

# Modular Energy Production Systems



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# Modular Approach allows for unlimited decentralized solutions



# Modular construction allows project development in remote locations



IEA says Over 1.3 billion people still do not have access to energy production

Distributed modular energy production will transform the energy industry much like the Personal Computer did for the computer industry.



# Corporate Offices for EAI/EES Welcome, MN

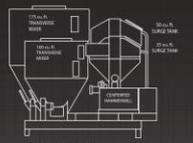


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# Modular Feed Systems

## MODULAR FEED PROCESSOR

The MFP allows you to select up to 12 main ingredient controls and up to 28 micro controls. If you include a micro-ingredient section, it has its own separate scale system for greater accuracy. Because it is a modular system, the MFP has the added advantage of being easily expandable. As your needs change, you have the option of adding to your system - instead of replacing it.



**OVERALL DIMENSIONS**

100 cu. ft. system	175 cu. ft. system
LENGTH	12' 3"
WIDTH	6' 9" (18.99m)
HEIGHT	9' 10"

**TRANSVERSE MIXER**  
The mixer's unique design provides transverse mixing action. Blending occurs rapidly, clumps are broken up, and a shorter mix time is needed to achieve accepted coefficient of variation. The Trans-Mix also performs well with liquid ingredients.

**CONTROLLER**  
The heart of the MFP system is the controller. It stores information for recipes and directs the rest of the system to automatically load, weigh, grind, mix, and unload your ingredients as a finished ration.

**HORIZONTAL AUGER**  
7-inch L-Hand Screw  
7-inch R-Hand Screw  
Two horizontal auger screws on a single shaft with opposite pitch fighting and separated by a kicker.

**AUGERS**  
Easy Grind feed augers: 5" O.D. variable speed HORIZONTAL AUGERS: 8" O.D. 400 RPM MIXER AUGERS:  
STEPPED 1" O.D./2" O.D. 400 RPM (100 cu. ft. tank)  
STEPPED 1" O.D./4" O.D. 400 RPM (175 cu. ft. tank)  
MOTOR SIZE: 15 HP (100 cu. ft. tank), 15 HP (175 cu. ft. tank)

**SURGE TANK**  
Depending on the amount of feed required, you can choose the size of surge tank which collects the main ingredients before they move through the hammermill.  
Sizes available:  
35 cu. ft.  
50 cu. ft.

**INSIDE VIEW**  
Unique centered hub produces a more uniform grain.

**HAMMERMILL**  
The simple rugged design of the center lid hammermill allows even wear on the hammers and screens used to grind ingredients for processing. Hammermill reverses direction automatically to extend hammer life. Hammermill speed can optionally be auto adjusted by formula to match grain requirements. Twin hammermills available.

Hammermill sizes available:  
10 hp  
20 hp  
30 hp

**EAI**

## ROTARY DUMP MICRO INGREDIENT SYSTEM

**STANDARD DIMENSIONS**

**POLY MICRO INGREDIENT BINS**

Stainless steel discharge tube, lids, and hardware.

**MICRO BIN SIZES INCLUDE:**  
2.8 cu. ft., 4.6 cu. ft., 5.6 cu. ft., 9.2 cu. ft.

**HIGH ACCURACY LOAD CELLS**  
NTEP approved load cells for individual bins are available for inventory purposes.

Rotary dump assembly inside stainless steel skid with large access doors.

**INTERNALS OF ROTATING DUMP SCALE PLATFORM**  
Micro ingredients are weighed in the stainless steel drum that rotates to discharge into a transfer conveyor.

**OPTIONAL PLATFORM AND STAIRS ARE AVAILABLE**

1/2 HP TEFC motors with integral inline gearboxes with 3/4 HP TEFC or explosion proof motor.

Micro systems can be built in a variety of configurations with up to 24 bins per micro system. Multiple units can be configured for an infinite number of micro ingredient bins.

**EAI**



## MINOR TOTE WEIGH HOPPER

The Minor Weigh Hopper design speeds up system by adding additional scales to weigh bulk bags or other ingredients. This allows for precise weighing of ingredients that are too big for a micro system but too small for a main ingredient.

**STANDARD LAYOUT**

**TOTE WEIGH HOPPER**

**STEEL BINS**  
Available in different capacities:  
• 6 cu. ft., • 12 cu. ft.,  
• 12 cu. ft., • 24 cu. ft.,  
• 30 cu. ft., • 60 cu. ft.

**OPTIONAL FLUSH HOPPER**  
Flush out ingredients from drag conveyor for next batch weigh up.

**LIMIT SWITCHES**  
Indicate gear position to get next batch weighed up.

**AIR GATES**  
\*\* Also available with electric gates. These gates control conveyor flow to prevent foreshifting and can be opened independently.

**LOAD CELL WEIGHING**  
5-shaped load cells for precise weight measurements.

**EAI**



**THE FUTURE OF FEED SOFTWARE IS HERE.**



**MANY MILLS.**

**ONE SOLUTION.**

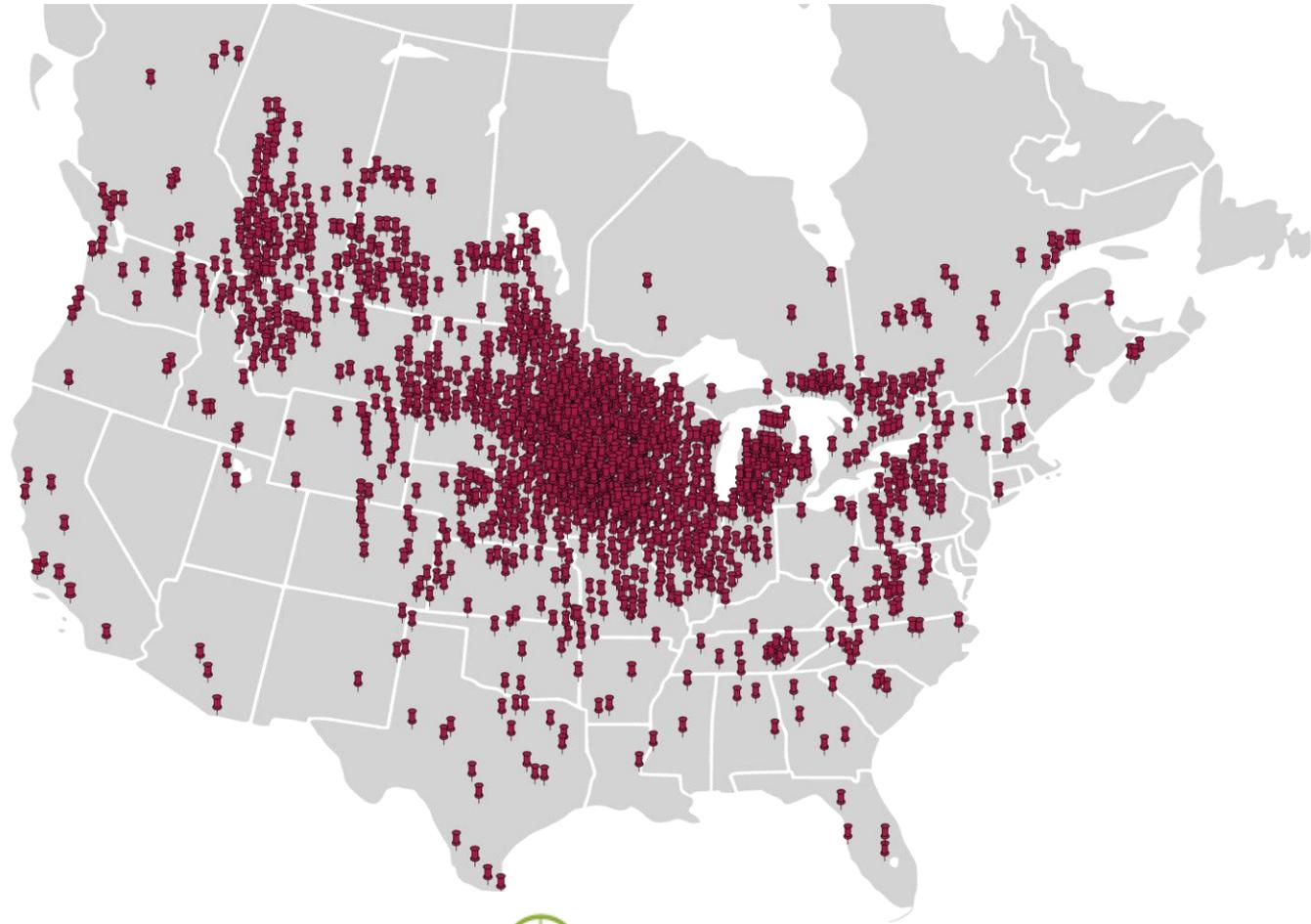
**FEED OFFICE ENTERPRISE™**



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# Easy Automation Customer Map

over 3,000 satisfied customers



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# Easy Energy Systems History

- Easy Energy Systems was founded in 2006 by EES President Mark Gaalswyk. Mark has invested over \$6,500,000 of his own money into the company.
- 2009 finished initial portion of test facility and began testing feedstocks and designing some of the individual modules.
- 2010 Received an Iowa Power Fund grant for \$500,000
- In 2011 received “Fire-Starter Award” that recognized companies with possible world changing technologies
- 2012 Began partnership with Green Biologics to develop N-Butanol.
- 2014 Received \$500,000 grant from the Minnesota Department of Agriculture.
- 2015 Working with ISU to modularize new Technologies and bring them into manufacturing.
- 2015 Purchased piloting/research facility in Truman, MN.

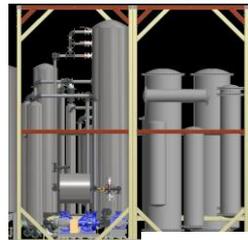
# Modular Energy Production System



# Individual Modular Technology Development



- Idea
- Scope Defined
- Preliminary Cost
- Project Initiation
- Requirements
- Solution/Design
- Project Execution
- ROI determined
- Implementation
  
- Completed Module



# Variable Partners/Variable Biofuels

## Feedstock Partners

- “Energy” sugar beets
- Grape Pomace
- Waste Paper
- Whey Permeate
- Crop Residue
- Waste beverage
- Wood
- Sweet Sorghum
- MSW
- Cassava
- Rice Hulls

## Biofuel Process Partners

- Pretreatments
- Enzyme
- Bacteria/Yeast
- N-Butanol
- Acetone
- Specialty alcohol
- Jet fuel
- Next gen ethanol (drop in replacement for gasoline)

## Technology Partners

- Material Handling
- Fermentation Design
- Heat Transfer
- Biofuel Separation
- Coproduct Processing
- Bubble Spray Distillation
- Water Purification/reclamation
- Electric Generation
- Automation Processes
- Data Gathering

# Complete Modular System Technology Development Through Multiple Technology Partnerships

Feedstock  
Handling/  
Processing



Enzyme/Yeast/  
Bacteria  
Development



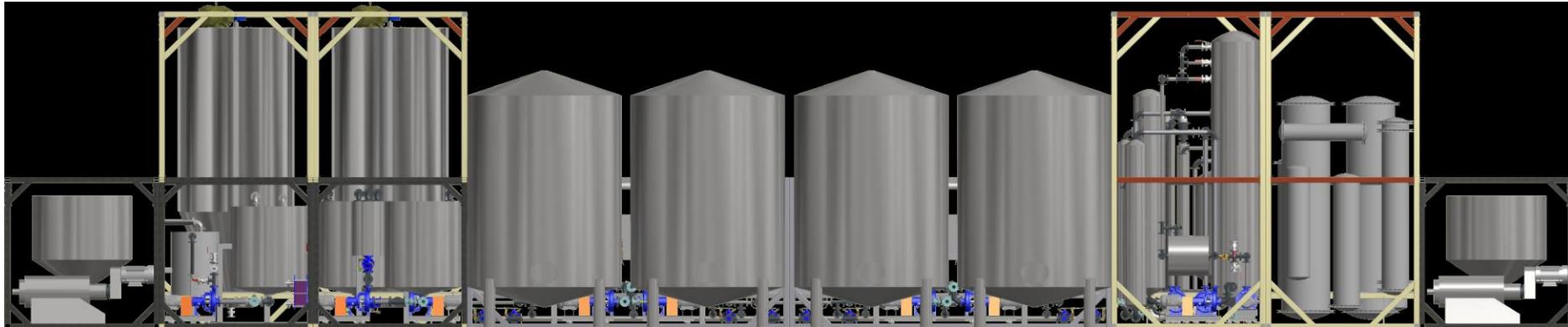
Fermentation



Distillation/  
Separation/  
recovery



Coproduct  
Development



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# Project Development Partners

■ Feedstock/ Testing

■ Local Bank/ USDA

■ Gap Financing/  
Investment

■ Process Partners

■ Technology Partners

■ Engineering/  
Manufacturing

■ Operations

■ Support/ Data  
Gathering

■ Optimization



# MEPS Management and Support Structure

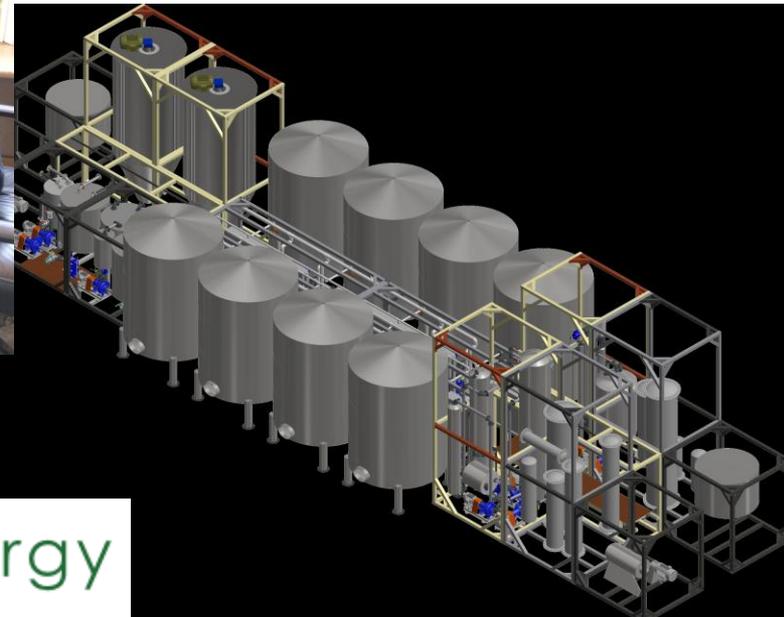
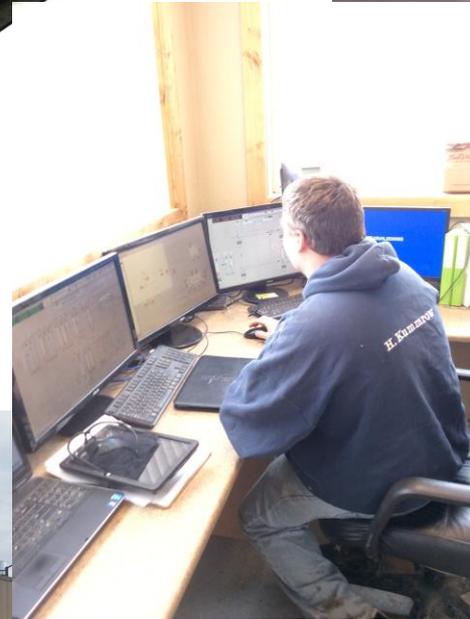


Support



Optimize

Gather Data



Manage Multiple Facilities



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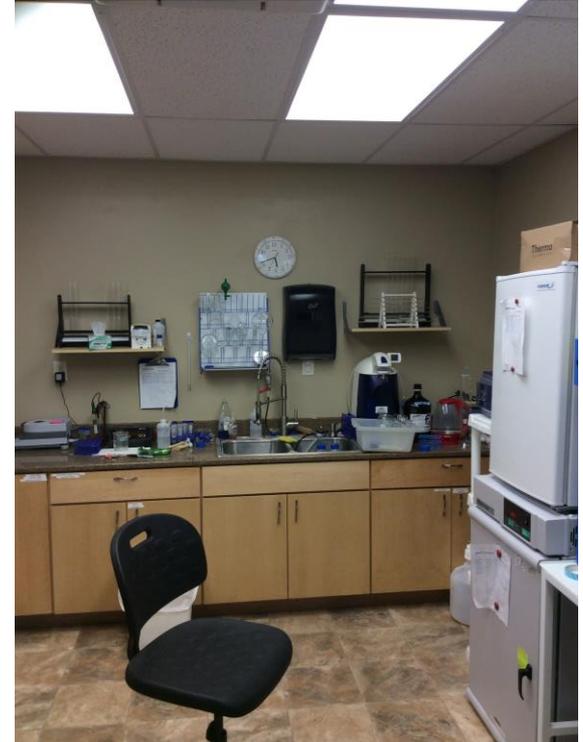
# Demonstration/Test Facility Emmetsburg, Iowa



# Demonstration/Test Facility Modules



# Emmetsburg Facility Lab



# Demonstration/Test Facility Emmetsburg, Iowa

- Facility allows EES to test various feedstocks for performance and profitability.
- Facility allows EES to test new equipment and biological technologies for the development of new modules.
- Facility allows EES to test combinations of technologies to assist in developing the best solution for the customer's bioenergy needs.
- Facility is attractive to new technology developers as most do not have the means to conduct large scale testing over an extended period of time.

# Research and Piloting Facility Truman, MN



# Waste Collection and Separation Facility for 2 counties (across the fence from new piloting site)



# Sample of the Ground municipal waste EES will use as feedstock



# The barriers/solutions regarding modular manufacturing of distributed systems

- US Department of Energy has a culture built around large scale, centralized solutions.
  - Move funds for smaller scale modular systems to the USDA as they are used to managing numerous decentralized projects.
- US Department of Energy grant applications are typically designed around large centralized projects.
  - Streamline application processes around small scale projects to eliminate the large up front investment in meeting application metrics.

# The barriers/solutions regarding modular manufacturing of distributed systems

- Financing tailored to large projects. 5-10 million dollars too large for local banks not large enough for large investment banks.
  - Need Loan Guarantees 10 million and under tailored to participating banks.
- The take off agreements are necessary for a loan guarantee. The agreement is usually made with large oil companies who are competitors.
  - Gov. guarantee to biofuels of \$3 per gallon or 20% over the average gasoline price, whichever is greater.

# The barriers/solutions regarding modular manufacturing of distributed systems

- Investment banks desire proven commercial scale financial records before they will provide financing.
  - EES has tested over 40 different feedstocks and technology processes. Many more demonstration plants are needed to develop commercial scale financial models. Each facility needs at least 1-2 year of continuous operation to collect the necessary data for commercialization.
- A lack of live data from multiple demonstration facilities utilizing different feedstocks and technologies.
  - Substantial funding to enable demonstration scale projects between technology providers, universities, and manufacturing. These systems will provide the data for financial modeling, permitting, engineering, manufacturing, logistics, and support.

# Easy Energy Systems

Easy Energy Systems will continue to grow and meet our goal through the following:

- Continuing to test various feedstocks/processes in our demonstration scale test facilities to develop feasible projects.
- Developing new technology partnerships to make sure that EES stays on the forefront of technology for its customers.
- Assisting technology partners in developing and demonstrating new green process technologies in our patented modular energy production systems.
- Designing, manufacturing, selling, commissioning, and supporting modular energy production systems.



**Our Goal**

**FUEL THE WORLD™**

**Our goal is to be the world leader in the design, manufacturing, installation, commissioning, support, and optimization of renewable modular processing systems.**