

## **Existing Studies on Woody Biomass Utilization and Availability**

### **Compiled by**

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### **Background**

This document's primary purpose is to serve as a working list of existing literature that focuses on the utilization and on the availability of woody biomass. Hopefully, by maintaining a thorough list of woody biomass reports, the risk of duplicating an existing report will be minimized.

### **Minnesota Department of Natural Resources (MN DNR)**

- Active and Proposed Wood Energy Facility Listings including information regarding annual volumes and specifications of biomass used. Updated Annually.
- Biomass Harvesting Guidelines for Forest Lands and Open Lands. 2007.
- Development of Procedures to Assess Brushland Resources for Woody Biomass Energy Markets. A pilot project was completed to assess shrubland density over a several county area using a combination of on-site biomass measurements and remote sensing techniques. Additionally, a simple technique for appraising Brushland biomass volumes for markets was developed for use by field resource managers. 2009.
- Forest Harvest Levels in Minnesota: Effects of Selected Forest Management Practices on Sustained Timber Yields. 2009.
- Keetac Expansion Project. Environmental Impact Statement. Anticipated November 2010.
- Linking Habitat Restoration to Bioenergy. An innovative new pilot project funded by the MN LCCMR that unites two separate but linked aspects of environmental health: habitat restoration and bioenergy. 2008.
- MN Forest Resources. An annual publication with information on Minnesota's forest resources and forest industry, and trends impacting them. 2009.
- MN Logged Area Residue Analysis. This report summarizes the results of data collected on woody logging residue remaining on harvested sites across Minnesota. Tables showing estimates of average harvest acreage by county, forest, and harvest type are also presented. 2007.
- MN Residential Fuelwood Survey. A long-term effort to monitor trends in the use of fuelwood by residential households and the impact of fuelwood on timber harvest levels. 2002-2003 & 2007-2008.
- MN Woody Biomass Facilities Directory. A directory resulting from the 2007 Woody Biomass Facility Survey. 2008.
- MN Woody Biomass Facility Survey. A comprehensive survey of wood energy facilities using biomass in 2007. 2008.
- Mountain Timber Wood Products Fuel Pellet Facility Environmental Assessment Worksheet. 2008.
- UPM/Blandin Paper Thunderhawk Project. Environmental Impact Statement. 2006.

- Woody Biomass Availability Reports composed by the Minnesota DNR's Utilization and Marketing Program. These reports examine biomass fuel availability from all ownerships within a specified procurement area. While these reports provide valuable information regarding fuel availability, they are not meant to substitute a full economic analysis for biomass utilization. Woody Biomass Availability Reports have been composed for the following areas:
  - Bemidji Fuel Supply Analysis. 50 mile procurement area. 2009.
  - Crookston County Fuel Supply Analysis. 50 mile procurement area. 2004.
  - Fairmont Fuel Supply Analysis. 50 mile procurement area. 2008.
  - Grand Rapids Fuel Supply Analysis. 50 mile procurement area. 2003 & 2005.
  - Keewatin Fuel Supply Analysis. 100 mile procurement area. 2009.
  - Little Falls Fuel Supply Analysis. 50 mile procurement area. 2005.
  - Morrison County Fuel Supply Analysis. 75-150 mile procurement area. 2008.
  - 12 Northwestern MN Counties Fuel Supply Analysis. 2008.
  - Onanegozie RC&D Area Fuel Supply Analysis. 2008.
  - Owatonna Fuel Supply Analysis. 50 mile procurement area. 2006.
  - Park Rapids Fuel Supply Analysis. 50 mile procurement area. 2007.
  - Remer and Mountain Iron Fuel Supply Analysis. 65 mile procurement area. 2009.
  - RockTenn (St. Paul) Fuel Supply Analysis. 50 mile procurement area. 2004.
  - 35 County Area around Sartell Fuel Supply Analysis. 2002.
  - William Fuel Supply Analysis. 60 mile procurement area. 2008.
  - Fond du Lac (Brookston) Fuel Supply Analysis. 100 mile procurement area. 2011.

#### **Agriculture Utilization Research Institute (AURI)**

- Aitkin County Biomass Utilization Report. 2009.
- An Analysis of Expanding Renewable Energy Markets in Minnesota. Implications for Rural Economic Development. 2010.
- AURI Biomass Pellet Plant Feasibility Guide. 2007.
- Biofuels Needs Assessment. 2008.
- Template for Estimating County Level Energy Use and Renewable Energy Potential. 2009.

#### **The Blandin Foundation**

- An Assessment of the Potential for Bioenergy and Biochemical Production from Forest-derived Biomass in Minnesota. A report for the Blandin Foundation Vital Forests/Vital Communities Initiative and Iron Range Resources. 2007.

#### **Dovetail Partners**

- An Assessment of the Potential for Bioenergy and Biochemical Production from Forest-derived Biomass in Minnesota. A report for the Blandin Foundation Vital Forests/Vital Communities Initiative and Iron Range Resources. 2007.
- Bio-Energy: *Momentum is Building for Large Scale Development*. Jim Bowyer. 2005.
- Biomass Energy - From Farms to Forests: An Emerging Opportunity for Rural America. Jim Bowyer. 2006.

- Bioenergy Update: A Biofuels/Biorefinery Development Report Card. 2009.
- Community-based Bioenergy and District Heating: Benefits, Challenges, Opportunities and Recommendations for Woody Biomass. Steve Bratkovich. 2009.
- Energy from Woody Biomass: A Review of Harvesting Guidelines and a Discussion of Related Challenges. Kathryn Fernholz. 2009.
- The U.S. Pulp and Paper Industry: *A Key Player in the Coming Bio-Revolution*. Jim Bowyer. 2005.
- Grand Portage Casino. Private Fuel Supply Analysis. 2011.
- Forest Biomass Heating and Electricity in Cook County, MN. 2011.

#### **Iron Range Resources (IRR)**

- An Assessment of the Potential for Bioenergy and Biochemicals Production from Forest-derived Biomass in Minnesota. A report for the Blandin Foundation Vital Forests/Vital Communities Initiative and Iron Range Resources. 2007.

#### **Minnesota Forest Resources Council (MFRC)**

- Biomass Harvesting Guidelines for Forest Lands and Open Lands. 2007.

#### **Natural Resources Research Institute (NRRI)**

- Bois Forte Band of Chippewa Biofuel Feasibility Study. 2009.
- Chisago-Isanti-Pine Biofuels Feasibility Study. 2009.
- Development of Procedures to Assess Brushland Resources for Woody Biomass Energy Markets. Brushlands have the potential to provide biomass for energy particularly in northern regions where these land types are common. A pilot project was completed to assess shrubland density over a several county area using a combination of on-site biomass measurements and remote sensing techniques. Additionally, a simple technique for appraising Brushland biomass volumes for markets was developed for use by field resource managers. 2009.
- Laurentian Energy Authority. Environmental Impact Statement: Biomass Sourcing. 2009.
- White Earth Biofuels Feasibility Study. 2009.

#### **University of MN-Center for Integrated Natural Resource and Agricultural Management**

- Harvesting Fuel: Cutting Costs and Reducing Forest Fire Hazards through Biomass Harvest. Dalia Abbas, Don Arnosti, Dean Current, and Mike Demchik. 2008.

#### **University of MN- Department of Forest Resources Staff Paper Series**

- Assessment of Carbon Flows Associated with Forest Management and biomass Procurement for the Laskin Biomass Facility. Grant M. Domke, Alan R. Ek, Dennis R. Becker, Javier F. Espeleta, Anthony W. D'Amato, Peter B. Reich, Sangwon Suh, Michael A. Kilgore, Dean A. Current, Howard M. Hoganson, Thomas E. Burk, and Charles R. Blinn. 2008.
- An Assessment of Dead Wood Standards and Practices in Minnesota. Ross N. Brown, Alan R. Ek, and Michael A. Kilgore. 2007.

- Minnesota Timber Harvesting GEIS: An Assessment of the First 10 Years. Michael A. Kilgore, Alan R. Ek, Karen E. Buhr, Lee E. Frelich, JoAnn M. Hanowski, Calder M. Hibbard, Andrew O. Finley, Leah C. Rathbun, Nicholas P. Danz, James W. Lind, and Gerald J. Niemi. 2005.
- 2010 Outlook for Forest Biomass Availability in Minnesota: Physical, Environmental, Economic, and Social Availability. Dennis R. Becker, Jonathan J. Klapperich, Grant M. Domke, Michael A. Kilgore, Anthony W. D'Amato, Dean A. Current, and Alan R. Ek. 2010.
- Tools to Minimize the Impacts of Energy Wood Harvesting on the Environment and Soil Productivity in Minnesota. Anna L. Robertson, Michael A. Kilgore, and Alan R. Ek. 2008.
- State Woody Biomass Utilization Policies. Dennis R. Becker and Christine Lee. 2008.
- Users Manual for the Minnesota Harvest Residue Estimation Model. Leah Rathbun and Thomas E. Burk. 2007.