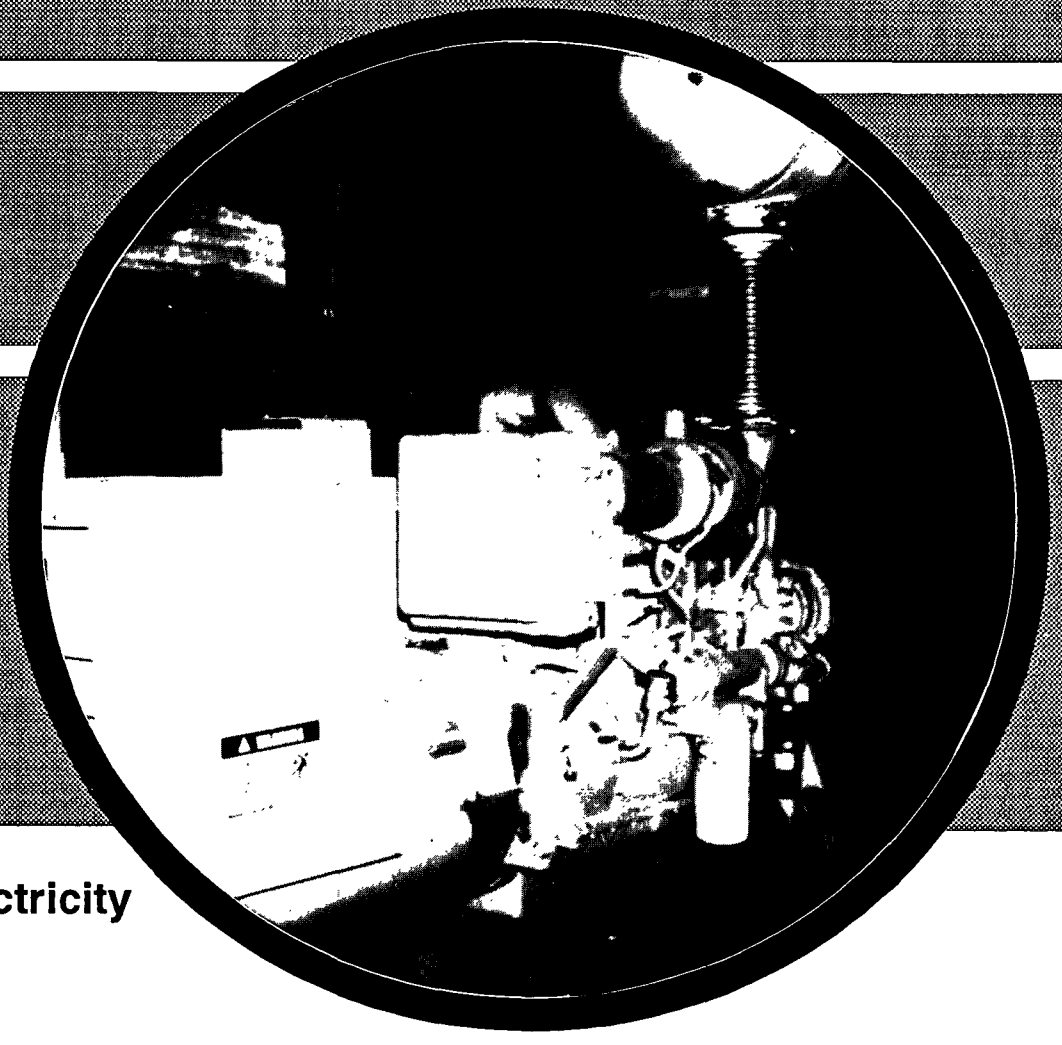
United States
Department of
Agriculture

Economic
Research
Service

IUS-4
December 1994

Industrial Uses Of Agricultural Materials

Situation and Outlook Report



Generating electricity from biogas.

Industrial Uses of Agricultural Materials Situation and Outlook. Commercial Agriculture Division, Economic Research Service, U.S. Department of Agriculture, December 1994, IUS-4.

Contents

Coordinator
Lewrene Glaser
Voice (202) 219-0091, Fax (202) 219-0042

Contributors
Bob Armstrong, Alternative Agricultural Research and Commercialization Center
Harry Parker, Cooperative State Research, Education, and Extension Service
William Tallent, Agricultural Research Service
Gloria Kulesa, U.S. Department of Energy
David Torgerson
Chin Lee
John McClelland, Office of Energy
Irshad Ahmed, Booz, Allen & Hamilton, Inc.
Allen Baker
Lewrene Glaser
Thomas Marcin, Forest Service
Charles Plummer
Donald Van Dyne, University of Missouri
Alan Weber, National Biodiesel Board
Joseph Bozell, National Renewable Energy Laboratory
Donald Dimmel, Institute of Paper Science and Technology
Arthur Power, Arthur J. Power and Associates

Statistical Support
Anton Raneses, (202) 501-8279
David Johnson, (202) 219-0355

Editor
Dixie Lee

Graphics, Design, and Layout
Wynnice P. Napper

Approved by the World Agricultural Outlook Board. Summary released December 14, 1994. The next summary of *Industrial Uses of Agricultural Materials Situation and Outlook Report* is scheduled for release on September 14, 1995.

Summaries and text may be accessed electronically through the USDA CID System; for details, call (202) 720-9045.

Acknowledgements

This report was made possible through the active support of many people and organizations. The June and December 1994 issues were primarily funded by contributions from the U.S. Department of Energy's Office of Industrial Technologies; USDA's Alternative Agricultural Research and Commercialization Center; Cooperative State Research, Education, and Extension Service; and Agricultural Research Service. Donald Van Dyne, Professor of Economics at the University of Missouri, and Irshad Ahmed, Director of Renewable Energy and Biotechnology at Booz, Allen & Hamilton, Inc., contributed time and expertise to this report.

Mention of private firms or products does not indicate endorsement by USDA. Cover photo is of an engine generator, which uses biogas to produce electricity, on Mason Dixon Farms in Gettysburg, PA (see special article).

Market Conditions and Research Increase Industrial Use of Agricultural Materials

During fiscal 1993-94, USDA's Alternative Agricultural Research and Commercialization (AARC) Center used $15.3 million to fund 39 projects. Private partners contributed another $43 million, resulting in a private-public funding ratio approaching 3 to 1. The AARC Board recently met and made the initial round of fiscal 1995 project selections from approximately 100 applications. USDA's Cooperative State Research, Education, and Extension Service is working with the U.S. Department of Defense to develop advanced materials from renewable resources. To date, USDA's Agricultural Research Service has negotiated over 425 cooperative research and development agreements with industrial partners. U.S. Department of Energy's Alternative Feedstocks Program has developed a thermal/chemical clean fractionation process that is being evaluated by industry.

The U.S. gross domestic product and industrial production are expected to grow 3.9 and 5.6 percent, respectively, in 1994. Growth, however, is forecast to slow in 1995. Industrial markets for agricultural products should continue to grow, albeit more slowly.

Despite the Court stay on the U.S. Environmental Protection Agency's renewable oxygenate requirement, high methanol prices and a recent Treasury Department announcement that ethyl tertiary butyl ether (ETBE) is eligible for excise tax exemption could push ethanol production close to 1.5 billion gallons in 1995. Industrial uses of corn in 1994/95 are forecast up 12 percent from 1993/94. Most of the increase is expected to be used to make ethanol. Corn also is used to produce sorbitol, a polyol widely used in personal-care products.

Meadowfoam, a new oilseed crop grown in Oregon, contains a unique oil that is used in cosmetics and has potential in other applications. Recent plant breeding, agronomic research, and oil-product development are bringing meadowfoam closer to commercial viability. Polyols, which are traditionally derived from petrochemicals, are now being made from vegetable oils.

Composite products are an important and growing segment of the forest products industry. Over 70 percent of all wood materials in use today contain some type of adhesive, and that figure is expected to grow as new products and processes are developed. As supplies of virgin timber tighten, nonwood biomass fibers, such as straw, and recycled fiber products, such as paper and wood wastes, are being used as raw materials for composite products.

Relatively recent technological developments have allowed improved screening of plants for potentially beneficial chemical compounds. Both public and private sectors have responded by beginning natural-products drug research. Markets for herbal remedies have also expanded, driven by increasing interest in health and alternative medicines.

Livestock producers who operate large-scale confinement operations, such as dairies and hog farms, are looking for ways to handle and dispose of animal wastes that are cost effective and meet odor and pollution regulations. Farm-level production of biogas (using anaerobic digesters) is one solution that also will help control methane emissions into the atmosphere. With current technologies, anaerobic digesters generally require warm climates, large volumes of manure, high local electricity rates, and daily maintenance and management to be profitable. "Biogas Production from Animal Manures: What Is the Potential?" covers these issues and describes four case studies that demonstrate the feasibility of farm-level production of biogas.

The second special article is "Pulping Catalysts From Lignin." Lignin, a common material in trees and woody plants, currently is a byproduct of pulp and paper production. However, joint research at the National Renewable Energy Laboratory and the Institute of Paper Science and Technology is aimed at broadening commercial uses of lignin. One project is assessing the potential for converting lignin into anthraquinone-like pulping catalysts. Anthraquinone (AQ) improves kraft pulping, but its cost hinders widespread use. Three processes were evaluated for their technical and economic feasibility of converting lignin into pulping catalysts. Preliminary results indicate that two of the processes appear viable. Comparing these two processes to competing petrochemical-based, AQ-producing methods, showed that the lignin-based routes were potentially the most cost effective.