

# BIODIESEL PLANT SUPERCRITICAL REACTOR DESIGN

CAPACITY 5 MGY  
ANNAWAN, IL



## Complete Plant Asset Sale

– Selling Now as Negotiated Sale

# CONTENTS

CRITICAL REACTOR BIODIESEL  
5 MGY ANNAWAN, IL

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- About this Asset Sale ..... 3
- Summary ..... 4
- SuperCritical Block Diagram..... 7
- Systems Analysis..... 9

## Plant Description

### Design: Critical Reactor

- SuperCritical (Super™) Differs from traditional biodiesel
- No catalyst – uses water and reactors
- Higher profit margin
- Feedstock can be very high ffa. Can handle up to 100% ffa
- Results in purer glycerin
- Produced biodiesel is clear

NOTE: Up to 100% ffa feedstock can be reacted.  
No catalyst is used. With biodiesel distillation  
product comes out clear (no color).

# ABOUT THIS NEGOTIATED SALE

CRITICAL REACTOR BIODIESEL  
5 MGY ANNAWAN, IL

- **Asset Sale Only** – Entire Biodiesel Plant is For Sale
  - **Plant Assets** to be sold as a complete entity
    - This is a structured negotiated sale – email us for a Quote
  - **Plant Condition**
    - Design: SuperCritical Reactor (Super™)
    - Idled, cleaned, hydroblasted - ready to remove & load
    - All structure, piping, instruments, controls, FF&E included
    - Some minor equipment reconditioning required – list available on request
  - **Complete List of Equipment and Systems available**
    - Contact us – we have much more information
    - All equipment is listed on our special website
      - **Virtual Data Room (VDR) available with all details & drawings**
    - Still installed – we can remove and load for you
    - We can consult and help with start-up



# GENERAL LISTING

CRITICAL REACTOR BIODIESEL  
5 MGY ANNAWAN, IL



- Major Equipment Cataloged
- All Pieces in Plant to be Sold
  - Instruments & Electrical
  - Piping
  - Structural
  - Spares
  - Controls



# GENERAL LISTING

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# GENERAL LISTING

CRITICAL REACTOR BIODIESEL  
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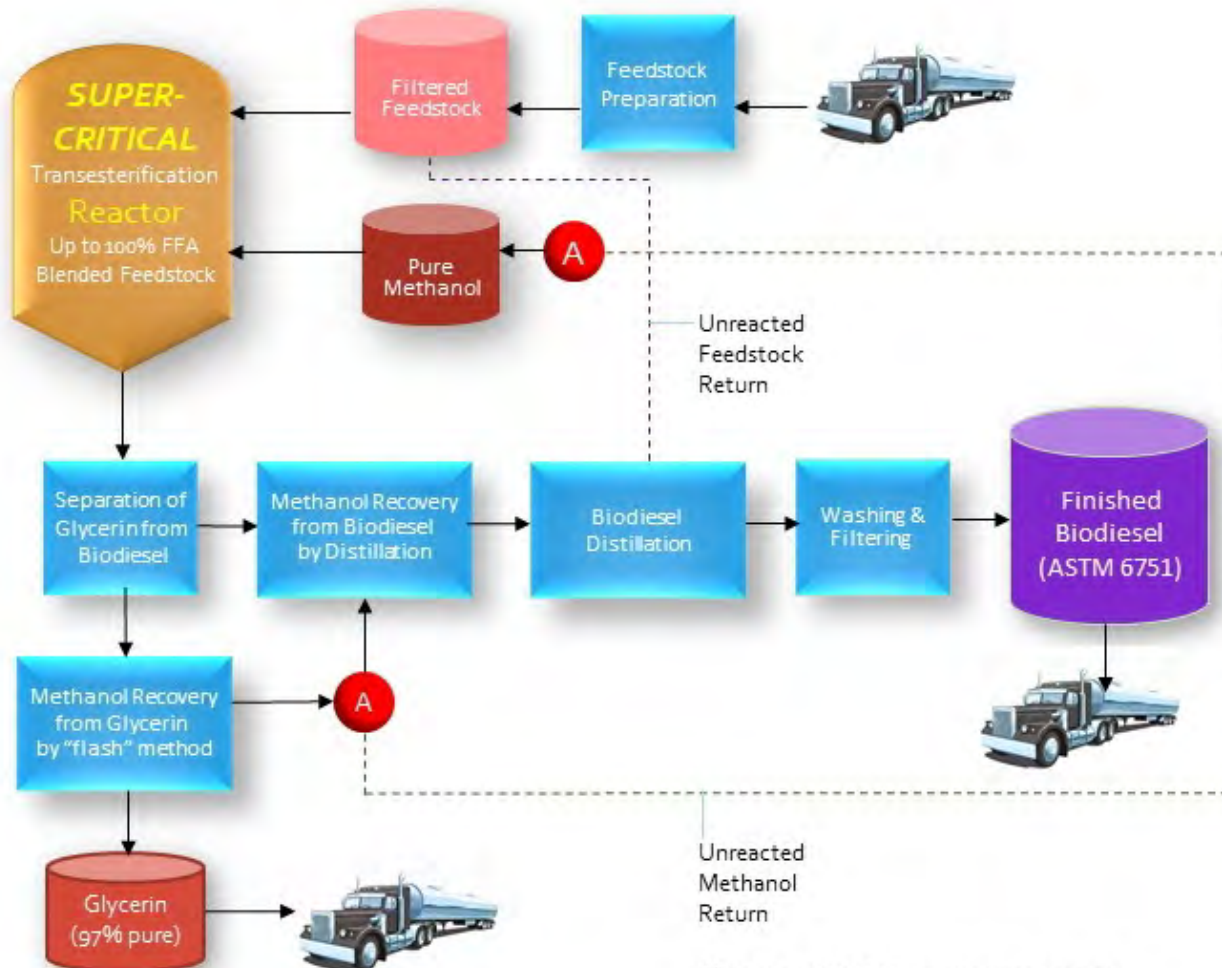
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# WHY SUPERCritical REACTOR

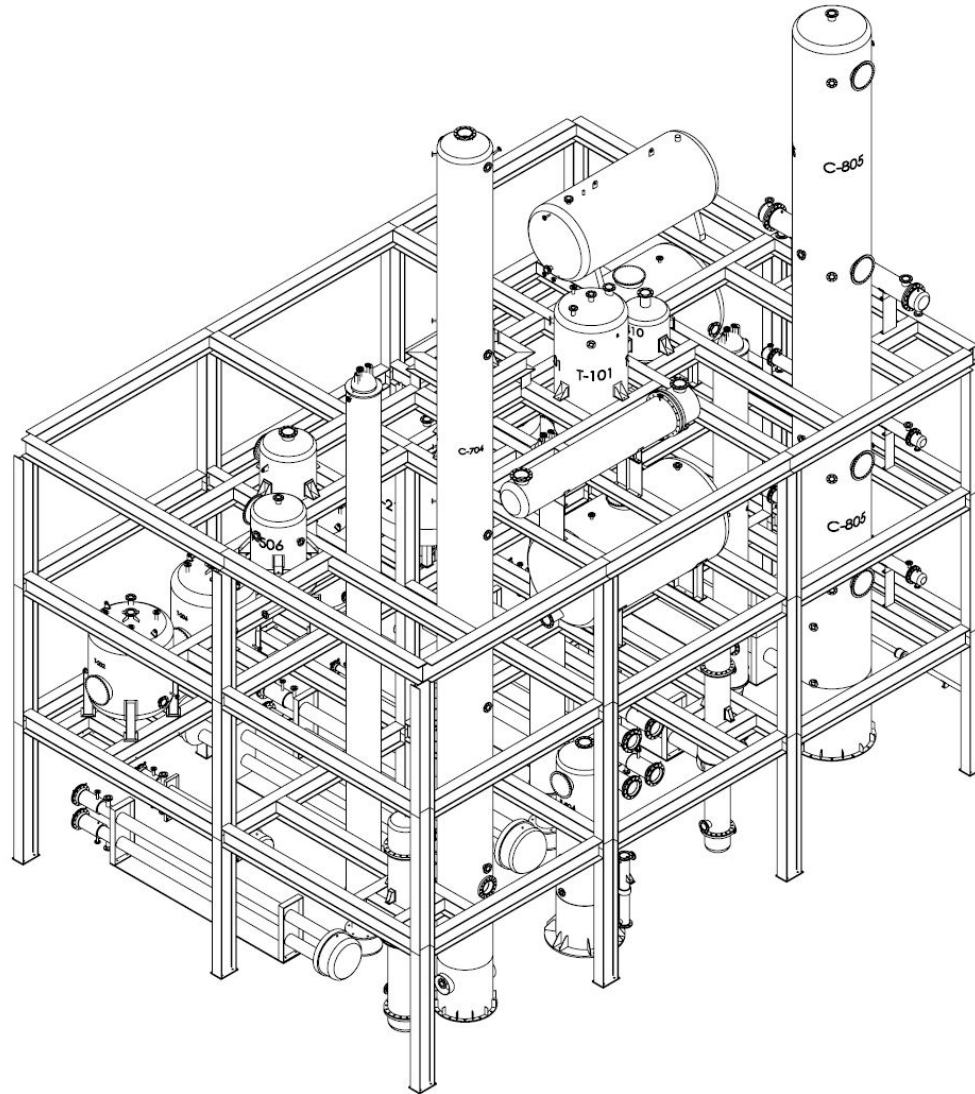
CRITICAL REACTOR BIODIESEL  
5 MGY ANNAWAN, IL



Note: Up to 100% FFA feedstocks can be reacted. No catalyst is used. With biodiesel distillation product comes out clear (no color).

# WHY SUPERCRITICAL REACTOR

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# *Profiting From Supercritical Biodiesel*

Why “Supercritical” Biodiesel  
Will Give You An Edge Over  
The Competition

*Jatro Renewables®*

SUSTAINABLECHEMISTRYFOREARTH

# Margin Comparison 5 MGY

*Super BD at 20% Brown Grease*

CRITICAL REACTOR BIODIESEL  
5 MGY ANNAWAN, IL

CRITERIA	TRADITIONAL BD	SUPER BD 20% BROWN GREASE	RHD
Production/Year (gals)	5,000,000	5,000,000	5,000,000
CAPEX	\$8,000,000	\$9,000,000	14,500,000 <sup>1</sup>
Cost Per Nameplate Gal.	\$1.60	\$1.80	\$2.90
Feedstock/lb (delivered)	\$0.48	0.42 <sup>2</sup>	0.48 <sup>2</sup>
Feedstock/gal	\$3.62	3.17	3.62
Operations	\$0.97	0.77	1.07
Total Cost	\$4.59	3.89	4.69
Revenue B99 (delivered)	\$5.35	5.35	5.45
By-Products (fob)	\$0.24	0.42	0.12
Total Revenue/gal <sup>3</sup>	\$5.59	5.77	5.57
EBITDA/gal	\$1.00	1.88	0.88
Total EBITDA/Year	\$5,000,000	\$9,400,000	4,400,000
Months to Payback	19	11	40
IRR (10 years)	62%	104%	28%

Notes: 1. Includes all plant equipment, tanks, permitting and labor, system uses SMR.

Deduct about \$5m if connecting to pipeline. Does not include civil nor building (if necessary)

2. About 25% low cost for feedstock blend (corn oil and YG/UCO @ \$0.48dlvd; brown grease \$0.21 delivered)

3. Based USDA and The Jacobsen spot index pricing for Midwest 10/11/21

4. RHD is Renewable Hydrocarbon Diesel known as Renewable Diesel



# Margin Comparison 5 MGY

*Super BD at 0% Brown Grease*

CRITICAL REACTOR BIODIESEL  
5 MGY ANNAWAN, IL

CRITERIA	TRADITIONAL BD	SUPER BD 0% BROWN GREASE	RHD
Production/Year (gals)	5,000,000	5,000,000	5,000,000
CAPEX	\$8,000,000	\$9,000,000	14,500,000 <sup>1</sup>
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Feedstock/gal	\$3.62	3.62	3.62
Operations	\$0.97	0.77	1.07
Total Cost	\$4.59	4.38	4.69
Revenue B99 (delivered)	\$5.35	5.35	5.45
By-Products (fob)	\$0.24	0.42	0.12
Total Revenue/gal <sup>3</sup>	\$5.59	5.77	5.57
EBITDA/gal	\$1.00	1.39	0.88
Total EBITDA/Year	\$5,000,000	\$6,950,000	4,400,000
Months to Payback	19	16	40
IRR (10 years)	21%	50%	47%

Notes: 1. Includes all plant equipment, tanks, permitting and labor, system uses SMR.

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# MAIN FEATURES OF SUPERCritical SYSTEM

CRITICAL REACTOR BIODIESEL  
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- **100% Catalyst free (prevents contamination of glycerin, yielding almost double market value vs processes using a catalyst)**
- **Truly multi-feedstock capable**
  - Example: Brown Grease. This SuperCritical plant has no problem running Brown Grease whereas only about 2% of traditional biodiesel plants can run brown grease, then they limit at about 15% ffa.
- **Feedstocks can be up to 100% ffa (free fatty acid)**
- **High value Glycerin at 94% vs. 80% Purity (market at about \$0.46/lb vs \$0.26/lb)**
- **Can use high-sulfur feedstocks**
- **Colorless Biodiesel**
- **20% lower OpEx compared to Traditional technologies**
- **Fully automated - Low maintenance**
- **Mature and production tested**
- **Patented (no royalties)**



# MAIN FEATURES OF SUPERCritical SYSTEM

CRITICAL REACTOR BIODIESEL  
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- **Capacity Ranges**

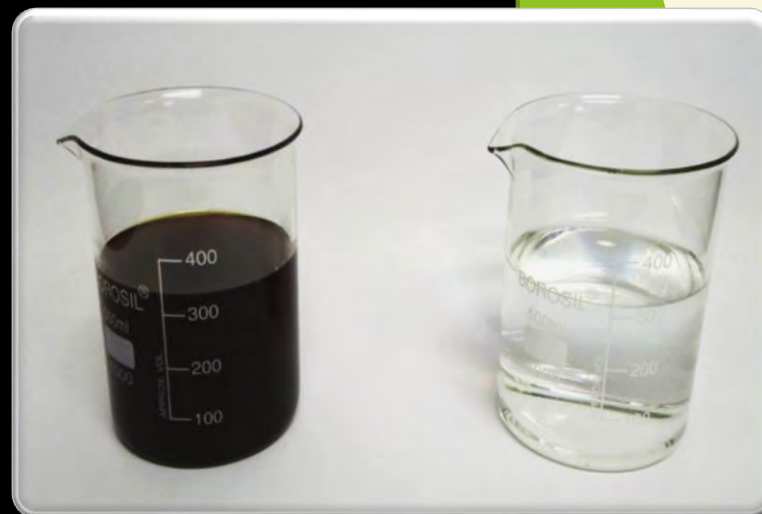
- Nameplate Capacity 5 MGY (Million Gallons per Year)
- Lower Range 3 MGY
  - Turn down ration 40% (running at 60%) or 3 MGY
- Upper Range 6 MGY +
  - Replace boiler and 2 heat exchangers attached to columns

- **Operational Enhancements** (vs Traditional Biodiesel)

- Can run a variable schedule.
- Process is continuous type but can be run like batch type
  - Can run a batch-like operation if desired
  - A week or 2 then down for a while
  - Day shifts but not 24/7
  - Can even shut down part way through the process and start back up the next day

# Advantages of Supercritical\* Process vs. Traditional?

- **38%** . . . approximate amount *Super*<sup>TM</sup> lowers total biodiesel production cost vs. traditional
- **100%** . . . FFA feedstock can be used to lower cost of feedstock choice by half or more
- **95%** . . . purer glycerin by-product, as *Super* process uses no catalyst to contaminate it
- **0°C** . . . cloud point after final distillation, renders a clear biodiesel suitable for use in winter



(Left) A feedstock blend of used cooking oil, corn oil and trap grease with a combined FFA of 65%.

(Right) ASTM 6751, B100 after processing with *Super*<sup>TM</sup> process

\* Jatro Renewables has trademarked Supercritical as *Super*<sup>TM</sup>



# *A Higher Quality Biodiesel With The Super™ Process*

- ASTM\* D6751 provides biodiesel specifications
  - 18 tests (in current ASTM version)
  - Includes both quality and performance indicators
  - No specification constraints feedstock options
  - Insures ASTM specification meets minimum quality
- Certificate of Analysis
  - A CoA typically available for every lot of biodiesel
  - Provides a complete list of specifications and test results
  - May contain additional tests beyond ASTM D6751



# *Super™ Process Includes Careful Quality Assurance*

- Quality Assurance Program (QA)
  - Created for the biodiesel industry by the industry
- Producers & Marketers
  - Rigorous, externally-monitored quality programs
  - Producer: no off-spec. biodiesel leaves the plant
  - Marketer: no off-spec. biodiesel leaves the plant
- *Super™* Process Requires additional content tests for:
  - Mono-, di-, and triglyceride
  - Moisture
  - Particulate contamination
  - Esters Content



# *Super™ Distilled Biodiesel For The Highest Quality Fuel*

- Distillation purifies liquids by a process of evaporation and condensation
  - Petroleum distillation produces different cuts to get gasoline, kerosene, diesel, etc.
  - Methyl ester distillation creates a purified biodiesel
- A purer product that blends better with #2 (ULSD) diesel
  - Superior cold weather operation
  - Greater feedstock flexibility
  - Dependable supply & pricing
  - Higher Cetane
  - Lower Carbon Intensity



NOTE: Up to 100% ffa feedstock can be reacted. No catalyst is used. With biodiesel distillation product comes out clear (no color).