TOMRA

Waste Wood Recycling

A guide to producing quality
wood-based recycled content.

Extending the lifecycle of wood

Globally, the wood recycling market is growing rapidly. Panelboard manufacturers are increasing their reliance on recycled wood primarily to access materials, but modern technology also helps them develop higher-quality products. Recycled wood content enables the panel industry to achieve higher yields and outputs while profiting from considerable cost reductions.

Millions of tons of wood waste from forestry, construction, and manufacturing that could be recycled end up in landfill or being used as fuel. Maximizing resources depends on the collection, sorting and recycling of wood waste. Technology-driven solutions offer recyclers, manufacturers, and wood biomass production chains new opportunities to create added value and potentially new revenue streams.

Extending the material lifecycle and boosting sustainability requires non-processed wood (Wood A) and different types of processed wood (Wood B) to be identified and separated into high-purity fractions. The future of wood recycling depends on sorting systems that effectively separate woodchips by type – from plywood to MDF and more.

Waste wood processing in a circular economy

Collection

Cleaning
(remove contaminants)

Sort wood by type

Recovery of recycable woodchips

Panel production

Consumer goods

A market with untapped potential

An estimated 27 million metric tons of waste wood is produced in high income countries around the world each year.[1] Today, only a tiny portion of waste wood is recycled into new products. As the infrastructure for waste wood recycling continues to develop, the opportunities in this market show incredible promise.

With the particleboard industry expecting massive growth and limited supplies of fresh wood resulting in price volatility, manufacturers are turning to recycled wood content to meet demand. Wood recyclers are also benefitting from these trends, expecting similar growth in the same timeframe. Once infrastructure for wood recycling is in place, demand for recycled wood content will continue to grow.

Recycled wood content offers more durability and lower moisture content, making it an economically viable option for manufactures. Extending the lifecycle of wood promotes sustainability by conserving trees and energy used to mill lumber. What's more, it diverts waste from landfills and reduces disposal costs.

1   World Bank (2018). What a Waste 2.0. Calculation based on 4% waste wood composition in high-income countries that generate 683 million tonnes of the the world's waste per annum.
2   Mordor Intelligence. Particle Board Market – Growth, Trends, Covid-19 Impact and Forecasts (2022-2027).
3   Expert Market Research. Global Wood Recycling Market Outlook (2022-2027)

Wood Recycling Market

▸ **5.07 Billion**
USD Value

▸ **5% CAGR**
expected until 2027[3]

Particleboard Market
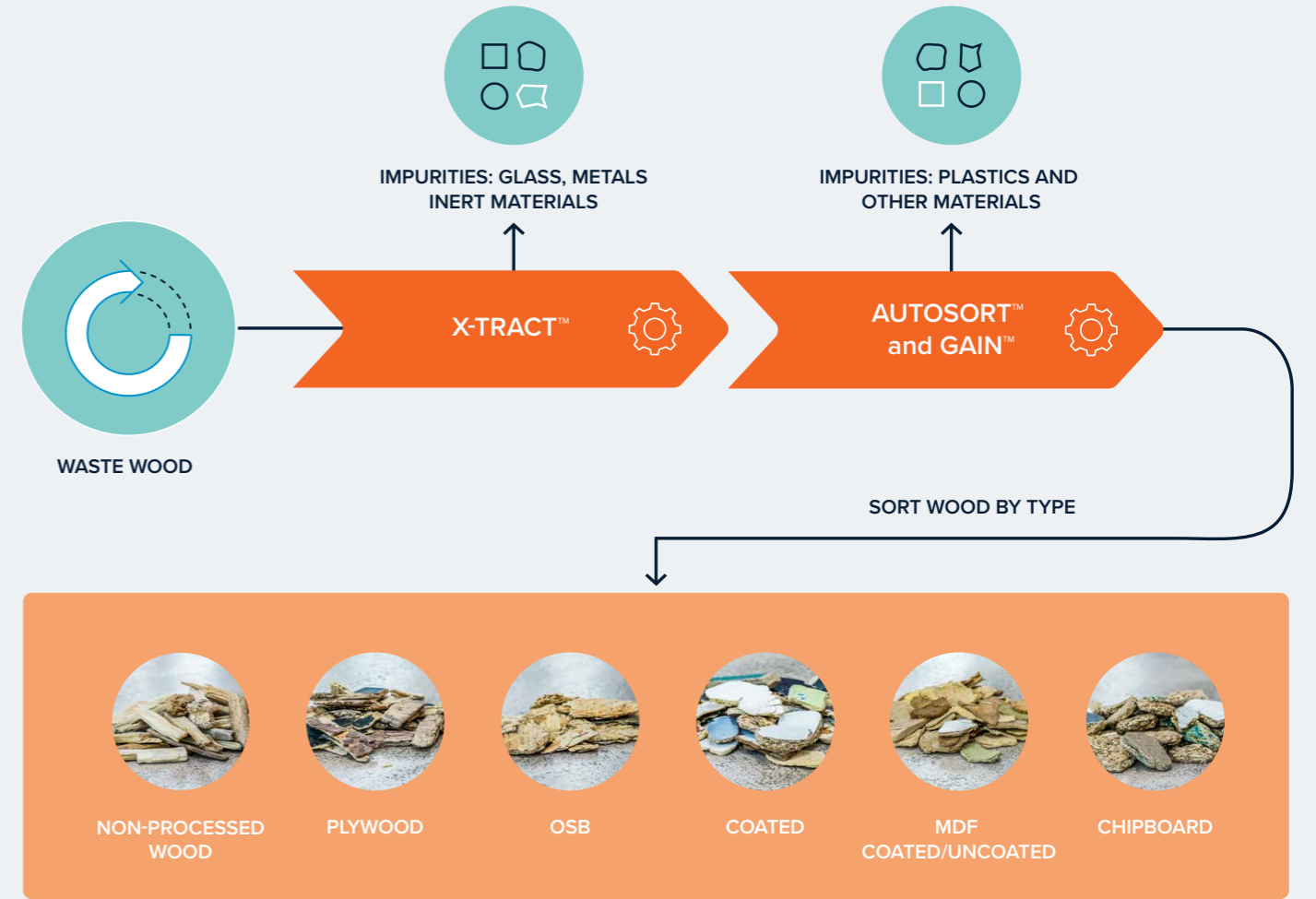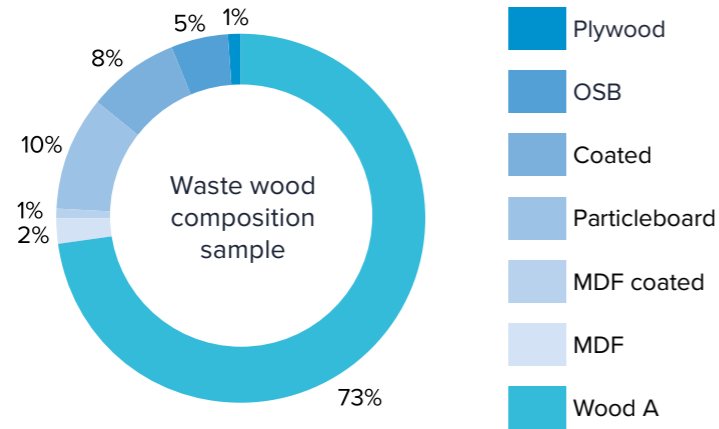
▸ **21 Billion**
USD Value

▸ **5% CAGR**
expected until 2027[2]

From waste to high value wood chips

High-precision analysis of the composition of waste wood is paramount for recycling and cascading use. Whether sorting wood from the construction and demolition sector, recycling depots or wood biomass production, the material stream is always highly variable and complex. Effectively sorting waste wood at an industrial scale requires modern systems to achieve higher throughput and purity levels.

Scaling the recovery of recyclable wood chips to meet future market demand requires advanced sensor technologies to remove impurities like metals, glass, inert materials and plastics. Data-driven software and deep learning neural networks take sorting capabilities to the next level by classifying and sorting wood by category and type.

Waste wood composition sample

- 1% Plywood
- 5% OSB
- 8% Coated
- 10% Particleboard
- 1% MDF coated
- 2% MDF
- 73% Wood A

WASTE WOOD

X-TRACT™
IMPURITIES: GLASS, METALS INERT MATERIALS

AUTOSORT™ and GAIN™
IMPURITIES: PLASTICS AND OTHER MATERIALS

SORT WOOD BY TYPE

- NON-PROCESSED WOOD
- PLYWOOD
- OSB
- COATED
- MDF COATED/UNCOATED
- CHIPBOARD

Conventional sorting methods

Traditional cleaning methods, combining magnets, eddy currents and air separators are favorable options for smaller plants that do not need high throughput and purity levels. For particleboard manufacturers that require higher volumes and only use a limited percentage of recycled wood,

multi-stage cleaners are commonplace investments as they can ran up to 50 metric ton throughput. Advanced sensor-based sorting technology is necessary to achieve the purity levels required for increasing the amount of recycled wood content in particleboards.

Sorting Method	Task	Purity Levels	Energy Consumption	Volume Throughput	Initial Investment
Air Separators	Removes impurities with different density	low	high	limited	low
Water Separators	Removes impurities with different density	low	low	limited	low
X-Ray Sorter	Removes impurities	high	low	high	moderate
Multiple-stage Cleaning Systems	Removes impurities	moderate	moderate	high	high
All-in-one Sorters (NIR, X-Ray)	Removes impurities, Wood A/B	moderate	high	limited	moderate
Optical Sorter (NIR)	Enhanced purification, Wood A/B	high	low	limited	moderate
Optical Sorter + Deep Learning	Enhanced purification, Wood by type (A/B, MDF, etc.)	high	low	limited	moderate

Modern sorting systems

The demand for high purity fractions of non-processed wood (Wood A) and engineered wood types like MDF continues to rise and shows no signs of a trend reversal. The future of wood-based manufacturing and a closed-loop bioeconomy requires solutions beyond Wood A/B sorting, enabling multiple types of processed wood to be recycled.

Sensor-based sorting systems with x-ray transmission (XRT) and deep learning (GAIN™) technology, are at the forefront of advanced waste wood processing. As an alternative or complementary solution to multiple-stage cleaning systems, optical sorters are an economically sound investment because they are capable of processing large volumes of material and thanks to the deep learning, even sort material by type.

High-precision sorting solutions can combine multiple technologies to maximize sorting flexibility and reduce long-term operating costs. While all-in-one machines may be attractive for plants with limited space, there is a significant compromise on throughput and performance levels.

Our intelligent wood sorting solution

TOMRA is a pioneer and global leader in the advanced sorting of waste wood. As the world's first solutions provider to apply deep learning technology to separate wood chips by material type, our holistic approach to waste wood processing ensures high purity levels, operational flexibility and a quick return on investment.

For over a decade, particleboard manufacturers and recyclers have relied on our X-TRACT™ sorting system. The x-ray transmission (XRT) sorting unit detects wood objects in complex mixed waste streams based on its atomic density. With its high throughput processing of up to 30 metric tons per hour, the field-proven sorting machine excels at removing impurities like metals, glass and inert materials of sizes down to 5 mm in size.

In 2021, we introduced yet another groundbreaking innovation in wood sorting. GAIN™, an add-on technology for our AUTOSORT™ unit, uses artificial neural networks trained with thousands of labeled images to classify different types of wood chips. The deep learning-based technology sets new benchmarks in wood recycling, making it possible to sort Wood A/B, MDF, coated materials and more.

With our expertise and technology that continues to evolve, we look forward to developing even more applications for wood-based industries.

Up to 30 t/h capacity

Sorts by wood type

Deep learning technology

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