

## Woody Biomass Utilization Challenges and Opportunities

What make sense?

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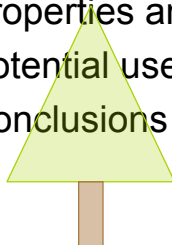
Sonora, May 22 2008

## Overview of today

Purpose:

Look at some alternatives for utilization based  
on challenges and opportunities

- \* Basic considerations
- \* Feedstocks
- \* Properties and problems
- \* Potential uses
- \* Conclusions



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## Value chain considerations

**Resource** : quality, price, availability



**Transport**: mode, distance, terrain



**Process – Product (technology)**



**Transport**



**Market**

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## 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)

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## Woody Biomass

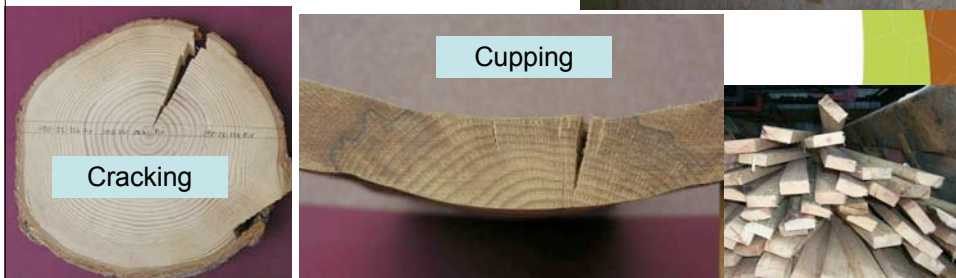


## Problems with smallwood?

- ★ Processing Cost
- ★ Product Quality
  - ★ Juvenile wood
  - ★ Differential shrinkage
  - ★ Knots
- ★ Competitor materials



Warp and twist



Cracking

Cupping

What can technology do?



Almost anything!

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Innovation in Lumber Processing



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## Round Wood-Is Stronger and More Stable



Slide provided by USDA Forest Service, Forest Products Lab

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## Connections are Difficult-Costly



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## End Products Can Be Beautiful!

Verification of design values is necessary to obtain building code approval

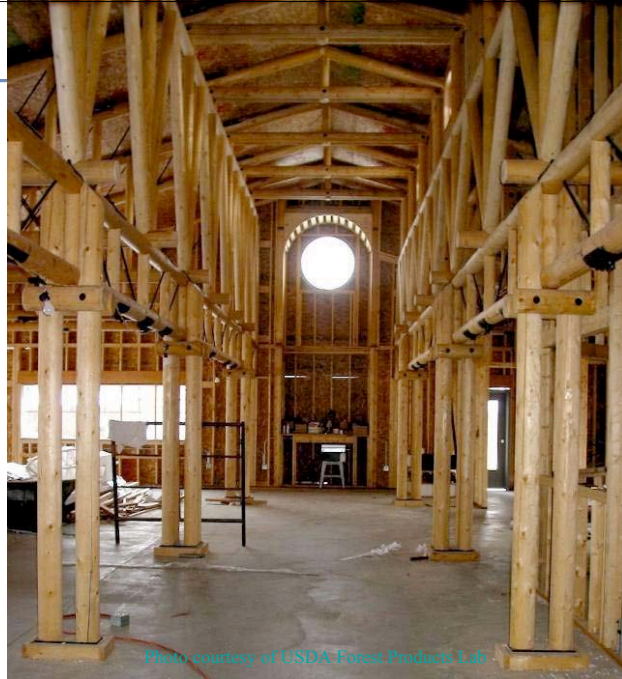


Photo courtesy of USDA Forest Products Lab

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## Post and Pole – more realistic for now

- ★ Low tech
- ★ Low investment
- ★ Available markets
- ★ Low value

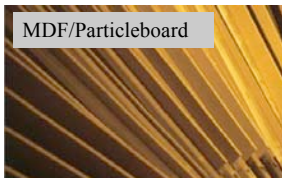
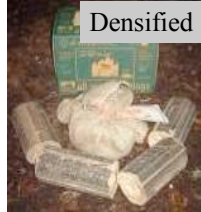


Breaking wood down into particles minimizes the impact of defects (knots, juvenile wood, insect galleries etc.)



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## Creating uniformity



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## Clean vs Dirty Chips



Clean Chip



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## Wood-Plastic Composites



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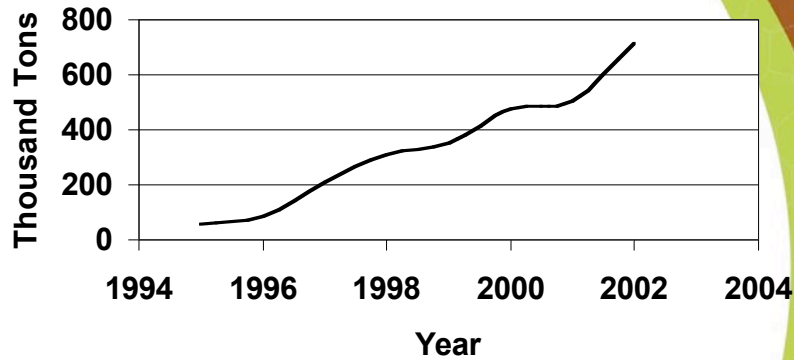
## Wood-Plastic Composites



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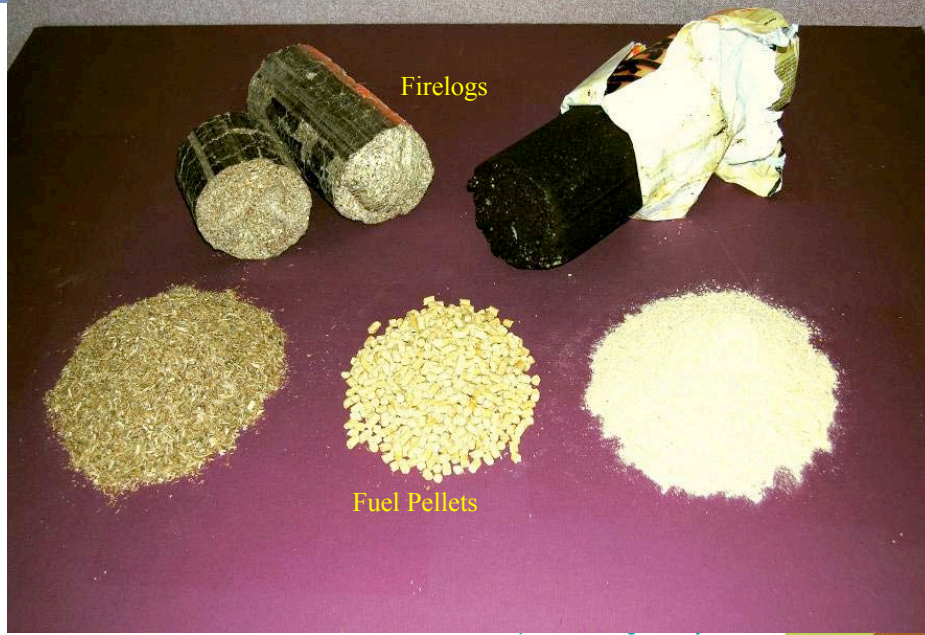
## Demand for Natural and Wood Fiber-Plastic Composites



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

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## Densified Solid Wood Products



## Densified fuel advantages

- \* Small-medium scale 10,000 tons+
- \* High energy content
- \* Convenience
- \* Consistent product
- \* Stoves meet air quality
- \* Global commodity
- \* Possible to use any biomass (gives a high ash content product)
  
- \* Disadvantages: equipment intensive, energy input (70-80kWh/t), expensive end-product

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## Niche woodchip and shavings

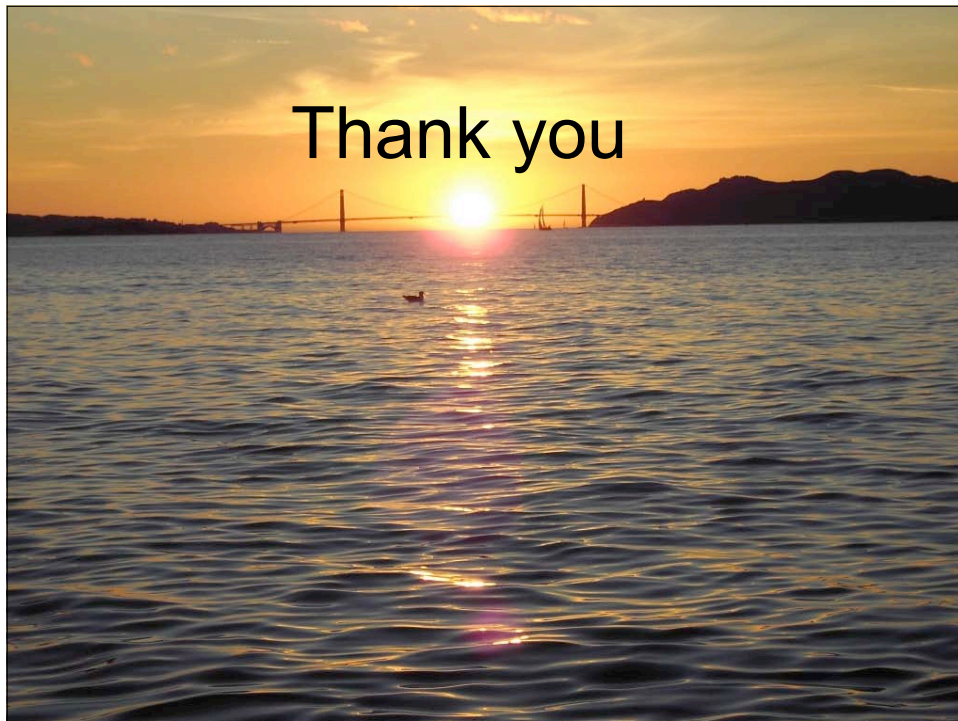
- \* Animal bedding
- \* Bio-filtration
- \* Cattle corrals



## 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

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## Feedstocks

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- \* Small diameter
- \* Dead trees
- \* Residues

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