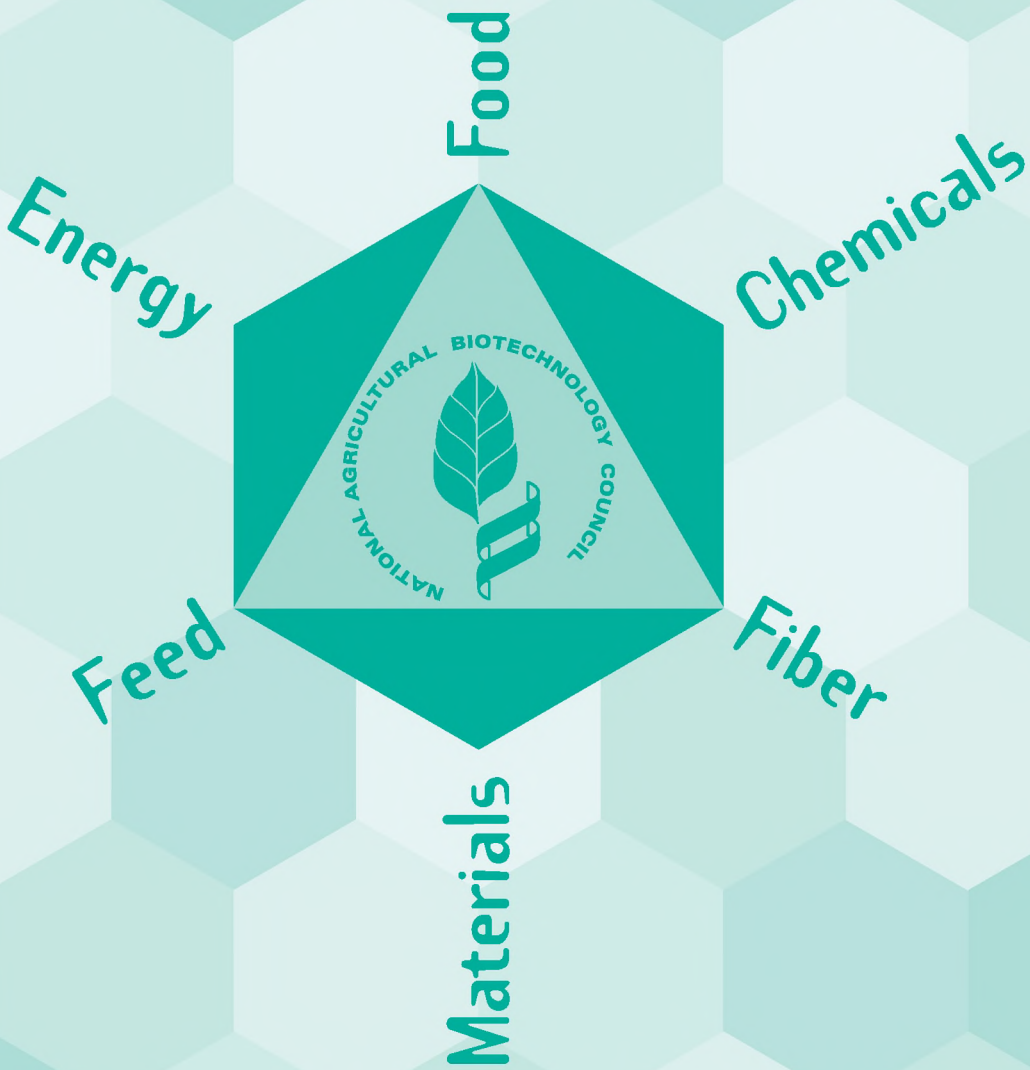
Vision for Agricultural Research and Development in the 21st Century

Biobased Products Will Provide Security and Sustainability in Food, Health, Energy, Environment, and Economy



Prepared by the National Agricultural Biotechnology Council

NABC Executive Coordinator: *Jane Baker Segelken*
NABC Associate Coordinator: *Barbara Kneen Avery*

Illustration and Design: *Linda R. Smith*

National Agricultural Biotechnology Council

419 Boyce Thompson Institute, Tower Road, Ithaca, NY 14853
Tel: 607-254-4856 Fax: 607-254-1242 E-mail: NABC@cornell.edu
http://www.cals.cornell.edu/extension/nabc

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The National Agricultural Biotechnology Council (NABC), a consortium of 26 major agricultural research and education institutions in the U.S. and Canada, has formulated the attached *"Vision for Agricultural Research and Development in the 21st Century*".

The role of agriculture in the 21st century will see major expansion beyond food, feed, and fiber. It will be the basis for the emerging biobased industrial products era. In the 21st century we will not only continue to have food security but will see improved nutritional quality and food safety. In addition, the new biobased economy will bring increased security in energy, materials, environment, and health. Agricultural R&D will be the driving force for the new biobased economy.

We are excited about this opportunity and hope that this vision also inspires you. Please contact us if you have questions or would like further details on this vision of agricultural R&D and a sustainable economy. We encourage you to share this vision with others.

Sincerely,

James R. Fischer
Chair, NABC
Dean and Director, South Carolina
Agriculture and Forestry Research System
Clemson University

Ralph W. F. Hardy
President, NABC

Vision For Agricultural Research and Development in the 21st Century

Biobased Products Will Provide Security and Sustainability in Food, Health, Energy, Environment, and Economy

Agricultural research and development (AR&D) will take the lead in providing the technology for a biobased economy in the 21st century In contrast with our present fossil-based economy the biobased economy will use renewable resources such as plants instead of non-renewable fossil sources. With the biobased industry now emerging, AR&D has a greatly expanded role beyond the traditional areas of food, feed, and fiber. The 21st century biobased economy will:

- be rooted in life-science, the dominant science as we enter the new millennium, coupled with bio-engineering processes;
- reduce our vulnerability in access to and supply of petroleum for energy and industrial products;
- make our industries more sustainable by utilizing domestically-produced renewable plant resources;
- be driven by AR&D to improve cost-competitiveness of biobased vs. fossil-based energy and products
- lessen projected global climate change by reducing the build up of carbon dioxide, the major greenhouse gas;
- create rural and urban job opportunities in the agricultural and industrial sectors;
- improve the quality of our air, water, and soil;
- improve the healthfulness of food;
- produce human health-related products in plants, microbes, and animals;
- produce value-added biobased products (fuels, chemicals, and materials) for domestic use and export;
- impact favorably our balance of payments by reducing or potentially eliminating our need for petroleum imports;
- be broadly distributed across the U.S.; and
- make optimal use and improve sustainability of our agricultural land growing food, feed, fiber, and bio-industrial crops.

Thus, the biobased economy will be a major contributor to improved U.S. security in energy, industrial chemicals and materials, the environment, human health, and our economy, as well as maintaining the security of and improving the quality of our food supply.

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20th Century AR&D has enabled the U.S. to have a secure, low-cost food supply and to export surplus food to the rest of the world. 21st Century AR&D will maintain this food security while improving nutritional quality and food safety Food will be modified to be more healthful with, for example, improved levels of antioxidants and balance of oil types. Transgenic plants and animals will produce health-related products such as pharmaceuticals and vaccines.

The energy resources and industrial chemicals of the 20th century are mainly fossil-based, as are a growing portion of materials, such as synthetic fibers. The dominant sources of energy and industrial products will become biobased, at prices that are economically competitive with those that are fossil-based. With AR&D investment, bio-industrial crops and novel biobased processes are being developed to produce liquid fuels at approximately half the current cost of producing ethanol, thereby making it cost competitive with gasoline. Plants will be modified genetically to make bio-polymers or be processed into chemicals, polymers, and fibers. In the long term, the need for imported fossil fuel, e.g. petroleum, could be eliminated, making the U.S. self-secure in energy, chemicals, and materials.

The fossil-based economy at the end of the 20th century is a major cause of global, regional, and local environmental problems. The biobased economy will minimize net carbon dioxide accumulation into the environment, thereby significantly reducing the problem of global warming and improving sustainability and global environmental security Fossil-based products, both in their manufacture and use, contaminate our air, water, and soil resulting in numerous environmental and health concerns. The growth, processing, and utilization of biobased products are less contaminating, thereby improving the quality of our air, water, and soil, and thus, our health security

Biobased industrial products will be a major U.S. economic growth area in the next century as fossil-based industrial products, such as synthetic chemicals and liquid fuels, were in the 20th century. Biobased industrial products will improve economic security through use of domestic versus imported resources, optimal use of currently unused or underused land, and geographically widespread production and manufacture across the U.S.

Investment in AR&D to develop the biobased industry of the 21st century will enable the U.S. to be the world leader in this major emerging industry while expanding U.S. security in food, energy, environment, health, and the economy. The National Research Council Report on Biobased Industrial Products, issued in 1998, outlines in some detail the opportunities of the biobased economy and the need for an expanded AR&D.

We, the representatives to the National Agricultural

Vision For Agricultural Research

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Dean and Research Director,
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UNI VERSITY of AR I ZON A
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William C. Stringer,
Interim Dean, College of Agriculture, Food & Natural Resources; Director, Missouri Agricultural Experiment Station

NATIONAL AGRICULTURAL BIOTECHNOLOGY COUNCIL
Ralph W. F. Hardy,
President

National Agricultural Biotechnology Council

419 BTI, Tower Road, Ithaca, N Y 14853

Tel: 607-254-4856 Fax: 607-254-1242

E-mail: NABC@cornell.edu

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