

Eureka, October 18 2010

Densified Wood Products

Part 1: Densified Wood Products

Part 2: Project Approaches

Gareth J Mayhead
University of California Berkeley
In partnership with:
USDA Forest Service Region 5

<http://ucanr.org/WoodyBiomass>



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Woody Biomass Utilization



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*Making a Difference
for California*

Overview

- Products
- Why densify and why not?
- Process
- Feedstock
- Conclusions

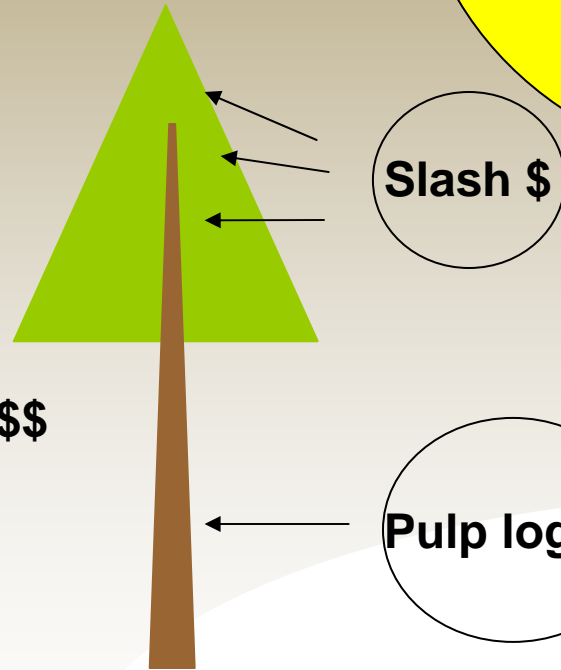
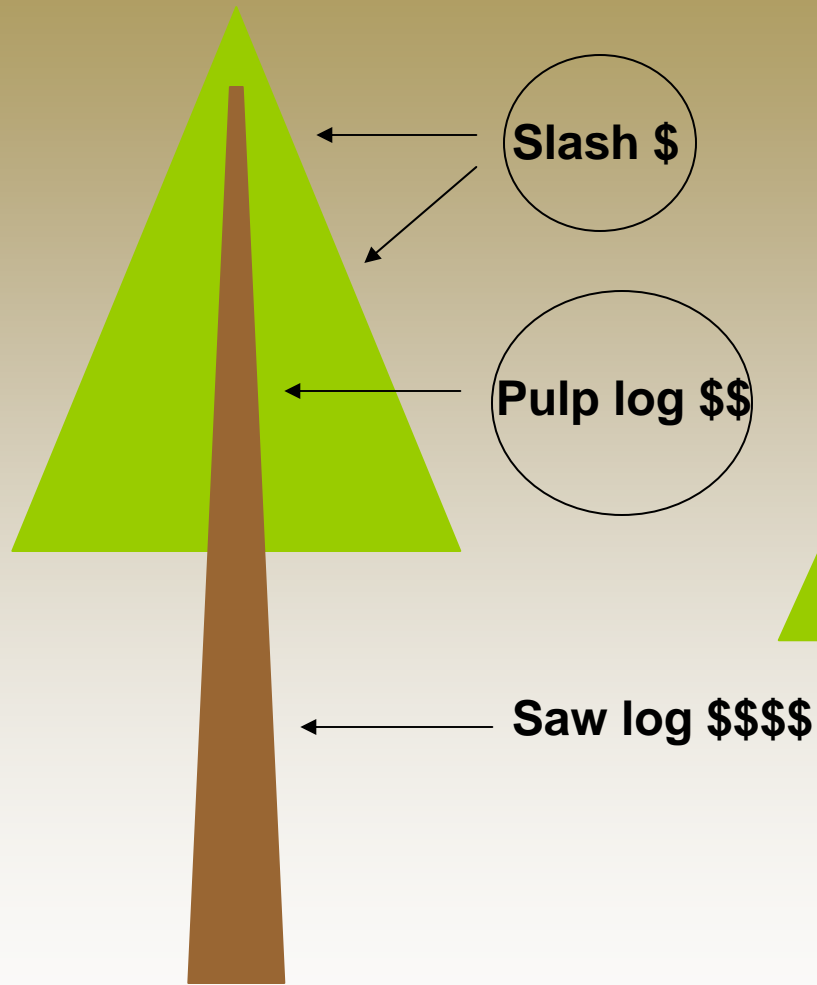
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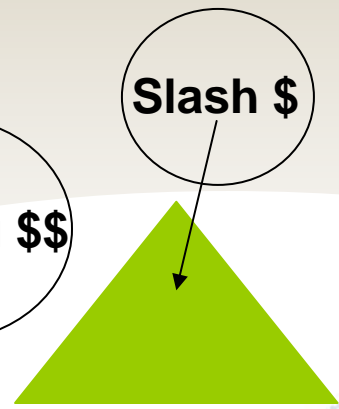
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Value helps to move residuals



What product or process could add value ?



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Densified Wood Products

- *Fire logs*
 - Presto logs, briquettes, pucks etc
- *Pellets*
 - Domestic
 - Commercial/dirty
- *Bricks*



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Why densify?

- Improved fuel vs chip or wood
 - Higher energy content per unit volume
 - Convenience
 - Consistent product
- Clean burning stoves (meet most air quality regulations)
- Other non fuel uses for pellets (animal bedding, barbeque pellets)
- Potential to use any woody biomass as a feedstock

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Why *not* densify?

- Equipment intensive
- Energy input (70-300kWh/t)
- Adds cost = expensive end-product
- Seasonal markets for product
- Alternative uses for feedstock
- Overcapacity = price volatility

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Wood pellets

- Invented in 1970s (ID)
- Uses
 - Fuel
 - Heat (seasonal)
 - Coal co-fire (export)
 - Animal bedding/litter
 - BBQ pellets
- Markets:
 - N America: 1.5-2 million tons/year
 - Europe: 10-12 million tons/year



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Firelogs



- Campfires
- Existing stoves/fires
- Smaller markets
- Boilers

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Bricks

- Similar product to firelogs
- Process is different (no die, high pressure, less heat)
- Burn in existing fire places, stoves, chimineas, camp fires
- Feedstock flexible (dirty chip is okay!) Source: BMFP
- Priced to compete with cordwood

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Densified Products – Typical Process

1. Chipping
2. Screens
3. Drying
4. Grinding
5. Conditioning
6. Compression (heat)
7. Cutting
8. Cooling
9. [Packaging]
10. Storage



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Pellet press

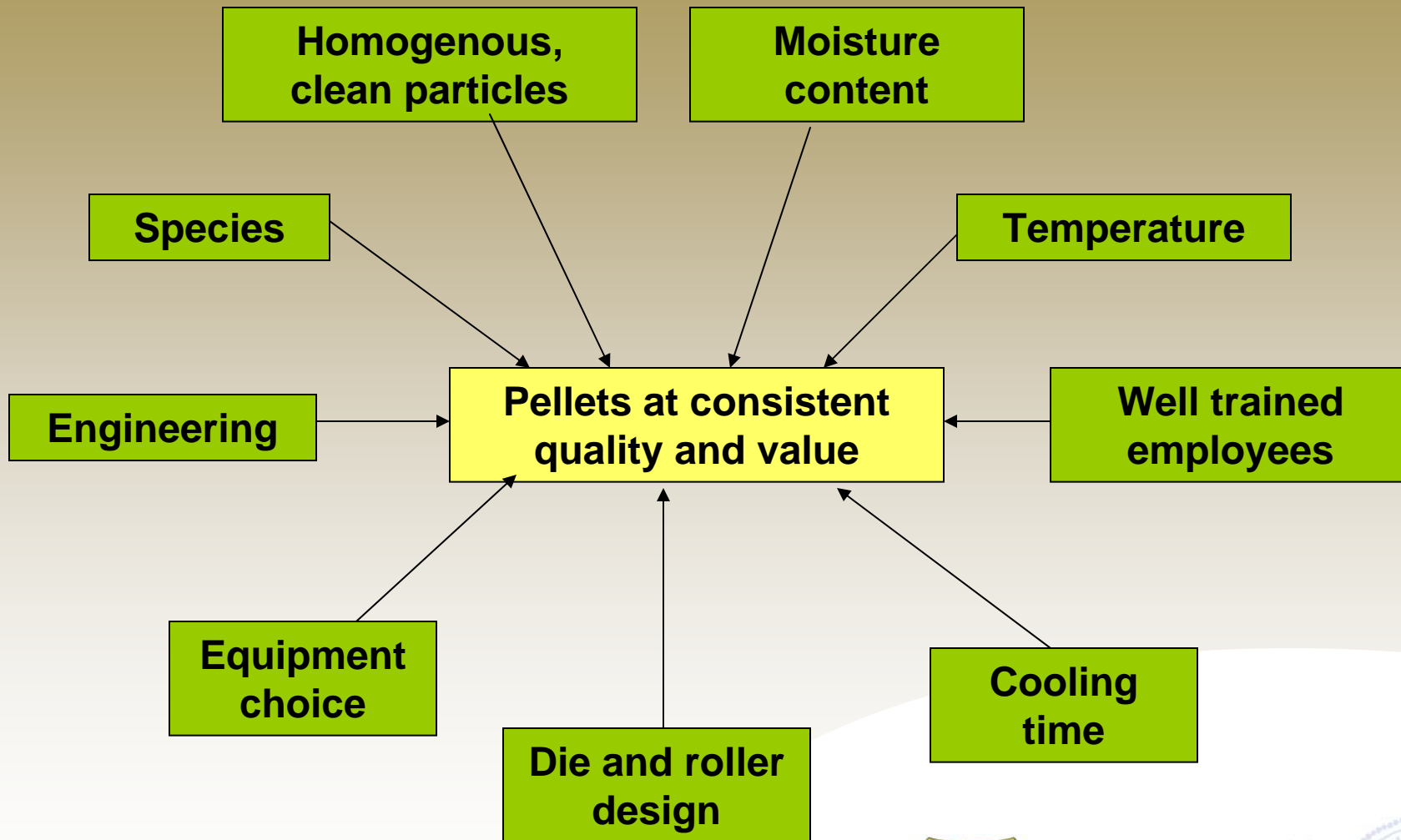


Roller

Die

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Pellet manufacturing variables



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“Traditional” US Pellet Mill

- 40,000 ton/yr pellet facility
 - 100 BDT/day sawmill residues
- Pay up to \$50/BDT
- \$5.5-\$7m build cost
- 24/7 operation
- 3-5 acre site
- May also make fire logs
- 30-35 jobs



Densified fuel feedstock

- For domestic market (<1% ash)
 - Less than 10% MC
 - **Clean** chips, shavings or sawdust
 - Pay up to \$50/BDT
 - 100 mile sourcing radius
- Possible to use any biomass (high ash)
 - Limited market (for pellets)
 - Tool wear is a problem
 - Consistency of product may be variable



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Think about...

- Smaller scale (2,000-20,000 BDT)
 - Bricks – forest chips, selling to displace cordwood
 - Small scale pellet or log facilities targeting local markets
 - How will you dry the feedstock?
- Large scale (100,000+ BDT)
 - Export market and some local sales
 - How will you secure enough feedstock?
- What about adding value using branding and environmental awareness? – escape the commodity trap

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Conclusions

- Densified fuels are proven production technologies serving existing markets
- 3 main products – similar process/feedstock
- Possible to utilize forest residues and other feedstocks
- Think about different approaches to projects

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Thank you

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Help with:

- Grants
- Technology
- Markets
- Networks
- Healthy skepticism

