



Seth Cool, University of Idaho graduate student, discusses his IDX work with NARA stakeholders at the Rocky Mountain Elk Foundation in Missoula, MT. Photo by Eric Foss

## The IDX course

### Student opportunity for meaningful work in NARA communities

One of the unique aspects of the NARA project is that it brings together multiple disciplines and objectives under a single organization. The structure encourages engineers, economists and biochemists to work together while it addresses energy literacy, product development, and supply chain planning objectives. These interrelationships are distilled down and reflected in a course aimed at analyzing regional supply chains for biofuels. NARA researchers instruct the course which is a joint venture between The University of Idaho and Washington State University. The course is called IDX (Integrated Design Experience).

On a chilly December afternoon, smartly dressed undergraduate and graduate IDX students representing civil engineering, business, architecture, planning, law, and landscape design disciplines assembled at the University of Idaho to make 15 minute presentations covering their ideas and research followed by questions from their classmates and instructors: [Tammi Laninga](#) and [Michele Vachon](#) from the University of Idaho and [Cara Poor](#), [Karl](#)

[Olsen](#), [Todd Beyreuther](#) and [Michael Wolcott](#) from Washington State University. Presentations ranged from an analysis of how government policy affects an emerging biofuel industry to site recommendations for conversion and depot facilities in western Montana.

### Taking their work on the road

In most classrooms, the assessment would stop there, but this was just rehearsal. These students refined their presentations, and in January, traveled to meet with their client, the [Montana Forest Products Restoration Roundtable](#), and to the Libby and Missoula regions in western Montana. Their job was to present their work to various stakeholders from government and business development agencies, resource managers, contract loggers and biomass handlers. In this environment, the students received input to insure that assumptions and values presented in their work were correct and helped advance NARA's efforts to envision and analyze a regional supply chain in the Western Montana Corridor (WMC).

The [timber to jet fuel biomass project explained](#)

“I really enjoy working with these students; they are motivated, they want to be there and they have future goals and careers in mind when they are done with their degree”, says Tammi Laninga, assistant professor at the University of Idaho and IDX instructor.

In addition to their work being presented, IDX student research will help generate a Bioregional Atlas that articulates regional supply chain assets such as existing infrastructure, human capital, financial capital, natural resources, and political will. They will also help produce innovations that serve to develop strategies and design concepts for potential production sites in the western Montana region. The information will serve as a road map for a new biomass to biofuel industry — one that can boost the local economy and reduce greenhouse gas emissions. Data from this work will also integrate into NARA tasks to generate techno-economic, environmental and social sustainability analyses for a new wood residue to biofuel industry in the Pacific Northwest.

### NARA building the bioenergy workforce of tomorrow

“IDX is not only important for the commu-

nities, but also important to the students participating in these service orientated services”, says [Steve Hollenhorst](#), Education Team Leader for NARA and [Dean of the Huxley College of the Environment](#) at Western Washington University. “These students are leaving with an amazing understanding of biomass and biofuels

supply chain issues and how it all works. Already, we are seeing these students go out and get jobs in the region. We are talking planners, architects, and engineers. They are going out and getting jobs to become the bioenergy experts in their communities and in business.”

The result of these students entering the bioenergy workforce is key to helping fulfill NARA’s bioenergy literacy goal. An additional benefit is that data and outreach accomplished through their efforts moves NARA one step closer in establishing effective supply chain coalitions within the Pacific Northwest.



# NARA Supply Chain

NARA is tasked to develop supply chain study areas for converting forest residue to biojet fuel and lignin-based co-products in the Pacific Northwest. The primary objective of supply chain management is to fulfill customer demands through the most efficient use of resources, including distribution capacity, inventory and labor. The above poster illustrates the major steps within this supply chain beginning at the feedstock site (working forest or softwood plantation) and ending when biojet fuel is delivered to clients.

The supply chain can be split into three phases. The upstream phase encompasses feedstock (wood residue) harvest and transport to a conversion facility. The midstream phase involves activities relating to converting the delivered biomass into biojet fuel and valuable co-products. The downstream phase encompasses distribution to market. These phases are represented on the poster as green, purple and red hexagons respectively.

At the bottom of the poster is a simple schematic illustrating the amount of lignin and biojet fuel produced from a bone dried ton of forest residue. Considerations affecting supply chain development, but not addressed in the poster, are asset and infrastructure use and revitalization, technological, economic, environmental sustainability and community acceptance. NARA is assessing all of these considerations.

[NARA Supply Chain Poster](#)

# Gauging Community Acceptance

## Supply Chain Development

One of the several outcomes to be delivered by NARA is a research-based recommendation on how to develop and structure a supply chain for an emerging wood residue to jet fuel industry. This work is currently underway in the Western Montana Corridor (WMC), which encompasses western Montana, the Idaho panhandle, parts of eastern Washington, and will soon extend to other regions in the Pacific Northwest. This region is important to the aviation biofuels market because refined oil products from Billings are one of two major distribution routes serving the major markets in Spokane and Eastern Washington.

Key elements in the supply chain include physical assets such as industrial sites, roads and pipelines. Additional assets would include available biomass and a capable workforce. And while all of these assets can be counted, evaluated, modeled and mapped to present an ideal supply chain scenario on paper, establishing a supply chain that works will only happen if the communities affected understand and embrace the challenge.

“We’ve seen lots of activities appear logical, make sense from an energy perspective, and bring economic development, but the populace stands up and says no”, says [Michael Wolcott](#), Co-Director for NARA, “so here we are trying to understand what the interests and concerns are up front so that they can be address; if there is a negative reaction, then we would realize that this is not the best industry for those areas.”

## Stakeholder Assessment

NARA is using multiple approaches to better understand the collective thoughts represented in the communities affected by a proposed supply chain. One approach will create a stakeholder assessment and involves direct interviews with people who have knowledge about the NARA project; live and work within these communities; and are involved in one or more of the 20 stakeholder categories identified by the NARA outreach team that include various business, government and natural resource groups.

“The interview process relates to the biomass to biojet fuel industry in the western Montana corridor, but ultimately will be used for the NARA region and beyond”, says [Paul Smith](#), a professor at Penn State University who leads this project; “our team, consisting of [Dr. Laninga](#) and [Jillian Moroney](#) at the University of Idaho, [Dr. Gaffney](#) at Washington State University, and [Katie Gagnon](#) at Penn State has spent a lot of time this fall developing and describing methods to do this in a scientific way where we can take these interviews and use them to make inferences to a greater population.”

## Identify Stakeholders and Survey

A cooperative effort between the NARA Stakeholder Assessment and Outreach Teams in November and December, 2012, resulted in the selection of 165 interviewees from a total of 254 potential people identified from various sources including [NARA Outreach Team](#) recommendations, the [Northwest Environmental Forum](#) data set, the [NARA website registry](#), a

survey conducted in March 2012, and registrations from NARA meetings held in Missoula, MT in March, June and December, 2012. Of the 165 interviewees, 32 are located in a region north of Spokane, 44 are from a region encompassing the Idaho Panhandle plus Libby and Lincoln counties in Montana, 27 are in Flathead County, Montana and the greater Flathead region, 33 are in the Missoula region, 24 are in select areas east of Missoula, and five encompass multiple sub categories of the western Montana corridor.

A survey has been developed and ten interviews were conducted as a pre-test to modify the survey. Next the survey will be shared with the other [national USDA-NIFA biofuels programs](#) for their feedback and to coordinate this assessment nationally and make the results more powerful. Included in the survey is the opportunity for interviewees to recommend other persons to interview.

Once the survey is finalized, University of Idaho students will conduct the interviews, which are scheduled to begin in early March, 2013. Preliminary findings should be available in May, 2013; the survey will be carried out when other NARA supply chain regions are established later in the year.

“I think that it is important to understand informed stakeholder perceptions in communities where we are proposing a NARA pilot plant and supply chain”, says Paul Smith; “this stakeholder assessment is a key component within the social and physical mapping work currently being done to create a successful biofuel industry in the region.”

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