

# Regional Strategies for Biobased Products in the Mississippi Delta



- Abundant supplies of agricultural and forestry biomass
- Excellent inbound/outbound logistics
- Diverse land types and long growing season
- A strong, vibrant chemical industry
- Existing agribusiness and research support

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A collaborative multi-client study developed by:



## Introduction

Globally it is an exciting time for those involved in the commercialization of biobased products in the manufacture of chemicals, biofuels, plastics and many other industrial products. Many believe that the Mississippi Delta region in proximity to Memphis, Tennessee is uniquely poised to capitalize on this global phenomenon. However, it has been difficult for companies to properly ascertain the most profitable course of action because there is no comprehensive strategic plan, asset and feedstock analysis, and other tools to align resources to maximize potential. This report, Regional Strategies for Biobased Products in the Mississippi Delta will answer these concerns and allow for strategic investment, while aligning the company's objectives with an already established network of farmers and supporting businesses representing logistics, agribusiness, chemical and related companies.

The "bioeconomy" is an entirely new economic segment in the United States and around the world. Feature articles have appeared in Forbes, The New York Times, Wired and many other publications touting the economic, environmental and national security benefits of utilizing renewable feedstocks for new and innovative consumer products. Many of the world's largest agribusiness and chemical companies are predicting steadily increasing market share for biobased-derived chemicals, plastics and other "high-value" biobased products. McKinsey & Co. recently predicted that the global market for industrial biotechnology (biobased products) will be \$125 billion by 2010, while almost \$2 billion in venture capital was invested in the United States in clean technologies in 2006.

The political, regulatory, environmental and strategic forces are the drivers of the bioeconomy. It is predicted to dramatically change the production structure and finished goods of chemical companies, offer new distribution channels for forestry and agricultural products, provide potential value-added opportunities for waste stream products, and offer new investment opportunities in cutting edge technologies. The technologies involved in producing biobased products will come together with other disciplines to create a new generation of products and the creation of new industry entities. Consider just a few of the recent developments:

- Demand for alternative fuels has opened up unprecedented opportunities for open discussions and strategies to commercialize new crops in the Mississippi Delta such as sugar beets, canola, sweet potatoes, and sorghum. This comes during the historic 2007 growing season which saw an amazing shift within commodity crop production (29% less cotton and 40% more corn in the MidSouth).

- A major push for high value biobased products and co-products that involve plant fractionation and novel uses for oils, starches, sugars, cellulose, proteins, and fibers.
- Investment of billions of dollars in commercializing biobased products including ADM, Cargill, Chevron, Conoco-Phillips, DuPont, Dutch Royal Shell, Monsanto and many more.

## **Understanding Biobased Industries and their Impact on Your Business**

The Memphis Bioworks® Foundation (MBF) has initiated a project with a group of public and private stakeholders with the objective of developing a strategic business plan for the region that will ultimately enhance regional linkages between agriculture and timber producers, the industrial companies that may consume green feedstocks, and the logistical assets in the Delta region. It is the intent of this project to maximize the value creation and new opportunities for the stakeholders within the region including farmers, processors, logistics providers, distribution and retailers, and ultimately consumers.

As part of this project, the MBF will launch a multi-client study that will investigate the opportunities and issues that surround the continued growth of the infant bioindustrial business complex in the Delta region. This study will focus on the commercialization of agricultural and forestry products into biobased products including biofuels, chemicals, and other products. The regional focus of this study includes fifty (50) selected counties that are part of the Delta Regional Authority ([www.dra.gov](http://www.dra.gov)) in Arkansas, Mississippi, Missouri and Tennessee, while making some broad observations about all 138 counties in this region. While this study has a regional focus, much of the information will provide value to subscribers as a template for biobased industrial efforts in other regions of North America.

This study will provide comprehensive detailed information about biobased industrial opportunities. Unlike most syndicated research, participants in Regional Strategies for Biobased Products in the Mississippi Delta will get answers to specific questions through participation in the formation of the study outline. The participants who enroll before the study kick-off meeting will help design the study and have a special opportunity to request specific topic areas that enable the study to provide proprietary results to the subscribers<sup>1</sup>. The end result is the answers the participant specifically needs plus a broader understanding of the market for a relatively minimal investment. This leaves the participants' resources free to focus on implementing strategies that capitalize on the findings of the study.

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<sup>1</sup> To manage the scope of the study, these special requests will be limited for each company and the Memphis Bioorks® Foundation will have final decision to accept the additional topics.

While content will be modified somewhat by subscribers, MBF expects the study to explore the future of biobased industrial production in the Delta region through an in-depth and open-minded analysis of topics including: existing and new feedstocks; biobased products along the entire value chain; logistics; policy and business issues; and environmental factors.

## Proposed Study Outline

1. For each county surveyed:
  - a. Crop and biomass production estimates including grains, oilseeds, cereals, hay, silage, crop residues, forest products, and forest residues
  - b. Crop and forest production acres including Conservation Reserve Program (CRP) set aside from 1985 to present
  - c. Animal production statistics for beef, dairy, chickens and swine including number of breeding animals and number of production animals
  - d. The number of Confined Animal Feeding Operations (CAFO) permitted sites
    - i. Manure produced by species on CAFO sites
  - e. The locations and capacity of animal slaughter and processing sites
  - f. The quantity of municipal solid waste produced
2. Identification of potential new crops that may have a beneficial potential for the region including but not limited to cassava, kenaf, hesperaloe, castor, camelina, sunflower, okra, sweet sorghum, sweet potato, sugar beets, switchgrass, miscanthus, Chinese tallow, short rotation woody species, etc.
3. For each crop, crop residue, plantation tree species and the resultant residues identified as existing or as a potential crop:
  - a. an estimated analysis based on the following components:
    - i. Oil content
      1. Oil composition %: Oleic, linoleic, etc
    - ii. Starch
    - iii. Protein
    - iv. Cellulose
    - v. Sugar
    - vi. Fiber
  - b. Provide an estimate of yield per acre per year
  - c. Provide an analysis of the crop nutrients removed per acre per year
  - d. Provide a listing of the biotechnology traits commercially available and in testing that may be utilized in the region.
  - e. The irrigation requirements if any
  - f. The potential for double-cropping and with what partner crops

4. An analysis of the potential products from bio-based feedstocks including: Market size, location of current production competitors, location of primary consumers, demand forecasts, potential bio-based feedstocks used in production, competitive advantages of the region versus current suppliers. Potential products may include the following plus others:
  - a. Biofuels
  - b. Bioenergy
  - c. Chemicals from biomass
  - d. BioPlastics
  - e. Functional fluids
  - f. Fiber products
  - g. Specialty products
5. Infrastructure
  - a. Inventory of farm machinery assets
  - b. Inventory of applicable factories and manufacturing capacity including products, capacity, volume, bio-based feedstock potential, percentage of idle infrastructure, issues and opportunities with biobased feedstocks
  - c. An analysis of existing or potential industrial clusters around key industries such as petroleum refining, plastics, automotive, pharmaceutical, etc.
6. A comparison of the conversion technologies listed below to the current and potential crops to determine the processing infrastructure needed for various cropping scenarios
  - a. Input Technologies
    - i. Dry-mill corn
    - ii. Wet-mill corn
    - iii. Biochemical - dilute acid, enzymatic hydrolysis, biocatalyst, etc.
    - iv. Thermo-chemical biomass - gasification, pyrolysis
    - v. Industrial fermentation
    - vi. Fiber separation/processing
    - vii. Oilseed crushing
    - viii. Mechanical - fractionation, hammermill, etc.
  - b. Co-product processing technologies
  - c. Enabling Technologies
    - i. Preprocessing technologies
    - ii. Enzyme production
7. Supply chain logistics in the Delta region
  - a. An analysis of the farm-to-factory options such as localized pretreatment facilities feeding a centralized factory vs. on-farm storage feeding a centralized factory vs. smaller specialized

- factories close to crop production and the critical pros and cons of each option
  - b. Inbound and outbound logistics strengths and weaknesses in the Delta region
  - c. Storage capacity for feedstocks, intermediates and final products
  - d. Road access opportunities and issues
  - e. Rail access opportunities and issues
  - f. Barge and harbor access opportunities and issues
  - g. Pipeline access opportunities and issues
8. Research, development and commercialization activities in the Delta
    - a. Inventory and assessment of current research and development capabilities
      - i. Labs, greenhouses, field test stations
    - b. current commercialization pathways
    - c. intellectual property protection competencies
    - d. field propagation of seed and plant stock - current volume and idle capacity
  9. An analysis of the environmental impact and natural resources balance resulting from conversion to various new cropping systems and bio-manufacturing plants
    - a. Water use in the potential crop and bioindustrial production scenarios
    - b. Air quality
    - c. Soil erosion
  10. Provide an assessment of the business issues that this initiative will face
    - a. Metropolitan support
    - b. Rural development
    - c. Capital sources
    - d. Education and workforce development
    - e. A review of other state and regional initiatives and results
  11. Provide an overview of relevant state, national and international government policies that may impact this project
    - a. State Policy - AR, MO, MS, TN
    - b. U.S. Federal Policy
    - c. European Policy
    - d. China and India Policy
    - e. Brazil Policy
    - f. World Overview

While study methodology may also be refined by participants, we expect it to include:

- Counties will be chosen as representative for the DRA region. These study counties will meet minimum criteria that may include logistical access, variable crop and animal production systems, distance to the consumption locations, number and size of farmers, average farm income and per capita income.
- At least 50 qualitative interviews with key producers that farm in the targeted counties
- Qualitative interviews of key influencers including industrial companies with a regional presence, companies seeking to enhance their biobased industrial competencies, national, state and regional government officials
- A quantitative survey of industrial companies, feedstock producers, and influencers

### **Why a Multi-Client Study?**

It is an opportunity for companies to get the answers they need to move their business forward at a fraction of the typical cost. A group of industrial companies, government agencies, and non-government organizations will jointly participate in funding this multi-client study. Those who purchase the study by December 31 will have an opportunity to tailor its focus to more specifically meet their needs. This multi-client format works well because gathering the information is non-strategic, so companies can save in this phase to focus resources on strategic areas such as how they use the information from the study.

### **Why Should a Company Participate?**

Many firms can benefit from the information in this study, including:

- Industrial biotechnology and biomass utilization businesses that are considering locating in the Mississippi Delta region near Memphis, Tennessee including 2<sup>nd</sup> generation biofuels businesses.
- Chemical companies that are considering production techniques using green feedstocks
- Manufacturing companies such as auto industry companies that are seeking green materials for use in their final products
- Companies that manufacture the equipment used in producing, harvesting, densifying, and transporting the biofeedstocks
- Financial institutions that need a deeper understanding of bioindustry to take advantage of the financing opportunities needed by the industry

## How Can Companies Take Advantage of this Study?

The Regional Strategies for Biobased Products in the Mississippi Delta may be used to focus or refine participant's strategic planning efforts including:

- Provide insights for positioning your company, products and services to gain the benefits of being an early adopter of bioindustry
- Help better target your organization's resources in bioindustry efforts
- Fuel new product development based on the issues and unmet needs of this growing industry segment

## What is the cost?

The fee for participating in the Regional Strategies for Biobased Products in the Mississippi Delta is \$35,000, which will be billed in two installments. Sixty percent (\$21,000) will be billed upon study initiation in January, 2008 and the remaining 40% will be billed upon delivery of the final report in September, 2008.

## What are the Deliverables?

Following the kick-off conference, participants will receive a final outline of the general topics to be covered during the study for their review and comment.

- At the completion of the study in September, 2008 the participants will receive a final written report.
- Participants will attend a one-day conference for a final report of the findings. The kick-off and final conferences also provide participants with useful networking opportunities.
- The Memphis Bioworks Foundation will also make on-site presentations of the findings at subscribers' offices for the cost of travel, which is billed at cost.

## What is the Project Timeline?

February 1, 2008	Enrollment deadline
Date TBA	Kick-off meeting
February – September 2008	Regular progress reports
September 2008	Final presentation (Date and location to be determined by subscribers)
October 2008	Final report distribution

## **Kick-Off Conference Focus**

The kick-off conference provides a chance to voice your specific needs, concerns and ideas, and work with other participants to shape the study content. The conference will be held in Memphis approximately 2 weeks after the February 1 deadline (exact date TBA).

## **What if I have Questions?**

For further information contact the project coordinators Mike Karst at 901-753-0470 or Pete Nelson at 901-315-1694. They will be pleased to discuss details of the study.

## **How do I Participate?**

Complete the attached enrollment form and fax to 901-448-8850 by February 1, 2008 and plan to attend the kick-off conference in Memphis (Date TBA).

## **QUALIFICATIONS**

Founded in 2001 as a nonprofit 501(c)(3), the Memphis Bioworks® Foundation leads an unprecedented collaboration of public, private, academic and government organizations aligned behind a common goal. The mission of this alliance is to build upon the bioscience industry already thriving in the Memphis economy and to establish the area as an internationally recognized center for the development and commercialization of biotechnology. The Foundation is in the process of implementing a 10-year, \$500 million plan for achieving its bold vision for the future - leveraging public money with private support. Because MBF focuses solely on bioscience and well connected in the community, the organization is well positioned to move this project forward. Since March of 2006, MBF has worked towards aligning regional stakeholders behind the common goal of developing a vibrant, strong biobased products industry.

The Regional Strategies for Biobased Products in the Mississippi Delta will be conducted under the direct supervision of Steve Bares, Ph.D., Mike Karst, and Peter Nelson. The study team will be joined by a national consulting team and coordinated in conjunction with a steering committee comprised of research and

business leaders from throughout the study region. Brief biographies of key personnel on the project team include:

**Steven J. Bares, Ph.D.**

In September, 2001 Steven J. Bares became President and Executive Director of the Memphis Bioworks® Foundation. Prior to this position, Dr. Bares served in a series of Executive roles at International Paper, the world's largest forest products company, specializing in growth business management, new product development and marketing. Before joining IP, Dr. Bares was President and co-founder of Sparcom Corporation, a company specializing in handheld computer applications and wireless communications products. Prior to this position, Dr. Bares was a Program Manager for Hewlett-Packard's Laser and Inkjet Printer Group and part of the initial team that started the inkjet printer business, now an over \$15 billion business worldwide. Dr. Bares is co-founder and board chairman of the Memphis Academy of Science and Engineering, a middle/high school for Memphis inner city children. Dr. Bares holds a Ph.D. in Physical Chemistry, a Masters of Business Administration (MBA), a B.Sc. in Chemistry and has authored nine patents. The Memphis Bioworks® Foundation is a catalyst for creating opportunity through biosciences growth in the Memphis region and is participating in the development of a regional plan for biobased products, industrial biotechnology, and agribusiness.

**Mike Karst**

Mike Karst is a principal in Entira, an agribusiness strategy and marketing consulting firm. He has a unique perspective on the future of food and agriculture. Since the mid 1980s, he has designed strategies for incorporating new technologies in agribusiness— ranging from precision agriculture to improve farming productivity to global e-commerce ventures involving all aspects of the farm-to-consumer value chain. Mr. Karst has managed a global marketing fungicide portfolio, with a focus on Asia, facilitated development of a global e-commerce structure to minimize inventory and working capital and created strategies for new initiatives and strategic alliances to create and capture value from biotechnology and information technologies. He received a Bachelor of Science in Agronomy at Purdue University. With Entira, Mr. Karst has partnered with other agricultural leaders that have wide ranging experience from livestock production to specialty grain production, segregation and export to overseas markets. This breadth of experience enables Entira to help companies build new value chains by bringing together cutting edge technologies, large-scale production agriculture and downstream processing competencies and capacities. Entira is committed to developing value chains that meet consumer needs, support innovation and equitably share the value created.

**Peter Nelson**

Peter Nelson is a principal in BioDimensions which provides services and makes investments in startup companies developing new green technology, a field he has been involved in since 1996. He is an advisor to companies including

Arkansas-based Infinite Enzymes and Ontario-based Stemergy which are both working to introduce new biobased product opportunities. Mr. Nelson was one of six initial steering committee members for the Southeast Sun Grant Initiative based at University of Tennessee which has received over \$40 million in Federal funding for university research. Mr. Nelson was one of three original founders of the Biobased Manufacturers Association (BMA) which helped influence key components of Title IX of the 2002 Farm Bill related to biobased products and renewable energy. He has been invited to participate on key steering committees and think tanks in the Southeast U.S. and wrote the "Tennessee Biobased Products for Farmers and Rural Development Act of 2000." Mr. Nelson has worked extensively with Tennessee State University, an 1890 Land Grant University, to develop opportunities for minority students to participate in new agricultural-based technologies. These programs have been successfully funded by DOE and USDA. Mr. Nelson is also a published writer and a frequent speaker at conferences related to biobased products and renewables.



## ENROLLMENT FORM

- Yes, I want to participate in **“Regional Strategies for Biobased Products in the Mississippi Delta”** multi-client study. The cost of the study is US\$35,000.

**Return Form Via Fax to (901) 448-8850**

- Please have someone contact me to provide further information.

Name: \_\_\_\_\_

Signature: \_\_\_\_\_

Title: \_\_\_\_\_

Company: \_\_\_\_\_

Street  
Address: \_\_\_\_\_

City: \_\_\_\_\_ State: \_\_\_\_\_ ZIP: \_\_\_\_\_

Telephone: \_\_\_\_\_ Fax: \_\_\_\_\_

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Please feel free to contact us with questions:

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