Welcome and Project Overview
by Darin Saul, Project Director
University of Idaho

The University of Idaho has gathered a team of researchers to investigate the social and economic opportunities and challenges forest biomass-based energy development poses to rural communities in the Northern Rocky Mountain region.

A $350,000 grant from the U.S. Department of Agriculture’s Agriculture and Food Research Initiative supports the three-year effort to understand rural bioenergy development from multiple perspectives. The interdisciplinary effort brings together researchers from the College of Agricultural and Life Sciences, College of Business and Economics, the McClure Center for Public Policy Research, and College of Natural Resources. The project team will also incorporate research by other UI faculty, classes, and students.

In May 2013, we met with representatives from land management agencies, forest industry, and academia to help develop realistic woody biomass development scenarios for detailed forest operations and economic impact analysis. Research and analysis will focus on scenarios at the local, regional, and international scale (More details, page 4.)

In summer 2013, we collaborated with the Northwest Advanced Renewables Alliance (NARA) to conduct a stakeholder survey across Idaho, Montana, Oregon, and Washington. Through the fall and winter, we refined forest operations scenarios and interviewed regional stakeholders such as nonindustrial forest owners, economic development professionals, conservation organizations, timber industry representatives, and elected officials to better understand the potential benefits, tradeoffs, and feasibility of different bioenergy development strategies in the Northern Rocky Mountains (Study area map, page 3.)

In July 2014, we will convene our first Advisory Committee meeting. The Advisory Committee will include representatives from communities, economic development entities, tribes, universities, government, and non-profit organizations.

During this project, we will work with stakeholders to evaluate the economic and social impacts of bioenergy technologies as a development strategy and will share project results with communities and relevant organizations in the study area. Results will provide useful information for public and private decision-makers at the community, state, and regional levels.

Our goal is to provide meaningful research that will help communities and agencies make informed decisions.

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Visit the project website: www.uidaho.edu/biofuels
MEET THE RESEARCH TEAMS

COMMUNITY OUTREACH TEAM

The community outreach team is gathering input from regional stakeholders to better understand the economic and political context for bioenergy development. Community is helping guide researchers as they develop realistic scenarios involving harvest, processing, and transportation options for use in mathematical models and simulations. These scenarios aim to address community and industry priorities and help local, state, and regional stakeholders make informed decisions. Additionally, a Stakeholder Advisory Committee will provide local and regional perspectives, and help interpret and disseminate research results. Questions? Contact Soren Newman (newman@uidaho.edu).

SIMULATION AND MODELING TEAM

The Simulation and Modeling team is developing a model to determine the overall viability and profitability of bioenergy strategies for woody biomass from the community perspective. Models will map each scenario from source to point of sale and estimate the number of jobs created and other potential benefits. The models will show effects of changes in variables such as transportation options and potential processing facility locations.
Prosperity and Sustainability:
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The Regional Optimization Modeling team will assess the feasibility of the three scenarios for bioenergy production using woody biomass. The team will develop a nonlinear optimization model to evaluate scenarios using different production technologies, varying fuel product pricing, and varying levels of production subsidies. Analysis will determine the optimal scenario—one that will produce bioenergy for the least cost and most profit.

The Economic Impacts team will analyze the regional and local economic impacts of the scenarios and methods of alternative bioenergy production using woody biomass. The team will:

- Identify potential sub-regions of biomass harvest, bioenergy production, and distribution.
- Develop an assessment to identify drivers of the regional economy.
- Examine how incomes will be affected by bioenergy development (using a social accounting matrix input/output model to look at the factors shaping supply and allocation of resources within a particular economy).
- Forecast potential effects of bioenergy development on local economies using the input/output model.
- Compare benefits and tradeoffs of each production method.

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To enrich education through diversity the University of Idaho is an equal opportunity/affirmative action employer and educational institution.
With input from industry and government stakeholders, researchers developed three scenarios (local, regional, and international) that will help determine potential economic and operational impacts of woody biomass production, conversion, and transportation in the Northern Rocky Mountains.

**LOCAL, DECENTRALIZED SCENARIO**

**MOBILE CONVERSION STATIONS**

Woody biomass is used to produce drop-in fuels and biochar. In this scenario, gasoline and biochar will be produced at mobile conversion stations located, for example, near areas that have high production of chips and hog fuel from logging residues, small diameter trees, and lodgepole pine killed by mountain pine beetle outbreaks. Chips and hog fuel processed within stands or at log landings will be transported directly to conversion unit sites without further intermediate processing. The small-scale mobile conversion stations will be located regionally in areas where a combination of large volumes of logging slash and/or beetle kill feedstocks are most readily available (e.g., the Jaype log yard in Headquarters, ID, and the Clarkia, ID, log sorting facility). Gasoline and biochar products will be transported by truck or rail to the location of their end use.

**REGIONAL SCENARIO**

**BIO-AVIATION FUEL**

Woody biomass in the form of chips or hog fuel from commercial logging residues and small diameter trees removed in thinning operations will be transported to a single, very large (more than 700,000 BDT per year) Gevo-owned bio-aviation fuel facility regionally located, either in Colville, WA, or western WA. This scenario corresponds directly to the Northwest Advanced Renewables Alliance (NARA) biofuels project analysis for the Northern Rocky Mountain region. Our analysis will expand on the NARA scenario to include the possible use of intermediate pre-processing plants, or depots, where chips and hog fuel will be upgraded to wood pellets, in order to increase the cost-effective transportation distance of feedstock materials that can feed the regional biofuels facility. For example, chips and hog fuel might be turned into pellets at a small pellet facility located at the Jaype log yard in Headquarters, ID, or the Clarkia, ID, log yard before subsequent transportation to the large biofuels facility in Colville, WA.

**INTERNATIONAL SCENARIO**

**WOOD PELLET MANUFACTURING FACILITIES**

Woody biomass in the form of chips or hog fuel from commercial logging slash (e.g., tree limbs, tree tops, and brush) and small diameter trees removed in thinning operations will be transported directly to a large wood pellet manufacturing facility in the Northwest region. Colville, WA, Lewiston, ID, and St. Maries, ID, will be considered as the pellet facility locations. Wood pellets will be shipped via truck, rail, or barge to coastal ports and then to international markets where there is significant demand. This scenario will be modeled after similar, high production pellet facilities in the southeastern United States and Vancouver, B.C.

**BIOFUELS 101**

**BDT (Bone Dry Ton)**

The volume of wood chips that would weigh one ton if all moisture content was removed.

**Biochar**

A charcoal byproduct that captures and stores carbon dioxide from the atmosphere and can be used as an agricultural soil amendment.

**Biofuel**

A renewable energy derived from plant materials, to be used for heat, electricity, or vehicle fuel.

**Drop-in fuels**

Biofuels that are very similar to diesel, gasoline, and jet fuel and are ready to “drop-in” to existing infrastructure.

**Feedstock**

Any renewable, biological material that can be used directly as a fuel, or converted to another form of energy.

**Gevo, Inc.**

A renewable chemicals and advanced biofuels company headquartered in Douglas County, CO.

**Hog fuel**

An unprocessed mix of coarse chips of bark and wood fiber.

**Woody biomass**

Wood and wood-based residues (e.g., tree limbs, tree tops, brush, small diameter trees and other material derived from forest vegetation). Often an unused byproduct of current logging practices.
Related Projects in the Rocky Mountain Region

NORTHWEST ADVANCED RENEWABLES ALLIANCE (NARA)

The Northwest Advanced Renewables Alliance (NARA) aims to build a supply chain for aviation biofuel with the goal of increasing efficiency in everything from forestry operations to conversion processes. The project includes a broad alliance of private industry and educational institutions from throughout the Northwest. Specific areas of focus are:

**Education:** Engage citizens, meet future workforce needs, enhance science literacy in biofuels, and help people understand the new energy economy.

**Conversion:** Provide a biomass-derived replacement for aviation fuel and other petroleum-derived chemicals in an economically and technologically feasible way.

**Feedstocks:** Development and sustainable production of feedstocks made from wood materials, including forest and mill residues, municipal solid waste, and specialty energy crops.

**Sustainability Measurement:** Evaluate and assess social, environmental, and economic viability of the overall wood-to-biofuels supply chain.

**Outreach:** Serve as a conduit between researchers and community stakeholders, helping to transfer the science and technology of biofuels and important co-products to communities in the Northwest.

For more information, visit the project website: [http://www.nararenewables.org/](http://www.nararenewables.org/)

BIOENERGY ALLIANCE NETWORK OF THE ROCKIES (BANR)

The Sustainable Bioenergy Alliance Network of the Rockies (BANR) brings together scientists, educators, and extension specialists from universities and government agencies across the region to work with industry and develop a comprehensive program addressing the major challenges limiting feedstock development, production, logistics, and utilization of insect-killed trees for the production of biofuels and biochar.

The BANR approach focuses on five major task areas: feedstock supply; feedstock logistics and processing; system performance and sustainability; education; Extension, outreach, health, and safety.

Partners include Colorado State University, University of Idaho, University of Montana, Montana State University, University of Wyoming, U.S. Forest Service Rocky Mountain Research Station, National Renewable Energy Lab, and Cool Planet Energy Systems.

More information is available on the project website at [http://banr.colostate.edu/](http://banr.colostate.edu/)