

Digital Tools to Turbocharge Recycling

Doctor Scrap is harnessing AI to help manufacturers procure the correct grade of recycled metals and lower their greenhouse gas emissions

Executive Summary

Historically, the fragmented scrap industry has relied heavily on manual, subjective sorting. In the non-ferrous metal market, where different grades of materials can look identical to the naked eye, this reliance has held back the international trade in recycled waste.

Founded in Florida in 2021, Doctor Scrap has set about harnessing advances in artificial intelligence (AI) to automatically grade scrap metals. It has developed an "industrial-grade computer vision" system, which can instantly decode the exact alloy composition and purity of scrap metal with greater than 95% accuracy, according to the company. Doctor Scrap has also established a business-to-business (B2B) marketplace, which uses AI to automatically value scrap material and match the seller with an appropriate buyer.

Doctor Scrap says its software is now used by thousands of businesses around the world. Its customer base includes several high-volume traders, processors and consumers of recycled metals, including Texas-based C&Y Global, India-based CMR Green Recycling Ltd, Illinois-based shredding plant operator Cimco Resources, and Italy-based Zoffoli Metalli Srl.

To date, Doctor Scrap's platform has processed 300,000 tons of verified scrap metal, which has been fed back into manufacturing, the company says. By displacing the need for virgin mining, Doctor Scrap estimates it has effectively mitigated more than two million tons of CO_2 emissions.

The business continues to grow rapidly. After facilitating US$100 Million in GMV (gross merchandise value) in 2025, the company says it has already received US$900 million in confirmed orders for 2026-2027. "Our ultimate vision is to become a 'social unicorn'—a company that not only generates billions in revenue, but permanently eliminates over 100 million tons of CO_2 from the global supply chain every single year, proving that AI is the key to a zero-waste future," says Thomas Tan, the founder and CEO of Doctor Scrap.

Recognised by the 4YFN Awards

This case study highlights a 4YFN26 Awards finalist - one of a select group of startups chosen from a global pool through a rigorous selection process led by top investors and industry leaders. The 4YFN Awards, held in partnership with the GSMA Foundry, spotlight the most promising digital startups shaping the future of innovation.

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Many manufacturers need high-quality non-ferrous metals, such as copper and aluminium. Rather than sourcing metals from virgin ores mined from the ground, most businesses prefer to buy recycled materials. Doing so reduces their carbon footprints, helping to meet targets to lower greenhouse gas emissions in their supply chains.

But, historically, sourcing high-purity recycled non-ferrous metals hasn't been easy. That's because the traditional scrap industry is highly fragmented, opaque and relies heavily on manual, subjective sorting.

These issues are compounded by the fact that different grades of non-ferrous metals can look identical to the naked eye. That means human workers might mistake high-value silicon bronze for low-value yellow brass or vice versa. "We call this problem material invisibility," says Thomas Tan, CEO and founder of Doctor Scrap, which uses digital technologies to improve recycling. "This leads to massive trust issues across borders—a buyer in Thailand cannot trust the manual grading of a seller in Germany. Because the quality and purity cannot be instantly verified, this recycled material is deemed too "risky" for high-end manufacturing. As a result, valuable metals are downgraded into cheap materials or lost in the supply chain, forcing major companies to keep mining carbon-intensive virgin ores from the earth."

After reflecting on this challenge at his home in Florida, Thomas Tan, a veteran of North America's recycling industry, founded Doctor Scrap in 2021. The goal was to help enterprises around the world answer two key questions: "what is this scrap?" and "what is it worth?".

Backed by seed funding from MiraclePlus, a spin off from the former Y Combinator China, Thomas Tan went about harnessing advances in artificial intelligence (AI) to grade scrap metals, with a view to turning non-descript piles of waste into machine-readable digital assets. Based in Arcadia, California, Doctor Scrap spent three years building a "Scrap Wiki", covering more than 500 waste categories, and training its AI models on millions of scrap images to perfect their accuracy.

It now has an "industrial-grade computer vision" system, which can instantly decode the exact alloy composition and purity of scrap metal with more than 95% accuracy, according to the company. It has integrated this technology into several software products. Users of its Scrap Science app, for example, can take a photo of some waste, which is then analysed by Doctor Scrap's AI model running in the cloud. Doctor Scrap describes this approach as "a practical, mobile-first alternative" to existing material identification methods, such as X-ray fluorescence analysers.

Matching graded materials with buyers

Doctor Scrap has established a B2B marketplace using AI agents to value waste material in real-time and match sellers with buyers. By linking directly to global exchange benchmarks like LME and COMEX and factoring in purity premiums, our engine accurately reflects the scrap's true market value to eliminate pricing opacity. "We use multiple AI agents to execute the entire trade—handling the complex cross-border logistics, customs documentation, financing, and secure payments," adds Thomas Tan.

As a third-party platform, Doctor Scrap charges service fees to both buyers and sellers separately after a transaction has been completed. The standard platform service fee is either US$20/ton or US$10/ton, depending on the value of the goods.

To reassure potential buyers, Doctor Scrap says it reviews and certifies the suppliers using the platform, conducting "comprehensive background checks on their business qualifications, industry reputation, and basic information." Buyers can also view the transaction history and reputation data of each supplier on the platform.

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Thomas Tan - CEO and founder of Doctor Scrap





Doctor Scrap also provides several systems to improve the efficiency and effectiveness of recycling plants. For example, it has developed a specialist enterprise resource management (ERP) system that is designed to provide one-stop management of data including inventory, quality, price and costs. To serve recycling plants processing large volumes of materials, Doctor Scrap has also developed AI software that can guide robotic sorting arms to physically separate the metals, achieving an industrial-grade purity of 99%+ without human error.

Since 2024, Doctor Scrap says it has scaled its software to thousands of users around the world, winning enterprise contracts, and integrating its system into logistics networks. The app's customer base includes several high-volume recyclers, processors and consumers of recycled metals, including Texas-based C&Y Global, India-based CMR Green Recycling Ltd., Illinois-based shredding plant operator Cimco Resources, and Italy-based Zoffoli Metalli Srl,

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Samantha Valli - Sales Manager at Zoffoli

according to Thomas Tan.

Zoffoli, a major wire recycling plant, is using Doctor Scrap to assess the content of cable scrap. "I didn't expect them to be able to calculate the wire content so accurately," says Samantha Valli, sales manager at Zoffoli. "Doctor Scrap's AI wire content assessment technology has been a great help to our scrap wire recycling business; now we no longer have to guess!" Doctor Scrap says its partnership with Zoffoli is expanding sales of recycled aluminium and copper in the Americas, together with wire products in Europe, boosting the Italian company's global competitiveness in scrap metal recycling.

For C&Y Global, Doctor Scrap says it developed an ERP system and other software to enhance the recycling company's operational efficiency and to boost its growth in North America, facilitating 10,000 tons of sales in six months. The two companies have also established a joint venture to provide specialist ERP systems to the North American recycling industry. "We fully support Doctor Scrap's vision of using AI and digital technology to advance the recycling industry," says Jane Chen, CEO of C&Y Global. "The Doctor Scrap and Scrap SaaS products have greatly improved our efficiency and are the best we've used. Their impact has been clear to us and the industry, and we look forward to their continued success."

On the demand side, Doctor Scrap is working directly with major manufacturers and brands, including AB InBev, one of the world's largest beer companies. "They collaborate with us to source traceable, high-purity recycled metals to close their supply chains and hit ESG goals," explains Thomas Tan. "Doctor Scrap has scaled over 150 recycling projects with AB InBev across more than 30 countries."

Building trust across international borders

By improving the flow of information between previously disparate parties, Doctor Scrap is aiming to build a trusted and transparent global recycling ecosystem. On the supply side, it has identified more than 10,000 verified recycling yards and processors across more than 170 countries. The goal is to give all of these small and medium enterprises access to a global market, as well as fair pricing.

As cross-border trade in waste is heavily regulated, Doctor Scrap is engaging with regulatory authorities to make it easier for materials to be recycled across international borders. For example, Doctor Scrap says it is collaborating directly with the General Administration of Customs of China to pilot a "smart customs" project. "We use drones and AI to automate scrap inspections, making legal cross-border trade faster and safer," adds Thomas Tan.

After joining the Google for Startups Accelerator in

2022, Doctor Scrap's annual transaction volume has grown from US$4 million to more than US$100 million. To date, Doctor Scrap's software has processed 300,000 tons of verified scrap metal, which has been fed back into manufacturing, the company says. By displacing the need for virgin mining, Doctor Scrap estimates it has effectively mitigated more than two million tons of CO2 emissions, while achieving a validated 1:2500 energy leverage ratio. This means for every 1 kWh of electricity its AI system consumes to identify and sort materials, Doctor Scrap saves 2,500 kWh of energy that would have been wasted smelting new metals. In recognition of these achievements, the company won the 4YFN Climate Tech Award at MWC 2026.

"We successfully facilitated US$100 million in GMV (gross merchandise value) in 2025," adds Thomas Tan. "Because industrial demand for verified materials is so high, we have already secured an astonishing US$900 million in confirmed orders for 2026-2027 (a 9x year-over-year growth). By standardising the grading process, we have also reduced international quality dispute rates by 50%."

To date, the business has funded its growth through the service fees generated by its solutions. But Doctor Scrap is now looking to attract investors, both to fund further geographic expansion, and the ongoing development of mobile robots that can automate the sorting of scrap. While non-ferrous metals will remain an area of focus, Doctor Scrap also plans to start taking on WEEE (waste electrical and electronic equipment)-related projects.

Mixing sustainability and profitability

Doctor Scrap's progress to date points to the potential to further digitise and expand the global waste management market, which was valued at US$1.52 trillion in 2025. Rising industrial demand for recycled aluminium, copper, and other non-ferrous metals, as well as advances in scrap collection and processing technologies, will drive the non-ferrous metal recycling market to grow by 5.2% in 2026 to be worth US$249 billion, according to a report by Research and Markets. The analyst firm notes that technological advancements in sorting and separation are improving recovery efficiency.

"The wider implication is that sustainability can be highly profitable," adds Thomas Tan. "Right now, the global average recycling rate is stuck at 20%; our technology is the infrastructure needed to push that to 50% and beyond."

By guaranteeing the purity and origin of scrap metal, Doctor Scrap says it is helping create a global "Green Premium" market in which manufacturers are willing to pay higher margins for traceable, recycled metals than for newly mined ones. "Our ultimate vision is to become a "social unicorn"—a company that not only generates billions in revenue, but permanently eliminates over 100 million tons of CO2 from the global supply chain every single year, proving that AI is the key to a zero-waste future," says Thomas Tan.

Doctor Scrap's long-term goal is to achieve a 100% recycling rate for scrap materials worldwide. "We are committed to transforming the scrap recycling industry through artificial intelligence, delivering efficient, intelligent, and precise solutions for customers across the globe," concludes Thomas Tan. "By replacing subjective guesswork with objective data, we have unlocked explosive commercial growth and massive environmental benefits. Scrap is not waste. There are no discarded materials—only resources waiting to be repositioned."

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Thomas Tan - CEO and founder of Doctor Scrap



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Doctor scrap

Doctor Scrap is a world-leading high-tech service platform dedicated to the global renewable recycling industry. Guided by the vision of achieving a 100% sustainable recycling rate for global scrap and renewable resources, we empower the traditional recycling sector with cutting-edge artificial intelligence technologies. Our mission is to digitize, intelligently upgrade, and standardize the global scrap recycling value chain, delivering efficient, accurate, and scalable intelligent solutions for industrial clients and partners worldwide.

We offer a full-spectrum product matrix covering digital trading, intelligent management, industrial training, intelligent sorting equipment, and cross-border compliance services, fully enabling the whole lifecycle operation of renewable resource enterprises:

Our software intelligent system portfolio includes the AI Scrap Intelligent Identification System, AI Real-time Price Forecasting Model, Exclusive AI-powered ERP Management System for recycling enterprises, and Professional Recycling Industry Training System. Meanwhile, our Global Digital Scrap Trading Platform breaks regional trade barriers and builds a transparent, efficient, and credible cross-border trading ecosystem for global renewable resource transactions. In addition, our system conducts pre inspection to detect non metallic inclusions and impurity content within scrap materials, assessing whether cargo meets official customs import standards before shipment, help enterprises avoid compliance risks, and greatly improve the efficiency and pass rate of global scrap import and export customs clearance.

We have independently developed AI powered sorting robots tailored for the renewable recycling industry. Equipped with high-precision identification, automatic sorting, and stable grabbing capabilities, effectively improving industrial production efficiency.

Integrating software algorithms, intelligent hardware, and cross-border compliance services, Doctor Scrap builds an all-round intelligent recycling ecosystem, driving the high-quality and sustainable development of the global renewable economy.

https://www.doctorscrap.com/

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