



Biomass Energy & Biofuels from Oregon's Forests:

The 2006 OFRI Biomass Study

**Western Forest Economists
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OFRI Biomass Study – Project Team

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 - Roger Lord, Carl Ehlen
- **Pacific Energy Systems**
 - David Stewart-Smith, John Martin, John Larson
- **OSU College of Forestry**
 - Dr. Loren Kellogg, Chad Davis, Melanie Stidham
- **OSU College of Agriculture**
 - Dr. Mike Penner
- **Univ. of Minnesota**
 - Dr. Jim Bowyer
- **Project Advisory Group (15 members)**

OFRI Biomass Study - Tasks

- Review existing research in 7 areas
- Assess potential for production of electric energy and biofuels from wood biomass in Oregon
- Review and summarize efforts underway in Oregon
- Conduct interviews with Oregon biomass stakeholders
- Assess constraints and challenges to woody biomass
- Develop recommendations on how Oregon can overcome the barriers

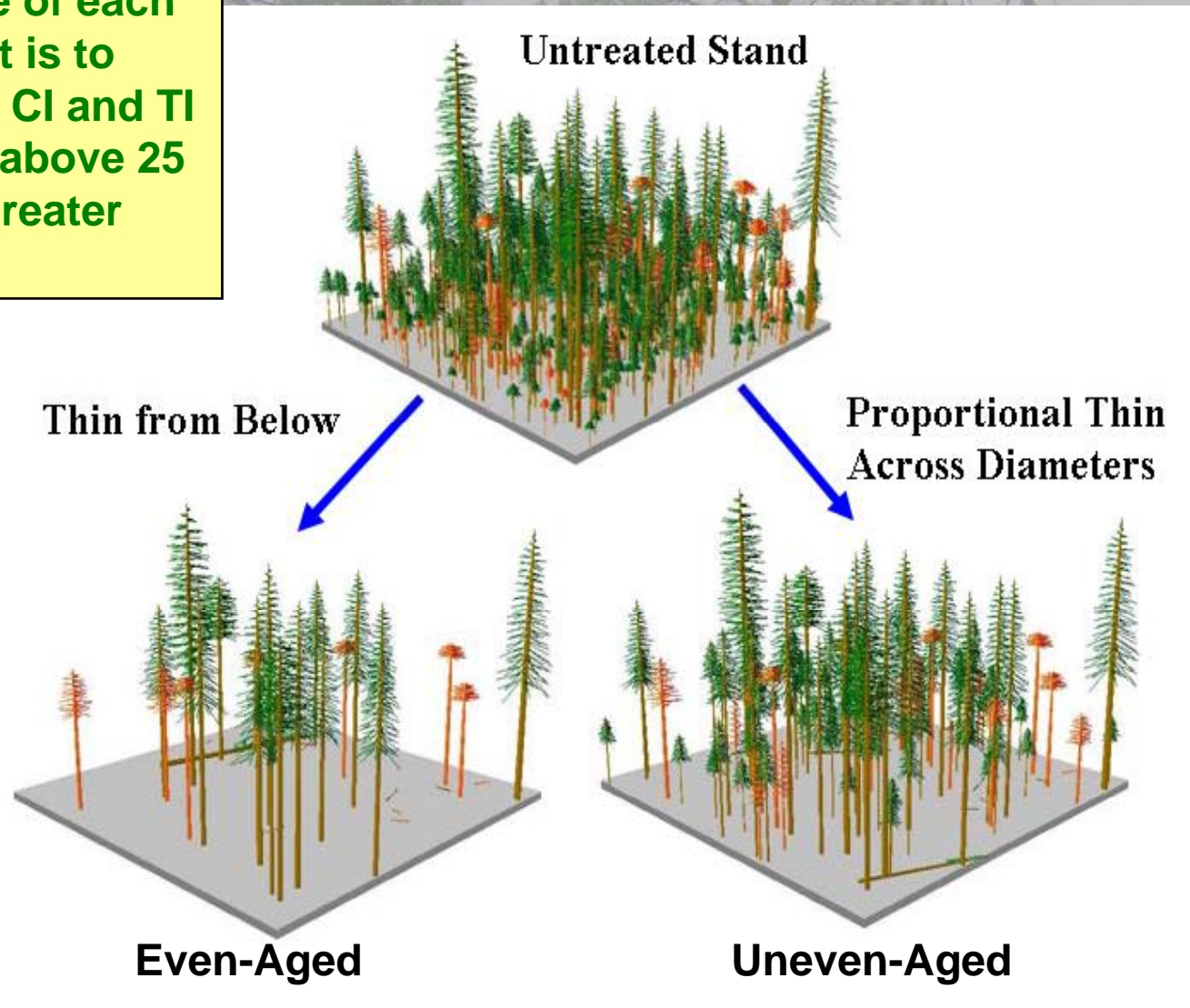
Assessment Method

- **USFS Fuel Treatment Evaluator**
 - FIA data
 - Identify fuel treatment needs
 - Simulate fuel reduction treatments
 - Estimate biomass volume removed
 - Estimate harvest costs
- Estimate haul cost to closest of 8 hypothetical processing plants

Study Area

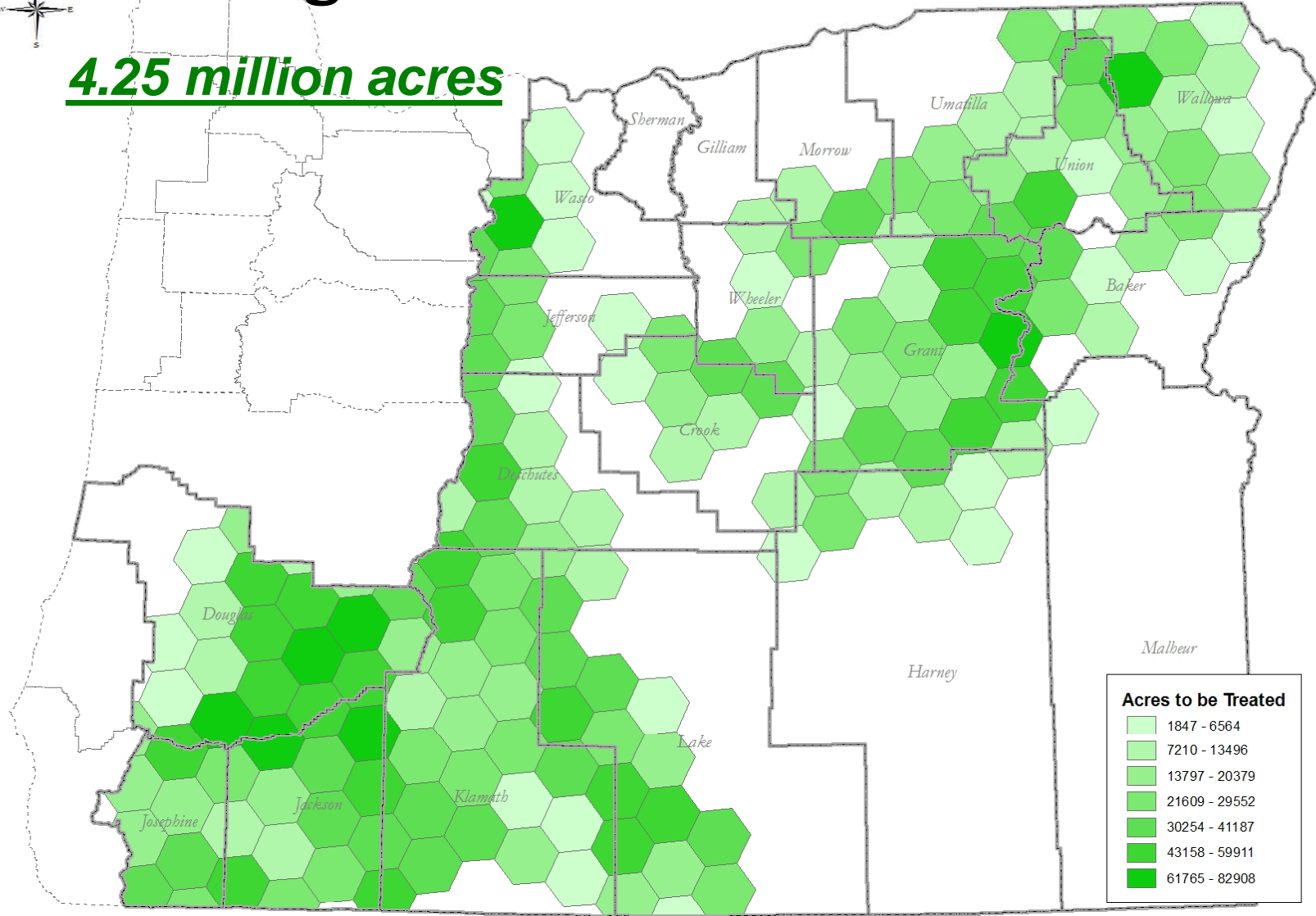
- **20 counties in eastern & southwest OR**
 - **14.9 million acres of timberland**
 - **12.4 million acres FRCC 2 & 3 (90%)**
 - **70% Federal**
- **Screen for fuel reduction treatment need**
 - **Exclude Roadless Areas, Wilderness, and parks**
 - **High fire risk: FRCC 2 or 3 AND Torching Index or Crowning Index < 25 mph**
 - **4.25 million acres eligible (29% of total)**

Objective of each treatment is to thin until CI and TI are both above 25 or CI is greater than 40.



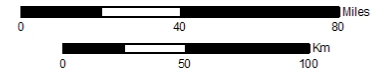
Acres Eligible for Fuel Reduction Treatment

4.25 million acres



Acres to be Treated	
Lightest Green	1847 - 6564
Light Green	7210 - 13496
Medium-Light Green	13797 - 20379
Medium Green	21609 - 29552
Dark Green	30254 - 41187
Very Dark Green	43158 - 59911
Darkest Green	61765 - 82908

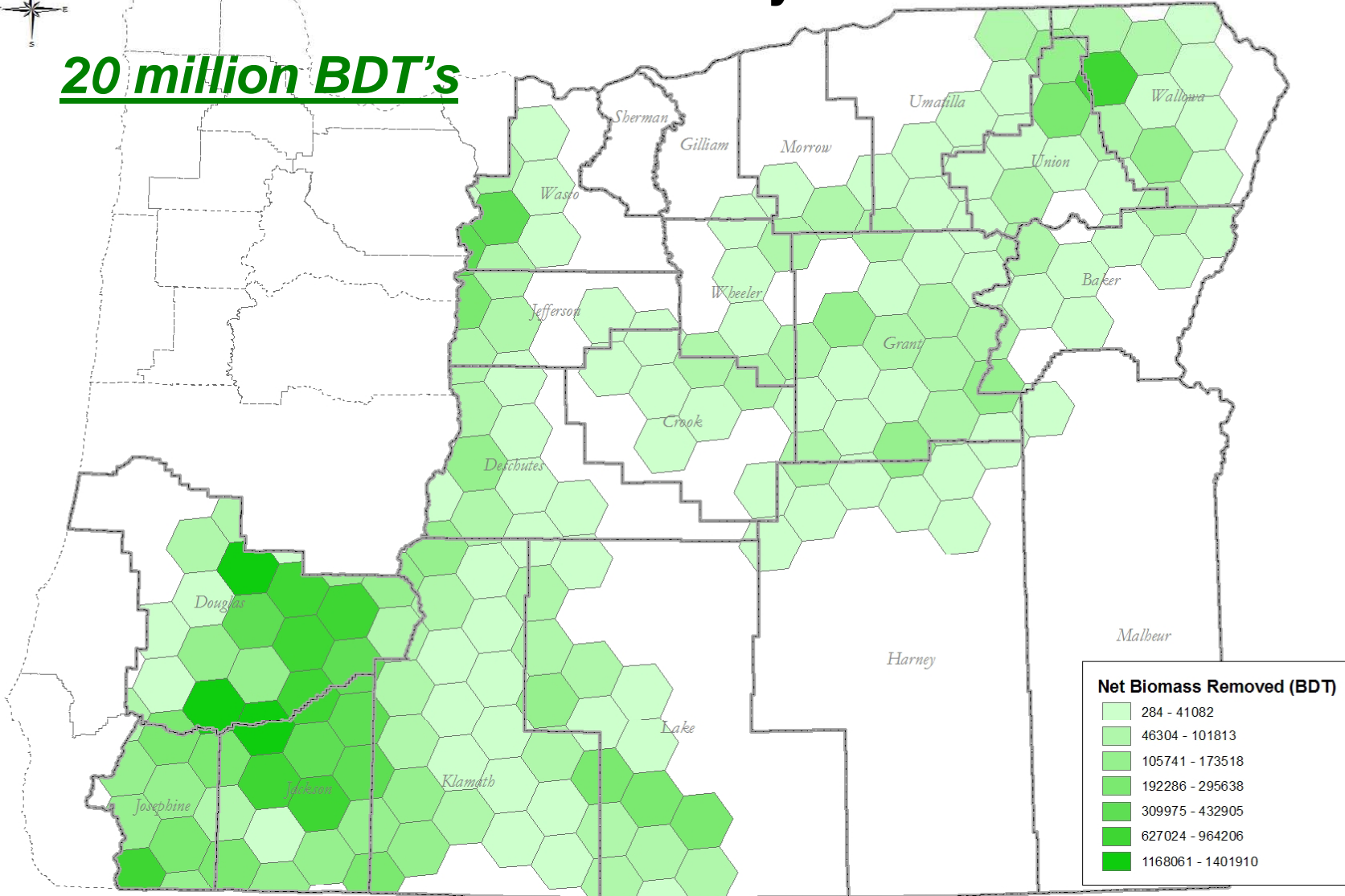
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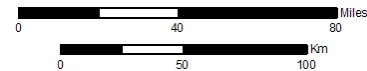
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15 March 2006; EPA_BDT_map1_revise_acre.mxd

Net Biomass Removed by Fuel Treatments

20 million BDT's



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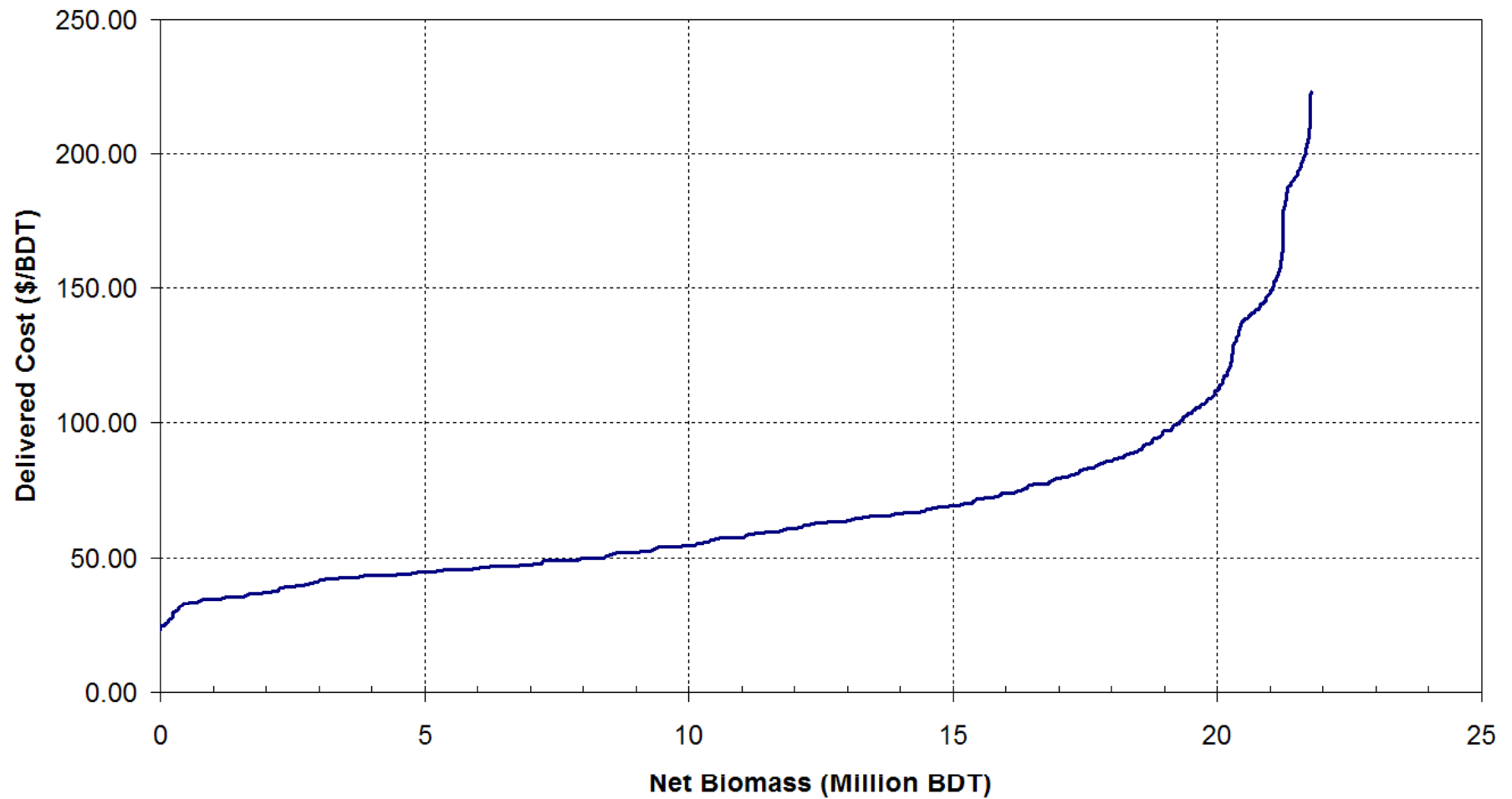
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15 March 2006; EPA_BDT_map1_revise.mxd

Estimated Biomass Supply

- **20 million bone dry tons (BDT) of supply**
- **1 million BDT/year if treated over 20 yrs.**
- **70% from federal lands**
- **Average delivered cost of \$59/BDT**

Delivered Cost Curve to Closest Destinations in Oregon Logging + Hauling Costs Net Biomass Available for Energy Production



Delivered Biomass Cost

Treatments over 20 years

Delivered Cost Less Than...	Volume Available BDT/Yr	Avg. Delivered Cost \$/BDT
\$ 40.00	140,092	\$ 35.08
\$ 60.00	588,684	\$ 45.89
\$ 80.00	859,158	\$ 53.07
\$ 100.00	964,021	\$ 56.94
\$ 120.00	1,011,595	\$ 59.36
\$ 140.00	1,031,645	\$ 60.80
\$ 160.00	1,060,119	\$ 63.11
\$ 250.00	1,088,484	\$ 66.47



1 MMBDT of forest biomass would be capable of producing...

- **150 MW of electricity at an average cost of 8.1¢ per kWh**

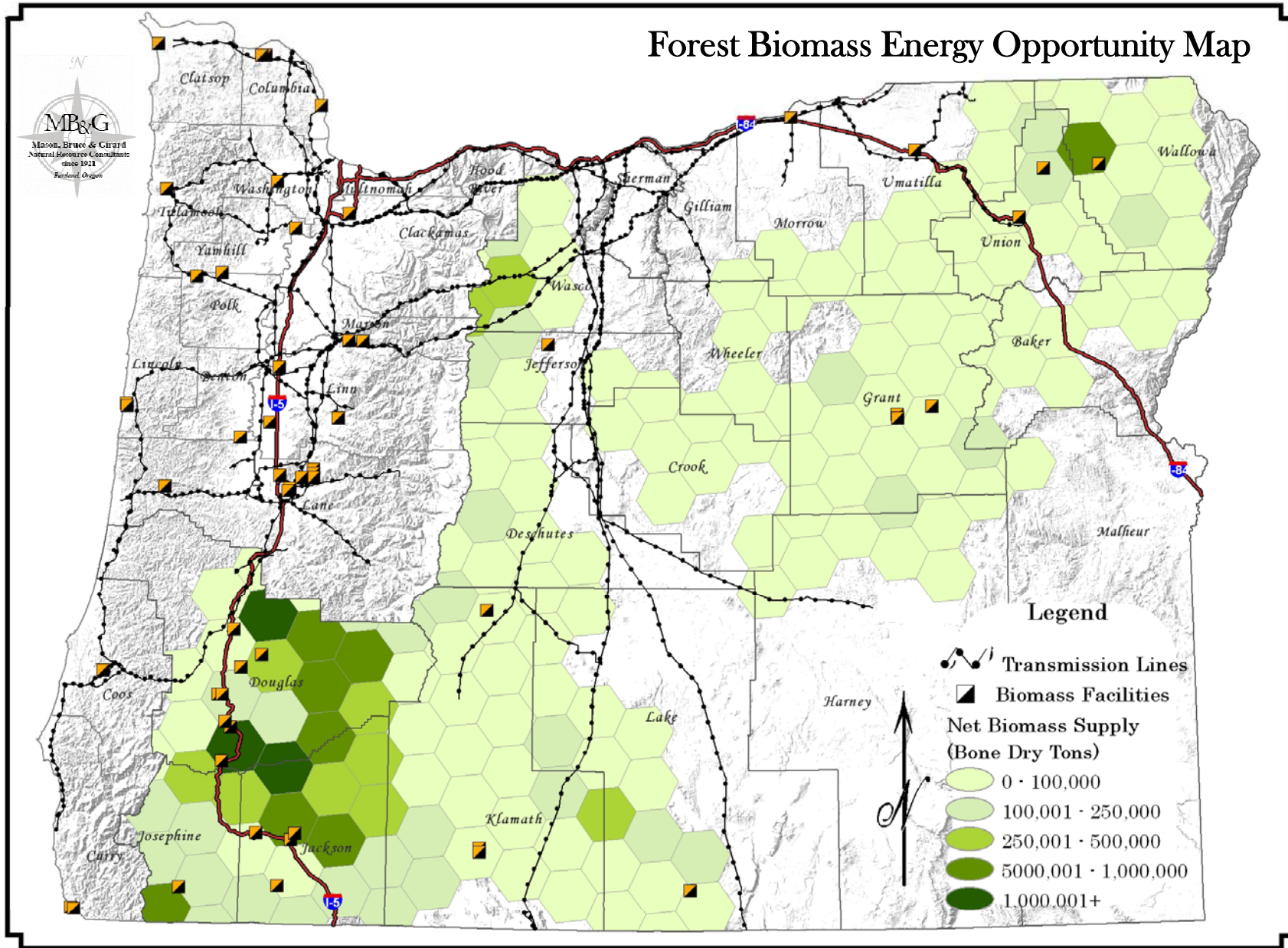
OR...

- **63 million gallons of ethanol per year**

“Sweet Spot”

- 600,000 BDT/year can be delivered at less than \$45/BDT**
- Capable of producing 81 MW of electricity at current market rates of 6.5 - 7.5¢ per kWh**

Forest Biomass Energy Opportunity Map



Triple - Win

- **Restore forest health, fire resiliency and wildlife habitat**
- **Help meet Oregon's renewable energy goals**
- **Provide hundreds of jobs and help revitalize rural economies**



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