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- Waste collection
- Africa's waste sector in focus
- Sustainable waste management in developing countries
- Composting methods and operation
- Effect of locally produced organic inputs (compost and manure) on cultivation
- Landfills
- Landfill gas and biogas
- Material and fuel recycling of waste
- Waste to energy

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Recycling: Capacity Expansions and New Technologies

Brigitte Weber
Editor-in-Chief

Recycling is gaining ground. This evolution is not only reflected by the worldwide response to the Global Recycling Day, which is held every year on March 18, but also by expanding the existing processing volumes and new plants. Over the last months, there have been quite a few announcements that new recycling capacities will come on stream in future years.

The trend has been apparent for years and seems to speed up. That applies in particular to plastics recycling. In 2021 alone, the installed capacity in Europe has grown by 17 percent, boosted by an estimated 1.75 billion Euro investment, the organization Plastics Recyclers Europe (PRE) gave account. With more than 730 recycling sites, the total capacity in EU27+3 would amount to 11.3 million tons. “This shows that the plastic recycling sector is an important employment generator with more than 30,000 persons across Europe”, and with 8.7 billion Euro in turnover, it would contribute substantially to the socio-economic welfare in the region. Germany, Spain, Italy, the United Kingdom, and France were the countries with the highest installed capacities, representing two-thirds of the European market. Furthermore, countries with notable growth were Poland and the Netherlands.

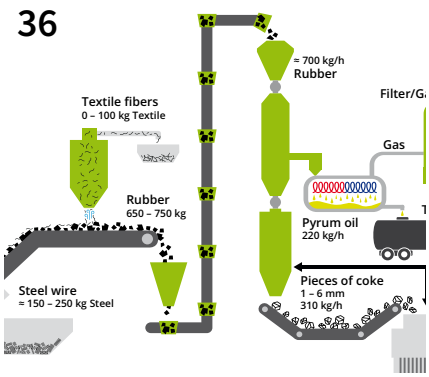
Worldwide, more investments in sorting and recycling facilities will certainly follow. India is heading towards a zero-waste nation and is pursuing its Waste to Wealth mission (pages 4 and 5). In addition, Latin America and the Caribbean region, which include 42 countries, are seeking a route to improve waste treatment; the different countries are unique in their demand to reduce waste and start a striking recycling strategy (page 22 onwards). In Asia, Japan strengthens plastic recycling by law (page 8). And in the USA, the number of facilities is also growing; for example, the start-up of a battery recycling plant is expected in the third quarter of this year (page 26).

Regarding tire recycling, there are technological advances, as you can read from page 36 onwards. In this area, state-of-the-art technologies can provide full control of challenging chemical recycling processes. Moreover, four partners are developing a recycling solution for used acrylic glass (page 39). Besides, the Japanese company Asahi Kasei and its partners have found a new technology for recycling carbon fiber plastic compounds (page 40). When equipped with modern technologies such as artificial intelligence, machines offer improved efficiency in the recycling process; the companies PICVISA (page 41) and Recycleye (page 42) present their solutions. Furthermore, there are some examples of equipment regarding car and metal recycling.

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

Yours
Brigitte Weber (weber@msvgmbh.eu)

Cover Photo: hiv360 / stock.adobe.com



MISSION: WASTE TO WEALTH

India is heading towards a zero-waste nation.

The Indian population of more than 1.3 billion currently generates about 62 million tons of municipal solid waste annually. About 377 million Indian citizens residing in urban areas contribute an estimated amount of 55 million tons.

Approximately 80 percent of the waste ends up in landfill, about 20 percent of that is being treated. Recycling is often carried out by the informal sector; around 1.5 million "waste pickers" are supposed to deal with the collection and recycling of waste. By 2041, annual waste generated in India is predicted to reach more than 160 million tons.

Recyclable garbage might help generating 30,000 crore Indian Rupees (converted: 3,625,500,000 US-Dollar) per year, reported The Times of India in May last year. The third-largest newspaper and digital news medium referred to a report titled 'Circular Economy in Municipal Solid and Liquid Waste' that had been prepared by the Indian Ministry of Housing and Urban Affairs (MoHUA) in 2021.

As stated in the report, an estimated 55 million tons of municipal solid waste is generated annually in India by 377 million citizens residing in urban areas. However, India's urban population is expected to grow to 600 million by 2030 and to 814 million by 2050. That also means that the amount of waste will grow. Accordingly, India would set to generate 165 million tons of waste by 2030 and 436 million tons by 2050. As a result, the annual greenhouse gas emissions from municipal solid waste is expected to go up to 41.09 million tons, the authors wrote. Therefore, they recommended a circular economy approach "that looks at sustainable waste management and optimum utilization of resources – key to an AatmaNirbhar Bharat".

Photo: Phuong / stock.adobe.com

A Center on Circular Economy for India

PAGE, though the United Nations Institute for Training and Research (UNITAR) and United Nations Environment Programme (UNEP), is supporting a study and consultations on preparing a framework for the establishment of a "Centre of Excellence on Circularity" in India. As reported, it is expected that the framework and guidance on establishing such a center would contribute to align India's economic policies and investments more closely with the Sustainable Development Goal SDG12 (responsible consumption and production) and the country's 2070 net-zero targets. While the specific services that the center should offer, would be defined based on national context and priorities, market demand and stakeholder consultations, it is expected that it would provide a range of services for establishing and upscaling circular economy models across sectors. India joined the Partnership for Action on Green Economy (PAGE) in 2018.

Potential for resource recovery

In the report, municipal solid waste is categorized into wet waste, dry waste as well as construction and demolition waste. An analysis by MoHUA identified a significant potential for resource recovery from these waste categories through circular economy. For example, dry waste recycling would have the potential to generate approximately 11,836 crore Rupees (converted: about 1.43 billion US-Dollar) per annum, and compost as well as bio-CNG (compressed natural gas) from wet waste could generate revenues of nearly 365 crore Rupees (about 44 million US-Dollar) and 1,679 crore (roughly 202 million US-Dollar) per annum respectively.

According to the report, C&D waste has the potential to generate revenues of approximately 416 crore (about 50.2 million US-Dollar) per annum. A similar trend is seen in the liquid waste space: revenues amounting to 6,570 crore (nearly 800 million US-Dollar) and 3,285 crore (nearly 400 million US-Dollar) per annum for treated sludge and wastewater. India generates approximately 1.45 lakh metric tons (145,000 metric tons) of solid waste daily, 35 percent of which is dry waste. "Thanks to India's informal sector, a majority of the plastic waste is recycled," the authors of the report gave account.

Plastic is the major component. India generates approximately 9.4 million tons per annum of plastic waste (which amounts to 26,000 tons per day), out of this approximately 5.6 million tons of plastic waste is annually recycled (about 15,600 tons per day). However, 3.8 million tons of plastic waste is left uncollected or littered (9,400 tons per day) per annum. "Though plastic recycling in India is almost three times the global average, there are no comprehensive methods in place for plastic waste management."

According to the report, there are also challenges with other waste components. For example, small metal scraps are often lost due to inefficient segregated waste collection and waste tracking, resulting in the loss of valuable metal resources. Similiarly, that also applies for the recycling of glass and ceramic waste. Nearly 45 percent of glass is making its way into recycling. "Risks of injuries and issue of breakages while handling glass and ceramics makes it less attractive to recyclers and handlers," the authors informed. "Though glass segregated by colors has an established market, yet lack of segregation and availability of glass is neither reported nor is there an established mechanism of communication between cities and the glass recycling industry." In addition, the recycling rate of textiles could be better. According to the study, the textiles industry in India reports that more than one million tons of textiles are discarded anually, most of this coming from household sources. While the industry had a recycling potential of 50 percent, only 25 percent were being recycled/ reused. "Even though age-old circular (reuse and refurbish) barter system still exists in small towns, there is limited collection and recycling system for textiles." Furthermore, tire recycling has also room to improve. "Currently, there is no tracking of discarded tires and monitoring of their disposal across India. Though retreading of tires by unorganized sector is a common practice, a large portion of the scrap tires are dumped in landfills."

As stated, the informal sector plays a major role in making the material flow of dry waste value chain resource efficient and circular by sorting the dry waste into different components and recovering valuable resources. "Yet, lack of integration of informal sector into the mainstream recycling industry leads to limiting their involvement to only certain fractions of waste. Furthermore, these workers are plagued with low wages and exposed to significant health risks."

"Recycling is a crucial part of the circular economy"

The authors of the study regard the circular economy as part of the solution. The savings from circular economy in India were estimated at 624 billion US-Dollar in the year 2050, they referred to a KPMG study. "To move towards a

circular economy in dry waste, the design and material aspect related to production must be addressed," they wrote. "Recycling is a crucial part of the circular economy, but the goal of 'true recycling' is that of converting the waste resource back to its original form, without sacrificing quality or integrity in the process. The recycled material should be at par with what was originally created using virgin raw material, for true circularity."

The authors additionally provide advice on the improvement of circularity in India. Their recommendations include:

- develop circular economy guidelines with circularity targets for each dry waste component
- national policy for marine plastic
- policy for mainstreaming informal workers, mandating their formalization
- policy for setting-up waste management parks, recycling zones
- make waste management a priority sector for lending and environmental clearances
- expand EPR (extended producer responsibility) to include other dry-waste components: paper, textile, rubber, metals and glass, to name but a few
- funding for research & development of product re-design, remanufacturing and alternate materials based on life cycle assessment (LCA) and material flow assessment (MFA)
- technical guidelines for production, usage, and recycling of bioplastics.

For regulatory interventions, they recommend, inter alia, a standing task force to drive and monitor the circular economy initiatives across all dry waste components and value chains. The report also suggests a digital platform to capture end-to-end dry waste material flow data for transparency and traceability as well as the mandating use of 25 percent recycled materials in the non-food grade packaging to ensure uptake of recycled materials. Regarding the infrastructure, the authors propose – among other things – mechanisms for single window clearance, simplified registration and compliance processes for recyclers and waste management agencies, incentives to use RDF (refuse-derived fuel) in cement kilns to save coal as a resource, land allocation to set-up waste management parks and recycling zones as well as an innovative financing mechanism to support recycling infrastructure.

Aim: Waste to Wealth Authority

The Swachh Bharat Unnat Bharat Abhiyan, set up under the Prime Minister's Science, Technology and Innovation Advisory Council (PM-STIAC), is an initiative by the Office of the Principal Scientific Advisor to the Government of India (PSA) in partnership with Invest India, the national investment promotion and facilitation agency. As reported, the initiative "will leverage global technological capabilities to create socio-economic benefits for 1.3 billion Indians by addressing the issues of waste disposal, deteriorating air quality and increasing pollution of water bodies". According to the information, PM-STIAC intends to establish a "Waste to Wealth Authority" that will employ latest technologies across states to address the problem of waste generation.

The Waste to Wealth mission "aims to identify, test, validate and deploy technologies to treat waste to generate energy, recycle materials, and extract resources of value and provide technology database of national and international technologies to support Urban Local Bodies address their waste challenges," Invest India informs on its homepage. "The mission will assist and augment the Swachh Bharat and Smart Cities projects by leveraging science, technology, and innovation to create circular economic models that are financially viable and sustainable for waste management to streamline waste handling in the country."

investindia.gov.in/waste-to-wealth
psa.gov.in/mission/waste-wealth/38

NEW SALES PARTNER IN INDIA

Danish company M&J Recycling – the former Metso Waste Recycling – has a new sales partner in India: Maan Enviro Technologies. The Indian firm, which belongs to Maan Enviro Group, is an engineering company specializing in providing end-to-end solutions for municipal solid waste management. "With a vision to be a leader in the field of environmental technologies in India, as well as extensive experience in municipal solid waste treatment system design and implementation, Maan is a prominent player in the Indian waste management industry and a great addition to M&J Recycling's partner network in India," the Danish manufacturer of industrial waste shredders underlined. "With this new partnership as well as our existing partnerships in India, M&J is better equipped to offer machine sales and after-sales service to the Indian market."

mjrecycling.com

UNLOCKING NEW VALUE THROUGH TRANSFORMATION OF INDUSTRIES

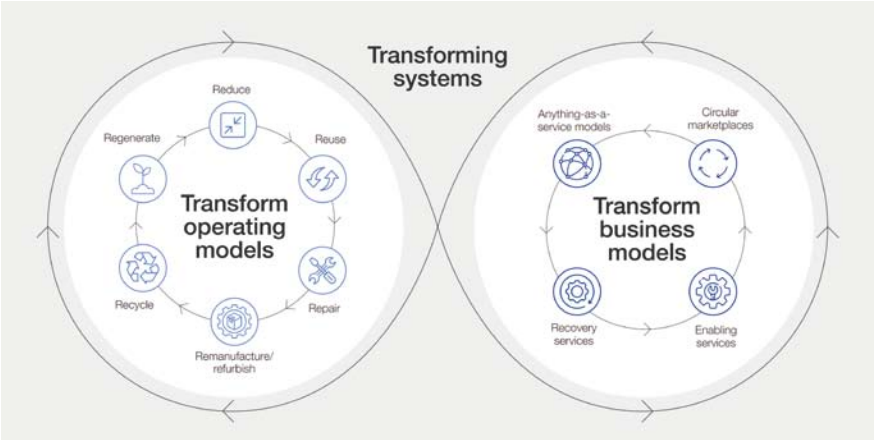
In January this year, the World Economic Forum published a new White Paper: "Circular Transformation of Industries: Unlocking New Value in a Resource-Constrained World".

The Circular Transformation of Industries is a new multi-stakeholder initiative at the World Economic Forum that aims to enable a growing, resilient and sustainable economy through adopting circularity at scale. According to Kristin Hughes (Director of Resource Circularity and Member of the Executive Committee, World Economic Forum) and Francisco Betti (Head of Advanced Manufacturing and Value Chains, World Economic Forum), organizations can transform with a more holistic approach to circularity initiatives, creating more adaptable operating and business models and contributing to system-wide change.

Industries and governments have set ambitious environmental targets for the next 10–20 years, the authors stated in the article "Here's how we can turn more industries into circular economies". The parties would aim to achieve supply-chain resilience, reach net zero and dramatically reduce waste, all while driving productivity, innovation and economic growth to meet rapidly changing consumer expectations. "That's already an unprecedented amount of change, and these visionary efforts operate in a challenging and uncertain geopolitical landscape," Kristin Hughes and Francisco Betti underlined. Achieving such commitments would require bold change. "Transforming business models and supply chains is no easy task. It requires system-wide adaptation to how we make, sell, use, reuse or recycle products and how the global economy operates overall."

"Circularity is not a new concept," they wrote. "In the past 20 years, businesses, industries and governments have experimented with circularity initiatives, mainly focused on recycling and waste management. Very few have succeeded at large-scale implementation, and even fewer have considered a full shift of the value chain." A recent Bain & Company survey found that about 60 percent of active circularity initiatives have not reached scale. "Early circularity initiatives are most frequently held back by a lack of technology capabilities, inconsistent industry standards and a lack of strong connections with other players in the industry." In this context, the authors referred to Jagjit Singh Srai, Director of Research in the Department of Engineering at the University of Cambridge: "Transformation to a circular economy will require cross-industry collaborations where systems thinking leverages advances in materials, production and digital technologies. These collaborations and technologies will underpin resource-efficient operating and business models of the future."

According to the authors, focusing primarily on recycling inputs and redirecting waste flows is an easier and more controlled option, but it would limit the potential to scale circularity initiatives. "Without a holistic approach across multiple supply chains, the circularity movement has hit a fundamental barrier: the extra cost and complexity of becoming circular outweigh the added benefits." The current value proposition had not convinced businesses and consumers to make circularity a reality or to undertake broader, systemic changes. "Circularity initiatives to date have shown that isolated efforts are not enough; slow, incremental change is ineffective," they are convinced.



Circular transformation requires both operations and business-model changes

Graphic: Bain & Company

Enabling economic growth

The authors of the White Paper believe that organizations that embark on circular transformations and create more adaptable operating and business models will be better positioned to prosper, even in times of disruption, while contributing to sustainable

growth. According to Hernan Saenz, Senior Partner and Global Head of Performance Improvement at Bain & Company, circularity "is not just about protecting the climate and our planet's biocapacity, but about enabling massive and resilient economic growth – circular models and operations are the future, and the companies that get there first will establish a competitive advantage."

Transforming how the global economy operates would go way beyond the first step of companies building circular networks. It requires bold thinking to reshape operating and business models, build new systems and change consumer behavior, Kristin Hughes and Francisco Betti wrote. These broader actions, in turn, would reconfigure industry value chains and set in motion a more systemic, sustainable approach to resources worldwide while unlocking economic growth.

Advice for policymakers

Meanwhile, governments can expedite the process by providing the right infrastructure and standards for circularity, the authors emphasized. Policymakers had an essential role to play.

According to the information, the European Union has been at the forefront of circular policy efforts creating frameworks such as the Circular Economy Action Plan (CEAP), Extended Producer Responsibility (EPR) and the new battery directive. Other countries were creating own programs, including the E-waste Producer Responsibility Organisation Nigeria (EPRON) and Singapore's Resource Sustainability Act (RSA) to manage electrical waste. "Although these programs build momentum, achieving a systemic shift will require more ambitious and holistic initiatives that are broader in scope, interconnected among industries and aligned across countries and regions in order to create global standards, trade rules and consistent incentive structures."

As emphasized by Kristin Hughes and Francisco Betti, industries and policymakers turn towards resource circularity to help secure, transform and diversify the supply of industry-critical materials while reducing the need for extraction and associated emissions. Industry coalitions have worked with future-focused governments to establish the incentives, policy frameworks, standards, operating models, certifications and circularity-focused capabilities necessary to scale. In some markets, business models have been transformed to decrease demand and increase recovery potential and actual recovery of these resources, partially mitigating the demand-supply gap going forward.

Forward-looking leadership teams were advised to focus on these crucial questions:

- What are the most effective and profitable circular models to support our growth and sustainability efforts and navigate global disruptions?
- How can organizations build a network of interconnected supply chains to enable new circular models?
- How can we achieve systems-wide change that dramatically increases the number of interconnected circular supply chains?

The initiative

The World Economic Forum – alongside partners Bain & Company, University of Cambridge, and INSEAD – have launched the Circular Transformation of Industries, a new initiative with the objective of hastening the shift to circular operating and business models, taking advantage of circularity to unlock productivity, resilience and sustainability. The project initiators are calling upon organizations to join a growing cohort of circular industry transformation leaders "to partner with us on this journey to collaborate at an unprecedented scale towards a circular transformation of our industries".

weforum.org/whitepapers/circular-transformation-of-industries-unlocking-new-value-in-a-resource-constrained-world

"Transformation to a circular economy will require cross-industry collaborations where systems thinking leverages advances in materials, production and digital technologies. These collaborations and technologies will underpin resource-efficient operating and business models of the future."

JAPAN TO STRENGTHEN PLASTIC RECYCLING

In April last year, the Act on Promotion of Resource Circulation for Plastics came into effect.

According to a survey conducted in April 2022 in Japan, the majority of respondents did not know anything about the Plastic Resource Circulation Act, the website statista.com reported five months later. "Only 25.3 percent had a grasp of the legal contents of the law."

The Japanese publication The Mainichi reported, Japan produced about 8.5 million metric tons of plastic garbage per year, "making it the second worst in the world for plastic waste per capita". The Japanese government had committed to reducing disposable plastics by 25 percent by 2030. Japan would recycle 85 percent of its plastic, Mainichi Japan wrote in June 2021. However, more than half of that amount was burned to generate electricity or exported abroad. "Only around 20 percent of plastic waste is turned into new products."

Conditions for more circulation

As reported by the government of Japan in May last year, the act came as part of the country's "3R [Reduce, Reuse, Recycle] + Renewable" initiatives to promote resource circulation of plastics in each stage of the entire lifecycle of plastic products, in collaboration with all stakeholders including municipalities, businesses and consumers. Based on the legal regulation, the government has also published "the guideline for design of plastic-containing products" to encourage designers and manufacturers to produce environmentally friendly designs. "The guideline prescribes using less plastic, reducing excessive packaging, designing products that are easy to disassemble and separate, and using recycled plastic and bio-based plastic," the public relations office gave account. "Moreover, the government has introduced a certification scheme to recognize excellent product designs." The administration would preferentially procure such certified products – and would require consumers and businesses to use them.

The Act on Promotion of Resource Circulation for Plastics is asking retailers and service providers to take action regarding specified plastic-containing products. These products refer to 12 plastic items: forks, spoons, table knives, stir sticks, and straws provided by retailers, restaurants, and so forth; hairbrushes, combs, razors, toothbrushes, and shower caps provided by accommodations; and hangers and clothing covers provided by laundry services and so forth. Retailers and service providers were required to implement any initiatives to reduce the amount of waste of these items.

For the discharge, collection and recycling stage, three measures are defined. "The first is related to sorted collection and recycling activities by municipalities. In Japan, most municipalities have been sorting, collecting, and recycling used PET bottles and other plastic packaging waste as a resource, with the help of residents, under the existing Act on the Promotion of Sorted Collection and Recycling of Containers and Packaging. The new Act requires municipalities to sort, collect, and recycle not only plastic containers and packaging waste but also other plastic products waste." The second is to make it easier for businesses such as manufacturers, retailers, and others to collect and recycle plastic products. The third is to require businesses to reduce the amount of plastic waste generation and to recycle plastic. Moreover, the act would introduce measures to facilitate recycling by such businesses.

Photo: Andi Karg

Initiatives

"Under the plastic resource recycling promotion law, businesses that provide five metric tons or more of plastic products per year are obliged to reduce the amount used," Mainichi informed end of March last year and reported some examples.

Japanese convenience store franchise chain Lawson Inc. intended to reduce the weight of its conventional spoons and forks by making holes in their handles and introducing these items in its stores by August. Furthermore, it wanted to start offering wooden spoons in some stores that month. Seven-Eleven Japan Co. would use plastic spoons and forks made up of about 30 percent of plant-derived materials.

The hotel industry is also beginning to review the distribution of plastic items. The hotel chain Super Hotel Co. would stop providing toothbrushes and other supplies in guest rooms but set up a supply corner in the front lobby of all its hotels; guests would bring such items into their rooms at their discretion.

Green Bonds:

S&P GLOBAL HAS BOUGHT SHADES OF GREEN BUSINESS

USA-based financial information and analytics company S&P Global Inc. has acquired the business Shades of Green, one of the world's largest providers of second party opinions on green bonds, from CICERO (Centre for International Climate and Environmental Research), a Norwegian climate research center.

According to S&P Global, the acquisition will be integrated into S&P Global Ratings and further expand the "breadth and depth of its second party opinions (SPOs) offering". SPOs are independent assessments of a company's financing or framework's alignment with market standards and are typically provided before any borrowing is raised. As reported by the Norwegian vendor, CICERO would receive about 20 million US-Dollar in cash "which will be spent on independent, high-quality climate research".

"This deal greatly increases the impact of our work", Kristin Halvorsen, director of CICERO and former Minister of Finance for Norway, was cited. "We have taken the Shades of Green methodology as far as we could. I am very happy that S&P Global will continue this work and realize the full global potential of Shades of Green."

CICERO issued the world's first second party opinion on green bonds for the World Bank in 2008. That started what has since become a global industry with several international players for assessing the environmental integrity of green bonds. The green bond activities were placed in a subsidiary in 2018 with a majority ownership by the climate research center. Shades of Green provides independent, research-based evaluations of green bond and sustainability financing frameworks to determine their environmental robustness. "The company has received numerous awards for the quality of its work and is ranked by Climate Bonds Initiative as the world's largest provider of second opinions on green bonds by number of transactions," CICERO underlined. The company would estimate to have helped provide climate risk transparency on more than 380 billion US-Dollar to projects accelerating the climate transition.

- cicero.oslo.no/en
- spglobal.com/en

ECO BALTIA ATTRACTED INTEREST FROM INVESTORS

AS Eco Baltia, the largest environmental and waste management group in the Baltics, issued eight million Euro of its inaugural 3-year bonds.

"Issue was oversubscribed more than 3.5 times with orders from over 250 qualified and retail investors from Latvia and Lithuania," the company reported on February 13 this year. The proceeds raised from bond issue would be used to finance future development projects of Eco Baltia, "with a focus on supporting the company's expansion plans in Europe and promoting the circular economy". Currently, several acquisition opportunities were evaluated. In addition, the company has several capital expenditure projects in its pipeline. The total volume of received orders was 28.49 million Euro. The size, quality and diversity of orders enabled Eco Baltia to set the annual coupon rate at eight percent, the lowest end of the indicated range. The tenor of the bonds is set at three years with the maturity date of 17 February, 2026 and an option for the issuer to call the bonds after two years, Eco Baltia informed. The nominal value of each bond is 1,000 Euro. Bonds would be issued at the nominal value, and the minimum subscription amount for one investor was set at ten bond units, or 10,000 Euro.

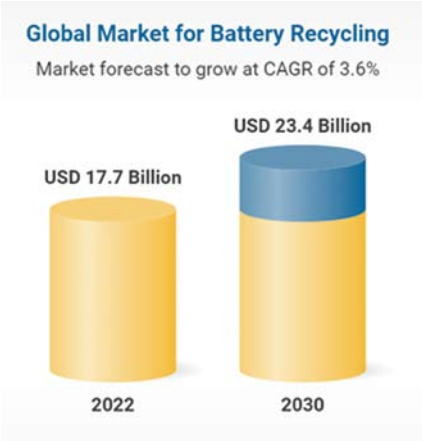
"Investors who placed the minimum order of 10,000 Euro were allocated in full, while bigger orders received partial allocations," the company gave account. "Retail investors were very active in this transaction and were allocated 5.5 million Euro (69 percent) of the total issue with institutional investors making up the remaining 2.5 million Euro (31 percent). Most of the demand came from Latvian and Lithuanian investors with subscription amounts standing at 54 percent and 45 percent of total orders respectively."

As reported, on February 8, 2023, the company applied for listing the bonds at Nasdaq Riga alternative market First North, and on February 9, Nasdaq Riga started the admission procedure. "Sole Lead Manager of the transaction was Luminor Bank together with Šiaulių bankas acting as Co-Manager and Dealer. Transaction legal counsel and Certified Adviser is law firm TGS Baltic, and trustee – law firm Eversheds Sutherland Bitāns."

ecobaltia.lv/en

GLOBAL BATTERY RECYCLING STRATEGIC BUSINESS REPORT 2023

The „Battery Recycling – Global Strategic Business Report" has been added to the offering of ResearchAndMarkets.com. According to the market research provider, the global market for battery recycling – estimated at 17.7 billion US-Dollar in the year 2022 – is projected to reach a revised size of 23.4 billion US-Dollar by 2030. That would represent a growth at a CAGR (compound annual growth rate) of 3.6 percent over the analysis period 2022-2030.



Graphic: ResearchAndMarkets.com

Lead Acid, one of the segments analyzed in the report, is projected to record a 3.8 percent CAGR and reach 12.3 billion US-Dollar by the end of the analysis period. "Taking into account the ongoing post-pandemic recovery, growth in the Lithium-Based segment is readjusted to a revised 4.6 percent CAGR for the next eight-year period," the information said. The battery recycling market in the USA was estimated at 4.8 billion US-Dollar in the year 2022. China, the world's second-largest economy, is forecast to reach a projected market size of 4.8 billion US-Dollar by 2030, trailing a CAGR of 6.2 percent over the analysis period 2022 to 2030. "Among the other noteworthy geographic markets are Japan and Canada, each forecast to grow at 0.9 percent and 4.2 percent, respectively, over the 2022-2030 period," ResearchAndMarkets.com reported. "Within Europe, Germany is forecast to grow at approximately 1.7 percent CAGR. Led by countries such as Australia, India, and South Korea, the market in Asia-Pacific is forecast to reach 3.1 billion US-Dollar by the year 2030."

researchandmarkets.com

ALTERNATIVE INVESTMENTS FOR EUROPEAN ENVIRONMENTAL OBJECTIVES

In June last year, Bankinter, S.A. – a Spanish financial services company – launched the Ecualia venture capital fund together with its Spanish partner Plenium Partners. They plan to initially raise 175 million Euro among Bankinter's high-net-worth customers.

The alternative investment vehicle "seeks to stay ahead of the market and invest in sectors that will be decisive in meeting long-term Spanish and EU-wide environmental objectives," a press release said. "The goal is to offer Bankinter's institutional and private banking customers the possibility of co-investing hand in hand with the bank in the real economy, specifically, in activities with a positive contribution to the environment and that present attractive medium- and long-term return opportunities for investors." In the first phase, Bankinter Investment and Plenium Partners planned to analyze various investment options with great potential to generate value in different sectors, including sustainable mobility, decarburization, energy rehabilitation, the circular economy and water management and treatment.

As underlined, Ecualia is the 17th alternative investment vehicle launched by Bankinter Investment in its six-year history. "The minimum investment required for institutional and private banking customers is 200,000 Euro, in addition to the diversification criteria required to ensure that investors' wealth is not excessively concentrated in a specific sector or type of asset." The fund would be managed by Plenium Partners, taking this company's total capital under management to two billion Euro. Of this amount, 1.25 billion Euro had been mobilized jointly with Bankinter over the last five years, focused on investment in renewable energies, student residences and sustainable projects and infrastructures.

Investment in plastic recycling

In July last year, Bankinter's Investment Banking subsidiary reported that the financial service company and Plenium Partners have reached an agreement with the Spanish firm RepetCo to invest in "a pioneering facility that recycles multilayer PET plastics, providing a solution to a previously unresolved problem through its proprietary clean, sustainable and profitable technology". According to the information, RepetCo intended to invest 55 million Euro in its plant in Albacete, which is projected to recycle up to 100,000 tons of multilayer PET plastics annually.

bankinter.com
repetco.com/en

India:

PLASTIC RECYCLING PROGRAMMED FOR GROWTH

The "India Plastic Recycling Market Analysis: Plant Capacity, Production, Operating Efficiency, Demand & Supply, End-User Industries, Distribution Channel, Regional Demand, 2015-2030" report has been added to ResearchAndMarkets.com's offering.

According to the information, India's plastic recycling market stood at 6.06 million tons in 2021 and is forecasted to reach 12.43 million tons by 2030. That is equivalent to 6.98 percent growth until the financial year 2030. "The plastic recycling industry in India is booming on account of the rise in the number of small-scale processing plants in the country and the increasing focus of non-governmental entities on secondary use economy," the market research firm stated. "Besides, the government has enforced a ban on ultra-thin polyethylene bags in some cities of India, presumably a surrogate measure for economic sustainability and advancement and curb plastic pollution." Additionally, the growing packaging industry was spurring the demand for PET and HDPE for packaging applications, "which is likely to enhance the plastic recycling market". Government initiatives such as Swachh Bharat Mission (SBM) and Make in India were continuously working towards circular economy policies, the information says. The Covid-19 pandemic resulted in a huge demand for plastic due to its extensive use in the healthcare, pharmaceutical, and food & beverage sector. But, the illegal and inappropriate disposal of plastic waste negatively affected the plastic recycling market.

researchandmarkets.com/r/ni6upa

SCRAPAD: CLICK, SELL & BUY

Spain-based ScrapAd is a worldwide digital marketplace for buying and selling recyclable materials.

The global platform, founded by Sandra Montes and Samuel Ruiz, is present in more than 70 countries, counts about 1,000 registered companies and has published approximately 1,000 advertisements. "ScrapAd is a simple, smart and transparent marketplace (a technological platform) that connects buyers and sellers from all over the world to buy and sell scrap and other recyclable materials, such as plastic, paper and cardboard or textiles," one can read on the homepage. With this platform, the team of 20 people wants to offer their customers the necessary services to facilitate their transactions and optimize their time "through a secure and reliable digital space".

How the digital trade works

The trade of the materials consists of the following steps. Interested persons can register for free on the platform, but they should provide the information the ScrapAd team asks about the business. "All users have passed this exhaustive verification process so that your buying and selling operations are guaranteed:

- KYC (Know Your Customer) verification: aims to prevent fraud by identifying and verifying the identity of users.
- Operational verification: users meet the necessary requirements to transact with recyclable materials."

Once registered by providing the required information and the account created, the person or company can choose from all the ads already published on the platform, either to buy or to sell. According to ScrapAd, there are filters to sift through the ads (location, material, and so on). "Whether to buy or to sell, select the chosen ad and negotiate the price."

Once an agreement has been reached between the buyer and seller, the whole process is completed online, and the buyer makes the corresponding deposit. "All these transactions are completely secure," ScrapAd assures. "Our financial partner is an entity of total confidence, guaranteed by the biggest bank in Europe; BNP Paribas." As reported, within the platform, the buyer would have his payment account, from which he would have control of the money. "Purchases are made through deposits, which are kept in a separate account, and are released to the seller as the different steps of the transaction process are completed," the information on the homepage says.

When the goods are loaded, an independent seller checks and verifies that the goods correspond to what the parties have agreed in the negotiation. "We then manage the logistical operations to ensure that the goods are collected from the seller's premises and delivered to the buyer's premises," ScrapAd emphasizes. "All you need to do is have the documentation ready and prepare for us to collect or deliver the goods to the address you specify."

scrapad.com/en

Goal:

A CARBON NEUTRAL INDUSTRIAL COMPLEX IN JAPAN

Ten Japanese firms*) have announced the signing of a memorandum of understanding (MoU) on a joint study into activities for establishing a carbon-neutral industrial complex in the Goi district of Ichihara City and the Soga District of Chiba City.

The districts form part of the Keiyo Rinkai industrial complex in Chiba, a prefecture adjacent to Tokyo that hosts Japan's largest concentration of materials and energy companies. The achievement of carbon neutrality at this industrial complex would enhance the overall competitiveness of the companies that maintain operations there, a press release said.

Based on the MoU, Yokogawa and these nine companies that are active in the energy, petrochemical, chemical, steel, materials, and other industries will study the feasibility of the commercialization of activities by the year 2030 that will be required to make the Goi and Soga industrial complex carbon neutral by 2050. These activities are as follows:

- Introduction of an inter-industry energy management system to minimize CO_2 emissions
- The recovery and effective utilization of CO_2 through inter-industry collaboration
- Reduction in CO_2 emissions through inter-industry collaboration in the utilization of hydrogen and other gas by-products from existing processes

*) Cosmo Oil Co., Ltd., Denka Company Limited, Iwatani Corporation, JFE Steel Corporation, JNC Corporation, KH Neochem Co., Ltd., Maruzen Petrochemical Co., Ltd., UBE Elastomer Co. Ltd., Ube Material Industries, Ltd., and Yokogawa Electric Corporation

CLEANING OCEANS FROM PLASTIC

There are many groups and projects to fight the surface plastic or collect material at the beach. But what is ocean cleaning really standing for?

Without urgent action, the estimated eleven million metric tons of plastic currently entering the ocean annually will triple in the next twenty years. This would mean between 23 and 37 million metric tons of plastic flowing into the ocean every year by 2040. That is equivalent to 50 kilograms of plastics per meter of coastline worldwide, the UNEP report „From Pollution to Solution“ indicates. But where does the waste come from and where does it end?

The provenance is obvious: Of 275 million tons of plastic waste annually, 99,5 million tons are generated by people living within 50 kilometers of a coastline, of which 31,9 million tons are discarded or mismanaged coastal plastic waste, littered or stored in landfills prone to leakage or loss. In the end, eight million tons of plastic enter the oceans annually, Jenna R. Jambeck, researcher at the University of Georgia, found out in 2015. Recent research speaks of nine million tons. In other words, a garbage truckload of plastic enters the ocean every minute, the Ocean Conservancy rated. According to UNEP, it can only be estimated that 75 to 199 million tons of plastic are currently found in the oceans [...].

■ Read the whole article on 🌐 global-recycling.info/archives/7995

USA:

"EXTENDED PRODUCER RESPONSIBILITY INCREASES RECYCLING RATES"

States can expect significant increases in recycling rates for packaging (including plastic, glass, aluminum and steel) and printed paper with the adoption of Extended Producer Responsibility (EPR) programs, according to a new study from the non-governmental organization "The Recycling Partnership".

The study "Increasing Recycling Rates with EPR Policy" – published in February this year and conducted by the NGO – explores the impact of EPR programs in seven jurisdictions worldwide and six U.S. states, to assess the effect on state-level recycling rates and other key metrics. As reported, the research examined EPR's impact on seven paper and packaging recycling programs worldwide. The findings showed that across the board, EPR policy drove the collection and recycling of target materials to over 75 percent in British Columbia, Belgium, Spain, South Korea, and the Netherlands, with Portugal and Quebec at over 60 percent, a press release informed. Across all materials, U.S. state programs performed far lower.

According to Keefe Harrison, Chief Executive Officer of The Recycling Partnership, lack of sustainable funding is one of the greatest challenges for U.S. residential recycling systems. "EPR provides a huge opportunity to unlock the environmental and economic benefits of recycling." Under EPR policy, companies that produce packaging materials have to fund local recycling programs by paying fees, shifting the financial burden away from local governments and taxpayers, The Recycling Partnership explained. "EPR fees can also incentivize companies to make packaging more recyclable and use a greater percentage of recycled content. Four states (California, Colorado, Maine, and Oregon) have adopted EPR legislation. Several other U.S. states are currently considering these programs."

As underlined, the study showed that implementing EPR programs in the states of the USA would:

- Increase overall residential recycling rates by as much as 48 percentage points
- Create nearly universal recycling access
- Increase overall participation in recycling
- Boost the amount of recycled content by millions of tons
- Recapture between 13 million and 91 million US-Dollar in lost material economic value in EPR states

"With this research, we can see that these international programs drive dramatic improvement in recycling rates and that EPR policy has a significant impact. It is clear that well-designed EPR policy is key to growing and improving recycling and achieving a circular economy," Dylan de Thomas, VP of Public Policy & Government Affairs at The Recycling Partnership, is convinced. "EPR has the potential to close gaps in recycling rates for all materials, create jobs, reduce greenhouse gas emissions, and deliver even more benefits to support people and planet."

■ The report, "Increasing Recycling Rates with EPR Policy" is available at recyclingpartnership.org/epr-report/.

THE WORLD RESOURCES FORUM 2023

September 5 – 7, 2023, Geneva (Switzerland)

The event will take stock of recent environmental, economic, social and geopolitical developments, and will focus on three key transitions that will be reflected in three main conference tracks: digitalization, value chains and sufficiency. The focus on high-potential transitions will dive into a rich variety of multi-disciplinary and cross-cutting topics, including mineral resource governance, responsible sourcing, digital circular economy, sustainable e-waste management, sustainable consumption and lifestyles, sufficiency in energy and built environment, and much more. The event, organized by the non-profit organization of the same name, will also engage international stakeholders from policy, science, industry and civil society through a dynamic and innovative program, including Impulse Talks, Panels, Ideation Labs, Research Labs, Solution Labs and Matchmaking Sessions.

wrforum.org/category/wrf23/

INTER-CONTINENTAL AGREEMENT BETWEEN ACE GREEN RECYCLING AND GLENCORE

As reported, the global deal would create a strategic partnership to support a circular and sustainable ecosystem for recycled battery materials.

American company ACE Green Recycling, a global recycling technology and supply chain platform, and Swiss-based Glencore plc intend to enter "a long-term supply agreement for recycled lead as well as key battery metal-based end products from recycled lithium-ion batteries". This strategic partnership would help create a circular supply chain on a global scale for these high-demand materials while reducing their environmental footprint.

The 15-year agreement allows for Glencore – one of the world's largest natural resources companies and a leading producer and recycler of metals for the production of batteries – to purchase up to 100 percent of ACE's products from four of its planned lead-acid and lithium-ion battery recycling parks being built in the United States, India and Thailand. "The parks are expected to be complete by 2024," ACE Green Recycling underlined in December last year. Once operational, the firm estimates that these recycling parks will cumulatively produce 1.6 million tons of recycled metals containing lead, lithium, nickel and cobalt.

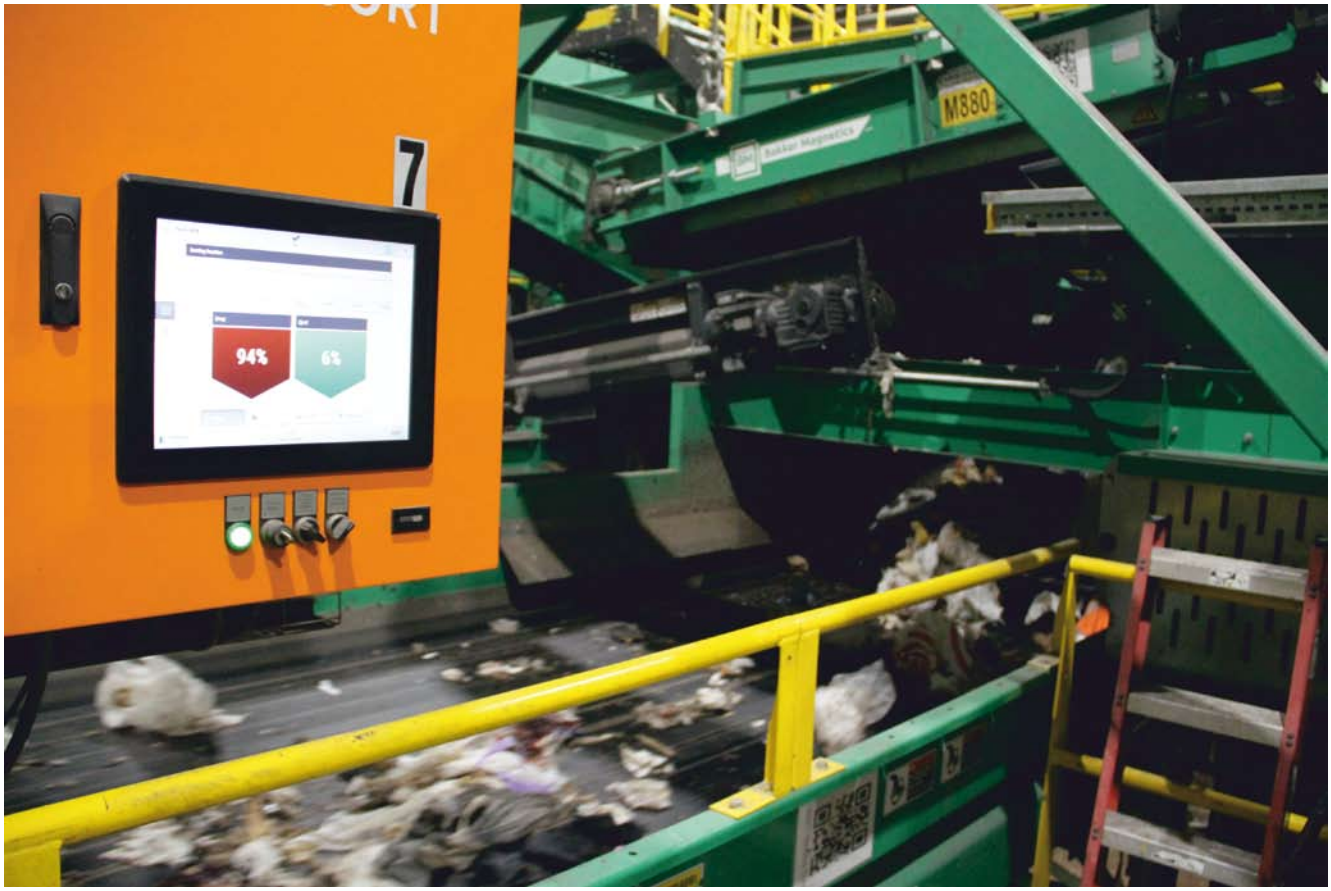
acegreenrecycling.com
glencore.com

TWO WASTEPAPER PROCESSING SYSTEMS FOR BANGLADESHI PAPER COMPANY

Austria-based international technology group Andritz has received an order from Bangladeshi Lipy Paper Mills Ltd. to supply wastepaper processing systems to its mill. As reported, these are the first Andritz RCF (Recycled Fiber) lines for Bangladesh. Start-up is scheduled for the third quarter of 2023. The Austrian company will supply key equipment for two RCF lines, featuring a total capacity of 150 tons/day and processing LOCC (Local Old Corrugated Containers) and MOW (Mixed Office Waste) as raw material for the production of testliner as well as writing and printing paper.

Lipy Paper Mills Ltd., which is located ten kilometers intercity from Dhaka in Changine, Modonpur, Kanchpur, Sonargaon (Bangladesh), was established in 2016 by Lipy Group, a family-owned Bangladeshi enterprise and successful player in the paper market.

andritz.com



MIXED WASTE PROCESSING WITH TOMRA AUTOSORT

Santa Barbara County's Resource Center sorts municipal solid waste (MSW) and single stream using the same circuit with the sorting technology realized in the Tomra Autosort.

Santa Barbara County's Resource Center in California may be a model of efficiency for future material recovery facilities (MRF) in North America. Conceptualized roughly 20 years ago, the mixed waste processing facility at the Tajiguas landfill site, in operation since 2020, is designed to meet the state's stringent organics recycling diversion targets set for 2025. Plus, it recovers recyclable commodities from municipal solid waste that would have been landfilled just a couple of years ago. According to Wilfred Poiesz, recycling system design and sales manager for the MRF builder Van Dyk Recycling Solutions (Norwalk, Connecticut), it runs both MSW and single stream on the same circuit.

A green solution for organics

Dubbed the biggest change to happen in waste management in over 30 years, California's Senate Bill (SB) 1383 targets organic waste to reduce short-lived climate pollutants in the state. It requires the state to reduce 75 percent of organic wastes – food, green waste, paper products, among others – by 2025. In 2018, California disposed of approximately 24 million tons of organic waste, and the mandate targets to reduce this by more than 20 million tons by 2025.

The recovery facility's design was – in part – geared toward meeting those mandates. The Tajiguas landfill serves the

Photos: Tomra

South Coast and the Santa Ynez and New Cuyama Valleys' commercial and residential waste services. "We serve approximately 220,000 people," Carlyle Johnston, project leader at the County of Santa Barbara, was cited. "Santa Barbara is an affluent county, and the general rule is waste generation increases with affluence." Waste generation for county residents would average nine pounds per person (about 4,1 kilograms/person).

The facility first shreds MSW to break apart and resize materials before being processed. The automated circuit handles material between 2.5-14 inches (1 inch = 2.54 cm). Then a series of trommels and screens sizes the material. Any heavy material falling through the 2.5-inch screens is treated as organics and sent to the anaerobic digesters. It is converted into compost and biogas for electricity.

Profiting from commodity recovery

With 20,000 square feet (about 6,096 square meters) under the roof for tipping floor space, Alan Coulter, general manager for MarBorg Recovery, operator of the Resource Center's MRF, says space is tight. "We can't keep material sitting on the floor for too long. We must keep it flowing from the floor to the circuit." The automated sorting circuit's designed capacity is 1,000 tons per day. The screening process also separates oversized material greater than 14 inch, diverted from the automated circuit for manual sorting. "Our goal is for quantity of material removed from the stream, so we employ manual sorters to help maximize material recovery." The remaining 2.5- to 14-inch waste material is sent through a series of ten Tomra Autosort units for recovering recyclable commodities, including plastics, plastic film, paper and wood.

Compact and flexible, the Tomra Autosort multifunctional sorting system can be used across different material sorting applications, including MSW, single stream, plastics, and e-scrap. As reported, the new generation of the sorting system incorporates the latest Tomra technologies to offer advanced accuracy of complex sorting tasks, such as pulling recyclate from MSW feed material, at high throughput rates.

"Using near-infrared (NIR) and visible light spectroscopy (VIS) to identify objects, Autosort's Sharp Eye technology increases light efficiency while maintaining the same energy consumption to advance sorting sharpness and improve separation of difficult-to-target fractions," Tomra informed. The sorters would also include its patented Flying Beam sensing technology to offer better light efficiency, flexible and easy installation, and enhanced light signal efficiency for improved detection.

The Resource Center's circuit is designed to use a positive sort, where the desired recyclable material fractions are ejected by the valve blocks, to increase recovered material purity. Each sorting unit is equipped with three to four different "recipes" of materials that operators can select to recover from the unit. "Autosort can be configured with dozens of recipes for recovered materials," Parker Bynum, sales manager for Tomra Recycling Sorting, gave account. "Tomra collaborated with Van Dyk to configure the sorters according to the customer's needs."

Quick switch to single stream

MarBorg runs MSW through the automated sorting circuit throughout the day to sort single stream recyclable material during the second shift. The circuit only shuts down for approximately 30-45 minutes to allow workers time to clean the screens and change Autosort's recipes to single stream sorting.

When running a single stream, workers increase the speed of the feed material conveyor belt through the circuit. Currently, the facility sorts and recovers five different spec recyclable plastic products, cardboard, aluminum and paper.

The recovered recyclable material helps to defray the Resource Center's annual operating costs. The recovered products generate approximately six million US-Dollar in sales annually, Johnston informed. Although the facility is not self-sustaining, it would lower the facility's operating costs.

More importantly, the Resource Center is achieving its goal of diverting material from landfill. That extends the life of the Tajiguas landfill and puts off the need to expand or site another landfill. "Between sorting MSW and single stream, our goal is achieving a diversion rate of approximately 80 percent," Coulter underlined.

Also, to comply with a portion of California SB 1383, the Resource Center has created an Education Center, where they open the facility to groups ranging from school-age students to senior citizens. Each year, the facility sees more than 1,000 visitors tour the Education Center to learn more about waste and recycling.

tomra.com/en

ZEPPELIN SYSTEMS JOINS FORCES WITH POLISH TIRE RECYCLING PARTNER

German-based plant engineering company Zeppelin Systems welcomed the Recykl Group, an established Polish market leader in managing post-consumer waste in the form of end-of-life tires, as a partner. As reported, this partnership – which started in February – is being made in alignment with the integrated circular economy concept.

According to Zeppelin Systems, the strategic merger of the two companies "generates valuable synergetic effects in the development and marketing of technologies in the field of end-of-life tire recycling". Polish company Recykl Organizacja Odzysku S.A. is part of a large capital group (Recykl Group, GRC) and has been working intensively on reprocessing used tires since 2004. "The company processes over 120,000 metric tons of used tire material every year, making it one of the largest companies of its kind in Central and Eastern Europe."

As underlined by the German company, its tire production and recycling rely on highly automated processes, zero-waste production, and technologies that reduce emissions. "This field is a key issue for the industry because it is essential that tire recyclates are of consistently high quality and available in sufficient quantities to achieve a sustainable circular economy in tire production. The merger with Recykl Group takes the mechanical recycling of used tires to the next level. Plant engineering technology is provided by Zeppelin Systems, and the process for tire recycling – in particular the devulcanization of rubber – by Recykl Group." The resulting high-quality recyclates could be directly integrated into the production cycle for new tires. For example, recycled textile fibers from mechanical recycling are reused as stabilizers in road construction and would offer even better properties than conventional materials.

As emphasized by Zeppelin Systems, this new partnership represents an important alliance: "As an integrated solutions provider for the recycling of end-of-life tires, we are closing an important gap in the circular economy using our partnership with Recykl Group. We are making our contribution to commercializing the recyclate production technologies which the tire industry urgently needs to manufacture sustainable tires," Guido Veit, Vice President of Sales for Polyolefins, Rubber and Silos at Zeppelin Systems GmbH, was quoted.

zeppelin.com/de-en/systems/

About Zeppelin Plant Engineering

According to its statement, Zeppelin Systems is a global leader in plant engineering for handling high-quality bulk materials. With over 70 years of experience in process engineering and extensive knowledge in handling raw materials, the firm offers complete solutions. With 22 locations worldwide, the company supports its customers from plant design through implementation and provides all aftersales services locally. "Each Zeppelin plant is customized to meet the requirements of each customer be it in the plastic, chemical, rubber and tire, or food industries," the plant manufacturer underlined. With its technology center network for bulk materials, Zeppelin would enable its customers to carry out tests on an industrial scale and verify and optimize their plant design. Furthermore, Zeppelin Systems develops and manufactures its components for key plant functions, also used in third-party plants.

zeppelin-systems.com

"CIRCELLIGENCE BY BCG" AVAILABLE ON SAP STORE

Developed by Boston Consulting Group (BCG) in partnership with software group SAP and "battle-tested" with BCG's clients, Circelligence is now available on SAP Store.

According to BCG, Circelligence is built on the SAP Business Technology Platform (SAP BTP) and integrates with SAP S/4HANA and SAP HANA Cloud to deliver insight to customers into the circularity of their businesses. The solution would evaluate "how much a company has moved away from a traditional and linear 'take, make, waste' model, and toward one that does more with less, fosters reuse and recycling, and encourages a closed loop that benefits the environment, society, and businesses". As part of the partnership with the German-based software group, BCG's Circelligence

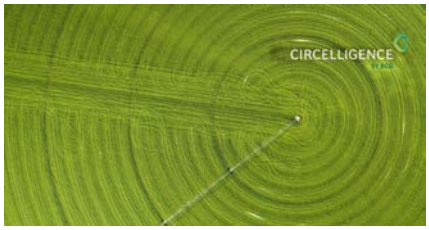


Photo: BCG

methodology has been repackaged into a stand-alone software tool for expanded access, the Boston Consulting Group informed.

"Circelligence by BCG customers are given the opportunity to leverage a proven and ready-to-use holistic methodology built on BCG's deep expertise in circular economies, analytics, and transformation," BCG stressed the benefits in a press release. "They can understand how circular their business is today based on their current performance data. Further, they can assess their company's readiness to increase circularity and identify key areas for improvement. Users can test, evaluate, and track their value-creating initiatives to drive decision-making and investments, and plot their transition to a circular, more resilient, business model that is fit for the future."

The SAP Store – the online marketplace of the software group – delivers more than 2,200 solutions from SAP and its partners; for each purchase made through this store, SAP would plant a tree.

bcg.com/capabilities/climate-change-sustainability/circular-economy-circelligence
store.sap.com/en/

SMS GROUP SUPPLIES PROCESS TECHNOLOGY FOR GREEN STEEL PRODUCTION PLANT

German-based SMS group, has been selected to provide a broad range of technology and equipment for the H2 Green Steel project in Sweden.

When completed, the plant will produce steel mostly from scrap collected for recycling, using green hydrogen instead of carbon. As reported, the H2 Green Steel site will be a almost 300 hectares greenfield project in Boden in the Swedish Norbotten region. The facility, called the "world's first large-scale green steel production plant", is expected to produce green steel by 2025, ramping up volumes in 2026.

Photo: SMS group

SMS group supplies process technology for the world's first large-scale green steel production plant

The agreement will see SMS group, including Paul Wurth and its consortium partner Midrex, as suppliers of process equipment from ironmaking to finished steel products based on hydrogen and electricity from renewable sources. The partners will provide a MIDREX direct reduction plant, the Electric Arc Furnace (EAF) based melt shop, a CSP Nexus casting and hot rolling plant as well as an advanced cold rolling and processing complex for the production of a broad product mix including advanced high strength steel and automotive steel grades. "Leading car manufacturers have already signed agreements with H2 Green Steel for the supply of green, high-quality steel", the German technology provider underlined. The total order volume for SMS group would exceed one billion Euro.

sms-group.com

US COMPANY ORDERED MORE PYROLYSIS OIL FROM SWEDISH RECYCLING FIRM

Swedish company Scandinavian Enviro Systems reported that it has received a follow-up order for pyrolysis oil from a leading US oil company.

The order concerns oil recovered from end-of-life vehicle tires – known as pyrolysis oil – at Enviro's plant in Åsensbruk, and is of the same type as the oil that the subsidiary of the oil company ordered last year, the Swedish firm gave account. The oil from the initial order had been used for production tests "to determine how suitable the oil is for the production of various biofuels". In November 2022, Enviro was able to announce that the production testing by the company in question had yielded good results.

Delivery of the new order is expected for about one year beginning in March 2023. Pricing of the order would be based on current market prices in connection with delivery; its total value is estimated at (converted) 450,000 US-Dollar. "This order is yet another example of the growing interest in the oil we can recover and deliver to the market. Increasing volume requirements among our customers also confirm the need for expanded recycling capacity that we have identified and based our expansion plans on," Thomas Sörensson, CEO of Enviro, was quoted. Enviro's recovered pyrolysis oil has been certified under the ISCC global sustainability certification system and approved by the EU REACH Directive.

envirosystems.se

Goal:

COMPLETE WASTE-TO-BIOFUEL SOLUTION

In January this year, the companies Topsoe and Steeper, both headquartered in Denmark, signed a global licensing agreement for a complete waste-to-fuel solution.

The agreement combines Topsoe's technologies in renewable fuels and hydrogen production as well as decades of experience in engineering with Steeper's proprietary Hydrofaction technology and industry expertise. According to Topsoe, the company would be able to provide a complete waste-to-fuel technology solution and, at the same time, a one-stop solution for refineries, project developers, and industries having access to excess waste biomass. "The end-products include Sustainable Aviation Fuel (SAF), marine biofuel, and renewable diesel from waste biomass," a joint press release said. With this agreement, the parties were working towards the first commercial-scale deployment of Hydrofaction technology.

Hydrothermal liquefaction

Steeper's Hydrofaction has been validated through various stages of continuous pilot and demonstration-scale plant operations over the past ten years.

Hydrothermal liquefaction (HTL) applies supercritical water as a reaction medium for the conversion of biomass directly into a high-energy density renewable biocrude oil. "Steeper's unique process mimics and accelerates nature by subjecting wet biomass to heat and high pressure," the companies informed. "The process conditions are carefully chosen to promote reaction pathways that favor high yields of high-quality renewable oil." With Steeper's Hydrofaction technology, it was possible to convert up to 85 percent of incoming biomass on an energy basis, "making it one of the most effective conversion technologies available".

steeperenergy.com
topsoe.com

DEMAND FOR OPTIMIZATION DRIVES SMART WASTE MANAGEMENT

At the end of last year, Slovakia-based tech company Sensoneo looked back at the biggest trends influencing smart waste management in 2022.

Being present in about 80 countries, the provider of smart waste management solutions has observed a demand for waste management optimization, connected to increasing waste management costs, new regulations and growing environmental consciousness.

According to Sensoneo, in 2022 main drivers were:

- Increasing prices for collection and treatment of waste
- Incentivizing citizens to create less waste and recycle
- Middle East emerging as one of the top regions for implementing smart waste solutions
- Novel ways to waste monitoring
- Implementing deposit return schemas in more countries
- Factories embracing ESG goals

"The trends are also reflected in Sensoneo's projects of 2022, which include deposit return scheme integration in two countries (Slovakia and Malta), complex waste monitoring deployments in Argentina, Island, Saudi Arabia, or Norway, or implementing smart bin access management," the company underlined.

sensoneo.com

Photo: Sensoneo

Latin America and the Caribbean: SEEKING THE ROUTE TO IMPROVE WASTE TREATMENT

Latin America and the Caribbean region consist of 42 countries, including South America and the Caribbean Islands. The different territories are unique in their demand to reduce waste and start a striking recycling strategy.

In a waste management outlook for Latin America and the Caribbean in 2018, the UN Environment balanced 541,000 tons/day of municipal waste generated in Latin America and the Caribbean. Around 40 million people lacked access to waste collection, and a daily amount of 145,000 tons of waste were still disposed of in open dumpsites. It is exptected that the figures will increase, at least, by 25 percent. In other words: Recycling seems indispensable.

Recycling rate of 4,5 percent

In its "What a waste 2.0"-study, the World Bank in 2018 quantified waste disposal and treatment in Latin America. "More than half of waste is disposed of in sanitary landfills with some environmental controls, reflecting a general regional focus on sustainable disposal methods", the study notified. 15 percent ended at controlled landfills. But the paper also had to acknowledge that open dumping accounted for about 27 percent of waste disposal. The recycling rate reached 4,5 percent, while the volumes treated by anaerobic digestion, composting and incineration were negligible. The World Bank additionally informed, that the waste collection differed between 85 percent in urban regions, mostly by a door-to-door system, while in rural communities the coverage was assured by 30 percent. The margin reached from 95 percent in cities in Uruguay and Colombia to twelve percent in Port au Prince.

Photo: hiv360 / stock.adobe.com

The differences in collection and disposal result in varying recycling behavior. As the Rijksdienst voor Ondernemend Nederland focusing on eight countries found out, municipal waste brought to landfills ranged between “40-60” to “80-100” percent (whereupon “landfilled” can mean anything from open dumps to controlled landfills). The recycling rate strained between zero and 15 percent, and the collection rate of municipal solid waste allegedly reached 60 to 100 percent. EPR systems were mostly “under development”, in one case even on “move to mandatory”. The collection systems were predominantly financed by the citizens, but in two countries the waste tax turned out to be insufficient. Private sector suppliers in some countries were said to be specifically catering to the waste sector, while in Columbia they are established but not organized, and in Chile even well organized, but with an incomplete portfolio. And six countries specified a Circular Economy strategy.

52 percent is organic

The Inter-American Development Bank outlines that for waste management “a high participation of trade recyclers” is carrying out the collection, recovery, and resale of recovered materials. These materials were paper, cardboard, metal, plastics and industrial glass. To be more precisely, in 2018, 52 percent of the generated waste was organic, followed by undefined, but largely organic waste (15 percent), paper and cardboard (13 percent) and plastic (twelve percent). The rest consisted of glass (four percent), metal (three percent) and rubber plus leather and wood (each one percent).

In spite of ranking first in generation, organic waste is last in management, 2018 the UN Environment gave account in its outlook. And added that streams like particularly hazardous wastes, hospital waste, construction and demolition waste, food waste and electrical and electronic equipment waste “are told not to be properly treated or even not inventoried and characterized”. In Chile for example, the recycling rate of municipal waste in 2017 reached just two percent and the reuse quota of organic waste one percent. Regarding the national waste – composed of 60 percent non-hazardous industrial and 35 percent municipal waste – twelve percent of plastic packaging and five percent of tires were recovered, the circular economy oriented Netherlands Enterprise Agency wrote. And the UN Industrial Development Organization criticized that “there are no accurate figures available at present regarding investment needs in the solid waste management and recycling sector for the different countries in the LAC (Latin and Caribean) region, addressing the existing challenges will require the use of resources from both national and local governments, and private-sector participation, as well as requesting loans and technical cooperation from multilateral agencies”.

Number of sorting plants growing

Meanwhile, companies in Southern America started recycling on a bigger scale. One of them is the Brazilian Orizon Valorização de Resíduos, running five “Ecoparks” in Brazil and waste management and processing facilities for approximately 4.6 million tons of waste per year. In March 2022, the company announced the forthcoming start of the “biggest mechanical sorting plant in Latin America” (as per the Prefecture Jaboatão dos Guararapes) for the treatment of 1.5 million tons of solid waste in Pernambuco, allowing greater reuse of recyclable waste and returning it into the industrial value chain. In October 2021, Mexico City saw the start of the Azcapotzalco Transfer Station and Sorting Plant, the supposed “largest and most modern sorting plant in Latin America” (as per Pet Planet), receiving up to 1,400 tons per day and sorting paper, cardboard, multilayer packaging, PET and HDPE, plastic bags and film, aluminum cans, metalized bags, textiles, glass and other metals. And in June 2022, Buenos Aires inaugurated the allegedly “most modern recycling plant in Argentina” (as per Mundolatas.com), recovering ten tons per hour of separately collected dry materials such as pans, paper, cardboard, glass and plastic.

Plastic recycling figures unknown

One of the biggest recycling problems results from plastics. According to the newspapers, Latin America is “addicted to plastics”, and appears to be “the US‘s new plastic dumping ground” or “declares a war on plastic”. Plastic is the fourth largest component by mass of the LAC municipal waste stream, encompassing 12.4 percent on average, World Bank statistics stated. The Spanish online-Magazine Gestión de Compras says that “annually the region generates 216 million tons of solid waste, of which 12 percent is highly recyclable plastic material”. The Netherlands Enterprise Agency knew that in 2020 only 11,8 percent of plastic packaging waste from domestic (4,5 percent) and industrial origin (17,6 percent) were valorized. Others are not so sure: “Data associated with plastics-only recycling in LAC is unknown but is likely lower than other more valuable materials like metals and paper”, the Inter-American Development Bank supposed. However, the Chilean journalist Cristian Ascencio Ojeda considers that at least most countries have progressively adopted legal measures against plastic bags or single-use plastic. But the volumes collected are low: The countries with the highest amount of residual plastic are Mexico (32,650 tons), El Salvador (4,054 tons) and Ecuador (3,665 tons). On the other hand, said the article by Gestión de Compras in 2020, the imports of plastic gave a push to the recycling sector: “The jobs that the sector is generating are already a reality ... Recycling facilities are the stars at the moment.” And Jaime Camara, founder, and CEO of Mexico-

based PetStar, already in 2017 stated: "Of course, the whole plastics recycling industry, specifically PET, is truly advanced and evolving."

E-scrap potential wasted

However, e-scrap needs to attract more attention. Admittedly the recycling rates in 13 Latin American countries – according to the UN report "Regional E-Waste Monitor for Latin America" – are very low, despite most of them having at least some e-scrap-related legislation. This is relativized by a strong repair culture in these countries. But the report also shows that the e-waste generated regionally in 2019 contained 7,000 kilos of gold, 310 kilos of rare-earth metals, 591 million kilos of iron, 54 million kilos of copper, and 91 million kilos of aluminum. Of this potential, only three percent are collected and treated by environmentally sound methods, while 97 percent are improperly treated. The lost value of roughly 1.7 billion US-Dollar of secondary raw materials was commented on by a website titled "How Latin America wastes billions of Dollars worth of valuable metals". But according to the market research & consulting firm 6W Research, the expanding market and technological advancements are increasingly encouraging the recycling of metal scrap due to its value.

The recovery of paper has some tradition in Latin America. A research paper written in 2003 shows, amongst others, a rate of 38 percent for paper and 73 percent for cardboard in Brazil. Venezuela reached 25 percent for both materials, while Argentina recovered 35 percent of its paper. Chile even realized a paper and cardboard recycling quota of around 50 percent. In an interview in 2019, Yury Bulgakov, Vipa Group regional director of North Europe and South America, spoke of 400 pulp and paper mills located across Latin America. Business Market Insight in 2022 expected growth of the South & Central America recycled paper market from 3,353.5 million US-Dollar in 2021 to 4,583.0 million US-Dollar by 2028.

Tire recycling progressing

Concerning tire recycling, Reciclanip started in 1999 as National Program for the Collection and Disposal of Waste Tires implemented by Anip (National Association of the Tire Industry), who represents manufacturers of new tires in Brazil. From the start of operations until the end of 2020, with more than 1,035 collection points spread across the country, more than 5.23 million tons of waste tires were collected and properly disposed of, equivalent to 1.1 billion tires outing. The national industry has already invested 1.6 billion Brazilian Real in this operation. According to the project, Reciclanip is considered one of the biggest initiatives of the Brazilian industry in the area of post-consumer responsibility and is comparable to the largest recycling programs developed in the country, in particular, that of aluminum cans and pesticide packaging. Additionally in 2016, the mining company Carbones del Correjon Ltd. announced the opening of a new tire recycling plant in Colombia. The plant, located in Albania in the province of La Guajira, accesses a recycling capacity of 2,360 tires per year and a production potential of 2,300 tons of steel and nearly 5,000 tons of crumb rubber for roadworks. Processing large tires weighing almost 3.5 tons, the facility is said to be the first of its kind in the entire Latin American region.

WtE-sector proliferating

Regarding power and heat recovery, Latin America showed attempts. Meanwhile, a handful of biogas plants have been installed and since 1992, Votorantim Cimentos deploys the first cement plant co-processing technique of industrial waste. Moreover, the thermal substitution rate has achieved 15 percent, the Italian company P&W Engineering and Consulting announced a feasibility study and preliminary designs for a plant in Buenos Aires, and the Barueri project was planned as "first WTE project" with the first "mass burn WtE contract" in Brazil. (More details can be found in Global Recycling 3/2021). But according to a research report of the Netherlands Enterprise Agency in February 2021, "to date, there is no such plant in Argentina (and not even in South America, for that matter)". On the other hand, market research company Triton suggests "that the waste-to-energy market in Latin America would proliferate with 6.24 percent of CAGR in the forecasting period of 2019 to 2027". And according to Triton and Research & Markets, several companies – amongst some others Waste Management Inc., Hitachi Zosen Corporation, Veolia Environnement S.A., Babcock & Wilcox Enterprises Inc. and China Everbright International – are "preeminent companies in the waste-to-energy market".

Recycling has a great potential

"Latin America has barely implemented eco-efficiency of a circular economy for lack of regulations encouraging such transition", the Latin American and Caribbean Economic System (SELA) – an intergovernmental regional organization of 25 Latin American and Caribbean countries – had to confess in November 2021. "Waste management and recycling have a great potential of job creation and economic development for Latin America and the Caribbean", the association stated and regarded circular economy as the driving force for Latin American and Caribbean recovery, able to launch direct and indirect effects of waste management on annual production for Chile, Colombia and Mexico ranging from 0.53 percent to 1.1 percent of their gross domestic product. Chile, for example, is aiming at the reduc-

tion of household waste going to landfills from currently 96 to 10 percent and features the ambition "to go from one percent recovery to 66 percent by the year 2040 by aiming for citizens to generate less organic waste, achieve a greater separation at the source, and by providing infrastructure, equipment and logistics systems", Netherlands Enterprise Agency anticipates. The independent policy institute Chatham House recognizes waste management and recycling among the three industrial areas that are a priority for the circular economy.

The policy agreed upon: In February 2021, the Ministers of Environment of Latin America and the Caribbean met, signed a Decision on Sustainable Consumption and Production and Circular Economy, formally launched the Circular Economy Coalition for Latin America and the Caribbean and thus inaugurated more than 80 public policy circular economy initiatives and the increasing number of national circular economy roadmaps and strategies that were in development, the Circular Economy Coalition stated.

Investment is necessary

At a rough estimate, better waste management could create up to 4.8 million jobs across the region by 2030, the UN's Economic Development Division of the Economic Commission for Latin America and the Caribbean reported. By 2050, it would be able to generate 7.7 million new jobs and save up to 621 billion US-Dollar annually, an UN Environment Programme report states. Chile, for example, has set a target of creating more than 180,000 formal jobs in the circular economy by 2040, according to the Oxford Business Group. So there can be no doubt whether an investment is necessary – for the policy and the economy. The Chatham House additionally advises "to attract both domestic and foreign investments beyond the waste management sector to make the transition to a circular economy possible". However, at the moment, the financing situation for the circular economy in the region "is limited mainly to the provision of international development finance", and investment in science and technology is characterized as "still comparatively low".

Photo: O. Kürth

Integration of the informal sector?

A secondary problem is the integration of waste pickers into an organized waste management system. The informal sector consists of around four million people, according to the Regional Initiative for Inclusive Recycling. The sector contributes approximately 25 to 50 percent of all municipal waste collection in the region, an article in the Forbes Magazin informed. And the paper gave the hint of "an enormous opportunity for investment to create a safer environment for these critical participants in the recycling value chain while". A path has to be found that serves the interests of policy, investors and waste pickers. The consulting and advisory organization BioEnergy Consult proposes that "in order to improve the working conditions of waste pickers, and in order to increase recycling rates, we don't need high technology". Another possibility was offered by Chatham House, that in September 2020 assessed Industry 4.0 as a "key enabler of the circular economy" and recommended new business models to be profitable. Or as the Inter-American Development Bank wrote: "The principles of the circular economy ... and the involvement of the industrial sector through extended producer responsibility plans are all gaining strength in the region". The truth might lie in the middle: In 2011, the German Association for International Cooperation published a study titled "Integrating the informal sector into solid waste management". The authors underlined that partnerships among the private sector, between formal and informal actors, would become more and more important. So, "support activities should not be limited to improve the social conditions of informal waste workers, but be aimed at establishing business activities that are economically viable over the longer term".

"The principles of the circular economy ... and the involvement of the industrial sector through extended producer responsibility plans are all gaining strength in the region".

NEW LITHIUM-ION BATTERY RECYCLING FACILITY IN THE USA

Ecobat, one of the world's largest recycler of batteries, has announced plans to build a new lithium-ion battery recycling facility in Arizona – the company's third lithium-ion battery recycling facility, and its first in North America. Start-up is expected in the third quarter of this year.

Photo: Ecobat

The new facility in Casa Grande (Arizona) will initially produce 10,000 estimated tons of recycled material per year, with plans to expand capacity to satisfy the increasing need to recycle lithium-ion batteries. According to Ecobat CEO Marcus Randolph, the American facility – like the ones in Germany and the United Kingdom – would represent "a significant milestone" in the firm's strategy to grow its lithium-ion battery recycling business to a scale, similar to Ecobat's world-leading lead battery recycling business. It is planned that Ecobat Casa Grande will repurpose lithium-ion batteries reaching end-of-life through diagnostics, sorting, shredding and material separation to produce a concentrated black mass containing the valuable materials in lithium-ion batteries. "It will be located approximately one mile from the existing Ecobat Resources Arizona facility, which has been using state-of-the-art technology and a highly trained workforce for 15 years to manufacture anodes."

ecobat.com

Battery Recycling:
NEW PARTNERSHIP

Singapore-based ACE Green Recycling (ACE), an integrated technology and supply chain platform for battery materials, recently signed a Memorandum of Understanding (MOU) with STC, a leading European engineering, procurement and construction management company specializing in building plants and equipment for battery recycling and lead production.

Through the strategic collaboration, STC will construct battery recycling facilities providing manufacturing of recycling equipment and overall engineering. According to the information, the agreement includes project management activities, integrating STC's proprietary technologies with ACE's zero Scope 1 emissions technologies for lead and lithium-ion batteries. "STC and ACE will also explore opportunities for licensing and co-marketing their battery recycling technologies," the firms announced.

Both companies expect synergies from the collaboration. ACE has developed "a portfolio of proprietary, Scope 1 emissions-free technologies to recycle lead-acid and lithium-ion batteries to extract critical battery materials". As emphasized, its proprietary hydrometallurgical technology is powered exclusively by electricity, emits zero greenhouse gases and has market-leading recovery yields.

Italy-based STC operates in battery recycling and lead production and has projects across the European Union, North America and Africa. The company is part of the Monbat Group and operates in other sectors such as hydrometallurgy chemistry, electrochemistry, environmental protection and water treatment.

acegreenrecycling.com
stcitaly.com

WASTE SHREDDER DEMAND IN EUROPE IS RISING

According to Fact.MR, the Europe waste shredder market is expected to be valued at 235.0 million US-Dollar by 2033, expanding at a compound annual growth rate (CAGR) of 3.2 percent. In 2022, the value of this market was estimated at 228.0 million US-Dollar.

As reported by Fact.MR, the development of the waste shredder market is primarily driven by expanding urbanization and rising industrialization. "Moreover, improved trash disposal awareness and waste size reduction for simple disposal have further enhanced waste shredder sales." It was anticipated that in the upcoming years, the market for waste shredders would increase due to the expanding innovations in waste management strategies and the expansion of recycling operations to support soaring urbanization.

Photo: O. Kürth

Additionally, there may be more opportunities for market expansion due to the increased need to recover waste, the market research and competitive intelligence provider stated. For instance, automobiles and other scrap metals are shredded using metal shredder machines to be used as raw materials in various end-use industries. Under shredding speed type, medium-speed shredders would dominate the market and were expected to be valued at 98.7 million US-Dollar in 2023. Additionally, it was stated that Germany would dominate the market with a market share of 25.0 percent in 2023. Currently valued at 59.3 million US-Dollar, the German waste shredder market is anticipated to grow to 83.5 million US-Dollar by 2033. The demand in France and Italy for waste shredders is expected to increase at CAGRs of 3.8 percent and 2.4 percent, respectively.

factmr.com/connectus/sample?flag=RC&rep_id=7982

European Union: **GOAL IS TO MAKE SUSTAINABLE PRODUCTS THE NORM**

Under its sustainable products initiative, the European Commission aims to ensure that all products placed on the EU market are designed with sustainability objectives in mind.

End of March last year, the European Commission presented a package of European Green Deal proposals "to make sustainable products the norm in the EU, boost circular business models and empower consumers for the green transition", a press release said. "As announced in the Circular Economy Action Plan, the Commission is proposing new rules to make almost all physical goods on the EU market more friendly to the environment, circular, and energy efficient throughout their whole lifecycle from the design phase through to daily use, repurposing and end-of-life."

End of November in the same year, a new proposal regarding packaging followed. The proposed new EU-wide rules on the packaging aim to tackle the constantly growing source of waste and of consumer frustration. "On average, each European generates almost 180 kilograms of packaging waste per year," the Commission stated. Packaging would be one of the main users of virgin materials as 40 percent of plastics and 50 percent of paper used in the EU is destined for packaging. "Without action, the EU would see a further 19 percent increase in packaging waste by 2030, and for plastic packaging waste even a 46 percent increase."

Photo: hkama / stock.adobe.com

According to the European Commission, the new rules aim to stop this trend. “For consumers, they will ensure reusable packaging options, get rid of unnecessary packaging, limit overpackaging, and provide clear labels to support correct recycling,” a press release underlined. “For the industry, they will create new business opportunities, especially for smaller companies, decrease the need for virgin materials, boosting Europe‘s recycling capacity as well as making Europe less dependent on primary resources and external suppliers. They will put the packaging sector on track for climate neutrality by 2050.”

As reported, the proposed revision of the EU legislation on Packaging and Packaging Waste has three main objectives. First, to prevent the generation of packaging waste: reduce it in quantity, restrict unnecessary packaging and promote reusable and refillable packaging solutions. Second, to boost high quality (‘closed loop‘) recycling: Make all packaging on the EU market recyclable in an economically viable way by 2030. And finally, to reduce the need for primary natural resources and create a well-functioning market for secondary raw materials, increasing the use of recycled plastics in packaging through mandatory targets.

- The main target is to reduce packaging waste by 15 percent by 2040 per Member State per capita, compared to 2018. “This would lead to an overall waste reduction in the EU of some 37 percent compared to a scenario without changing the legislation. It will happen through both reuse and recycling,” the Commission is convinced.
- To foster reuse or refill of packaging, which has declined steeply in the last 20 years, “companies will have to offer a certain percentage of their products to consumers in reusable or refillable packaging, for example takeaway drinks and meals or e-commerce deliveries”. There would also be some standardization of packaging formats and clear labelling of reusable packaging.
- To clearly address unnecessary packaging, certain forms of packaging will be banned, for example single-use packaging for food and beverages when consumed inside restaurants and cafes, single-use packaging for fruits and vegetables, miniature shampoo bottles and other miniature packaging in hotels.
- Many measures aim to make packaging fully recyclable by 2030, the Commission pointed out. “This includes setting design criteria for packaging; creating mandatory deposit return systems for plastic bottles and aluminum

cans; and making it clear which very limited types of packaging must be compostable so that consumers can throw these to bio-waste."
- There would also be mandatory rates of recycled content that producers have to include in new plastic packaging. "This will help turn recycled plastic into a valuable raw material – as already shown by the example of PET bottles in the context of the Single-Use Plastics Directive."

The proposal would also clear up confusion on which packaging belongs to which recycling bin. "Every piece of packaging will carry a label showing what the packaging is made of and in which waste stream it should go. Waste collection containers will carry the same labels. The same symbols will be used everywhere in the EU." By 2030, the proposed measures would bring greenhouse gas emissions from packaging down to 43 million tons compared to 66 million if the legislation is not changed, the Commission wrote. The costs of environmental damage for the economy and society would be reduced by 6.4 billion Euro relative to the baseline 2030. The proposal on packaging and packaging waste would be considered by the European Parliament and the Council, in the ordinary legislative procedure.

Bioplastics

Furthermore, it is intended to clear up the confusion around biobased, biodegradable and compostable plastics. As underlined by the Commission, the new framework would clarify in what way these plastics could be part of a sustainable future.

ec.europa.eu

Old Textiles:
BENEFITS OF REUSE AND RECYCLING

In Europe, a new life-cycle assessment revealed that the reuse and recycling of old clothing are economical and ecological.

As reported by EuRIC, the European Recycling Industries' Confederation, a new life-cycle assessment (LCA) commissioned by the European textile reuse and recycling industry has confirmed the significant CO_2 and water savings of reusing textiles compared to producing new clothing. "The environmental impact of reusing textiles is 70 times lower, even when accounting for global exports for reuse including transport emissions."

More specifically, the study would reveal that three kilograms of CO_2 are saved for each high/medium-quality clothing that is reused, while only a mere 0.01 percent of the water used to produce new clothing is required for reuse. "These results come on the back of the EU launching its Strategy for Sustainable Textiles and requirements for Member States to start collecting textiles separately by 2025," EuRIC pointed out. The study would confirm waste hierarchy assumptions on the environmental benefits of reuse over recycling, in the case of low-quality clothing, typically entirely composed of polyester. However, recycling also has comparative environmental benefits when consumers are less likely to purchase second-hand clothing.

"Regrettably, around 62 percent of used clothing and textiles end up in household waste meaning valuable textiles are likely to be incinerated or landfilled. The European textile reuse and recycling industry envisages a circular textile value chain where every piece of clothing is reused in an optimal way and/or recycled," Mariska Boer, President of EuRIC Textiles. "This study endorses the environmental benefits of a global market for textile reuse and recycling's potential to tackle the rising amounts of low-quality and non-reusable clothing."

The study also emphasized recommendations to policymakers, calling for initiatives that accelerate investments in state-of-the-art textile recycling facilities globally. In particular, innovation in fiber-to-fiber recycling will be essential to keeping textile fibers in the loop as volumes of non-reusable clothing are set to increase dramatically. "The study also notes the importance of eco-design criteria that enhance the lifespan of clothing before there is a need for recycling as well as rules that mandate detailed sorting of high/medium-quality and low-quality textiles," EuRIC informed.

Photo: MSV-Archive

The Perfect Trifecta:
A ROADMAP FOR MORE SUSTAINABLE METAL AEROSOLS

Mike MacKay, co-owner and managing director of Despray Environment (despray.com), which offers a recycling technology for aerosols, warns that the European Commission's (EC) recently adopted sustainable products initiative is set to rattle the industry.

In what he calls 'the perfect trifecta', he outlines below why recycled metal, liquid fuel and propellant fuel are essential pillars of a sustainable aerosol recycling program that could significantly reduce the industry's carbon footprint and boost its sustainability status.

The EC's initiative impact

There are serious concerns about the EC's recently adopted sustainable products initiative. In fact, it can be considered a straight-up gut punch. The initiative is so wide-reaching that it will disrupt the industry at the very least and has the real possibility of doing major damage to certain aspects and products offered by the industry.

The intention of the initiative may not have been to cripple the industry; however, if every detail in it is to be followed it will create far-reaching damages that it may not have intended or even considered. Some of the proposals seem nearly impossible to adhere to. Nonetheless, a significant amount of the targets is attainable over time. The industry can and will unite to address the environmental sustainability of our aerosol products.

Addressing the elephant in the room: true sustainability

Over the last few decades incredible efforts have been made by the aerosol industry to address eco-friendly packaging, plant and supply chain sustainability, logistics and financial resources. The way we think of aerosols' sustainability may require an additional angle to the tried-and-true methods to date. After all, there is only a finite amount of eco design, reduction of materials, distribution, manufacturing and supply chain carbon footprint that can be tolerated in the packaging design while still keeping products viable and safe. It is also noted that companies are prohibited from making certain types of environmental claims deemed to be misleading. In fact, calling a product sustainable could fall under this statement: Using the words potential sustainability may be more suitable than true sustainability considering aerosol products. So, the issue that needs to be addressed is how to make aerosols more sustainable and still have a profitable and reliable product.

The answer is clearly not inclusive of the upfront efforts implemented to date. The problems concerning the EC's intentions is that it may warrant additional efforts and perhaps a new way of thinking to address an end of life "true sustainability" claims. The circular economy is achievable for aerosols even as they exist today. Green initiative and environmentalist groups are looking this way whether we accept responsibility or not. They will still be here in the future with growing strength. Now is the time to show industry cohesion and address the elephant in the room: true sustainability. We need to deal with the industries overall environmental and product "end-of-life" impact issues at hand, openly and honestly.

As an ardent advocate of aerosol recycling for 25 years along with its positive environmental impact, I truly believe that as an industry, we must play our role in our planet's future. Aerosols, as they exist now, can be recycled safely and efficiently while supporting a near 100 percent circular economy. That is worth exploring, and it is worth the effort.

The alarm bells are ringing

The EC's initiative will lay down a map for eco design requirements, reliability, upgradability, durability and reus-

ability, reparability, resource efficiency as well as maintenance and refurbishment of these products, including presence of substances relating to energy consumption and recycled content. On top of this, better labelling will be required along with introducing an EU-wide packaging deposit return scheme. If that is not enough, measures to limit advertising of products that are environmentally damaging will be introduced. That will include a mandatory disclaimer for products that are particularly harmful for the environment.

The question remains: What can we do with the cards we have to deal with today? That is a tough question to answer. If dealt with independently, all of the line items in the initiative would be taxing enough, but as a combined initiative they may seem impossible or overwhelming. Taking a look from the backside of the business may carry a refreshing outlook that cannot possibly cover all of the topics at hand, but could directly address the sustainability and potential circular economy for the majority of our current aerosol products.

The suggested refill and reuse targets are not only unrealistic, but they may be counterproductive. Reuse and refill are not always the best option from a climate and environmental perspective. The logistical complexities of sorting, return transportation, etc., will be extremely difficult and most likely impossible.

Setting an example: The UK Aerosol Recycling Initiative

Current sustainability and recycling efforts to increase recycling rates of metal cans are already being driven by Alupro (alupro.org.uk), along with Ball Corporation (ball.com), through The UK Aerosol Recycling Initiative (alupro.org.uk/industry/programmes/the-uk-aerosol-recycling-initiative/). The initiative is not only cutting-edge but could be the road map to a sustainable future for the aerosol industry. What started as an initiative to increase low aerosol recycling rates is growing into a full sustainable aerosol recycling platform that can be rolled out across the globe. Making sustainable aerosol products the norm is vital to the future of the aerosol industry.

What exactly would a sustainable aerosol recycling programme look like that could significantly reduce the industries carbon footprint and boost sustainability? The answer is three-fold:

1. Metal Containers

As per the Alupro/Ball initiative, the most obvious target for a more sustainable future will be to increase the recycling

rates of metal aerosol cans. The recycled metal containers offer a significantly lower footprint than creating cans from raw materials. Targeting these cans while striving to get close to the recycling rates of soda and soup cans will have a major impact on the aerosol sustainability factor. The barrier to success will be the ability to capture these metals and simultaneously handle flammable propellants and an endless mixture of liquid contents proving to be almost impossible to sort.

- Some aerosol contents are non-toxic, non-hazardous, and environmentally friendly but may be propelled by flammable propellants. Some contents are flammable and considered hazardous and could be filled with flammable propellants or non-flammable propellant systems

Photos: Despray

such as Bag-on-Valve (BOV), pumps, CO_2, etc. There seems to be a never-ending combination of possible mixtures of non-Haz Vs, Haz Vs, BOV Vs, pumps, etc.

- The hard facts are that to call aerosols sustainable, all three components – metal, liquid contents and propellants – need to be targeted. Leaving one of the three components out of our targeted recycling loop leaves out the opportunity to be truly sustainable.

2. Liquid contents

The main problem with recycling all these seemingly endless combinations of liquids is that they're impossible to sort by propellant type or contents composition. Due to sorting impossibility, all aerosols, along with their propellant and liquid contents, need to be treated as hazardous waste or, at the very minimum, as flammable. These cans are almost never empty and could still remain over ten percent or even 15 percent full on average in the post-consumer stream. In conclusion, if all products were recycled together and treated as hazardous waste, the efforts would include minor sorting and limited handling, resulting in a sustainable product.

The good news is that if the liquid contents are mixed together with endless combinations of recipes, they can be 100 percent used for waste-to-energy as a low-grade fuel. That seems easy enough if they are processed in a non-explosive atmosphere. Now we can access the metal can for full recycling, right? Not so fast ... it is not that simple. We still have propellants to deal with.

3. Propellants

Now that we have dealt with the recycling issues of the metal cans and the liquid contents, the only thing left for a recycling trifecta is capturing the propellants to reuse as high-grade fuel in waste-to-energy applications. Aerosols have many types of propellant methods including fossil fuels, BOV, pump sprays, CO_2 propellants and environmentally friendly propellants. At the recycling centers these all get mixed in with flammable propellants, which again proves that it is impossible to sort aerosols by propellant type.

Since many propellants are flammable and even very explosive, safety measures force all propellants to be treated as flammable or explosive. Sorting by propellant type would be impossible other than special vertical skew markets that can be identified easily. Again, the obvious answer for proper recycling of the propellants in the current state of affairs is to treat all cans as if they have flammable propellants. Once we do that, we can capture the propellants and compress it back to liquid form for easy transport and use for waste-to-energy solutions.

The perfect trifecta: metal recycled + liquid fuel recycled + propellant fuel recycled.

Once the three main components of an aerosol product are captured safely as well as prepared and ready for 100 percent recycling or waste-to-energy applications, we can use the word sustainability with pride and conviction.

We may not have all the tools or political means to change or redirect all the new policies thrown at the aerosol industry right now, but we can deal with the cards we are dealt with to achieve a more sustainable product. The technology already exists for a truly sustainable aerosol market. We need to embrace it sooner than later.

despray.com

The perfect trifecta: metal recycled + liquid fuel recycled + propellant fuel recycled

France:

NEW RECYCLING LINE FOR AGRICULTURAL PLASTIC WASTE NETS

French company RecyOuest, a start-up that handles the recycling of contaminated filamentary thermoplastics, has started up "the world's first recycling line for agricultural plastic waste nets" at its mill in Argentan.

Net waste before mechanical cleaning process

End product – plastic pellets produced at the end of the process

Photos: Andritz

The recycling line was delivered, installed and commissioned by the Austria-based international technology group Andritz in August 2022. According to the provider, it can process up to 8,000 tons of waste and produce recycling fibers for nonwoven applications and pellets made of waste from agricultural single-use plastic nets and twines. These pellets are then returned to the plastics industry by mixing both recycled and virgin raw materials, thus reducing the amount of virgin plastic used.

"This line, inspired by the techniques from textile wastes recycling, is equipped with a unique mechanical dry-cleaning system that allows resource savings by avoiding the use of water and chemicals," Andritz pointed out. "This state-of-the-art Andritz equipment allows RecyOuest to produce recycling fibers for nonwoven applications and also pellets for new eco-designed nets and twines for the agricultural sector, with the lowest possible environmental impact." RecyOuest, based in Argentan, France, is a green economy company recycling contaminated filamentary thermoplastics such as round bale nets and twines. With its recycling process, RecyOuest is part of a circular economy approach.

andritz.com
recyouest.fr/en/

RECYCLEME LAUNCHES FREE RECYCLABILITY-TOOL IN SLOVAKIA

Internationally active consulting company RecycleMe has released its online tool "Circulate Easy" on the Slovak market.

Users of the tool that allows the digital assessment of packaging can conduct assessments and evaluations of the recyclability of their packaging in a few simple steps, as the consulting company described the service. "The tool is free of charge and will help manufacturers and distributors of packaging to get a better understanding of the circularity of their packaging and discover potential for optimization."

As a business consultancy, RecycleMe focuses on circular economy, EPR (Extended Producer Responsibility)-Compliance and packaging recyclability. The team supports its customers in different countries regarding the optimization of packaging circularity and the fulfillment of international regulations. Only recently, the EU has published its draft of a revision of the Packaging and Packaging Waste Regulation (PPWR). Circular economy and the high-quality recycling of materials are gaining more and more importance, the company pointed out. Control instruments like eco-modulation or the specification of recycled material quotas in packaging would encourage packaging manufacturers and distributors to prioritize the recyclability of their products.

recycleme.eco/en

North America:

PLASTIC PELLETS MADE FROM RECOVERED MARINE GEAR

The new product, named "Legacy Plastic", is made from post-consumer processed recycled plastic recovered during ocean, shoreline, and marine equipment cleanups.

As reported by Ocean Legacy Foundation (a Canadian non-profit organization that develops and implements worldwide plastic pollution programs), the coalition produces the "first commercially available plastic pellet in North America, called Legacy Plastic". Resource for "Legacy Plastic" is recovered marine gear such as fishing ropes, buoys, floats, oyster trays and other anthropogenic plastic debris collected from cleanup activities and reprocessed for use in manufacturing

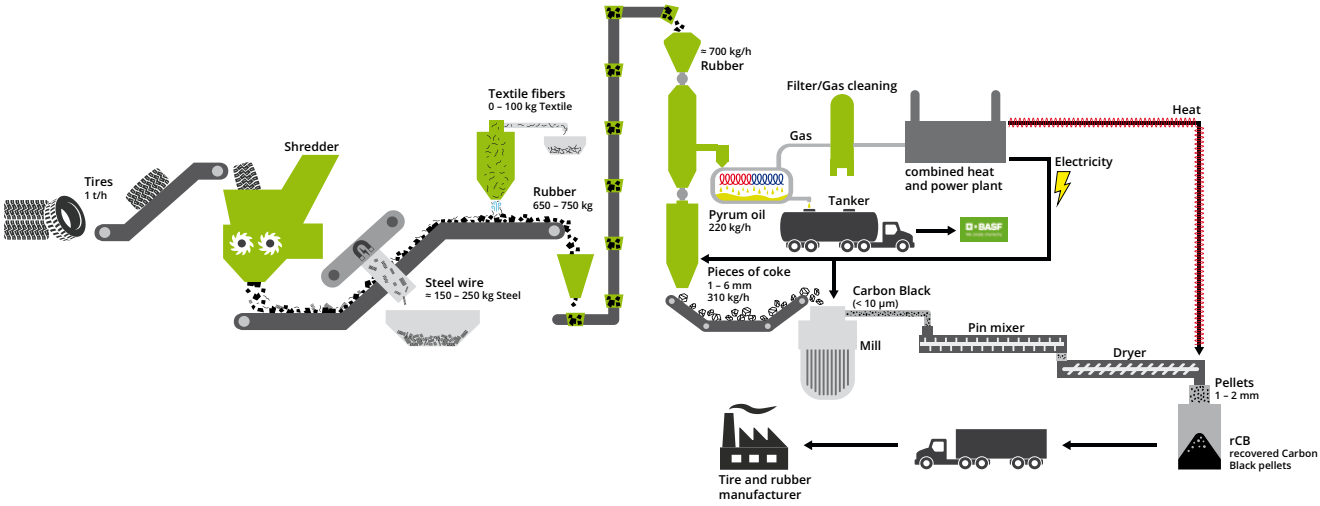
Photo: Ocean Legacy

new durable products. As reported, the plastic material is sourced from diverse channels within Ocean Legacy's network of plastic and debris recovery operations with community partners and their recovery efforts. According to Gil Yaron, Director of Sales and Marketing for Ocean Legacy Foundation, "Legacy Plastic" is made in Western Canada entirely from 100 percent cleanup recovered plastic. "For example, we're really excited about a new partnership with Full Circle Plastics from Nobleford, Alberta. Full Circle Plastics' line of plastic lumber used in commercial, industrial and residential construction are products that replace many traditional lumber applications, such as planter boxes, agriculture fence posts, outdoor decking construction, and a wide array of domestic outdoor furniture."

- legacyplastic.ca
- oceanlegacy.ca
- fullcircleplastics.com

TIRE RECYCLING TO REDUCE ENVIRONMENTAL IMPACT

State-of-the-art technologies provide full control of challenging chemical recycling processes.



The recycling of end-of-life tires (ELTs) is a real challenge due to the durability of materials and the harm they cause to the environment. And considering the fact that tires are produced in very large quantities, this is indeed a problem of enormous scale. Separating the various materials mechanically within the scope of material recycling and sorting them into different groups (e.g. rubber, steel and textiles) for use in less challenging applications is of course possible. Alternatively, scrap tires can be incinerated in cement plants, pulp mills, or power plants to benefit from their high calorific value. But to keep valuable resources in the loop, the focus should be directed to cutting-edge chemical recycling processes, including those of Pyrum Innovations AG. The company reduces scrap tires to their basic components, thus enabling sustainable reuse.

Since the 19th century, bicycles, motorcycles, and especially automobiles have been the leading means of individual transport and thus a powerful symbol of personal freedom. The invention of pneumatic tires, which ultimately replaced the bothersome, metal-coated wooden wheels, was a major milestone towards public acceptance. Today, a modern tire is a high-tech product made from rubber, textiles, steel, and various additives. Since the early days of development, tremendous quantities of tires have been produced, used, and finally sorted out.[1]

End-of-life tires are a valuable resource

“These tires aren’t waste, but valuable materials that must absolutely be reused and recycled”, emphasizes Pascal Klein, Founder and CEO of Pyrum Innovations AG in Dillingen: “Through our patented thermolysis process, which is a chemical recycling process, we completely transform the rubber components of end-of-life tires into solid, liquid, and gaseous materials. This process produces so-called recovered carbon black (rCB), an ISCC+-certified, sustainable pyrolysis oil, as well as pyrolysis gas”.

The fields of application for these products are indeed attractive. To mention just a few examples: When used in tire manufacturing or as a pigment in the paint industry, recovered carbon black significantly reduces the carbon footprint of these products. This is due to the fact that virgin carbon black is still being produced in CO_2-intensive furnace processes. The pyrolysis oil can serve as a replacement for fossil crude oil for the production of synthetic fibers such as polyester. The use of the recovered oil helps conserve natural resources and thus effectively contrib-

Photos / Graphics: Siemens AG and Pyrum Innovations AG

Dr. Frauke Jordt, Head of Chemistry in the Process Automation Business Unit of Siemens AG

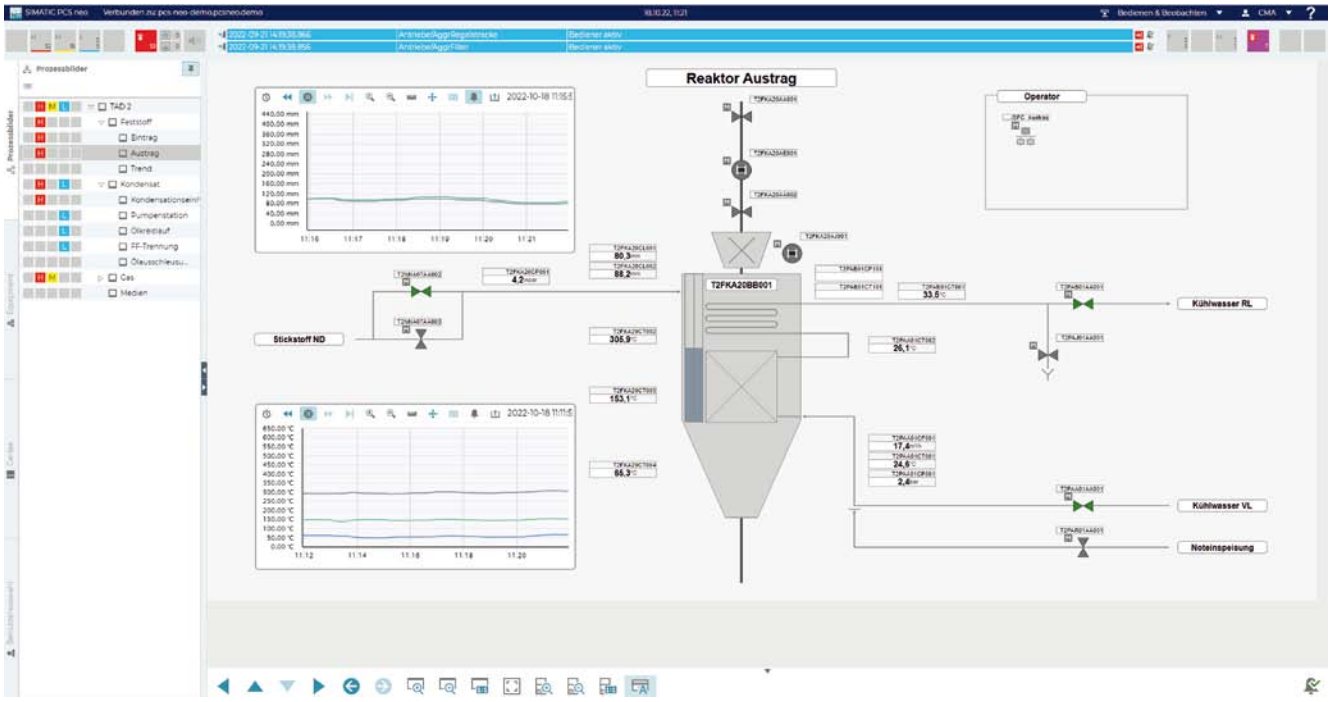
Pascal Klein, CEO of Pyrum Innovations AG

utes to climate protection.[2] The gaseous substances are converted into electricity that serves as an energy source for the process itself.

The process developed and implemented by Pyrum is structured in a modular way. It starts with shredding the tires and separating the steel wires and textile fibers from the rubber. Next, the shredded parts run through a so-called vertical thermal reactor[3], from top to bottom, in an oxygen-free atmosphere. This step includes the chemical transformation of elastomers into short-chain, vaporous hydrocarbon compounds and solids. The mode of operation and the process control parameters directly influence how much of each substance is created during this tire decomposition. The pyrolysis oil is the result of subsequent vapor condensation.

A recycling process that produces surplus energy

The remaining, non-condensed vapors consist of a mix of various gases with hydrogen and methane as the main components. This mix is cleaned and converted into



Simatic PCS neo provides access to relevant plant information and helps to securely control and operate the plant

electricity in a combined heat and power (cogeneration) unit, thus providing the energy required for the electrically heated reactor. The solid content (coke) is cooled down, ground, and brought to market as carbon black after being converted into agglomerates.

The waste heat produced during this conversion into electricity is used to supply the pyrolysis process and surrounding electrical consumers with process heat. This means that the thermolysis plant is almost energy self-sufficient; only the start-up process requires additional energy. The process even creates surplus energy, allowing the company to also supply other sections of the plant complex. This approach supports the transition toward a sustainable and efficient circular economy, as proposed and requested by the Green Deal of the European Union and the Sustainable Development Goals of the United Nations[4]. Depending on the site concept, the pyrolysis process can save up to 72% of the CO_2 produced by conventional thermal recycling.[5]

The rubber components of end-of-life tires are transformed into solid, liquid and gaseous (raw) materials in the thermolysis reactor

Modularized processes – holistic digitalization

It is a logical consequence to apply the modular principle to the automation technology that monitors and controls this process, too. Here, Pyrum Innovations relies on automation and digitalization technologies from Siemens that keep the process stable and safe. In addition, the devices installed generate huge amounts of data that can be consolidated and evaluated with suitable applications. Furthermore, this data provides the basis for optimized interventions, for example through parameter adaptation and preventive maintenance. Properly planned maintenance workflows based on actual and accurate asset data enable effective, target-oriented, and perfectly prepared actions. “Thanks to a holistic digitalization concept and state-of-the-art technologies such as the Digital Twin, we benefit in terms of process control, process development, and optimization”, stresses Meike Jungmann of Pyrum Innovations AG.

Consistent information in the right context

To extend its existing plant, Pyrum opted for the innovative Simatic PCS neo process control system. Thanks to object-centric data management, all the stakeholders involved have access to consistent and reliable information at any time in order to make the right decisions in the shortest possible time. The Simatic PCS neo provides immediate and secure access to all the information required – independent of the location and time and via all common end devices, including mobile devices. The sophisticated security concept ensures that the know-how is protected against unauthorized access.

The system consistently uses state-of-the-art web services. The client requires nothing more than just Windows 10 and an HTML5-capable browser. All the project information is stored on servers on which the licenses and security measures are centrally installed and managed, too. For this, Simatic PCS neo uses cutting-edge IT technology, including secure authentication and communication functions. Upgrades are installed on the server level, and functions such as control and monitoring, engineering, etc. are available on zero-installation clients. “Web technology also enhances the flexibility and scalability of process control technology. Additional operator stations, for example, can be added within just a few minutes”, explains Frauke Jordt, Head of Chemistry at Siemens. “End devices of various types can be used to access necessary information conveniently and securely, independent of the user’s location.”

Generating added value through industry standards

Compliance with industry standards is a fascinating topic in this context. The field bus technology and its descriptions

Abstract

Granulates from end-of-life tires are used in numerous secondary applications with lower quality characteristics, for example for synthetic turf, flooring for sports fields and playgrounds, as well as for simple molded parts. However, there are already numerous players competing in this market. Converting end-of-life tires into their basic chemical components opens up entirely new opportunities in terms of resource efficiency. Reliable information is a key prerequisite for developing and implementing such innovative processes and procedures. Target-oriented data evaluation in dedicated applications, as well as using the results as a basis for sophisticated control algorithms, enable cost-efficient and sustainable process control. The digitized plant thus unlocks new opportunities for industrial applications that drive defossilization and modernization in line with the Green Deal of the EU Commission.

for standardized communication have already been established on the field level for quite some time. Today, industry is working on descriptions of how machines can communicate with each other. Module Type Packages (MTP) play a major role when it comes to seamlessly integrating plant sections and components into higher-level systems such as Simatic PCS neo.

MTP defines the common "language" for describing the properties of process modules in a manufacturer- and technology-independent way. It thus allows the higher-level, MTP-capable process control system to perfectly control a certain module – such as a shredder or conveyor units.

pyrum.net
siemens.com/recycling

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NEW PROJECT TO DEVELOP A RECYCLING SOLUTION FOR ACRYLIC GLASS

The acrylic glass recycling company Pekutherm Kunststoffe GmbH – together with Polysecure GmbH, Pforzheim University of Applied Sciences and an acrylic glass supplier – is developing an innovative recycling solution to be able to recognize high-quality transparent plastics and recycle them according to their specification. The Deutsche Bundesstiftung Umwelt (DBU) is funding the approach with nearly 250,000 Euro. The PACE project ("PMMA in the Circular Economy") involves the development of a consistent recycling concept for used acrylic glass within two years, of which only ten percent is currently recycled throughout Germany. The starting point is foil- and sheet-shaped PMMA semi-finished products from both post-industrial and post-consumer sources. In addition to the systematic testing of detection methods and the visible marking of semi-finished products, the project is pursuing an approach using fluorescent markers. The inorganic fluorescent markers are added to acrylic glass products as identification in ppm concentrations and enable material identification in the manufacturing, use and after-use phases. Within the project's scope, among other things, a mobile detector is to be developed and tested, with which large, plate-shaped semi-finished products in particular can be reliably identified prior to shredding. For a convincing circular economy solution for acrylic glass, different cross-linked PMMA grades have to be recognized, and other clear polymers such as polycarbonate (PC), polystyrene (PS), styrene copolymers or PET have to be separated. The European semi-finished products market for acrylic glass amounted to around 230,000 tons in 2020. Acrylic glass enables long service lives in numerous applications, some with very high optical requirements. For this reason, the highest purity requirements must be met for the recyclates used in order to ensure a functioning circular economy.

pekutherm.de/en/, polysecure.eu/en/, hs-pforzheim.de/en/

A NEW RECYCLING TECHNOLOGY FOR CARBON FIBER

Asahi Kasei, a diversified Japanese multinational company, has developed a new technology for recycling carbon fiber plastic compounds with the National Institute of Technology, Kitakyushu College and Tokyo University of Science.

Carbon fiber reinforced plastics (CFRP) are highly attractive for various industries in demanding application fields due to their unique balance of rigidity, mechanical strength and lightweight – compared with conventional glass fiber reinforced plastics. However, CFRPs are expensive and challenging from a recycling perspective, as it is difficult to extract carbon fibers from the resin after usage. Together with its project partners at the National Institute of Technology at Kitakyushu College and the Tokyo University of Science, Asahi Kasei has developed a recycling method that allows carbon fibers to be extracted from CFRP or carbon fiber reinforced thermoplastics (CFRTP) used in automobiles.

According to the information, this results "in high-quality, inexpensive continuous carbon fiber that can be recycled perpetually, contributing to circular economy. Unlike carbon fiber chopped up during the recycling process, Asahi Kasei's method allows carbon fiber to be extracted from a plastic compound seamlessly, resulting in continuous strands of carbon fiber that can be reapplied in exactly the same manner while retaining properties identical to the original substance".

The conventional technologies for recycling carbon fibers by chopping and re-applying them results in a product with lower quality and less durability, insufficient for high-performance applications. To address this issue, Asahi Kasei has developed an "electrolyzed sulfuric acid solution method" that allows the carbon fiber to retain its original strength and continuous nature while fully decomposing the resin carbon fiber is embedded in. "This allows for its continued use in high-performance applications and presents an inexpensive, circular solution to the end-of-life dilemma of carbon fiber plastic compounds," the company emphasized. "Thus, these carbon fiber compounds present in vehicles for weight reduction. It can be easily and inexpensively be broken down at end-of-vehicle-life and reapplied to new vehicles in the future."

In addition, the company is developing a carbon fiber-reinforced thermoplastic unidirectional tape (CFRTP-UD tape) that utilizes both recycled continuous carbon fiber and the company's Leona polyamide resin. Boasting a higher strength than metal, this CFRTP-UD tape could be applied to automobile frames and bodies, further enabling the recycling of end-of-vehicle-life parts into different, new automobile parts. "This presents a solution to the long-term challenge that carbon fiber usage for vehicles has posed on the industry and is expected to economically benefit and strengthen carbon fiber's usage within the automobile industry on a global scale," Asahi Kasei is convinced.

"Moving forward, Asahi Kasei will perform demonstrations and develop the business, aiming for practical application around 2030."

asahi-kasei.com

PLANT MANUFACTURER EXPANDED PORTFOLIO

In January this year, Dieffenbacher – an international active manufacturer of press systems and complete production plants for the wood-based panels, forming and recycling industries – acquired the know-how and key assets of Austrian company BERTSCHenergy, through the newly formed Dieffenbacher Energy GmbH subsidiary. The acquisition would accelerate the manufacturer's ability to support its customers while helping to shape Europe's rapidly evolving energy future, a press release said. According to the German company, Dieffenbacher's increased portfolio will include fluidized bed combustion systems for solid fuels (e.g. biomass), gas and steam turbines for power and steam production, and industrial waste heat systems. In addition, the acquisition would extend its long-time use of conventional grate firing in energy systems.

Photo: BERTSCHenergy power plants

dieffenbacher.com/en

ARTIFICIAL INTELLIGENCE APPLIED TO THE PLASTICS SECTOR

The EU has just confirmed its commitment to a global agreement to end plastic pollution by 2040.

This is a historic step to end the pollution of an industry that has multiplied its waste in recent decades, and that generates 400 million tons per year. It is the most important public effort since the Paris Agreement and a fundamental step on the road to a more sustainable and circular industry.

It is essential to automate processes that were manual until now to achieve these ambitious goals. Also the application of new technologies that help us classify and separate plastic waste to prevent it from polluting the environment and to be able to recover it within a more circular economy model. Intelligence and computer vision play a crucial role in this regard.

Artificial Intelligence brings together different technologies, from machine learning to natural language processing. These technologies enable machines to perceive, understand, act and learn.

Machine Vision is a subfield of Artificial Intelligence (AI), which aims to get a machine to identify an object and classify it. Through the analysis and interpretation of the content, numerical or symbolic information is extracted. This information is processed by a computer and allows you to act correctly and effectively in a given situation or process.

Combining Artificial Intelligence with Artificial Vision, PICVISA manages to provide its systems with a decision-making and reaction capacity unprecedented in the industry. By applying a deep learning algorithm to the images recorded with the camera, the equipment allows an accurate classification of the materials that pass over a conveyor belt.

In this sense, artificial intelligence systems and robotics, such as those developed by PICVISA, are constantly advancing to improve the selection capacity of waste such as plastic packaging. With the greater technification of the MSW plants provided by PICVISA technology, two major objectives are achieved. On the one hand, it is possbile to maximize the recovery of materials present in waste streams. And on the other hand, the plants ensure optimal quality of the recovered materials that allows their subsequent transformation into secondary raw materials and, consequently, valorizes them.

PICVISA's work within this field of innovation is applied, for example, in a Spanish company dedicated to the recycling of HDPE.

An ECOPACK optical separator has been installed for this plant at the end of the HDPE classification line with the aim of carrying out a quality control on batches of different colors of HDPE previously classified.

It is the first equipment that works exclusively with artificial intelligence, without integrated NIR sensor. It incorporates the latest technology in vision and artificial intelligence, BRAIN by PICVISA, composed of RGB camera and Deep Learning, detecting improper not detectable by NIR, such as silicone cartridges or Rhinomer type containers. These are manufactured externally with HDPE, and therefore the NIR sensor would classify them as HDPE, but they contain other contaminants inside that would seriously impair the subsequent recycling process.

The unit also incorporates an inductive sensor under the feeding belt for the detection of all types of metals.

The equipment is configured to classify the material according to its nature using three outputs:

Photos: PICVISA

1. Contaminants that can be considered rejection (including silicones, Rhinomer type containers)
2. Contaminants in the processed batch but which are recoverable in another batch and which are recirculated at the head of the process (colors not corresponding to that batch)
3. Correct material that continues the recycling process.

The incorporation of this equipment in the process thus offers a double advantage, it increases the purity of the final product and contributes to increasing the overall effectiveness ratios.

The equipment is already in production 24/7 after the commissioning and training period required by this type of technologies based on continuous learning, with separation effectiveness values of up to 95 % and purities of up to 98 %.

One of the great added values of artificial intelligence to work in the classification of containers is versatility and flexibility, offering continuous improvement that keeps the equipment adapted to new packaging that may arise in the market through simple software updates.

The average recycling rate of plastic packaging in Europe in 2020 is 46 %, well above the global average of between 14 % and 18 %, or that of the United States, which is at 30 %*). According to Eurostat data, Germany and Belgium are the two countries that lead the recovery of municipal waste and the collection of packaging respectively. Germany manages to collect 66.1 % of municipal waste. To continue in this line of growth, it is essential to bet on innovation and new technologies that continue to increase the global numbers of recycled plastics until reaching the ambitious European objectives for 2040.

*) According to the Organization for Economic Cooperation and Development (OCCDE).

picvisa.com

RECYCLEYE SECURES FUNDING FROM DCVC

Recycleye, provider of an AI-driven solution for sorting dry mixed recycling, has announced a 17 million US-Dollar Series A financing round led by deep-tech venture capital firm DCVC.

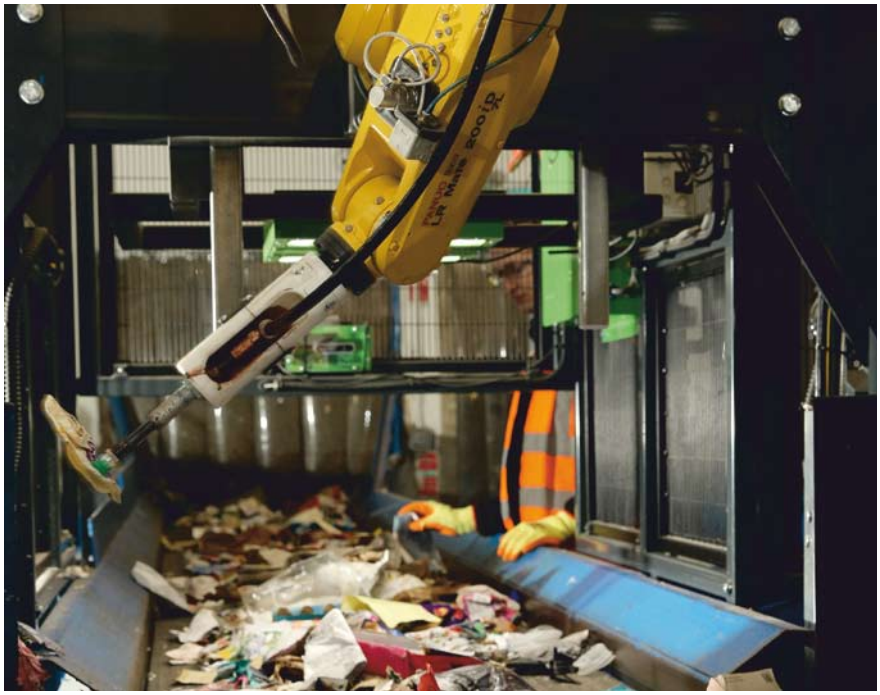
The company with head offices in UK and France uses AI-powered waste-picking robots to lower the cost of sorting materials. “This ground-breaking technology is turning the world’s waste into resource and delivering data essential for dynamic decision-making in a Material Recovery Facility (MRF),” Recycleye pointed out. “The new investment will be used to further improve the uncommon accuracy of Recycleye’s sorting.”

As reported, DCVC led the funding round, with existing investors increasing their stakes. Promus Ventures, Playfair Capital, MMC Ventures, Creator Fund and Atypical were joined by new Madrid-based investors Seaya Andromeda. The series A follows five million US-Dollar previously raised in 2021 and 2.6 million US-Dollar secured to date in European and UK government innovation funding.

The technology

Recycleye’s technology combines computer vision and robotics to pick with more consistent accuracy than a human does, the European company assured in a press release. “Using proprietary AI models, the robot ‘sees’ waste and is trained to pick an unlimited number of material classes such as plastics, aluminum, paper and cardboard.” Recycleye Robotics was “the most accurate and efficient AI robotic picking solution globally available today,” the company self-assuredly emphasized its competence. “Objects are scanned and identified at an unrivaled 60 frames per second. That is twice as fast as the industry standard and means that each item is seen on average 30 times as it passes along the conveyor belt, with double the chance of being accurately identified before picking.” As underlined, Recycleye was developed for use with the waste generated by households

Photo: Recycleye



and businesses and can operate 24/7, 365 days a year, currently picking up to 33,000 items per robot over a 10-hour shift while capturing compositional data to enable strategic decisions by plant managers. The enterprise is working with a growing number of waste management companies facing the two-fold challenge of labor shortages and increased costs while responding to a growing demand for quality recyclates.

Installation into existing plants

According to the provider, a small team of its engineers can retrofit the company's technology into existing sorting facilities and, over a weekend, if needed, minimize plant downtime. "Installed at the end of the sorting process, Recycleye robot models can pick contaminants and valuable objects, depending on client requirements, both of which may have been missed earlier in a plant's sorting process."

About the company

Recycleye was co-founded in 2019 by CEO Victor Dewulf and CTO Peter Hedley, and its technology is installed in facilities in England, Ireland, Scotland, Germany, Australia, the US and France, with multiple robot orders confirmed in Italy and Belgium.

Recycleye's technology combines computer vision and robotics to pick with more consistent accuracy than a human does.

The firm's team consists of 33 experts and includes graduates of Cambridge, Caltech, Imperial College London and the Universities of Bath, Warwick, Cardiff, Sheffield and Southampton. "The team boasts a wealth of experience in software, machine learning, robotics, engineering, project management, technical sales, HR, and marketing, drawn from sectors including oil and gas, energy, telecoms and technology."

- recycleye.com
- dcvc.com

Recycling to Create New Value:

THE POTENTIAL OF ALUMINUM AND THE INNOVATIVE SOLUTIONS FOR ITS PROCESSING

The increasing consumption of resources and the rapid technological change are contributing to a rising need for investment in advanced and material-specific recycling systems. One of the most valuable materials that can be recycled is aluminum. Indeed, thanks to its characteristics, aluminum is considered a circular material, capable of being recycled multiple times without losing its original properties. Furthermore, its recycling process only requires five percent of the energy needed to produce it primarily, making the process very convenient and attractive.

FOR REC's commitment to a more efficient aluminum recycling process

FOR REC takes great care of regulations against environmental pollution, designing customized and high-performance machines for the recycling of aluminum and other materials. These solutions allow the treatment of metal to obtain new resources usable for future processes. In addition, the plants are specifically developed to reduce the volume of aluminum and select the most appropriate materials for reuse. The line developed by FOR REC's internal department has been designed to make the product ready for the furnace, and it is composed of two essential parts:

- Hammer mills: extremely powerful and fast processing, which allow the grinding of heterogeneous materials;
- Single shaft shredder: built with high quality steel, ideal for the treatment of metals.

Hammers mills for aluminum processing

FOR REC hammer mills are realized with a sturdy structure, which make them very trustworthy, and are designed to ease the access to the parts subject to wear and tear, making the maintenance faster.

Main advantages:

- Hydraulic opening system for the upper cover
- Hydraulic lifting of the rotor by means of the upper cover lifting
- Hydraulic opening for the discharge of foreign bodies
- Screen fixed by the upper cover
- Customizable hammers
- Adjustable cutting plates
- Cutting chamber with changeable armours made of anti-wear material
- Special anti-vibrators to reduce stresses on the machine support frame
- Inverter for rotors revolutions control

Single shaft shredder for aluminum processing

Thanks to its enhanced structure and low running rotor, FOR REC single shaft shredder combines the traditional cutting system with a technology based on interchangeable plates equipped with special shock absorber bearing that protects from possible breakdowns. Everything has been designed to ensure maximum reliability, fast maintenance, and considerable production increase.

Main advantages:

- Special steel blade-holder shaft with surface heat hardening to reduce wear
- Belt transmission with chain gearbox in oil bath
- Interchangeable wear-proof selection screen for a fast maintenance
- Spiral lateral seals for a safer working process
- Configurable blades for thickness and number of teeth

The systems designed and manufactured by FOR REC have multiple and customizable solutions according to the kind of material to treat (cast aluminum, UBC bales and aluminum profiles, both loose or baled). Many different installations have already been installed in Italy and all over the world. Turkey represents our top market, with around ten operative systems (single machines or complete lines).

■ Are you interested in learning more about FOR REC aluminum recycling plants? Visit the company's website 🌐 forrec.eu.

Photo: FOR REC

BUNTING BUILDS MONSTER STAINLESS STEEL SEPARATOR

The latest Stainless Steel Separation Conveyor (SSSC) leaving Bunting's manufacturing facility in Kansas, USA is the largest built so far. The model SSSC 12-24-462 may only be 0.61-metres wide, but sits at the end of an 11.6-metre long conveyor. The high-intensity magnetic separator is destined for installation in an automotive recycling plant in North Carolina.

The 11.6-metre long SSSC 12-24-462 Stainless Steel Separation Conveyor

Bunting is one of the world's leading designers and manufacturers of magnetic separators, eddy current separators, metal detectors and electrostatic separators. Bunting has separator manufacturing facilities in Kansas, USA and Redditch, just outside Birmingham, United Kingdom.

Customer Focused Design

The Stainless Steel Separation Conveyor (SSSC) features a patented ultra-strong Neodymium magnetic head roll positioned at the end of a conveyor. The intense magnetic strength enables the recovery of weakly magnetic mid-sized fragmented stainless-steel from automotive shredder residue (ASR). After initial application discussions, the recycler reviewed the installation and concluded that they required a single, longer SSSC rather than the standard 3.7-metre long unit. This would then negate the requirement for an additional inline feed conveyor.

The 11.6-metre long SSSC was far longer than any previously built unit, which posed a number of challenges for Bunting's design engineering team. During the design process, the team considered the belt support system, the drive mechanics, and the heavy-duty framework and housing requirement for such an arduous application. Using knowledge of supplying Shredder Feeder Conveyors to the plastics and waste industries, the team modified the standard SSSC design and extended the belt length to 11.6-metres. Once in production, the SSSC 12-24-462 will handle between 1-1.6 tonnes per hour of mixed automotive shredder residue. The automotive recycler also ordered a patented High Intensity Separation Conveyor (HISC), with a standard 300mm long conveyor. The model HISC 6-24-48 recovers fragmented stainless-steel from smaller sized scrap.

The SSSC 12-24-462 stainless Steel Separation Conveyor in final assembly

"Extending the SSSC belt from 3.7 to 11.6-metres was not straight forward," explained Wendell Love, Bunting's Product Manager for Material Handling Equipment for Recycling. "Our engineering team worked closely with the customer to ensure that the final design perfectly matched their installation requirements. The result is a monster-sized SSSC and another exciting metal recycling project for Bunting."

bunting-redditch.com

Photos: Bunting Magnetics Europe Ltd.

Hammel Recyclingtechnik:

END-OF-LIFE VEHICLE RECYCLING – "FROM TRASH TO GOLD"

What happens to old cars at the end of their useful life?

A car consists of valuable raw materials, 75% metal (steel, copper, light metals, precious metals), besides glass, tires and other plastics. With an unladen weight of one ton, a vehicle consists of approximately 600 kg of steel, 10 kg of cast iron and 90 kg of aluminum. Therefore, at the end of their useful life, vehicles have value as a source of spare parts and for recycling the residual material. In the US alone, approximately 12-15 million vehicles reach the end of their useful life each year, which has spawned a strong dismantling industry.

VB 950 DK

The car recycling process is quite complex and usually done in two stages. First, all operating fluids, fuel, radiator fluid, engine, transmission and other oils, air conditioning refrigerants, etc. are drained and collected in a dismantling plant. Battery, airbags and catalytic converters are also removed and recycled as spare parts. During the second stage, the residual car body is processed, and a shredder scrap containing iron and steel and a shredder fraction containing non-ferrous metals are obtained.

Hammel Recyclingtechnik GmbH has developed a complete mobile metal processing plant for shredding and sorting these materials. A slow-running two-shaft shredder is used at the beginning of the shredding process. The Hammel primary crusher type VB 950 DK – RED GIANT – in a new modern design, is equipped with a powerful CAT C18 stage 5 motor with approximately 563 kW. The input material, such as car bodies or light mixed scrap and white goods, is optimally carried out by the two special counter-rotating shafts.

After shredding, the input material is transported to a mobile metal screen MMS 150 DK. The integrated vibrating finger screen separates the material < 150 mm and > 150 mm. The oversized material is returned to the primary crusher via a return belt to be crushed again. The screened material < 150 mm passes via a vibrating chute onto a magnetic drum, permanently separating ferrous and non-ferrous material. Both materials are discharged via conveyor belts.

Mobile metal screen MMS 150 DK

For further processing, ferrous parts are fed onto a mobile sorting belt. Manual sorting removes inclusions that may contain waste, cable and

Photos: Hammel Recyclingtechnik GmbH

stainless steel. An almost unmixed, marketable FE material is produced as the end product.

The non-ferrous parts are sorted into aluminum and shredder light fractions with an eddy current separator. The separator type MWA 1000 E is semi-mobile and installed on a hook lift and has a vibrating chute for optimal feeding of the material onto the fast-rotating permanent magnet system. A time-variable magnetic field induces eddy currents in electrically conductive particles such as aluminum and copper and separates them via conveyor belts. Further integrated sorting tables enable the production of a sorted aluminum fraction in which the manual inclusions are sorted out. The shredder light fraction produced, a mixture of materials such as plastic, rubber, glass and residual metals, is used for energy recovery in waste incineration plants or in landfill construction or mining backfill.

Complete processing plant

All components of the metal plant are interconnected, and the electrical machines can be operated by an integrated generator installed in the MMS 150 DK screen. The “mobile” plant can be set up at any other location rapidly, which is an advantage.

The main objective of processing end-of-life vehicles with the Hammel plant is to separate different material streams simply and cost-effectively. In total, almost 99 % of the metals contained in end-of-life vehicles can be recycled. If you want to see the Hammel plant live, please visit the next demo day at Hammel in Bad Salzungen or contact the company at: info@hammel.de.

hammel.de

Finland:

KUUSAKOSKI TO EXPAND THE PROCESSING CAPACITY FOR NON-FERROUS METALS

Finnish recycling company Kuusakoski will invest 25 million Euro in a major new production line that is being built at the company’s recycling plant in Heinola. The aim is to increase the recycling efficiency and the processing capacity for non-ferrous metals, including aluminum. As underlined by the company, the demand for recycled raw materials is growing. “During this decade, for example, the production of recycled aluminum will, for the first time, exceed that of primary aluminum.” In 2022, Kuusakoski had supplied its customers with the equivalent of all the aluminum needed for 2,000 new passenger aircraft.

“Nordic companies are investing heavily in the green transition, and today all discussions with our customers relate in one way or another to opportunities to build a more sustainable value chain using recycled raw materials”, Mikko Kuusilehto, President and CEO, was cited. “When this project is completed, our total non-ferrous metal processing capacity will increase by 50 percent. The investment will enable us to provide larger volumes of high purity recycled raw materials to the manufacturing industry.” As reported, the overall investment in non-ferrous metals processing is scheduled for completion in 2025.

kuusakoski.com/en/global/

ERIEZ' SHRED1 ACHIEVES ULTRA-HIGH PURITY STEEL FROM SCRAP

At present, vehicles are tightly regulated to limit environmental impact when they are scrapped. This is done through various measures to encourage the recovery, reuse and recycling of metals, plastics and rubber to reduce the amount of waste created. However, beyond the considerations of environmental impact lies huge value for recyclers with the right tools to extract profit.

Photo: Eriez

Since introducing the revolutionary Shred1 Ballistic Separator in 2011, Eriez has successfully installed units in various shredding yards, steel mills and slag processing facilities throughout Europe and North America. Other than a few minor modifications made to the design of the unit since its release to further improve maintenance accessibility, the Shred1 has proven itself to be the reliable and effective choice for scrap processors. Those who are looking to differentiate themselves with a premium ferrous shred whilst demanding a higher value per unit weight have found the Shred1 to be an invaluable part of their process line.

The Shred1 separator produces a premium low-copper shred using ballistics to effectively separate iron-rich ferrous from much of the mixed metals and waste material in the post-magnetic drum flow phase of scrap processing lines. The powerful separator delivers three distinct fractions, the first being a high-value, low-copper-content ferrous product. This valuable shred represents more than 70 % of the flow and contains less than 0.2 % of copper. The second fraction represents less than 20 % of the flow and contains mostly mixed metals, copper and aluminium with steel housings or cores. Hand sorting of this fraction can be achieved with relatively few pickers. The final low-volume fraction representing less than 7 % of the flow consists of heavy steel objects and light materials such as fluff, rubber and some wire. This fraction can also be easily picked or sorted.

When the Shred1 Ballistic Separator is combined with an Eriez P-Rex Permanent Rare Earth Magnetic Drum, the entire process is improved further. This system, referred to as the CleanStream Process, recovers more ferrous metals and concentrates 75 % of the post-drum magnet flow into a low-copper premium shred. It also eliminates the need for a scavenger magnet, a Z-box air system and hand-picking the entire flow, ultimately increasing revenue, and reducing overhead for scrap processors worldwide.

However, it is not all about scrap metal, when it comes to the tires, a magnetic drum is used to extract ferrous pieces and metal detectors to identify any stray metal, enabling every part of a vehicle to be repurposed. These intelligent recycling systems ensure that 'recycled' does not equate to a loss in quality or quantity for processers and their end customers.

eriez.com

PLASTICS RECYCLING WORLD EXPO

June 14 – 15, 2023, Essen (Germany)

Plastics Recycling World Expo, organized by AMI (Applied Market Information), brings together professionals from the plastics recycling industry for two days of networking, knowledge sharing, and innovation. The event also offers a two-day program of technical presentations, seminars, industry debates and exclusive networking events.

eu.plasticsrecyclingworldexpo.com

LARGE-SCALE TIRE RECYCLING DEMO

At the German trade fair RecyclingAKTIV & TiefbauLIVE 2023 (RATL 2023, 27th – 29th April, Karlsruhe), the manufacturer of double-shaft shredders ARJES and its sales partner HWH Machines will be showing off the process of pre-shredding truck and tractor tires – one of the first and most crucial steps in the recycling loop.

Photo: ARJES

ARJES and HWH Machines will be showing what the recycling of large tires looks like in practice

During the live demo, HWH Machines will present the material handler Fuchs MHL320, which is used to load scrap tires into the twin-shaft shredder. “Its double-edged cylinder bearings on the loading equipment, high-performance cooling system with distributed coolers, and double-row ball bearing slewing ring ensure a long service life.”

Then the stationary twin-shaft shredder ARJES TITAN 900 d-pu will provide for the physical size reduction of the truck and tractor tires. “A high-volume hopper ensures optimum feeding, sending tires past the two shredding shafts as they spin asynchronously and in opposite directions,” the process is described. “The durable tire material, made of tough rubber and wire mesh, demands a lot from the machine – but, as you’ll see on the RATL demo site, the TITAN 900 d-pu is powered by a 405kW diesel engine, making it more than up to the task. Alternatively, the stationary shredder can also run on two strong 160kW electric motors, in which case installation will be designated ‘e-pu’ instead. Both the electric and diesel versions will be shown in the exhibition area of RecyclingAKTIV at booth F254 of ARJES and HWH Machines.”

In addition, two other ARJES sales partners at the trade fair – Kurz Aufbereitungsanlagen and Moerschen Mobile Aufbereitung –will present some new ARJES products in their booth and demo – the IMPAKTOR 250 evo II and EKOMAXX 800.

arjes.de/en/

USA:

RUMPKE TO BUILD NEW RECYCLING FACILITY IN OHIO

In February, the American company Rumpke Waste & Recycling broke ground on its recycling campus and shared updates for the new facility in Columbus (Ohio). Andrew Rumpke, Columbus Area President of the company, announced that its initial 50 million US-Dollar private investment to build the new recycling campus has increased to more than 90 million US-Dollar. “We have strategically designed our new facility to serve the long-term recycling needs of Columbus and the region’s residents and local governments, as well as the growing recycling demands of the commercial and industrial business growth in central Ohio,” he said in a report of the company.

According to Rumpke Waste & Recycling, the new 223,000-square-foot facility, expected to be operational in 2024, would be the largest of its kind in North America. It is planned that it will have the capability to process 250,000 tons of material from 40 Ohio counties per year, 100,000 tons more than Rumpke’s current plant. The new facility “will contain the newest technology to keep all materials inside one building, including state-of-the-art optical scanners, equipment enhanced with artificial intelligence, and a sampling station, offering a quick (within a couple of hours) glimpse of material composition to help identify recycling opportunities and challenges for communities and businesses.”

rumpke.com

INNOVATION UPDATE FOR RECYCLING APPLICATIONS

Doosan Infracore Europe, a global industry leader in engineering and manufacturing compact and heavy construction equipment, has launched a new Waste and Recycling Kit for the company's DL-7 range of wheel loaders.

As reported, it is the first kit of its type for Doosan wheel loaders and is designed to help operators work safely in the hazardous conditions that often accompany waste handling and recycling applications, including contending with airborne dust, dirt and other dangerous particulates and materials.

Numerous features

Available for all Doosan wheel loader models from the DL200-7 through to the DL480-7 the kit's main features include:

- Windshield guards
- Rim covers
- Road light protection (Front + Rear)
- Arm cylinder cover
- Articulation guard
- Front frame cover
- Belly protection (Front + Centre + Rear)
- Air intake mesh
- Wider fin air conditioner condenser
- Solid tires

Photo: Doosan

Several of these features will be available as options, so customers can choose a kit to tailor their wheel loaders for their specific applications. Doosan is also preparing an aftermarket version for those customers who decide to install it at a later date.

Doosan's mission is to empower customers to do their jobs more efficiently and effectively. Therefore, apart from choosing from a number of extra features, the operators will also be able to work more safely and confidently on job sites. In addition, Doosan is providing a wider fin air conditioner condenser as standard to facilitate easy cleaning and maintenance.

Moreover, all of the new DL-7-wheel loaders are equipped as standard with a 3rd spool valve with settable flow and detent function, providing a constant flow for hydraulically driven attachments. That guarantees maximum performance and versatility.

Increased productivity

Like all DL-7-wheel loaders, the DL200-7 to DL480-7 models feature redesigned buckets offering up to 7% more capacity for easier and faster loading with standard bucket capacities from 2.0 to 4.8 m^3. That provides increased productivity for a wide range of material-handling applications.

Apart from the waste and recycling industry, these include the transport and delivery of soil, sand, aggregates, and other materials and applications in construction, demolition, mining and quarrying. Doosan is also offering a wider choice of options to provide more work tools for a better match with applications, further increasing output. According to the company, the upgraded hydraulic system and major parts ensure improved durability and maintainability. The high reliability and quality of the new DL-7-wheel loaders are backed up by a standard full 3-year/5000-hour warranty. The new kit created great interest among visitors to the Doosan stand at Bauma, where it was shown for the first time, installed and displayed on a new generation DL280-7 wheel loader.

na.doosanequipment.com/en

CHINESE COMPANY TREATS KITCHEN WASTE WITH NEW SHREDDERS

Austrian manufacturer Andritz has delivered two shredders for kitchen waste treatment to Grandblue Bioenvironment Co., Ltd., which is operating at its mills in Jinjiang City, Fujian Province, and Xiaogan City, Hubei Province, China. The two new ADuro QZ1600-BIO shredders process kitchen waste at a design capacity of 15 tons per hour each and pulp the organic fraction effectively by means of rotating chains, Andritz informed. "Non-organic material like plastics remains largely intact enabling optimum separation in subsequent process steps. The machines do not use any cutting tools, but gently and quickly break up the input material per impact forces. Compared to conventional cutting systems, the ADuro QZ offers significant advantages in terms of performance and wear." Grandblue Bioenvironment collaborates with the Austrian provider since 2016. The company, a wholly owned subsidiary of Grandblue Environment Co., Ltd., will soon start up two more ADuro QZ1600-BIO shredders and equipment for compacting delivered by Andritz for additional kitchen waste treatment plants in Hebei and Hubei provinces, China.

andritz.com

RECYCLINGAKTIV & TIEFBAULIVE

April 27 – 29, 2023, Karlsruhe (Germany)

The recycling and civil engineering industry will meet at the Karlsruhe Trade Fair Center, which, with Germany's third-largest outdoor exhibition area, will provide the thematically unique trade fair duo with the ideal setting for unique live demonstrations.

The organizers expect that on just one day, with the least expenditure of time, construction, demolition and landscaping contractors, waste management companies, and all related industry players will find a condensed information presentation of the product portfolio for recycling technology, construction machinery and construction equipment.

ratl-messe.com/en/

SAMOTER LAUNCHES SAMOTER LAB AT VERONAFIERE

May 3 – 7, 2023, Verona (Italy)

SaMoTer offers a venue of discussion and dialogue with a massive emphasis on innovation at Veronafiere, the international construction equipment trade fair. "Digitisation and de-carbonization are the keywords characterizing the new format", said Sara Quotti Tubi, Agritech Area Manager. There is consequently room for sensors, all remote sensing devices and diagnostic tools, as well as for IoT, machine-to-machine platforms and low-emission machinery. According to SaMoTer, this project came into being through continuous dialogue with the sector, which expressed the need for a venue specifically for technological exposure combined with opportunities for updating, training and comparison involving companies that generate innovation, end users, institutions and the research world.

samoter.it/en

PLASTPOL

May 23 – 26, 2023, Targi Kielce (Poland)

One of Europe's most important events crafted around plastics processing and converting returns to Targi Kielce on its traditional date in May.

The 27th International Fair of Plastics and Rubber Processing PLASTPOL attracts the latest technological advancements and exciting market offers. The expo also gathers representatives of all business sector groups – distributors, material producers, machines manufacturers, and, first and foremost, the industry clients. "PLASTPOL", as the organizers underlined, "is much more than machines and purchase offers. The expo abounds with meetings, seminars and training courses".

targikielce.pl/en/plastpol

PLASTICS RECYCLING SHOW EUROPE 2023

May 10 – 11, 2023, Amsterdam (The Netherlands)

The Plastics Recycling Show Europe, according to its organizers, is the dedicated exhibition and conference for plastics recycling in mainland Europe. The show will display exhibitors from different areas: recycled materials, recycling machinery and services. The free conference with key industry figures will address the latest opportunities and challenges that face the plastic recycling industry in Europe.

The event covers the supply chain from design for raw materials, design for recycling collection, sorting and recycling of industrial, commercial, agricultural, post-consumer and ocean plastic to the recycled polymer being designed and incorporated into new products and applications.

prseventeurope.com/prse2023/en/page/home

SARDINIA 2023

October 9 – 13, 2023, Cagliari (Italy)

The 19th International Symposium on Waste Management and Sustainable Landfilling is organized by IWWG – International Waste Working Group, with the scientific support of the Universities of Padova (Italy), BOKU Vienna (Austria), Tongji (China) and the Technical Universities of Luleå (Sweden) and Hamburg (Germany). Founded in 1987, the conference usually gathers more than 700 participants from around the world, with more than 400 papers presented in each edition, making the Sardinia Symposium one of the most important solid waste management conferences internationally. The organizers promise that the program will include leading keynote presentations, parallel oral sessions, workshops, active labs and other practical activities, discussion forums, poster presentations, commercial exhibition, B2B meetings, outstanding networking opportunities and exciting social events.

sardiniasymposium.it

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Provisional Sequence of Meetings*

MONDAY, 22 MAY 2023

09.30 **Opening Session** *followed by*
10.00 **"The Challenge"**
12.00 **Paper Division**
13.00 *Networking Lunch*
14.00 **Non-Ferrous Metals Division**
16.00 **Stainless Steel & Special Alloys Committee**

TUESDAY, 23 MAY 2023

09.30 **E-Scrap Committee**
11.00 **Ferrous Division**
12.00 **Shredder Committee**
13.00 *Networking Lunch*
14.30 **General Assembly**
16.00 **International Environment Council**

WEDNESDAY, 24 MAY 2023

10.00 **Textiles Division** (parallel session)
10.45 **Tyres & Rubber Committee**
12.00 **Plastics Committee**
13.00 *Networking Lunch*

**Subject to change*

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