

The Michigan Agricultural Energy Council was established in October, 1993 but at that time it was named the Michigan Agricultural Electric Council. When it's focus expanded to energy audits for agricultural the Council name substituted Energy for Electric.

There has been a long history of the Agricultural Engineering Department of Michigan State University working with the electric power supplier serving rural Michigan that dates back to the 1920s. At that time electrical power was only available in the urban areas of Michigan. Times were tough in rural America, light by kerosine lanterns, work was accomplished mostly with human hands, horse power, steam tractors, and gasoline engines. Electric power was needed in rural Michigan but it was believed to be not profitable for electric utilities. A bold project in 1927 proved electricity to rural Michigan could be a profitable venture.

Cooperation between electric power suppliers serving Michigan rural areas and MSC Agricultural Engineering Dept. has been a continuous venture since the 1920s.

Herman Gallagher
Consumers Power Co.

Prof. & Chair Mussleman
Ag. Eng. Dept. MSC



MASON-DANSVILLE ELECTRIC LINE

BUILT 1926-1927

ENERGIZED FEB. 4, 1927

EAST TWO MILES FROM THIS POINT, NORTH TWO MILES AND WEST THREE MILES RUNS THE FIRST RURAL ELECTRIC LINE BUILT IN MICHIGAN FOR THE STUDY OF ELECTRICITY'S USEFULNESS IN FARM LIFE.

THIS PIONEER BEGINNING IN RURAL ELECTRIFICATION WAS ACCOMPLISHED THROUGH THE COOPERATION OF MICHIGAN STATE COLLEGE, FARM ORGANIZATIONS, CONSUMERS POWER COMPANY, AND TWELVE FARM FAMILIES WHO WANTED ELECTRIC SERVICE.

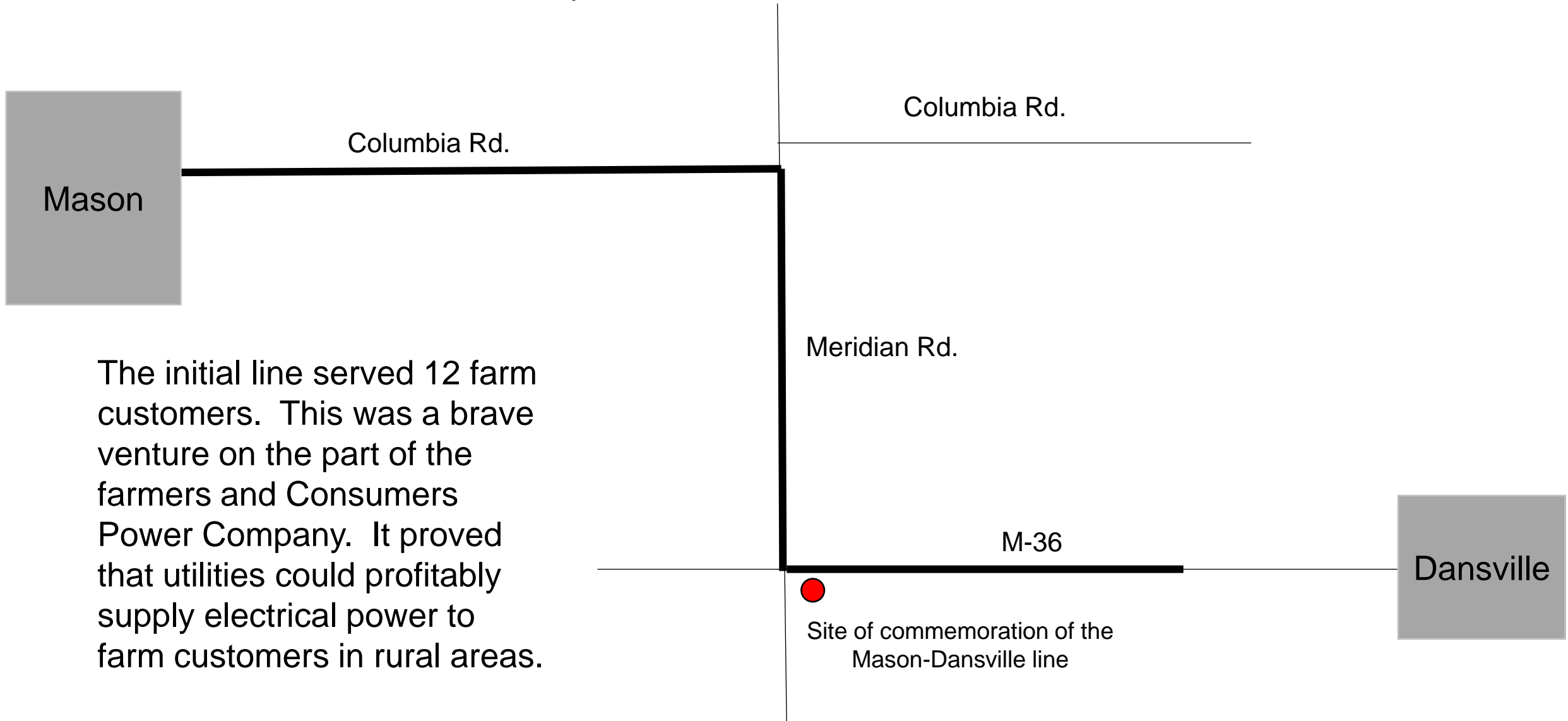
THIS MARKER WAS DEDICATED AUGUST 25, 1938, BY WHICH TIME 92,000 FARMS WERE RECEIVING ELECTRIC SERVICE FROM MICHIGAN UTILITY COMPANIES.



First rural electric line in the world, 1927

Route of the Mason-Dansville Line

First strictly rural electrical distribution line in America



The initial line served 12 farm customers. This was a brave venture on the part of the farmers and Consumers Power Company. It proved that utilities could profitably supply electrical power to farm customers in rural areas.

In 1952 the electric power suppliers serving rural Michigan and the Agricultural Engineering Department of Michigan State College formed an organization called the Michigan Committee on Rural Electrification who's purpose was to demonstrate to farms across Michigan the benefits electricity to provide lighting, power, and electric appliances for the homes. With assistance from WKAR radio and television the MCRE this utility/MSU cooperation lasted from 1952 until 1980.



Michigan Agricultural Energy Council

The Council was established in 1993 to bring personnel at MSU, energy utilities serving rural Michigan, and State agencies together to deal with energy issues in the rural areas of Michigan including energy related problems and energy efficiency. This alliance resulted in solutions to neutral-to-earth voltage problems and the creation of the Michigan Agricultural Energy Program which with the help of USDA Rural Development grants makes low cost energy audits available to Michigan farmers and rural businesses. These audits have resulted in large reductions in agricultural energy use and availability of assistance to reduce the cost of making energy improvements on farms.

Utility personnel training to effectively deal with neutral-to-earth voltage (stray voltage) issues for farm customers.



Actual field training for utility personnel to determine sources of NEV and identify effective solutions that may be present.



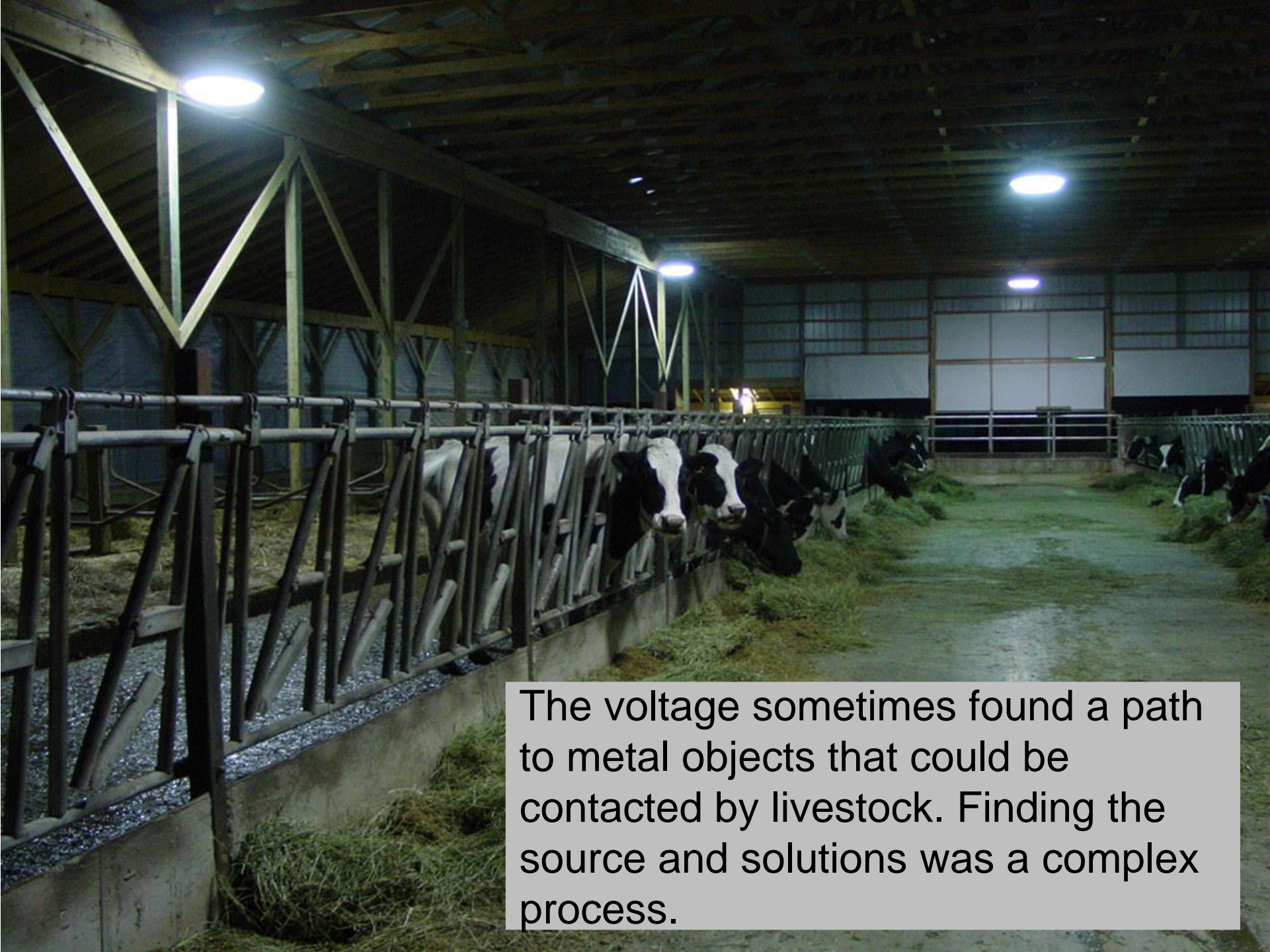
How to determine the source of neutral-to-earth voltage to determine proper solutions.







High levels of neutral-to-earth voltage were of major concern on dairy farms.



The voltage sometimes found a path to metal objects that could be contacted by livestock. Finding the source and solutions was a complex process.

Utility personnel after performing field measurement would need to analyze the data to determine the source or sources of the voltage which could be from the farm, the utility system, or a neighbor's property.





Farm Transformer

Sometimes an NEV source could be mitigated at the farm transformer by the utility

Safety device installed by utility

Warning sign to utility line personnel that neutrals have been separated.



Utility transformer pole

Farmer

Utility Rep.

It was essential to work with the farmer to measure and explain the issue.

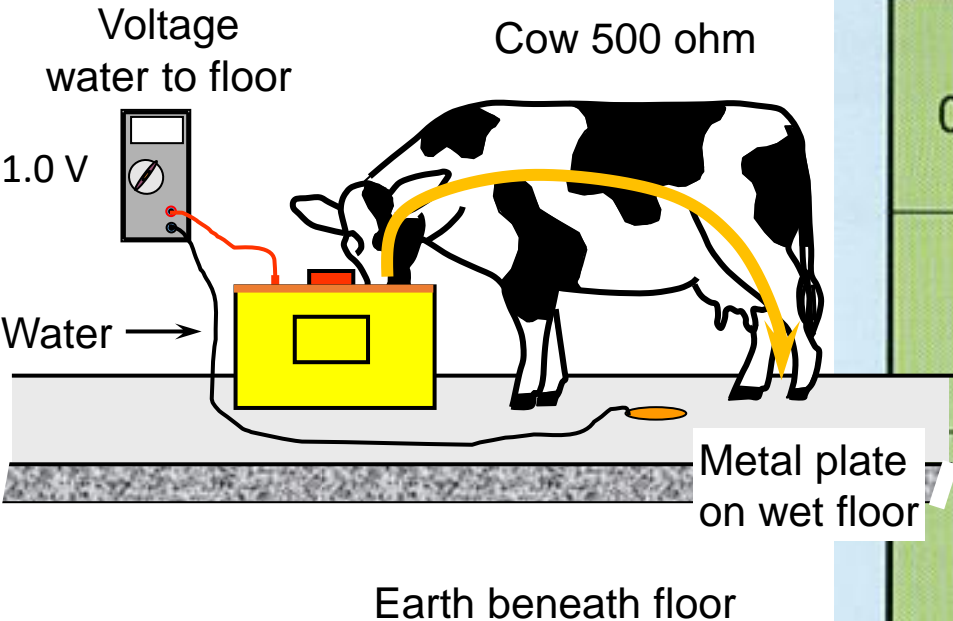
Ground fault in this heated water device was shocking the cows.

The source of the NEV (stray voltage) was at devices on the farm.



One of the first projects of the MAEC was to develop easy to understand literature to show the effect of neutral-to-earth voltage (stray voltage) on livestock as determined by research around the world.

Calculate current through animal using Ohm's law.



How do livestock respond to stray voltage and current?

Voltage Level (1)	Perception (2)	Behavior Response (3)	Production Loss (4)	Current Flow
0.5 volt	less than 1 in 50 animals	none	none	0.001 ampere (1 milliampere)
1 volt	less than 1 in 10 animals	none	none	0.002 ampere (2 milliampere)
2 volt	majority of animals	short-term changes with some animals	none	0.004 ampere (4 milliampere)



Michigan Agricultural Energy Council

In about 2008 there was a major initiative in Michigan and across the nation to increase the energy efficiency on farms and rural businesses. At the time this initiative was being pushed by the Michigan Energy Office with assistance from USDA Rural Development. The MAEC took on this challenge added a person supported by the Council to provide the leadership to develop an effective program to train certified farm energy auditors and to manage a program which became the Michigan Agricultural Energy Program. Over the past few years this Michigan program has raised the level of success to the top ten in the nation.

Agricultural Energy Audit Training (Part I)

Detailed training manual with energy audit calculators were developed and provided to each of the trainees.



The Michigan certified farm energy program trainee process is a 3-part training program.







Agricultural Energy Audit Training (Part II)

The auditors are taken through an actual farm energy audit to collect all of the information necessary to complete the energy audit.







It is essential to visit with the farm operator in order to complete an audit that the farm operator sees as suitable. No two energy audits are exactly the same.





It is essential to listen to the farm operator to determine management procedures. Recommendations will not be implemented if they do not fit the management style.

Agricultural Energy Audit Training (Part II continued)

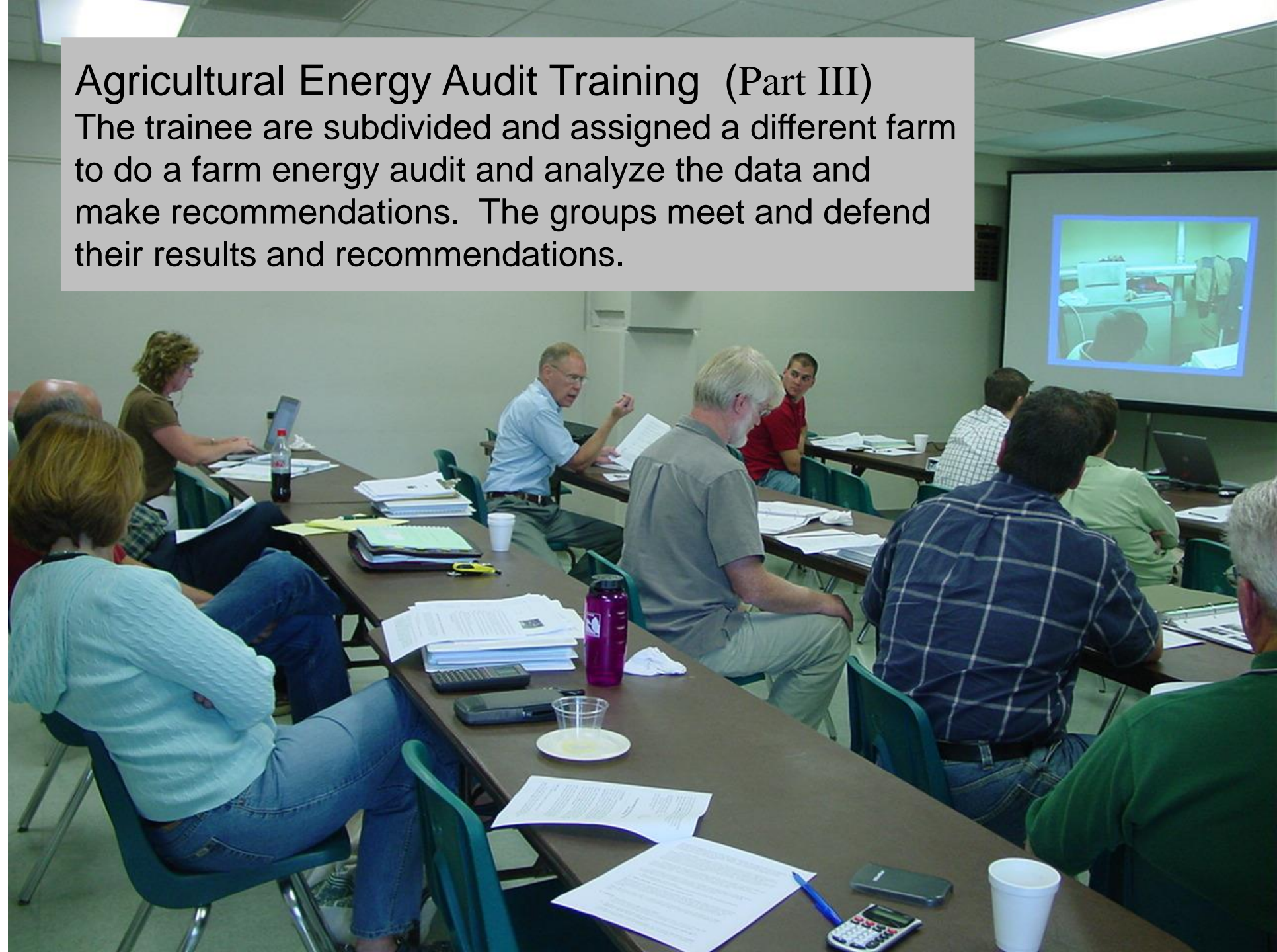
Back to the classroom to plow through the calculations. Then examine the results and make a list of recommendations the farm operator can put into action.



Each trainee must work through the calculations and develop their own final report. This session following the farm visit is essential.

Agricultural Energy Audit Training (Part III)

The trainees are subdivided and assigned a different farm to do a farm energy audit and analyze the data and make recommendations. The groups meet and defend their results and recommendations.







Farm Land Apply Manure v.
Custom Application

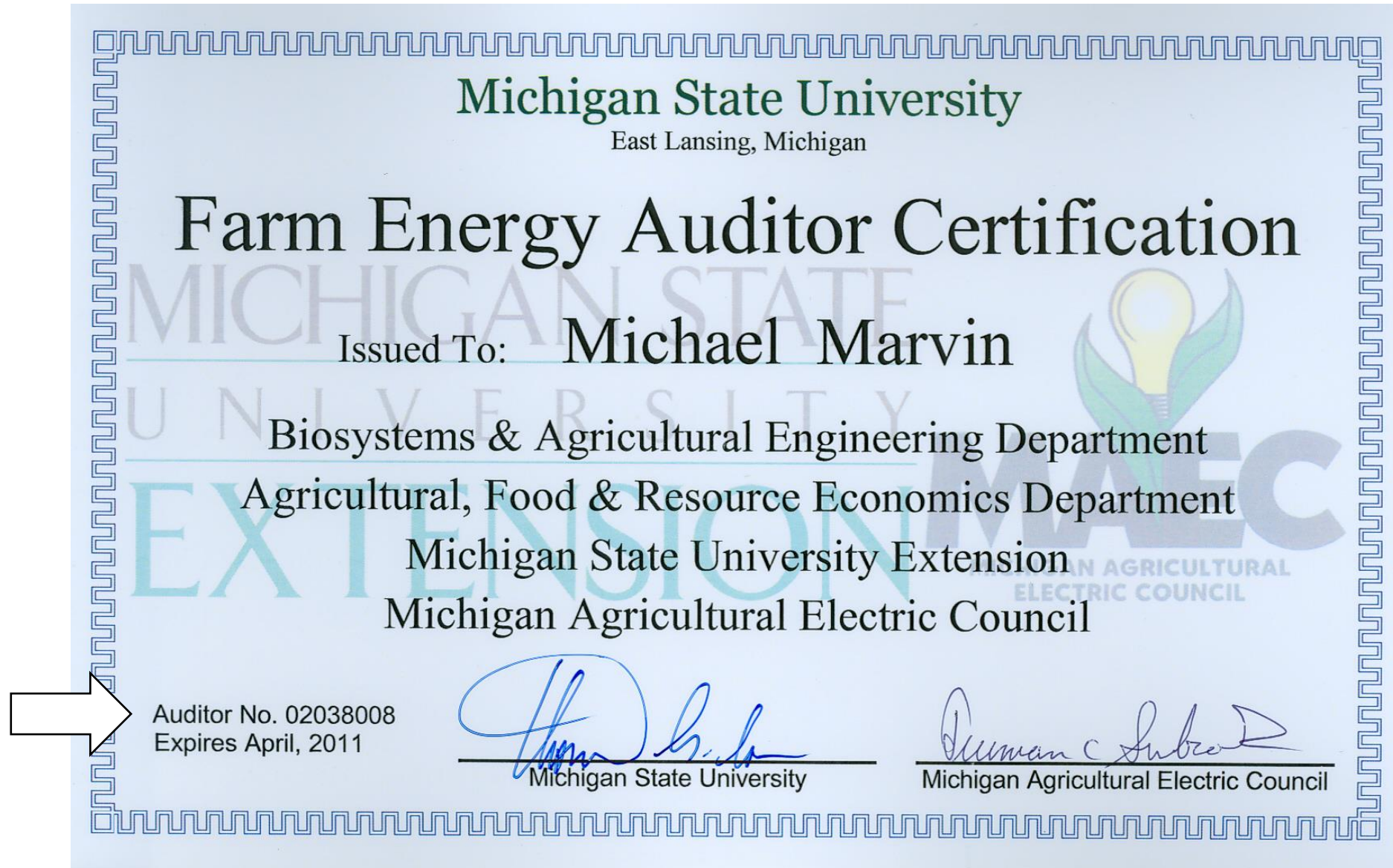


Farm

\$ 43,890 - self

\$ 12,000 - commercial

Upon successful completion of the farm energy auditor training program each auditor is given a certification number and a completion certificate.



The Michigan Agricultural Energy Program has developed specific procedures and calculators for grain drying systems











Michigan Agricultural Energy Council

Vocational Agriculture high school support through programming materials in the area of electrical maintenance wiring and energy management.

A photograph of a vocational classroom where a man, Jon Althouse, is standing and observing two students working on wiring projects. The students are seated at a long table with various electrical components and tools. The room has orange cabinets and shelves with various equipment. A text box is overlaid on the top right of the image.

Jon Althouse (Council member) conducts the annual FFA stills competition for basic wiring skills and energy management awareness.

The council works with FFA and vocational agricultural teachers to assist them with basic wiring skills and energy management recommendations







Michigan Agricultural Energy Council

MSU, IAT Electrical Technology Apprenticeship Program

Assistance to MSU Institute of Agriculture Technology in the development of an electrical apprenticeship program meeting U.S. Department of Labor and Michigan Bureau of Construction Codes standards that in addition to training apprentices in residential, commercial, and industrial wiring and national code understand to also provide training in techniques for wiring agricultural facilities.



Starting the Electrical Technology was a cooperative project with Michigan electric utilities.

Electrical Technology program graduated it's first class in 1972



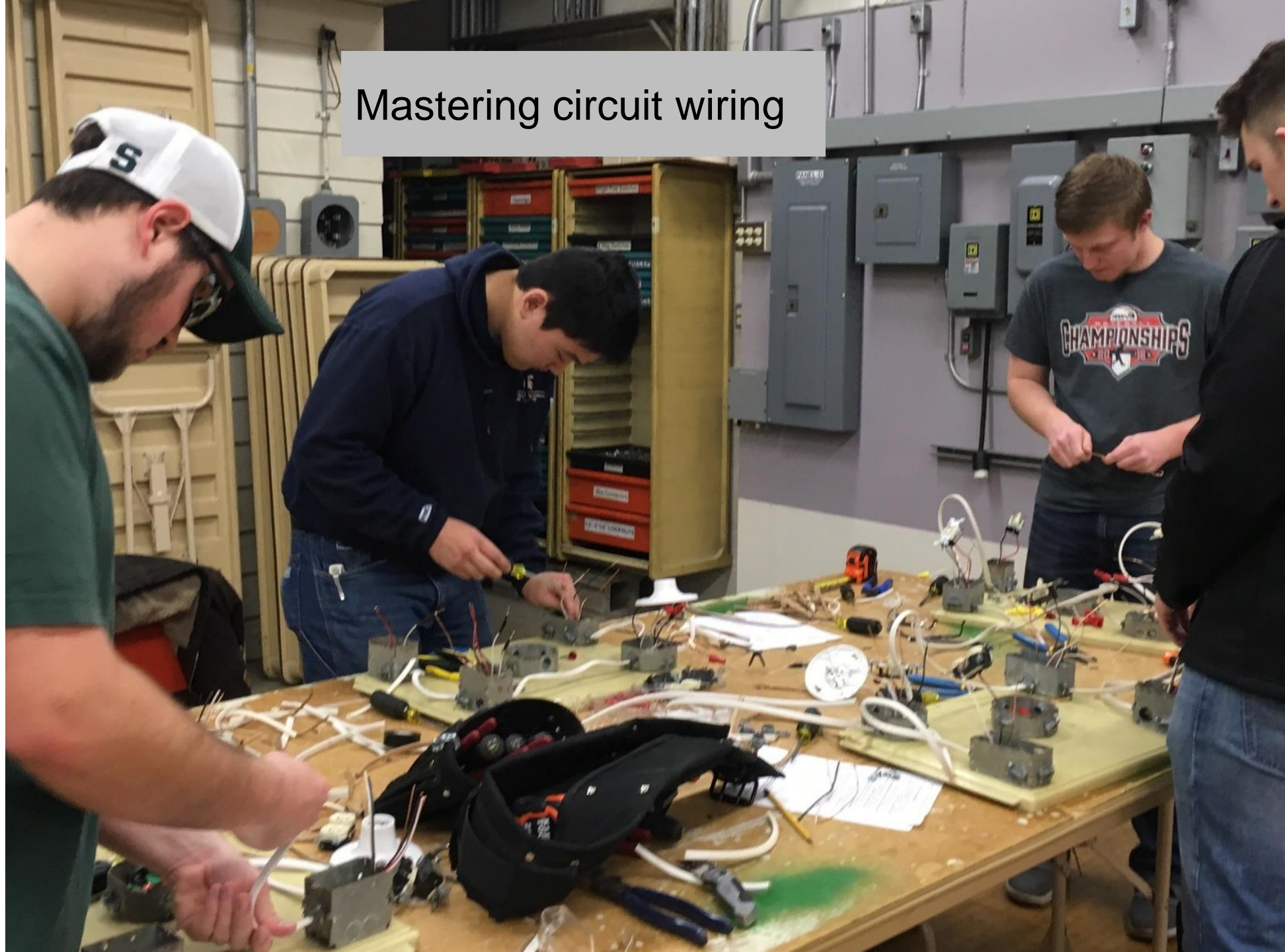
Electrical Technology apprentice program.
Mastering electrical fundamentals is
essential.

Mastering fundamentals and the use of meters and instruments

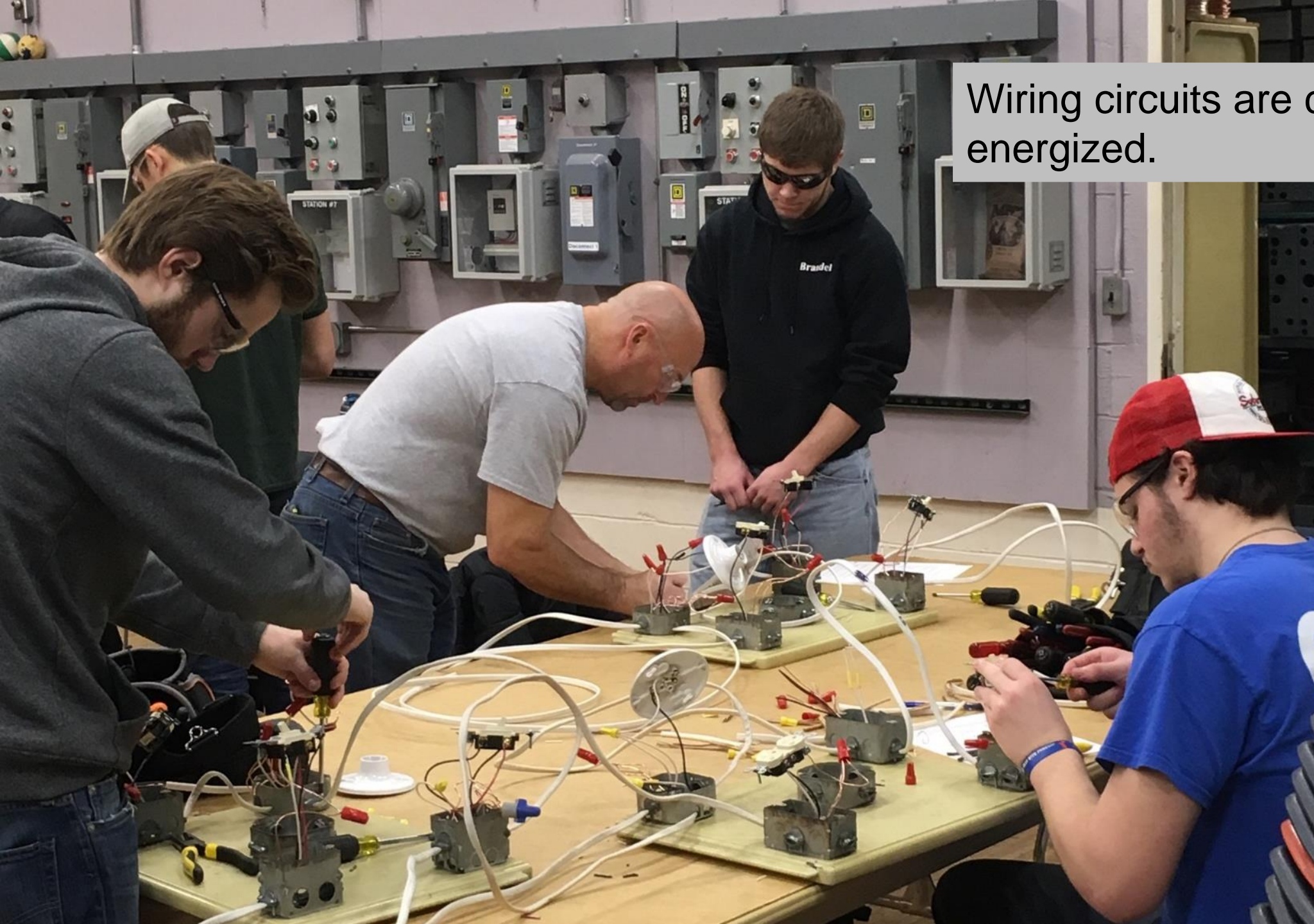




Mastering circuit wiring



Wiring circuits are checked and energized.



Skills are learned in the lab and practiced until the trainee can accomplish them correctly.





Practice, practice, practice.

Controls and control systems are studied and practiced in class and in the lab including understanding ladder diagrams. This student is learning to program and operate a programmable logic controller, PLC.





Michigan Agricultural Energy Council

For more information on any of these activities visit the MAEC web site.

<https://maec.msu.edu>