

An Economic & Environmental Analysis of the U.S. Biobased Products Industry

*A Report to the Congress of the United States of
America*

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Farm Bill Mandated Report

- **An Economic Impact Analysis of the U.S. Biobased Products Industry: A Report to the Congress of the United States of America.**

Prepared for the U. S. Department of Agriculture (USDA) BioPreferred® program and the Congress of the United States of America as mandated in Section 9002 of the 2014 Farm Bill (the Agricultural Act of 2014; P.L. 113-79).



- USDA Press release <http://1.usa.gov/1KgTsq9>
- Full report:
<http://bit.ly/BioProductsEconomicImpactReport>
- 157,000 downloads
- 164 million media impressions



Goals of the Report

- Determine the:
 1. Quantity of biobased products sold
 2. Value of biobased products
 3. Quantity of jobs created
 4. Quantity of petroleum displaced
 5. Other environmental benefits
 6. Areas in which the use or manufacturing of biobased products could be more effectively used, including identifying any technical and economic obstacles and recommending how those obstacles can be overcome.

Economic Modeling

- Input-Output modeling technique
 - Economic impact types
 - Direct
 - Impacts within the biobased industry
 - Indirect
 - Impacts within the biobased industry supply chain
 - Induced
 - Impacts resulting from purchasing consumer goods with employee income
 - Total
 - Sum of all impacts



IMPLAN Modeling Tool

- Based on 2013 USA Economy
 - All trade grouped into 536 sectors
- Tracks the flow of money through the economy until it leaves the study region through leakage
- Key metrics reported
 - Value added (GDP)
 - Employment (full and part time jobs)
 - Industry economic multipliers (Type SAM)

U.S. BioProducts Sector Grouping

Included

- Agriculture and forestry
- Biorefining
- Enzymes
- Biochemicals
- Textiles
- Forest products
- Plastic bottles and packaging

Excluded

- Energy
- Livestock
- Food
- Feed
- Pharmaceuticals

Summary of Findings

National Level All Sectors

Figure 1: Key Findings of the U.S. Biobased Products Industry in 2013

The Number of
American Jobs
Contributed

4 Million

by the U.S. Biobased
Products Industry in
2013

Value added
Contribution to the
U.S. Economy

**\$369
Billion**

from the U.S.
Biobased Products
Industry in 2013

The Jobs Multiplier

2.64

For every 1 Biobased
Products job, 1.64
more jobs are created
in the United States

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THE SUPPLY CHAIN RESOURCE COOPERATIVE

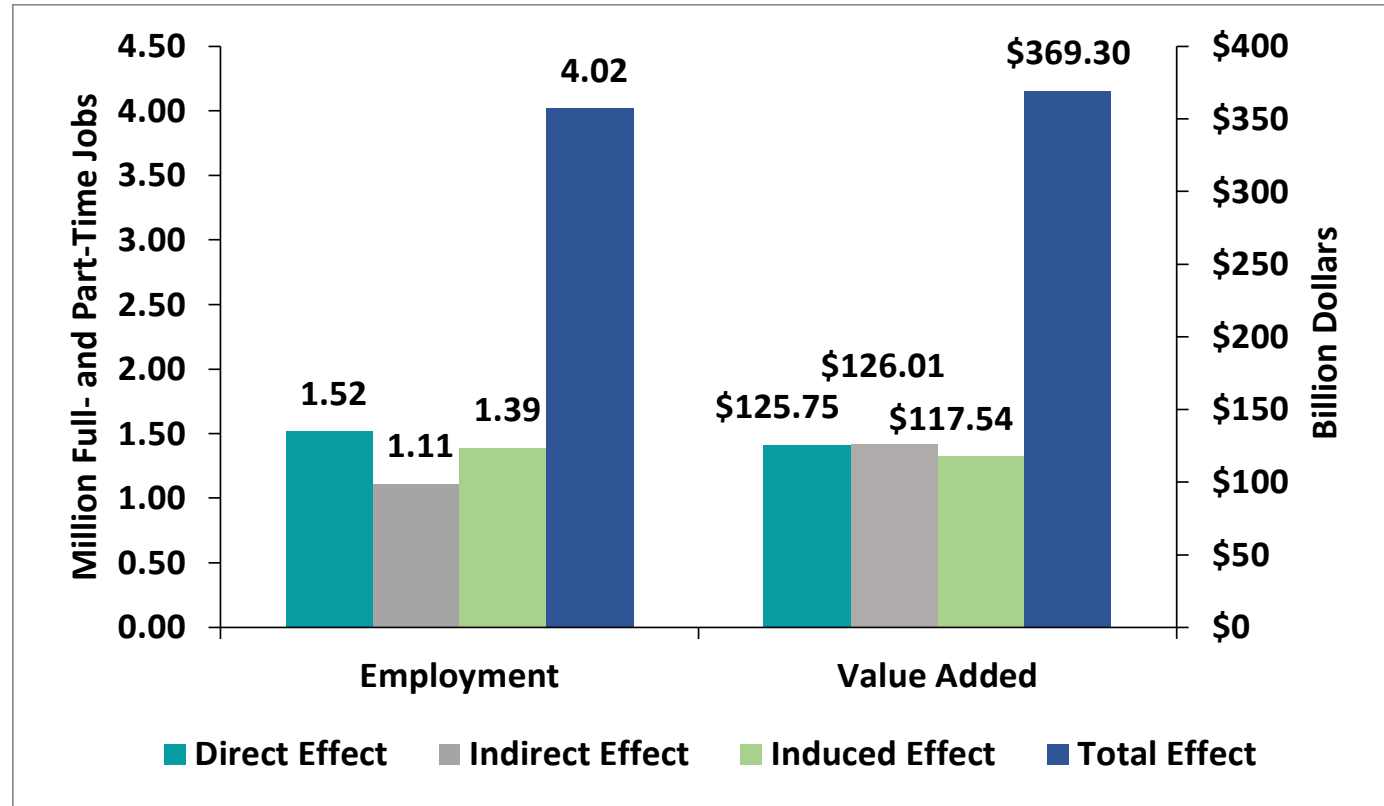
Figure 2: Total Employment and Value Added to the U.S. Economy from the Biobased Products Industry in 2013

Total Economic Impact

Figure 2: Total Employment and Value Added to the U.S. Economy from the Biopharmaceutical Products Industry in 2013

~4 million Jobs

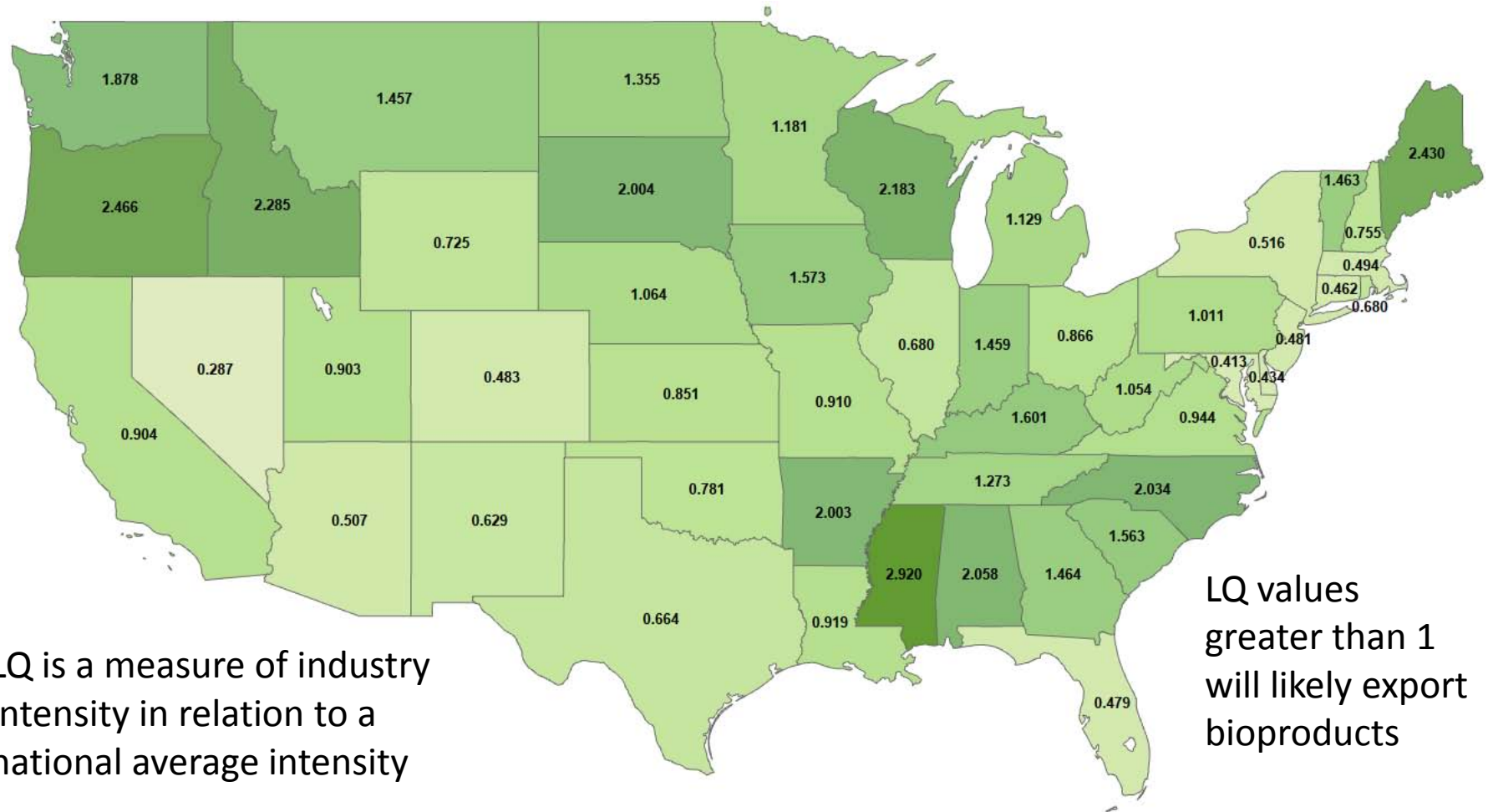
~369 Billion dollars in Value Added (GDP)



specialized in the biobased products industry relative to the U.S. A LQ of less than 1.0 means it is less specialized. Figure 3 shows that the LQs for the contiguous 48 states. States with the greatest concentrations of biobased products industrial activities are Mississippi, Oregon, Maine, Wisconsin, Idaho, Alabama, North Carolina, Arkansas, and South Dakota.

Location Quotient (LQ) Total Biobased Industry

Figure 3: Location Quotient for the Total Biobased Products Industry in 2013

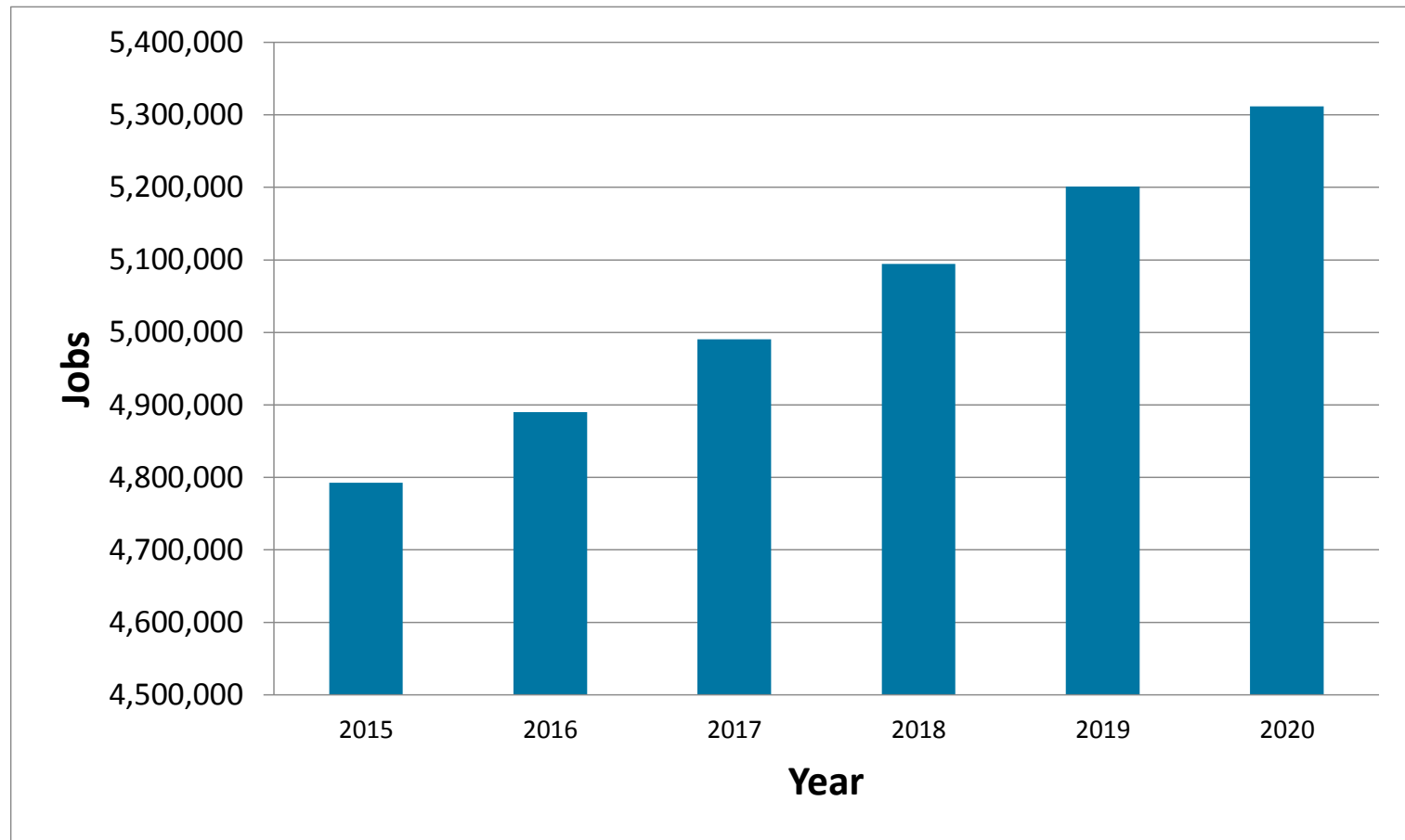


of increasing by five to 10% in the next
five years provided that the right
conditions are in place.

a reality, so long-term partnerships and
alternative sources of funding are needed.

U.S. Employment Growth Biobased Industries

Figure 16: Estimated Growth in Employment from 2015 through 2020 for the Biobased Products Sector in the U.S. (Excluding Enzymes)



Conclusions

- BioProducts industry is NOT isolated to just a few states in the Midwest, but what we learned is that the BioProducts industry is clearly a NATIONAL program creating added value and jobs all across the U.S
- The BioPreferred Program and specifically the label are serving to create greater consumer and retailer awareness and interest in biobased products.
- BioProducts Industry continues to gain momentum in large part due to the pull of major retailers and brands who are seeking consumer goods manufactured with lower environmental impacts.

Recommendations

- Create biobased industry NAICS codes
- Implement production tax credits and other tax incentives
- Promote and increase in government and private sector purchasing of biobased products
- Fund and administer USDA/DOE biomass research and development program
- Create a biobased industry consortium
- Develop consistent and appropriate methods to account for plant based product carbon emissions

Future Work

- Biobased industry workshop
 - Develop strategies for quantifying product environmental impacts
 - Shape further economic impact research
- Integrate developing biogenic carbon emission accounting methodologies into product LCAs
- Perform state level economic analysis
- Explore the creation of a BioBased Products Industry Consortia for Research



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Supplemental Information for Online Viewing

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Companies Interviewed

- American Chemical Society
- American Cleaning Institute
- BASF
- Bayer
- BioFiber Solutions International
- Biotechnology Industry Organization
- Coca-Cola
- Cotton Inc.
- Green BioLogics
- DuPont
- Dow
- Ford
- John Deere
- Lux Research
- Myriant Corporation
- NatureWorks
- North Carolina Biotechnology Center
- Novozymes
- OfficeMax
- Patagonia
- Penford
- Pistil
- Procter & Gamble
- Seventh Generation
- Society of the Plastics Industry
- Dr. Ramani Narayan, Michigan State University
- Tecnon OrbiChem
- United Soybean Board
- U.S. Department of Labor-Bureau of Labor Statistics
- U.S. Forest Service
- Walmart
- Yulex

BioPreferred®

The goal of the BioPreferred program is to increase the purchase and use of biobased products.

The program's purpose is to spur

- economic development,
- create new jobs and
- provide new markets for farm commodities.

The increased development, purchase, and use of biobased products

- reduces our nation's reliance on petroleum,
- increases the use of renewable agricultural resources, and
- contributes to reducing adverse environmental and health impacts.

Industry Consortia are Driving Life-Cycle Assessments of Bioproducts



- Supply chain transparency driven by industry requirements for Life Cycle Analysis (LCA) and quantification of environmental impacts of products
- Biobased feedstocks are key for improving environmental performance (by lowering climate change impacts of products)

TEXTILES

IMPLAN Code	NAICS Code	IMPLAN Sector Description
		Textiles
Textile Mills		
112	31311	Fiber, yarn, and thread mills
113	313210	Broadwoven fabric mills
114	31322	Narrow fabric mills and schiffli machine embroidery
115	313230	Nonwoven fabric mills
116	31324	Knit fabric mills
117	31331	Textile and fabric finishing mills
118	313320	Fabric coating mills
119	314110	Carpet and rug mills
120	31412	Curtain and linen mills
121	31491	Textile bag and canvas mills
122	314991, 314992	Rope, cordage, twine, tire cord and tire fabric mills
123	314999	Other textile product mills
124	31511	Hosiery and sock mills
125	31519	Other apparel knitting mills
Textile Products		
126	31521	Cut and sew apparel contractors
127	31522	Men's and boys' cut and sew apparel manufacturing
128	31523	Women's and girls' cut and sew apparel manufacturing
129	31529	Other cut and sew apparel manufacturing
130	31599	Apparel accessories and other apparel manufacturing

FOREST PRODUCTS

Wood Product Manufacturing	NAICS CODE	DESCRIPTION
134	321113	Sawmills
135	321114	Wood preservation
136	321211, 321212	Veneer and plywood manufacturing
137	321213, 321214	Engineered wood member and truss manufacturing
138	321219	Reconstituted wood product manufacturing
139	321911	Wood windows and door manufacturing
140	321912	Cut stock, resawing lumber, and planing
141	321918	Other millwork, including flooring
142	321920	Wood container and pallet manufacturing
143	321991	Manufactured home (mobile home) manufacturing
144	321992	Prefabricated wood building manufacturing
145	321999	All other miscellaneous wood product manufacturing
Paper Manufacturing		
146	322110	Pulp mills
147	32212	Paper mills
148	322130	Paperboard mills
149	32221	Paperboard container manufacturing
150	32222	Paper bag and coated and treated paper manufacturing
151	32223	Stationery product manufacturing
152	322291	Sanitary paper product manufacturing
153	322299	All other converted paper product manufacturing
Wood Furniture		
368	337110	Wood kitchen cabinet and countertop manufacturing
369	337121	Upholstered household furniture manufacturing
370	337122	Nonupholstered wood household furniture manufacturing
371	337125	Other household nonupholstered furniture manufacturing
372	337127	Institutional furniture manufacturing
373	337211	Wood office furniture manufacturing
374	337212	Custom architectural woodwork and millwork

BIOCHEMICALS

IMPLAN Code	NAICS Code	IMPLAN Sector Description
Other Basic Chemicals		
165	32519	Other basic organic chemical manufacturing
Plastics and artificial fibers		
166	325211	Plastics material and resin manufacturing
168	32522	Artificial and synthetic fibers and filaments manufacturing
Paints and Adhesives		
177	325510	Paint and coating manufacturing
178	325520	Adhesive manufacturing
Soaps and Polish		
179	325611	Soap and other detergent manufacturing
180	325612	Polish and other sanitation good manufacturing
181	325613	Surface active agent manufacturing
Toiletries		
182	325620	Toilet preparation manufacturing
Printing and Resins		
183	325910	Printing ink manufacturing
185	325991	Custom compounding of purchased resins
186	325992	Photographic film and chemical manufacturing
187	325998	Other miscellaneous chemical product manufacturing
Foams		
192	326140	Polystyrene foam product manufacturing
193	326150	Urethane and other foam product (except polystyrene) manufacturing
Rubber and Tires		
196	32621	Tire manufacturing
197	326220	Rubber and plastics hoses and belting manufacturing
198	32629	Other rubber product manufacturing

AGRICULTURE AND FORESTRY

IMPLAN Code	NAICS Code	IMPLAN Sector Description
		Agriculture and Forestry
1	11111	Oilseed farming
2	111150	Grain farming **Only corn included
8	111920	Cotton farming
9	111930, 111991	Sugarcane and sugar beet farming
15	113110, 113210	Forestry, forest products, and timber tract production
16	113310	Commercial logging
19	11511, 11531	Support activities for agriculture and forestry * Animal Production has been excluded