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Densified Wood Products

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In partnership with:
USDA Forest Service Region 5

<http://ucanr.org/WoodyBiomass>



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Overview

- Products
- Why densify and why not?
- Process
- Feedstock
- Markets
- California situation
- Conclusions

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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

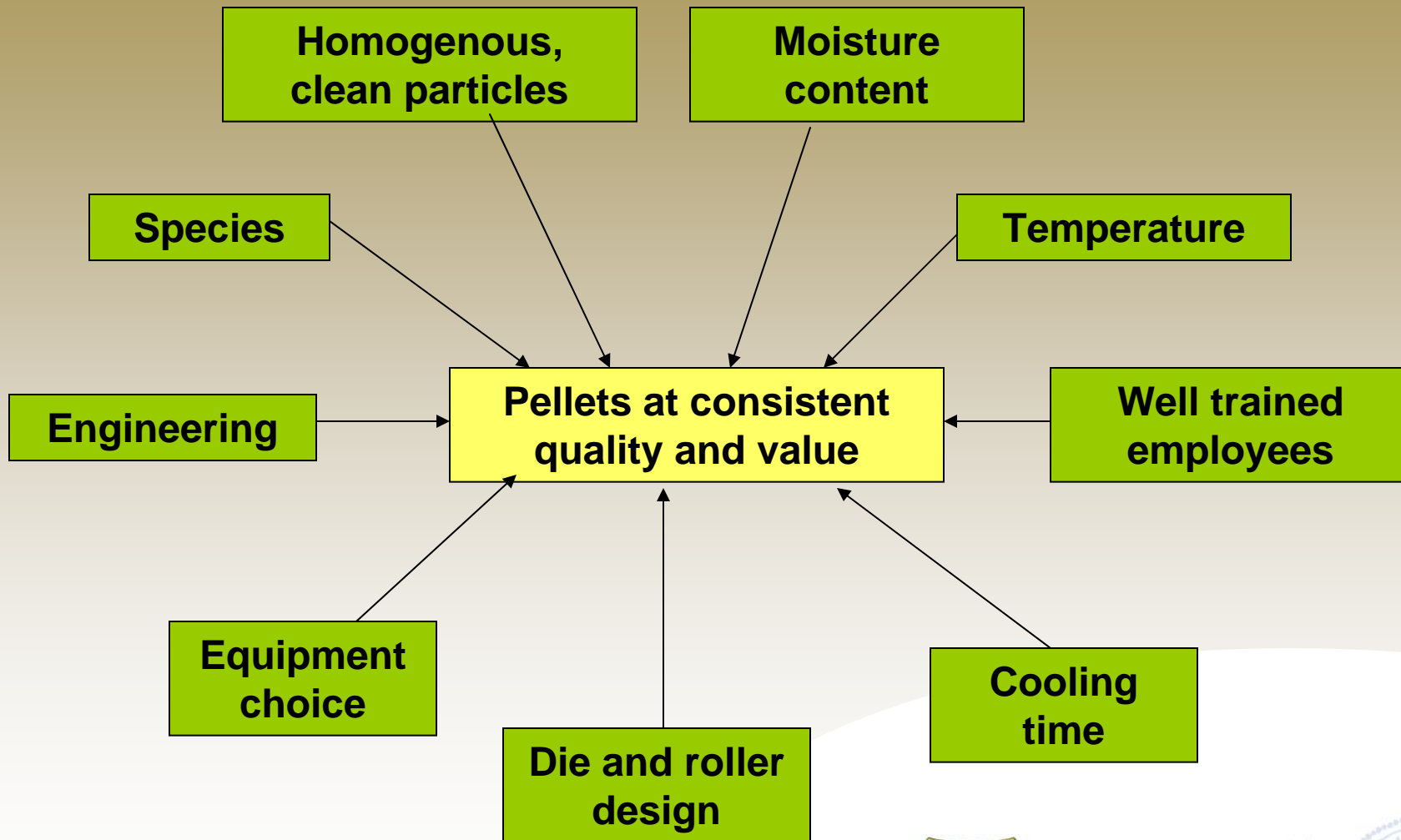


Roller

Die

<http://ucanr.org/WoodyB>

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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General market situation (2010)

- Global installed capacity: ~20m tons
- US capacity: ~4.1m tons (69 mills)
- Raw material shortages
- Slow stove sales (low propane and oil prices, economy)
- Price reductions in domestic pellets
- Weak Euro impacting market for co-firing with coal
- Tough market at present but potential for future growth



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Why no manufacturing capacity?

- Less sawmill residuals
 - 27 primary wood processing facilities closed from Jan 2000-June 2009*
- Sawmill residuals are in demand by other markets:
 - Biomass power (~32 power plants)
 - Landscape amendments
 - Animal bedding
- Other markets can often pay above \$50/BDT for residuals
- Other non-traditional feedstock sources (slash?) require a different approach to business

*Source: California Forestry Association

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California densified fuels

- In 2009 5 operational mills
- All small <5,000 ton/yr
- Based on local markets
- Secondary businesses
- 4 proposed mills
- Larger scale 10,000-200,000 ton/yr



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Project approaches

- Use alternative feedstocks
- Use different approaches to drying feedstock
- Develop non-seasonal markets
- Produce a product that competes with cordwood
- Partner with an existing densified fuel manufacturer
 - Technical expertise
 - Market access
- Manage costs - leverage existing assets
- Serve local markets – reduce transport costs
- Grow production capacity gradually with market growth
- Serve export markets to grow local markets

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Conclusions

- Densified fuels are proven production technologies serving existing markets
- Significant interest in densified fuels
- A diverse range of project proposals moving forward in the US and California
- Attempts to utilize forest residues and other feedstocks
- Range of distinct products
- Projects need to identify their market niche
- Project finance is challenging

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Thank you

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Help with:

- Grants
- Technology
- Markets
- Networks
- Healthy skepticism

