

# Frazier, Barnes & Associates, LLC



*Since 1996, Frazier, Barnes & Associates has been a leading provider of technical and management consulting services to the agricultural industry.*

*FBA specializes in the development and analysis of grain and oilseed processing projects and 1st and 2nd generation bioenergy projects.*

## Renewable Fuels and Agri-Business Consulting

**FOOD/FEED/AGRIBUSINESS/RENEWABLE FUELS**



**Frazier, Barnes & Associates, LLC**

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Frazier, Barnes & Associates, LLC (FBA) is a Technical and Business Consulting services firm formed in 1996 to provide a broad range of services to the oilseed processing and the renewable fuel industries. The firm's project expertise ranges from feasibility analysis and business plans to project development, engineering and construction oversight.

Extreme market volatility has brought opportunities and, more recently, challenges to project developers investors, and plant owners. FBA is uniquely positioned to bring insight and sustainable solutions through a wide offering of value-added services.

As an industry innovator in project and plant analysis, FBA offers four broad categories of services:

- **Technical and Operations Support**
- **Project Development and Commercialization**
- **Procurement and Marketing Support**
- **Management Oversight and Management Services**

FBA’s commitment to its clients is demonstrated by the loyalty and expansion of its client base. Quality, accuracy and timeliness are hallmarks of FBA’s client services. FBA’s growing client family includes independent petroleum refiners, large corporations, lending institutions, commodity and trade associations, research institutions and state governmental groups, among others. Its close partner relationship with a vast array of clients gives FBA an expanding perspective on the growing needs of the agricultural industry as it shifts to an energy-driven market.

Located at the Agri-Center International in Memphis, Tennessee, FBA is uniquely positioned to assist its clients in the development of new and existing processing facilities and associated infrastructure.

In addition to marketing and engineering resources, FBA can provide Strategic Planning, Training and Asset Appraisals. FBA is committed to being a reliable resource for all Agricultural Processing Industries.

## Frazier, Barnes & Associates

| Business Services              | Technical Services                 |
|--------------------------------|------------------------------------|
| Feasibility Studies            | Independent Engineering            |
| Business Plans                 | Technology Upgrades                |
| RFS2 / RIN Verification        | RFS2 Reviews                       |
| Feedstock Procurement          | Plant Expansions                   |
| Technology Evaluations         | Start-up Services                  |
| Business Valuations/Appraisals | Operations Manuals                 |
| Operator Training Programs     | Process Engineering                |
| Product Marketing              | Process Safety Management Programs |

**FRAZIER, BARNES & ASSOCIATES**  
**Providing a Full Range of Value-Added Solutions**

**PROJECT DEVELOPMENT AND COMMERCIALIZATION**

- Assessment of Processing Options
- Feasibility Studies
- Business Plans
- **Independent Reviews**
- Financial Closure
- Site Selection Analysis
- Project Engineering Services
- Construction Management/Owner's Rep Services
- Start-Up Planning and Implementation

**TECHNICAL AND OPERATIONS SUPPORT**

- Capital Project Audits and Evaluations for Biofuel Projects
- Process Engineering Services
- Oilseed Processing Solutions
- Operations Benchmarking Audits
- Operations Evaluations/ Plant Valuations
- Operator Training Programs
- **Third-Party Engineering Reviews**
- Technology Upgrades and Expansions

**MANAGEMENT AND MARKETING SUPPORT**

- **Feedstock Procurement**
- Product and Co-Product Marketing
- Marketing Plan Development
- Plant Management Services
- Product Off-take Agreements
- Quality Assurance, ISO 9000 and BQ 9000 Development
- **Strategic Planning**

**RESEARCH AND DEVELOPMENT**

- Processing Plant Product Quality Research Studies
- Leading Edge Processing Technology Research and Development
- Pilot Plant Technology Development
- Alternative Feedstock and By-product Research

## **RELEVANT PROJECT EXPERIENCE:**

FBA has conducted numerous appraisals, feasibility studies, business plans, technical reviews and audits for the biofuels & agricultural processing industries. In addition, FBA provides project development services for a broad customer base and has been involved in the development of a significant amount of process capacity.

Following is a sample of the consulting projects we have worked on in the past.

## **BIOMASS**

### **Pyrolysis Technology Evaluation**

Evaluated numerous pyrolysis technology options in various stages of development. Recommended the lowest risk investment to the client.

### **Biomass Education Project**

Worked in conjunction with AgroTech Communications to develop a biomass education program that identified potential biomass feedstocks to be utilized in Tennessee. Made presentations across the state to potential biomass project developers.

### **Anaerobic Digestion By-Products Study**

Feasibility of anaerobic digestion of acid whey and yogurt into biogas and digestate.

### **Anaerobic Digestion of SwineWaste**

Feasibility of locating an anaerobic digestion facility in north-central Iowa to process swine waste from the estimated 80,000 feeder pigs in the region.

### **Cottonseed Oil Mill Biomass to Energy Project**

FBA evaluated the feasibility of utilizing alternative energy sources for process steam generation at a cottonseed processing plant utilizing state-of-the-art boiler technology.

### **Agricultural By-Products Cogeneration Study**

Conducted an evaluation determining the process and economics for converting soybean hulls and corn germ into thermal energy for an Iowa soybean processing plant.

### **Landfill Gas Utilization Project for an Existing Soybean Processing Facility in the Upper Midwest**

Identified requirements for converting from natural gas to methane gas. Negotiated with the landfill owner and pipeline operator. Project resulted in significant energy savings for the processing plant.

## **Aggregation and Densification Study**

FBA evaluated the biomass feedstock available in the procurement region of a planned pellet mill in WI. Evaluated the transportation and storage logistics for the agricultural and woody biomass. Contacted local farmers and co-ops for willingness to participate.

## **AGRICULTURAL PROCESSING & ENGINEERING**

### **Corn Fractionation Study for the World's Leading Chemical Company**

FBA evaluated the feasibility of fractionating high-starch corn and deoiling the germ component for edible oil or biodiesel use for an ethanol renewable energy plant.

### **Employee and Management Training Program for a New Soybean processing Facility in Fairmont, Minnesota**

Operations and safety training before and after startup of a large crushing facility for Cenex Harvest State's processing plant in Fairmont, Minnesota.

### **Silica from Grain Projects**

FBA provided conceptual design, schematic design and equipment selection for new Silica project from renewable grain feedstocks. Provided engineering equipment selection and worked as owner's engineer and project representative.

### **Nutrients from Wastewater Projects**

FBA provided schematic design and project oversight for new protein and nutrients from wastewater project. Worked as owner's engineer and project oversight for project development, equipment selection and construction of project. The firm provided grew and extracted protein and nutrients from a large industrial wastewater system.

### **Soybean Processing Feasibility Study**

Conducted a soybean processing and refining feasibility study for a Fortune 100 company.

### **Soybean Processing Internal Audits**

Conducted multiple operational audits for numerous soybean processors. Developed a database to benchmark processing plant costs and efficiencies for internal use.

### **Soybean Processing Plant Modernization Project**

Provided recommendations on necessary equipment modifications and the economics associated with recommended changes.

### **Edible Oil Refining Consultant Services**

FBA has provided various technical services to edible oil refining operations.

### **Corn Oil Generation Conceptual Strategy for Leading U.S. Corn Oil Marketer**

FBA provided technical and market consulting services for the front-end removal of corn oil from ethanol plants.

### **Grain Terminal Facility Asset Evaluations**

FBA has conducted asset valuation reports on multiple grain handling facilities.

### **Bulk Fuel Terminal Feasibility Study**

Conducted study determining the viability of constructing a bulk fuel river terminal in eastern Iowa.

### **Oilseed Processing Feasibility Studies & Business Plans**

Conducted multiple feasibility studies and business plans for agricultural co-ops and soybean councils in the U.S. and Canada.

### **University of Illinois Soybean Processing and Meal Quality Study**

FBA conducted a soybean processing Pilot Plant test for soybean meal and coordinated extensive soybean meal feeding trial tests utilizing soybean meal samples from multiple U.S. processing plants.

### **Tennessee Oilseed Diversification Business Development Plan**

Developed a Business Plan/Conceptual Processing Model for a value-added oilseed processing facility to be located in West Tennessee. Project was conducted in collaboration with the Memphis Bioworks® Foundation and the Tennessee Department of Agriculture.

### **Cottonseed Oil Mill Business Valuation**

FBA performed a due-diligence business and asset evaluation of an operational cottonseed processing facility.

### **Market and Financial Review for Montana Biofuel and Bio-lubricant project**

Worked with producer group, University and Private Corporation to review their feasibility study and marketing plan. Developed a model for conversion of wheat acres into canola/mustard seed acres.

## **BIODIESEL**

### **Feedstock Procurement for Biodiesel Facilities**

Purchase and procurement for approximately 15 million gallons of soybean oil, animal fats and restaurant grease for several biodiesel facilities.

### **Project Detailed Design Engineering for New 18 Million Gallon Biodiesel Plant**

Provided construction drawings for 18 million gallon per year biodiesel plant. Provided conceptual engineering, schematic design, preliminary engineering and detailed design for new biodiesel plant located in an existing brownfield extraction plant. Provided process design, P&IDs, equipment list, process narrative, process piping design, vent condenser design for methanol tanks, tank design, equipment list, and equipment specifications. Provided safety and code review, industrial ventilation and designed upgrades for electrical and grounding systems.

### **Project Engineering for Upgrade to 12 Million Gallon Biodiesel Plant**

Provided process and mechanical engineering to increase esterification capacity and increase plant flexibility. FBA designed and project managed new guard beds for resin esterification system, upgrades for methanol column capacity with new packing and equipment upgrades, new glycerin separation, new process chilled water and cold soak systems. Performed PHA and safety reviews.

### **Project Engineering for Upgrade to 10 Million Gallon Biodiesel Plant**

FBA provided detailed engineering to increase plant capacity by 50% from 10 to 15 mgy. Added acid esterification upgrade for feedstock flexibility, methanol column and utilities upgrade. Designed all process and mechanical systems, provided project management for multiple projects. Performed PSM and PHA for plant.

### **Start-up Services for 40 million Gallon Biodiesel Plant**

Once the technology provider left and the plant was not functioning after a year of trials, the client called in the FBA team to troubleshoot the transesterification, glycerin and methanol recovery units. Within a month, FBA had identified all of the problems and the plant was able to produce in-spec biodiesel. RFS2 Certification (Plant Registration)

### **Operator Training and Start-up Services for 100 million Gallons per year Biodiesel Plant**

FBA provided on-site operator training for safety, process, chemistry and plant operations for 100 mgy biodiesel plant. Provided operations training procedures to new operators and on-site start-up assistance. FBA provided written operating procedures for the following unit operations associated with the biodiesel facility, Phosphoric Refining, Alcohol Neutralization, Transesterification, Methyl Ester Distillation, Gums and Glycerin Acidulation, Glycerin Evaporation & Neutralization, Methanol Recovery and Distillation, Acid Esterification, and Utilities. Training was provided for normal startup, normal shutdown, and emergency shutdown due to loss of power, loss of chillers, loss of instrument air, and loss of process heater. Provide on-going start-up assistance for new plant.

## **RFS2 Certification (Plant Registration) for Renewable Energy plants registration with EPA**

FBA has licensed PE's in nearly every state that biodiesel is produced. Our team of engineers provided RFS2 independent engineering reviews for approximately 25% of the registered renewable fuel facilities, including biodiesel, biogas, and ethanol plants.

### **Plant Acquisition Due Diligence**

Provided comprehensive due diligence for biodiesel acquisition by established petroleum refiner including valuation, technical due diligence and feedstock/market assessment.

### **Biodiesel Feasibility Study for Ethanol Company Diversifying into Biodiesel**

In-depth analysis of technology options and full-scale feasibility analysis for a Northeast ethanol and retail gas distribution company.

### **Project Development for 36 Million Gallon Biodiesel Plant**

Provided direct support from inception to operation for second largest biodiesel facility in the U.S. at the time, including business plan, construction oversight and product off-take agreements.

### **Biodiesel Technology Evaluation**

FBA conducted a technical evaluation of Greenline Industries processing technology for Leaf Clean Energy. The evaluation resulted in \$20 million Series A preferred stock financing.

### **30 Million Gallon Biodiesel Plant in Iowa with Multiple Feedstock Capability**

FBA completed the comprehensive feasibility study for Western Iowa Energy. Plant is operating as one of the largest biodiesel facilities in the U.S.

### **Biodiesel Feasibility study for Largest Oilseed Processor in the World**

Examined technical and marketing aspects of biodiesel production for multiple biodiesel locations in multiple states. FBA developed financial projections for various facility sizes.

### **Feedstock Assessment for 50 Million Gallon Biodiesel Plant in Nebraska**

Provided overview of available sources of feedstocks to supply large-scale biodiesel production facility in southeast Nebraska.

### **Marketing and Technical Reviews for 180 Million Gallon Biodiesel Plant at Coastal U.S. Location**

Provided technical fatal flaw report and marketing production audit for large-scale biodiesel production facility in development.

### **Fatal Flaw Report for Large International Investment Bank**

Provided technical evaluation of 105 million gallon biodiesel plant in development at coastal U.S. location. Currently serves as independent engineer for the financial institution.



### **Technical Evaluation of Biodiesel Processing Technology**

Conducted a technical evaluation of a modular commercial biodiesel technology utilized in multiple facilities. The evaluation entailed site visits and interviews with representatives from multiple operational facilities employing the technology.

### **Comprehensive Study for \$51 billion Pharmaceutical Company**

Feasibility of retrofitting an idled pharmaceutical facility into a large-scale biodiesel facility including capital and operating estimates.

### **Biodiesel Feasibility Study for Automobile Manufacturer**

Examined the feasibility of a large-scale biodiesel facility utilizing truck, rail and barge transportation. Primary investor is a major car company.

### **Biodiesel Technology Analysis for Worlds Largest Meat Processor**

Technical evaluation of viable technologies for converting various types of animal fat into biodiesel.

### **Global Fats & Oils Market Workshop**

Conducted one-day seminar on availability and use of fats and oils for Fortune 100 Energy Company.

### **Comprehensive Marketing Analysis for Large International Investment Bank**

Evaluated the market feasibility of an 86 million gallon biodiesel plant located at a port location in the Gulf of Mexico. Assessed the viability of utilizing imported feedstocks and exporting to biodiesel markets in the European Union.

### **Biodiesel Market Overview for World's Two Largest Debt Rating Agencies**

Provided market-consulting services for first biodiesel plant debt issuance rated by top multi-national financial and investment research firms.

### **Renewable Diesel Process Review in Canada**

Evaluated process technology to produce "green diesel" in Canada. Compared benefits versus production of methyl esters in Cold-weather Climates.

### **Biodiesel Feasibility Study in Canada**

Evaluated feasibility of biodiesel production in Ontario in conjunction with a co-located soybean processing facility.

### **Technical Services for Proposed 200 Million Gallon Biodiesel Plant in the Bahamas**

Provided preliminary engineering for large-scale biodiesel production facility in the Caribbean.

### **20 million gallon Biodiesel Plant in Michigan**

Feasibility study, technology evaluation and project development services for first large-scale biodiesel plant utilizing multiple modular production units. Provided start up assistance, RFS2 report, safety evaluations and EPA required environmental reports.

### **30 Million Gallon Biodiesel Plant in New Jersey**

Feasibility study, business plan, and project development for a state of the art biodiesel facility.

### **Biodiesel Feasibility Analysis for stand-alone Facility in Virginia**

Provided a clear and concise analysis to allow for a rapid start-up of a biodiesel facility. Plant was subsequently visited by the President once it became operational.

### **Statewide Biodiesel Feasibility Studies in Mississippi, Arkansas, Tennessee, Georgia, and Ohio**

Developed comprehensive analysis as a basis for commercializing biodiesel projects in those states.

### **Biodiesel and Biomass Research Consultant for the University of Georgia**

Provided input and support for biodiesel, ethanol, and biomass feasibility studies.

## **ETHANOL**

### **Cellulosic Ethanol Technical Evaluation**

Technology evaluation of cellulosic ethanol technology vendor for lending institutions.

### **Cellulosic Biomass Conversion Process Technical Evaluation in Canada**

Evaluation of leading cellulosic ethanol technology for large capital investment firm.

### **Ethanol Feasibility Study for Large U.S. Based Chemical Company**

Feasibility of retrofitting an under-utilized chemical plant into a large-scale ethanol facility, including capital and operating estimates.

### **Independent Evaluation of Multiple Ethanol Plants**

Conducted due diligence engineer evaluation of multiple ethanol plants for private equity investment firm.

### **Ethanol Feasibility Study Using Unique Alternative Feedstock**

Comprehensive feasibility studies for an East Coast ethanol plant that would utilize barley rather than corn. Assisted in successful project funding.

### **Dry Fractionation Ethanol Production Overview for Canadian Ethanol Plant**

Provided overview of advantages entailed in fractionating corn germ for ethanol plants and co-processing the germ.

### **Iowa Ethanol Feasibility Study**

Comprehensive feasibility study for stand-alone ethanol plant with a corn dry fractionation technology utilizing corn feedstock.

### **Indiana Ethanol Feasibility Study**

Comprehensive feasibility study for stand-alone ethanol plant with a corn dry fractionation technology utilizing corn feedstock, and biofuels project with combined ethanol, biodiesel, and biomass uses.

### **Missouri Ethanol Feasibility Study**

Comprehensive feasibility study for stand-alone 50 million gallon ethanol plant.

### **Mississippi Ethanol Feasibility Study**

Comprehensive feasibility study for stand-alone 30 million gallon ethanol plant utilizing corn and milo.

## **CONSULTANT SUMMARY:**

**Kenneth E. (Pete) Moss – President** - Mr. Moss became President and owner of FBA in 2006. He has over twenty-five years of professional experience in oilseed processing, renewable energy commercialization, marketing, business plans, and financial analysis. Mr. Moss started his career as a marketing manager for a large scale soybean processing facility located on the Mississippi river. Mr. Moss has a comprehensive understanding of the Biofuels industry; feedstock and product value analysis and frequently speaks at financial summits and Biofuels seminars. He earned his bachelor's degree in management/marketing, and his masters of business administration (Executive MBA) from the University of Memphis.

**Gerald U. Sherfy – Vice President of Operations** - Extensive experience in renewable energy, oilseed processing and biomass feasibility analysis and business plans. Mr. Sherfy has provided significant research and analysis for numerous ethanol and biomass projects and is a specialist in feedstock research and financial analysis and provides technical equipment appraisals for the renewable energy and industrial plants. Prior to joining FBA, Mr. Sherfy worked in both the real estate appraisal and commercial finance fields. He received a bachelor's degree in physics and an Executive MBA (masters of business administration) from the University of Memphis.

**Tim Gorman, P.E., Vice President of Engineering-** Over 35 years of professional engineering experience in design, fabrication, construction oversight, start-up and commissioning of renewable energy, industrial, process and manufacturing facilities. Mr. Gorman has worked on biodiesel, ethanol, oilseed, processing, oil refining, packaging, grain storage, grain handling, corn fractionation, truck and rail loading/unloading operations, industrial boiler, industrial and pharmaceutical HVAC systems, steam, condensate, cooling water piping, and dust collection systems. He has worked on energy and utility audits, and project manager. He is a registered professional engineer in twenty states and CA.

**Sean Austin – Technical Process Consultant** – With a specialization in knowledge of biofuel production technologies, he is experienced in generating mass and energy balances, process design, existing process troubleshooting and environmental permitting. Mr. Austin has been involved in retrofitting numerous biodiesel and renewable energy plants with new technology. He graduated from North Carolina State University with his degree in Chemical Engineering.

**Patrick Moss – Technical Process Consultant** – A graduate from the University of Tennessee at Chattanooga, Patrick earned a degree in Chemical Engineering and a minor in Chemistry. He has experience working in several chemical production plants and is knowledgeable in the biodiesel production process. He has an extensive understanding of computer programs for Mass Balance, equipment selections, P&IDs and piping drawings, along with the RFS2 regulations and renewable fuels technology.

**Amanda Smith – Feedstock Assistant** - Ms. Smith specializes in feedstock procurement and is responsible for managing feedstock inventories for several biodiesel facilities. She is knowledgeable in the RFS2 regulations, and has worked extensively in helping facilities meet the EPA's requirements for the Separated Food Waste Plans. She has also assisted on numerous feasibility studies and has experience with developing operator training materials.

**Christen Andrews – Office Manager** - Ms. Andrews provides all of the Accounts Receivables and Payables, Renewable energy RIN Verification QAP program as well as project tracking. As Office Manager for FBA, Christen ensures that all FBA projects go smoothly and client interaction is seamless.