

# Densified Wood Products

Gareth J Mayhead  
University of California Berkeley



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# Densified Wood Products

Firelogs



Fuel Pellets

# Densified Products – Typical Process



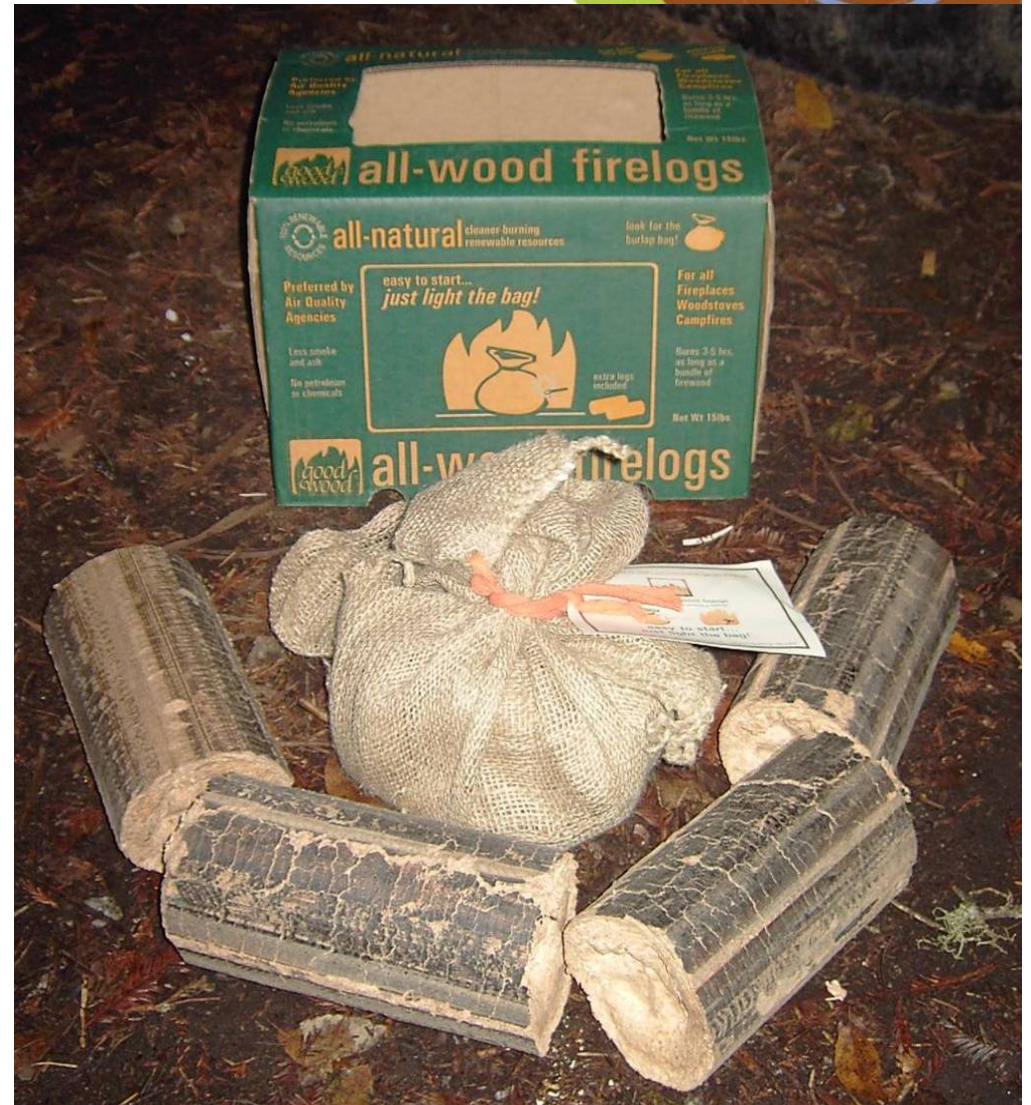
1. Breakdown
2. Screens
3. Drying
4. Breakdown
5. Compression  
(heat)
6. Cutting
7. Cooling



# Firelogs



- Campfires
- Existing stoves/fires
- Smaller markets



<http://ucanr.org/woodybiomass>

# Wood pellets

## ★ Uses

- ★ Fuel (seasonal)
- ★ Animal bedding/litter
- ★ BBQ pellets

## ★ Markets:

- ★ N America: 1.5 million tons/year
- ★ Europe: 10-12 million tons/year





# Wood pellets for heat

- ★ Domestic grades – big demand?
- ★ Commercial grades
- ★ High energy content
- ★ Convenience
- ★ Consistent product
- ★ Stoves meet air quality (EPA but not PM 2.5)
- ★ Global commodity
- ★ Equipment intensive
- ★ Energy input (70-80kWh/t)
- ★ Expensive end-product



# Densified fuel feedstock

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- ★ For domestic market (<1% ash)
  - ★ Less than 10% MC
  - ★ **Clean** chips, shavings or sawdust
  - ★ Pay up to \$50/BDT
  - ★ 100 mile sourcing radius
  - ★ Delivery: 0-1000+ miles
- ★ Possible to use any biomass (high ash)
  - ★ Limited market (for pellets)
  - ★ Tool wear
  - ★ Consistency





## Example: 40,000 ton/yr pellet facility

- 100 BDT/day
- \$5.5-\$7m build cost
- 24/7 operation
- 3-5 acre site
- 30-35 jobs



# Cost hierarchy for pellets

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1. Feedstock \$\$\$\$\$
2. Workforce \$\$\$\$
3. Drying \$\$\$
4. Pelleting \$\$
5. Finance \$

Source: Buhler



# Why do they make sense?

- ★ Small-mid scale
- ★ Proven technology
- ★ Can use small diameter logs (debark and chip)
- ★ Potential to use dirty material
- ★ Proximity to market
- ★ Minimal CA capacity (micro-operations)



# Challenges

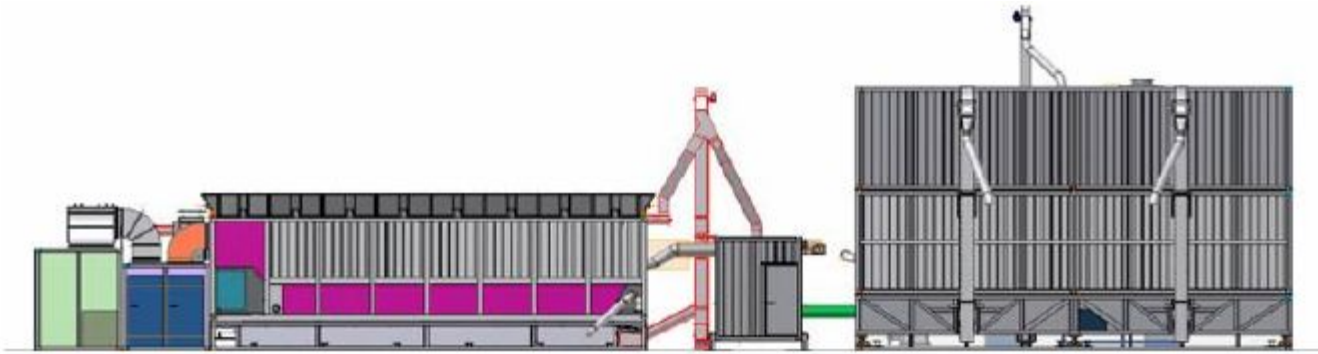
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- ★ Seasonal markets
- ★ Air quality
- ★ Market development
- ★ Quality control
- ★ Surviving the first year



# Rapidly re-deployable units

- ★ BioJoule (UK) - pellets



# Strategies

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- ★ Partner with an existing densified fuel manufacturer
  - ★ Technical expertise
  - ★ Market access
  
- ★ Make a product that competes with fire wood, eg bricks
  - ★ Slash feedstock
  - ★ Bigger market
  - ★ Less technical challenges



