Forest Biomass HOT Topics

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Photo: Aaron Toso/DNR

Emerging Issues

DNR's Forest Biomass Initiative is effectively demonstrating the opportunities for improved forest health, green house gas reduction, green energy production and rural economic development. At the same time, some members of the public have raised concerns related to ecosystem health, air quality and greenhouse gas emissions, and the sorts of materials that will be utilized to generate wood-based energy. This paper addresses those concerns and provides readers with the information needed to better understand this component of Washington's renewable energy sector.

Forest Biomass: What it is and what it is not

Concurrent with the growth of interest in wood-based energy products, questions have been raised regarding the composition of the feedstocks that will be used: Will forest biomass energy facilities 'mow down' Washington forests to generate the feedstocks that they need? Will treated wood be burned? What about old growth forests?

Washington State has defined forest biomass, in its definition of 'renewable [energy] resource,' as:

"Renewable resource" means:

(i) biomass energy based on animal waste or solid organic fuels from wood, forest, or field residues, or dedicated energy crops that do not include (i) wood pieces that have been treated with chemical preservatives such as creosote, pentachlorophenol, or copper-chrome arsenic; (ii) black liquor byproduct from paper production; (iii) wood from old growth forests; or (iv) municipal solid waste. [RCW 19.285.030 (18)])

Understanding the definition of forest biomass in Washington State law helps clarify what will and what will not be used in bioenergy facilities being built and/or planned in Washington State.

Forest biomass feedstocks WILL come from:

- Residual branches, needles, and tree tops (called "slash") left over from ongoing logging operations.
- Products of pre-commercial thinning (small saplings from overcrowded young forests).

Washington's Forest Practices Rules protect many things

Washington's Forest Practice Rules protect soils, water, fish, wildlife, and capital improvements (roads, power lines) from impacts related to forest practices in private, county, and state forest land. The Forest Practice Act which authorizes the rules, was adopted by the Legislature in 1974 and published as Title 222 of the Washington State Administrative Code (WAC).[1] Currently, "forest biomass" is being added to the definition of 'forest practice' in the forest practices rules.

[1]Forest Practices Illustrated. Washington State Department of Natural Resources. 2007.

- Tree stems and tops thinned from forests that are at risk from wildfires, insects or diseases (forest health treatments) that are not currently utilized.
- Clean, untreated wood construction and demolition waste that would otherwise have gone to a landfill.
- Unused material from lumber mills, such as sawdust, shavings, chips or bark.

Forest biomass feedstocks WILL NOT come from:

- Traditional timber or whole trees that would otherwise be made into lumber, paper, or other products by existing industries.
- Downed logs required to be left on site by forest practice regulations, material incorporated into the forest floor, stumps.
- Wood products treated with chemical preservatives, such as creosote or "green-treated" lumber.
- Wood and wood products from old growth forests.

Ultimately, the use of forest biomass as an energy feedstock is helping to create a market for a product previously seen as 'waste.' In so doing, rural jobs are being created, rural economic vitality is being increased, and clean renewable energy sources are being produced. Air emissions may also improve. Logging slash is often piled and burned in the open for disposal, creating smoke pollution. If instead, this biomass material is burned in a controlled and highly regulated facility, air pollution would decrease. Air emissions are also improved by reduced emissions from severe wilfires. Biomass utilization would enable more thinning in crowded, diseased eastern Washington forests to enhance forest health and reduce their susceptibility to uncharacteristically severe fires.

Forest Biomass: Ecosystem Health, Supply and Human Health Concerns

Forest Biomass and Ecosystem Health

An outgrowth of the concern that forests will be 'mowed down' to provide forest biomass to bioenergy facilities is the concern that ecosystem health will be negatively impacted because organic materials, essential to forest health, will be removed from the forest floor. This concern can also be addressed by referring to the definition of forest biomass. Materials that will be used are those that would likely have otherwise been burned in slash piles, sent to a landfill, or remained in overcrowded forests to slow forest growth, create conditions conducive to disease, or unnaturally increase the severity of wildfires.

Washington's Forest Practices Board, in August 2010, has begun a rulemaking process to include forest biomass removal in the Forest

Forest Service Grant to Help Fund a Sustainable Forest Biomass Supply Study

DNR received a $1 million grant from the USFS in 2010. A portion of this will be used to determine an economically and ecologically available volume to be harvested in Washington State.

Practice Rule definition of 'forest practice.' This means all activities related to the collection of forest biomass must apply for a Forest Practice Permit and comply with the State's strict forest practices guidelines. Permits will only be issued if the applicant can demonstrate compliance with Forest Practice rules that are in place to protect ecosystem health.

Biomass Supply

Biomass supply is also an issue that has been raised in reference to the long-term sustainability of the forest biomass energy sector. Whether Washington's forests have sufficient supply of biomass to power energy facilities without negatively impacting ecosystem health is a question being asked by some members of the public. The Department of Natural Resources recognizes this as a valid question that needs to be answered to ensure an ecologically and economically sustainable market for forest biomass.

In July 2010, DNR received a $1 million grant from the U.S. Forest Service, a portion of which is intended to complete a statewide forest biomass sustainable supply study. The study, to be completed in 2011, will help assess the volume of forest biomass available ecologically and economically throughout Washington State as well as fulfill DNR's specific requirements under Section 2(1) of 2SHB 2481 (which authorizes DNR to


Photo: Aaron Toso/DNR

Supply data will support economic stability and ensure ecological protection

Detailed supply data will provide information that will inform decisions related to appropriate scale, location, and technology of planned and proposed facilities; it will support economic stability in the emerging market; and it will ensure ecological protection.

enter into long-term contracts for forest biomass from public lands). The grant will, in addition to the supply study, enable DNR and partners to test methods for making forest biomass material available from broad, multi-landowner areas with the aim to improve the economic feasibility of protecting forests from wildfire and restoring forest health.

Forest Bioenergy and Human Health

There have been concerns that the combustion of forest biomass to generate energy will result in increased air emissions above existing levels, both of particulates and of greenhouse gases. National Ambient Air Quality Standards (NAAQS) are established by the Environmental Protection Agency under the authority of the Clean Air Act (42 U.S.C. 7401 et seq.). These standards apply to all emission sources in the United States and are intended to protect human health. The EPA sets standards for six 'criteria air contaminants': ozone, particulate matter, carbon monoxide, sulfur dioxide, nitrogen oxides and lead. Biomass facilities, like all others, must obtain the required air quality permit and may not exceed EPA emissions limits. Emissions from these facilities are tested on a regular basis by local air authorities to ensure continued compliance.

Conversion Facility and Technologies' Carbon Footprint

Greenhouse gas emissions, the carbon footprint of forest biomass-based energy facilities, and the impacts on forest carbon storage capacity have also been raised in relation to Washington's emerging forest biomass energy sector. Climate change may be the biggest challenge facing the world today. It is important that these questions be asked in reference to all energy options being explored.

Greenhouse Gas Emissions

There are greenhouse gas emissions that result from the combustion of forest biomass to make energy and energy products. Unlike fossil fuels, however, greenhouse gases that result from forest biomass combustion do not result in a net increase of greenhouse gases in the atmosphere because they are part of the natural baseline of atmospheric carbon and are not new in the atmosphere, having been relatively recently removed by growing trees and other plants, and they continue to be removed in this way. Emissions from fossil fuels, on the other hand, are new emissions (not part of an existing natural exchange of carbon in the biosphere). Carbon in fossil fuels has been stored in the earth's crust for millions of years. When a fossil fuel is combusted, the greenhouse gas emissions that

are released will not be balanced through a system comparable to the forest carbon cycle.

So long as the stocks of forests that absorb carbon from the atmosphere remains the same, any greenhouse gases emitted from the combustion of forest biomass will be balanced by the carbon naturally absorbed and stored in forests and other ecosystems. It is critically important that efforts continue to prevent the conversion of forestland to other uses, because this can result in the permanent loss of sequestration capacity.

When forest biomass is used as a feedstock for fuel or energy production, the carbon that is released through the conversion technology is balanced by the re-absorption of carbon by the forests. It is because of this that both federal and Washington State policy has viewed the utilization of forest biomass as an energy feedstock as carbon neutral.

Carbon Footprint of Forest Biomass Facilities in Comparison to Other Fates of Forest Biomass

Questions regarding the overall carbon "footprint" (the total amount of carbon released by the use of forest biomass for energy production) of forest biomass energy facilities have been raised by some members of the public. First, the carbon footprint of forest biomass being hauled 30-60 miles (estimated distance that is economically sustainable) to a processing facility will always be significantly less than the carbon footprint of fossil fuels that have been shipped from other parts of the world. That said, it is still important to look at the overall carbon footprint of various forest biomass fates.

The Olympic Region Clean Air Agency (ORCAA) was commissioned by the EPA to evaluate, utilizing a life cycle approach, the relative carbon footprints of various fates of forest biomass. Preliminary data is suggesting that even taking into account emissions associated with transportation and processing, there are still fewer greenhouse gas emissions from forest biomass used to produce energy than if the forest residuals were to either be left on site (to biodegrade in a slash pile) or burned on site. The final report from ORCAA is expected to be published in December 2010.

THE FOREST CARBON CYCLE

"Carbon is an abundant element that is necessary for life on Earth. The carbon cycle is the exchange of carbon between all of earth's components – the atmosphere, oceans and rivers, rocks and sediments, and living things."[2]

"One critical part of the carbon cycle takes place in forests. Forests exchange large amounts of CO_2 and other gases with the atmosphere and store carbon, in various forms, in trees and soils. Carbon stored in plants or soils is called "sequestered carbon." Carbon returned to the atmosphere when it has been used by trees or other organisms as energy for life is called 'respired carbon.' Much of the CO_2 in the air above a forest is taken in by trees through the process of photosynthesis, where it becomes one of the building blocks for tree growth or energy for life."[3]

[2] "The Carbon Cycle." NAICS Fact Sheet. USDA, September 2007.

[3] "Climate change facts: A primer on carbon recyling." The Wilderness Society. 2008.