

## Woody Biomass Utilization Challenges and Opportunities

What make sense?

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## Overview of today

Purpose:

Look at some alternatives for utilization based  
on challenges and opportunities

- ★ Feedstocks
- ★ Properties and problems
- ★ Potential uses
  - ★ Lumber
  - ★ Roundwood
  - ★ WPC
  - ★ Densified products
- ★ Conclusions



## Restoring ecosystems, protecting communities, recreation



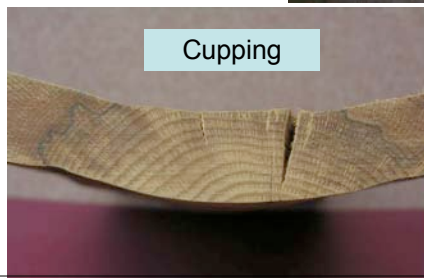
## Feedstocks

- \* Small diameter
- \* Dead trees
- \* Residues
  
- \* “waste”
- \* “disposal”
- \* “get rid of stuff”
- \* “stuff”
- \* “it”
- \* “cost”



## Problems with smallwood?

- ★ Processing Cost
- ★ Product Quality
  - ★ juvenile wood
  - ★ differential shrinkage
  - ★ knots



## What can technology do?

Almost anything!

## Innovation in Lumber Processing



## Round Wood-Is Stronger and More Stable



Slide provided by USDA Forest Service, Forest Products Lab

## Connections are Difficult-Costly



Slide provided by USDA Forest Service, Forest Products Lab

## End Products Can Be Beautiful!

Verification of design values is necessary to obtain building code approval

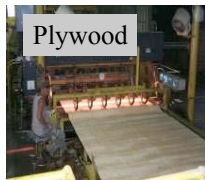


Photo courtesy of USDA Forest Products Lab

Breaking wood down into particles minimizes the impact of defects (knots, juvenile wood, insect galleries etc.)



### Creating uniformity



## Innovation

- ★ Wood-Plastic Composites



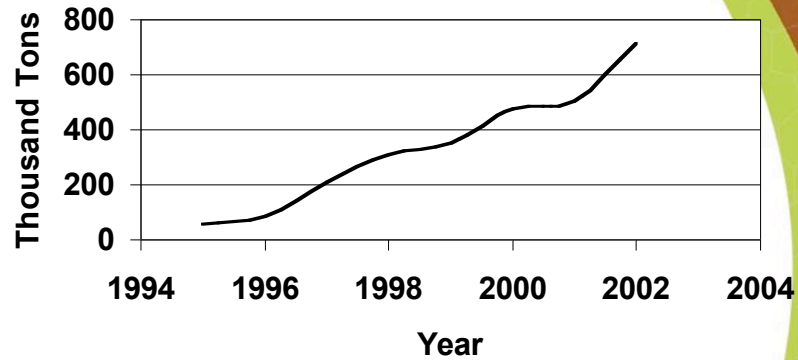
## Innovation

- ★ Wood-Plastic Composites



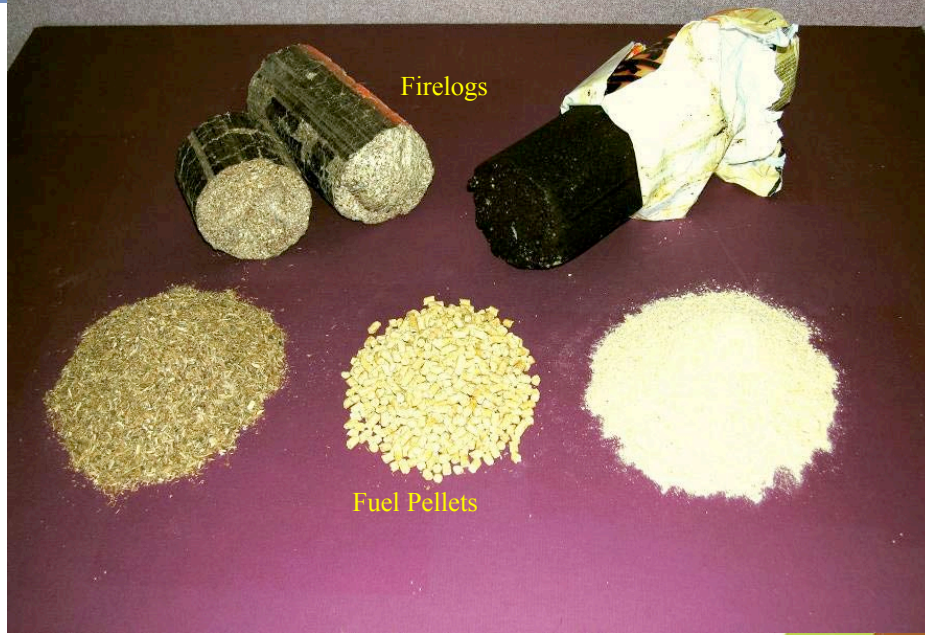


## Demand for Natural and Wood Fiber-Plastic Composites



*Adapted from Morton, Quarmley, and Rossi. 2004. Seventh International Conference on Wood Fiber – Plastic Composites. Forest Products Society, Madison, WI*

## Densified Solid Wood Products



## Densified Products



- \* Breakdown
- \* Screens
- \* Drying
- \* Compression and heat
- \* Cutting
- \* Cooling



## 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
- ★ Global commodity
- ★ Equipment intensive
- ★ Energy input
- ★ Expensive end-product





- ★ 10,000-40,000 tons/yr typical plant production (Some are 100,000 tons+)
- ★ 60,000 tons optimal
- ★ Simple process requires much optimization – many variables



## Pellet feedstock



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



Example: 40,000 ton/yr facility

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

## Niche woodchip and shavings

- ★ Animal bedding
- ★ Bio-filtration
- ★ Cattle corrals



## Scale of markets

- ★ **Bulk**
  - ★ A monster to feed?
  - ★ Long term (~10 years) supply commitments required in order for investment to happen
  - ★ Is this compatible with what society wants from Federal lands?
- ★ **Small-medium markets (<60,000 ton/yr)**
  - ★ Smaller investment (less risk?)
  - ★ Less impact (can be located closer to the resource)
  - ★ Better story to tell (public perception)

## Conclusions

- \* Woody biomass has unique properties
- \* It is possible to make many different products
- \* Economics and politics determine viability
- \* Fully assess value chain when developing a product offer [forest to market]
- \* Raw material supply is crucial for new investments and to maintain existing infrastructure
- \* Can Forest Service objectives be compatible with existing and new industries?
- \* Product opportunities:
  - \* Roundwood
  - \* Wood plastic composites
  - \* Densified wood products
  - \* Speciality chip



Thank you

