



2950 Niles Road, St. Joseph, MI 49085-9659, USA
269.429.0300 fax 269.429.3852 hq@asabe.org www.asabe.org

An ASABE Meeting Presentation

DOI: 10.13031/aim.201700417

Paper Number: 1700417

Michigan Farm Energy Program

***Benjamin Van Zweden, Aluel Go, Truman Surbrook
Michigan State University, East Lansing, MI 48825 USA***

**Written for presentation at the
2017 ASABE Annual International Meeting
Sponsored by ASABE
Spokane, Washington
July 16-19, 2017**

ABSTRACT. Before the launch of the Michigan Farm Energy Program (MFEP), the unavailability of affordable energy auditors with understanding of agricultural operations led to Michigan being at the bottom 5th in USDA energy efficiency investments. MEFP was launched in 2009 to correct this problem, and started training and certifying energy auditors to conduct audits that meet the ASABE/ANSI S612 Type 2 energy audit standard that is required by most Federal and utility company energy efficiency funding programs. By 2013, Michigan had climbed from 46th place to 5th place in USDA energy efficiency investments. Central to the development of MFEP and the ASABE/ANSI S612 standard is Michigan State University's Department of Agricultural and Biological Engineering. Faculty from this department are involved in managing MFEP, training auditors, and outreach to continually expand the positive impact of MFEP. As of 2016, MEFP has conducted 334 energy efficiency audits and 154 renewable energy assessments on Michigan agricultural operations, saving Michigan agricultural operations over \$7M and 113M kWh of energy. All of these results were achieved with less than 1% of Michigan agricultural operations, so the potential future impact of MFEP is substantial. It is therefore important that Federal, State, and utility company energy efficiency incentives remain available so MFEP can continue to have a positive impact on Michigan agriculture and the environment.

Keywords. Michigan Farm Energy Program, MFEP, energy conservation, energy efficiency, Michigan State University.

Introduction

The United States Energy Information Administration (2017) states that Michigan is the 10th largest consumer of energy in the United States. Of the approximately 2,882 trillion Btu of energy consumed each year, 683 trillion Btu (24%) is produced in Michigan. This means that 76% of the energy Michigan consumes is imported. Michigan's farmers are heavy users of energy. According to the Michigan Department of Agriculture and Rural Development (2017), Michigan farmers cultivate over 9.9 million acres of land and are a major contributor to the over \$102 billion Michigan food and agricultural industry. Therefore, it is essential for Michigan farms to become more energy efficient to stay competitive in today's global farm economy. In order to get State and Federal funding for energy efficiency upgrades, it is usually necessary for the farmer to conduct a certified energy audit following the ASABE/ANSI S612 Type 2 standards.

The authors are solely responsible for the content of this meeting presentation. The presentation does not necessarily reflect the official position of the American Society of Agricultural and Biological Engineers (ASABE), and its printing and distribution does not constitute an endorsement of views which may be expressed. Meeting presentations are not subject to the formal peer review process by ASABE editorial committees; therefore, they are not to be presented as refereed publications. Publish your paper in our journal after successfully completing the peer review process. See www.asabe.org/JournalSubmission for details. Citation of this work should state that it is from an ASABE meeting paper. EXAMPLE: Author's Last Name, Initials. 2017. Title of presentation. ASABE Paper No. ---. St. Joseph, MI.: ASABE. For information about securing permission to reprint or reproduce a meeting presentation, please contact ASABE at www.asabe.org/permissions (2950 Niles Road, St. Joseph, MI 49085-9659 USA).

Program Background

Before the Michigan Farm Energy Program (MFEP) started conducting certified farm energy audits in 2009, farmers in Michigan were faced with a major challenge—they could not find certified farm energy auditors and the cost was prohibitive. Agricultural enterprises consume a considerable quantity of energy each year, so a certified farm energy audit can show operators ways to become more energy efficient and save money. MFEP was launched in 2009 to train certified farm energy auditors to conduct audits that meet ASABE/ANSI S612 standards for Type 2 audits as required by Federal funding programs. The unavailability of auditors who understand agricultural operations and can conduct affordable audits led to Michigan being at the bottom 5th in USDA energy efficiency projects from 2003-2009. Renewable energy did not fare well either, so the program developed a report format with USDA and expanded into renewable energy assessments in 2010.

Michigan had 35 USDA energy efficiency and 31 renewable energy projects amounting to \$1,217,172 and \$3,814,868 from 2003-2009. The data compiled in Table 1 from the USDA (2015) energy investment report shows Michigan's USDA funded energy efficiency project rankings compared to other states. The highest ranking Michigan ever achieved in number of USDA funded energy efficiency projects was 46th between 2003-2009. During 2010-2013 there were 381 (988% increase) energy efficiency and 410 (1,223% increase) renewable energy projects amounting to investments of \$27,546,996 (2,163% increase) and \$31,888,872 (736% increase) respectively as compared to the previous 7 years. This caused Michigan to climb to a ranking of 5th in 2012-2013.

Table 1—USDA energy efficiency project state rankings

State	2003-2009	2012-2013	2014
Iowa	1 st	1 st	1 st
Nebraska	2 nd	2 nd	2 nd
Minnesota	3 rd	4 th	3 rd
Illinois	4 th	7 th	4 th
North Carolina	5 th	3 rd	5 th
Michigan	46 th	5 th	10 th

This exceptional climb in ranking is due in part to the energy audit and renewable energy funding assistance that was made available through the Herrick Foundation, Michigan Energy Office, and USDA-REAP. Farmers can have access to these funds **only after a certified Type 2 farm energy audit is conducted**. It is important that State and Federal assistance are available to farmers to conduct energy audits and implement energy efficiency projects. The efforts of MFEP have significantly impacted Michigan's USDA energy efficiency investment, and therefore the number of energy efficiency projects. On the flip side, a reduction of MFEP and USDA assistance has a significant corresponding drop in state rankings as observed in 2014. This can be seen in Table 1, when program funding was reduced by 50% and USDA energy efficiency projects in Michigan dropped in 2014. This drop in energy efficiency projects for 2014 resulted in an investment reduction of about \$0.7M, which is why Michigan lost its exceptional momentum and its ranking fell to 10th place.

Energy Audits

A certified Type 2 audit identifies areas for reducing energy costs and improving energy efficiency. For the audit to be effective, the farmer who requested the audit must compile a list of the farm's current energy usage. This list includes 3 years of monthly utility and fuel usage, as well as equipment information such as run time, age, and size. If the farm is a dairy operation, they must also supply at least one year of milk production records. An energy audit report will categorize this compiled information, and show areas for improvement in each category. Each energy use improvement recommendation will include the current cost, potential energy savings, potential cost savings, cost to implement, and payback period.

Auditors are not looking to tell operators what's right or what's wrong. Instead, they conduct audits 'with eyes on-site' to identify ways to improve energy efficiency and the costs to upgrade or replace current equipment or processes. The auditor takes a 'whole enterprise' approach when developing recommendations. The operators' management practices are taken into full consideration since an operator is not likely to implement an energy efficiency recommendation if it negatively affects the management strategy. It is therefore very important that operators are forthcoming with their management strategy, and that the energy auditor becomes familiar with the type of operation and how it is managed.

All MFEP audits are voluntary and the reports are for the farmer's use only. They are confidential and designed to be a management tool. As the national focus becomes zeroed in on energy efficiency and alternative energy, there are several national and state programs coming online that offer grants, rebates and loans for energy efficiency improvement and renewable energy projects. **The key is, farms should first have a certified farm energy audit.** MFEP Type 2 audits usually identify funding and assistance options from State, Federal, University and Utility energy efficiency programs/sources.

To insure completeness and accuracy of the farm or rural business energy audit, the audit report is submitted to the program manager at Michigan State University who then submits the report to an experienced audit report reviewer. Once a satisfactory report has been approved, the auditor schedules a meeting with the enterprise operator to discuss the results and recommendations.

Results

Michigan State University's Department of Biosystems and Agricultural Engineering has played an important role in the formation of MFEP. MSU is also one of only 3 universities that are cited in the ANSI/ASABE S612 (2009) farm energy audit standards. MFEP has received some very important recognitions since it was initiated, including:

- Three USDA energy audit and renewable energy projects (2010, 2011, and 2012) were selected for evaluation/audit and each attained a 100% equivalent rating by USDA Washington.
- Honorable Mention Recognition at the first Governor's Energy Excellence Awards in 2015.
- MFEP audits are the only farm energy audits accepted by Michigan utility providers when applying for a farm energy audit rebate
- Michigan Energy Office and USDA-RD (REAP) recommend MFEP audits and renewable energy assessments conducted by MFEP auditors.

All of these accomplishments reinforce the thoroughness and credibility of MFEP audits, as well as the excellent training received by MFEP auditors at Michigan State University. Table 2 shows the variety of agricultural operations audited and the projected energy and cost savings. All data in table 2 was compiled from MFEP audit reports and renewable energy assessments. Initially, MFEP energy efforts were directed toward energy efficiency, but the number of renewable energy assessments has increased in recent years.

Table 2—2010-2016 MFEP potential energy savings for Michigan

No.	Operation	Energy Savings (kWh)	% Savings	Annual Savings (\$)	Cost to Implement (\$)	Payback Time (years)	Average Annual Savings (\$)
133	Dairy Farms	11,190,946	35	1,214,725	2,741,579	2.3	9,133
57	Grain Drying	14,302,450	28	999,482	6,836,135	6.8	17,535
35	Greenhouse	27,762,764	34	1,106,753	4,917,592	4.4	31,622
27	Food Processing	2,371,934	38	338,023	1,347,791	4.0	12,519
19	Irrigation	4,433,969	51	418,839	1,560,736	3.7	22,044
12	Crops	375,529	4	53,583	130,250	2.4	4,465
5	Beef	69,076	14	9,913	19,476	2.0	1,983
4	Hogs	198,264	14	18,002	59,718	3.3	4,501
2	Poultry	12,618,901	62	567,365	2,053,625	3.6	283,683
36	Rural Business	13,706,260	36	768,458	1,916,983	2.5	21,346
1	Mixed Farm	11,358	94	1,693	3,480	2.1	1,693
3	Fish Hatcheries	2,085,817	13	93,610	206,775	2.2	31,203
334	Audit Total	89,127,267	34	5,590,446	21,794,140	3.9	16,738
154	Renewable Energy	24,763,113	69	1,797,018	15,636,108	8.7	11,669
488	Grand Total	113,890,380	38	7,387,465	37,430,248	5.1	15,138

Conclusion

MFEP has huge potential future impact since all of the results in Table 2 were achieved with less than 1% of Michigan's agricultural enterprises. Therefore, it is important that State and Federal assistance are continually available in the future, so MFEP can have an even greater positive impact on Michigan's agricultural enterprises and the environment. For more information about MFEP, visit <http://maec.msu.edu/farmenergy>. If you are interested in an energy audit or renewable energy assessment for your agricultural enterprise, contact Aluel Go at goaluel@egr.msu.edu or 517-214-6128.

References

- ASABE Standards. (2009). ANSI/ASABE S612 JUL2009 (R2015) performing on-farm energy audits. St. Joseph, MI: ASABE.
- Michigan Department of Agricultural and Rural Development (MDARD). (2017). Facts about Michigan agriculture. In *Michigan Department of Agricultural and Rural Development*. Retrieved from <http://www.michigan.gov/mdard/0,4610,7-125-1572-7775--,00.html>
- United States Department of Agriculture (USDA). (2015). Energy investment report. In *United States Department of Agriculture*. Retrieved from <https://www.usda.gov/energy/maps/report.htm>
- U.S. Energy Information Administration (USEIA). (2017, January 19). Michigan state profile and energy estimates. In *U.S. Energy Information Administration*. Retrieved January 30, 2017, from <http://www.eia.gov/state/data.cfm?sid=MI>