The Pacific Northwest…

…is an abundant agricultural region, producing a large assortment of crops and products, including grains, fruits, vegetables, forage crops, as well as dairy and forest products. The industry employs 120,000 people in Washington alone, providing a vital fiscal foundation for rural areas. Unfortunately, northwest agriculture is facing acute economic, energy and environmental pressures. Caught between low commodity prices and ever-increasing production costs, many producers have been pushed to the brink of financial disaster.

An unprecedented opportunity has emerged to boost the region's agricultural market and at the same time help address national energy needs. Significant advances in the biological and physical sciences are enabling technologies to be developed that can convert the chemical building blocks of agricultural waste into high value bioproducts, such as plastics, fibers, adhesives, and solvents, which are currently made from imported oil and gas.

Producing high value bioproducts can address many of the barriers that have stymied earlier efforts to utilize biomass. High-value materials can be made from low-value material—often much less expensively—and via processes that are more energy efficient and environmentally friendly than petroleum-based products.

Bio-Based Products

Delivering Regional Benefits

Background

Biomass is a common term for materials made by living things. Much of the biomass we produce today is used to meet our everyday needs, such as food, animal feed, and fiber. However, a significant amount of biomass has low or little value, and in some cases represents an environmental concern. Examples of biomass include:

- Low-value food processing byproducts (e.g. potato processing residuals, millfeed, corn fiber, pomace)
- Farm residues and waste (e.g. straw, manure, culls)
- Pulp, paper, and forest products byproducts and waste (e.g. waste fiber, bark, black liquor)

Recent advances in biotechnology and the biological sciences, along with new advances in chemistry and the physicals sciences, are enabling scientists and engineers to develop novel technologies to convert the chemical building blocks of biomass into several products such as:

- Pharmaceuticals & nutraceuticals
- Specialty and commodity "bioproducts" (e.g. chemicals for plastics, fibers, solvents, paints, & adhesives)
- Transportation fuels
- Power (for heat and electricity)

Producing higher value products (e.g. pharmaceuticals, nutraceuticals, & bioproducts) can overcome many of the barriers that have stymied previous biomass utilization efforts and provide the economic driving force to make new enterprises successful. Moreover, because of their chemical makeup, "bioproducts" can often be made less expensively than a similar product made from petroleum, with processes that are less energy intensive and more environmentally friendly.

Regional Bioproducts and Bioenergy Research

A research consortium has formed that brings together industry, processors, growers, universities and federal laboratories to advance bioproducts research and to develop the enabling technologies necessary to create a robust, bioproducts and bioenergy industry in the Northwest.

The Northwest Bioproducts Research Institute is a joint effort between Pacific Northwest National Laboratory, Idaho National Engineering and Environmental Laboratory, Washington State University, and the University of Idaho—all leading organizations with significant research expertise in biomass and agricultural issues.

The recently formed Institute is engaging industry and other organizations to perform the necessary research to rapidly translate scientific discoveries into the deployable technologies vital to launching a comprehensive bio-based products infrastructure in the Northwest.

Bioproducts Processing Laboratory

Critical to the success of a cohesive, regional effort will be the new Bioproducts Processing Laboratory. When established, this facility will contain the scientific and technological capabilities for swiftly turning scientific discoveries into commercial technologies.

Examples of the facility's leading-edge capabilities include:

- A "biorefinery" test system consisting of multiple, engineering-scale processing units (e.g. fermentation, catalytic reactors, separations systems) that can be configured into various "biorefinery" processing flow schemes.
- Co-located biological science, chemical processing science, and engineering development laboratories.
- Extensive analytical capabilities
- Multipurpose educational space for classroom instruction, teaching laboratories, and seminars.

We are working with Washington State University Tri-Cities to establish this joint bioproducts research and education facility.

National and Regional Benefits

Benefits of this effort includes:

- **Energy** – Utilizes a renewable feedstock to reduce our dependence on foreign oil and gas.
- **Economy** – Adds value to the region's agriculture and rural-based economy
- **Environment** – Reduces environmental impact from agriculture and food processing residues
- **Education** – Delivers a qualified, educated workforce necessary for this new industry

This effort will also create unique technologies for the region and nation and provide the technically valid and industrially relevant data to support commercial deployment.

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