

# Biomass Enterprise Development through a Collaborative Process



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Brought to you by.....

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University of Minnesota: Steve Taff

The Beck Group: Roy Anderson

# Why did we do it?

-  Significant time and resources are often spent in pursuing biomass utilization projects that are not suitable or appropriate for the situation
-  To assist communities and partners in rapidly evaluating their biomass utilization opportunities, from small energy heating options to an integrated wood products enterprises

# What are they?

🌲 The eBooks are a multimedia electronic library that include:

- text
- photos
- video interviews
- diagrams
- interactive calculators



# What are they?

🌲 Link to interactive financial models that allow you to:

- rapidly assess a variety of thermal energy options without having to invest time or money
- model an integrated biomass processing facility

The screenshot shows the 'Wood Energy Project' web application. The header includes 'Project Calculator', 'Handbooks', 'State Policy', 'Links', and 'Contact'. A sidebar on the left lists steps: 'Step 1: Existing Heating System' (highlighted), 'Step 2: Biomass System Design', 'Step 3: Fuel Cost Saving', 'Step 4: Financial Inputs', and 'Step 5: Financial Results'. Below the sidebar, there are summary metrics: 'Total System Cost \$0', 'Annual Fuel Cost Saving \$0', and 'Payback Period Never'. The main content area has a note: 'Note: Select an input field and scroll down to change the value with the help of the slider or change it manually.' It contains input fields for 'Facility Location' (State and County), 'Fuel' (Fuel Type: Propane, Cost per Gallon: \$5.00, Cost per MMBtu: \$54.76, MMBtu per Gallon: 0.09130), and 'Annual Fuel Usage' (Gallons per Year: 0, MMBtu/Year: 0, Annual Propane Cost: \$0).

The screenshot shows the 'Biomass Enterprise Economic Model' software interface. It features the OSU Oregon State University College of Forestry logo. The interface is divided into several sections: 1) Facility (Size, Medium, Budget, Wage), 2) Woodchips, Biomass, and Biorefinery (Log, Ground biomass, Chunk wood short bag), 3) Design/Construction/Category (New, Fuel cost balance, Wood treatment), and 4) Plant configuration (Pulp Chips & 40-cord Palletwood Plant, Pulp & Pulp Plant). A table in section 4 shows production metrics for 'Pulp & Pulp Plant' with columns for 'Total MMBtu', 'Biomass', and 'Pulp cost'.

Production Name	Total MMBtu	Biomass	Pulp cost
Chips only	45	4.5	\$/MMBtu
Chips savings & woodchips	30	4.5	\$/MMBtu
Pulp chips	10	100	\$/MMBtu
High fuel pulp, 100%	10	30	\$/MMBtu
Total 100%			



United States Department of Agriculture  
Forest Service

Pacific Northwest  
Research Station  
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## Community Biomass Handbook Volume I: Thermal Wood Energy

Becker, D.; Lowell, E.; Bihn, D.; Anderson, R.; Taff, S.



Rapidly evaluate a portfolio of wood energy options and their impact on the restoration landscape



Look at appropriate scale processes and products suitable for rural communities



Provides case studies / stories

# The Financial Calculator

## Wood Energy Project

[Project Calculator](#) [Handbooks](#) [State Policy](#) [Links](#) [Contact](#)

Home

Step 1: Existing Heating System

Step 2: Biomass System Design

Step 3: Fuel Cost Saving

Step 4: Financial Inputs

Step 5: Financial Results

Total System Cost  
\$0

Annual Fuel Cost Saving  
\$0

Payback Period  
Never

[Generate Report](#)

[Project Examples](#)

**Note:** Select an input field and scroll down to change the value with the help of the slider or change it manually.

### Facility Location

**State**  
Select State

**County**  
Select State First

### Fuel

**Fuel Type**  
Propane

**Cost per Gallon**  
\$5.00

**Cost per MMBtu**  
\$54.76

**MMBtu per Gallon**  
0.09130

### Annual Fuel Usage

**Gallons per Year**  
0

**MMBtu/Year**  
0

### Annual Propane Cost

\$0





U.S. Department of Agriculture

## Community Biomass Handbook

### Volume 4: Enterprise Development for Integrated Wood Manufacturing

Eini C. Lowell, Dennis R. Becker, David Smith, Marcus Kauffman, Dan Bihn



Forest  
Service

Pacific Northwest  
Research Station

General Technical Report  
PNW-GTR-953

March  
2017



# Who can use it?

-  Local businesses and entrepreneurs
-  Regional economic development specialists
-  Community organizations
-  Federal, state, and private land managers
-  Non-profit organizations
-  Project developers and consultants
-  Equipment manufacturers and distributors
-  Industry and trade organizations

# Creating Mutual Understanding

Coordination starts at the source of the raw material and follows all the way through to business plan development and eventually project implementation. But this isn't just the responsibility of the business entrepreneur. Forest managers and community partners have a responsibility. Why? Because the terms of operation (size, location) and the outputs of forest management are heavily influenced by their actions. That impacts business profitability and investor willingness to assume the financial risks that goes along with achieving the common goal of restoring forests. Working together fosters an environment of business certainty, mutual understanding, and sustainability—of the resource base, financial investments, and community development.

This section discusses how to go about generating the types of knowledge needed at each step in an integrated wood manufacturing process. Each one of these individuals—forest managers, business entrepreneurs, and community partners—have unique knowledge and expertise they can bring to the table to improve business and agency planning. Time is of the essence.

## Forest Knowledge



**Forest managers and planners** have a responsibility to provide robust and timely estimates of the potential quantity, quality, timing and location of the byproducts from forest restoration treatments and timber sales.

## Business Knowledge



**Business entrepreneurs** and investors have a responsibility to provide fair and accurate information to forest managers and community stakeholders on the type and scale of wood conversion enterprises being considered.

## Community Knowledge



**Community partners** have a responsibility to highlight concerns and facilitate education and outreach. They can help businesses scale operations to meet local needs and expectations. They can help design projects to meet multiple and potentially conflicting objectives.



# Forest Knowledge

- 🌲 Tree properties
- 🌲 Site and stand-level characteristics
- 🌲 Resource supply and availability
- 🌲 Project staging and seasonality





# Business Knowledge



Product markets



Investment plans



Resource requirements



Infrastructure needs



# Community Knowledge

-  Community capacity
-  History and project familiarity
-  Attitudes and beliefs
-  Project scale and impact

# Mobilizing to Create Action

Mobilizing knowledge—of the forest, business operations, and community expectations—is the next step to realizing a sustainable business solution. Now the real work begins. Applying this knowledge to mobilize agency planning, business investments, and community assets requires patience and understanding of the processes at work. It requires understanding the decision space for collaboration and opportunities to affect outcomes.

Managing community expectations, matching business and forest planning expectations, and realizing outcomes in a timely manner are not easy. But increasing awareness of business and forest planning realities can increase the chances of success. The following pages highlight agency planning processes and timelines, pitfalls to avoid, and project development outputs that can help you accomplish your objectives.

## Agency Planning



**Project planning** dominates federal agency thinking. Forest plans, National Environmental Policy Act (NEPA) analysis, and internal project tracking systems guide managers when designing, prepping, and implementing timber sales and forest restoration treatments. Understanding the lingo and key steps will help you navigate agency planning processes.

## Mind the Gaps



**Mind the gaps** because many things can and will go astray. It's inevitable given the complexity of decisions and range of interests involved. But there are things you can do to keep your project on track. Remember, time is of the essence.

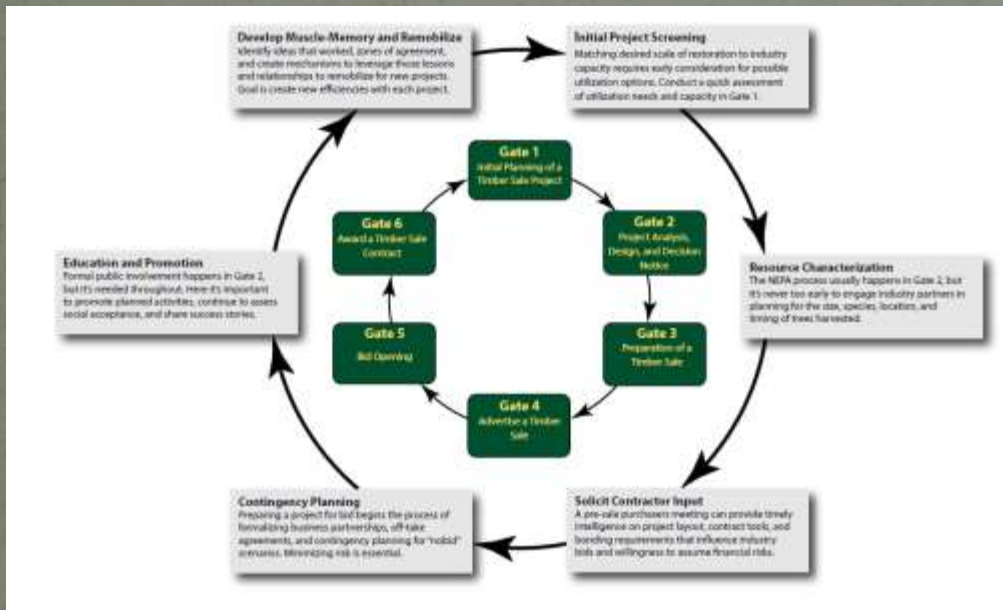
## Project Development Outputs



**Project development** outputs can range from simple lists of community assets to complex forest planning documents with geographic information system (GIS) layers and prioritized treatment plans. All are important. Identifying which outputs are needed at which stage of the process and how to mobilize action will define success.



# Planning



# Minding the Gaps



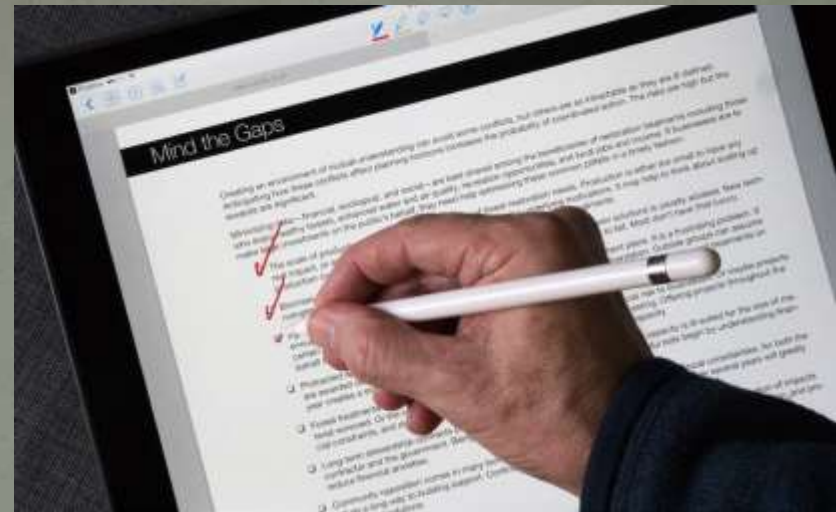
Address conflict



Minimize risk

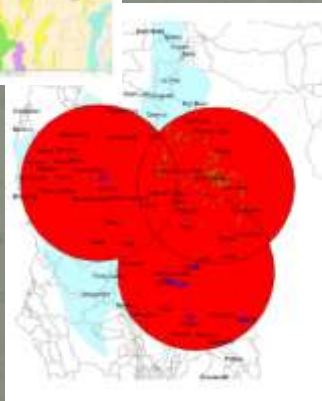


Transparency and honest evaluation of impacts





# Outputs





# Show Me the Money!

## Modeling Biomass Enterprise Economics

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# Forest Biomass - Understand the restraints

- Biomass—plentiful & expensive
  - expensive to collect and transport
- Weak hog fuel markets
  - Hard to up-grade field-ground biomass
- Value-added products
  - Convert round wood into salable products
- Thin margins
  - volume and efficiency vital



Photo: Marcus Kauffman, ODF



# Manufacturing Basics

1. Economies of scale
2. Capital investment
3. Material handling challenges
4. Product quality
5. Residuals and yield
6. Mix of products
7. Operating costs





# Is it complicated?

- Yes
  - but model simplifies it
- Not iOS but still intuitive
  - Use it and you'll grasp what works and what doesn't
- Starting point
  - Next step: develop a viable business plan



# Show me the money!

- Download from OSU webpage:
- Biomass Enterprise Model
- <http://owic.oregonstate.edu/biomass-enterprise-economic-model>
- Save to your computer (9.1MB), then open with Java (ver. 8 or higher)
- Open and use--you can't mess it up

# Check it out

- Chip mill example
- Small/large chip mills
- Volume matters
- Adding complexity
- Energy?
- Save your work





# Disclaimer

- Accuracy of the Estimates
  - Limited by general assumptions of site suitability, owner expertise, and operating schedules.
  - New facility CapEx : within a 30% range of actual
  - Operating economics based on 2016 cost estimates.
  - Input values and logic developed by OSU/COF researchers and validated by Evergreen Engineering, Inc. Eugene OR.
- Accept Model Estimates with Caution!

# Review

- The Model is a starting point
- Download [Biomass Enterprise Model](#) to start
- Open and begin playing around
- Export scenarios you like
- Support from Oregon Wood Innovation Center at the College of Forestry, OSU
- <http://owic.oregonstate.edu/biomass-enterprise-economic-model>

Thanks...



...Questions?

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Community Biomass Handbooks are available from:  
iTunes (volume 1 only)  
[www.woodenergyproject.org](http://www.woodenergyproject.org)  
[www.treesearch.fs.fed.us/TreeSearch](http://www.treesearch.fs.fed.us/TreeSearch) (.pdf)