Modular/Mobile Wood Processing Technologies

The list below are examples of currently available technologies for processing forest biomass on a modular/mobile scale. They are representative of technologies and are not to be considered as endorsement of particular manufacturers or being vetted.

The target audience of this document are communities, Resource Conservation Districts, Fire Safe Councils, land managers, and other entities that are looking for options to utilize their forest management residue, short of building a stationary bioenergy plant that takes many years to finance and build. For land managers who are implementing forest management activities in remote areas, away from major roads, or on small tracts of land, large investments in fixed assets are impractical as well as infeasible due to limited access to markets for potential products. With no revenue to balance expenses, the common practice is often to pile and burn residuals as the least cost option.

The purpose of this document is to provide an overview for a range of processing equipment currently available to convert woody biomass on-site into a variety of products instead of just burning it. "Range" in this context generally encompasses purchase price, equipment size, feedstock consumption and sizing, as well as variety of products.

Each project site has specific circumstances, including but not limited to availability, accessibility, quality, and volume of feedstock, proximity to demand centers for products, operating and maintenance constraints, as well as financial capabilities. The modular and mobile equipment listed here can provide opportunities to evaluate distributed, scalable and/or temporary use cases for forest biomass while at the same time mitigating the risk of large stranded assets. These technologies may also provide opportunities for communities to utilize wood waste while determining the scope and scale of potential stationary facilities.

The information in this document can only inform a part of the due diligence process necessary prior to any project implementation. As such, it describes available conversion technologies in general. However, locally specific factors such as economic analysis; sustainability analysis; air quality impacts; code compliance; impacts on soils; impacts on wildfire reduction/forest productivity; necessary permitting; markets for products, etc. are beyond its scope.

While this list is rather comprehensive as of fall 2020, it is neither static nor final. As technologies continue to evolve and management objectives as well as markets change, we consider this to be a living document that should be revised annually.

Martin Twer, WRTC, martin@thewatershedcenter.com, 11/4/2020

Contents

Waste Reduction

Roll-off FireBox	Air Burners
Pollution control device for open burning of clean wood waste (air curtain burner, incinerator).	
Landing size	Less than 1/8 acre for machine, 1 to 4 acres for feedstock pile.
Equipment footprint	S116R = 7’ x 25’; S119R = 7’ x 28’
Utilities req’d on site	None, diesel powered
Air permit req’d?	Yes - Title V Operating Permit (40 CFR part 70)
Emissions	Lowest Particulate Matter possible (<1 lb/ton). Air Burners are ACB tested and certified by the US EPA. Certified testing data for Air Burners machines is available for customer permit support.
Ground disturbance	No heat impact, Roll-Off units have a floor
Transportation (Equipment)	Roll-off container truck, the FireBox meets ANSI spec for Cable Hoist or “J” Hook type trucks.
Transportation (Product)	If biochar is produced, it can be transported by small truck.
In use in California?	Yes
Spec sheet	S-116R, S-119R
Pricing (Equipment)	$110,000 - $122,000
Pricing (Product)	Biochar is sold from approximately $100 to $140/cubic yard.
Operating Costs	$6.00/hour + labor
Material/Feedstock quality	Clean wood waste, stumps, trees, (incl partially burned), slash, tumbleweeds and C&D wood waste.
Material/Feedstock sizing	Up to 18’ in length, no dense material like chips or sawdust
Sorting required?	No sorting, grinding, chipping or any preprocessing required
Preferred moisture content	Not an issue
Consumption rate	2 to 5 tons/hour
Production rate	Biochar (if collected) approximately 10 cubic yards/day
Comments	

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FireBox	Air Burners
Pollution control device for open burning of clean wood waste (air curtain burner, incinerator).	
Landing size	Less than 1/8 acre for machine, 1 to 4 acres for feedstock pile.
Equipment footprint	Smallest 7’ x 24’; largest 12’ x 41’
Utilities req’d on site	No utilities for diesel powered. For electrical drive 480V, 3PH
Air permit req’d?	Yes - Title V Operating Permit (40 CFR part 70)
Emissions	Lowest Particulate Matter possible (<1 lb/ton). Air Burners are ACB tested and certified by the US EPA. Certified testing data for Air Burners machines is available for customer permit support.
Ground disturbance	No heat impact with optional floor or 4” depth w/o floor.
Transportation (Equipment)	Transport off-site with any flat deck trailer or lowboy type trailer. Reposition on-site by dragging, all FireBoxes are “skid” based.
Transportation (Product)	Carbon ash and Biochar is returned to the soil around the machine or collected and sold.
In use in California?	Yes, by CalParks, CAL FIRE, municipalities, growers, and National Parks.
Spec sheet	FireBox Spec Sheet
Pricing (Equipment)	$99,000 - $168,000
Pricing (Product)	Biochar is sold from approximately $100 to $140 per cubic yard.
Operating Costs	$6.00/hour to $7.50/hour + labor
Material/Feedstock quality	Clean wood waste, stumps, trees, (incl partially burned), slash, tumbleweeds, and C&D wood waste.
Material/Feedstock sizing	Up to 29’ in length, no chips or sawdust.
Sorting required?	No sorting, grinding, chipping or any preprocessing required
Preferred moisture content	Not an issue
Consumption rate	4 to 13 tons/hour
Production rate	Biochar (if collected) approximately 10 -15 cubic yards/day
Comments	This technology is designed to reduce one of the most damaging climate forcers, “Particulate Matter.” The International Panel on Climate Change (IPCC) ranks PM (also called Black Carbon) as the number 2 most significant climate forcer. Air Burners machines have been well proven to significantly reduce or eliminate PM with the added economic benefit of burning very fast.

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BurnBoss®	Air Burners
Pollution control device for open burning of clean wood waste (air curtain burner, incinerator).	
Landing size	Machine and one day's feedstock pile, approximately 1/4 acre.
Equipment footprint	8' x 20'
Utilities req'd on site	None, diesel powered.
Air permit req'd?	Yes - Title V Operating Permit (40 CFR part 70)
Emissions	Lowest Particulate Matter possible (<1 lb/ton). Air Burners are ACB tested and certified by the US EPA. Certified testing data for Air Burners machines is available for customer permit support.
Ground disturbance	Heat impact less than 4" deep and 4' x 12'
Transportation (Equipment)	DOT approved trailer, towing with HD pick-up truck
Transportation (Product)	Ash and biochar is returned to the soil around the machine or collected and sold.
In use in California	Yes, BurnBoss® was originally designed for CAL FIRE. Currently used by CalParks, CAL FIRE, municipalities, growers, and National Parks.
Spec sheet	BurnBoss T24
Pricing (Equipment)	Approx. $53,000
Pricing (Product)	Biochar is sold from approximately $100 to $140 per cubic yard.
Operating Costs	$1.30 per hour + labor
Material/Feedstock quality	Clean wood waste, stumps, trees, (incl partially burned), slash, tumbleweeds, and C&D wood waste
Material/Feedstock sizing	Needs to fit in the 4' by 12' opening. No chips or sawdust.
Sorting required?	No sorting, grinding, chipping or any preprocessing required.
Preferred moisture content	Not an issue
Consumption rate	10 to 20 cubic yards/hour
Production rate	If biochar is collected, approximately 1 - 2 cubic yards/day.
Comments	A towable FireBox. Designed in cooperation with CAL FIRE and the US Forest Service, the BurnBoss brings the FireBox advantages to smaller jobs, in particular those supporting wildfire mitigation in the wildland urban interface.

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Baler

Biomass Baler	Forest Concepts
Slash compactor for more efficient transport, storage, and handling.	
Landing size	N/A
Equipment footprint	8’ x 22’
Utilities req’d on site	N/A
Air permit req’d?	Yes - Title V Operating Permit (40 CFR part 70)
Emissions	Model 2054 will be CARB compliant
Ground disturbance	N/A - Street legal trailer
Transportation (Equipment)	Towable with 1-ton truck
Transportation (Product)	Flatbed truck, trailer
In use in California	Yes (for demos)
Spec sheet	in development
Pricing (Equipment)	$100,000 - $175,000 depending on options
Pricing (Product)	N/A
Operating Costs	Depends on configuration and use
Material/Feedstock quality	Brush, slash, vegetation management trimmings
Material/Feedstock sizing	length <= 4’ , diameter <= 12”
Sorting required?	No
Preferred moisture content	Any
Consumption rate	N/A
Production rate	1 bale/hour, size: 32” x 48” x 64”, ~1,300 lbs each
Comments	

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Biochar

Carbonator	Tigercat
Advanced wood debris conversion system to biochar (air curtain burner)	
Landing size	350' radius
Equipment footprint	40' x 11'-10"
Utilities req'd on site	Water supply (this can be provided by way of water truck)
Air permit req'd?	Yes - Title V Operating Permit (40 CFR part 70)
Emissions	Engine: EO# U-R-022-0218;
Ground disturbance	57 psi
Transportation (Equipment)	Lowboy trailer
Transportation (Product)	Steel container
In use in California	Yes
Spec sheet	6050 Carbonator
Pricing (Equipment)	~$700,000
Pricing (Product)	$
Operating Cost	~$20/ton
Material/Feedstock quality	clean logs, partially burned trees, limbs, brush, stumps and other wood based debris
Material/Feedstock sizing	max. 25' length
Sorting required?	Not required
Preferred moisture content	N/A
Consumption rate	15-20 tons/hour
Production rate	1,800 - 2,200 lbs biochar/hour
Biochar certification	
Comments	

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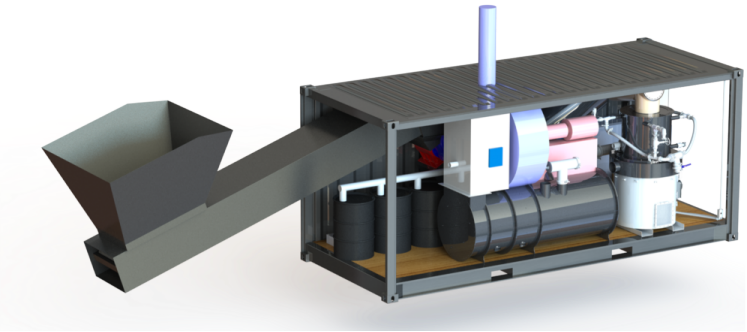
Chartainer	All Power Labs
Containerized combined Heat and Biochar (CHAB) pyrolyzer system (in development)	
Landing size	300 sqft
Equipment footprint	8’ x 40’
Utilities req’d on site	No electricity required--works in a totally off-grid context
Air permit req’d?	No
Emissions	Third-party testing has been done, the results are being finalized. Wood gases are flared.
Ground disturbance	
Transportation (Equipment)	20’ shipping container
Transportation (Product)	
In use in California	First deployment is Yosemite National Park, 2020
Spec sheet	Chartainer
Pricing (Equipment)	Beta units are $300k, final version will be $150/200k.
Pricing (Product)	Biochar can be sold in a Local Carbon Network scheme for ongoing revenue. See https://localcarbon.net/
Operating Cost	
Material/Feedstock quality	wood chips, nut shells, and other woody biomass (e.g. stone fruit pits).
Material/Feedstock sizing	1/8 inch - 2 1/2 inch
Sorting required?	Generally no. This is a fairly fuel-flexible machine if you have any standard chipper.
Preferred moisture content	<30%, generally none. This is a fairly fuel-flexible machine if a standard chipper is available.
Consumption rate	250 kg/hour
Production rate	500 kW thermal, 18%+ biochar yield by mass
Biochar certification	International Biochar Initiative (IBI)
Comments	

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ARTi Biochar	www.ARTi.com
Containerized biochar pyrolyzer system	
Landing size	600 square feet
Equipment footprint	40’ x 8’
Utilities req’d on site	200-600V (1 or 3 phase), 10GPM water supply, small propane 20lbs tanks, optional gen set or solar system
Air permit req’d?	Depends on location where equipment is deployed
Emissions	NOx, SOx, O2, PM, VOC, CO2, H2O, Analysis with Third-party testing for when it is required
Ground disturbance	Land leveling and concrete pad recommended
Transportation (Equipment)	Trailer, 40’ container
Transportation (Product)	Bulk Bags
In use in California	No
Spec sheet	Biochar Reactor (link), Biomass Dryer (link)
Pricing (Equipment)	1 Pyrolysis train Reactor and Dryer in a 40’ container $250K
Pricing (Product)	$250/ cubic yard of biochar (bulk)
Operating Cost per Ton of Biochar	Labor $50, Electricity 100KWh $15, to start: Propane 2lb $1, Internet $10
Material/Feedstock quality	Biomass waste: wood products: woodchips, pellets, sawdust, shavings, tree clearing residues; Crop residues: Corn husks and cobs, rice and oat hulls, hemp stocks; Manures, byproducts and sludges: chicken litter, bio-solids, DDG, cow fibers, horse bedding, etc. Restrictions apply.
Material/Feedstock sizing	<1 in particle size or we add grinder on the front end
Sorting required?	No. Magnetic separator and screener available for metals and big rocks if needed.
Preferred moisture content	less than 20%, more need to include the dryer
Consumption rate	10 to 50 tons per day of biomass depending on model
Production rate	2 to 10 tons per day of biochar, 5 to 50 MMBTU/Hr of thermal
Biochar certification	Started process, but not currently done
Comments	Excess Heat applications available. Handling equipment available: trough, transfer auger, super sacks filling equipment. Biochar Milling and Classifier available.

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B-1000	Biochar Solutions Inc.
Containerized biochar pyrolyzer system	
Landing size	500 x 500 ft
Equipment footprint	50 ft x 50 ft
Utilities req'd on site	3 phase 30 Amps 480 Volts
Air permit req'd?	Site dependent – we have data
Emissions	Gas and PM data are available
Ground disturbance	Needs at minimum a dirt level pad
Transportation (Equipment)	1 or 2 flatbeds
Transportation (Product)	Bulk bag on a pallet
In use in California	Yes
Spec sheet	www.biocharsolutions.com
Pricing (Equipment)	$400,000
Pricing (Product)	$200/cubic yard
Operating Cost	1 unit of labor + power as stated + cap ex over 5 years (a model is available)
Material/Feedstock quality	Clean dry wood chip
Material/Feedstock sizing	0.50 – 4.0 in chip or grind
Sorting required?	Clean dry chip
Preferred moisture content	15%
Consumption rate	1 ton per hour inbound
Production rate	1-2 yard of char per hour and 3 to 6 MMBTU thermal
Biochar certification	IBI
Comments	Preferably placed in proximity to a heating load

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Retort	Exeter Retort
Wood debris conversion system to biochar.	
Landing size	
Equipment footprint	~9’ x 5.5’ (with trailer: ~12.5’ x 7.2’)
Utilities req’d on site	None
Air permit req’d?	No
Emissions	During start-up similar to a small bonfire, then clean except for flame from the temperature control valve.
Ground disturbance	None
Transportation (Equipment)	Towed
Transportation (Product)	Bulk bagged or smaller bags
In use in California	No
Spec sheet	The Exeter
Pricing (Equipment)	~$18,000 - $22,300 (£14,350 GBP; £17,650 GBP with trailer).
Pricing (Product)	$ variable
Operating Cost	Labor cost/burn, some simple fettling required during lifetime.
Material/Feedstock quality	any solid woody biomass and animal bones
Material/Feedstock sizing	length <= 7’ , diameter <= 6” , but diameter can exceed 6” if wood cut to shorter lengths. Split wood ideal.
Sorting required?	No
Preferred moisture content	<20%, but will process green wood
Consumption rate	~60 cu ft/day
Production rate	~30 cu ft/day biochar (assuming 50% conversion efficiency by volume)
Biochar certification	None
Comments	Flue-gas capturing under development (capture, cool, clean and store syngas for use in generator/CHP unit)

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Flame Cap Kiln	Custom
Low-tech wood debris conversion to biochar.	
Landing size	
Equipment footprint	92” x 70”
Utilities req’d on site	Water supply for quenching
Air permit req’d?	No
Emissions	Similar to a well-tended small bonfire
Ground disturbance	Heat
Transportation (Equipment)	Pick-up truck, utility trailer, 4 people
Transportation (Product)	Bulk bagged or smaller bags
In use in California	Yes
Spec sheet	
Pricing (Equipment)	~$1,200
Pricing (Product)	$ variable
Operating Cost	Variable
Material/Feedstock quality	Slash, tree and vineyard prunings, reed
Material/Feedstock sizing	length <= 4’ , diameter <= 4”
Sorting required?	Yes
Preferred moisture content	<20%
Consumption rate	11 cu yd/day
Production rate	2 cu yd/day (conversion efficiency ~15-22% by volume)
Biochar certification	None
Comments	

Power/Heat Generation

PGFireBox®	Air Burners
Advanced wood debris conversion system to power/heat (air curtain burner, co-gen, CHP)	
Landing size	Less than ¼ acre for machine. 1 to 4 acres for brush pile.
Equipment footprint	Approx. 40’ x 40’ and Cooling 20’ x 8’.
Utilities req’d on site	Grid connection, 480V 3PH
Air permit req’d?	Yes - Title V Operating Permit (40 CFR part 70)
Emissions	Lowest Particulate Matter possible (<1 lb/ton). Air Burners are ACB tested and certified by the US EPA. Certified testing data for Air Burners machines is available for customer permit support.
Ground disturbance	Heat impact 4” depth.
Transportation (Equipment)	Easily moved on three flatbed trucks. All three machines are road legal dimensions, no special road permits required. All accessories pack into the three units for transportation.
Transportation (Product)	Ash and biochar is returned to the soil around the machine or collected and sold.
In use in California	Yes, currently purchased by municipalities. The PGFireBox qualifies for landfill diversion credits. Agricultural and Forestry markets.
Spec sheet	PGFirebox® - 100kW, 500kW, 1,000kW
Pricing (Equipment)	Approx. $830,000 to $4,200,000
Pricing (Product)	$
Operating Cost	Labor. The machine generates power for itself and energy (thermal or electric) to sell plus the sale of waste elimination.
Material/Feedstock quality	Clean wood waste, stumps, trees, (incl. partially burned), slash, tumbleweeds, and C&D wood waste.
Material/Feedstock sizing	Up to 29’ in length, no chips or sawdust.
Sorting required?	No sorting, grinding, chipping or any preprocessing required
Preferred moisture content	Not an issue
Consumption rate	7 to 13 tons/hour
Production rate	Biochar (if collected) approximately 10 - 15 cubic yards/day
Comments	This will revolutionize recycling, a portable system turning waste into power, allowing more finished products to come out of the forest and allowing large electrical machinery to run on batteries. Waste will be the fuel replacing diesel.

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Power Pallet	All Power Labs
Advanced wood debris conversion system to power/heat (co-gen, CHP).	
Landing size	50 sqft
Equipment footprint	75” x 56”
Utilities req’d on site	Electrical hookup: utility grid, microgrid, or directly powering machinery/storage, etc.
Air permit req’d?	No
Emissions	Emissions profile available upon request, validated from third-party testing and permitted in California.
Ground disturbance	
Transportation (Equipment)	Pallet/Crate
Transportation (Product)	Wire, pipe
In use in California	Yes
Spec sheet	PP30
Pricing (Equipment)	$65,000
Pricing (Product)	Biochar, electricity, and heat can be negotiated as part of ongoing revenue in a Local Carbon Network scheme. See https://localcarbon.net/
Operating Cost	
Material/Feedstock quality	Woody biomass (wood chips, nut shells, stone fruit pits) with processing (chipping and some sorting)
Material/Feedstock sizing	1/2 inch – 1 1/2 inch (1 cm – 4 cm)
Sorting required?	Yes
Preferred moisture content	5% – 30%
Consumption rate	1.0 kg/kWh
Production rate	25 kW electric, 50 kW thermal, 5% yield biochar 50 kW electric, 100 kW thermal, 5% yield biochar
Biochar certification	International Biochar Initiative (IBI)
Comments	Machinery can be paired with an atmospheric water generator for water extraction from biomass or an adsorption chiller for combined cooling, heating, and power.

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Power Pallet Hybrid Container	All Power Labs
Modular power plant converting clean wood waste into on-site, on-demand electricity in a variety of configurations for both on, off-grid, and microgrid use.	
Landing size	650 sqft
Equipment footprint	23’ x 16’
Utilities req’d on site	Electrical hookup: utility grid, microgrid, directly powering machinery/storage, etc.
Air permit req’d?	
Emissions	Emissions profile available upon request, validated from third-party testing and permitted in California.
Ground disturbance	
Transportation (Equipment)	20’ shipping container
Transportation (Product)	Wire
In use in California	No
Spec sheet	PPHC130
Pricing (Equipment)	Finalized product will be ~$300k
Pricing (Product)	Electricity and heat can be negotiated as part of ongoing revenue in a Local Carbon Network scheme. See https://localcarbon.net/
Operating Cost	
Material/Feedstock quality	Woody biomass (wood chips, nut shells, stone fruit pits) with processing (chipping and some sorting)
Material/Feedstock sizing	1/2 inch - 1 1/2 inch (12-40 mm)
Sorting required?	Yes
Preferred moisture content	<80%
Consumption rate	250 kg/hour
Production rate	250 kW electric, 500 kW thermal.
Comments	Beta unit requiring further development.

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Syngas/Biochar/Bio-Oil Production

Containerized Pyrolysis Module	Biogreen
Thermochemical conversion through torrefaction, pyrolysis, or gasification processes to convert useful energies or resources from waste products.	
Landing size	
Equipment footprint	40’ x 8’
Utilities req’d on site	400V 3PH, 100 kW; water for char cooling: 4m3/hour
Air permit req’d?	No
Emissions	None
Ground disturbance	
Transportation (Equipment)	40ft shipping container
Transportation (Product)	Wire, barrel, bulk bagged
In use in California	No
Spec sheet	Biogreen CM 600
Pricing (Equipment)	>$1MM
Pricing (Product)	$ variable
Operating Cost	
Material/Feedstock quality	Wood chips, sawdust, nut shells, dry sludges, plastics, RDF/SRF (Refuse derived fuel/Solid recovered fuel), calorific fractions of municipal and industrial waste;
Material/Feedstock sizing	<=20mm
Sorting required?	
Preferred moisture content	10% - 20%
Consumption rate	Up to 16 tons/day
Production rate	Up to 4.8 tons/day biochar; up to 8 tons/day bio-oil; up to 10 MJ/m3, up to 450 kW (9 MWh/day) syngas
Biochar certification	None
Comments	

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Modular Gasification Unit	VGrid Energy
Thermochemical conversion through gasification process to electricity and biochar.	
Landing size	1,000 sq ft
Equipment footprint	9’ x 29’, 4’ x 11’
Utilities req’d on site	Water for cooling, power grid access if net metering
Air permit req’d?	
Emissions	Meets San Joaquin Valley Air Pollution Reqs
Ground disturbance	Concrete slab or rock bed
Transportation (Equipment)	2 trailers; 1 gasifier + 1 genset
Transportation (Product)	Super sacks or drums
In use in California	Yes
Spec sheet	BioEnergy Server – Model 100
Pricing (Equipment)	$450,000
Pricing (Product)	variable
Operating Cost	3 people per 5 units
Material/Feedstock quality	Wood pellets, small wood chips, nut shells, other as reviewed
Material/Feedstock sizing	<=3/4 inch
Sorting required?	must remove small fines
Preferred moisture content	<20% or heat required to dry on input
Consumption rate	250 lbs/hour
Production rate	up to 35 lbs/hour, depending on feed rate
Biochar certification	Certified in CA for animal feed and soil amendment
Comments	

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Solid Fuel

Pelleting line	EcoKraft
Sawdust to heating pellets	
Landing size	
Equipment footprint	~6’ x 30’
Utilities req’d on site	Electricity (400V 3PH)
Air permit req’d?	No
Emissions	None
Ground disturbance	None
Transportation (Equipment)	Pallet/Crate
Transportation (Product)	supersacs, bins
In use in California	No
Spec sheet	PL1
Pricing (Equipment)	~$110,000
Pricing (Product)	$
Operating Cost	
Material/Feedstock quality	clean sawdust and shavings
Material/Feedstock sizing	<=6mm
Sorting required?	
Preferred moisture content	
Consumption rate	~ 400 lbs/hour
Production rate	~ 400 lbs/hour
Comments	

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Briquetter	RUF
Briquetting of wood shavings, sawdust, wood chips.	
Landing size	
Equipment footprint	Various; smallest 52” x 59”, largest 118” x 130”
Utilities req’d on site	Electricity (400V 3PH)
Air permit req’d?	No
Emissions	None
Ground disturbance	None
Transportation (Equipment)	
Transportation (Product)	
In use in California	Yes
Spec sheet	Wood and Biomass Briquetter
Pricing (Equipment)	$35,000 to $300,000
Pricing (Product)	
Operating Cost	Varies by machine and materials
Material/Feedstock quality	wood chips, saw dust
Material/Feedstock sizing	shavings, sawdust, chips
Sorting required?	No
Preferred moisture content	<15%
Consumption rate	various; smallest 120 lbs/hour, largest 3,300 lbs/hour
Production rate	various; smallest 120 lbs/hour, largest 3,300 lbs/hour
Comments	

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Lumber

Portable sawmill	Wood-Mizer
Whole logs to cants and boards.	
Landing size	
Equipment footprint	
Utilities req'd on site	no
Air permit req'd?	
Emissions	
Ground disturbance	
Transportation (Equipment)	Trailer
Transportation (Product)	Trailer
In use in California	
Spec sheet	
Pricing (Equipment)	$3,000 to $16,000
Pricing (Product)	
Operating Cost	
Material/Feedstock quality	logs
Material/Feedstock sizing	
Sorting required?	
Preferred moisture content	
Consumption rate	
Production rate	
Comments	

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Erosion Control

WoodStraw® ECM	Forest Concepts Mountain Pine Manufacturing
Engineered wood strand erosion control mulch.	
Landing size	NA (bales may be delivered on pallets for staging)
Equipment footprint	NA
Utilities req'd on site	NA
Air permit req'd?	
Emissions	NA
Ground disturbance	NA
Transportation (Equipment)	NA
Transportation (Product)	Tarped flatbed truck or dry van like hay
In use in California	Yes
Spec sheet	www.woodstraw.com
Pricing (Equipment)	$ NA
Pricing (Product)	$ Volume dependent, call for pricing
Operating Cost	
Material/Feedstock quality	
Material/Feedstock sizing	
Sorting required?	
Preferred moisture content	
Consumption rate	
Production rate	
Comments	WoodStraw® bales are transported long distances by tarped flatbed trucks just like hay. Bales can be palletized to simplify loading, handling at work centers, and reloading. There are either 20 or 24 regular bales per pallet and three large bales per pallet. Regular bales are the same cross section as hay bales but shorter to keep the weight around 50 lbs to meet FS ergonomic standards. Large bales are around 800 lbs depending on moisture content.

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Wood Shred	USDA Forest Service
Wood strand erosion control mulch.	
Landing size	
Equipment footprint	
Utilities req'd on site	
Air permit req'd?	
Emissions	
Ground disturbance	
Transportation (Equipment)	
Transportation (Product)	
In use in California	
Spec sheet	Wood Shred
Pricing (Equipment)	$
Pricing (Product)	$
Operating Cost	
Material/Feedstock quality	clean logs, partially burned trees
Material/Feedstock sizing	
Sorting required?	
Preferred moisture content	
Consumption rate (x per hour)	
Production rate (x per hour)	
Comments	

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