

## **ECONOMIC BENEFITS OF THE USE OF WOODY BIOMASS FOR ENERGY PRODUCTION**

During the March 5, 2015 public hearing on HB 2449 before the House Committee on Energy and Environment, several committee members asked specific questions regarding the value of ancillary benefits associated with woody biomass power generation in Oregon. These questions related to the proposed extension of the biomass collector and producer tax credit and the request for the restoration of the tax credit rate for woody biomass. This submittal is presented to document third party calculations for some of these uncompensated environmental benefits associated with energy production using woody biomass.

In January 2006, the Biomass Task Force convened by the Western Governor's Association Clean and Diversified Energy Advisory Committee (CDEAC) issued a report which focused on the utilization of biomass resources for the production of electricity. Based upon this focus, the task force report did not address the potential benefits for the production of transportation fuels and/or thermal energy from biomass.

The Biomass Task Force consisted of 27 members from public, private, non-profit, and educational organizations that are regional experts on energy production and biomass resources. In addition to the Biomass Task Force, the CDEAC created a Quantitative Working Group consisting of economics and energy experts "to compare the analysis of data among task forces in order to ensure consistency in assumptions across the reports."

The Biomass Task Force Report summarized the following:

*"Biomass can supply a constant, distributed, and economic energy supply that is renewable, and that provides important and unique ancillary environmental benefits while the resource is being utilized productively. Examples of these benefits include reduced risks of destructive wildfires, reduced consumption of landfill capacity, and air quality benefits due to reductions in open burning of agricultural and forest residues. In addition, the use of biomass as an energy resource actually reduces greenhouse gas emissions associated with the other dispositions of the material, and contributes to improved public health and stable rural economies."*

In the report, the Biomass Task Force featured a methodology developed by the National Renewable Energy Laboratory (NREL) to estimate the value of the uncompensated benefits of biomass energy production. In 1999, NREL estimated the value of the uncompensated benefits of biomass energy production to be \$0.114 per kilowatt hour for the total US biomass mix (Morris, G., The Value of the Benefits of U.S. Biomass Power, NREL Report No. NREL/SR-570-27541, November 1999.). While this model is beneficial in demonstrating the monetary value of the uncompensated societal benefits of biomass power production from the total US biomass mix, only 15% of the total US biomass mix used in that model consisted of forest

residues. Another factor to consider in this 1999 assessment is that the value of greenhouse gas reduction valued CO<sub>2</sub> at \$33/ton. Significant impacts that were not included in the 1999 model were “energy diversity and security, the costs and damages of wildfire suppression as compared to a fuels reduction approach; watershed damage and reduced water yields and lower water quality; and lost production and revenues due to wildfires and smoke affecting recreation, manufacturing, and education.”

The Biomass Task Force used the model that was developed for the 1999 NREL study “to calculate some of the component values that are implicit in the calculation of benefits for the total fuel-mix.” In this calculation, the value of CO<sub>2</sub> was reduced to \$10/ton for the greenhouse gas reduction component of the model. Using the model and damage values from the 1999 NREL Report, the Biomass Task Force generated Benefits for Avoidance of Specific Disposal Options. The Specific Disposal Options that are relevant to woody biomass include Avoided Open Burning and Avoided Forest Overgrowth Accumulation. The benefit values assigned to these two specific disposal options are \$0.126 per kilowatt hour for avoided open burning and \$0.202 per kilowatt hour for avoided forest overgrowth accumulation. Converted to dollar values per megawatt hour (MWh), the benefit values for avoided open burning are \$126.00 per MWh and \$202.00 per MWh, respectively. Using the rule of thumb for electric energy production of 1 MWh from 1 BDT woody biomass (references a,b,c, &d in Notes below), the Biomass Task Force model calculated uncompensated benefits of using forest residues for electrical power generation ranging from \$126.00 to \$202.00 per BDT. Although the Biomass Task Force admits that the benefit value calculation did not include significant additional benefits such as “rural economic development opportunities, energy diversity and security, protection against the price volatility associated with fossil fuels, and increased agricultural and forestry health and productivity,” the benefit values calculated by the Biomass Task Force do represent an important evaluation by third party biomass and energy experts.

With a proposed tax credit value of \$20/BDT for eligible woody biomass (HB 2449-4), the return on investment (ROI) on this tax credit for those societal benefits that were calculated by the Biomass Task Force range from 530% to 910%. These ROI estimates are determined by the following calculation:  $ROI = (\text{Benefits [gains]} - \text{tax credit cost}) / \text{tax credit cost}$ . This suggests that there is a substantial positive ROI on the cost of the proposed tax credit, before evaluating the value of items such as rural economic development that were not included in the Biomass Task Force model.

One of the key policy recommendations presented in the 2006 Biomass Task Force Report is that “Environmental Benefits Of Biomass Should Be Paid For By Beneficiaries.” The rationale presented stated that “Biomass is unique among renewables in its ability to address and solve a host of local and regional environmental issues through the choice of its fuel supply.” Since the uncompensated environmental benefits of energy generation in Oregon using woody biomass are valuable to all of the residents of the state, an Oregon tax credit appears to be an appropriate method for the beneficiaries to pay for these uncompensated benefits of biomass power generation.

## NOTES

References for conversion factor of 1 BDT = 1 MWh of electric energy production

- a. Mayhead, Gareth J. University of California Agriculture and Natural Resources. Biomass to Electricity presentation. October 21, 2010.
- b. Minnesota Loggers Education Program. Biomass Harvest Guidelines – Frequently Asked Questions – PDF
- c. JR Shelly, UC Berkley Exhibit 1 to Shasta County, California, Woody Biomass Definitions and Conversion Factors. 12/06/2007.
- d. Personal conversation with Todd Hansen, Fuel Manager for Biomass One, White City, Oregon. March 17, 2015.

1 MW of electricity provides enough power for 800 to 1,000 homes.

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