

WOOD WASTE UTILIZATION ASSESSMENT



Taos Community
Meeting

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PRESENTATION OVERVIEW

- Overview of Assessment
- Target Study Area Recap
- Key Initial Findings
- Value Added Utilization
- Project Timeline
- Questions



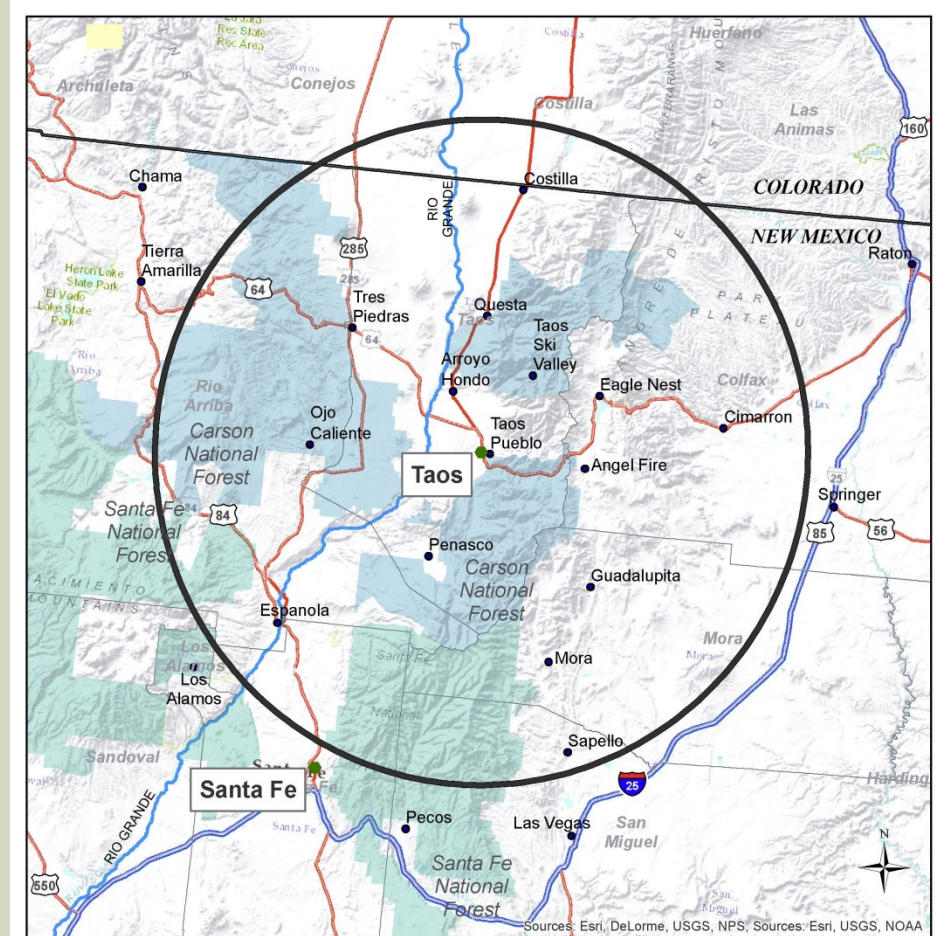
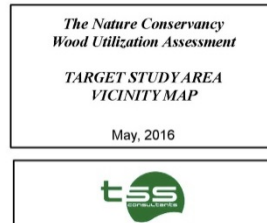
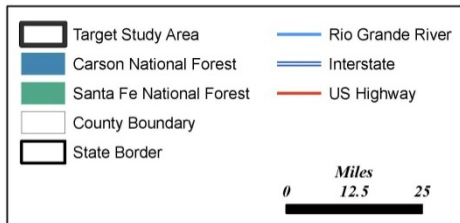
WOOD UTILIZATION ASSESSMENT – PART I

Tasks

- Biomass feedstock supply analysis - *completed*
- Biomass supply competition analysis - *completed*
- Regional biomass feedstock supply analysis - *completed*
- Value-Added utilization options - *underway*

TARGET STUDY AREA

- Target Study Area (TSA) lies in a 50 mile radius from Taos
- 5,026,090 acres
- Includes portions of the Carson and Santa Fe National Forests



TYPES OF WOOD WASTE CONSIDERED

- Forest residuals from management operations (limbs, tops, small diameter stems)
- Woodland restoration residuals (pinyon-juniper removals)
- Wood waste from hazardous fuels reduction activities (limbs, small stems)
- Forest products manufacturing byproducts (sawdust, bark, shavings)
- Urban wood waste (tree trimmings, pallets, clean construction wood)

INITIAL FINDINGS

BIOMASS FEEDSTOCK SUPPLY

- Initial assessment has been completed. The methodology for biomass supply volume estimation:
- Potentially Available Volume
 - Total amount produced annually. Obtained through data analysis and in-person interviews
- Technically Available Volume
 - Availability considering physical constraints such as terrain (steep slopes) and transport (road systems that do not support removal)
- Economically Available Volume
 - Amount available considering existing competition for wood waste

TIMBER HARVEST RESIDUALS

<i>SOURCE</i>	<i>PRIVATE (BDT/YEAR)</i>	<i>PUBLIC (BDT/YEAR)</i>
Carson National Forest		4,224
Santa Fe National Forest		397
Area Ranches	1,264	
Other Private Landowners	200	
Potentially Available	1,464	4,621
Adjustment For Recovery	- 586	- 2,311
Technically Available	878	2,311
Adjustment For Competing Uses	0	0
Economically Available	878	2,311
Private And Public Total Economically Available	3,189	

FOREST RESTORATION AND FUELS TREATMENT ACTIVITIES AND RESIDUALS

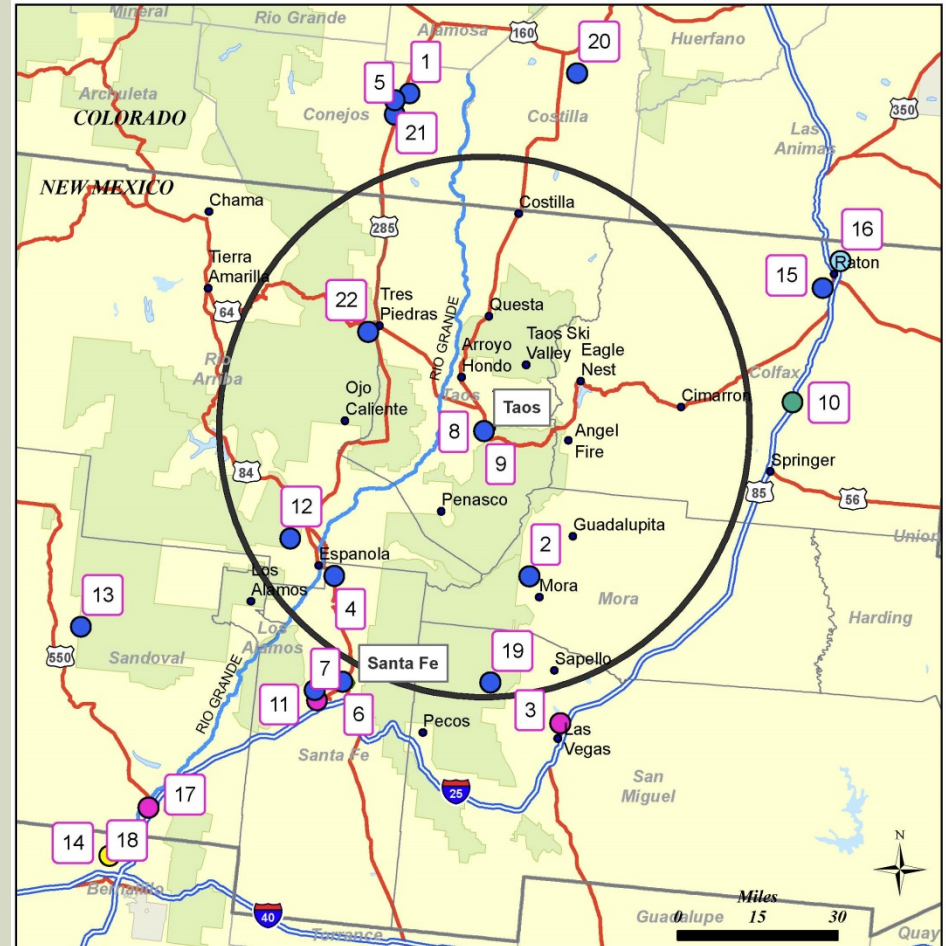
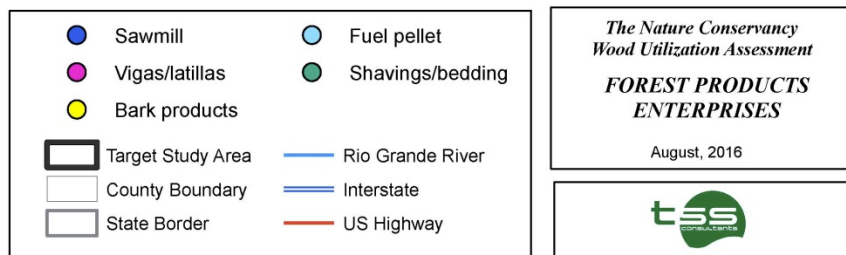
<i>SOURCE</i>	<i>TREATMENT AREA AVERAGE (ACRES/ YR)</i>	<i>BIOMASS FEEDSTOCK (BDT/YEAR)</i>
Carson NF - East Zone	1,285	8,995
Carson NF - West Zone	2,200	15,400
Santa Fe NF	200	1,400
Rio Castilla Cooperative Livestock Association	15	150
Taos Pueblo	30	300
Angel Fire CWPP and Fire Wise Program	13	125
NRCS Supported Projects	138	1,375
New Mexico Forest Health Improvement Program	200	2,000
Taos Soil and Water Conservation District Supported Projects	25	250
Taos Community Wildfire Protection Plan (CWPP)	35	350
Taos Ski Valley	25	250
NM State Lands	350	3,500
Subtotal	4,315	34,095
Potentially Available	34,095	
Adjustment For Recovery	-16,218	
Technically Available	17,878	
Adjustment For Competing Uses	0	
Total Economically Available	17,878	

PINYON-JUNIPER TREATMENT AND FUELS REDUCTION ACTIVITIES

<i>SOURCE</i>	<i>TREATMENT AREA AVERAGE (ACRES/YR)</i>	<i>BIOMASS FEEDSTOCK (BDT/YEAR)</i>
Carson NF - East Zone	325	1,625
Carson NF - West Zone	640	3,200
Santa Fe NF	200	1,000
BLM - Taos District	400	2,000
Area Ranches	125	875
Taos Pueblo	15	105
NM State Lands	150	1,050
NRCS Supported Projects	150	1,050
Subtotal	2,005	10,905
Potentially Available		10,905
Adjustment For Recovery		- 5,145
Technically Available		5,761
Adjustment For Competing Uses		0
Total Economically Available		5,761

EXISTING FOREST PRODUCTS ENTERPRISES IN TSA REGION

- There are 21 forest product businesses in the TSA or nearby
- Most sawmills sell multiple products including vigas, latillas and firewood
- Many facilities generate manufacturing residuals such as sawdust, bark, or chips



SUMMARY OF BIOMASS FEEDSTOCK SUPPLY AVAILABILITY

<i>SOURCE</i>	<i>POTENTIALLY AVAILABLE (BDT/YEAR)</i>	<i>TECHNICALLY AVAILABLE (BDT/ YEAR)</i>	<i>ECONOMICALLY AVAILABLE (BDT/ YEAR)</i>
Timber Harvest Residuals	6,085	3,189	3,189
Forest Restoration and Fuel Treatment Residuals	34,095	17,878	17,878
Pinyon Juniper Treatment Residuals	10,905	5,761	5,761
Forest Products Manufacturing Residuals	0	0	0
Electric Transmission/Distribution	0	0	0
Construction and Demolition Wood Waste	1,591	1,034	1,034
Residential Tree Trimming	45	36	14
Total	52,721	27,897	27,876

WOOD UTILIZATION ASSESSMENT – PART II

Key questions to be addressed:

- What value-added forest biomass utilization business models, scaled to local resource sustainability, have the highest potential for successful implementation by local contractors and biomass utilization projects?
- Which business models are complementary such that a coordinated approach is possible – one that facilitates multiple businesses producing a variety of value-added products?
- How should these multiple businesses coordinate so that a healthy equilibrium and triple bottom line, represented by a balance between local environment, community and economy, is accomplished?

VALUE-ADDED OPTIONS

BIOMASS POWER AND THERMAL ENERGY

Process or Product	Feedstock Specifications	Jobs (FTE) Low	Jobs (FTE) High	Main Equipment	Market Potential	Comments
Small-scale Biomass Combined Heat and Power (Solid fuel steam cycle)	Woody biomass chipped to 3"minus, 50% mc, 3% ash. Drier feedstock preferred.	2	30	Feedstock handling, boiler, turbine-generator, emissions control, water cooling and recovery.	Technology is evolving quickly and becoming more cost effective.	More appropriate where electrical and thermal energy wholesale rates are high. Typically found in states with attractive Renewable Portfolio Standards or renewable energy incentives
Biomass Heating for Buildings	Woody biomass chipped to 3"minus, 50% mc, 3% ash.	1	2	Boiler system and hot water or steam delivery system.	Especially cost effective if replacing existing heating oil or propane heat. Can use for cooling also (using absorption chillers).	Feedstock sizing has been an issue with recently installed thermal energy facilities. Typical installations include schools, hospitals, and community buildings.
Gasification Combined Heat and Power	Woody biomass chipped to 3"minus, 30% mc, 3% ash.	2	5	Gasifier, gas clean-up, IC engine or turbine-generator.	Technology is evolving quickly and slowly becoming more cost effective.	More appropriate where electrical and thermal energy wholesale rates are high or in remote installations where power is not currently available.
Pyrolysis/Torrefaction (charcoal)	Wood pieces (flexible spec).	1	2	Charcoal kiln or Pyrolysis Reaction Unity.	Charcoal: for cooking, artist's charcoal, filtration, soil amendment (biochar). Energy product: Co-firing in coal power plants (no modifications required to coal handling systems) or as feedstock supplement for biomass power plants	Charcoal is from slow pyrolysis and very units currently deployed. Energy product from mild pyrolysis (torrefaction) is torrefied feedstock and can be highly marketable due to BTU/pound and impervious to water. Coal is a key solid fuel in the marketplace and tends to set the price point.

DENSIFIED FUELWOODS

Process or Product	Feedstock Specifications	Jobs (FTE) Low	Jobs (FTE) High	Main Equipment	Market Potential	Comments
Fire logs (manufactured)	Clean, dry (<10% mc) chip, needs to be <1% ash.	3	9	Log machine, dryer, cooler, hammermill, packaging.	Substitute for firewood is the primary market.	Use of either roundwood or biomass from forest possible (e.g., small logs or chips low in bark). Key issue and expense is drying system.
Wood fuel pellets	Clean, dry (<10% mc) chip, needs to be <1% ash.	15	65	Pellet mill, dryer, cooler, hammermill, packaging.	Domestic users now, but potential for biomass boilers. Large scale can be co-fired with coal and gives access to international markets .	Use of either roundwood or biomass from forest possible (e.g., small logs or chips low in bark). Key issue and expense is drying system. Larger scale facility may face challenges in gaining market share for domestic stoves. Large-scale export facility will have feedstock sourcing challenges and exposure to currency exchange rate risk.
Fuel bricks	Chip, dry (<15% mc), needles, bark okay.	3	6	Brick machine, dryer, cooler, hammermill, packaging.	Substitute for firewood is the primary market. Domestic use or camping, lighter and more portable.	May use needles and bark. Also paper. Potential to use field-dried material as feedstock.

SMALL SCALE SAWMILL

Process or Product	Feedstock Specifications	Jobs (FTE) Low	Jobs (FTE) High	Main Equipment	Market Potential	Comments
Post and pole Agriculture	Straight, low taper softwood (lodgepole, ponderosa) is preferred.	5	15	Rosser head peeler and/or doweller. Sorting line. Bucking saw.	Market for fencing, landscaping, outdoor latillas, vineyard trellising.	Typically sold without stripping bark or treating the wood. Small 2-5 inch diameter can be utilized.
Post and pole Architecture	Straight, low taper softwood (lodgepole, ponderosa) is preferred.	5	15	Rosser head peeler and/or doweller. Sorting line. Bucking saw.	Sold to treating facilities or direct to clients. Market for vigas and latillas. Market for outdoor uses for treated wood in patios or landscaping.	Higher quality preferred. Dried (kiln dried) and sometimes treated. Small 1-5" diameter for latillas, larger 6 – 20" diameter for vigas and home building.
Lumber kiln	Lumber products or firewood.	1	2	Kiln (steam or dehumidifier).	Kiln dried lumber has added value in the market place. Transport of dried lumber products is more cost effective (due to lower weight).	Could also dry firewood or heat treat lumber and packaging to meet ISPM15 (treatment standard for wood shipped internationally). Could use waste wood as a feedstock source for the heating.

AGRICULTURE, LANDSCAPING, AND FURNITURE/OUTDOOR RECREATION

Process or Product	Feedstock Specifications	Jobs (FTE) Low	Jobs (FTE) High	Main Equipment	Market Potential	Comments
Decorative bark	Small roundwood that is easily debarked. Raw bark from sawmills is common source.	2	6	Debarker (flail, ring or rosser head), screen (trommel or flat).	Higher value in urban areas.	As sawmill residuals become scarce, value of bark for landscape cover increases. Alternative use is hog fuel.
Decorative chip	Bark free and sized (no fines) wood chip.	2	6	Debarker (flail, ring or rosser head), screen (trommel or flat).	Colorized landscape cover sold in bulk and/or bagged.	Colored landscape cover requires additional equipment (colorizer). Note that bark free chip has alternative markets such as pulp/paper or furnished for composite products (particleboard/hardboard/decking).
Compost	Tree trimmings and grass clippings (greenwaste)	2	6	Grinder, screen and windrow turner.	Soil amendment market is seasonal. Typically sold in bulk or bagged.	A compost operation near an existing landfill diverts greenwaste from landfills. Compost and mulch operations work best on same site.
Animal bedding (Shavings)	Small roundwood (ponderosa pine preferred).	2	6	Shaver, screens, drying, packaging.	Can be sold in bulk and/or in bags.	Shavings are produced from roundwood, including small diameter material. Chipped biomass or mill sawdust can also be used for animal bedding, is not considered shavings.
Greenhouse and Nursery	For heating: woody biomass chipped to 3"minus, 50% mc, 3% ash.	4	20	For chipping: debarking equipment (e.g., chain flail) chipper and screen. For heating: biomass boiler and hot water or steam delivery system	A greenhouse facility integrates the use of several types of chipped biomass into one business enterprise.	Greenhouses utilize several wood waste streams. Chips could be used on pathways or under benches and as a mulch or soil additive. Thermal energy system could utilize woody biomass for heating and cooling.
Furniture/Outdoor Recreation Sets	Small to medium roundwood			Debarker, head rig, resaw, edger. Woodworking and cabinetry equipment	Sold to individual furniture craftsmen, or built and soldJuly 2016 Invoicies on-site at a sawmill.	Wood needs to be dried. Potential for a commercial outlet (?)

ADVANCED WOOD MATERIALS

Process or Product	Feedstock Specifications	Jobs (FTE) Low	Jobs (FTE) High	Main Equipment	Market Potential	Comments
Plastic/Wood Fiber Composites (WPC)	Clean, dry (2-12% mc) wood flour. Wood is ~55% of feedstock along with plastic and additives. Recycled wood use common.	14	40	Blender (compounder extruder), extrusion line, cooler, cut-off saw.	Landscape (bender board), decking, fencing, park furniture (picnic tables and seats), outdoor signage. The composite wood furniture market is growing due to interest in sustainability. Increasingly used in building, exterior siding.	Requires cost effective thermoplastic feedstock (HDPE, LDPE, PP, PVC). Utilize recycled plastics (milk jugs, plastic bags). Commercial facilities typically use pine, oak and maple. Altree is a wood plastic material that can include pinyon-juniper. Blending (compounding) of wood and plastic may be two processes or single process depending upon equipment. Commercial molding processes typically continuous extrusion or batch injection molding.
Compound pellets for WPC production	Clean, dry (2-8% mc) wood flour. Wood is ~55% of feedstock along with plastic and additives. Recycled wood use common.			Compounder extruder.	Existing WPC mills.	Cheaper way to get into WPC market place than making finished products.
Chip for Pulp/Paper or Composite Panel Furnish	Woody biomass chipped to 3" minus, 50% mc, bark free with few fines.	3	6	Debarking equipment (e.g., chain flail) chipper and screen.	No virgin pulp/paper operations in the region.	No virgin paper mills in NM, some secondary mills utilizing manufactured paper or recycled paper.
Veneer	Straight logs with limited taper. 8"+ diameter.	40	80+	Steaming vats, veneer lathes, trimming, rolling stock.	Plywood and LVL mills are in Oregon, peeler cores (2"-4") sold into post and pole market.	Typically a large commercial-scale facility (process 420 blocks per hour).
Air filtration media	Virgin material that will grind to large same-sized particles.			Grinder and screen.	Also called bio-filtration. Wastewater treatment facilities, manufacturing with air filtration needs	Need a second market for grinder material that does not meet specifications for filtration media; e.g., hog fuel or landscaping.
Biofuels	Wood waste, forest harvest and thinning residues			Grinder or chipper and screens	Use as alternative transportation fuels	Due to economies of scale, commercial facilities will need to be large with considerable feedstock needs
Essentials oils	Pinyon pine and Juniper. Chipped or shredded.			'Extractives' distillation done in a still with boiling water. Can use biomass heat source.		Marketing for retail or internet sales and distribution.

CRITICAL ATTRIBUTES

- Minimum economic scale
- Types of feedstock utilized
- Transportation to market
- Ease of facility siting
- Workforce requirements
- Environmental permitting and compliance
- Potential project partners
- Synergies for collocation in multiple output/product yard

PROJECT TIMELINE

<i>TASK</i>	<i>COMPLETION DATE</i>
Pre-Work Conference	April
Biomass Feedstock Supply Analysis	June
Biomass Feedstock Competition Analysis	July
Regional Biomass Feedstock Analysis	August
Value-Added Opportunities Analysis	September
Draft Report	November
Final Report	December

QUESTIONS?



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