
City of Norway	33,867	0	5	0	0	0	0
City of Petoskey	9,964	0	0	330,747	35,401	0	366,148
City of Portland	3,766	0	0	53,108	15,357	0	68,465
City of Sebewaing	1,510	0	0	12,500	4,670	79,138	96,308
City of South Haven	13,496	0	0	7,719	0	0	7,719
City of St. Louis	2,940	0	0	75,093	0	0	75,093
City of Stephenson	689	0	0	0	0	0	0
City of Sturgis	31,319	0	407	12,051	0	0	12,051
City of Wakefield	2,023	0	0	0	0	0	0
Chelsea Dept of Electric & Water	2,990	0	0	374,353	22,646	0	396,999
Coldwater Board of Public Utilties*	45,494	0	0	3,411	0	0	3,411
Croswell Municipal Light & Power Dept	3,878	0	0	822	4,265	72,210	77,297
Daggett Electric Dept	131	0	0	1,905	0	0	1,905
Grand Haven Board of Light & Power	26,712	0	0	804,545	0	0	804,545
Hillsdale Board of Public Utilities*	45,494	0	0	1,473	0	0	1,473
Holland Board of Public Works	69,878	0	0	6,352,628	0	0	6,352,628
Lansing Board of Water & Light	156,253	0	0	8,185,779	1,397,359	41,105,832	50,688,970
Lowell Light & Power	8,577	0	0	390,922	359,318	11,394,963	12,145,203
Marquette Board of Light & Power	21,598	0	0	42,175	0	0	42,175
Marshall Electric Dept*	45,494	0	0	7,186	0	0	7,186
Negaunee Dept of Public Works	1,128	0	0	0	0	0	0
Newberry Water & Light Board	4,971	0	0	2,173,289	0	0	2,173,289
Niles Utility Dept	13,102	0	0	7,529	0	0	7,529
Traverse City Light & Power	36,867	0	6,678	0	0	0	0
Union City Electric Dept*	45,494	0	0	506	0	0	506
Wyandotte Dept of Municipal Service	24,095	0	0	466,467	0	0	466,467
Village of Baraga	937	0	0	0	0	0	0
Village of Clinton*	45,494	0	0	269	0	0	269
Village of L'Anse	611	0	0	0	0	0	0
Village of Paw Paw	4,083	0	0	2,505	0	0	2,505
Zeeland Board of Public Works	30,446	0	0	11,332	0	0	11,332
	636,799	**0**	**11,448**	**21,156,107**	**2,065,315**	**55,953,234**	**79,174,656**
Combined Annual Report*							
Alternative Electric Suppliers (AES):							
CMS ERM Michigan LLC							
Commerce Energy Inc							
Constellation Energy Services, Inc (formally Integrys)							
Constellation NewEnergy Inc							
Direct Energy Business LLC							
FirstEnergy Solutions Corp							
Noble Americas Energy Solutions LLC f/k/a Sempra Energy Solutions LLC							
Spartan Renewable Energy Inc							
UP Power Marketing LLC							
Wolverine Power Marketing Cooperative Inc							
	1,073,628	**1,071**	**136**	**2,025,974**	**21,500**	**500,000**	**2,547,474**
***Totals:**	**10,038,019**	**1,071**	**137,104**	**351,211,916**	**74,125,866**	**428,578,953**	**853,916,735**

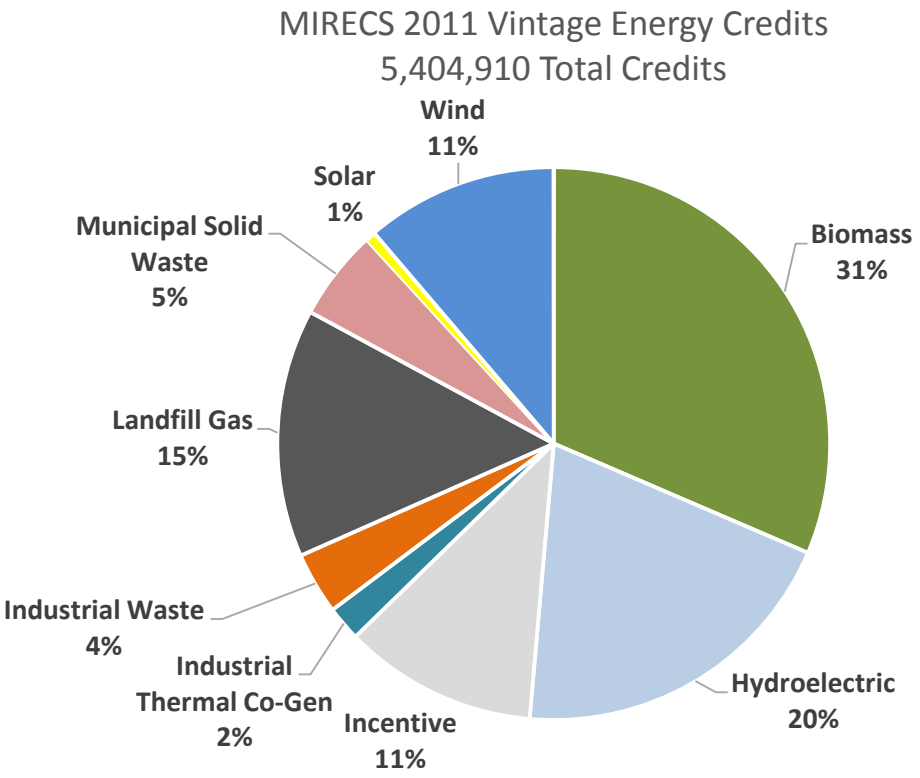
Michigan Retail Sales (MWh):	**103,362,287**
Michigan Estimated Renewable Energy %:	**9.6%**

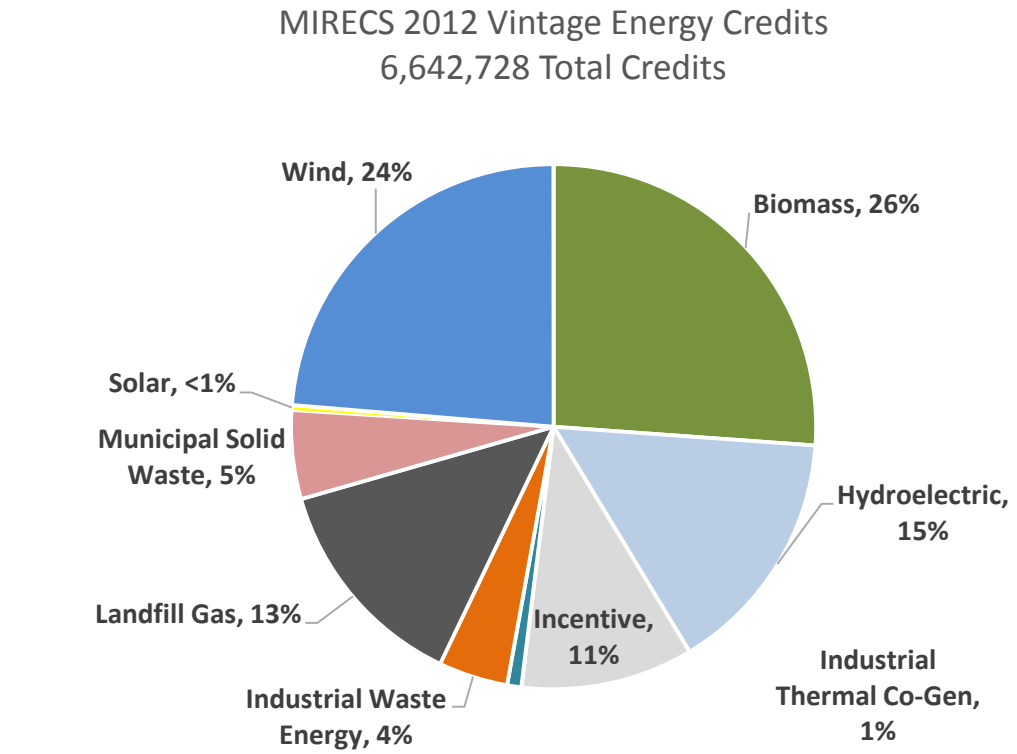
(Based on Appendix B Retail Sales Total)

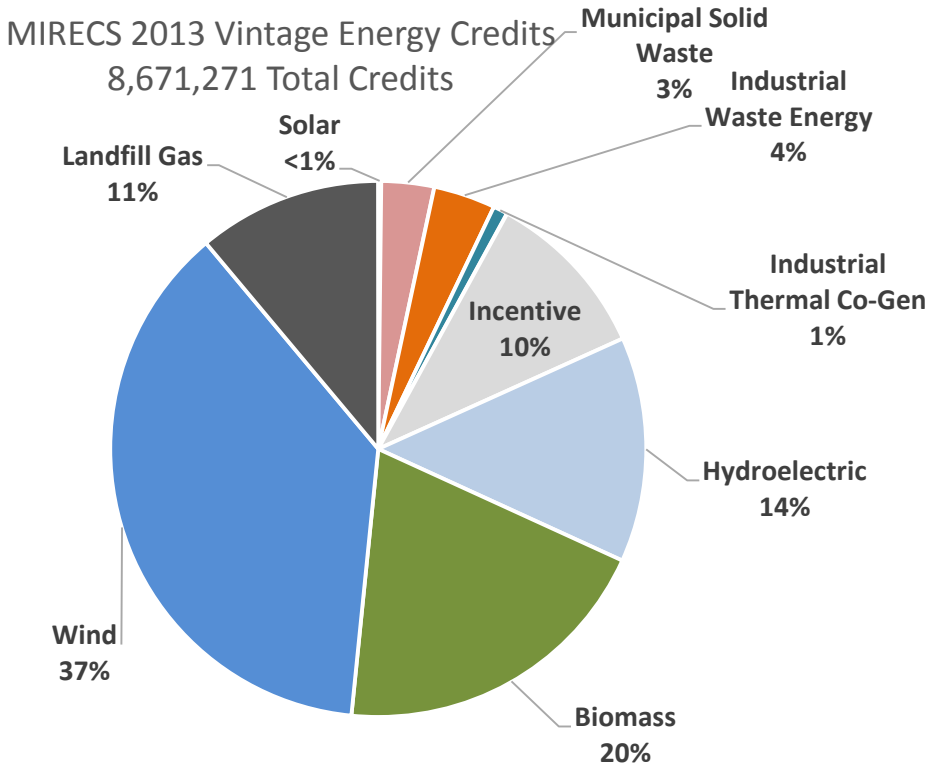
Source: PA 295 Annual Reports:
http://www.michigan.gov/mpsc/0,4639,7-159-16393_53570-240179--,00.html
*AES totals are aggregated

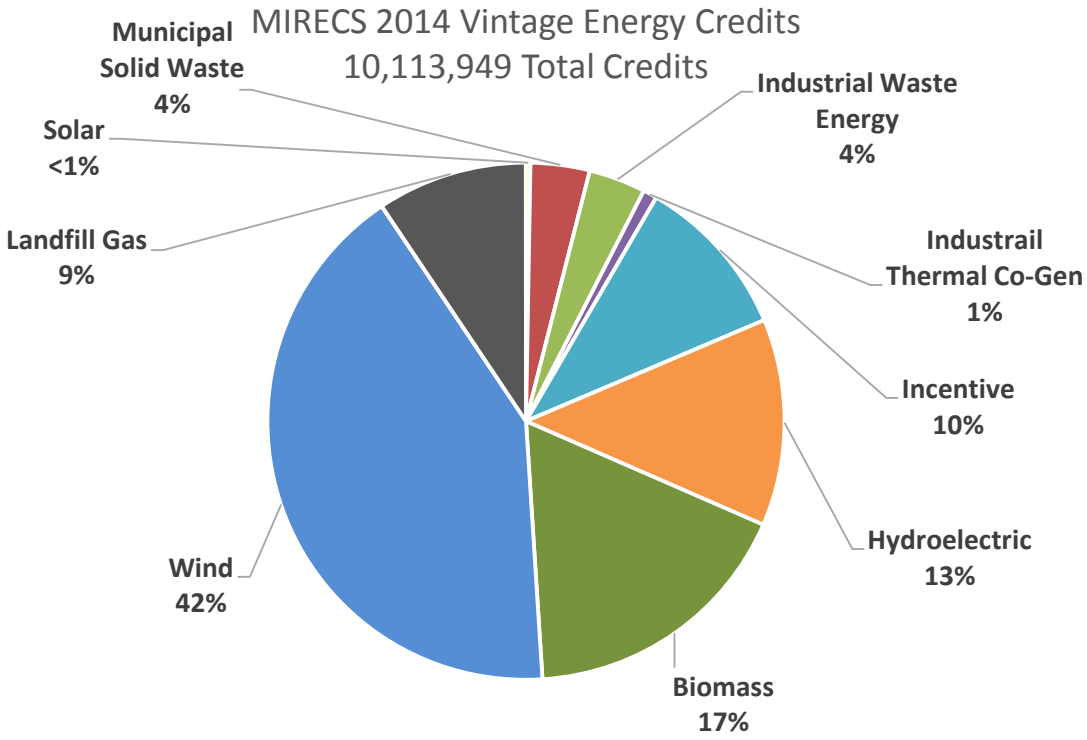

MIRECS 2009 Vintage Energy Credits
5,256,722 Total Credits
Wind
7%
Municipal Solid
Waste
7%
Biomass
35%
Landfill Gas
13%
Solar
< 1%
Industrial Waste
3%
Industrial
Thermal Co-Gen
3%
Incentive
10%
Hydroelectric
22%

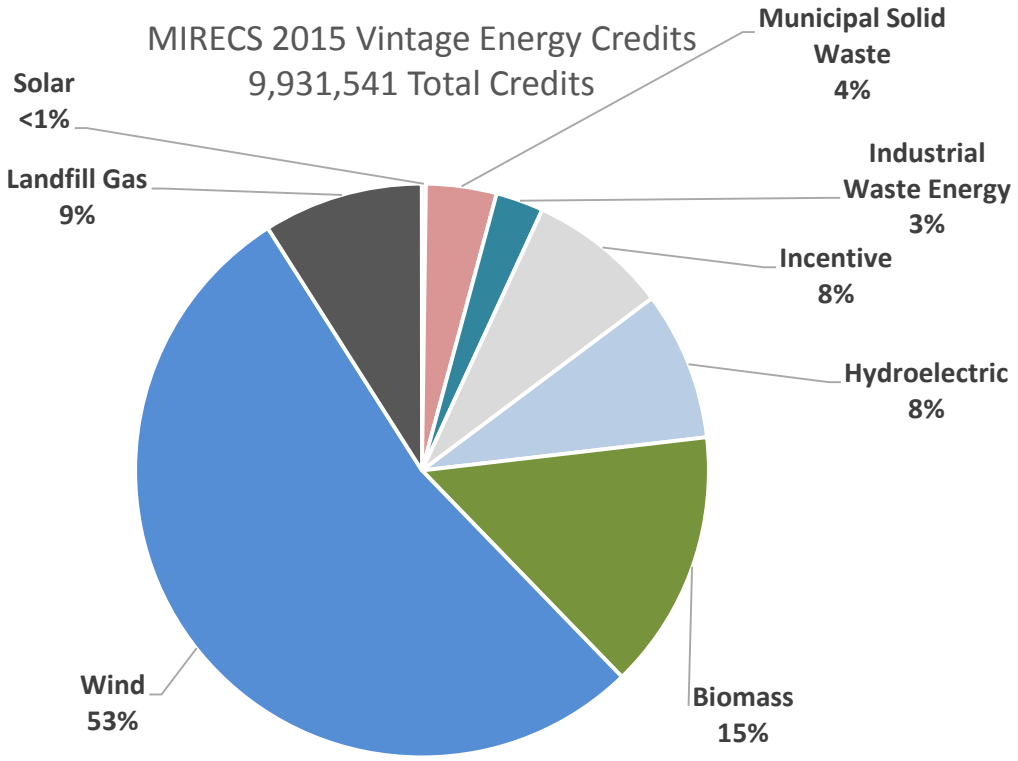

MIRECS 2010 Vintage Energy Credits
5,109,511 Total Credits
Wind
10%
Municipal Solid
Waste
5%
Biomass
33%
Landfill Gas
14%
Solar
< 1%
Industrial Waste
5%
Industrial
Thermal Co-Gen
2%
Incentive
11%
Hydroelectric
20%

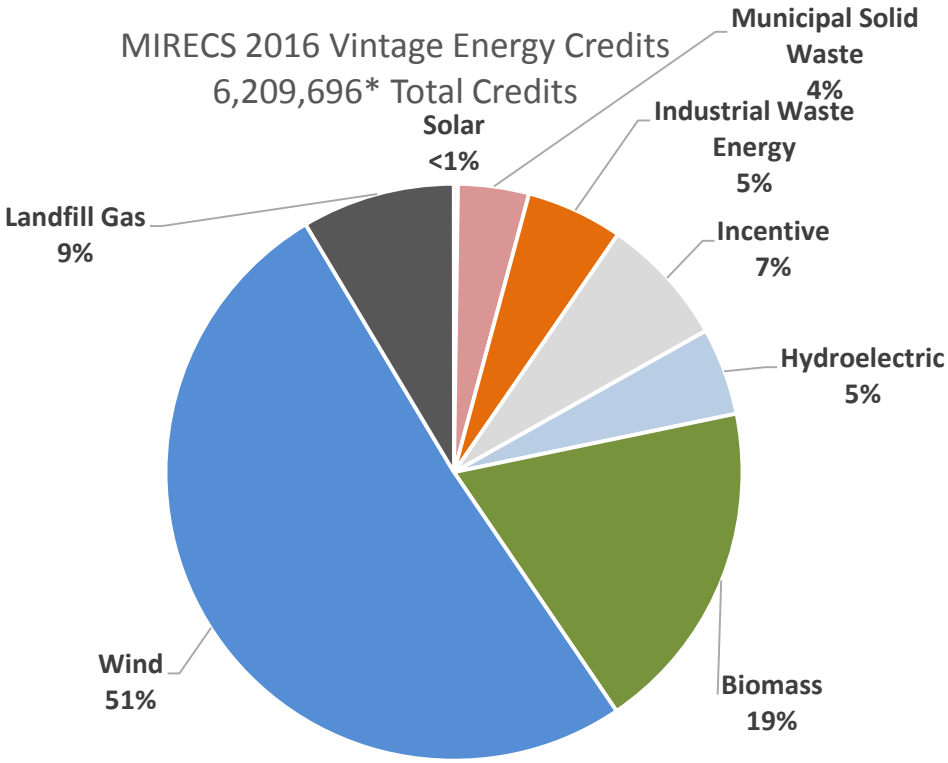

MIRECS 2011 Vintage Energy Credits
5,404,910 Total Credits
Wind
11%
Solar
1%
Municipal Solid
Waste
5%
Biomass
31%
Landfill Gas
15%
Industrial Waste
4%
Industrial
Thermal Co-Gen
2%
Incentive
11%
Hydroelectric
20%


MIRECS 2012 Vintage Energy Credits
6,642,728 Total Credits
Wind, 24%
Biomass, 26%
Solar, <1%
Municipal Solid
Waste, 5%
Hydroelectric,
15%
Landfill Gas, 13%
Incentive,
11%
Industrial
Thermal Co-Gen,
1%
Industrial Waste
Energy, 4%


MIRECS 2013 Vintage Energy Credits
8,671,271 Total Credits
Municipal Solid Waste 3%
Industrial Waste Energy 4%
Industrial Thermal Co-Gen 1%
Incentive 10%
Hydroelectric 14%
Biomass 20%
Wind 37%
Landfill Gas 11%
Solar <1%


MIRECS 2014 Vintage Energy Credits
10,113,949 Total Credits
Municipal Solid Waste 4%
Industrial Waste Energy 4%
Industrail Thermal Co-Gen 1%
Incentive 10%
Hydroelectric 13%
Biomass 17%
Wind 42%
Landfill Gas 9%
Solar <1%





*Not all data has been reported for 2016.

Appendix E- Contract Summary

	Consumers Energy : Contracts							
Map Key	Seller	Quantity	Cost*	Term	Renewable Energy Type	Request for Proposal	Commission Approval	Commercial Operation Date
39	General Electric Company	44 MW	$45/MWh	Company Owned "Cross Winds II"	Wind	10/2/2012	12/20/2016	12/31/2017
37	Suniva, Inc.	Solar Modules up to 10 MW	$160.00/MWh	Company Owned "Solar Gardens"	Solar	7/31/2015	3/29/2016	Starting with 4/18/2016
	SMA Solar Technology America, LLC	String Inverters				8/7/2015		
	J. Ranck Electric, Inc.	Electrical Installation				8/24/2015		
	Mounting Systems Inc.	Panel Racking				8/7/2015		
26	Experimental Advanced Renewable Program Phases 26-35	2,161.5 kW	$0.199-$0.243	Up to 15 years	Solar	Unsolicited	2/11/2016	Varies
34	Geronimo Huron Wind, LLC (Apple Blossom)	100 MW	Less than $45	Up to 15 years	Wind	Unsolicited	11/19/2015	2017
36	Experimental Advanced Renewable Program Anaerobic Digester	2.6 MW	$86/MWh or $76.39/MWh-106.39/MWh	20 years	Anaerobic	Unsolicited	4/23/2015	Varies
26	Experimental Advanced Renewable Program Phases 16-21	1425.1 kW	$0.199-$0.243	Up to 15 Years	Solar	Unsolicited	4/23/2015	Varies
	Experimental Advanced Renewable Program Phases 10-15	1193.7 kW	Non-Residential $0.199-0.209 Residential $0.243-0.249	Up to 15 Years	Solar	Unsolicited	5/2/2014	Varies
32	Barton Malow Company	Construction	$59.00/MWh	Company Owned "Cross Winds"	Wind	4/25/2013	9/10/2013	12/31/2014
	General Electric Company	62 1.7-100 1.7 MW				10/2/2012	6/28/2013	
	ABB Transformers	2- 34.5KV to 345KV transformers				2/27/2013	9/10/2013	
28	Blissfield Wind (Beebe Wind)	Unchanged	Unchanged	20 Years	Wind	Amendment	1/26/2012	12/31/2012
2	Heritage Garden Wind Farm I	20 MW	Unchanged	20 Years	Wind	Amendment	1/26/2012	12/31/2012
3	Heritage Stoney Corners Wind Farm II	Unchanged	Unchanged	20 Years	Wind	Amendment	1/26/2012	1/1/2012
3	Heritage Stoney Corners Wind Farm I (Phase 3)	8.35 MW	$106.20 MWh	20 Years	Wind	Result of Amendments	1/26/2012	1/1/2012
4	Experimental Advanced Renewable Program	987.7 KW	Commercial $0.375/KWh	12 Years	Solar	Unsolicited	5/10/2011	Varies
1	Vestas-American Wind Technology	56 V100 1.8 MW Turbines	$110.00/MWh	Company Owned "Lake Winds"	Wind	1/15/2010	12/2/2010	12/31/2012
	White Construction, Inc. U-15805 edocket files # 251-256	Installation and construction				7/23/2010		
	GE Prolec Transformers, Inc.	2-125 KV transformers				7/27/2009		
2	Heritage Garden Wind Farm I	28.6 MW	$106.20 MWh	20 Years	Wind	Unsolicited	11/19/2010	1/1/2012
3	Heritage Stoney Corners Wind Farm II	12.3 MW	$98.50 MWh	20 Years	Wind	Unsolicited	11/19/2010	1/1/2012
4	Experimental Advanced Renewable Program	Commercial 836.6 KW Residential	Commercial $0.45/KWh	12 Years	Solar	Unsolicited	12/21/2010	5/1/2010
5	Scenic View Dairy**	0.35 MW	$83.07/MWh	63 Months	Anaerobic	Unsolicited	10/26/2010	7/29/2010
28	Blissfield Wind (Now Beebe Wind)	81 MW	$100.88/MWh	20 Years	Wind	5/7/2009	7/27/2010	12/31/2012

Appendix E- Contract Summary

	Consumers Energy : Contracts							
Map Key	Seller	Quantity	Cost*	Term	Renewable Energy Type	Request for Proposal	Commission Approval	Commercial Operation Date
7	Harvest II Wind	59.4 MW	$98.38/MWh	20 Years	Wind	5/7/2009	7/27/2010	12/31/2012
8	Michigan Wind 2	90 MW	$94.00/MWh	20 Years	Wind	5/7/2009	7/27/2010	6/30/2012
9	WM Renewable Energy - Pine Tree Acres	12.8 MW	$98.75/MWh	20 Years	Landfill Gas	5/7/2009	7/27/2010	6/30/2012
10	WM Renewable Energy - Northern Oaks Landfill	1.6 MW	$122.39/MWh	20 Years	Landfill Gas	1/29/2009	10/13/2009	11/11/2010
11	NANR – Lennon	1.6 MW	$137.27/MWh	20 Years	Landfill Gas	1/29/2009	10/13/2009	12/31/2010
12	Elk Rapids Hydro Electric** 1	0.7 MW	$121.31/MWh	10 Years	Hydro	1/29/2009	10/13/2009	7/11/2009
13	Zeeland**	1.6 MW	$122.20/MWh	7 Years	Landfill Gas	1/29/2009	10/13/2009	7/11/2009
14	Freemont Community Digester	3.1 MW	$139.35/MWh	20 Years	Anaerobic	1/29/2009	10/13/2009	11/11/2012
15	Scenic View Dairy** 1, 2	0.82 MW	$138.17/MWh	7 Years	Anaerobic	1/29/2009	10/13/2009	7/11/2009

Appendix E- Contract Summary

	DTE Electric Company : Contracts							
Map Key	Seller	Quantity	Cost*	Term	Renewable Energy Type	Request for Proposal	Commission Approval	Commercial Operation Date
40	Pine River Wind Energy, LLC	161.3 MW	$59.67***	Company Owned “Pine River”	Wind	5/20/2016	12/20/2016	12/31/2018
38	Innovatus (DTE Solar)	Up to 50 MW	$113.52/MWh***	Company Owned	Solar	6/24/2015	12/11/2015	10/31/2016
35	General Electric Company	1.7MW-100 model turbines up to 50 MW	$47/MlWh - $53/MWh	Company Owned “Pinnebog Wind”	Wind	2/17/2014	12/18/2014	12/31/2015
	Aristeo Construction Company	Installation and construction				6/20/2014		
16	Rudolf Libbe, Inc	750 kW	$3,741/kW	Company Owned	Solar	9/28/2012	7/8/2014	Apr-15
	Inovateus Solar, LLC. (SolarCurrents)	504 kW						
33	Big Turtle Wind Farm, LLC	20 MW	$53/MWh	20 Years	Wind	Unsolicited	9/24/2013	Expected 2014
31	Pheasant Run Wind, LLC	74.8 MW	Up to $49.25/MWh	20 Years	Wind	Unsolicited	5/17/2013	12/31/2014
31	Pheasant Run Wind II, LLC	74.8 MW	Up to $49.25/MWh	Company Owned “Brookfield”	Wind	Unsolicited	5/17/2013	12/31/2014
16	SolarCurrents Phase II	0.5 MW Non-Residential 1.5 MW Residential	$0.13/W $0.02/kWh $0.20/W $0.03/kWh	Through 8/31/2029	Solar	Unsolicited	11/16/2012	Varies
29	Tuscola Wind II, LLC	100 MW	$49.25/MWh***	20 Years	Wind	5/3/2012	10/31/2012	12/31/2013
30	General Electric Company	1.6MW-100 model turbines up to 110 MW	$52.50/MWh	Company Owned “Echo Wind”	Wind	10/12/2011	9/11/2012	12/31/2013
	Barton Malow Company	Installation and construction				4/17/2012		
24	Michigan Waste Energy, Inc.	Up to 65,000 RECs/Year	$7.00/REC	13 Years	Incinerator	Unsolicited	12/6/2011	1991
16	Nova Consultants, Inc.	Solar EPC	Up to $48 Million	Company Owned	Solar	2/28/2011	11/10/2011	12/31/2015
	McNaughton-McKay Electric Company	Supply up to 12 MW of Modules	Up to $24 Million			3/24/2011		
	Inovateus Solar, LLC (SolarCurrents)	Supply up to 12MW						
27	General Electric Company	Up to 69 1.6MW-100 Turbines	$61-$64/MWh	Company Owned “Thumb Wind” McKinley, Minden, Sigel	Wind	3/9/2011	9/13/2011	12/31/2012
	Barton Malow Company	Installation and construction				5/6/2011		
25	Tuscola Bay Wind. LLC	120 MW	Up to $60.90/MWh	20 Years	Wind	11/18/2010	8/25/2011	10/31/2012
20	L’Anse Warden Electric Company	110,374 RECs	$11.98 (Average of 4 REC/ACEC Contracts)	Amendment Acquiring Vintage RECs	Biomass	8/18/2009	8/25/2011	7/1/2010
18	Gratiot County Wind	12.8 MW additional	Unchanged from original contract	Company Owned	Wind	Amendment	5/10/2011	12/31/2012
16	Nova Consultants (SolarCurrents)	Unchanged from original contract	Unchanged from original contract	Company Owned	Solar	Extension	12/21/2010	12/31/2011
17	Blue Water Renewables - Smiths Creek Landfill	3.2 MW	$99.00/MWh	20 Years	Landfill	Unsolicited	1/20/2011	12/31/2011
18	Gratiot County Wind	110.4 MW 89.6 MW Company Owned	$91.43/MWh Up to $94.43/MWh	20 Years Company Owned	Wind	8/18/2009	9/14/2010	5/1/2012 3/31/2012

Appendix E- Contract Summary

	DTE Electric Company : Contracts							
Map Key	Seller	Quantity	Cost*	Term	Renewable Energy Type	Request for Proposal	Commission Approval	Commercial Operation Date
19	WM Renewable Energy - Eagle Valley Landfill	3.2 MW	Combined average price of $98.94/MWh	20 years	Landfill	8/18/2009	8/10/2010	6/1/2011
20	L'Anse Warden Electric Company	17 MW		20 years	Biomass	8/18/2009	8/10/2010	7/1/2010
21	Boyce Hydro**	Firm 210,000 RECs w/additional 112,000 RECs dependent on	$7.75/ REC	7 Years	Hydro	12/23/2009	4/27/2010	3/16/2010
16	Nova Consultants (SolarCurrents)	Up to 3 MW	Up to $18 Million	Company Owned	Solar	11/23/2009	3/2/2010	12/31/2010
3	Heritage Sustainable Energy Stoney Corners Wind Farm	12.2 MW	Unchanged from original contract	20 Years	Wind	Unsolicited	12/1/2009	1/1/2011
23	UPPCO**	Firm 500,000 RECs	Combined average price of $12.46/REC	7 Years	Hydro	12/23/2009	12/1/2009	10/1/2009
Not Shown	Sterling Planet**	Firm 2,500,000 RECs		10 Years	MISC	12/23/2009	12/1/2009	10/1/2009
3	Heritage Sustainable Energy Stoney Corners Wind Farm	14 MW	$116.00/MWh	20 Years	Wind	Unsolicited	4/30/2009	12/21/2009

* Per MWh prices represent levelized costs.
** Pre-existing projects prior to 2008 PA 295 - The commercial operation date would refer to the effective date of the contract.
***Staff calculated levelized cost

Appendix E- Contract Summary

	Alpena Power Company : Contracts							
	Seller	**Quantity**	**Cost**	**Term**	**Renewable Energy Type**	**Request for Proposal**	**Commission Approval**	**Commercial Operation Date**
26	Consumers Energy	"Bulk of RECs needed to meet the RPS"	Consumers Energy Company's Average Cost of RECs	20 Years	MISC	Unsolicited	9/15/2009	8/4/2009
	AEP/Indiana Michigan : Contracts							
	Seller	**Quantity**	**Cost**	**Term**	**Renewable Energy Type**	**Request for Proposal**	**Commission Approval**	**Commercial Operation Date**
	Fowler Ridge Wind Farm II	50 MW (7.5MW for MI)	Redacted	20 Years	Wind	Unsolicited	9/15/2009	2/15/2010
	Wildcat I Wind Farm, LLC	100 MW (60MW for MI)	Redacted	20 years	Wind	Competitive Solicitation	8/25/2011	12/31/2012
	Wisconsin Electric Power Company : Contracts							
	Seller	**Quantity**	**Cost**	**Term**	**Renewable Energy Type**	**Request for Proposal**	**Commission Approval**	**Commercial Operation Date**
	Cadillac Renewable Energy. LLC	REC-Only Redacted	Redacted	Redacted	Biomass	Competitive Solicitation	1/23/2014	Redacted

Appendix F - Requests for Proposal (RFP) Summary

Consumers Energy : Request for Proposals/Requests for Information/Pre-Qualifications						
Issue Date	**Type**	**Description**	**Requested Capacity**	**Company Owned**	**Applicable Technology***	**Responses**
8/7/2015	RFP	Request for Proposal for Solar String Inverters				4 Suppliers
7/31/2015	RFP	Request for Proposal for Solar Modules				4 Suppliers
8/7/2015	RFP	Request for Proposal for Solar Park Racking				6 Suppliers
8/24/2015	RFP	Request for Proposal for Solar Park Construction				4 Suppliers
	RFQ	Request for Qualifications for Solar Park Construction	Up to 10 MW	Yes	Solar	11 Suppliers
4/25/2013	RFP	Requested bids for the Installation of a Utility Owned Wind Farm (Cross Winds)				6 Proposals
2/27/2013	RFP	Requested Substation Transformer Bids for Utility Owned Wind Farm (Cross Winds)				5 Proposals
10/2/2012	RFP	Requested bids for Utility Owned Wind Turbines (Cross Winds)	105 MW by	Yes	Wind	9 Proposals/ 6 Suppliers
May-12	RFQ	Request for Qualifications for 105 MWs of Utility Owned Wind Turbines	N/A	Yes	Wind	12 Recipiants
7/23/2010	RFP	Requested bids for the Installation of a Utility Owned Wind Farm				7 Proposals
1/15/2010	RFP	Requested bids for Utility Owned Wind Turbines				11 Proposals/ 4 Suppliers
7/27/2009	RFP	Requested Substation Transformer Bids for Utility Owned Wind Farm	100 MW by 2012	Yes	Wind	4 Proposals
2/19/2010	RFQ	Request for Qualifications for the Installation of a 100 MW Utility Owned Wind Farm	N/A	Yes	Wind	8 Recipients
7/14/2010	RFQ	Request for Qualifications for 100 MWs of Utility Owned Wind Turbines	N/A	Yes	Wind	8 Recipients

* All=Any Renewable Energy Resource defined by 2008 PA 295; REC=Renewable Energy Credit; ACEC=Advanced Cleaner Energy Credit
** CEREC=Capacity, Energy, and Renewable Energy Attributes

Appendix F - Requests for Proposal (RFP) Summary

5/7/2009	RFP	Requested CEREC**	100 MW by 2012 / 150 MW by 2014	No	All	80 Proposals
1/29/2009	RFP	Requested CEREC**	17.4 MW	No	All	12 Proposals/ 11 Suppliers
DTE Electric Company : Request for Proposals/Requests for Information/Pre-Qualifications						
Issue Date	**Type**	**Description**	**Requested Capacity**	**Company Owned**	**Applicable Technology***	**Responses**
5/20/2016	RFP	Wind Ownership Option	Up to 150	Yes	Solar	4 proposals/ 3 suppliers
6/20/2015	RFP	Up to 50 MW Solar Engineering Procurement and Construction	50 MW	Yes	Solar	53 project sites / 12 proposals
6/20/2014	RFP	Requested bids for the Installation of a Utility Owned Wind Farm				3 proposals / 3 suppliers
2/17/2014	RFP	Up to 100 MW of Utility Owned Wind Turbines (Pinnebog)	100 MW by 12/31/2015	Yes	Wind	17 proposals / 6 suppliers
2/6/2013	RFP	Phase II Solar Engineering Procurement and Construction				4 responses
9/28/2012	RFP	Phase I Solar Engineering Procurement and Construction	1.25 MW	Yes	Solar	19 responses / 106 projects
5/3/2012	RFP	100 MW of Wind	100 MW by 12/31/2013	No	Wind	17 proposals / 16 suppliers
4/17/2012	RFP	EPC (Echo)	NA	Yes	Wind	13 proposals / 13 suppliers
12/7/2011	Auction	Requested RECs* Without the Associated Energy	2009 and 2010 Vintage	No	All	NA
10/12/2011	RFP	110 MW of Utility Owned Wind Turbines (Echo)	110 MW by 12/31/2013	Yes	Wind	14 proposals / 7 suppliers
5/6/2011	RFP	EPC (Thumb)	N/A	Yes	Wind	6 proposals / 6 suppliers
3/24/2011	RFP	Solar Panels	12 MW	Yes	Solar	38 proposals, 24 companies
3/10/2011	RFP	Wind Ownership Option	50 MW by 12/31/2014	Yes	All	38 proposals / 15 suppliers
3/9/2011	RFP	109 MW of Utility Owned Wind Turbines (Thumb)	109 MW by 12/31/2012	Yes	Wind	17 proposals / 7 suppliers
2/28/2011	RFP	Requested bids for the Installation of Utility Owned Solar	N/A	Yes	Solar	27 companies, 27 proposals
2/10/2011	RFP	O&M Services	N/A	Yes	Wind	5 proposals / 5 suppliers
11/18/2010	RFP	Requested CEREC**	245 MW by 12/31/2014	No	All	146 proposals / 46 Suppliers

* All=Any Renewable Energy Resource defined by 2008 PA 295; REC=Renewable Energy Credit; ACEC=Advanced Cleaner Energy Credit
** CEREC=Capacity, Energy, and Renewable Energy Attributes

Appendix F - Requests for Proposal (RFP) Summary

7/26/2010	Pre-Q	Pre-qualification for 100-200 MW of Utility Owned Wind Turbines	N/A	Yes	Wind	27 proposals / 17 Suppliers
3/29/2010	SOI	Solicitation of Interest to Host Utility Owned Solar at the Customers Location	N/A	Yes	Solar	10 Responses
11/23/2009	RFP	Requested bids for the Installation of Utility Owned Solar	3 MW	Yes	Solar	11 Proposals
10/23/2009	Pre-Q	Pre-Qualification for the Installation of 3 MW of Utility Owned Solar	N/A	Yes	Solar	30 Responses
8/18/2009	RFP	Joint Development for Utility Owned Wind	75 MW by 12/31/2011	Yes	Wind	12 Proposals/ 9 Suppliers
8/18/2009	RFP	Requested CEREC**	106 MW by 12/31/2011	No	All	35 Proposals/ 21 Suppliers
5/22/2009	RFI	Request for Information for the Joint Development of Wind Farms	N/A	Yes	Wind	155 Registered 27 Responses
12/23/2008	RFP	Requested RECs* and ACECs* Without the Associated Energy	250,000 RECs*/Year	No	All	43 Proposals/ 11 Suppliers

* All=Any Renewable Energy Resource defined by 2008 PA 295; REC=Renewable Energy Credit; ACEC=Advanced Cleaner Energy Credit
** CEREC=Capacity, Energy, and Renewable Energy Attributes

Appendix G - PA 295 CONTRACT RENEWABLE ENERGY PROJECTS

MPSC Rate Regulated Electric Providers

Map Key	Renewable Project Name	County	Capacity (MW)	Type	Power Purchaser	Commercial Operation Date
36	Experimental Advanced Renewable Program	Varies	2.6	Anaerobic Digester	Consumers Energy	Varies
14	Freemont Community Digester	Newaygo	3.1	Anaerobic Digester	Consumers Energy	2012
5, 15	Scenic View Dairy - 2 Locations	Allegan & Barry	1.2	Anaerobic Digester	Consumers Energy	2009 - 2010
20	L'Anse Warden	Baraga	17	Biomass	DTE	2010
		Biomass Total	**23.9**	**MW**		
12	Elk Rapids Hydro	Antrim	0.7	Hydro	DTE	Pre-Act 295 Project
		Hydro Total	**0.7**	**MW**		
19	Eagle Valley Landfill	Oakland	3.2	Landfill Gas	DTE	2011
11	Lennon Generation Station	Shiawassee	1.6	Landfill Gas	Consumers Energy	2010
10	Northern Oaks Landfill	Clare	1.6	Landfill Gas	Consumers Energy	2010
9	Pine Tree Acres Landfill	Macomb	12.8	Landfill Gas	Consumers Energy	2012
17	Smith's Creek Landfill	St. Clair	3.2	Landfill Gas	DTE	2011
13	Zeeland #2	Ottawa	1.6	Landfill Gas	Consumers Energy	2009
		Landfill Gas Total	**24**	**MW**		
4	Experimental Advanced Renewable Program	Varies	6	Solar	Consumers Energy	2009-Present
38	DTE Solar	Lapeer/Wayne	50	Solar	DTE Owned	2016
37	Solar Gardens	Varies	5	Solar	Consumers Energy Owned	2016
16	SolarCurrents	Varies	22	Solar	DTE Owned and Customer Owned	2009 - Present
		Solar Total	**83**	**MW**		
34	Apple Blossom	Huron	100	Wind	Consumers Energy	December 2017
28	Beebe	Gratiot	81	Wind	Consumers Energy	December 2012
33	Big Turtle	Huron	20	Wind	DTE	December 2014
31	Brookfield	Huron	74.8	Wind	DTE Owned	February 2014
32	Cross Winds	Tuscola	105.4	Wind	Consumers Energy Owned	December 2014
39	Cross Winds 2	Tuscola	44	Wind	Consumers Energy Owned	December 2017
30	Echo	Huron	112	Wind	DTE Owned	September 2014
	Fowler Ridge II (MI Allocation)	Benton County, Indiana	7.5	Wind	Indiana Michigan	2010
2	Garden I	Delta	28	Wind	Consumers Energy & DTE	September 2012
18	Gratiot County	Gratiot	212.8	Wind	DTE & DTE Owned	June 2012
7	Harvest II	Huron	59.4	Wind	Consumers Energy	November 2012
1	Lake Winds	Mason	100.8	Wind	Consumers Energy Owned	November 2012
27	McKinley	Huron	14.4	Wind	DTE Owned	December 2012
8	Michigan Wind II	Sanilac	90	Wind	Consumers Energy	January 2012
27	Minden	Sanilac	32	Wind	DTE Owned	December 2012
31	Pheasant Run	Huron	74.8	Wind	DTE	December 2013
40	Pine River	Gratiot, Isabella	161.3	Wind	DTE	December 2018
35	Pinnebog	Huron	51	Wind	DTE Owned	December 2016
27	Sigel	Huron	64	Wind	DTE Owned	December 2012
3	Stoney Corners	Missaukee & Osceola	60	Wind	Consumers Energy & DTE	October 2012
25	Tuscola Bay Wind	Tuscola, Bay & Saginaw	120	Wind	DTE	December 2012
29	Tuscola Bay Wind II	Tuscola & Bay	100	Wind	DTE	November 2013
	Wildcat I (MI Allocation)	Madison & Tipton Counties, Indiana	60	Wind	Indiana Michigan	2012
		Wind Total	**1,773**	**MW**		
		Total Act 295 Contracts	**1,905**	**MW**		

Appendix H — Michigan Utility Scale Wind Farms*

Project Name	County	Capacity (MW)	Turbine Size (MW)	Number of Turbines	Turbine Manufacturer	Developer	Power Purchaser	Commercial Operation Date
Apple Blossom	Huron	100	3.45	29		Geronimo Energy	Consumers Energy	Expected 12/31/2017
Beebe	**Gratiot**	**81**	**2.4**	**34**	**Nordex**	**Exelon & Great Lakes Wind**	**Consumers Energy**	**December 2012**
Beebe 1B	**Gratiot**	**50.4**	**2.4**	**21**	**Nordex**	**Exelon**	**Municipal Utility**	**December 2014**
Big Turtle	**Huron**	**20**	**2.0**	**10**	**Gamesa**	**Heritage Sustainable Energy**	**DTE**	**December 2014**
Big Turtle II	Huron	30	2.0	15	Gamesa	Heritage Sustainable Energy		Expected 12/31/2016
Brookfield	**Huron**	**74.8**	**1.7**	**44**	**GE Energy**	**NextEra Energy**	**DTE**	**February 2014**
Cross Winds	**Tuscola**	**105.4**	**1.7**	**62**	**GE Energy**	**Consumers Energy**	**N/A**	**December 2014**
CrossWinds II	Tuscola	44	2.3	19	GE Energy	Consumers Energy		December 2017
Deerfield Wind	Huron	150	2	72	Vestas	RES Americas	Wolverine Power Cooperative	Expected 2017
Echo	**Huron**	**112**	**1.6**	**70**	**GE Energy**	**DTE**	**N/A**	**September 2014**
Garden I	**Delta**	**28**	**2.0**	**14**	**Gamesa**	**Heritage Sustainable Energy**	**Consumers Energy****	**September 2012**
Gratiot County	**Gratiot**	**212.8**	**1.6**	**133**	**GE Energy**	**Invenergy & DTE**	**DTE**	**June 2012**
Harvest	**Huron**	**52.8**	**1.65**	**32**	**Vestas**	**Exelon**	**Wolverine Power Cooperative**	**2008**
Harvest II	**Huron**	**59.4**	**1.8**	**33**	**Vestas**	**Exelon**	**Consumers Energy**	**November 2012**
Lake Winds	**Mason**	**100.8**	**1.8**	**56**	**Vestas**	**Consumers Energy**	**N/A**	**November 2012**
Mackinaw City	**Emmet**	**1.8**	**0.9**	**2**	**NEG Micon**	**Mackinaw Power**	**Consumers Energy**	**2001**
McKinley	**Huron**	**14.4**	**1.6**	**9**	**GE Energy**	**DTE**	**N/A**	**December 2012**
Michigan Wind I	**Huron**	**69**	**1.5**	**46**	**GE Energy**	**Exelon**	**Consumers Energy**	**2008**
Michigan Wind II	**Sanilac**	**90**	**1.8**	**50**	**Vestas**	**Exelon**	**Consumers Energy**	**January 2012**
Michigan Wind III	Sanilac	153	2.4	63	Nordex	Exelon	Wolverine Power Cooperative	Expected 12/31/2016
Minden	**Sanilac**	**32**	**1.6**	**20**	**GE Energy**	**DTE**	**N/A**	**December 2012**
Pheasant Run Wind	**Huron**	**74.8**	**1.7**	**44**	**GE Energy**	**NextEra Energy**	**DTE**	**December 2013**
Pine River Wind	Gratiot, Isabella	161.3		65		Pine River Wind Energy, LLC	DTE	December 2018
Pinnebog	**Huron**	**51**	**1.7**	**30**	**GE Energy**	**DTE**	**DTE**	**December 2016**
Sigel	**Huron**	**64**	**1.6**	**40**	**GE Energy**	**DTE**	**N/A**	**December 2012**
Stoney Corners	**Missaukee & Osceola**	**60**	**2 - 2.5**	**29**	**Repower, Fuhrlander, Northern Power Systems**	**Heritage Sustainable Energy**	**Consumers Energy, DTE, Traverse City Light & Power**	**2008 - October 2012**
Tuscola Bay Wind	**Tuscola, Bay & Saginaw**	**120**	**1.6**	**75**	**GE Energy**	**NextEra Energy**	**DTE**	**December 2012**
Tuscola Wind II	**Tuscola & Bay**	**100.3**	**1.7**	**59**	**GE Energy**	**NextEra Energy**	**DTE Electric**	**November 2013**
Tuscola Wind III	Tuscola	125		58		NextEra Energy		2017
Totals		**2,338.0**	**MW**	**1,234**	**Turbines**			
Operational Totals		**1,574.7**	**MW**	**883**	**Turbines**			

Bold text indicates the wind farm is operational.

**Heritage may supply power and RECs from this wind farm to DTE under an "additional supply" provision in a separate contract.

* Prepared by MPSC Staff and includes all wind farms operational, planned or under contract with an MPSC-rate-regulated electric provider. Additional wind farms are included as MPSC Staff becomes aware of the pro

Appendix H - Michigan Utility Scale Wind Farms

22 Apple Blossom, 100 MW
1 Beebe Wind, 81 MW
20 Beebe 1B, 50.4 MW
21 Big Turtle, 20 MW
23 Big Turtle II, 30 MW
19 Brookfield, 74.8 MW
16 Crosswinds, 105 MW
16 Crosswinds II, 44 MW
24 Deerfield Wind, 150 MW
2 Echo Wind, 112 MW
3 Garden Wind Farm, 28 MW
4 Gratiot County Wind, 212.8 MW
5 Harvest I Wind, 52.8 MW
6 Harvest II Wind, 59.4 MW
7 Lake Winds Energy Park, 100.8 MW
8 Mackinaw City, 1.8 MW
9 McKinley, 14.4 MW
10 Michigan Wind I, 69 MW
11 Michigan Wind II, 90 MW
25 Michigan Wind III, 153
12 Minden, 32 MW
18 Pheasant Run Wind, 74.8 MW
28 Pine River Wind, 161.3 MW
26 Pinnebog, 51 MW
15 Sigel, 64 MW
14 Stoney Corners, 60 MW
13 Tuscola Bay Wind, 120 MW
17 Tuscola Bay Wind II, 100 MW
27 Tuscola Bay Wind III, 125 MW

1574 MW Total Operational

Currently Operational
Under Development