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# MAttress Recycling Council Wood Market STudY

# Executive Summary

The Mattress Recycling Council (MRC) contracted with SCS Engineers’ (SCS) to conduct research on markets for wood dismantled from box springs (e.g. foundations) at the ten recyclers under contract to MRC in California. MRC’s mandate with CalRecycle require the program to achieve a 75% recycling rate by 2020. To achieve this rate, it is important that all wood extracted from box springs be recycled through such processes as reuse, mulching, composting, or biomass production.

MRC wanted to understand the capacity and viability of secondary wood markets in California with the primary objective to identify sustainable and financially viable outlets for all its recyclers. The following information summarizes the findings from this research.

## End Market Survey participants

To initiate the study, SCS staff identified 352 facilities using CalRecycle’s Solid Waste Information System (SWIS) database, and the Wood Products Primary Processing & Biomass Energy Facilities list from UC Berkeley. SCS reviewed the list and removed 169 facilities that do not take material from the public or do not process wood. SCS contacted 173 facilities to understand if they accept wood with minimal contamination, potential tip fees, requirements for drop off or collection, and interest by the facility in the wood originating from the recyclers. Of the 173 facilities contacted, 100 did not return our calls after three attempts, and 73 facilities indicated they would accept wood with limited contamination. The average tipping fee at each facility is $53.74 per ton, with the minimum $0 per ton and the maximum $250 per ton. The average distance between mattress recyclers and the end market facility is 14 miles. The results of the survey, including the questions asked, can be found in Attachment A.

## Facility Visits and Outcomes

SCS visited the ten recyclers under contract with MRC. The purpose of the site visit was to evaluate the methods and equipment used to separate wood from metal in box springs, to understand their process, and confirm how MRC might help with identification and development of end markets.

The site visits revealed that all ten facilities operate similarly. All facilities remove fabric by hand and use a pallet shear to remove metal springs. All facilities have some contamination that is left on the wood, including a small amount of fabric, plastic and metal staples.

Using the information from the wood end market survey, SCS identified and gathered information from the end markets that were located within 25 miles of each recycler to evaluate the opportunities to increase wood recycling. Each recycler was provided an individual summary of its facility practices, volumes, and potential end markets.



## Alternative Wood Markets

MRC wanted to understand the viability of alternative wood markets in California with the primary objective to identify sustainable and financially viable outlets for all the recyclers. Wood taken to many of the facilities identified during the survey is used as Alternative Daily Cover (ADC), biomass energy generation, or mulch. Two of the three uses listed are going to be a problem in the near future due to AB 1594 and the closure of biomass facilities. California’s AB 1594 will commence January 1, 2020 and the use of green material as ADC will not constitute diversion through recycling. Additionally, California biomass facilities are closing or decreasing the amount of material they can accept. To address these concerns, SCS researched and provided reports regarding five alternative wood markets.

### BioChar

Biochar is a type of charcoal formed from pyrolysis, gasification, torrefaction or hydrothermal carbonization of lignocellulosic organic matter, with waste wood being a common feedstock. Biochar differs from traditional charcoal in that it is used as an addition to soil (referred to as a soil amendment) which can improve soil fertility, nutrient retention, microbial processes, and improve soil drought resistance. The untreated softwood generated from recycled box springs is an acceptable feedstock that carries very low risk of toxicity and is technically easy to process via pyrolysis. This wood would require little to no pre-processing (depending on the specific pyrolysis system), even with staples or fabric contamination, and has a proven track record as a feedstock in the biochar industry. SCS reviewed available biochar technologies, applications of wood waste-derived biochar, and feedstock requirements and characteristics for biochar production.

### NOWON. LLC

NOWON has a patented, innovative technology, which offers an efficient and cost-effective alternative to landfill disposal. NOWON has established an operation in the US to distribute and market the Thermal Pressure Hydrolysis (TPH) technology. The TPH technology converts waste into biomass. Biomass can produce solid biofuel pellets, compost, fertilizers, and processed feedstock for anaerobic digesters. The TPH technology can accept any volume of all types of wood. A pilot Research and Development facility is in operation in Southern California. This technology should be explored further to understand its full potential for wood markets, and if the technology will be considered diversion under California laws and regulations.

### Particle Board

Particleboard is a manufactured, dry-formed, wood-based composite made up of particles of millimeter dimensions. “Soft” wood species with a high density are preferred in the manufacturing of particleboard. Manufacturers of particleboard prefer using recycled wood because recycled wood is inexpensive compared to other materials, is typically very dry and therefore easy to process, and is more environmentally friendly to use than virgin lumber. Current identified markets estimate particleboard manufacturing in California facilities process 300-700 tons per day of bone-dry wood.

### Pine Wood Chips

Pine wood chips (PWCs) are small pieces of pinewood that have been ground up and can be used to aid plant growth as a substrate in growing mediums. Use of wood products in the substrate manufacturing market is an area of interest to substrate manufacturers, and several studies have been conducted to determine if PWCs can replace perlite. Substrate manufacturers are not currently using recycled wood, and there is no current evidence of testing recycled wood in the industry. To determine if there is a market for wood extracted from recycled box springs, a substrate manufacturer would need to test the material to determine if the quality meets their standards.

### TREX

TREX constructs composite decking from a mix of 95% recycled material, including sawdust and polyethylene film. TREX accepts only hardwood products, meaning the softwoods reclaimed from mattresses are not acceptable for TREX’s purposes. Currently, TREX does not appear to be a viable solution for soft wood from MRC’s network of mattress recyclers.

## Shredders and grinders

While researching the alternative wood markets listed above, SCS found some markets required material to be delivered pre-shredded and free of metal contamination. As a result, SCS researched a number of chipping, shredding and grinding equipment manufacturers in order to understand costs, input requirements and logistical considerations. SCS contacted seven companies that sell shredders or grinders: Bandit; CBI; Doppstadt; Komptech; Metso; Shred-Tech and SSI. Each company has a variety of products that come in different sizes, styles and features.. SCS provided MRC and each recycler detailed reports of each company, the varying components of its equipment, and recommendations based on interviews conducted with each company as well as cost.