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Participants at the 2015 NARA annual meeting held in Spokane, WA

NARA 2015 Annual Meeting

In mid September, NARA conducted its 2015 Annual Meeting in Spokane, WA. This meeting marked the conclusion of the Northwest Advanced Renewables Alliance Project's fourth year, and the launch of its last year under the contractual terms with the United States Department of Agriculture's National Institute of Food and Agriculture (USDA-NIFA). Those in attendance were NARA members, NARA Advisory Committee members, William Goldner (USDA-NIFA), and invited stakeholders.

The primary purposes of this year's Annual Meeting were to:

1) review what had been accomplished in the previous year and highlight the key lessons learned during that time; and

2) define the intended outcomes to be achieved by the conclusion of the Project in mid-2016 and strategize how those outcomes would be accomplished.

Day one of the Annual Meeting provided briefings on the Project's progress since the previous 2014 annual meeting. These briefings consisted of presentations and an evening poster session and were tailored to update stakeholders and receive their input.

View day one PowerPoint presentations here.

View day one posters here.

The remaining days were designed to provide opportunities for NARA Project Teams to share information and perspectives with each other and strategize how they will work together during Year 5 to achieve the NARA Project's vision and goals. The Project also heard recommendations from the NARA Advisory Committee and from USDA-NIFA leadership regarding key issues to consider, address or prioritize for the final Project year.

One of the key priorities for this final year is to develop public-private partnerships to advance commercialization and help build one or two pilot-scale facilities within the Pacific Northwest used to process post-harvest forest residuals into biojet fuel and co-products. Within the next few months, NARA will identify the most suitable facility site(s) using site selection data generated through analyses performed by the Integrated Design Experience (IDX) group. Once a site has been selected, further design and financing steps will follow. It is anticipated that a full life cycle assessment (LCA) will accompany the selected site.

View site selection analyses developed by IDX here.

Other priorities include enhanced outreach to policy makers and a comprehensive analysis of the "real world" impacts from removing biomass from post-harvest forest operations.

IDX students observe collection and processing equipment for post-harvest forest residual in the Olympic Peninsula.

NARA students provide supply chain data for the Olympic Peninsula

Students enrolled in the Integrated Design Experience (IDX) course at Washington State University are showing people what a wood-to-bio-jet fuel supply chain might look like.

The IDX students are working on behalf of NARA and multiple stakeholders to identify and evaluate potential facility sites that could function as either an integrated biorefinery, a solids depots or a liquids depot. The evaluations are complex and include a range of considerations like the availability and cost of post-harvest forest residuals, transportation options, permits, existing infrastructure, work force, social acceptance, the type of products that could be produced and the available markets for those products.

View regional supply chain studies prepared by IDX

Some of the information used to produce these evaluations is provided through open sources and from data generated by the NARA teams; however, much of the information comes from the people and companies who manage working forests, transport wood, and produce wood-based products.

This semester, the IDX course will provide an assessment that covers the Olympic Peninsula and will provide the following:

- Analysis and design for a co-located liquids depot at existing pulp and paper mills, with analysis of biomass requirements and potential markets
- Analysis and design for a lignin recovery facility at existing pulp and paper mills, with analysis of biomass requirements and potential markets
- Assessment of community perceptions in Clallam and Jefferson counties related to wood-based biofuels and co-products production

That's why students in the IDX course traveled to the Olympic Peninsula in October. They meet with Bill Hermann, the owner of Hermann Brothers in Port Angeles, to observe a business that collects and processes post-harvest forest residuals. They also meet with Port Townsend Paper mill and Nippon Paper mill to learn about their operations, and they attended a packed open house to hear what local citizens thought about a potential industry that uses post harvest residuals to make bio-jet fuel and other products.

Hermann Brothers

Bill Hermann is a man who provides solutions. To reduce the cost of hauling slash material to customers, his company designed chip vans with rear wheel steering. To ensure that only clean water escaped from the wood yard, the company built settling ponds and a water purification plant. His crew escorted the IDX students to a post-harvest site where slash was chipped into hog fuel and transported to a facility that uses the fuel to generate electricity and heat. The slash was removed so that the harvest site could be re-planted. The students also traveled with chip van drivers, toured the wood yard where logs are converted into pulp chips, and observed slash piles being formed. The information will help IDX students understand the hauling and processing costs involved with handling post-harvest forest residuals.

Port Townsend Open House

The WSU Jefferson County Extension office hosted a community open house in Port Townsend that featured the NARA project. The meeting room was filled with locals and the IDX students heard a wide array of questions and concerns about the use of post-harvest forest residuals. Listed are some of the issues discussed:

- Many wanted to know how the production of biofuels and co-products from post –harvest forest residuals would affect the local air and water quality, noise, smells and traffic levels.
- Questions were asked about the kind of waste products generated from the conversion process and how citizens could be sure that a life cycle assessment (LCA) would be produced accurately and without bias.
- Additional topics covered the amount of residuals that should be left in a working forest to maintain ecological health, and the potential demand for forest residues once an industry was established.

NARA research is providing answers to some of these topics. For instance, a life cycle assessment is nearly developed that describes the impact on air quality and greenhouse gas emissions. Their research indicates that regional air quality would improve significantly if post-harvest forest residuals were removed and used to produce alternative jet fuel rather than if burned. The International Organization for Standardization will review the NARA LCA once completed to ensure that the methodology is sound. NARA also conducts research that measures the impact of post-harvest forest residuals on forest ecology.

View a recent webinar describing the NARA LCA findings

View a recent webinar describing NARA research on post-harvest residuals

Port Townsend Paper and Nippon Paper

The IDX team met with representatives of the Port Townsend Paper mill and Nippon Paper mill located on the Olympic Peninsula. The purpose for the meetings was to learn about their operations and describe the types of analyses the IDX group could provide. These analyses would include supply curves that project the biomass cost from a given distance to the facility and site designs with cost assessments for converting wood biomass into simple sugars. Providing these kinds of assessments allows the IDX students to develop skills and provides stakeholders with quality information they can use for future planning.

Single trailer chip truck loading post-harvest forest residuals

The benefits of single vs. tandem trailers to haul post harvest forest residuals

Using post-harvest forest residuals, or slash, to make biojet fuel and co-products is an economic challenge. A significant cost in the supply chain is transportation associated with hauling the processed slash material to a conversion facility. To supply slash material to a conversion facility or processing depot, trucks need to travel on forest roads and often travel long distances.

NARA researchers Rene Zamora-Cristales and John Sessions have evaluated multiple approaches used to lower the transportation costs of moving slash. These approaches include improved methods to load the processed slash into a trailer so that bulk density is increased to providing logistic models used to select the most cost effective routes and equipment to haul slash out of the harvest site.

Recently, they published a peer-reviewed paper, partially funded through NARA by the USDA-NIFA, evaluating the use of single and double trailers, double trailers being one truck pulling two trailers, in steep terrain. Their goal was to examine conditions where using a double trailer configuration might be more economical than a single trailer configuration.

Are double trailers cost effective for transporting forest biomass on steep terrain

Experiment design

To evaluate these two options, the researchers developed a simulation model based on data from trucking observations at timber harvest sites in southwest Oregon. Using the simulation model, they compared the cost of using a truck pulling two single 32-foot trailers (28-feet in California due to State regulations) to a similar truck pulling a single 32 or 45-foot trailer. All truck configurations complied with state regulations. The single-lane roads used in the simulation were gravel with gradients ranging from 5% to 20% and could accommodate a single or double trailer configuration.

The travel speed of each trailer configuration was evaluated under a variety of road conditions and loads. They also evaluated the time and cost involved to connect, disconnect and load (including grinder costs) the trailers and the amount of fuel consumed. In general, double trailer configurations traveled slower than single configurations and required more time and fuel, hence cost.

Experimental results

Getting a double trailer configuration to a slash grinding location, loading it, and hauling the load to a conversion

facility took 34% more time, and had a 24% higher hourly cost, than using a single trailer configuration. The time and cost difference would favor single trailer configurations, however, double-trailer configurations can carry more biomass than single trailers. As the double trailer configuration travels further, the economics favor the larger load. It turns out that if the distance from the grinding site to the conversion facility is greater than 35 miles, than a double trailer is more economical than a single 32-foot trailer. When using a single 42-foot or 45-foot trailer, then the breakeven point is 56 and 70 miles respectfully.

If the double trailer requires a trailer hook-up distant from the grinding/loading site, then the cost advantage sways to a single configuration. For example, if the distance to the conversion facility is 70 miles and the trailer hookup occurs two miles from the loading site, then a 42-foot single trailer is more cost efficient.

Of course, the layout of a harvest site can vary. The authors considered a scenario featuring a centralized landing yard with a large turn around where untreated slash material is hauled from the surrounding area using bin trucks and ground at the landing. In this case, the benefits for a double trailer were marginal. Although the hook-up times were eliminated, the cost of the bin trucks eliminated the cost benefit of no hook-ups.

Conclusions

The authors summarize that double trailer configurations are only cost effective for long distance hauls when hook-up distance to the loading site are minimal. They point out that improvements in trailer steering and packing methods may offer better results to decrease transport costs.

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