Finding a Way Out of the Woods:

By:
Craig Rawlings
Forest Business Network, LLC

A review of Montana's oversupply of biomass and the quest for a creative solution

November 2011

As part of its ongoing exploration of issues surrounding biomass utilization and forest restoration, the Montana Forest Restoration Committee (MFRC) commissioned this white paper from Craig Rawlings, President, Forest Business Network LLC, at the request of the Forest Products Retention Roundtable.

This document is intended as a simple survey and as such does not directly address many of the scientific, social, and political issues surrounding biomass harvesting and utilization, including the profitability of biomass in relation to other energy sources, the sustainability of biomass harvesting and use, and the ecological value of plants. In regard to these issues, any views or assumptions are those of the author or the authors of his cited references, and do not necessarily represent the views of MFRC or its individual members.

Introduction

The biomass sector of Montana's forest economy is out of balance.

In recent years demand for biomass has shrunk, even as the state's supply has grown. Of course when demand shrinks, fuel reduction and forest restoration projects are less likely to be able to pay for themselves, and as a result, they get postponed or abandoned. That means that the forest workers of Montana's rural communities find it harder to get work, and at the same time, land managers find it harder to keep forests healthy and fire-resistant.

This white paper will briefly review the history of this biomass imbalance and recent attempts to correct it. ("Biomass" is defined here as non-sawlog, forest-derived wood, i.e., smaller-diameter trees including bark, branches and bole wood). Our paper will end not with an answer, but a question: *How can we improve existing programs that are aimed at increasing demand?* And just as important, is there a solution that hasn't occurred to us? Remember that the business of biomass is dynamic and evolving; the facts, figures, and scenarios cited here will change. Consequently this paper is a work in progress and should be considered as food for thought — a launch pad for strategic problem solving.

The Supply of Biomass in Montana

According to a 2009 University of Montana study, the state's 93 million acres of land include 20 million acres of non-reserved timberland, which in turn contain 850 million dry tons of sawlog and non-sawlog woody biomass.[1] The study removed larger-diameter trees from consideration, along with trees in non-productive forests, in older forests, in roadless areas, and on steep hillsides. It also filtered out areas too far from roads to be accessible by ground-based harvesting systems. That left about 3.5 million available acres, containing about 40 million dry tons of woody biomass. More material could become available through treatments of fire-damaged stands and the thinning of beetle-killed trees.

Projects Adding to the Supply of Harvested Biomass

For most of the twentieth century the U.S. Forest Service suppressed every wildfire it could reach, no matter what the cause. At the same time, the prevailing management priority was to maximize the amount of big, marketable logs produced by timber sales. These two trends —suppression and aggressive big-tree harvesting— left behind vast stands of smaller, overgrown and fire-prone trees.

The following Montana organizations are addressing these and related issues, including the potential over-development of rural areas and changes to the ecosystem caused by a warming climate:

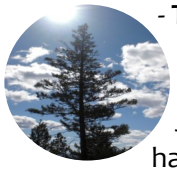
- **The Blackfoot Challenge** has arranged for conservation easements on many tens of thousands of acres of forest and ranch land in the Blackfoot watershed. In 2008, the Challenge formed a Forestry Committee to "prioritize mitigation efforts, strategize on treatments, and increase fire safety in communities…[and create] more resilient forests for the future." The Challenge has reported thinning an average of 100 acres annually in recent years.[3]

- **The Southwestern Crown of the Continent Collaborative** comprises the Blackfoot Challenge and 19 other organizations, including non-profits, academic institutions, and governmental agencies. The Collaborative was formed to help restore the health of forests in the Blackfoot, Swan, and Clearwater River drainages of Western Montana. Over the next eight years, it intends to treat more than 130,000 acres, which should produce more than 250,000 bone dry tons of biomass.[4]

- **The Nature Conservancy** and **The Trust for Public Lands,** national nonprofits that are also members of the Southwest Crown Collaborative, teamed up to buy more than 310,000 acres of timber company land in four western Montana counties. Partially funded by a conservation bond provision in the 2008 Farm Bill, the purchase is intended to conserve habitat and access, and, in the Conservancy's words, to "maintain…production and restoration opportunities."

- **The Montana Forest Restoration Committee** is a collaborative group that was formed in 2007 to create a set of forest restoration principles and to ensure that those principles get carried out in Montana's national forests. The committee's guiding principles have been adopted by other collaborative groups around the country and include a community-centered process designed to minimize appeals and increase long-term woody biomass supply.

- **The Clearwater Resource Council** is one of the best examples of Montana's leadership in creating Community Wildfire Protection Plans (CWPPs). The Council's Seeley Lake Fuels Mitigation Task Force has been particularly successful in mapping fire-affected areas and helping landowners reduce fire risk through thinning. The task force reports that for each of the last seven years, its projects have averaged more than 14,000 tons of slash.[5]



- **The Montana Department of Natural Resources** (DNRC) is the management agency for state lands. It has been a major partner in the Blackfoot Challenge and other cross-management programs in the state. In addition, State Forester Bob Harrington created and managed the Jump Start program, which used $8.7 in federal stimulus funds to underwrite forest thinning, hazardous fuels reduction, and beetle-kill treatments on state and private forestland in Montana.

These organizations and their many partners, together with the U.S. Forest Service, have pioneered a collaborative approach that has become a national model for restoration efforts. In fact Montana has been recognized by Secretary of Agriculture Tom Vilsak, who on a recent visit said, "There's a growing awareness that it's going to take local leadership and vision like this to drive progress."[6] Similarly, Secretary of Interior Ken Salazar recently visited and remarked that the Blackfoot Valley is "the birthplace of the conservation concept for the 21st century."[7]

The collaborative approach contrasts sharply with the gridlock of 20 years ago, marked by distrust among landowners, government agencies, and environmental groups. However the new model is not simply more civil, but also more productive, which means that more forest will be treated and more biomass will be produced.

Indeed, Montana's local collaborations laid the groundwork for Senator Jon Tester's proposed **Forest Jobs and Recreation Act**. If passed, this legislation would initiate a community-based process by which 100,000 fire-prone acres in two Montana national forests would eventually be managed for timber harvest.

Unfortunately even as collaborative restoration efforts succeed and more biomass is produced, mills are closing or cutting back operations, reducing the demand for biomass. What follows is an overview of a shrinking market and recent attempts to expand it.

Current and Potential Markets for Biomass

"There's a growing awareness that it's going to take local leadership and vision like this to drive progress."
Secretary Vilsak

Over the past several decades, Montana's biomass has been put to the following uses (listed in descending order of volume):
- Raw material for linerboard
- Hog fuel for boilers
- Roundwood products such as posts and poles
- Pellets for industrial use
- Pellets for home use
- Combined heat and power plants
- Wood/plastic composite products
- Miscellaneous uses such as flooring and horse bedding

Biomass is also being considered and tested as a feedstock for liquid fuel and biochemicals.

Recent Events Affecting Market Demand

- Pulp Mill closure

Until January 2010, the Smurfit Stone linerboard plant in Frenchtown had accepted 1.5 million tons of biomass per year. The Smurfit plant was Montana's only pulp and paper facility; its sudden closure more than halved the state's consumption of woody biomass, which had averaged between 2.2 and 2.7 million dry tons (MDT) annually.

- Sawmill closures

Since 2005, four large western Montana sawmills have permanently closed:

-- Owens & Hurst / Eureka sawmill
-- Stimson / Bonner sawmill and plywood plant
-- Plum Creek / Ksanka stud mill
-- Plum Creek / Pablo lumber mill

In the near term, these sawmill closures have indirectly added to the supply of biomass. Federal and state contracts include forest restoration clauses, which means that contractors are required to harvest small diameter trees together with saw logs. When mills close and the market value of timber decreases, profit margins shrink and contractors can't afford to haul those small trees away, instead leaving them piled in the woods, ready to be burned. However, sawmills have the potential to add substantially to biomass *demand*. In a recent study funded by Northwestern Energy (cited later in this document), researchers found that Montana's remaining sawmills would be the ideal sites for combined heat and power (CHP) plants, which would use in-woods biomass as their primary feedstock.

From that perspective, each sawmill closure lowers demand. It also leads to a cascading series of other negative effects:

Each mill closure increases the cost to transport saw logs and biomass to the next-closest mill, which in turn increases contractors' expenses on timber projects (and the restoration components of those projects). When a sawmill closes, some skilled mill workers leave for work in other places — most recently the oil and gas fields of North Dakota, Wyoming, and Pennsylvania. Loggers leave also, often after converting their equipment for fossil fuel work (for example, adapting their trailers to haul pipes instead of logs). This blue-collar brain drain will make it harder to restart efficient logging and milling operations once market conditions improve.

If the loss of sawmills and workers continues, Montana faces the same fate as Arizona and New Mexico, where a disappearing timber infrastructure has driven the cost of restoration projects far beyond the reach of many communities.

Remaining Infrastructure Contributing to Biomass Demand

Western Montana has more than 160 operational timber processing facilities. However, of the 300 MMBF processed in the state during 2009 and 2010, 90% was handled by the largest ten operations.[8] As mentioned above, sawmills affect biomass demand because of the restoration and small wood removal clauses in timber sale contracts — and because of their potential as sites for CHP facilities. In addition, most of the facilities listed here provide sawdust and other mill residue to biomass-centered businesses such as MDF, particleboard and pellet mills, which represent the major remaining in-state biomass users now that the Smurfit-Stone plant has closed.

Facility	Product
Pyramid Mountain Lumber / Seeley Lake	Dimensional lumber
Tricon Timber / St. Regis	Studs, flooring, and posts and poles
Thompson River Lumber / Thompson Falls	Dimensional lumber
Sun Mountain Lumber / Deer Lodge	Studs
F.H. Stoltze Land & Lumber / Columbia Falls	Dimensional lumber
R–Y Timber / Townsend	Studs
R–Y Timber / Livingston	Studs
Plum Creek / Evergreen	Plywood
Plum Creek / Columbia Falls	Lumber, plywood & medium-density fiberboard (MDF)
Roseburg Forests Products / Missoula	Particleboard (*This plant primarily uses mill residue such as sawdust.*)
Eagle Stud Mill / Hall	Studs (*Although it's not a major mill and has been decommissioned, the Eagle mill appears here because its facilities are still intact and available to buyers.*)

Most of these facilities are still operating, but are struggling to overcome the effects of the housing downturn (and an earlier chronic lack of available timber during the housing boom). What's more, the recession has made it harder for mills to plan the purchase of biomass-related equipment such as boilers for heating and power.

Fortunately Montana has a resilient network of biomass advocates within business, government academia and the conservation community. The following three sections highlight a few of their efforts.

Projects that are Increasing Demand for Montana Biomass

- Fuels for Schools and Beyond was founded to help institutions in the Intermountain West replace their fossil fuel-based heat systems with biomass. To date, this partnership of federal and state foresters has helped convert 11 public facilities, which together use more than 10,000 tons of biomass a year:

-- Darby Public Schools
-- Victor Public Schools
-- Thompson Falls Public Schools
-- Philipsburg Public Schools
-- Glacier High School
-- UM-Western Campus at Dillon
-- Townsend Elementary & High Schools
-- Troy Public Schools
-- Eureka Public Schools
-- Deer Lodge Elementary School
-- DNRC Anaconda Unit Office

suppression and aggressive big-tree harvesting— left behind vast stands of smaller, overgrown and fire-prone trees.

By March of 2012, the program will also have helped convert two Montana hospitals and a state correctional facility, which will use over 320 tons a year:

-- Mineral County Hospital
-- Clark Fork Valley Hospital
-- Treasure State Correctional Training Center

- Since the Smurfit-Stone closure in 2009, **Montana Rail Link** (MRL) has found five mills in other western states willing to buy chips from Montana. MRL is also actively marketing Montana biomass to potential Chinese customers.

- **The Forest Business Technical Assistance Project** is an enterprise of the BitterRoot Economic Development District (BREDD, Inc.). The project is officially moving from planning to operations, but it has already provided strategic, financial, engineering, and operational advice to many forest-based businesses, most of which could become users of biomass.

- Until 2010, the **Montana Community Development Corporation** (MCDC) assisted a number of business startups that now convert small-diameter trees into everything from flooring to animal bedding. The clients in MCDC's portfolio have since been transferred to either the BREDD program or a Missoula-based private consultancy.

Biomass Projects in the Planning or Pre-operational Stage

- **The University of Montana** is seeking permits for a planned biomass gasification boiler at its Missoula campus. If approved, it is projected to need 16,000 tons of woody biomass a year.

- **The Green Investment Group Inc.** (GIGI) has purchased a 3200-acre Smurfit Stone facility in Frenchtown, Montana, and is preparing to convert it to a "green" business campus. GIGI's business model involves taking an equity stake in participating enterprises.

- A recently-announced, 40-million dollar, four-state **USDA grant** will fund the research and development of non-food woody feedstocks and biorefineries designed to produce aviation fuel. Four Montanans are on the development team and will be able to advocate for the placement of refineries and/or processing centers in the state, one prime candidate being the GIGI facility in Frenchtown. Each biorefinery will require 12,000 BDT per year of forest-derived biomass.

- **The Thompson River Power facility** in Thompson Falls is a 15 MW thermal electric and steam co-generation plant whose owners are actively seeking a buyer. After an unsuccessful test period using coal, the facility was re-engineered and refitted, and is now permitted to combust 100% wood waste biomass. The plant is "shovel ready," and after purchase is expected to begin using biomass at the rate of 90,000 BDT a year.

Research & Development of Emerging Biomass Technologies

- The **Biomass Research and Development Initiative** (BRDI) is a project of the U.S. Forest Service's Rocky Mountain Research Station at the University of Montana. The project has begun a systematic exploration of the development of forest-based feedstocks, biofuels, and biobased products, with a particular emphasis on activated carbon and biochar. Tricon Lumber in St. Regis will provide mill residue and a site for the project's test equipment.

- The Missoula branch of Seattle-based **Blue Marble Biomaterials** will use the company's patented fermentation process to make flavorings, fragrances and other specialty chemicals from a range of sources, including wood chips or dust. The company is surveying the state's forest product manufacturers, looking for a source of both feedstocks and useful chemicals that could be collected from kiln exhaust. Blue Marble estimates that its current test site will use 1200 tons of chips or dust a year, and a production facility would use 12,000 tons per year.

- **Algae AquaCulture Technology** (AACT) is building a biorefinery on the grounds of Stoltze Land & Lumber in Columbia Falls. AACT feeds mill residue, waste heat and carbon dioxide into engineered containers of algae, which then produce methane for power generation — leaving behind high-grade organic fertilizer as a byproduct.

Strategic Initiatives Aimed at Increasing Demand for Biomass

- In 2009 the Bureau of Business and Economic Research at UM (BBER) published a report entitled ***An Assessment of Forest-based Woody Biomass Supply and Use in Montana***. This document has become an important reference work for the study of biomass in Montana.

- The Montana DNRC is in the process of publishing a report entitled ***The Montana Biomass Utilization Strategy***, which will review the supply and demand for biomass in Montana, then lay out a strategy for sustaining and enhancing biomass utilization.

- A 2010 **Biomass Energy Feasibility Study** was prepared for NorthWestern Energy by MCDC and various private, tribal and governmental partners. The study made a case for locating biomass-fueled Combined Heat and Power (CHP) plants at sawmills, which already have the necessary manpower, infrastructure and flow of feedstock, and which could benefit from the predictability of the sale of excess power to NorthWestern.

- In 2004, a Forest Service-sponsored **Slash Study** entitled, *A Study of How to Decrease the Costs of Collecting, Processing and Transporting Slash,* looked at ways to lower transportation costs (and thus make thinning a more attractive business proposition). It found that costs could be reduced by using smaller, hooklift-equipped trucks to shuttle modular roll on/off containers from centralized landing sites to the mill. Four years later, the same researchers found that roll on/off containers could also help move slash more efficiently from cutting sites to landing sites.

The Biomass Tipping Point

Montana's advocates for biomass utilization are in a race for time. We're off to a good start, but our efforts to increase demand haven't achieved critical mass. For example, despite Fuels for Schools and other programs, the thinned material from the Blackfoot Challenge's projects has begun to accumulate in slash piles. If we can't figure out new ways to turn that slash into products or energy, it will be turned into smoke — as early as this fall. What hangs in the balance is the health of Montana's forests and rural communities.

So Where Do We Go from Here?

The problem in its simplest form is this: How to create more demand for biomass in Montana?
As hard as people here in Montana have been working (and as ingenious as some of our solutions have been), we realize that the "Big Idea" might come from someone outside our circle. That's why we're throwing open the problem, and asking anyone with the knowledge, time, and inclination, to brainstorm with us.
Our starting questions are:

- How can we improve our existing initiatives?
- Are there new initiatives that can help create demand for biomass while increasing jobs?
- Are we asking the right questions?

We're ready to start.

Forest Product Retention Roundtable Participants

Julia Altemus—MT Wood Products Assoc - EVP
Matt Arno - Woodland Restoration
Al Christophersen - Rocky Mountain Elk Foundation
Tom Coston - MT Rail Link
Eugene DeGayner—Forest Service Northern Region
Brianne Dugan—Senator Max Baucus' Office
Erin Gabrian - Congressman Denny Rehberg's Office
John Gatchell—Montana Wilderness Association
John Guthmiller—USDA Rural Development
Nicole Hagerman Miller—MT World Trade Center
Mike Halligan—Washington Corporation
Bob Harrington - Montana State Forester
Dale Harris - Great Burn Study Group/MFRC
Steven Hayes—U of M BBER
John Hines - Northwestern Energy
Dan Johnson - USDA Rural Development
Matt Jones – USDA Rural Development
Brian Kahn - Artemis Common Ground
Joe Kerkvliet - The Wilderness Society
Julie Kies - MT DNRC - Forestry Div (Biomass)
Jim Lewis - MT Rail Link
John Manz - Citizen-at-Large
Tom Martin - Forest Service Northern Region
Todd Morgan—U of M BBER
Mark Nicholson - DA Davidson, Investment Co
Keith Olson - Montana Logging Assoc
Craig Rawlings—Forest Business Network
Chuck Roady - F.H. Stoltze Land & Lumber
Gordy Sanders - Pyramid Mountain Lumber/MFRC
Tom Schultz - Montana Trust Lands
James Stephens—Blue Marble Biomaterials
Tracy Stone-Manning—Senator Jon Tester's Office
Jason Todhunter—Montana Logging Association
Mark Vander Meer - Watershed Consulting
Mike Volesky—Office of the Governor
Pat Wise - Governor's Office of Economic Development
Roger Ziesak - MT DNRC - Forestry Div

For questions or more information, please contact

Craig Rawlings
Forest Business Network, LLC
P.O. Box 2220
Missoula, Montana 59806
406.240.0300
craig@forestbusinessnetwork.com
www.forestbusinessnetwork.com

Melissa Hayes
Montana Forest Restoration Committee {MFRC} Coordinator
P.O. Box 16885
Missoula, Montana 59808
406.542.4314
melissa@montanarestoration.org
www.montanarestoration.org

Additional Resources & Further Reading

Algae AquaCulture Technology—http://algaeaqua.com/AACT/Welcome.html
Biomass Research & Development Initiative—http://www.usbiomassboard.gov/
Blackfoot Challenge— http://blackfootchallenge.org/Articles/
Blue Marble Biomaterials—http://bluemarblebio.com/
Clearwater Resource Council—http://www.crcmt.org/
F.H. Stoltze Land & Lumber—http://www.stoltzelumber.com/
The Forest Business Technical Assistance Program—http://www.bredd.org/current-project/technical-assistance-to-forest-businesses/
Forest Products Retention Roundtable—http://www.montanarestoration.org/roundtable
Fuels for Schools and Beyond—http://www.fuelsforschools.info/
Green Investment Group—http://greeninvgroup.com/projects/project-missoula-montana.html
Montana Department of Natural Resources & Conservation—http://dnrc.mt.gov/
Montana Forest Restoration Committee (MFRC)—http://www.montanarestoration.org/home
Montana Rail Link—http://www.montanarail.com/
The Nature Conservancy—http://www.nature.org/ourinitiatives/regions/northamerica/unitedstates/montana/index.htm
Northwest Advanced Renewables Alliance—http://www.nararenewables.org/
Plum Creek—http://www.plumcreek.com/
Pyramid Mountain Lumber—http://www.pyramidlumber.com/
Roseburg Forest Products—http://roseburg.com/cgi-bin/s-mart.pl
R-Y Timber—http://rytimber.com/
Southwestern Crown Collaborative— http://www.swcrown.org/
Sun Mountain Lumber—http://www.sunmtnlumber.com/
The Trust for Public Lands—http://www.tpl.org/
The University of Montana Biomass Boiler—http://www.umt.edu/biomassplant/

An Assessment of Forest-based Woody Biomass Supply and Use in Montana—http://dnrc.mt.gov/forestry/Assistance/Biomass/Documents/MT_WoodyBiomassAssessment.pdf
Forest Service Slash Study—http://dnrc.mt.gov/forestry/Assistance/Biomass/Pubs/Documents/Slashproctrans.pdf
The Montana Biomass Utilization Strategy—http://dnrc.mt.gov/Forestry/Assistance/Biomass/default.asp
Senator Tester—Forest Jobs & Recreation Act—http://tester.senate.gov/Legislation/forestresources.cfm

References

[1]*An Assessment of Forest-based Woody Biomass Supply and Use in Montana*, prepared by Todd A. Morgan, CF, for the Bureau of Business and Economic Research at The University of Montana in Missoula, April 29, 2009.

[2]*Montana Removal and Other Related Information*, a presentation by Todd A. Morgan, CF, for the Bureau of Business and Economic Research at The University of Montana in Missoula.

[3]Electronic correspondence between MFPRR and Gary Burnett, Executive Director, The Blackfoot Challenge, August 22, 2011.

[4]*Southwestern Crown of the Continent Landscape Restoration Strategy*, prepared by the Southwestern Crown Collaborative, May 12, 2010.

[5]Electronic correspondence between MFPRR and Roger Marshall, Board Member, Clearwater Resource Council, September 6, 2011.

[6]*Missoulian*, June 1, 2010.

[7]*Missoulian*, July 17, 2011.

[8]Electronic correspondence between MFPRR and Todd A. Morgan, Director of Forest Industry Research, and Associate Director, Bureau of Business and Economic Research at The University of Montana, Missoula, MT, September 2, 2011.

Our paper will end not with an answer, but a question:

How can we improve existing programs that are aimed at increasing demand?

What hangs in the balance is the health of Montana's forests and rural communities.

we're throwing open the problem