

Update to the
2012 Washington State Legislature
on DNR's Forest Biomass Initiative:

Bioaviation Fuel Production from Residual Woody Biomass

December 1, 2011

Washington State Department of Natural Resources

The Washington State Department of Natural Resources (DNR) was asked to provide the Washington State Legislature with an update on all activities related to the department's biomass-to-aviation fuel efforts by December 1, 2011. This includes current research endeavors, as well as the ongoing evaluation of the adequacy of forest practices rules in addressing the impacts a forest biomass sector might have on public resources (SHB 1422).

This report follows up on two other bills passed in previous legislative sessions: one that authorized DNR to move forward with biomass-to-energy pilot projects (HB 2164) and one that authorized the department to transact biomass from state lands, and enter into long-term contracts for biomass from state-managed trust lands (SHB 2481). This report follows up on the report delivered to the 2011 Legislature. The report can be found online at: http://www.dnr.wa.gov/Publications/em_biomass_leg_rprt_2011.pdf.

DNR's analysis continues to indicate that a sustainable forest biomass based renewable energy and fuel sector can emerge in Washington State consistent with the following values:

1. *Appropriate Scale*. Facilities should be sited only where sufficient forest biomass is available and does not interfere with existing sustainable uses.
2. *Maximum Efficiency*. Processing technologies should extract the greatest energy value from the forest biomass. The department is supportive of existing efforts in Washington to encourage facility efficiency.
3. *Ideal Location*. Opportunities should be sought to site facilities in regions that lack forest product processing infrastructure and are challenged by declining forest health. Facilities should also be located close to adequate supplies of forest biomass, with access to energy infrastructure, and where rural economic benefits can be realized.

Residual Forest Biomass to Aviation Fuel

DNR was authorized, through SHB 1422, to work with the Department of Commerce and the state's research institutions on a bioaviation fuel pilot project in order to demonstrate the utility of forest biomass as a bioaviation fuel feedstock. This bill was an outgrowth of work done through the Sustainable Aviation Fuels Northwest (SAFN) effort on which DNR played a prominent role. The final SAFN report identified a pilot-scale demonstration project as a fundamental next step to realizing the efficient production of bioaviation fuel from residual forest biomass. The report can be found online: <http://www.safnw.com/sustainable-aviations-fuels-bibliography/>.

Prior to initiating a pilot-scale bioaviation fuel project, the department wanted to both ensure necessary sustainability assurances were in place through the completion of two substantial research efforts underway by DNR and identify a path to collaborate with the two major

USDA funded research efforts that the University of Washington and Washington State University are initiating.

DNR has continued its work on the Washington Forest Biomass Supply Assessment and the Forest Practices Biomass Work Group (both described later in this report). The outcomes of these research efforts will provide information necessary to ensure that all biomass-to-bioaviation fuel efforts initiated in the state are sustainable. At this time the department has neither expended any resources toward nor generated revenue from a demonstration bioaviation fuel project.

In addition to awaiting results from these efforts, the department wanted to be certain before moving forward that its actions toward initiating a bioaviation fuel pilot project were supportive of the two \$40 million research efforts recently announced by the University of Washington and Washington State University. DNR, as directed in SHB 1422, will support the work of both of these projects.

\$80M USDA Grants to Washington's Universities

In the fall of 2011, the University of Washington and Washington State University were granted \$40 million from the United States Department of Agriculture to study technologies, market conditions, and feedstock availability of transforming woody materials into jet fuel. Each \$40 million grant supports two unique consortiums, each comprised of regional research institutions, industry, technology producers, feedstock suppliers, and others. DNR will support these efforts to help assure that Washington State is an international leader in sustainable bioaviation fuel production. Brief descriptions of each of these efforts follow.

Northwest Advanced Renewables Alliance (NARA): Washington State University is the Lead Institution

The Pacific Northwest is well positioned to deliver such bio-based aviation fuels and chemicals within five years because of established oil refining and distribution assets, a high need for military and commercial aviation fuels, and abundant woody biomass currently at appropriate scale.

Northwest Advanced Renewables Alliance (NARA): A New Vista for Green Fuels, Chemicals, and Environmentally Preferred Products (EPPs) was created to develop regional sustainable solutions for aviation fuel and key petrochemical replacements from sustainable woody-based resources in the Pacific Northwest. It is envisaged that NARA will serve as a national model in this regard with its game-changing approaches.

In addressing this regional and national challenge, NARA links all of the major research institutions in the Pacific Northwest (Washington State University, University of Washington, Oregon State University, University of Idaho, University of Montana, Montana State University) and tribal colleges, with industrial partners (Weyerhaeuser and Gevo) and various federal laboratories (USDA Forest Service).

NARA's approach involves developing feedstock, sustainable forest/ plantation production, and new methodologies to identify the most promising plant lines/forest residuals and their

subsequent conversions into aviation fuel/petrochemicals at an appropriate scale and cost. A significant effort will also be directed towards training the next generation of the leaders and workers needed for this emerging green economy.

Objectives: The objectives of the Northwest Advanced Renewables Alliance (NARA) are to:

- (1) Develop and improve Douglas-fir/Western red hemlock and poplar/red alder for aviation fuel and bioproduct production;
- (2) Assess availability and cost to supply the fuels and chemical industry with minimal environmental burdens;
- (3) Develop harvesting and transportation schemes to deliver feedstocks to market;
- (4) Provide state-of-the-art assessments of the social, environmental, and economic impacts; and
- (5) Develop comprehensive biofuels literacy with citizens from the K-12 through university level, and move them into the workforce.

This highly integrated effort will evaluate sustainable forestry techniques and logistics to produce and move wood materials from the forest to a processing facility. These forest treatments and removal of biomass will be evaluated using a series of environmental metrics to assess their long-term impact on the ecosystems. Additionally, for longer term objectives, the team will evaluate the potential of various hardwood lines for plantation culture and as starting materials for aviation fuel and polymer replacements.

Multiple value streams from lignin residues will also be developed to support the economics of biofuels production. With the industrial team led by feedstock experts at Weyerhaeuser and biofuels producer Gevo, other anticipated outputs are on a five-year track to assess commercial viability of producing bioaviation fuels and co-products.

The social science/outreach team will additionally engage communities and stakeholders to examine perceptions and needs of these groups in developing a sustainable supply chain. Product attributes necessary to increase market share and value for our products will be evaluated and connected with technical components of the research.

Participating Organizations:

Washington State University (Lead Institution)
Gevo, Inc.
Facing the Future
Forest Service - Forest Products Lab
Greenwood Resources
Montana State University
National Center for Genome Resources
Oregon State University
Pacific Northwest Research Station, USDA-FS
Penn State University
Salish Kootenai College
University of Idaho
University of Minnesota
University of Montana
University of Washington
Weyerhaeuser

