



Minnesota Renewable Energy Roundtable  
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# MVR for more efficient plant operations

Bill Schafer, PE  
Founder and CEO  
Energy Integration Inc., LLC

# EII's MVR is One of Today's Best CI Lowering Technologies



## MVR

Electrification  
Decarbonization  
Energy Efficiency

6-13 points CI Reduction

About 0.5 kWh/gal EtOH  
>80% DDE Natgas reduction  
Lowest capital cost

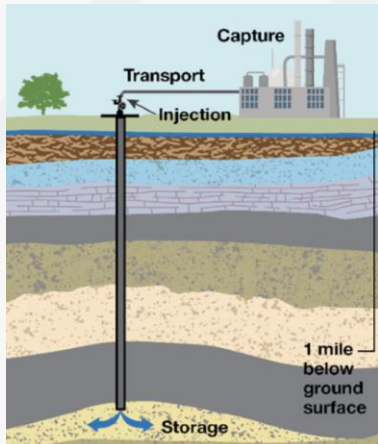


## AD

Renewable Natgas  
Cellulosic

6 points CI Reduction

Whole Stillage  
Thin Stillage  
Manure  
Pipeline (Upgrading)  
or  
On-Site Usage



## CCUS

CO<sub>2</sub> Capture,  
Utilization,  
Storage

30 points CI Reduction

About 0.4 kWh/gal EtOH  
Pipeline or  
On-Site Class VI Well  
Dry Ice  
Liquid CO<sub>2</sub>

*21 Companies in the Project Pipeline*

# Why Should I Care About EII's MVR Technology?



## Benefits

### Decarbonization

- 6-13 point reduction in carbon intensity

### Electrification

- Leverage lower power pricing and greening grid

### Energy Savings

- 50% average reduction in total plant energy
- 85% average reduction in distillation, dehydration, and evaporation energy
- > 14,000 Btus/gal thermal energy reduction with COP > 7.5

# Why EII's MVR?



- Most efficient design, proven optimization, highest COP
- Lowest project cost, no new process equipment
- Most reliable with 4 years of continuous operating data
- Fastest, easiest startup and shutdown, reversible
- Greatest carbon intensity improvement



# A 4-year Record of Efficient, Reliable Operations



Europe's Largest Biorefinery, 75mm gpy ICM/Fagen + 75mm gpy Maguin  
Pannonia Bio, Dunaföldvár, Hungary



# Recognition



## IChemE Global Awards 2021



### Winner

Pannonia Bio, Hungary, Energy Integration, USA and Piller Blowers & Compressors, Germany

*Decarbonizing Biorefineries to Produce Greener Bioethanol*

Sponsored by



# US DOE \$10.5 Million for Aemetis MVR



**External Investor Relations Contact:**

Kirin Smith  
PCG Advisory Group  
(646) 863-6519  
[ksmith@pcgadvisory.com](mailto:ksmith@pcgadvisory.com)

**Company Investor Relations/**

**Media Contact:**

Todd Waltz  
(408) 213-0940  
[investors@aemetis.com](mailto:investors@aemetis.com)

**Aemetis Reports Revenues of \$66 Million for the Second Quarter 2024**

*Revenues increased 48% over the Second Quarter of 2023*

CUPERTINO, Calif. – August 1, 2024 - **Aemetis, Inc.** (NASDAQ: AMTX), a renewable natural gas and renewable fuels company focused on low and negative carbon intensity products that replace fossil fuels, today announced its financial results for the three and six months ended June 30, 2024.

The Ethanol business also received an allocation of \$10.5 million of IRA tax credits from the U.S. Department of Energy and the Internal Revenue Service under the first phase of IRA Section 48C awards to support the installation of a Mechanical Vapor Recompression system that is expected to reduce the Keyes facility natural gas usage by approximately 80%, significantly reducing the carbon intensity of the fuel ethanol produced and generating an associated increase in revenues. Detailed engineering for MVR is completed, and the company has begun procurement of the MVR equipment.

# US DOE \$145mm for Skyven MVR



PR Newswire Send a Release

## U.S. Department of Energy Announces \$145 Million for Skyven Technologies to Decarbonize Industrial Steam

skyventechnologies

NEWS PROVIDED BY Skyven Technologies → Mar 25, 2024, 07:11 ET

SHARE THIS ARTICLE

DOE funding will catalyze Skyven steam-generating heat pump installations at US manufacturing facilities to eliminate over 400,000 metric tons (MT) of CO<sub>2</sub> annually



# USDA \$1mm for Granite Falls Energy MVR



An official website of the United States government [Here's how you know](#) ✓



## Rural Development

U.S. DEPARTMENT OF AGRICULTURE

[Rural Energy for America Program](#) (REAP) grants announced today in Minnesota include:

- Granite Falls Energy LLC in Granite Falls will use a \$1,000,000 grant to install a Mechanical Vapor Recompression system. The project, which will increase ethanol production by up to 8,300,000 gallons a year, is expected to save the business \$29,818,530 per year and 63,539 kilowatt-hours (kWh) per year, which is enough electricity to power 58 homes.

## U.S. Patent Portfolio

Integrated MVR with CHP (US9925476B2)

Integrated MVR without CHP (US9925477B2)

Integrated MVR with TVR, dryer, etc. (US11458413B2)

Integrated MVR method for dryers (US10787407B2)

Integrated MVR system for dryers (US11034638B2)

Integrated MVR with reversibility (US11471784B2)

Integrated MVR for CO2 conversion (US10947486B1)

Integrated MVR for petro/biochem (US11291927B2)

Integrated MVR for optimization (US11364449B2)

Integrated MVR for network design (US11478724B2)

## International Patents:

Received: *EU, China, Canada, South Africa*

Pending: *India, Brazil*

# Licensing EII's Technology



## Options

### License from EII

- One-time, up-front, reasonable license fee
  - No trailing royalties, project or site license

### Risk patent infringement

- Potential patent infringement
  - Freedom to operate?
    - Just an opinion!
  - Require indemnification by whoever claims it doesn't infringe.
    - Don't be left "holding the bag"

# From Interested to Operating

## Project Execution

1. Preliminary Design
2. Detailed Design  
Engineering
3. Equipment Orders and  
Service Agreements
4. Construction and  
Installation
5. Commissioning
6. Operations

## Project Funding

- Direct
  - 20%-30% equity
  - Bank Collateralized or  
Agency Guaranteed Debt
- 3<sup>rd</sup> Party/EaaS
  - Fund/Design/Build/Own  
/Maintain
  - Off Balance Sheet?
  - Infrastructure Investors
  - Tax Credit monetization





ENERGY  
INTEGRATION  
INC

**Electrification**

**Decarbonization**

**Energy Efficiency**

Providing a Practical, Proven Means  
for  
Electrifying Biorefineries  
and  
Reducing Their Carbon Intensity

Bill Schafer, CEO

[bill@energyintegrationinc.com](mailto:bill@energyintegrationinc.com)  
[www.energyintegrationinc.com](http://www.energyintegrationinc.com)  
+1 (303) 517-2130

Thank you for your interest! **Questions?**