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# GLOBAL RECYCLING

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# Recycling Supports the Transition to Sustainability

Brigitte Weber
Editor-in-Chief

Recycling is worldwide gaining ground as more and more countries promote the circular economy. A recent example is India. The government of the world's most populous country is convinced that India – with a new legal framework regarding solid waste management and a strategy aiming at a well-functioning circular economy – will be able to achieve economic resilience, environmental sustainability and social security. As a result, the country seeks to harness the economic advantages of recycling. Those interested can find more information about this topic on page 3 and beyond.

This is not the only evidence that recycling plays an important role for the transition to more sustainability. Regarding the construction industry, for instance, an increasing number of initiatives is devoted to circular economy and low-carbon solutions. At Marmomac (23-26 September this year, Veronafiere, Italy), an important world fair dedicated to the entire stone production chain, the exhibition platform "Stone Next" presented for example a new system for low-carbon circular architecture: Stone 3D Printing, developed by Swiss ETH Zürich. Made with 80 percent recycled stone and a low-impact binder, it would combine material circularity with digital precision, the information said.

Another example is the now officially launched Horizon Europe project "Bios Mater", co-funded by the Circular Bio-Based Europe Joint Undertaking (CBE JU) and the European Union. The initiative aims to transform the construction sector by introducing advanced bio-based materials, applying circular economy principles, and implementing Safe-and-Sustainable-by-Design (SSbD) solutions to ensure health, safety and environmental responsibility throughout the building lifecycle. Four bio-based products will be tested in a dedicated "DEMOpark" under real conditions to prove their performance, scalability, and environmental impact. The project brings together 22 partners from ten countries.

Further advancements in technology could also be beneficial for the recycling industry. According to global business market research and consulting firm Verified Market Reports, the global mattress recycling service market is projected to reach 2.5 billion US-Dollar by 2033. The increasing demand for sustainable disposal methods and recycling initiatives is expected to drive an annual growth rate of 4.8 percent from 2022 to 2030. However, mattress recycling is implemented globally, but not in every country (page 32 onwards).

As far as plastics recycling is concerned, the European plastics market has recently become increasingly challenging. According to the German company Source One GmbH, the solution can be a holistic approach, described on page 10. Moreover, the American company PureCycle Technologies LLC has big plans regarding its patented dissolution technology for polypropylene recycling (page 14).

We hope you get a lot of new and useful information from reading this current magazine.

Yours
Brigitte Weber (weber@msvgmbh.eu)

Cover Photo: MSV, AI-generated










Photo: MSV, AI-generated

# INDIA: ON THE ROAD TO SUSTAINABLE GROWTH AND RESOURCE EFFICIENCY

With a new legal framework regarding solid waste management and a strategy aiming at a well-functioning circular economy, the Indian government is convinced that the country can achieve economic resilience, environmental sustainability, and social security.

In December 2024, the Indian Ministry of Environment, Forest and Climate Change (MoEFCC) introduced draft rules on solid waste management (SWM) for public consultation, feedback, and comments, the Indian Centre for Science and Environment (🌐 www.csein-dia.org) informed, and offered a webinar in January this year. As reported, eight years after the existing regime of the SWM Rules 2016, the proposed new draft rules would lead to "significant reforms, such as encouraging responsible management of biodegradable and non-biodegradable waste by bulk waste generators and incentivizing recycling through exchangeable certificates between waste processors and generators." The draft was open for public comment until the first week of February 2025. Once approved, the new rules would come into effect in October 2025.

According to "EnvilianceAsia – EHS Info Service" (🌐 enviliance.com) – an environmental information service developed by Japan-based research and consulting firm EnviX (🌐 www.envix.co.jp/en/) – the draft rules included an "Extended Bulk Waste Generator Responsibility (EBWGR)", which means new obligations for entities generating large quantities of solid waste. A bulk waste generator was defined as

- buildings with floor area of 20,000 square meters or above,
- water consumption of 5,000 liters per day,
- solid waste generation of 100 kilograms per day.

This category includes institutional entities such as central government departments or undertakings with buildings,

commercial establishments like airports, malls, hotels, stadia, and markets, as well as residential societies. These bulk waste generators have to register on an online portal, the draft said. They have to fulfill the responsibility of processing the waste generated by purchasing certificates from local bodies or waste processing facilities, Aoki Kenji wrote in January this year. Furthermore, they have to submit information, for example, about the generated waste, for the financial year. There are also rules for industrial units regarding the utilization of solid waste fuels; the percentage starts at six percent and is to increase to ten percent after three years from the date the new rules came into effect. As reported, the Indian citizens also have obligations. They have to sort the waste into four separate streams – wet waste, sanitary waste, special care waste (for example, paint drums, pesticide cans, spent batteries), as well as dry waste – and then pass them to authorized pickers or collectors. Biomedical as well as construction and demolition waste need to be disposed of separately from solid waste. Moreover, Indian households are obligated to pay a user fee for solid waste management as specified in the byelaws of local bodies.

### Waste recycling and climate change

According to available information, India generates about 62 million tons of waste each year. Of this volume, 43 million tons (or 70 percent) are collected. Twelve million tons of the collected quantity are treated, and 31 million tons end up in landfill sites, according to the online dictionary Wikipedia. "With changing consumption patterns and rapid economic growth, it is estimated that urban municipal solid waste generation will increase to 165 million tons in 2030."

Given this dimension regarding waste, with plastic, electronic, and hazardous waste growing rapidly, the Minister for Environment, Forest and Climate Change, Bhupender Yadav, had inaugurated an event organized by the Recycling and Environment Industry Association of India (🌐 https://reiaindia.org), on "Waste Recycling & Climate Change 2025" in February this year. On this occasion, the minister indicated that India is shifting from waste management to harnessing the economic potential of recycling through waste-to-wealth initiative. "The circular economy has a major role in the future, including reducing, reusing, and recycling at every stage, from product design to end-of-life management," he was quoted by the governmental Press Information Bureau (PIB). "Waste should not be treated as a burden but as a resource. Adopting sustainable practices is crucial for achieving economic resilience, environmental sustainability, and social security."

According to the information, the minister further stated that by the year 2050, India's circular economy is expected to have a market value of two trillion US-Dollar and create ten million jobs. It would be a huge opportunity for start-ups and new recycled product developers. Furthermore, he urged the recycling industry in the country to develop and adopt newer innovative technologies for reducing dependence on natural resources, as well as cutting down imports of critical minerals needed for economic growth. "Adopting circular economy principles can bring tremendous economic benefits. This shift towards resource efficiency aligns seamlessly with our national vision of Atmanirbhar Bharat, enhancing the competitiveness of Indian industries in global markets", the PIB cited Bhupender Yadav, who informed that the ministry has been instrumental in formulating policies and regulations, including Extended Producer Responsibility (EPR) frameworks that incentivize recyclers and integrate the informal sector into formal recycling systems. These initiatives would aim to streamline waste management and promote eco-friendly production across industries. The ministry had notified several market-based EPR Regulations, including those on e-waste, end-of-life vehicles, plastic packaging, waste tires, waste batteries, and used oil. "The revenue earned by registered recyclers from the sale of EPR certificates is additional profit earned over and above the profit generated from the sale of recycled product," he was quoted.

To drive sustainable growth and resource efficiency, he highlighted four key strategies:

- "Redesigning Products for Circularity: Companies must move beyond single-use models and design products for recyclability. The integration of biodegradable, reusable, and modular components will help extend product life cycles and reduce waste.
- Investment in Advanced Recycling Technologies: Adoption of emerging technologies can transform waste management systems, thereby improving recovery rates.
- Strengthening Supply Chain Collaboration: Businesses need to collaborate across the value chain to optimize resource utilization, create closed-loop production systems, and build markets for secondary raw materials.
- Consumer Awareness and Behavioral Change: Circularity requires active consumer participation. Industries must invest in campaigns to engage consumers, incentivize recycling, and promote sustainable consumption behaviors."

As also reported, Dr. Amandeep Garg, Additional Secretary at the ministry and Chairman of Central Pollution Control Board, expressed his opinion that "there is a huge gap and huge potential to work towards waste recycling system, as the role of recycling industry is important to cut imports of various critical products needed for economic growth". Corporate houses should lead the transition to a circular economy by incorporating recyclable designs, promoting

sustainability in dealership operations, and enhancing consumer awareness.

### The Indian investment climate

As described by the Asia Investor Group on Climate Change (AIGCC) in June this year, India's institutional investors are showing "strong progress in integrating climate into their governance and in engaging corporates on climate risks and opportunities". They would also increasingly recognize the financial materiality of climate change. Based on a recent analysis of the most significant Indian institutional investors, the new data covers 15 Indian institutional investors with – converted – 1.2 trillion US-Dollar in collective assets under management. The data was an exclusive India-focused extract complementing the sixth edition of AIGCC's annual 'The State of Investor Climate Transition in Asia' (🌐 https://aigcc.net/wp-content/uploads/2025/04/AIGCC-Climate-Transition-Report_April2025.pdf), which reviews 230 of the most significant and influential investors across Asia.

According to AIGCC's research, a growing proportion of India's investors is on par with the overall Asian investor benchmark. This applies to several aspects of climate governance and climate corporate engagement, such as:

- "Recognition of Climate Risks/Opportunities. This is gradually becoming mainstream investment practice amongst Indian investors as 60% of Indian investors are now recognizing the financial materiality of climate change.
- Investment Policies on Climate Integration. 47% of Indian investors have integrated climate considerations into their investment policies. This is near the overall Asia Investor Average of 66%.
- Board-Level Oversight of Climate Change. 53% of Indian investors are integrating climate into their corporate governance oversight.

### Technological Progress "Made in India"

As published by the Ministry of Science & Technology in April this year, Indian scientists have developed technologies for solid waste management. Here are some examples, which were published on the governmental homepage by the Press Information Bureau (🌐 www.pib.gov.in):

- "CSIR-Indian Institute of Chemical Technology (CSIR-IICT) has developed a novel high-rate bio methanation technology for decentralized applications of sewage and organic solid waste. This technology is superior in terms of biogas and bio-manure production as it incorporates novel pre and post processing technologies required for the bio methanation of organic solid waste. This technology has been commercialized and is in operation.
- CSIR-Central Mechanical Engineering Research Institute (CMERI) has developed a decentralized solid waste management technology. The significant features of the technology include mechanized segregation system for biodegradable & non-biodegradable waste; Eco-friendly disposal of plastic waste through agglomeration process; Generation of biogas from organic waste and conversion of agro-waste into briquette. The technology has been transferred to industries for commercialization.
- Indian scientists have developed a technology to recycle the Construction & Demolition (C&D) waste to produce a high compressive strength Glass Foam Bricks, which are offering a sustainable alternative to conventional building materials.
- A robust mechanical separator has been developed to facilitate the efficient disassembly of solar photovoltaic (PV) modules, supporting enhanced recycling and sustainability in the solar energy sector.
- CSIR-Advanced Materials and Processes Research Institute (AMPRI) has developed a technology for the bulk utilization of fly ash in the production of synthetic fine and coarse aggregates, which can replace conventional natural aggregates in construction, promoting sustainability and reducing the environmental impact of traditional aggregate production.
- Indian Institutes of Science Education and Research (IISER) Tirupathi and CSIR-National Metallurgical Laboratory (NML) has developed a technology for recycling of graphite from spent Lithium-ion batteries for high energy Li-ion capacitors.
- With the support of DST, CSIR-Institute of Himalayan Bioresource Technology (IHBT) has developed an indigenous non-pathogenic psychrophilic bacterial formulations and composting methods for accelerated composting of municipal solid waste and agricultural waste in cold regions.
- Ministry of Housing and Urban Affairs (MoHUA) has setup Material Recovery Facilities (MRFs) nationwide, for sorting, processing and recycling of segregated dry waste."

- Reporting on Voting Decisions. 50% of Indian investors are reporting on voting decisions (vs Overall Asia Investor Average of 39%)."

AIGCC has also identified key areas for Indian investors to prioritize:

- "Near term climate targets. India's investors do not yet appear to set near term climate goals (for example, 2030 or 2035 emissions reduction targets). Setting robust interim targets form the basis for investors in order to further develop concrete transition plans and strategies.
- Internal policies on, or approaches to, high-impact areas, including fossil fuels and nature/deforestation. A few of India's investors appear to have internal climate policies on fossil fuels or other high-emitting sectors but many of them have yet to build this up internally.
- Publication of climate scenario analysis. A few of India's investors have started to do so but many of them have yet to make disclosing climate scenario analysis results a mainstream practice.
- Transparency and support of climate policies. India's investors do not yet publicly disclose support or actions relating to climate policy advocacy and related engagements."

### Investment opportunities

"Invest India" (🌐 www.investindia.gov.in), the National Investment Promotion and Facilitation Agency of the Government of India, serves as the first point of contact for global and domestic investors. "It provides comprehensive, end-to-end support across all stages of the investment lifecycle – ranging from pre-investment advisory and facilitation to aftercare and expansion support – with a strong emphasis on enabling manufacturing through the Make in India initiative," one can read on the homepage.

The agency focuses on promoting investments in high-impact sectors such as Electronics & Semiconductors, Renewable Energy, Electric Vehicles, Capital Goods, Textiles, Food & Agriculture, Pharmaceuticals, Chemicals & Critical Minerals, and Infrastructure.

## RESOURCE CIRCULATION EQUIPMENT MARKET TO GROW

According to the market research and consulting agency SNS Insider, innovations and global regulations propel the demand for smart recycling equipment amid rising industrial waste and digital transformation initiatives. The market was valued at 25.63 billion US-Dollar in 2024 and is expected to reach 48.42 billion US-Dollar by 2032, growing at a CAGR of 8.25 percent over the forecast period of 2025-2032.

"The U.S. Environmental Protection Agency reported over 292.4 million tons of municipal waste in 2022, driving demand for balers and shredders", the information said. "Japan's Ministry of the Environment highlighted a 40 percent industrial recycling rate in 2023, boosting investment in advanced granulators. Companies like Harris Equipment launched IoT-enabled balers in 2024, while European firms and U.S. tech startups invest in smart sorting systems, fueling digitalized recycling infrastructure across industries."

As reported, the Asia Pacific region dominated the market in 2024 with a market share of 39 percent. "The dominance is due to significant investments and government-backed recycling initiatives in China, Japan, and South Korea. Japan's Ministry of Economy, Trade and Industry reported a 12 percent rise in equipment installations in 2023. China's 14th Five-Year Plan supports circular economy measures across electronics and construction. Rapid industrialization, growing urban populations, and stricter environmental regulations also drive demand for modern recycling technologies. Local companies like China Recycling Development Co. are deploying AI-driven sorting systems and advanced granulators, further strengthening Asia Pacific's leadership in resource circulation equipment and sustainable waste management solutions." SNS Insider also informed that the Baler Press Segment had a market share of 25 percent, which would be due to the widespread use of baler presses across automotive, packaging, and retail industries to reduce scrap volume and transport costs. By application, the Electrical & Electronics Segment dominated the Resource Circulation Equipment Market in 2024, with a 34 percent market share. Rising e-waste volumes and stricter compliance needs would push industries to adopt shredders and separators for valuable component recovery, the market research agency stated. Regulatory measures such as the EU's WEEE Directive and U.S. state-level e-waste laws would further reinforce segment strength.

🌐 snsinsider.com/sample-request/7852

# EUROPE'S COMPOSITE RECYCLING MARKET AND ITS POTENTIAL

As the amount of composite waste generated in Europe is not officially monitored, the European Composites Industry Association (EuCIA) has collaborated with its members and partners to estimate the potential size of the composites recycling market.

While the quantity of composite waste is small compared to plastics, aluminum, and other popular materials, Europe's transition to a circular economy makes sustainable waste management essential. To inform policy development and infrastructure planning, EuCIA has estimated the volume of thermoset composite waste accessible for recycling. This data will also support the activities of the new European Circular Composites Alliance (ECCA), the association underlined in a press release.

The effective management of end-of-life (EoL) composites requires accurate data on the waste volumes. However, the amount of composite waste generated in Europe is not officially monitored. EuCIA has therefore been collaborating with its members and partners to estimate the potential size of the composites recycling market. The association has developed a model based on the gross domestic product (GDP) of European countries, predicting a total volume of thermoset composites waste of about 914,000 tons in Europe in 2025.

"In reality, the situation is more complex and the volume currently accessible for recycling is much lower for several reasons:

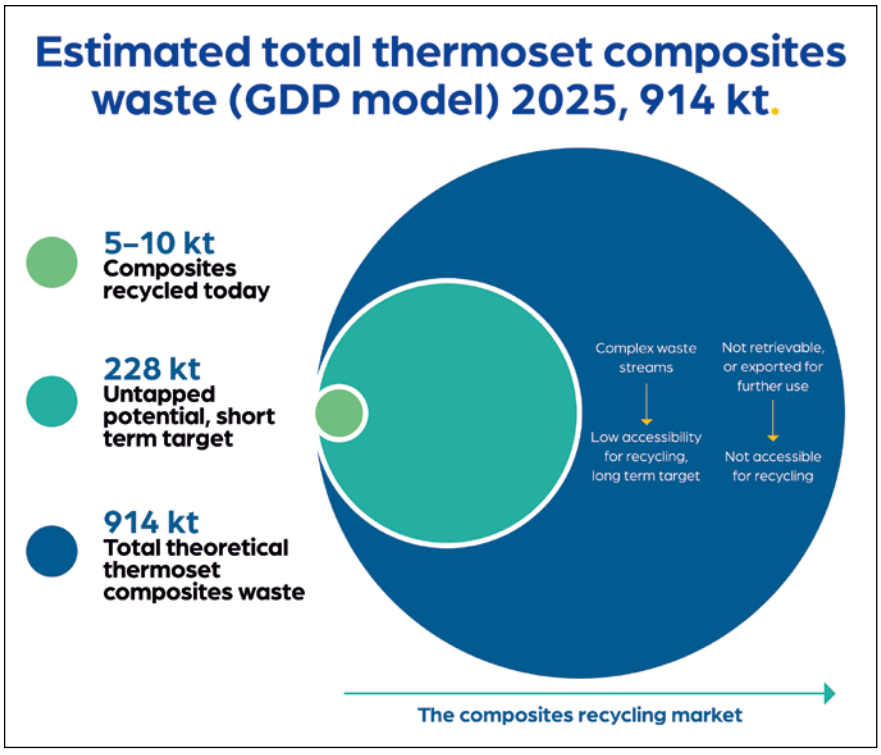
- Some composite components (e.g. wind turbine blades) are exported for reuse outside of Europe.
- In many cases, composite parts are embedded in infrastructure that cannot be easily retrieved for recycling, such as underground pipes and tanks.
- Collection and sorting systems tailored to recycling composites are limited and therefore a large number of end-of-use composite products are not collected."

As reported, EuCIA therefore conducted a deeper analysis per market, taking into account several factors, including the existence of established collection and recycling routes. This indicates that the actual volume of thermoset composite waste accessible for recycling is likely to be around 228,000 tons in 2025, approximately 25 percent of the theoretical amount predicted by the GDP waste model. "Of this, we estimate that currently a maximum of five percent is being recycled," the association informed. "These figures clearly show an untapped resource that could potentially be returned to the value chain. Exploiting this opportunity will require building a robust European value chain and infrastructure to enable reuse and recycling of composite materials. Longer term, establishing systems to enable more widespread collection and sorting of composite waste will be key to fully realizing a circular economy for composite materials."

Further information, including estimates of the size of the composites waste streams generated by different market sectors, is available in the new publication Reimagining end-of-use composites as a new resource (eucia.eu/wp-content/uploads/2025/07/Reimagining-end-of-use-composites-as-a-new-resource.pdf).

## Mobilizing investment into recycling

According to EuCIA, this waste data will be input into the activities of the new European Circular Composites Alliance (ECCA), "which aims to identify and resolve the legal, economic and technical barriers to composites recycling". The alliance would recommend




Source: EuCIA

essential policy updates, such as the creation of dedicated waste codes for EoL composites, to enable the scaling up of sustainable composites recycling solutions. It would also promote the building of markets for secondary (recycled) composites.

"The ECCA is a sectorial alliance of EuCIA, launched in partnership with JEC in March 2025", the association informed. "All stakeholders are invited to join the alliance to drive collective action and build a circular and competitive future for Europe's composites industry."

As per Raphaël Pleynet, EuCIA's Managing Director, the collaboration of Europe's composites stakeholders is essential for achieving the full circularity of composite materials. "ECCA members will commit to this goal, working together to fully establish the circular economy for composites by implementing strategies for greater reuse, repair, repurposing, and recycling, and setting and delivering on targets for the recycling of existing products."

Stakeholders across the composites value chain can join the European Circular Composites Alliance by signing the declaration.

eucia.eu/ecca/

# GLOBAL SHIP RECYCLING MARKET ON THE RISE

According to the latest study from BCC Research, the "Global Ship Recycling Market" is estimated to increase from 9.1 billion US-Dollar in 2025 to 13 billion US-Dollar by the end of 2030, at a compound annual growth rate (CAGR) of 7.4 percent from 2025 through 2030.

The report presents a comprehensive analysis of the global ship recycling market, combining quantitative and qualitative insights to highlight the latest trends and developments, the market research firm informed. It would evaluate market performance in terms of revenue, measured in millions of dollars. Furthermore, the market is segmented by vessel type, including bulk carriers, container ships, oil tankers, general cargo ships, and others.

The report would also examine ship recycling methods such as beaching, dry-docking, alongside/pier-breaking, and other emerging techniques. "This report is especially relevant today due to the imminent enforcement of the Hong Kong International Convention for the Safe and Environmentally Sound Recycling of Ships," BCC Research wrote. "Although adopted in 2009, the convention officially came into force on June 26, 2025, introducing stricter global standards for ship recycling. Its primary objective is to ensure that ships, at the end of their operational life, are dismantled in a manner that minimizes risks to human health, safety, and the environment. This regulatory shift is expected to significantly impact industry practices, making timely insights and analysis crucial for stakeholders."

Photo: MSV, AI-generated

According to the information, the factors driving the market's growth include:

- "Increasing demand for scrap steel: Scrap steel recovered from dismantled ships is a valuable resource for steel production, especially in countries with growing infrastructure needs. It offers a cost-effective and environmentally friendly alternative to producing new steel, driving demand for ship recycling.
- Increasing age of the global shipping fleet: Many ships in operation are nearing or have exceeded their optimal service life, making them inefficient and costly to maintain. As older vessels are phased out, they enter the recycling stream, providing a steady supply for the industry.
- Stringent ship end-of-life regulations: International and regional regulations now require ships to be dismantled in safe, environmentally sound facilities. These rules promote responsible recycling practices, increasing demand for certified ship-breaking yards and boosting market growth."

bccresearch.com

# GREEN CHEMICALS MARKET VALUATION IS SET TO MORE THAN DOUBLE BY 2033

According to globally active market research and advisory firm AstuteAnalytica India Pvt. Ltd., the value of the global green chemicals market is projected to "skyrocket". This market was valued at 13.80 billion US-Dollar in 2024 and is expected to reach 28.05 billion US-Dollar by 2033, growing at a CAGR (compound annual growth rate) of 8.2 percent during the forecast period 2025–2033. The sector is dominated by bio-alcohols, propelled by global fuel mandates and process innovations, the company underlined.

The construction sector's demand would surge, fueled by green building standards, creating a robust market for sustainable materials. "The green chemical revolution is a global phenomenon," AstuteAnalytica wrote. In 2024, North America's green chemicals market was projected to generate revenues of 53.8 billion US-Dollar, with an anticipated CAGR of 9.17 percent from 2024 to 2029.

"The United States has over 150 operational bio-based chemical plants, while China has established over 200 bio-refineries. Europe is noted as the fastest-growing regional market, supported by the EU's comprehensive regulatory framework." Key industry events would foster global collaboration. As stated, the combined EU & US bio-based chemicals market, valued at 60.02 billion US-Dollar in 2023, was projected to hit 64.72 billion US-Dollar in 2024. "With the European Commission's 2025 Annual Single Market and Competitiveness Report released on January 29, 2025, and sales of clean label ingredients set to grow by 6.75 percent annually, the data confirms the unstoppable momentum of the global green chemicals market", the firm characterized the growth potential shortly.

astuteanalytica.com/ask-for-customization/green-chemicals-market

The sorting and recycling plant, operated by Source One Plastics

# HOLISTIC APPROACH FOR FUTURE-PROOF RECYCLING COMPANIES

The circular economy is a key driver of growth and innovation for the plastics industry, stresses German company Source One GmbH in this article.

Competing in the European plastics market has recently become increasingly challenging. Expanded raw material prices, delivery difficulties, and declining orders are determining the development of individual companies. Moreover, rising energy costs, restrained investment activity, and political framework conditions that fall short of expectations are increasing the pressure for transformation across the entire industry. At the same time, this situation opens up opportunities: how can the plastics sector chart a successful course out of the crisis and into a sustainable future? Technological innovations, resource-saving processes, and international networking are seen as the key to competitiveness in the current market environment. Digitalization, automation, and artificial intelligence are also driving the development of efficient and flexible solutions for the plastics industry. The goal is a sustainable, climate-neutral circular economy.

Modern recycling secures access to valuable materials, enables their energy- and cost-efficient processing, and paves the way for a more stable and sustainable market future. “The circular economy is becoming a key driver of growth and innovation for the plastics industry,” says Kai Hoyer, Managing Director of Source One GmbH. “The opportunity lies in the holistic approach. Manufacturers, as well as suppliers and waste management companies, have the opportunity to position their company within a circular value chain in a robust and crisis-proof manner.”

### Best practice: Kickoff and ramp-up in a challenging market situation

Source One is a holistic advisory firm for the circular economy, developing technological solutions and customizing material flows to create circular value chains. It links the relevant players, establishes global recycling structures, and ensures that even hard-to-recycle plastics are utilized again. With the goal of bringing more and more recyclates into the resource-saving production of plastics, Source One supports companies in all aspects of plastics recycling and sustainability management. In the midst of a challenging market, Source One has succeeded in designing and realizing an operational company for sorting and recycling tasks

Photos: Source One GmbH

that is sustainable from the root up and set up for the future – its sister company, Source One Plastics GmbH.

In April 2024, Source One Plastics launched its sorting and recycling plant into regular three-shift operation with 14 employees, and can look back on a successful first year of operation. The facility achieved the planned annual throughput of 70,000 tons of mixed plastic waste, which is difficult to recycle as planned. Today, forty people work for the Eicklingen-based company. The team is strongly committed to optimizing processes and ensuring the highest material quality. "Source One Plastics is not only increasing production volumes, but also constantly improving quality," says Source One Plastics plant manager Dr. Oliver Krahn. "To this end, we carried out more than 2,500 tests in our in-house laboratory within just the first year of operation."

## Sustainable engineering: Energy and cost-efficient plant operation

Source One has integrated the approaches of its sustainable corporate vision into the Source One Plastics plant, shaping a holistic concept that is now seen as a model solution for the plastics industry: technological innovation driving resource-conserving value creation. The sorting and recycling plant is characterized by energy efficiency, thanks to, e.g., the dry-mechanical processing of plastic waste. The system sorts post-consumer waste up to a size of a few millimeters using near-infrared technology. The subsequent cleaning of the different types of plastic is essentially carried out by friction. Further sorting divides the material stream into 2D (film) and 3D (rigid) fractions. The 2D polyolefins are agglomerated, recut, and separated from residual metals. The 3D stream is refined once again. Source One Plastics also commissioned two sorting machines from Meyer Deutschland GmbH in July 2025 for the optical sorting of these rigid plastics. The flake sorters will separate 15,000 tons of processed post-consumer waste per year according to color and polymer type.


The unique technology arrangement of the Source One Plastics plant saves up to 30 percent of the energy required by conventional recycling technology – that is, five to six million kilowatt hours per year. The renewable local energies that supply the plant also counteract rising energy prices and keep the $CO_2$ footprint comparatively low.

General growth drivers such as digitalization and the use of artificial intelligence ensure the efficiency of semi-automated processes in Eicklingen in very concrete terms – in the digitalized control of the plant and the recognition and sorting of material compositions. However, the pioneering engineering only reflects one part of the robustly organized company. The decisive factor is the combination of modern engineering with the sourcing strategy.

## Robust sourcing strategy: Secure capacity utilization, secure sales

"Source One Plastics is firmly integrated into the value chain of the material cycle," says Kai Hoyer. "As a result, it is well equipped to deal with slight market fluctuations and now also stands for a secure workplace." The latter is a major competitive advantage, also in terms of attracting the necessary skilled labor.

With its sourcing strategy, the company has embedded itself both horizontally and vertically in the material flow through fixed supplying and purchasing partners to operate successfully on the market in the long term. That can be seen, among other things, in the shareholder structure. In addition to 23 Oaks Investments GmbH, LyondellBasell, a large petrochemical company from the Netherlands, is also involved as a joint venture partner. Following the European Green Deal of 2019, LyondellBasell has set itself the goal of using two million tons of recyclates in the production of its plastics by 2030. Accordingly, the majority of various material streams from the Source One Plastics plant for chemical and mechanical recycling are contractually secured. In addition, there are also long-term contracts and partnerships on the material procurement side, so that the plant is always sufficiently utilized.

## In-house recycling: A profitable business model in the circular economy

The Source One Plastics plant was built to produce specified materials and supply them, at least in part, to the global recycling market in large volumes of exclusive material flows. It is therefore a preliminary stage of so-called "in-house recycling". Source One designs customized sourcing solutions and sustainable engineering for companies with a high volume of plastic waste: "An in-house recycling plant is profitable from a capacity of ten thousand tons of

plastic waste," says Kai Hoyer. "It is particularly suitable for companies that receive goods in individual packaging as well as for logistics and handling centers or waste disposal companies." In-house recycling aims to reduce costs, secure access to materials, achieve sustainability goals, and generate income through an additional source of income.
Legal requirements such as the EU Packaging Ordinance (PPWR) stipulate increasingly binding requirements for the recyclability of plastics and the use of recyclates. Every in-house recycling plant can supply the plastics industry and support it in terms of the circular economy with regard to the increasingly individualized demand for materials. In this way, capacities can be created to close the expected recyclate gap, which is presumed to be around thirty percent between supply and demand in Germany in 2030. That will make them part of the industry's circular economy breeding ground: "Overall, the plastics industry still faces considerable challenges," says Kai Hoyer. "However, it is also showing signs of adaptation and recovery. We can see this in the fact that more consulting services are being requested again, as well as more engineering for individual plant construction projects. Demand for recyclates is also rising again slightly. That keeps me personally very optimistic."

s-one.de

# SOLVENT-BASED PLASTICS RECYCLING FOR CIRCULAR ECONOMY

With the solvent-based recycling process developed at the Fraunhofer Institute for Process Engineering and Packaging IVV, a wide variety of plastics from packaging, as well as from the automotive, electronics, construction, and textile sectors, can be recycled and processed into high-purity plastic recyclates. In this way, waste fractions that cannot be recycled using conventional recycling processes according to the state of the art become available for a circular economy with the solvent-based process. The Fraunhofer IVV will be demonstrating this processing method at the K trade fair for plastics and rubber from October 8-15 in Düsseldorf.

As emphasized, compared to mechanical separation processes, it offers the advantage that the target polymer can be selectively dissolved and recovered in high purity. "Foreign polymers and other solids remain undissolved and are effectively separated. Dissolved impurities such as flame retardants, plasticizers, degradation products, and odors are separated by specific solvents, resulting in high-purity recycled plastic," the Fraunhofer IVV assured. "Solvent-based recycling is a physical process and an effective alternative to chemical recycling. This is because the polymers are not degraded, and polymerization from chemically recycled raw materials is not necessary."

Together with industry partners, recycling experts from Fraunhofer IVV, Dr. Martin Schlummer (left) and Dr. Andreas Mäurer (right), are implementing the solvent-based recycling process in industrial plants

A large-scale pilot plant is available at the Fraunhofer IVV for scaling up solvent-based recycling to an industrial scale and to produce quantities of recyclate for industrial application tests. To transfer the process to industrial plants, the Fraunhofer IVV is looking for partners.

ivv.fraunhofer.de

Photo: Fraunhofer IVV

# USA: INNOVATION AWARD FOR “THE TOPPER STOPPER”

“The Topper Stopper” won the award at the 2025 Charlotte Hornets Innovation Summit. It is a patent-pending device, that combines barcode scanning, AI verification, and real-time analytics to eliminate recycling contamination. Invented by Marcus Wade of Genesis 1 Technologies LLC and commercialized through a partnership with Waste Wise Innovation, this recycling device secured a 25,000 US-Dollar investment, a press release underlined. “By retrofitting existing recycling bins with intelligent technology, the device transforms passive waste receptacles into active data collection and contamination prevention systems.”

- genesis1.tech
- wastewiseinnovation.com/topper-stopper/

# CARBIOS ENTERS THE R-PET MARKET

French biotech company CARBIOS has signed a multi-year commercial agreement with Thailand-based Indorama Ventures, a global leader in PET production. According to the French firm, this agreement covers the supply of biorecycled monomers, which will be transformed into r-PET filaments by Indorama Ventures. While CARBIOS would use its enzymatic PET recycling technology to produce monomers from complex PET waste at its future industrial site in Longlaville, the Thai partner “will handle the repolymerization and production of technical filaments. Michelin will use these innovative materials in its tire reinforcements.”

- carbios.com
- beta.indoramaventures.com

# IPG FACILITY ACHIEVES ZERO WASTE CERTIFICATION

USA-headquartered IPG, a global provider of packaging and protective solutions, reported that its manufacturing facility in Chicago has been awarded GOLD certification under the TRUE (Total Resource Use and Efficiency) rating system. This plant “has demonstrated its dedication to best practices in recycling, reusing, and reducing waste, achieving an impressive 91.6 percent diversion rate by recycling materials such as plastics and cardboard. The team also implemented composting, transitioned to paperless office functions, and developed systems that emphasize reuse.” As underlined, the TRUE certification, administered by Green Business Certification Inc. (GBCI), helps facilities measure, improve, and recognize zero waste performance by encouraging the adoption of sustainable practices that contribute to positive environmental, health, and economic outcomes.

- itape.com, true.gbci.org

## Vecoplan:

# NEW AREA CREATES SPACE FOR HEAVY MACHINERY

German-based Vecoplan AG, a company specialized in machinery and plants for shredding, conveying, and processing, is investing more than five million Euro to expand its main site in Bad Marienberg. It has enlarged its Plant I by a total of 1,900 square meters, while also investing in new production equipment. The engineering company is preparing to meet steadily increasing demands on production and logistics by adding assembly capacity and establishing an ultramodern warehouse for long-span goods. According to Vecoplan’s CEO, Werner Berens, the company had to create additional space, especially in preassembly, to meet the growing demand for its heavy machinery.

- vecoplan.com


# PURECYCLE HAS BIG PLANS FOR THE FUTURE

American company PureCycle Technologies LLC., a subsidiary of PureCycle Technologies, Inc., holds a global license for the patented dissolution recycling technology (developed by The Procter & Gamble Company) designed to transform polypropylene plastic waste (designated as #5 plastic) into a continuously renewable resource. The purification process removes color, odor, and other impurities from this plastic waste, resulting in its PureFive resin "that can be recycled and reused multiple times, changing our relationship with plastic".

In an interview with GLOBAL RECYCLING, PureCycle CEO Dustin Olson explained the recycling process and its prospects regarding international polypropylene recycling.

***PureCycle's solvent-based purification process represents a novel approach to recycling polypropylene. How does this technology differ from conventional mechanical recycling methods, and what are the key advantages in terms of material quality and application potential?***

Plastic recycling has been around for decades, but mechanical methods produce a recycled product that often comes with a handful of trade-offs, including unpleasant odors, unreliable performance, high scrap rates, limited colorability – and, most importantly, fewer end-use applications.

At PureCycle, we have a groundbreaking, patented process for recycling polypropylene. Through a form of dissolution recycling, we remove color, odor, additives, and other plastics from waste polypropylene. Dissolution is a physical process, not a chemical process. Plastic waste is shredded and mixed with a proprietary solvent that selectively dissolves the polypropylene, separating it from the other materials. Unlike traditional mechanical recycling, which degrades plastic quality over time, this process produces an ultra-pure recycled resin that looks, feels, and performs like virgin plastic. Additionally, our dissolution recycling process

is more environmentally friendly with a lower carbon footprint than new plastic production. This allows our customers to meet their sustainability goals without compromising on quality or performance in applications such as BOPP film, fiber, thermoforming, or injection molding. In short, our process helps close the loop on plastic waste while making recycled polypropylene more accessible at scale.

***Your flagship plant in Ironton has begun delivering initial product volumes. What technical or operational insights have you gained since start-up?***

As with any novel technology, when commissioning and reviewing early operational data, several key learnings emerged that have driven multiple upgrades to our business operations. Feedstock quality from MRF's was an early challenge that we have addressed through the creation and ongoing operations at our Denver, PA sorting facility and several key upgrades at Ironton. The Denver facility has allowed PureCycle to increase the percentage of polypropylene in feedstock bales being sent to Ironton to greater than 95 percent. With these higher-percentage feedstock bales, we can operate Ironton more efficiently.

During 2024, we decided to expand our commercial operations by introducing compounding. By adding compounding into our product creation process, PureCycle has been able to introduce a wide range of resin grades that include varying amounts of recycled content. The decision to add compounding has allowed us to expand the applicability of our PureFive resin and expedite the timeline of customer trials.

In 2025, we have furthered our investment in compounding by deciding to vertically integrate compounding at our Ironton Facility. We anticipate this expansion to be completed by the end of 2025 and can provide approximately 100 million pounds of annual compounding capacity onsite. Additionally, we anticipate this decision to have sustainability benefits and eliminate approximately four million US-Dollar of annualized third-party costs currently associated with compounding our PureFive Choice resin.


Photos: PureCycle

***Which end-use markets or applications are you currently prioritizing for the rollout of PureFive, and what feedback have you received from early industrial trials, particularly in the film, fiber, or food packaging sectors?***

We're seeing strong interest in our PureFive resins across a variety of end-use markets. This includes applications in fiber, film, packaging, and consumer goods, where demand for high-quality recycled polypropylene continues to outpace supply. Approximately 20 percent of the global virgin polypropylene (PP) supply is used for fiber. Until now, there has not been a reliable recycling alternative to replace virgin PP due to the complexity of the fiber operations. Earlier this year, we completed a sale to Drake Extrusion, the leading producer of fiber and yarn in North America, after they successfully tested our resin across multiple fiber types. That agreement marked a turning point for us and has already accelerated commercial conversations across the broader fiber industry. We're also partnering with Emerald Carpets to bring circularity to the trade show space. They've signed a commercial supply agreement for approximately five million pounds.

The packaging sector is another priority. We've advanced to scaled production trials with P&G for spout and dose caps on select bottles of Procter & Gamble products, and we expect to see those products on shelves in early 2026. That's a major milestone, not just for us, but for the industry, proving that our resin can meet the technical and aesthetic standards of some of the world's most recognizable brands.

We've also worked with Churchill Container to launch their Run It Back line of souvenir cups and buckets that contain up to 100 percent post-consumer recycled content. The Run It Back line is available to professional and collegiate sports teams looking to introduce sustainable souvenir items for their fans in 2025, and we've already gotten interest from several major sports teams. Earlier this month, we announced that the Cleveland Browns, a professional American football team, will use 100 percent PureFive resin in their 2025 line of player souvenir cups.

Compounding has played a key role in accelerating these efforts. It allows us to tailor our PureFive Choice resin for specific applications and bring it to the market faster. We've had early success in the automotive space with trials showing that our resin performs well in demanding applications like bumper fascias. Polypropylene is the most widely used plastic in automotive applications, with an average of around 100 pounds per passenger car, so the automotive industry represents a large opportunity for us.

Across a majority of the trials, the feedback has been clear: our PureFive resins perform like virgin polypropylene, but with the sustainability advantages of a post-consumer recycled material. That's what the market has been waiting for, and that's what sets us apart.

***PureCycle recently announced a 300 million US-Dollar capital raise to support expansion in Asia, Europe, and the U.S. Can you share more about how this funding will accelerate your global rollout strategy – and what makes regions like Thailand and Europe particularly attractive for high-capacity polypropylene recycling investments?***

The recent 300 million US-Dollar capital raise is a pivotal step in accelerating our global growth strategy and brings us closer to achieving our goal of one billion pounds of installed capacity by 2030 across the U.S., Europe, and Asia. This capital enables us to move ahead on high-impact projects, including a 130-million-pound line in Thailand in partnership with IRPC, a Petrochemical Company based in Thailand, and another 130-million-pound line in the Next-Gen District at the Port of Antwerp, Belgium. Both locations offer mature feedstock streams, strong infrastructure, and low-risk expansion opportunities. In Thailand specifically, we're leveraging IRPC's local expertise and infrastructure to bring the facility online more quickly and cost-effectively. In Antwerp, being co-located with other circular economy innovators allows us to collaborate and create operational efficiencies from day one.

We're also applying everything we've learned from Ironton to enhance the next U.S. facility, planned for Augusta, Georgia, where we intend to build a Gen 2 line with a capacity of over 300 million pounds annually. The capital raise gives us the flexibility to execute these builds quickly and efficiently, bringing our product to more markets around the world.

***The upcoming facility in Rayong, Thailand – developed in partnership with IRPC – is set to become a key milestone in your international strategy. How does this collaboration leverage local infrastructure and expertise, and what lessons from Ironton are being applied to ensure a faster, more cost-effective ramp-up?***

Thailand is a great opportunity for PureCycle. We're partnering with IRPC, the first fully integrated petrochemical operator in Southeast Asia. Several of their team members are already being onboarded, bringing local expertise and strong project experience to the expansion. Additionally, IRPC's existing infrastructure, including a deep-sea port, oil depots, and power plants, will allow PureCycle to leverage this existing site infrastructure to streamline construction costs.

As with all future growth projects, we're applying key lessons from Ironton and have had third-party engineering groups validate our approach. We expect Thailand to be up and running before any other facilities in our pipeline.

***Mr. Olson, thank you for this interview.***

purecycle.com

## CDE PUBLISHES SUSTAINABILITY REPORT

On July 24, at Earth Overshoot Day – the day in which humanity's consumption and use of ecological resources and services exceeds what earth can regenerate in that year – CDE, a leader in wet processing solutions for the natural and waste recycling sectors, has published its 2024 sustainability report. The self-declared report centers on the environmental impact, social responsibility, and transparent governance of CDE's operations, which align with the United Nations Sustainable Development Goals (SDGs). As reported, it highlights the company's commitment to achieving net zero by pledging to decrease its scope 1 & 2 net emissions by 50 percent by 2030 and achieving net zero by 2050. CDE is committed to reducing both water consumption and steel scrap waste by ten percent by 2025.

cdegroup.com

# SWISS-INDIAN PARTNERSHIP FOR GREEN CHEMISTRY

Archroma, a global leader in sustainable specialty chemicals, has entered into a strategic collaboration with Veermata Jijabai Technological Institute (V.J.T.I.), Mumbai, to advance research and innovation in green chemistry and sustainable technologies. As reported, the collaboration focuses on pioneering research and development in green chemistry, emphasizing the design of safer chemicals and cleaner industrial processes. Key areas of innovation include renewable energy solutions such as biofuels and hydrogen technologies, and the development of sustainable materials like bioplastics, advanced composites, and nanomaterials.

"Water treatment is also a major area of focus, with initiatives targeting advanced wastewater recycling and the recovery of valuable resources," the information said. "In parallel, education and training programs are being developed to raise awareness about sustainable practices and to equip the next generation of engineers and scientists with the tools needed to drive lasting change."

archroma.com
vjti.ac.in

# RECYCLED GLASS FOR AMERICAN SOLAR PANELS

USA-based company Solarcycle reported that Illuminate USA, the largest single-site solar panel manufacturer in North America, has signed a five-year agreement with the solar panel recycler to purchase domestically manufactured solar glass. "The glass will support the production of three gigawatts (GW) of solar panels each year at Illuminate USA's advanced manufacturing facility based in Pataskala, Ohio." This multi-year commitment would make Illuminate USA the largest customer for Solarcycle's future solar glass factory in Cedartown, Georgia. The technology-based solar panel recycler and materials company will produce glass using recycled materials from retired solar panels. According to the information, the future solar glass production capacity is almost entirely committed in long-term agreements. "The facility is shovel-ready, and the company is now working to finalize the remaining investment necessary to begin construction", Solarcycle gave account. The company would target early 2028 for initial deliveries of solar glass. Once complete, the new solar glass factory in Cedartown is expected to be the first to produce specialized glass for crystalline-silicon solar panels in the United States, "and the first in the world to use recycled glass cullet from end-of-life solar panels as a key input".

solarcycle.us

Reuse and Recycling of EV-Batteries:

# MEETING THE EU CHALLENGE

Stena Recycling Battery Center in Farum, Denmark, taps WireFlow Donsö system for second-life application.

With at least 30 million zero-emission electric vehicles forecasted to be on EU roads by 2030, the EU battery directive aims to ensure batteries can be repurposed, remanufactured, or recycled at the end of life. Up to 18 times more lithium and five times more cobalt will be needed by 2030. Manufacturer requirements include minimizing waste and reusing or recycling material content, how batteries should be safely dismantled, transported, and recycled, and disclosure of the environmental and health impact of contents.

## Stena Recycling Solution

Stena has invested in new battery centers equipped with the WireFlow Donsö system, employing WireFlow's comprehensive Bifrost system for the reuse and recycling of EV batteries. Donsö diagnoses EV-battery health and determines suitable second-life applications or complete discharge to recycle core minerals. WireFlow Total-DischargeTM is employed to ensure no energy is left before recycling.

## Flexibility

Managing both battery packs and modules, Donsö is designed to run ten channels simultaneously, independent of each other, delivering 6kW per channel. Environmentally friendly, the system sends energy back to the grid. Donsö enables the use of big data and statistical models. Outcome can be used for:

- Battery characterization
- Battery state estimation
- Battery remaining life estimation


Stena Recycling Battery Center in Farum Denmark

## Scalable

Stena selected Donsö as it aimed for a solution where battery centers could be designed differently, and the system could be scalable to adapt to individual requirements.

## Safe

Bifrost connection nodes – equipped with contactors, shunts, fuses and IOs to control the measurement and reach an elevated level of safety – are located as close to battery packs as possible, minimizing cabling.

Each battery is connected using DC cabling and temperature sensors to the distributed Bifrost node, controlled by the central cabinet and operator station. A series of safety checks are performed and the user is alerted should any test fail criteria – halting the process.


Donsö central cabinet

- System checks ensures battery is correctly connected
- Contactors in Bifrost node activated to connect battery to power electronics in central cabinet
- System measures battery voltage – checks level in expected range
- Temperature sensors checked, ensure valid values reported
- System Feature: Operation station is single point of control for all channels

During discharge, system monitors and logs:

- Individual sensor temperature
- Temperature difference between

Photos: WireFlow

sensors
- Voltage
- Current
- Power
- Aggregated Power

Safety is a priority: The system will stop the discharge if the temperature exceeds the limit. With process automation as a priority, Donsö is fully integrated into the Stena production system making it a seamless part of the entire battery handling process. All tests can be initiated from adjacent systems and results are stored in a central database for traceability and analysis.

Everything in the process is logged and saved, ensuring each battery and all recycled parts are traceable. Employing Donsö, Stena Recycling is provided with the capability of safely discharging EV batteries for recycling and assurance that they can fulfil the requirements of the EU battery directive.

wireflow.com/battery-test-measurement/
stenarecycling.com

■ Source: WireFlow

# LITHIUM RECOVERY FROM SPENT ELECTRIC VEHICLE BATTERIES

European companies cylib and Syensqo reported a significant milestone in circular battery materials processing by producing high-purity lithium hydroxide from spent electric vehicle (EV) batteries.

According to the joint press release, this collaboration would mark a major advancement in the recovery of valuable materials, "as very few recycling companies today can produce lithium at battery-grade, especially lithium hydroxide, the preferred form of lithium for new EV batteries". This achievement would enable the extraction and purification of lithium from shredded battery electrodes, known as black mass, from different battery chemistries, such as NMC (nickel-manganese-cobalt) and LFP (lithium-iron-phosphate), on a single operating line. That approach would simplify the recycling process, increases versatility and potentially reduces capital expenditures (CAPEX).

"Syensqo's technology perfectly complements cylib's hydrometallurgical process, enhancing both the yield and purity of recovered lithium," Laurent Cohen, in charge of Strategic Development and Alliances for Mining Solutions at Syensqo, was cited. "By combining our expertise in solvent extraction with cylib's process, we're establishing a scalable, high-purity lithium recovery route aligned with Europe's circular economy and battery regulation goals."

As part of the project, hundreds of liters of cylib's lithium-rich effluent were processed by Syensqo using an extraction technology co-developed with its engineering partner, Tenova Advanced Technologies. The process uses CYANEX 936P, Syensqo's proprietary solvent extractant. Following extraction, purification, conversion and crystallization, the resulting product meets, and in some respects exceeds, the strict purity standards required by leading cathode active material (CAM) manufacturers, the information said.

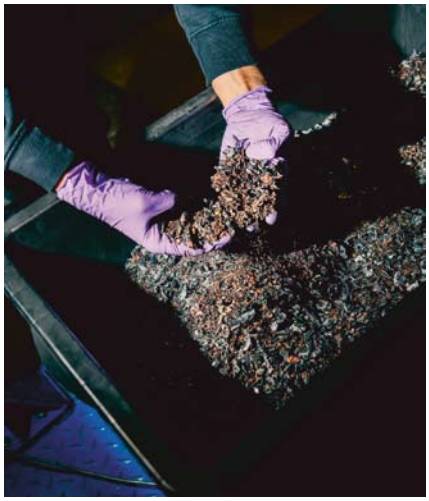


Photo: cylib/Jann Höfer

"This collaboration with Syensqo demonstrates our commitment to working continuously with partners to develop new processes and expand our technological leadership in battery recycling," Matthias Breidenbach, Vice President Commercial at cylib, informed. "By combining our innovative hydrometallurgical expertise with Syensqo's advanced solvent extraction technology, we are setting new standards for lithium recovery efficiency and purity."

As emphasized, this achievement also advances the objectives set by the European Union for lithium recovery in battery recycling. According to the Battery Regulation (EU) 2023/1542, adopted two years ago, recyclers must recover at least 50 percent of the lithium content in battery waste by the end of 2027, and no less than 80 percent by the end of 2031.

syensqo.com
cylib.de

# JOINT VENTURE IN BATTERY RECYCLING

German-based revomet GmbH, founded in 2023 as a subsidiary of the international Cronimet Group, and Chinese CNGR Advanced Material Co. Ltd. have officially finalized their joint venture following the Heads of Agreement signed in December 2023. “Once all conditions from the joint venture agreement have been met, CNGR will acquire a 25 percent stake in revomet Bitterfeld GmbH, previously a wholly owned subsidiary of revomet GmbH,” Cronimet informed on its homepage.


Photo: Cronimet

“After extensive negotiations and a shared vision, a strategic intent has now become a flagship project, a milestone for both partners and for Europe’s battery industry. The partnership’s goal is to recover valuable raw materials such as nickel, cobalt, and lithium in the highest purity and return them to the production cycle. In doing so, it makes a decisive contribution to closing the loop in the battery value chain and to strengthening Europe’s sustainable raw material supply.” According to Dr. Filipe Costa, Managing Director of revomet GmbH, the partnership would bring together “cutting-edge recycling technologies, international market expertise and a strong logistics network – setting a new benchmark for sustainable value creation in the battery industry”.

While revomet contributes advanced recycling technologies, deep process know-how, and a strategically central location in Bitterfeld-Wolfen, complemented by offices in Leipzig and Karlsruhe, CNGR brings long-standing expertise in the production of precursors for active cathode materials (pCAM) as well as a worldwide network in the battery industry, the information highlighted the benefits of the partnership. And Cronimet, as revomet’s parent company, contributes its global network, decades of leadership in stainless steel recycling, as well as extensive logistics and collection capacities across Europe. “This cooperation between a German and a Chinese company is among the first of its kind in Europe and represents a pioneering model for international partnerships in the battery industry.”

cronimet.de
cngrgf.com.cn

# ECOBAT IS FOCUSING ON CORE RECYCLING OPERATIONS

In August, USA-headquartered company Ecobat – a global leader in battery recycling – announced that it has entered into a binding agreement to sell its battery recycling and specialty lead operations in Germany and Austria to Clarios, a global leader in advanced energy storage solutions. The transaction would include Ecobat’s facilities in Freiberg and Braubach (Germany) as well as the Arnoldstein operation in Austria.

“We are pleased to announce the sale of our German and Austrian operations,” Tom Slabe, President and CEO of Ecobat, was cited. “Upon completion, this transaction – along with the previously announced divestitures of France, Italy, and Battery Distribution – will enable Ecobat to concentrate its efforts on core recycling operations, as well as our global lithium-ion battery business. Ecobat will continue to pursue additional opportunities to maximize value for shareholders beyond these transactions.” The transaction is expected to close by early 2026, pending regulatory approvals, the company said.

In July, Ecobat had reported the completion of the sale of its battery and polypropylene recycling business in Italy to Haiki + S.p.A. The transaction included the company’s facilities in Marcianise, Paderno Dugnano, and Bologna, and indicated Ecobat’s exit from the Italian market. According to Tom Slabe, this sale would mark “yet another step forward in our strategic efforts to optimize Ecobat’s geographic footprint”.

One month earlier, in June, the internationally active battery recycler announced the sale of its European battery distribution business to Endless LLP, a UK-based private equity firm. “We are pleased to announce the completion of the European battery distribution sale to Endless,” Tom Slabe explained. “This transaction marks another step in our strategy to

divest non-core assets and sharpen our focus on our core mission of sustainable battery recycling."

Ecobat Resources France is also no longer owned by Ecobat. In May, the company announced that it had received a binding offer from Campine NV to acquire its battery recycling and specialty lead manufacturing operations in France, and on this basis, it agreed to grant exclusivity to Campine NV. The transaction included Ecobat's facilities in Estrée-Saint-Denis, Bazoches, and Pont-Sainte-Maxence, which would mark Ecobat's exit from the French market, except for its lithium-ion battery collection business.

ecobat.com

# SORTING BY MEANS OF AI

Northern Ireland-based company AGGAI Ltd intends to enter the global market and offers AI-powered separation systems.

According to James Vaughan, founder of the engineering company with over a decade of experience in material handling, AGGAI has launched into the global market. It would deliver "advanced AI-powered separation systems that help producers recover cleaner, higher-value materials from complex streams in aggregates, recycled aggregates and mining applications".

As underlined, the company is positioned as a leading solutions-based provider, "focused on helping customers achieve cleaner products, higher yields and stronger returns through smart, flexible separation systems designed for real-world conditions". Its AI-powered fine separation systems would combine real-time material identification with high-speed pneumatic ejection, enabling precise removal of unwanted contaminants across a wide range of applications, including:

- Washed aggregate refinement
- Trash stone and trommel fines processing
- Separation of rubble, glass and plastics from clean stone
- Metal and mineral recovery from IBA (Incinerator Bottom Ash)
- Fine ore and waste separation in mining operations

"While AGGAI's primary focus is on aggregates, recycled aggregates, and mining, these markets all offer enormous potential and are ever-growing in the challenges they bring. The company continues to explore new use cases where fine separation can unlock value from contaminated or mixed material streams," the information said. "From demolition recovery to secondary resource refinement, the applications are expanding every day."

The engineering company would offer its solutions as fully integrated plant systems, retrofit packages, and semi-mobile units. "Each system is designed to perform optimally, while also fitting into a manageable footprint – ideal for both large-scale operations and space-constrained sites." Furthermore, the provider supports customer-led trials using AI-powered fine separation systems and welcomes project discussions "that may include material evaluation and viability studies allowing customers to understand achievable output quality, system performance, and commercial impact before committing to full-scale investment".

As reported, the firm is in discussion with multiple companies across the UK, Ireland, and international markets that are all facing shared challenges: contamination, yield loss, rising quality standards, and pressure to extract more value from their processes.

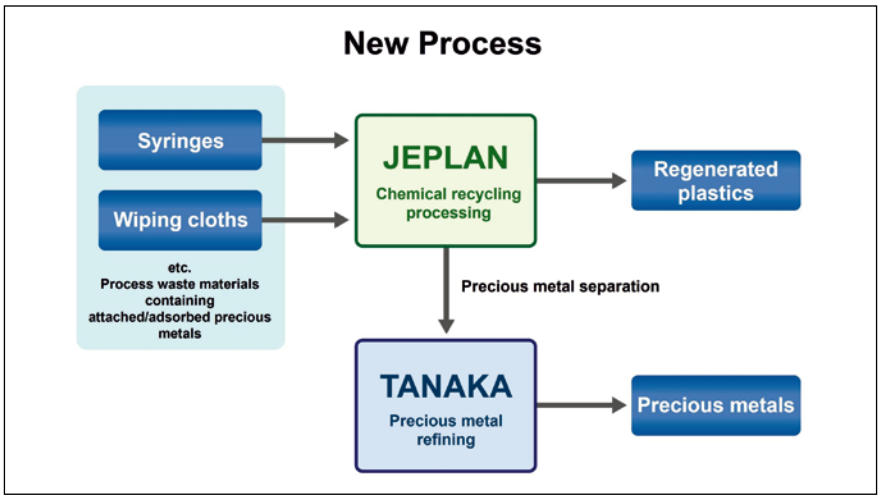
aggai.co.uk

AI Concept Plant

Photos: AGGAI

# TANAKA PRECIOUS METAL GROUP COLLABORATES WITH JEPLAN

The two Japanese companies have decided to enter into a business partnership to reduce $CO_2$ emissions and promote the recycling of organic materials in the precious metal recovery processes of Tanaka Precious Metal Technologies Co., Ltd.




Source: Jeplan

Since its founding in 1885, Tanaka has been a leader in the precious metals industry, actively engaged in recycling these resources. “Among the process waste materials received from customers who request recycling, those containing organic materials (plastics) as main components with precious metals attached or adsorbed have traditionally been processed through incineration to remove the organic materials, with precious metals then recovered from the ash left behind,” the information said. “While this incineration process has addressed the removal of environmentally regulated substances, the reduction of $CO_2$ generated during the combustion of organic materials has become a major challenge in realizing a decarbonized society.”

Jeplan has established a proprietary chemical recycling technology for polyethylene terephthalate (PET). To address the aforementioned $CO_2$ emissions issue, Tanaka is considering using chemical recycling in the future, in addition to the conventional precious metal recovery process through incineration. “This initiative is being explored through a business partnership with Jeplan.” As reported, the materials targeted for chemical processing include plastics such as syringes and wiping cloths. $CO_2$ emissions from the targeted precious metal recovery process are expected to be reduced to approximately ten percent of conventional levels. In addition, this process would enable not only precious metal recovery but also plastic regeneration.

tanaka-preciousmetals.com
jeplan.co.jp

# POLYOL PRODUCTION FROM RECYCLED PET BOTTLES

Turkish polyurethane system house Kimpur has started producing polyester polyol at its Düzce production facility by chemically recycling post-consumer PET (polyethylene terephthalate) bottle waste.

“Thanks to the depolymerization technology used in this process, a portion of traditional fossil-based raw materials can be replaced with recycled alternatives,” the company said. This new polyol solution was initially designed for rigid polyurethane foam applications used in sandwich panel production; it could be integrated into production processes without compromising performance when compared to standard systems.

Kimpur aims to generate 25 percent of its total product sales by 2030 from systems that contribute to resource efficiency, emissions reduction, and energy efficiency. In line with this goal, the company plans to increase the share of such products in its portfolio and integrate them into applications across various sectors.

kimpur.com

# DEMONSTRATION PLANT FOR DIAPER RECYCLING IN ITALY

On 21 July, in Spresiano (Italy), a new recycling center powered by i-Foria's patented technology was opened. The plant is dedicated to the recycling of Absorbent Hygiene Product (AHP) waste.

As reported, diapers and sanitary napkins accounts for approximately four percent of municipal solid waste. It is estimated that in Italy, every year, three landfills are created, filled, and closed to treat waste from AHP, which amounts to 900,000 tons per year (Europe: about 8,500,000 tons/year). The Spresiano demonstration plant, with a processing capacity of 100 kilograms per batch, would serve as a pivotal testbed for scaling up this transformative solution. The new plant would realize "a full recovery of high-quality secondary raw materials, including plastics and absorbent cellulose, to be reused in new manufacturing processes", the information provided by agency Revolve said. Funded by the ICARUS project, the plant would also validate the recycling and upcycling of cellulosic materials recovered from urban wastewater treatment plants operated by Acciona Agua. "These materials are destined for high-value applications in the construction, chemical, and technological sectors. The project will explore AI-powered digital platforms to optimize operations and ensure consistent quality of the recovered resources."

Photo: MSV, AI-generated

It is planned that the Spresiano facility will continue to refine the AHP recycling process, with a focus on maximizing energy efficiency and enhancing the quality of recovered materials. "It will also be open to visits from stakeholders across the value chain, including waste management operators, industry partners, and potential investors exploring the adoption of this technology."

- i-foria.eu/en/ahp-recycling/
- project-icarus.eu
- acciona.com

# AGILYX TO ACQUIRE SHARES IN GREENDOT GLOBAL

In July, Norway-based Agilyx ASA informed that it entered into a binding and fully financed agreement to acquire 44 percent of GreenDot Global S.à r.l.

This transformative investment would significantly strengthen the company's presence in the European market, creating "a global platform for sourcing and supplying feedstock to the advanced recycling industry", Agilyx described the benefit of the planned strategic participation. "GreenDot is the leading circular plastic recycling platform in Europe and the third-largest recycling company in Germany. Licensed across 29 countries, it is the most recognized recycling brand in Europe. GreenDot processes more than one million tons of packaging waste annually, including over 400,000 tons of plastic." The company would expand its advanced recycling feedstock supply capabilities by investing in sorting facilities in Austria and Italy. For 2025, GreenDot's operations are expected to generate approximately 400 million Euro in total sales and double-digit EBITDA.

As reported, Agilyx intends to acquire its stake for a total consideration of 52 million Euro, consisting of approximately 32 million Euro in newly issued company shares and approximately 20 million Euro in cash in a combination of primary and secondary share purchases. The transaction would value GreenDot at a post-money enterprise value of 197 million Euro. The transaction was expected to close in late Q3 2025, subject to customary conditions including, inter alia: regulatory approval under German foreign direct investment laws, lender consent for change of control at GreenDot, and Agilyx shareholder approval.

agilyx.com
green-dot.com

# ONE MORE STEP TO SCALE POLYESTER RECYCLING

The German-based company matterr has announced a strategic partnership with family-owned international fashion group Bestseller, headquartered in Denmark. matterr has developed a depolymerization process that breaks down polyester (PET) into its original building blocks – terephthalic acid (TPA) and monoethylene glycol (MEG). "Chemically identical to virgin materials, they can be directly reused in existing textile and packaging production," the company underlined.

According to matterr, the investment, made through the Danish company's innovation and investment platform Invest FWD, follows a major EU commitment of 30 million Euro in public support through the EFRE/JTF program in North Rhine-Westphalia. Together, these milestones would lay the foundation for matterr's first small-scale industrial plant and the subsequent international scale-up of its technology. It is planned that the construction work will begin in 2026. "Once completed, the facility is designed to process 10,000 tons of polyester-rich waste annually, creating a reliable source of drop-in ready feedstock for the textile and packaging industries." According to Bestseller, through its innovation and investment platform, Invest FWD, the Danish firm has continuously invested in new recycling technologies and focuses on various promising companies within the same business area. "Common to all of them is the difficult – but important – process towards scaling". As stated by Dorte Rye Olsen, Bestseller's Head of Sustainability, matterr is a young company with an interesting solution that aims to be implemented on a large scale to benefit the entire fashion industry. "We believe in the scalability of their technology as well as the commercial potential of the company. This can ensure the right impact in the long run."

matterr.de
bestseller.com

matterr and Bestseller collaborate to scale polyester recycling

Photo: Bestseller

# ADURO JOINS PLASTICS ASSOCIATIONS TO SUPPORT INDUSTRY COLLABORATION

Canada-based Aduro Clean Technologies Inc. has announced its membership in both the Plastics Industry Association (PLASTICS) and the Polystyrene Recycling Alliance (PSRA), a collaborative initiative of PLASTICS focused on advancing polystyrene recycling solutions.

As underlined by the Canadian clean technological company, the PSRA brings together stakeholders from across the polystyrene value chain. The alliance would promote "both mechanical and advanced recycling approaches aimed at improving recovery rates and creating viable end markets for polystyrene materials". The membership in PLASTICS would connect Aduro to a broad network of resin producers, recyclers, converters, and brand owners committed to driving sustainability and circularity in the plastics industry. Through this association, the company would participate in working groups and policy discussions "that shape the regulatory frameworks, standards, and infrastructure needed to expand the role of chemical recycling and advanced conversion technologies". According to Aduro, by joining the Polystyrene Recycling Alliance, the firm is "contributing to a collaborative industry effort focused on addressing the systemic and material-specific challenges of polystyrene recovery, such as limited collection infrastructure, low recycling rates, and public misperceptions". These challenges were central to PSRA's mission to expand access to and adoption of both mechanical and advanced recycling solutions. Aduro's early-stage work in converting polystyrene into targeted hydrocarbon intermediates using its Hydrochemolytic Technology aligns with PSRA's objectives to support innovation, data sharing, and viable end-market development.

## The process

Hydrochemolytic Technology (HCT), developed by Aduro, works with water along with a catalyst at moderate temperatures to cleave carbon–carbon and carbon–heteroatom bonds in polymers, resulting in lower-molecular-weight compounds. As reported by the company, unlike other technologies that rely on high thermal input to effect uncontrolled rupture of polymer molecules, HCT operates under gentler conditions, enabling controlled reaction pathways. "The catalyzed, selective chemistry of HCT results in higher yields of hydrocarbon products with high functional group purity with minimal loss of polymer feedstock to undesired by-products such as char or heavy tar and gases. Experiments conducted on bench and large lab-scale flow-through units have demonstrated the applicability of HCT to convert post-consumer polystyrene into defined hydrocarbon intermediates such as toluene, ethylbenzene, and cumene. These outputs are compatible with downstream chemical infrastructure and require no further upgrading. While further development and validation are ongoing, these results underscore the potential of HCT to produce valuable chemical products and intermediates from difficult-to-recycle feedstocks and reflect Aduro's technical strength in the valorization of waste streams", the Canadian company pointed out.

## Pilot plant

Aduro is currently constructing its Next Generation Process (NGP) Pilot Plant in London, Ontario. Designed to operate under continuous flow conditions, the plant is to support the evaluation of Hydrochemolytic Technology (HCT) using real-world feedstocks. "Its modular and scalable design enables flexibility for project-specific applications across a range of customer needs. Aduro's participation in the PSRA complements this development by facilitating technical exchange, sample coordination, and closer alignment with evolving industry requirements," the information said.

aduroclean tech.com

Photo: KATR O / stock.adobe.com (Generated with AI)

# UK WASTEPOLITICS IN TIMES OF CHANGE

"Of the 26 million tons of waste produced in the UK, 12 million tons are recycled, and 14 million tons are sent to landfill sites. This gives us an average recycling rate of 45 percent", waste management company Recycling Bins.Co.UK states on its homepage. But recycling in the UK is a much more complicated, difficult and challenging task.

The taxonomy of the particular waste types in the UK differs somewhat from the European system. The latest statistics from 2021, edited by the British Government under the summing up title "UK statistics on waste", indicate "waste from household arisings" amounting to 27.6 million tons (Mt) and a recycling rate of 44.6 percent. 14 Mt of "municipal waste" including 6.7 million tons of biodegradable material went to landfill. There was 12.7 Mt of "packaging waste" with an achieved recycling rate of 63.2 percent. Waste from "commercial and industrial" activities added to 40.4 Mt. According to the paper, the generation of "non-hazardous construction and demolition waste" reached 59 Mt and a recovery rate of 92.6 percent. "Construction, demolition and excavation" including dredging waste was measured at 137.8 Mt – with 62 percent delivering the greatest share of British waste. Altogether "the UK generated 222.2 Mt of total waste in 2018", the Crown paper balanced.

### 108 material recovery facilities

Looking at the source of waste production, the material results in 12 percent from households, 19 percent from commercial and industrial activities (C&I) and mainly in 62 percent by construction, demolition and excavation (CD&E). To manage this quantity, several proceeding routes are installed. The Statistics of the Department for Environment, Food & Rural Affairs (DEFRA) of 2018 made clear that the list of treatment methods included recycling and other recovery by 108.4 Mt of waste, landfill with 50.8 Mt, "land treatment and release into water bodies" with 25.7 Mt and incineration within energy recovery at 8.5 Mt. Solely incin-

eration is designated for 7.3 Mt and backfilling for 14.2 Mt. According to Statista, numbers available for the year 2020 show 621 sites permitted for landfill, 43 facilities for incineration within energy recovery, 100 facilities for incineration and 3,279 units to recover waste other than energy recovery including backfilling. A market overview published by consultancy services provider Monksleigh in 2023 counted 108 material recovery facilities, receiving 4.277 Mt of qualified material. Among the companies, Biffa is number one, runs 19 facilities, and possesses 18 percent of the market share by tons received, followed by Suez (12/14 percent) and Veolia (11/8 percent).

### Roughly 123,400 people employed

According to the Office of National Statistics, in 2022 the whole waste sector in the United Kingdom employed roughly 123,400 people, of which – with 40 percent – waste collection was the largest waste management segment, but also showed the biggest decrease of nearly 18 percent year-over-year. One-third of the employees were engaged in the waste treatment and disposal sector. The "wholesale of waste and scrap segment" pledged above 10,000 people.

### Only three percent more recycled

How effectively does the waste facility park work? In a "response" paper from November 2023, the government underlined that the household recycling rates in England between 2000 and 2022 rose from 11 to 42 percent. Meanwhile, the rates "have 'plateaued' at around 42 percent to 44 percent". A report on the UK recycling and waste treatment market edited by Tolvik Consulting and the Environmental Services Association (ESA) gives little encouragement that much had changed: "The total recorded tonnage of wastes accepted at all types of permitted landfills over the past ten years has remained broadly constant at circa 50Mt per annum." And following the current homepage of Recycling Bins.Co.UK, the effects of recycling seem to be straightforward: "In the UK, we are only recycling three percent more waste than we did in 2010."

### Ten years of change and stagnation

The latest "UK statistics on waste" from 28 June 2023 balanced the main trends of waste treatment in the last years in a more detailed and illustrated way:

- The arisings concerning household waste stagnated from 2015 to 2021 at about 27 Mt and a recycling rate between 44.5 and 46 percent.
- Municipal waste to landfill between 2010 and 2021 certainly declined from some 25 to 14 Mt; the biodegradable waste that went to landfill was reduced too from 13 Mt to 6.7 Mt.
- The recovery rate of non-hazardous construction and demolition started at nearly 90 percent in 2010 and reached 92.6 percent in 2020.
- The commercial and industrial waste generation volume between 2010 and 2020 fluctuated at a guess between 43.9 and 40.0 Mt.
- Numbers addressing the change of treatment methods from 2016 to 2018 show a decline in backfilling and landfilling (-15.8 / -2.8 percent), increasing rates of incineration with and without energy recovery (+15.5 / +28.3 percent) and a small ascent of recycling and other recovery (+4.3 percent).

### Important: exports

One must not forget that the UK exported waste. Following statistics from the Commercial Waste Quotes website, the nation in 2023 exported nearly 140,000 tons of plastic to Turkey, 120,000 tons to the Netherlands and some 50,000 tons to Germany – altogether about 600,000 tons. 80 percent of the 10.6 Mt of domestically generated metal scrap – i.e 8.2 Mt – were mainly sold to Turkey, Egypt, India and 15 other nations. About 700,000 tons of refuse-derived fuel went to Sweden, more than 400,000 tons to the Netherlands, and some 150,000 tons to Germany – all in all 1.6 Mt. Electronic and electrical waste (including 30,000 illegal tons) especially found buyers in Belgium (approx. 125,000 metric tons) and Spain (11,000 metric tons).

### No great changes in recyclable rates

The tonnage of recyclables processed by material recycling facilities (MRF) showed no great changes between 2016 and 2021. According to MRF output numbers offered by the Monksleigh study, waste paper performed a progressive downward trend from about 150,000 to 120,000 tons, plastic and metal outputs increased slightly, while glass in 2020 nearly doubled the output of 2016 and decreased again by the pandemic. According to the official statistics, packaging waste achieved recycling rates of 76.4 percent for steel, 74.8 percent for aluminum, 73.6 percent for glass, 70.6 percent for paper and cardboard, 44.2 percent for plastics, and nearly the same for wood – a total for recycling of 63.2 percent.

### "Falling short of the mark"

In 2021, the UK recycled 63.2 percent of its packaging waste and around 47 percent of waste from households – in Wales at 56.7 percent, followed by Northern Ireland at 48.4 percent, England at 44.1 percent, and Scotland at 41.7 percent. These results did not meet the recycling targets from DEFRA of 60 percent by 2030 and 65 percent by 2035. According to a fact sheet edited by Cladco, a profiles producer,

"UK recycling is falling short of the mark", as the level of potentially recyclable household waste could be 80 percent. For example, five Mt of paper per year and 14 million glass containers per day are going to be landfilled. At least something has been done to the organic wastes by households: In 2010, the UK sent 25,019 tons of municipal waste, of which 12,982 were biodegradables, to landfill. Thanks to the implementation of various policies and programs, the municipal waste that ends up in landfills went down from 25,019 tons in 2010 to 14,003 tons in 2021, of which 12,982 tons respectively 6,761 tons were biodegradables, according to official information.

### "Historic landfills"

What these records conceal is the number of so-called "historic" landfills. According to The Guardian, there are more than 21,000 sites with largely unknown and potentially polluting contents. Decades ago, these places were used to "dilute and disperse" industrial and domestic waste. Since the government closed the funding program for contaminated land enforcement generally in April 2014 and for "absolutely emergency cases" in April 2017, the affected local authorities must care for and procure money themselves.

### Turnover of 23.5 billion British Pounds

However, treating waste also makes money: The experts of Tolvik Consulting valued the turnover of the UK recycling and waste treatment sector at 23.5 billion (bn) Pounds – a new height, caused by increased waste tonnage values through the pandemic and market prices. The collection of commercial and industrial waste contributed six bn Pounds, the collection by Local Authorities three bn Pounds, energy from waste amounted to 2.6 bn Pounds, landfill brought 1.1bn Pounds, mechanical biological treatment added 0.3 bn Pounds and co-incineration 0.1 bn Pounds. The biggest share represented recycling with more than seven bn Pounds, composed of five bn Pounds from the metal sector, 1.2 bn Pounds from packaging, and several others: non-packaging 0.7 bn Pounds, material recovery facilities 0.5 bn Pounds, waste wood 0.4 bn Pounds, and organics, WEEE and as well bottom ash from incineration each 0.2 bn Pounds. According to the numbers of the Office of National Statistics, the 23.5bn consists of ten bn Pounds by collection, about five bn Pounds by treatment and disposal, and 18.5 bn Pounds by recovery of sorted materials and others.

> Investment in the British waste recycling sector is utterly necessary – from national as well as international view.

### To benefit the environment

The British waste policy is not only directed by the government and the Department for Environment, Food & Rural Affairs (short: DEFRA), but also influenced by the activities of other organizations. For example, LARAC, The Local Authority Recycling Advisory Committee, was formed in 1985 to represent local authority views on waste, recycling, and resource issues. The Waste and Resources Action Programme – short: WRAP – is a global environmental action NGO to "transform our broken product and food systems to create Circular Living for the benefit of climate, nature and people". For over twenty years, WRAP delivered programs "to benefit the environment". The Recycling Association – perceiving itself as "The Voice of the UK-Recycling Industry" – was formed in 1975. "Working with the UK Government and devolved Nations on policy, regulation and law", it now comprises companies involved in collecting, sorting, and recycling a wide variety of materials. In May 2024, the association declared to be against the immediate introduction of a DRS scheme and recommended taking time to assess whether to introduce a Digital DRS scheme instead.

### A new waste management plan

In December 2018, DEFRA published a "Resources and Waste Strategy for England", followed by a new "Waste Management Plan for England" in January 2021. Both papers should play their part "in embedding sustainable thinking around waste management and bringing about a real step change in how we consume resources", said Rebecca Pow in a ministerial foreword. The intention of the management plan was "not to introduce new policies or to change the landscape of how waste is managed in England", but to "bring current waste management policies under the umbrella of one national plan": Clean Growth Strategy, Industrial Strategy, Litter Strategy, UK-Plan for Shipments of Wastes and the National Policy Statements for Hazardous Waste and Renewable Energy Infrastructure. In September 2021, an updated "UK plan for shipments of waste" followed, "prohibiting imports and exports of waste to and from the UK for disposal". DEFRA argued that the plan was "to reflect the UK's departure from the EU in 2019, in addition to certain policy and minor technical changes" and to implement "self-sufficiency in waste disposal". (The latest "UK statistics on waste" occurred on 28th June, 2023. So it is not yet documented, whether these plans were or at least could have been effective.)

### New government, new goals

In June 2024, short before the general election, the Conservative and Unionist Party Manifesto 2024 appeared. It included a ban on future incinerators and a promise to revoke permits for plants that have not yet undergone substantial construction. But the next month, the Labour Party won the majority in Parliament by general election. Three years ago, at their annual conference, designated green chancellor Rachel Reeves had already announced an additional 28 billion Pounds in capital investment for every year of this decade in the green economy. According to The Guardian, in February 2024, Reeves reduced the plan to under 15 bn Pounds and finally to 4.7 bn Pounds. Albeit Ed Miliband, the new Secretary of State for Energy Security and Net Zero, officially declared "to make Britain a clean energy superpower with zero carbon electricity by 2030, and accelerating our journey to net zero". And Sadiq Khan, Mayor of London, even pledged to make his town zero waste.

Online magazine MRW compared the election with an "independence day for many in the waste and recycling sector, who hope that a new administration can set the resources and waste strategy free from the Conservatives' constraints". The online portal letsrecycle.com cited Jacob Hayler, ESA Executive Director, expecting a "more resource-efficient, lower-carbon, circular economy in the UK". Furthermore, he looked forward to a policy "that will allow our members to invest billions in world-class new recycling infrastructure and services". LARAC welcomed the new government and "asked it to prioritize key waste management reforms", among others the Extended Producer Responsibility for packaging producers.

### Neither ambitious nor radical

In July 2024, Recycling Today reported that recycling, waste conversion, and alternative energy trade groups hopefully awaited "a boost in government support for their sectors". But the online magazine also cited Shaun Spiers, executive director of the Green Alliance: "This was not an election fought largely on environmental issues." The waste management company FCC Environment was skeptical too: Waste and recycling may "not be in forefront of Minister's mind" and not be an area that they are planning to be particularly ambitious or radical. And Jennifer Brown, associate director at Grant Thornton UK, published on letsrecycle.com, that at the time there was a "critical juncture in the approach to waste management in the UK" and that "Labour must not be short-sighted".

According to FCC-Environment in July 2024, certainty and stability were wanted, steady policy progress too, "suitable conditions for investment", the creation of thousands of green jobs, the delivery of infrastructure, and all in all, a "progress to continue and provide a stable environment for further investment". At the same time, the online magazine MRW titled shortly that "the industry wants some real action from new ministers".

### Some real action wanted

That something had to be done, the members of the Environmental Services Association already stated in June 2021. To reduce UK greenhouse gas emissions ahead of and faster than the conservative government's deadline, the ESA set out a detailed plan to cut eight percent of UK total greenhouse gas emissions to net zero by 2040. For this purpose, the ESA members were ready "to invest ten bn Pounds of new money in recycling infrastructure to drive up recycling rates and cut down waste" and to increase capture of methane emissions, the Green Business Journal wrote. ESA chairman Gavin Graveson underlined: "Our report also shows that done right, decarbonization can deliver green jobs and investment right across the UK."

In November 2022, the Environment Food and Rural Affairs (EFRA) Select Committee called on the government to work with industry to unlock one billion Pounds of investment in domestic plastic reprocessing infrastructure. According to waste management company Viridor, this investment could deliver 46 new industrial facilities across the UK, create 1,100 permanent skilled green jobs and a further 975 in the supply chain, and deliver economic benefits of more than three bn Pounds over 25 years.

In November 2023, the British Business Bank's 200 million Pounds South West Investment Fund announced its first major equity deal with a 500,000 Pounds equity investment in tech-led commercial waste and recycling business Binit. According to a parliament paper on "The price of plastic" in November 2022, the Environment Agency committed to continue allocating ten million Pounds to waste crime enforcement in 2022/23. Another source cites the Environment Agency estimating waste crime costing the UK economy one bn Pounds every year.

### Investments are essential

Investment in the British waste recycling sector is utterly necessary – from national as well as international view. The question will be whether the politics will begin and succeed in acquiring the essential investment funds to pave the way for a cleaner environment and a waste economy that pays off. Already in 2019, Tony Goodman, director of waste disposal company Crawleys, highlighted that "investment in the UK's recycling infrastructure is needed ... and fast!"

# THE RECYCLED POLYOLEFIN MARKET IS SET TO GROW

According to Canada- and India-based market research company Towards Chem and Materials, a sister firm of Precedence Research, the global recycled polyolefin market size is estimated at 66.67 billion US-Dollar in 2025. By 2034, the market is expected to hit around 144.2 billion US-Dollar, growing at a compound annual growth rate (CAGR) of 8.95 percent over the forecast period. As stated, the market is experiencing significant expansion due to the movement to sustainable packaging, lightweight automotive, growing infrastructure, and conversion to more recyclable polymer-based solutions. It has continued to grow with higher environmental considerations, government mandates, and increasing consumer, brand owner, and retailer demand for sustainable solutions. Improvements in related sorting technologies and recycling technologies have continued to enhance the end-use quality of recycled polyolefins.

### Recycled-content laws strengthening demand

Governments are promoting recycled polyolefin adoption, with recycled-content mandates making it law and enforceable, Towards Chem and Materials pointed out. In June 2025, India, had released a draft of the Plastic Waste Management (Second Amendment) Rules, requiring the Category I rigid plastic packaging to have a minimum of 30 percent recycled content in 2025-26, with targets to reach 60 percent in 2028-29. And in the USA, California's Assembly Bill (AB) 793 mandates recycled content standards for plastic beverage containers to include 25 percent PCR (post-consumer resin) in 2025; by 2030 the packaging must reach 50 percent PCR. "These governments provided mandates create un-assessable demand for recycled HDPE and PP, which means packaging producers and resin suppliers can use this buying behavior to take risks, invest in scalable polyolefin recycling infrastructure and material supply, even without market-research summaries."

### AI and quality

Artificial intelligence is beginning to bring higher levels of efficiency and quality into the recycled polyolefin market, Towards Chem and Materials informed. While India-based Ishitva Robotics is seen as "leading in AI-powered waste sorting using NIR and machine learning methods to identify HDPE, LDPE, and PP from mixed waste streams accurately", Europe would be home to one of the largest organizations working on a similar project. There, involving an AI-powered robotic solution called OMNI – provided by Recycleye and Valorplast – the technology had been capable of recovering food-grade PP with over 95 percent purity. "Multinational firms like Borealis and TotalEnergies will be investing in AI-based systems to enhance sorting, traceability and end-product quality to continue to bridge the gap to virgin-grade standards and build the role of recycled polyolefins in the circular economy."

### Market Opportunity

The report provider is convinced that one main opportunity for the recycled polyolefin segment is the growing demand for sustainable packaging found in sectors like food & beverage, personal care, and even e-commerce. "With environmental concerns building and regulations being enacted for recycled packaging content, many companies are hoping to move away from virgin plastics. For example, Unilever and PepsiCo have recently committed to incorporating more post-consumer recycled polyolefin in their product packaging." Consumer awareness would surge, "so brands are also taking it seriously to meet their circular economic goals. All of this is helpful for recycled polyolefins as a valuable material in the world as we transition to greener packaging alternatives."

towardschemandmaterials.com/download-sample/5646

## THE GLOBAL WASTE RECYCLING SERVICES MARKET

ResearchAndMarkets.com, a leading source for international market research reports and market data, offers a new report titled "Waste Recycling Services Market Size, Share & Trends Analysis Report By Product (Paper & Paperboard, Metals, Plastics, Glass, Food, Bulbs, Batteries & Electronics, Yard Trimmings), By Application (Municipal, Industrial), By Region, And Segment Forecasts, 2025 – 2033". As stated, the global market size was valued at 65.08 billion US-Dollar in 2024 and is projected to reach 109.79 billion US-Dollar by 2033, growing at a CAGR (compound annual growth rate) of 6.1 percent from 2025 to 2033. The progression is driven by increasing environmental concerns, strict government regulations, rising industrial waste, and growing awareness of sustainable practices. researchandmarkets.com

Germany:

# A NEW CENTER FOR CIRCULAR PRODUCTION OF NEXT BATTERIES AND FUEL CELLS

On August 18, the symbolic starting signal was given at the Technical University of Braunschweig for the "Centre for Circular Production of Next Batteries and Fuel Cells" (CPC).

Completion is scheduled for the end of 2027. The new research building, estimated to cost around 73 million Euro, is being funded by the state and federal government with 65 million Euro. It will also "strengthen the regional network of Braunschweig LabFactories for Batteries and More (BLB+), driving its forward-looking development," the Technical University of Braunschweig gave account.

The central goal of the CPC is to integrate recycling and resynthesis processes completely into the circular production of new generations of batteries and energy converters, starting from the product development phase. It is planned that about 150 scientists from the fields of process engineering, recycling, manufacturing technology, chemistry, physics, and logistics will collaborate to conduct research into solid-state batteries, membrane-based flow batteries, fuel cells, and metal-oxygen systems. Particular focus would be given to the recovery of critical raw materials and their processing into high-purity active materials, "which enables a consistently circular economy approach and ensures the sustainable use of valuable resources by closing material cycles".

Thorsten Kornblum (Mayor, City of Braunschweig), Angela Ittel (President, TU Braunschweig), Carsten Müller (Member of the German Parliament, CDU), Falko Mohrs (Lower Saxony Minister of Science and Culture), Prof. Arno Kwade (BLB+, TU Braunschweig) and Torsten Markgräfe (Head of Building Management, TU Braunschweig)

Photo: Christian Bierwagen/TU Braunschweig

The new center is under construction in proximity to the research facilities of TU Braunschweig's NFF (vehicle engineering) and NFL (aviation), as well as the Fraunhofer Centre for Energy Storage and Systems (ZESS) and the BLB's (Battery LabFactory Braunschweig) CircularLab test hall. "This means that the CPC is closely linked to energy storage, vehicle, and aviation research, further strengthening both the research focus on mobility in Braunschweig and Lower Saxony's research activities on the energy transition."

magazin.tu-braunschweig.de/en/

Photo: RetourMatras

# MATTRESS RECYCLING:
## WORLDWIDE BUT NOT EVERYWHERE

According to numbers of Verified Market Reports, the global mattress recycling service market was valued at 1.2 billion US-Dollar in 2024 and is projected to reach 2.5 billion US-Dollar by 2033. The increasing demand for sustainable disposal methods and recycling initiatives is expected to drive an annual growth rate of 4.8 percent from 2022 to 2030. However, the varying national circumstances still promote a cautious optimism about this growth.

### USA: Servicing customers nationwide

"Americans send more than 50,000 mattresses to the landfill each day, and less than five percent are recycled", according to the Product Stewardship Institute (PSI), a policy expert and nonprofit consulting. In numbers, approximately 20 million mattresses are disposed of annually in the United States, resulting in significant landfill waste, says the U.S. Environmental Protection Agency (EPA). The mattresses add as much as 800 million cubic feet to landfills in the USA, says the Indian Sleep Products Federation in an international report on its homepage. It is not a lack of interest that keeps Americans from environmentally disposing of mattresses. The Northwest Product Stewardship Council admits that "interest in mattress stewardship has grown in recent years due to increasing disposal costs and the recognition that most mattress components are recyclable". There is ample information available on various methods for handling mattress materials. For instance, American Mattress, a family-owned and operated company, provides a comprehensive guide on "How to get rid of a mattress." And there is no shortage of opportunities that prevent the discarding: In June 2023, the A Bedder World company proclaimed on its website: "Now servicing customers nationwide" and added: "Our industry-leading network of over 3,000 drivers allows us to pick up and recycle mattresses across the entire United States."

### Only three states under EPR law

The obvious reason: There are only three (four) states in the United States that run mattress recycling programs.

In California, Connecticut, Rhode Island/Oregon, they are mandated by law and managed by the non-profit organization Mattress Recycling Council (MRC). Developed in 2012 by state and local government members and industry input, Connecticut enacted the first mattress EPR law in 2013; later, mattress EPR laws were passed in California, Rhode Island, and Oregon. In 2015, PSI published the Advancing Mattress Stewardship: A How-To Guide. Since then, programs in Connecticut, California, and Rhode Island have recycled more than 12 million mattresses and diverted over 450 million pounds of material – steel, foam, cotton, and wood – from disposal.

According to their website, Bye Bye Mattress led to the recycling of 15 million mattresses in December 2024. With currently fees between 16 US-Dollar per unit and 22.50 US-Dollar in Oregon, the program will further enable the provision of collection locations with containers, transportation of the container to a recycler, and then the dismantling of those units. "Other portions of the fee help communities address illegal dumping or go towards research projects that improve recycling processes or end markets for the materials." Part of the MRC budget in 2025 is provided for the compensation of "participating entities for collecting dumped units and reporting data on illegal mattress dumping, to fund pilot projects for innovative approaches to solving the illegally dumped mattress problem and to educate California residents about how to properly discard their used mattresses." According to Mike O'Donnell, MRC Chief Operating Officer, the program in the three states California, Connecticut, and Rhode Island will recycle nearly two million mattresses a year.

### Europe: An accumulation of several approaches

Europe is a conglomerate of different mattress disposal approaches. By founding a producer responsibility organization named Mattress-Recycling Germany, the Professional Association Mattress-Industry will create a solid basis for an extended producer responsibility. The Austrian Mattress Alliance was founded in September 2024 to establish a nonprofit association to create the best possible framework conditions for a circular business model in the mattress-recycling branch. Combined with Valumat, TripleR.io – together with five producers and three mattress recyclers – has, since 2024, stepwise introduced a digital product certificate in Belgium. In the Netherlands, it was estimated in 2020 that 75 percent of waste mattresses were collected and recycled. Now, RetourMatras has enough capacity to dispose of 1.5 million items. In France, the motto of Ecomobilier was "No furniture to waste"; now its successor Ecomaison is responsible for recycling up to four million mattresses. The current report on end-of-life mattresses in the United Kingdom shows that collection losses still add up to 76 percent. In Ireland, EcoMattress Recycling and Bounce Back Recycling are the most prominent recycling services offering collection and possibilities. The dismantling quota lies between 11 and 17 percent. In Italy since 2022, mattress dismantling falls under an EPR regulation, and its handling is the task of the consortia Ecoremat and Ecotessili. In Spain, there is neither a nationwide initiative nor a specific program; still, 1.5 million mattresses end up in landfills.

### Australia looking for appropriate standards

"Manual dismantling and shredding are the two common approaches to mattress recycling in Australia", says ABSC, the Australian Bedding Stewardship Council, a not-for-profit organization with a voluntary, industry-led product stewardship scheme. Backed by the Federal Government and with authorization of the ACCC (Australian Competition & Consumer Commission), its members focus on manual deconstructing and sorting by hand of materials like steel and foam or the – eventually energetic – shredding for foams and fabrics /floc. As a mattress cannot be completely recycled in Australia and the materials recovered from mattresses have only limited value, ABSC aims to find new solutions for end-of-life materials and to support existing mattress recyclers to expand their services to retailers, councils, and consumers. The scheme is not yet offered to organizations that reskin or refurbish mattresses, but ABSC wants to develop appropriate industry standards "in line with The Department of Climate Change, Energy, Environment and Water's stance on the right to repair and reuse legislation". At least twelve mattress-recycling enterprises belong to the council that cooperates with Charitable Reuse Australia, Waste Recycling Industry Queensland, and the WMRR, as well as the Waste Management & Resource Recovery Association Australia. Soft Landing – an ABSC-approved recycler too – is in its own words Australia's largest mattress recycler and ensures by its manual dismantling method "the highest percentage of mattress materials (up to 75 percent)".

### China: Focus on foam scraps and fabric remnants

If Jinlonghen, a mattress and bed manufacturer since 1992, is right, "energy-efficient manufacturing processes have become the cornerstone of sustainable production practices in China's mattress industry". That means both the adoption of advanced technologies and equipment, as well as the reduction of energy and water consumption, and the enhancement of efficient production. But investing in research and development to explore alternative materials and production techniques that require less energy introduces not only progress into the production sector, but they are likewise implements innovative techniques for recycling and reusing materials. The result: "Foam scraps

and fabric remnants are collected and repurposed into various products or used as raw materials for other industries", Jinlonghen concludes.

At the 56th China International Furniture Fair in March 2025 in Shanghai, a Facebook input of China IRN made clear that "China's bed market has entered a new stage of high-quality development". The supply side delivers improved industrial efficiency through material innovation and digital factory construction. In the future, enterprises would need increased investment in research and development of AI and Internet of Things, and among others, to "establish a circular economy system and promote mattress recycling projects".

### Volume progression by 15 percent wanted

In 2021, the Chinese website People's Daily Online titled "Online service eases headache of disposal of large garbage" showed that private selling of large-sized furniture, offering it online to the flea market, or contacting garbage stations does not work. And storing it temporarily at facilities, asking for a mini collection program, or ordering a door-to-door collection service was expensive. Meanwhile, the wind has changed. According to an official publication of the State Council of the People's Republic of China in 2024, the country wants to increase the volume of recycled home appliances and furniture by 15 percent by two years, "to grow the national recycling industry". In the meantime, IKEA offers a furniture disposal service at its Hong Kong and Macau stores, Sourcify China published a comprehensive Guide for responsible furniture disposal in China, and Couch Disposal+ – covering 18,000 cities nationwide in the USA – offers appliance removal and disposal "in the most responsible method".

Although information about organized mattress recycling is not available, the rising level of technical development can be measured from the offers by China's recycling and dismantling techniques. Changshu Sail Nonwoven Machine Company, for example, offers its so-called Polyester Mattress Recycling Machine Bed Mattress Recycling Machine for 5,000 - 20,000 US-Dollar, Mingxin Machinery advertises a Mattress Plastic Recycling Industrial Food 2 Shaft Shredder Machine for 5,700 US-Dollar, and the Enerpat (Jiangsu) International Trading Company wants to sell a Pocket Coils Recycling Line for Mattress for 100,000 US-Dollar per piece.

### Latin America: Little-to-no infrastructure

The judgment from materials science company Dow regarding the recycling of discarded mattresses is clear: "There is little-to-no infrastructure in place in Latin America to properly discard old furniture and bedding". According to Dow, several thousand couches, living room chairs, and end-of-life mattresses were disposed of in local landfills, so that the discarded material could be recycled. Until the Reuse campaign was initiated.

In its first phase, launched in 2021 in the city of Hortolândia, Brazil, The Reuse collected and sent to recycling more than 3,500 items – gathering wood, polyurethane foam, fabrics, rubber, strings, and other materials. The project, which started in 2022, included fridges and freezers and expanded to other cities. By the end of the campaign, in May 2023, 105.8 tons of material were saved from landfills, and 72 tons of $CO_2$ emissions were reduced. According to Dow, the Reuse campaign leveraged key learnings from the Renuva program in Europe, which recycled polyurethane foam from end-of-life mattresses and turned it into polyols for use in new mattresses and other applications.

### Recycling programs in Brazil and Chile

According to Dow, the Reuse campaign in Brazil was a success, largely due to the support from the Mattress Recycling Council (MRC), which has funded research and development of mattress recycling technologies and provided resources for mattress recycling programs. Edge Global Innovation (EGI) also played a crucial role by developing the vitrimerization process for recycling polyurethane foam. Meanwhile in Brazil, mattress recycling is facilitated through initiatives like MRC, whose Bye Bye Mattress program allows residents to recycle mattresses and box springs at designated facilities, and Boomera do Brasil, providing circular economy solutions to difficult-to-recycle materials for various industries. In Chile, CIC – Saber vivir mejor, running a bed- and mattress factory, offers a mattress recycling program and has since recycled 17,631 beds and mattresses and covered 2,776 tons of material by recycling and composting of wood and sawdust.

### Canada: difficult start

In 2013, at a conference hosted by the Solid Waste and Recycling magazine in Toronto, Simon Zysman, managing consultant of Recover Canada, reported on the national treatment of mattresses. According to the expert, mattress

"Online service eases headache of disposal of large garbage."

retailers have begun to substitute some mattress diversion initiatives, “but those efforts only divert about seven per cent of discarded mattresses in Canada”. At that time, about 70 percent of mattresses in Canada were either burned or landfilled: “That’s equal to approximately 50 million mattresses and box springs each year.” However, since 1996, Zysman’s Toronto-based company has diverted about one million mattresses from landfill. In 2014, the Environmental Consulting firm Giroux reported on mattress recyclers existing in British Columbia, Alberta, Ontario, and Québec. Some municipalities had started landfill bans for bulky items, but there was yet no legislated EPR in place for mattresses.

### Consumers are the largest generators

A Research Paper published by the University of Halifax in Nova Scotia, Canada, in 2022, evaluates that approximately 95,000 mattresses end up in landfills, of which not even one-third of the amount is from industrial, commercial, or institutional generators and retailers. So, it is assumed with confidence that consumers are the largest generators of mattresses that end up in landfills, contributing an estimated 70 percent. According to BIV, Mattress Recycling has processed more than 650,000 mattresses since 2008, together with Scaldaferri at a rate of 70,000 to 90,000 units per year. Depending on its numbers, Canadian Mattress Recycling has recycled over 55,687,984 pounds of mattresses and furniture for residents and businesses across the Lower Mainland since 2011.

Photo: MSV, AI-generated

### Africa: Demand goes upward

According to a brand-new market report on the Middle East and Africa mattress recycling service market, there is “stronger demand for mattress take-back schemes and eco-disposal services”. Except for several socio-economic variables, the reasons for the demand include increased adoption of digital solutions, rising longing for sustainable practices, and growing investments in infrastructure and innovation. Although the supply side is not yet adequately developed, the demand for take-back schemes for mattresses and more eco-disposal services is increasing, especially in rapidly developing regions as the United Arab Emirates, Saudi Arabia, South Africa, Nigeria, and Egypt. Driven by innovation, expanding markets, and advancing technologies, meanwhile, at least 25 mattress recycling services across the Middle East offer their service.

It must not be forgotten that in Africa, different interest groups already maintain several offers and programs online. For example, in South Africa, several services already exist that offer removal, recycling, or donation addresses for old mattresses. Now, a mattress manufacturing program like Restoric SA recycles more than 7,236 tons of material per year, handles 9,600 tons of textiles during the past year, and uses in its mattress production 30 percent of raw material coming from recycled materials. And even a small company like Mattress Warehouse uses materials like wood from the bed base, foam, cotton, and steel springs, and suggests creative ideas like using fabric strips from the sheeting to create new items or donating them to shelters.

### India: Eight ways to get rid of it

The Indian Sleep Products Federation is straightforward in its assessment: “India lacks the infrastructure necessary for efficient mattress recycling. The country does not yet have a comprehensive network of specialized recycling centers equipped to handle bulky items like mattresses.” Lack of awareness, limited infrastructure, and informal sector dominance meet people who are unaware of the environmental impact of mattress disposal or the benefits of recycling”.

Harshad Parolkar of Flo Mattress – an online mattress seller – dissents and advocates that there are eight ways to dispose of old mattresses in India. Apart from donating, disposing of them yourself, dropping them at a collection point, or calling scrap dealers (Raddiwalas/Kabadiwalas), they can be listed for resale on local classified or online marketplaces. A professional disposal service might be hired in Mumbai, Kerala, Bangalore, Delhi, or Hyderabad, the items given to a popular recycling company like Hindusthan Recycling, The Kabadiwala, or Let’s Recycle, or finally a mattress exchange program chosen.

# DRIVING BUSINESS TOWARDS A CIRCULAR ECONOMY

Thai plastic product manufacturer Royce Universal Co., Ltd. can recycle around 15,000 tons of post-consumer PET per year, turning it into food-contact material for packaging applications.

"We do not think plastic scrap is waste. We consider it as our resource," explained Touchawatt Techamongkoljit, CEO of Royce Universal Co. Ltd. "Our goal is to recycle as much plastic waste as possible. In PET bottle-to-bottle recycling, we saw the opportunity to reduce the amount of plastic waste and reuse it in a way that avoids downcycling." Royce offers certified food-grade recycled PET pellets under the brand name "PetaRoyce". The company invested in PET bottle-to-bottle recycling technology from Austrian manufacturer Starlinger in 2023. The recoSTAR PET 165 HC iV+, installed at Royce's production site in Nakhon Pathom Province, 50 kilometers from Bangkok, turns washed PET flakes into food-contact rPET pellets and has a production capacity of up to 1,800 kg/h. The company uses the food-contact rPET in its sheet production. It supplies it to brand owners and beverage producers for mineral water and soft drinks in Thailand as well as in the US, Australia, and Japan. According to Touchawatt Techamongkoljit, the Thai company is working on developing a circular economy. In one of its current projects, Royce plans to expand its operations and recycle used PET bottles collected in southern Thailand. The rPET pellets would be shipped back for producing food-contact packaging in the region. "In addition, we want to enable Extended Producer Responsibility by developing a traceability system that uses blockchain technology to prevent greenwashing. These are a few of our steps to support and drive the use of sustainable recycled materials in various applications like food and beverage packaging, cosmetic packaging, or home appliances and houseware."


The Starlinger bottle-to-bottle recycling line installed at Royce's production site in Sam Phran, Thailand

Photo: Royce Universal Co. Ltd.

### Success through strategic diversification

Founded in 1970 as Thai Creative Lighting Co., Ltd. for manufacturing, importing, and distributing decorative lamps, the company diversified in the following years to include the production of furniture and household items made of plastic. In 2000, the company Royce Universal Co., Ltd. was established.

After restructuring measures in 2020, Royce Universal Co., Ltd. now acts as a corporate company for existing businesses. Its core areas are furniture and houseware, building materials, food and beverage packaging (sheet extrusion and thermoforming), and rPET production. In 2023, Royce created the brand "PetaRoyce" to market the food-contact rPET it produces on the Starlinger recycling line. Royce operates three production sites located close to each other in the town of Sam Phran, Nakhon Pathom Province in Central Thailand, and employs more than 500 people.

royceuniversal.net
starlinger.com

## ICBR, IARC, AND IERC ASIA

November, 10 – 13, 2025, Shanghai (China)

Swiss-based organizer ICM AG returns to Asia with three co-located congresses in battery, automotive, electronics circular economy, resource utilization and recycling. As pointed out, this event would also feature a comprehensive exhibition "showcasing cutting-edge technologies and solutions for the recycling and refurbishment industries". Experts from around the world would discuss the latest advancements in the circular economy and sustainable resource recovery industries in Asia and worldwide. Furthermore, ICM AG is offering exclusive plant tours to SK tes China, Baosteel, Botree Recycling Technologies or China Recycling Newell Equipment Company. Simultaneous English-Chinese translation will be available during the congresses.

events.icm.ch/event/ASIA2025/home

# A PLEA FOR INVESTMENT IN RECYCLING

Dan Felton, President and CEO of the Flexible Packaging Association (FPA), testified in July before the U.S. House of Representatives Committee on Energy and Commerce (E&C) Subcommittee on Environment during a hearing about recycling innovation and economic growth.

"Flexible packaging is one of the most sustainable packaging types, as it reduces water and energy consumption, improves product-to-package ratio, enhances transportation efficiency, minimizes food waste, and reduces greenhouse gas emissions," he informed. Felton then spoke about recycling and proposed to the subcommittee several public policy issues on which FPA focuses to increase flexible packaging recycling. That included the Recycling Infrastructure and Accessibility Act (RIAA) and the Recycling and Composting Accountability Act (RCCA) currently under consideration in Congress; advanced recycling technologies; the use of recycled content in flexible packaging; and support for a federal law for labeling of packaging for compostability, recyclability, and reusability. "FPA is deeply committed to solving packaging waste issues and increasing the recyclability and recycling of flexible packaging," Felton testified. "We are collaborating with manufacturers, brand owners, recyclers, retailers, waste management companies, and other organizations to continue making strides toward total packaging recovery."

flexpack.org

# A BUSINESS COMBINATION FOR CRITICAL MINERALS

As underlined, the proposed business combination would create a public company that aligns with the U.S. Mineral Independence Strategy.

Volato Group, Inc., a technology-driven private aviation company, and M2i Global, Inc., a company specializing in the development and execution of a complete global value supply chain for critical minerals, intend to combine businesses. According to the business combination agreement, Volato will acquire 100 percent of the issued and outstanding shares of common and preferred stock of M2i Global. Goal is "a diversified industrial platform serving a range of sectors – from aviation technology and software to the global supply chain for critical minerals essential to U.S. national defense, advanced technologies, and infrastructure". The management of both companies would support this combination transaction and has recommended that shareholders approve the transaction.

flyvolato.com
m2i.global

# THE GLOBAL RECYCLED OCEAN PLASTICS MARKET

American market research and advisory company Custom Market Insights (CMI) has published a new research report regarding the recycled ocean plastic market.

According to the latest research study, the global recycled ocean plastics market was valued at approximately 82 billion US-Dollar in 2024 and is expected to reach 1.93 billion US-Dollar in 2025, CMI gave account. By 2034, the value is predicted to reach around 3.50 billion US-Dollar at a compound annual growth rate (CAGR) of about 6.81 percent during the forecast period 2025 to 2034.

As per the industry experts at CMI, this global market is developing strongly "with myriad applications for materials that are both sustainable and traceable. Major companies are increasing their capabilities in the collection, processing, and certification of plastic waste retrieved from oceans. In North America, companies are making advancements with AI-based sorting technologies and digital traceability systems." European leaders would focus on eco-certifications as well as closed-loop supply chains, which support circular economy and climate objectives. "From the Asia-Pacific region, there is an increase in recycling infrastructure to satisfy the demand from textile, packaging, and consumer goods markets. Sustainability combined with compliance to rules spanning multiple countries fuels innovation across regions."

custommarketinsights.com/report/recycled-ocean-plastic-market/

Research Project:

# RECYCLING OF MULTILAYER PLASTIC MATERIALS

The RECIPLUS project applies technologies such as physicochemical delamination, a combination of mechanical separation techniques, and enzymatic recycling.

Spain-based technological center Aimplas is addressing the issue of plastic waste, as multilayer plastic materials present a major challenge at the end of their life cycle due to the complexity of separating and processing their different components. This difficulty leads to lower recycling efficiency and increases the amount of waste ending up in landfills or incinerators. Using innovative technologies such as physicochemical delamination, a combination of mechanical separation techniques and enzymatic recycling, Aimplas was able to recycle multilayer waste, allowing it to be reintroduced into the value chain or used to produce new recycled plastic products. This work has been carried out within the framework of the RECIPLUS research project, funded by the Valencian Institute for Competitiveness and Innovation (IVACE+i) through ERDF (European Regional Development Fund) funds, the Spanish technological center gave account.

To separate and purify the different components of the multilayer structure, “we used chemical solvents under supercritical fluid pressure and temperature conditions, which allows us to reduce processing time and solvent usage,” Mireia Fernández, lead researcher in Chemical Recycling at Aimplas, explained. “The environmental impact is lower, and the separated components have higher purity.”


Photo: Aimplas

As part of this research, Aimplas also optimized existing separation technologies to increase efficiency based on the material mix obtained after delamination. This included various methods such as NIR (near-infrared) separation, airflow density separation, and triboelectric separation. “Once the different components of the multilayer material – PE, PET, and aluminum – are separated, they can be reintroduced into the value chain as recycled film, for example, thus closing the loop,” Mireia Fernández was quoted. Alternatively, they could be used separately in the production of plastic items. “With the recycled polyethylene, and after an additive process to modify its properties, we have manufactured plant pots as an example of circular economy in the plastics sector.”

### Enzymatic recycling

In addition to physicochemical delamination, Aimplas has also addressed multilayer waste recycling through enzymatic delamination, which involves incorporating enzymes into the plastic material to enable its self-biodegradation. As reported, Acteco, a company specialized in comprehensive waste management, recovery and valorization, and Cebimat Lab, a spin-off from the Jaume I University dedicated to studying material biodegradation, have collaborated on this research.

aimplas.net
acteco.es

## PRESONA AB TO BE ACQUIRED BY INDUCORE

Internationally active Swedish manufacturer of balers Presona AB will be integrated into the System Solutions business area of Inducore AB. The transaction was closed in June. The Sweden-based Inducore Group already includes several specialized operational businesses that provide system solutions, products, components, logistics solutions, and contract manufacturing.

presona.se

# PLASTIC SORTING WITH TERAHERTZ SPECTROSCOPIC IMAGING

UK-based company Vanden and Oxford University collaborate on advanced plastic recycling technology.

As reported by Vanden Recycling, the internationally active company is supporting Professor Michael Johnston at the University of Oxford's Department of Physics to tackle one of the most pressing challenges in the recycling industry: identifying and sorting complex plastic waste with greater precision. "This partnership, supported by the UK Research and Innovation Engineering and Physical Sciences Research Council (UKRI EPSRC) through an Impact Acceleration Account, brings together academic excellence and industrial experience to accelerate science-driven innovation in plastic recycling," a press release underlined. "The initiative is spearheaded by Vanden's Technical Director, Beril Baykal Yesilırmak, and aims to translate advanced laboratory research into practical solutions that can be deployed across recycling infrastructure in the UK and beyond."

At the core of this partnership is terahertz spectroscopic imaging. According to the information, unlike technologies such as Near Infrared (NIR) or Fourier Transform Infrared (FTIR), terahertz imaging would be able to:

- "See through all colours of plastic (including black) overcoming one of the biggest limitations of conventional systems.
- Penetrate multilayer packaging to analyse internal structures and chemical compositions.
- Detect signs of degradation and embedded contaminants, offering deeper quality insights.
- Deliver high-speed, 3D imaging in real-time, supporting automated, inline industrial sorting systems."

These features would make terahertz imaging an ideal candidate for enhancing the efficiency, accuracy, and economic value of plastic recycling operations, Vanden pointed out. The company's experience in global markets would mean that they are well-positioned to provide real-world examples of the reality these barriers present when it comes to building closed-loop supply chains and the wider circular economy. The objective is to develop and test scalable solutions that will ensure more plastic is captured, recycled, and reintegrated into the supply chain.

## The potential benefits

The partners are convinced that the impact of this project could be transformative not only for the UK recycling system:

- "Improved sorting accuracy will boost the quality of recycled plastics, supporting compliance with UK Plastics Pact targets.
- Recyclers will be able to accept and process previously 'difficult' materials, including black plastics and complex packaging formats.
- Manufacturers will gain access to higher-quality feedstock that meets specific technical requirements, supporting closed-loop systems.
- Less plastic waste will be lost, creating both environmental and economic gains."

Globally, terahertz imaging would offer the potential to standardize "high-quality recyclate and leapfrog older technologies, especially in regions building modern recycling infrastructure from the ground up".

vandenrecycling.com
physics.ox.ac.uk

# LIEBHERR CRANE TECHNOLOGY FOR ARCELORMITTAL'S DECARBURIZATION PROJECT

With the construction of a new electric arc furnace in Gijón, ArcelorMittal is advancing a key pillar of its European decarbonization strategy. The introduction of the new arc furnace makes a significant contribution to reducing $CO_2$ emissions in steel production. It is being built during ongoing plant operations. Tight spatial constraints, a sensitive working environment, and stringent safety requirements pose challenges. In this context, a lifting solution was needed that is powerful, compact, and flexible. According to the provider, the Liebherr 1188 EC-H Fibre fully meets these demands. "With a lifting capacity of around nine tons at a maximum radius of 90 meters, it plays a key role in assembling the systems linked to the new furnace."

Photo: Liebherr

The new Liebherr 1188 EC-H fibre high-top crane is the ideal choice when it comes to handling heavy loads

Especially in confined environments, the high-top crane would prove its strengths, thanks to its compact tower and jib components that allow for efficient use of space. "For ArcelorMittal, this was a decisive advantage, as the use of additional lifting equipment could be minimized, streamlining logistics on site", Liebherr underlined. "A standout feature of this crane is its fibre rope. Compared to traditional steel rope, the high-performance fibre rope offers numerous benefits: its lighter weight allows for higher lifting capacities, it has up to four times the service life, and it is significantly easier to handle. On site in Gijón, the reduced rope weight enables precise and safe lifting, especially during work near ongoing operations." The integrated Litronic control system would ensure smooth and precise crane movements. It supports the operator with assistance features such as load swing damping and micro-positioning, the information said. "The control system is operated via a modern 12-inch touchscreen display and allows for optimal adjustment to changing site conditions."

liebherr.com

# GERMAN TECHNOLOGY FOR POLYURETHANE RECYCLING IN MEXICO

H&S Anlagentechnik has successfully launched a new polyurethane (PU) recycling plant in Ramos Arizpe, Mexico. The facility is operated by the Mexican division of Ikano Industry and marks the second joint project between the two partners.

According to the German manufacturer, the plant is designed to recycle post-industrial PU foam waste and convert it into high-quality recovered polyol, which can replace up to 50 percent of virgin polyol in the production of mattress foam, without compromising product quality.

"In some applications, such as upholstered furniture, even higher replacement rates are possible."

As underlined, this latest project follows the successful implementation of similar circular economy initiatives in Europe, including the RENUVATM plant in France and the Retour Matras plant in the Netherlands, both launched between 2022 and 2024, both dedicated to recycling end-of-life mattresses.

hs-anlagentechnik.de

# FIRST AI OPTICAL SORTER FOR C&D WASTE IN EUROPE

Recycleye, the British developer of AI-powered sorting technology, has successfully commissioned its Recycleye QuantiSort unit at Heydt's construction and demolition (C&D) waste facility in Germany.

"Delivered in partnership with global plant builder specialist Stadler, the project marks a European first: the use of AI-only optical sorting to separate mineral fractions – including brick from concrete", Recycleye emphasized. In June, both companies completed the installation of a new sorting stage at the German plant with the QuantiSort system, "enabling the facility to accurately identify and extract complex materials such as brick, concrete, gypsum, breezeblock, metals, wood, plastic, tile and glass".

For Heydt, also active in C&D waste recycling, the project would enable brick extraction and upcycling for the first time – a breakthrough in inert material recovery, the British firm stated. "Historically, NIR optical sorters have failed to perform this sort due to their sensitivity to dust, impurities and surface defilements, and are often not economically viable options. While VIS (RGB) sorters can detect color, they are limited to surface features and do not offer the depth or adaptability needed for complex, dirt-covered or irregular materials." Recycleye QuantiSort would overcome these limitations using Recycleye CogniScan, a proprietary AI vision system trained on over one billion waste images. "With machine learning models making 28.6 billion decisions per second, the system replicates human visual recognition – factoring in color, texture, shape and contextual cues – and accurately classifies each item. Combined with the SuperEject pneumatic system, the sorter reliably separates large brick fragments from mixed aggregates and fines, even when materials are dusty or soiled."


Recycleye Quantisort in operation at Heydt

Output fractions: brick and non-brick

Stadler provided engineering leadership and expertise regarding the mechanical sorting unit as a whole, as well as on system and site integration, ensuring seamless deployment within Heydt's established operation.

recycleye.com
w-stadler.de

Photos: Recycleye

# SUNNKING SUSTAINABLE SOLUTIONS ENHANCED CAPACITY

To increase its recycling capacity, the New York-based company Sunnking Sustainable Solution was seeking a robust shredder with a high throughput rate that could quickly and efficiently produce a homogeneous output material, particularly suitable for shredding electronic scrap. It also needed to be possible to adjust the speed and torque for process optimization.

Photo: Untha

The RS100 shredds up to 12 tons/day and is part of a comprehensive recycling plant

Now the IT asset disposition (ITAD) and electronics recycling company relies on the RS100 4-shaft shredder from Untha to process large quantities of electronic waste (WEEE). The shredder's throughput, quality of the output material, and reliability were the main factors that convinced the company, the manufacturer emphasized. Sunnking Sustainable Solutions is advised and supported by the team Untha America, Inc.

According to Adam Shine, President of Sunnking Sustainable Solutions, the investment in the shredder has been a game-changer for the company's operations. In 2024, the firm purchased the 4-shaft shredder RS100 – a machine designed to process a wide variety of electronic waste materials – and integrated it into its processing line. "The shredder, powered by a 75-foot-long conveyor system, efficiently shreds mixed electronics while allowing for the removal of oversized items, such as televisions and transformers, which require special handling and processing," the provider highlighted the machine's performance. "The RS100 shreds approximately 30,000 pounds of material per day, producing two key output fractions: clean ferrous steel and consumer shred, which is sent to refiners for processing." As reported, building on the success of the RS100, Sunnking is planning to expand its operations beyond New York. The company intends to establish a standalone facility outside of New York State to serve its customers better and enhance its recycling capabilities. "Additionally, Sunnking remains committed to supporting local communities through social initiatives like the 'E-Scrap for Camp program,' which raises funds to help send children battling cancer to summer camp."

untha.com
sunnking.com

## TECHNOLOGICAL UPGRADE IN COLOMBIA

Holcim Colombia and Geocycle have modernized and expanded their co-processing platform in Nobsa, Boyacá. This technological upgrade, backed by a two-million-dollar investment, would enable the transformation of more than 100,000 tons of waste per year into a sustainable energy source. The alternative fuels are derived from waste materials such as paper, cardboard, plastics, and biomass that would otherwise end up in landfills. The system upgrade includes the installation of a state-of-the-art shredder with a nominal capacity of over ten tons of waste per hour, along with new transfer systems and a modern dosing system capable of feeding up to 20 tons of alternative fuels per hour into the cement kiln. "These enhancements will gradually increase the thermal substitution rate of fossil fuels used at the Nobsa cement plant – from 40 percent in the short term to an ambitious target of more than 70 percent by 2030," Holcim informed.

geocycle.com, holcim.com.co

# FIRE REDUCTION BY EMPLOYING AI

The German company Korn Recycling has reduced a major safety risk in its sorting plant in Albstadt: fires caused by improperly disposed lithium-ion batteries. Battery.Sort by WeSort.AI provides preventive protection for sorting facilities. As reported by the provider, the AI-powered Battery.Sort solution from Würzburg-based company WeSort.AI was integrated into the commercial waste sorting facility earlier this year. Since then, it has used X-ray sensors and artificial intelligence to detect hazardous objects, particularly lithium batteries and battery-containing devices, and automatically remove them. The installation was carried out by Europress.

Between June 15 and July 31, 2025, only one battery-related fire was recorded – compared to 17 incidents during the same period the previous year, WeSort.AI gave account. "During this time span, Battery.Sort detected and removed an average of 12.41 kilograms of potentially hazardous materials per hour from a waste stream of approximately 20 tons of commercial waste. These included not only individual lithium-ion battery cells, but also vapes, battery packs, and block batteries. It is precisely these hidden batteries that frequently trigger fires during sorting and processing."

Battery.Sort installed at Korn Recycling

Photo: WeSort.AI

As underlined, the fact that Battery.Sort made its way into live operations is thanks to Korn Recycling. As the first industry partner, the company from Albstadt played a decisive role in the development of the technology and made its plant available for the installation of the initial system.

### About WeSort.AI

WeSort.AI develops AI-based systems for intelligent detection and sorting of various materials in the waste management industry. The company's mission is to make recycling processes safer, more efficient, and more sustainable.

wesort.ai

# ESG AND CLIMATE AFRICA SUMMIT

November, 26 – 27, 2025, Nairobi (Kenya)

As underlined by the organizers, this event is dedicated to promoting sustainable development and fostering ESG integration in various sectors. It "brings together influential leaders, policymakers, investors, and sustainability professionals to engage in insightful discussions, share best practices, and explore innovative solutions". The summit will cover a wide range of important topics, including sustainable development goals, climate change mitigation, renewable energy, circular economy, social impact, diversity and inclusion, ethical business practices, stakeholder engagement, and ESG reporting. "Participants can expect to engage in thought-provoking panel discussions, keynote speeches, interactive workshops, and networking sessions, allowing for meaningful exchanges and collaborations," the information says. A matching app would improve the interaction.

leadventgrp.com/events/esg-and-climate-africa-summit/details

# SMM APAC LEAD-ACID BATTERY INDUSTRY CONFERENCE 2025

December, 4 – 5, 2025, Ho Chi Minh City (Vietnam)

Shanghai Metals Market (SMM), a leading integrated platform in the field of nonferrous and ferrous metals, is organizing this year's APAC Lead-Acid Battery Industry Conference (LABC2025). "As geopolitical dynamics shift and the global energy transition accelerates, the lead-acid battery supply chain is undergoing significant changes," the organizers stated. "In particular, the energy crisis in Europe and export restrictions in the US have accelerated the relocation of battery production capacity to Southeast Asia. "According to the information, Vietnam is the ideal host for LABC2025 as it has become a global lead-acid battery hub, driven by its massive motorcycle market and Chinese manufacturers' local production. The country now supplies 23.29 percent of U.S. lead-acid battery imports (2024), yet faces a critical challenge: an annual shortage of 100,000–150,000 metric tons of lead ingots due to limited smelting capacity.

Photo: MSV, AI-generated

LABC2025 would bring together Vietnam's key industry players with global ore suppliers, battery manufacturers, and end-users to jointly address challenges – from securing raw materials to optimizing supply chains and developing sustainable recycling solutions.

apac-lead-acid-battery.metal.com

## INDEX

# CHINAPLAS 2026

April 21 – 24, 2026, Shanghai (PR China)

Held alternatively between Shanghai (even years) and Shenzhen (odd years) and focusing on the theme of "Transformation · Collaboration · Sustainability", the plastics and rubber trade fair Chinaplas will also bring next year "the latest transformative trends plus pulse of development in plastics and rubber industries, acting as a pioneer with forward-looking vision," the organizers emphasized. As underlined, this event is serving as an outlet for development opportunities not only in Asia, but also in the world. "The trade fair in 2025 attracted 281,206 professionals from over 170 countries and regions worldwide, with 68,542 visitors (24.37 percent) from overseas and Hong Kong, Macau, and the Taiwan region of China, marking a new leap in internationalization." Exhibitors had pursued the networking and trade opportunities further by forming strategic partnerships and signing deals with local and international buyers. The organizing company referred to the exhibition's ability to convert trade opportunities into tangible results. "Along with the kick start of Chinaplas 2026 promotion to global buyers, a series of projects have been planned – visiting industry chambers of commerce, associations, and buyers in different countries and regions, participating in key industry events as well as running targeted promotional campaigns, in order to reach global buyers and discover golden opportunities."


Photo: Chinaplas

Organized by Adsale Exhibition Services Ltd. with co-organizers like Beijing Yazhan and Messe Düsseldorf China, Chinaplas is a trade-only event, prohibiting entry for those under 18. Exhibits cover machinery like 3D tech, extruders, injection molding, automation, recycling, and molds. The event would present raw materials such as bioplastics, recycled plastics, engineering plastics, additives, pigments, composites, and rubbers.

chinaplasonline.com/CPS/idx/eng

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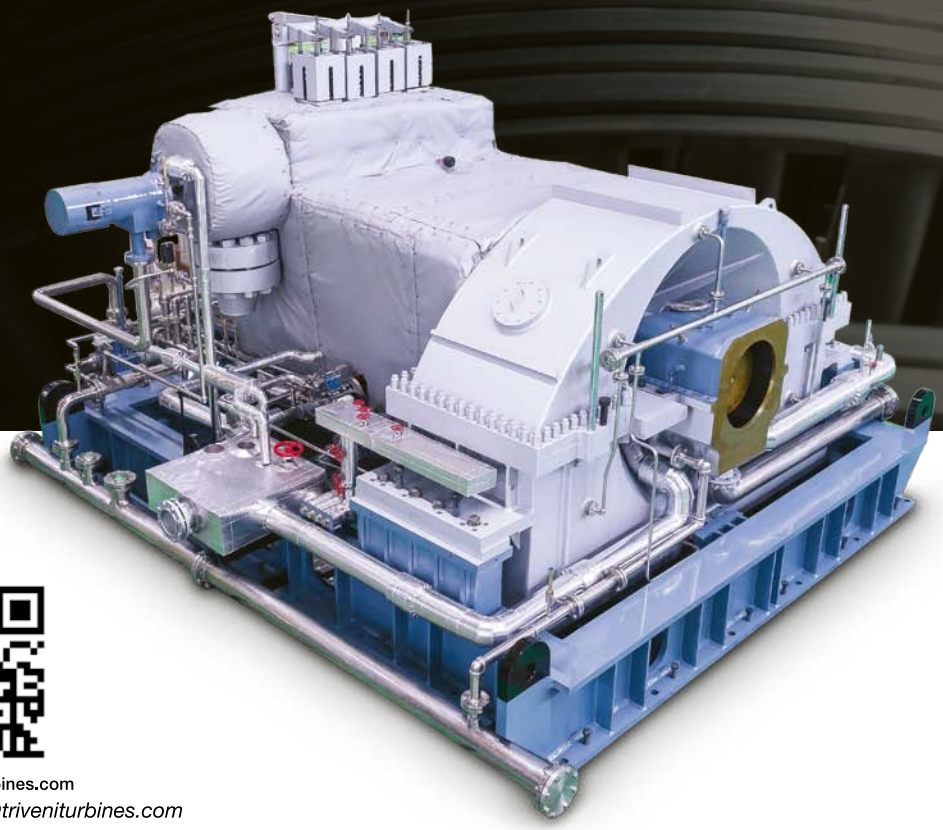

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