United States Department of Agriculture

Residual Biomass Harvesting and Carbon

BACKGROUND: WOOD WASTE TO JET FUEL

By using residual biomass—commonly known as slash—from logging operations as feedstock, the Northwest Advanced Renewables Alliance (NARA) project aims to create a sustainable industry to produce aviation biofuels and value-added co-products.

About 40 percent of the tree is left behind during timber harvests in the interior West. The unused branches and tree tops are either piled and burned or left to decompose. Researchers assessed the effects of slash burning on air quality and carbon release and compared them to the estimated effects of collecting and transporting biomass residuals to a treatment facility to begin biofuel production.

The assessment focused on private and state forest lands in eastern Washington, northern Idaho, and western Montana.

A truck is loaded with chipped residual biomass following timber harvest. The carbon footprint of the operation is smaller when larger trucks are used because fewer trips are needed.

KEY FINDINGS

- Avoided slash-pile burns would improve local air quality and reduce local health impacts caused by the harmful pollutants emitted during burning.
- A 70-percent reduction in global-warming potential can be achieved by substituting 100-percent petroleum-based jet fuel with 100-percent wood-based jet fuel.
- Collecting, grinding, and transporting residual biomass contribute 20 to 30 percent of the global-warming potential of biomass-to-jet-fuel conversion.
- Co-products that displace other coal-based products would further improve the environmental footprint of the residual-biomass-to-jet-fuel conversion process. Activated carbon, used in water and air filters, is one such possible co-product.

CONSIDERATIONS

The size and condition of forest roads are key factors contributing to the carbon footprint created by collecting and transporting forest residuals.

- Larger trucks (50-cubic-yard containers) making fewer trips yield a smaller carbon footprint, but these trucks are too large for smaller spur roads.
- Smaller trucks (30-cubic-yard containers), used on spur roads, necessitate more trips, which yield a larger carbon footprint.

Harvesting forest residuals from a broad zone along a developed road system that can accommodate larger trucks likely will result in fewer carbon emissions than would a narrow “deep” harvest zone requiring access via spur roads.

ABOUT NARA

NARA was funded from 2011 through 2016 by Agriculture and Food Research Initiative competitive grant no. 2011-68005-3016 from the USDA National Institute of Food and Agriculture.

https://nararenewables.org/

Led by Washington State University, the NARA project includes a broad alliance of private industry, government laboratories, and educational institutions from throughout the Northwest.

NARA

Northwest Advanced Renewables Alliance

Washington State University