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Densified Wood Products

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

http://ucanr.org/WoodyBiomass

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Making a Difference for California

Overview

- Why densify?
- Products
- Process
- Feedstock
- Markets
- California situation
- Approaches
- Conclusions
- Densified fuels (pellets etc)
- Market conditions
- California project approaches

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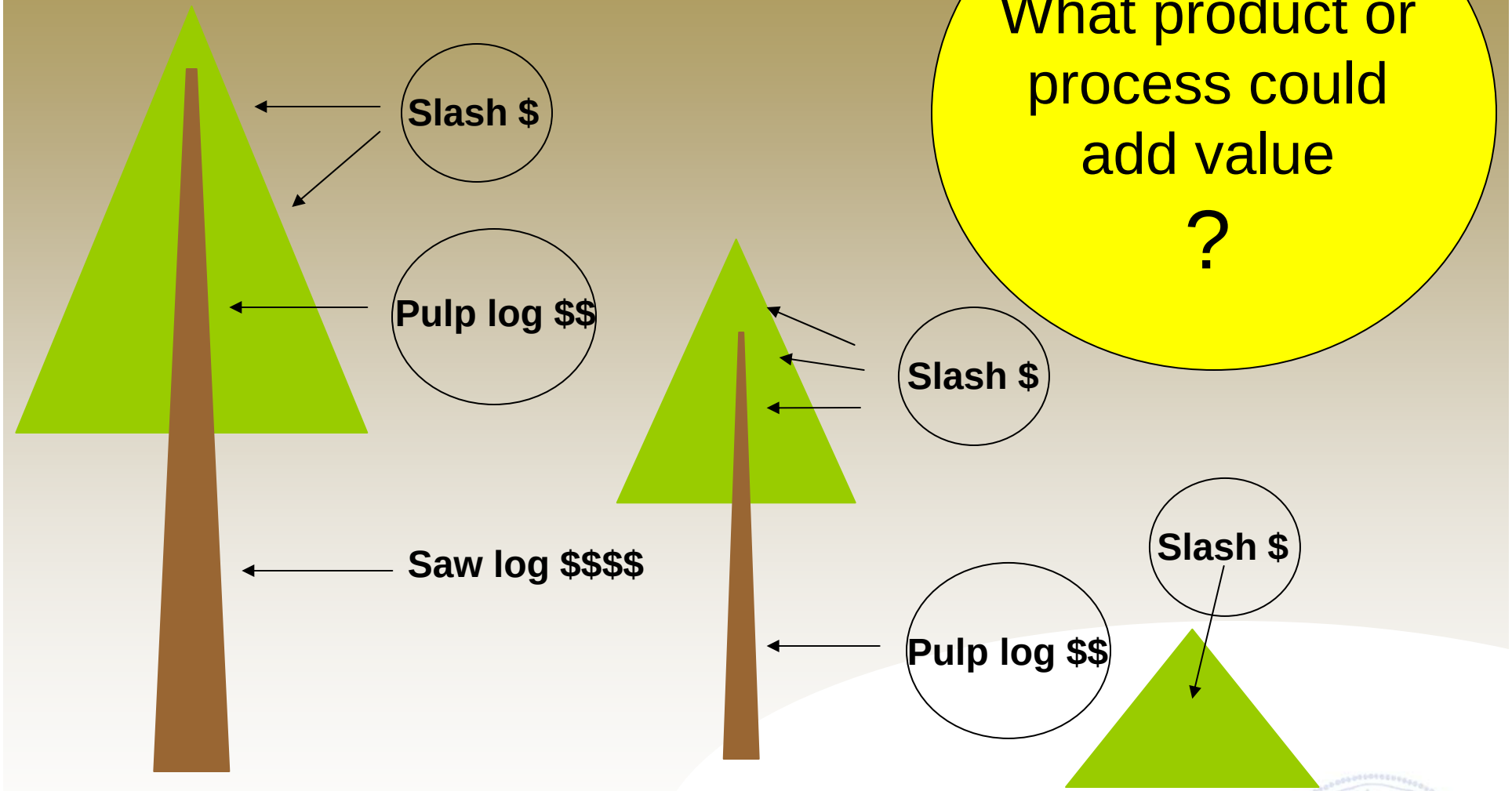
Value helps to move residuals



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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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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General market situation

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

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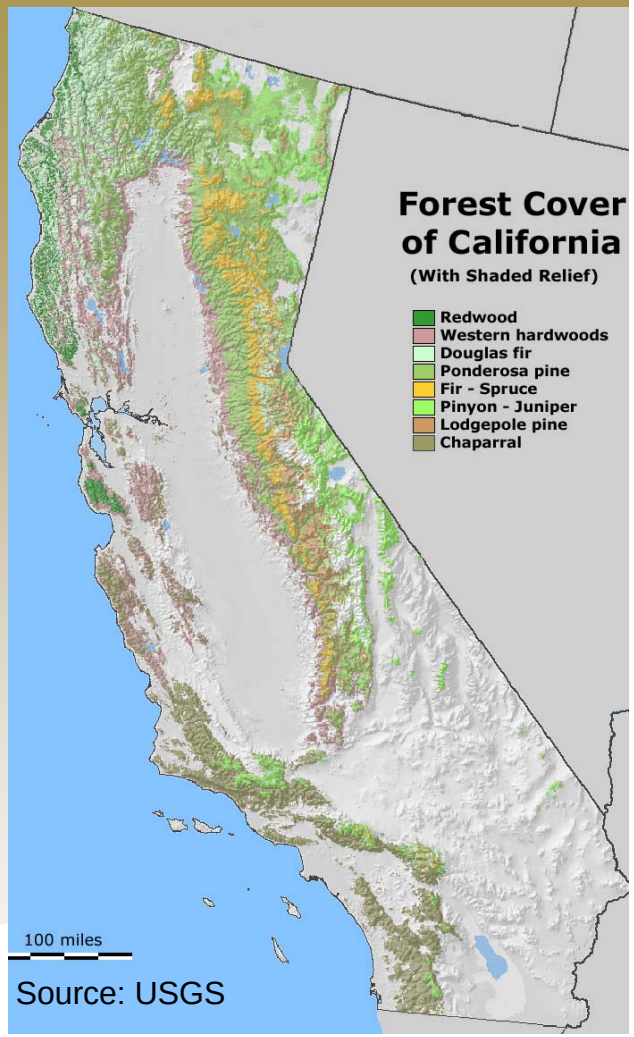
Traditional US Pellet Mill

- 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 fuels in California

- Anecdotal evidence suggests a large residential market for densified fuels exists
- Almost no in state manufacturing capacity (~5 small mills)
- 18 National Forests (20m acres)
  - Link to forest health projects?



Source: USGS

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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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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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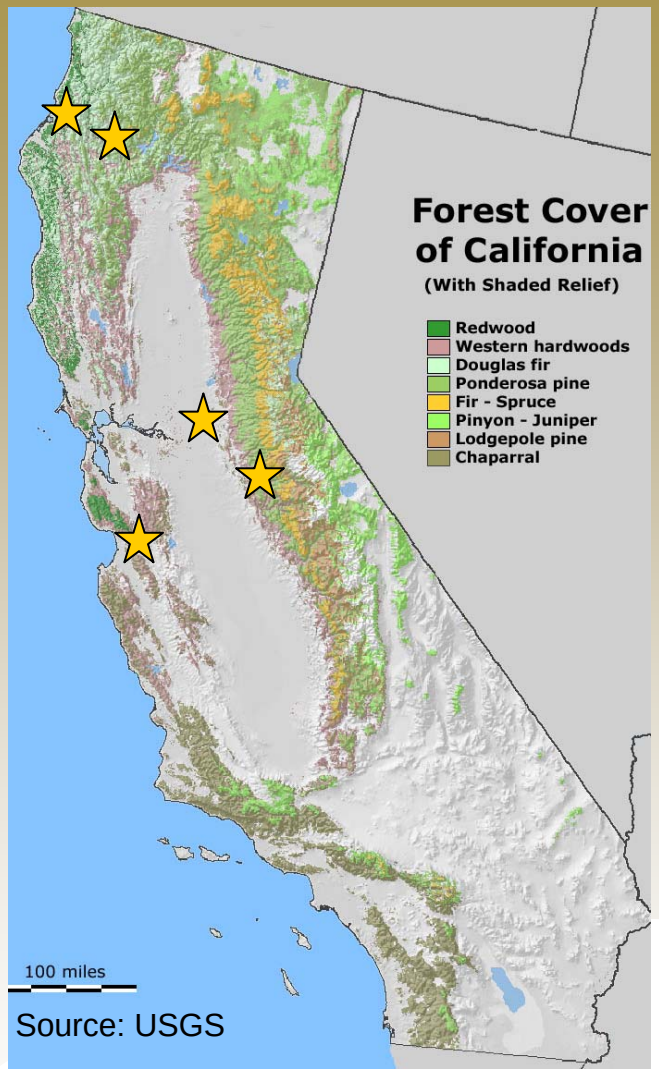
Project Approaches

- *Go big*
- *Go micro*
- *Go re-deployable*
- *Go local*
- *Go high value*



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Go big

Enligna, Port of Sacramento

- 184,000 BDT pellet mill for export market
- 5.8 MWe cogeneration facility
- Raw material:
  - Construction and demolition (hog fuel)
  - Forest: bole material (chipped or ground including bark)
  - Slash subject to specification
  - Agricultural waste
  - Arboricultural waste

Source: USGS

ENLIGNA.

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Go big – Enligna Approach

- Start with export market (Europe/Asia) – long term supply contracts
- Leverage existing port facilities
- Develop local markets for:
  - Domestic pellets
  - Commercial pellets - supplying institutional boilers (BioEnergy Solutions)
- 360º sourcing radius
- Diversified feedstocks to manage supply risk

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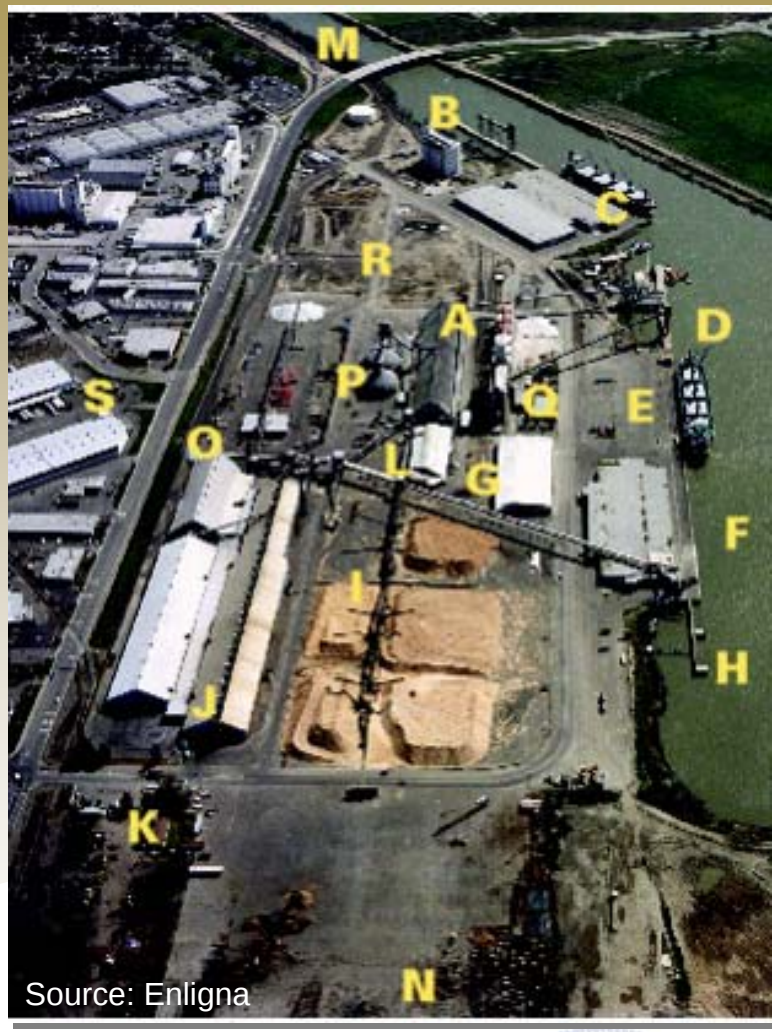
Go big – Enligna Status

- Conditional use permit in place
- AQ permit in place
- Negotiations ongoing for sale of project to industry player

Source: Enligna



Source: Enligna

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Go micro

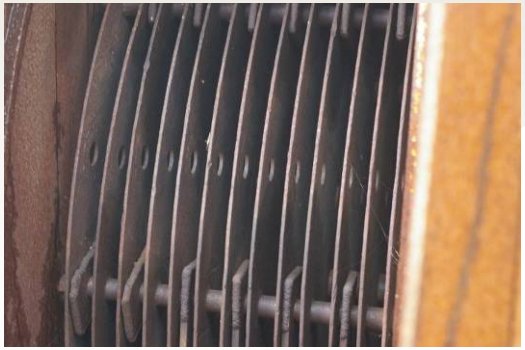
Red Rooster Fuels, Humboldt County

- 2,000 tons/yr pellets
- Raw material:
  - Small diameter trees (Douglas fir)
  - Tops (Douglas fir)

Source: USGS

Go micro – Approach

- Capitalized pellet mill, debarkers and chippers
- Existing firewood producer
- Husband and wife team
- Local markets (stoves and animal bedding)
- Bagged or bulk delivery



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Go micro – Status

- Pellets well received
- Demand outstrips supply
- Manufacture pellets to order (no inventory held)
- Streamlining system to produce 10 ton batches

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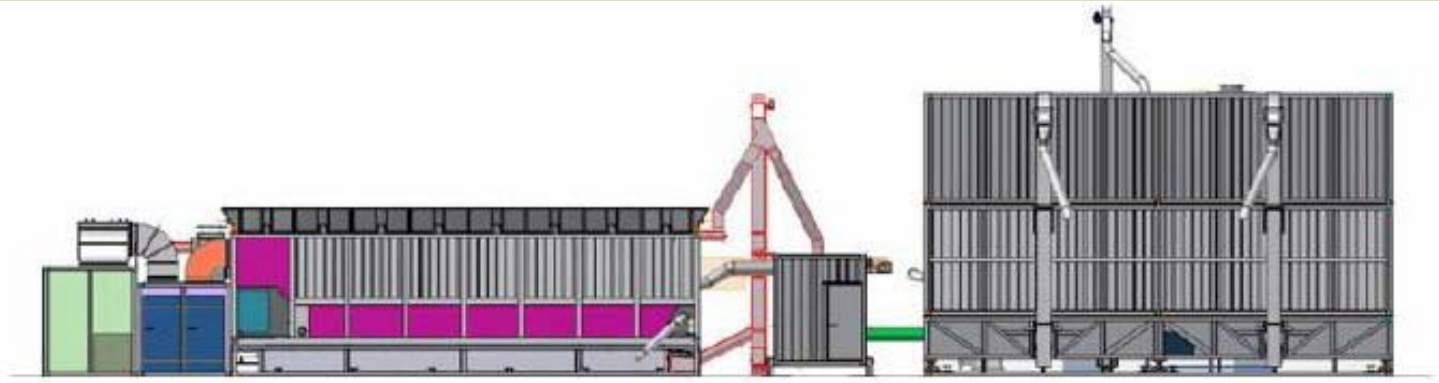
Go re-deployable

Woodwork, Trinity County

- 10,000 tons/yr pellets
- Raw material:
  - Small diameter trees
  - Tops

Source: USGS


Source: BioJoule

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Go re-deployable - Approach

- Rapidly re-deployable BioJoule (UK) unit
- Move equipment to site near forest management operation
- Relocate when work is complete
- Partnership with existing pellet manufacturer to sell product
- Bed dryer
- Small scale CHP sized to heat load
- Automated – few staff required

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Go re-deployable - Status

- Dead

Source: BioJoule

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Go local

Bear Mountain Forest Products, Sonora

- 18,000 tons/yr brick mill in Sonora
- Raw material:
  - Forest chips


Source: BMFP

Source: USGS

Bear Mountain™ Forest Products

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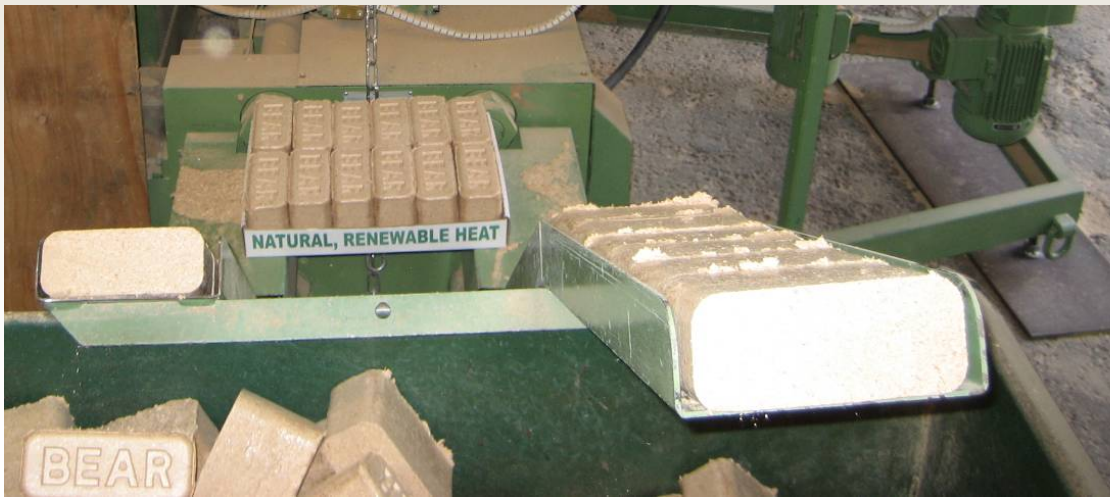
Go local – BMFP Approach

- Make a product that competes with cordwood
- Uses forest waste
- Forest health benefits a selling point
- Use of a novel bed drying system
- Build on existing brand
- Develop local commercial markets



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Go local – BMFP Status

- USDA Forest Service Woody Biomass Utilization Grant secured
- Staged approach
- Negotiations with partners (raw material supply and site)
- Initial sales though Costco and others – supply from Oregon mill
- Locate equipment in 2010
- Start supplying California product to market late 2010

Source: BMFP

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Go high value

Goodwood Products, Watsonville

- 3,000 tons/yr fire logs
- Raw material:
  - Forest residues
  - Arboricultural waste
  - Mill residues

Source: USGS

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Go high value – Goodwood Approach

- Produce a desirable easy to use high value fire log
  - Existing stoves/fires
  - “Campfire in a box”
- Niche marketing based on environmental benefits

Go high value – Goodwood Status

- Demand outstrips supply
- Possible partnership with another company to assist growth

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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

Thank you

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Help with:

- Grants
- Technology
- Markets
- Networks
- Healthy skepticism