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GLOBAL RECYCLING

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Recycling: Raw Materials for the Industry – Even in Difficult Times

Brigitte Weber
Editor-in-Chief

Nobody can predict the future. Although, many experts worldwide are trying to analyze the past and the present to formulate their predictions. Nevertheless, from time to time, unexpected events unfold. And nobody could have foreseen their impact on the world before. The most recent example is the Ukraine conflict started by Russia in February this year.

Tom Bird, President of BIR (Bureau of International Recycling), underlined one day after the aggression that his thoughts were with the innocent civilians on both sides of this war – and the BIR members, industry media, and business partners in Ukraine. "It is way too early to understand and measure the magnitude of the present situation, the long-term consequences in Ukraine, and the subsequent impact at global level," he wrote. "We already see that stock markets are under pressure, and this will no doubt reflect on the global economy." After two years of the pandemic from which the recycling industry suffered – and prevailed – BIR would do everything possible to provide its members with the appropriate support during these difficult times.

According to Ranjit Baxi, Founder of the Global Recycling Foundation, the threat to oil and gas supplies from Russia due to the war in the Ukraine means to rethink sustainable energy and net-zero emissions. "Power supplies must be maintained, but that puts greater pressure on the search for sustainable alternatives. It is now essential that we put greater effort into using waste to energy and recycling to mitigate what will inevitably be a spike in emissions if we want to prevent further climate change," he emphasized referring to the readily available resource waste. The Global Recycling Day, organized by the foundation, falls on March 18 each year and aims to promote the vitality of recycling across the globe.

Recycling has many positive impacts. We will look at some of them in this issue: UK-based recycling and trading Romco Group Co Ltd. with its facilities in Africa was able to show that smart investments can lead to success (page 3). Concerning oil, UAE-based Dulsco Group launched a new re-refinery plant, which transforms waste oil into a renewable resource (page 24). There are also a few solutions for recycling used beverage containers regarding PolyAl (page 34 onwards and page 14). The company Haver & Boecker Niagara informs about a customized processing plant for recycling furnace bricks and slag (page 41). And TOMRA Recycling has further strengthened its waste wood sorting solutions with a deep learning-based technology (page 48).

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

Yours
Brigitte Weber (weber@msvgmbh.eu)

Cover Photo: TOMRA Sorting GmbH

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SMART INVESTMENTS LEAD TO SUCCESS

2021 was a strong year for UK-based recycling and trading Romco Group Co Ltd.

In the third quarter alone, the group – consisting of Romco Recycling Company Ltd. in Nigeria, Romco Metals Ltd. in Ghana, and Romco Trading LLC in Dubai – achieved a record-breaking revenue of 9.1 million US-Dollar. Its facilities in Africa recycled 5,257 metric tons non-ferrous metals for the first time, 220 percent more than in the third quarter of 2020.

Since Raymond Onovwigun founded the company in 2015, its revenue has risen consistently. Last year, Romco's income in the first quarter was 5.8 million US-Dollar and in the second three-month period 7.0 million US-Dollar. The increased income in the third quarter of 2021 underlines that this success did not happen by chance. Over time, Romco expanded from Nigeria to Ghana and recycled more than 22,700 tons of metal, saving carbon emissions. In 2020, the firm started recycling copper, and is now exploring zinc and lead additions to the product line. Today, the group – which employs more than 300 people in the United Kingdom of Great Britain (UK), Nigeria, Ghana, the United Arab Emirates (UAE), and Burkina Faso – is shipping recycled non-ferrous metals to over seventeen countries.

GLOBAL RECYCLING asked Raymond Onovwigun, Chief Executive Officer of Romco Group Co Ltd, how he assesses the African recycling market and the future business opportunities.

Mr. Onovwigun, your company has expanded rapidly. How did you achieve this?

Our company has always been marked by ambitious growth. There is a massive need to increase recycling in the areas we work in. That need is complimented with a growth

Photos: Romco

opportunity, accentuated by limited recycling infrastructure, growing GDP and population, an increasing middle/consumer class, and a growing industrial base throughout the ECOWAS (Economic Community of West African States). We are uniquely positioned to take advantage of these conditions with local knowledge and a model designed to increase recycling capacity where it currently does not exist.

Why did you decide to focus on the African recycling market?

The emerging markets of Africa are where the need and opportunities are and where we know we can make the most initial positive impact. It is estimated that only 13 percent of recyclable goods are diverted from landfills in Nigeria, and that is likely similar throughout the region. When you understand that only one percent of global recycled non-ferrous metals are produced on the continent, with a population of 1.2 billion people and growing, you can see that we are only just scratching the surface with what we can achieve in Africa. But that is not where we limit ourselves. We see Romco as a solution in all emerging markets across the globe, increasing recycling capacity in all places of need.

It seems that the African recycling market holds a wide range of business opportunities. Which areas do you consider to be particularly promising?

Africa has a certain energy to the place. You only know it if you have been there on the ground. There is an appetite for work and progress, an entrepreneurial spirit, if you will, that we have seen in the communities we are immersing ourselves in and building in. There is an infectious hunger and desire to build something truly sustainable and circular. We have seen over 1,000 indirect jobs created beyond our sites, in the communities, because of the external opportunities and building a larger recycling industry. That is the most promising aspect of growing the recycling market. The knock-on effect it has on people, the environment, and the overall wellbeing of everyone we work with.

Romco Metals is mainly involved in the recycling of non-ferrous metals. Are there any plans to expand the recycling activities to other areas? Which would these be?

We are currently focused on the immediate need in front of us. Working on expanding our range of non-ferrous metals and increasing our production efficiency on those lines is our number one priority for now. That said, another need we see in the communities is plastics. That has always been something we have kept an eye on. We know diverting more plastics from landfills and replacing the primary production of plastics with secondary would have a massive positive impact on the ground. It is about doing it right. That takes careful consideration of the model that would work on the ground.

According to Romco's homepage, "Our investment strategy is best interpreted through our tagline: 'Invest. Reduce. Grow.'" What does that exactly mean?

Invest, Reduce & Grow is what we do. We invest in communities, the environment, and the responsible management of our resources. We reduce carbon emissions, waste, power usage, landfill, and the need to mine virgin resources for the materials we are using. Finally, we are boldly growing recycling capacity worldwide by developing a sustainable business in the renewables sector that is scalable and profitable.

Do external investors also have the possibility to invest in Romco?

Recycling is a very capital-intensive operation. We are always looking for investments, but it must be with the right

partners that understand our mission and unique scalable model. So far, we have a strong community of investors that have got us where we are today. The next steps will be even more exciting as we work with a greater investment pool that understands the challenge and rewards of building the recycling sector in emerging markets.

As part of its corporate responsibility, Romco invests in its employees. Which programs are available?

Something unmovable in our ethos is how we treat staff. We provide private healthcare where adequate public healthcare does not exist, pay above-average wages, fully fund technical training to see our employees grow into their full potential, and have an equitable gender agenda. We see this as a cornerstone to how we operate and are constantly looking for ways to improve our employee programs.

Romco intends to expand into new countries, with facilities and operations earmarked for expansion throughout West Africa. Which countries are being considered?

We are looking into East Africa at the moment, opening ourselves up from a port closer to Asia. That would improve the efficiency of our overall operation. We also have long-term designs on South East Asia and South America when the time is right.

To which countries does Romco deliver the secondary metals it produces?

We ship globally, anywhere you can imagine. At the moment, there is a strong demand in China and Japan, so we see quite a bit going to OEM's there. But we have shipped to all over Europe, the Middle East, and beyond. We prove that

recycled materials from Africa can be some of the highest quality and be the most reliable in the world.

Can you tell us about your plans for the future of the Romco Group?

We have a plan for seven plants within the next five years. We are also expanding our range of products, recycling more of the required resources for the green transition globally. We respond to needs and opportunities, ensuring our plans create a positive impact in line with our capabilities. Romco has a good footing in the communities we work in to expand in capacity and range, so we plan to leverage our current resources as effectively as possible to increase our offering as a company that invests, reduces, and grows.

Mr. Onovwigun, thank you for the interview.

www.romcometals.com

ISRI LAUNCHES NEW MEMBER CATEGORY: THE BRANDS LEADERSHIP COUNCIL

According to the USA-based Institute of Scrap Recycling Industries (ISRI), this recently formed council provides a win-win connection between recyclers and global brand companies. The Brands Leadership Council was established in February this year. It aims at providing "a forum for leading consumer brands to connect with recyclers in a collaborative forum aimed to address challenges in the recycling supply chain," ISRI emphasized. The inaugural members are Starbucks, Keurig Dr Pepper, McDonald's, Unilever, and Colgate-Palmolive. "Bringing together brands and recyclers will help ensure products are designed with recyclability in mind, as well as provide a platform for collaboration on corporate sustainability goals, public outreach, global markets, and beyond," ISRI President Robin Wiener commented. The organization – that represents 1,300 companies in the USA – were excited "to welcome brands into our membership and we look forward to their contributions".

www.isri.org

USA: PEPSICO BEVERAGES INVESTS IN CLOSED LOOP LOCAL RECYCLING FUND

In January this year, PepsiCo Beverages North America announced a 35 million US-Dollar investment with Closed Loop Partners that will create the "Closed Loop Local Recycling Fund".

According to the New York-based investment firm Closed Loop Partners, the new fund, which is dedicated to recycling, is a circular economy initiative to advance new small-scale, modular recycling systems in communities across the USA. "The fund aims to increase recycling in areas with no or limited access to recycling, reducing waste and unlocking a new supply of recycled plastic (rPET), among other valuable materials, to support PepsiCo's pep+ (PepsiCo Positive) sustainable packaging goals."

The investment company would use the investment to deploy small-scale modular materials recovery facilities (MRFs) in underserved communities. "This gap in access is typically due to a lack of funding or geographic proximity to facilities that process the materials," Closed Loop Partners described the situation. "The smaller, local MRFs lay the groundwork for the future of recycling, introducing a new way to meet and adapt to the various needs of communities across the U.S.

These modular recycling systems are smaller and less capital intensive than traditional large-scale recycling facilities, reducing the need for the costly transportation of recycled materials to larger MRFs outside of the area." The small-scale MRFs would help recapture recyclables like paper, plastic, glass, and metals, reducing waste sent to landfill and unlocking a new supply of recycled materials. "Each individual system creates the capacity to recycle at least 8,000 tons per year of materials, including keeping 400 tons of rPET in circulation every year." The plants were also expected to yield higher quality plastic while also reducing the costs and greenhouse gas emissions associated with the longer distance transportation of the materials.

As underlined, PepsiCo's investment would reinforce the company's desire to create a world "where packaging never becomes waste and to increase recycling rates in the United States". It would aim to support PepsiCo's goal to cut virgin plastic from non-renewable sources across its food and beverage portfolios by 50 percent by 2030.

As the Closed Loop Local Recycling Fund begins investing in community recycling, municipalities across the U.S. – as well as local haulers – can reach out to Closed Loop Partners if they are interested in exploring a small-scale, modular MRF in their community.

www.closedlooppartners.com/closed-loop-local-recycling-fund/

SAUDI ARABIA: SIRC INVITES FIRMS TO PARTNER IN WASTE MANAGEMENT AND RECYCLING PROJECTS

The Saudi Investment Recycling Company (SIRC) is a wholly-owned subsidiary of the Public Investment Fund in Saudi Arabia. It calls on all local, regional, and international companies specialized in the waste management and recycling sector to register their interest in a potential partnership for developing an integrated waste management and recycling ecosystem for the city of Riyadh.

Through these partnerships with qualified companies and consortia, SIRC aims to contribute to diverting 94 percent of Municipal Solid Waste (MSW) from landfills by 2035, in line with the national targets of the Saudi Green Initiative. Additionally, SIRC emphasizes that the integrated waste management and recycling solution for Riyadh must follow international best practices in the field of waste treatment and recycling while catering to the local landscape and requirements. The solution will include sorting and recycling stations, waste to energy and alternative fuel (RDF) production plants, and composting facilities. The proposed solution will enable the entire MSW value chain, starting from sorting at the source, collection, transportation, treatment, and finally recycling. SIRC, along with the private sector, will develop the solution in accordance with the rules and regulations of the National Center for Waste Management "MWAN". SIRC invites companies seeking to invest and participate in this endeavor to submit their interest through the SIRC website using the provided link:

www.sirc.sa/company-registration-form

GOOD OUTLOOK FOR THE GLOBAL RECYCLED PLASTICS MARKET

According to Indian-based Fortune Business Insights, the global recycled plastics market size is projected to reach 72.6 billion US-Dollar by the end of 2026.

The presence of several large-scale companies across the world will have a positive impact on the growth of the market in the coming years, the company emphasized in October last year. The recycled plastics industry was worth 37.8 billion US-Dollar in 2018 and will exhibit a CAGR (compound annual growth rate) of 8.5 percent from 2019 to 2026. The increasing demand for recycled plastics, "resulting from its widespread applications across diverse industries, will contribute to the growth of the market," the information said. "Accounting to the serious effects of plastic wastes on the environment, governments across the world have imposed strict regulations towards their usage." The report would encompass several factors that have contributed to the growth of the market in recent years. Plastic waste has a serious effect on the environment, particularly on aquatic and wildlife.

As a result, several large companies were partnering to minimize the use of plastic and make people aware of its negative effects. In March 2019, Coca-Cola, Nestle, and Unilever formed the 'African Plastics Recycling Alliance' to bring about a change in the plastic recycling infrastructure across Sub-Saharan Africa. "This alliance will not just influence the regional market, but will also have a direct impact on the growth of the global market," Fortune Business Insights predicted.

The report had analyzed the ongoing beer market trends across North America, Latin America, Europe, Asia Pacific, and the Middle East and Africa. "Among these regions, the market in the Asia Pacific is likely to emerge dominant in the coming years. The presence of several bottled water manufacturers will aid the growth of the recycled plastics market." The market in North America would also witness considerable growth in the coming years, driven by the increasing number of government initiatives.

www.fortunebusinessinsights.com/enquiry/queries/recycled-plastic-market-102568

PLASTIC-TO-FUEL MARKET AWAITS A STRONG GROWTH

According to UK-based firm Fairfield Consultancy Services OPC Pvt Ltd, growing inclination toward sustainability, raising awareness of environmental conservation, and increasing public knowledge of the recovery of marketable fuel from millions of tons of plastic waste collectively create growth prospects for the plastic-to-fuel (PTF) market.

Photo: PublicDomainPictures /pixabay.com

Soaring adoption of plastic-to-fuel technologies to complement the existing plastic recycling initiatives is expected to contribute to market growth, Fairfield Market Research found out in a market intelligence study. "The potential ability of PTF technology to allow considerable reduction in greenhouse gas (GHG) emissions will continue to solidify their position against several new crude oil extraction forms. That, according to the report, will account for an upsurge in plastic-to-fuel market." Registering the valuation of more than 900 million US-Dollar in 2020, the global plastic-to-fuel market was all set to surpass the billion-dollar revenue toward 2026 end.

"The report highlights the fact that the entire plastic management sector has been facing the wrath of Covid-19 pandemic. PTF market was also under a heavy setback, majorly due to a highly disrupted raw material supply network. However, adoption of plastic-to-fuel technologies is regaining its momentum and is expected to see robust growth of over 13 percent by 2026." Pyrolysis would continue to be the most sought-after technology, the market research provider referred to its report. Fairfield Market Research stated that despite the effort around the clean energy recovery from plastic waste over the past decade, it has hardly been economical. A greater number of companies today were displaying their interest in the transformation of non-recycled, used plastic waste into fuel and petroleum-based products "as it provides a viable, effective way of clean energy recovery from massive plastic waste volumes. Plastic-to-fuel technologies are thus gaining ground, thereby pushing investments in the PTF sector."

www.fairfieldmarketresearch.com/report/plastics-to-fuel-ptf-market/request-sample

EUROPE: CLOSED LOOP FOR HIGH-PERFORMANCE INSULATION MATERIAL

Closing the materials cycle for rigid polyurethane foams is the goal of a new pan-European project.

The EU-funded project "Circular Foam", coordinated by German-based polymer company Covestro, brings together 22 partners from nine countries. Within four years, the participants from industry, academia and society want to establish a complete circular value chain for raw materials for rigid polyurethane foams used as insulation material in refrigerators and the construction industry. As reported by German non-profit Dechema (Gesellschaft für Chemische Technik und Biotechnologie – Society for Chemical Engineering and Biotechnology), the project will not only focus on the development of two novel chemical recycling routes for end-of-life materials. "It will also help set up and demonstrate corresponding logistics and waste collection systems, elaborate on dismantling and sorting solutions, as well as the design of future products and materials for enhanced recyclability." Once implemented across Europe, the system could help save one million tons of waste, 2.9 million tons of CO_2 emissions and 150 million euros in incineration costs annually, starting in 2040.

www.circular-foam.eu

RECYCLED METAL MARKET SIZE IS STILL GROWING

Precedence Research estimates that the global recycled metal market size will be worth around 102 billion US-Dollar by 2030 and will have a compound annual growth rate (CAGR) of 4.2 percent between 2021 to 2030. According to the information, this global market size was valued at 67.6 billion US-Dollar in 2020. The rising investments by the top players to set up recycling facilities and implement and improve waste management systems would play a crucial role in the market growth during the forecast period, the market research and consulting firm pointed out. “The rising government initiatives to reduce carbon footprint and reduce energy consumption has fueled the adoption of metal recycling across the globe. The recycling of metal consumes less energy as compared to mining. Hence, the development of sustainable ways

Photo: O. Kürth

for the industrial and infrastructural development is a key factor that is expected to fuel the market growth in the upcoming years.”

Based on region, in terms of revenue Asia Pacific dominated the global recycled metal market with a share of over 50 percent in 2020 and is estimated to sustain its dominance during the forecast period. As reported, Asia Pacific is among the top importers of recycled metal. “The lack of advanced technology for recycling metal coupled with huge demand for the recycled metal has made this region a top consumer of recycled metal,” Precedence Research informed. It was expected that the rising industrialization and rapid urbanization would drive the growth of this market by 2030.

On the other hand, North America is estimated to be the most opportunistic market during the forecast period. “The rising popularity of electric vehicles and demand for advanced electronic goods are the major factors of growth.”

www.precedenceresearch.com

WOULD YOU DRIVE A CAR BUILT FROM RECYCLED MATERIALS?

Norwegian industry is shifting towards a greener future. But what does the transition to a greener economy really mean for industry and consumers?

The Norwegian University of Science and Technology (NTNU) explained the requirements, illustrating with an example: cars.

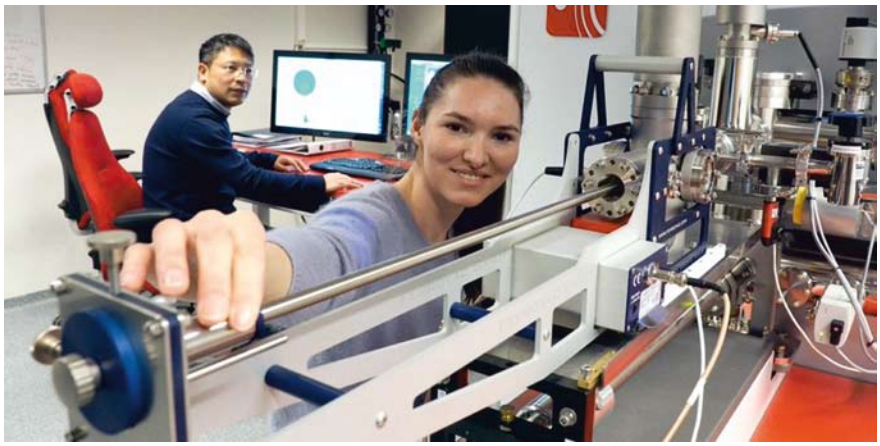


Photo: Per Henning, NTNU

Researchers at the Norwegian University of Science and Technology (NTNU) use advanced instruments to characterize materials. The photo shows the instrument used for Atom Probe Tomography

When wrecking a car, usable parts are taken out and reused. Materials that can be remelted are sent to recycling. Many car parts contain valuable metals (including the battery, which has rare metals) that hold great potential for a new life. The degree of recycling depends on how the car parts are produced.

The green shift means that we slowly but surely need to get used to the idea that the products we buy are not "new" but consist of materials that have been given new life through recycling. The latest report from the United Nations' Intergovernmental Panel on Climate Change (IPCC) is crystal clear that immediate and major reductions in greenhouse gas emissions are necessary to achieve the Paris Agreement goal to limit the earth's temperature increase to 1.5 degrees celsius.

For industry, this means transitioning to manufacturing low-carbon products. More products need to be recycled. Moreover, production needs to be adapted to a world in which things are reused, either as the same original product type or remelted and reused for new purposes. The goal is to maintain the value of products, materials and resources for as long as possible. That aligns with the principle of a circular economy. The idea is that all manufacturing should consider the product's lifespan and recycling possibilities. Another important factor is high product quality. We need products with a long shelf life that do not need to be replaced often. Longer product life will contribute to the green shift.

The transition to greener processes in the metal industry has been going on for some time already. However, the awareness of the great potential for further reducing emissions is now growing. Norwegian (and international) metal-based industries must increasingly comply with national and international rules and requirements for greater use of recycled metal in their materials and products. Better systems and routines for collecting and sorting scrap metal are important, but it is also critical and necessary to develop new metal alloys and products that are designed to be recycled.

New technologies (process and material solutions) and innovations enabling greater reuse of scrap metal are essential in the green shift. For example, 75 percent of all aluminum produced in the world is still in use and represents a major resource for the respective industry, both in replacing and supplementing the primary production of aluminum. Remelting requires only five to seven percent of the energy required for primary aluminum production.

Finding new and greener manufacturing methods requires a lot of new knowledge. Research and industry need to work hand in hand for a rapid green shift. Funding schemes for research in Norway (e.g. the Research Council of Norway's "Green Platform") and internationally (e.g. the EU's "Green Deal") are now aiming at projects that have sustainability as their fundamental objective.
Innovative measures will facilitate increased knowledge. Ensuring that all the new knowledge is used in the industry and becomes part of the

circular economy is also key. To this end, research organizations and the industry must collaborate closely.

Center for research on physical metallurgy

The Norwegian University of Science and Technology, NTNU and SINTEF, Scandinavia's largest independent research institution, have established SFI PhysMet, a center for research on physical metallurgy where researchers and industry partners work closely together. The center is one of the Research Council's centers for research-based innovation (SFI).

Physical metallurgy can be defined as the "art" of making useful products from metals. The field encompasses the study of the properties of metals and alloys, such as mechanical strength and forming properties. The overarching goal of SFI PhysMet is to help Norwegian metal-based industries shift to more sustainable materials, processes and products.

SFI PhysMet collaborates with the automotive industry to produce car parts with lower CO_2 footprints. The center is also working on creating sustainable metal-based solutions. These are important for developing offshore wind turbines, the construction of large bridge structures that can replace the ferry on the E39 highway between Trondheim and Kristiansand, and new processes for making materials and alloys better suited for recycling and recovery.

The interaction between research and industry is essential for shifting to greener technologies. In the end, however, it is consumers who will make use of all the "green" products. Down the road, we may all be driving cars produced completely from recycled materials.

We can probably expect the recycled products to be, at least, as good as today's products. The difference is that the new production methods will contribute to the green shift and a safer future for our earth, NTNU wrote.

www.ntnu.edu

THE GLOBAL SECONDARY ALUMINUM ALLOY MARKET

According to market research company Research Nester, this market will touch 63,244.79 million US-Dollar by 2030.

The growth is expected at a compounded annual growth rate (CAGR) of 4.90 percent over 2021-2030 from 39,198.54 million US-Dollar in the year 2020. As reported, the reason for this is the growing application of secondary aluminum in the manufacturing of automobiles and aircraft. "The total number of cars and commercial vehicles produced around the globe, according to the statistics by the International Organization of Motor Vehicle Manufacturers (OICA), grew from 58239494 and 19344025 numbers respectively in the year 2010 to 67149196 and 24637665 numbers respectively in the year 2019," the research firm gave account. "Moreover, according to the statistics by the General Aviation Manufacturers Association (GAMA), the year-to-date (YTD) total shipment of airplanes grew from 2020 numbers in the year 2010 to 2658 numbers in the year 2019. Amongst these, turboprops grew from 368 numbers to 525 numbers, while business jets grew from 763 to 809 numbers during the same period."

The automotive and aeronautics industry utilizes recycled aluminum alloys, also known as secondary aluminum alloys, as recycled aluminum is highly cost-effective and less energy-consuming, Research Nester informed. In 2018, the global recycling input rate (RIR) for aluminum amounted to 32 percent. The global recycling efficiency rate (RER) was 76 percent.

www.researchnester.com/reports/secondary-aluminum-alloy-market/3578

Photo: O. Kürth

Kosovo:

NEARLY 20 MILLION EURO FOR WASTEWATER TREATMENT

The European Investment Bank (EIB), the bank of the European Union, continues to support vital infrastructure in Kosovo by investing 19.8 million Euro for constructing a new wastewater treatment plant and the rehabilitation and extension of the existing wastewater collection system in the municipality of Mitrovica. "The project will provide access to modern sanitation services to more than 213,000 people while protecting the environment and public health," EIB underlined. That is the bank's second investment in the water sector in Kosovo since 2020. At that time, it unlocked 11 million Euro for a wastewater treatment facility and the rehabilitation of an existing facility in the municipality of Gjilan.

As the investment will improve living conditions contributing to economic and social resilience and growth, it is being provided under the EIB's Economic Resilience Initiative, the bank gave account. The project was supported by both technical assistance and investment grants for preparation and implementation via the Western Balkans Investment Framework (WBIF) and is co-financed with the European Bank of Reconstruction and Development (EBRD).

www.eib.org/en

USA:

PROJECT TO MODERNIZE RECYCLING COLLECTION IN BALTIMORE

Funded by a public-private partnership, the project would advance safer, more efficient, and equitable recycling access for nearly 200,000 Baltimore households, The Recycling Partnership informed.

Last year, the City of Baltimore had launched the delivery of nearly 200,000 curbside recycling carts, which was expected to be completed in early 2022. The project (worth about 10 million US-Dollar) is estimated to increase recycling output per household by 80 percent and generate as much as 40 million pounds of new recyclables each year. "The initiative to bring equitable curbside recycling access to the City's 609,000 residents was made possible by a groundbreaking collaboration brought together by The Recycling Partnership, with the American Beverage Association's Every Bottle Back initiative, Closed Loop Partners, Dow, the Baltimore Civic Fund, and Rehrig Pacific," the information said. The program would also help collect and recycle nearly 30 million new pounds of plastic over ten years, including 16 million new pounds of polyethylene terephthalate (PET), commonly found in beverage bottles.

NEW DIAGNOSTICS TOOL FOR BATTERIES OF E-VEHICLES

The new analysis software BattMan ReLife is used as a means of initial diagnosis in battery recycling at the pilot plant of Volkswagen Group Components in Salzgitter (Germany).

A high-voltage battery may be reused in a vehicle either in whole or in part. That depends on the capacity that the inspection system detects. The battery receives a "second life" as a mobile or stationary energy reservoir, or the material might be returned to cell production through an innovative recycling process. According to Volkswagen AG, the first version of the BattMan (Battery Monitoring Analysis Necessity) software was developed by the Audi Brussels quality management department for the quick and reliable analysis of Audi e-tron's high-voltage battery. It is already in use as a diagnostics tool for several brands of the Volkswagen Group. "BattMan then underwent further development in cooperation with recycling experts at Volkswagen Group Components prior to the opening of the pilot plant for battery recycling in Salzgitter.

After several months of programming and testing, BattMan ReLife emerged as the new analysis solution that provides a reliable first assessment of a battery in just a few minutes to help set its further course. Previously, this process took several hours."

www.volkswagenag.com/en.html

Spain:

STRATEGIC ALLIANCE BETWEEN GCR GROUP AND SINTAC RECYCLING

GCR Group manufactures sustainable plastic solutions for the plastics processing industry and has acquired a participation in Sintac Recycling, which offers a wide range of 100 percent recycled plastics. The strategic alliance between both Spanish companies would respond to the objective of expanding the offer of sustainable and circular solutions to provide greater added value to customers, placing environmental commitment at the center, Sintac Recycling pointed out. This agreement was an important step towards the transition to a more sustainable plastics industry, promoting the circular economy to give plastics a second life by marketing 100 percent recycled and recyclable products.

www.sintac.es, www.gcrgroup.es

France:

NEW RECYCLING PLANT EXPECTED TO START IN 2023

Plastic Energy is building an advanced recycling plant in northern France. The large-scale recycling facility, which will be adjacent to ExxonMobil's Notre Dame de Gravenchon petrochemical complex, is to have a capacity of 25,000 tons of plastic waste per annum. There are plans to scale up the facility to 33,000 tons in the future. In 2021, Plastic Energy signed an offtake collaboration agreement with ExxonMobil. As per the arrangement, TACOIL (or recycled oils) from this future plant will be used by ExxonMobil to create virgin-quality certified circular polymers and other high-value products. Start-up of the recycling plant is anticipated in 2023. Plastic Energy is specializing in recycling end-of-life plastics. The company's patented technology is transforming plastic waste into raw materials.

www.plasticenergy.com

Ecoplasteam:
NEW IDEA FOR RECYCLING MULTI-LAYER PACKAGING

Multi-layer packaging like “tetrapaks” for beverages and food is still a challenge for the circular economy. However, the Italian company Ecoplasteam has found a solution.

Such packaging for beverages and food consists of paper, polyethylene and aluminum. While paper mills take off the paper layer, the mixture of polyethylene and aluminum (PolyAl, sometimes referred to as PE-AL) is part of the multi-layer packaging waste because the components cannot be easily separated.

According to the European Circular Economy Stakeholder Platform, the Italian company Ecoplasteam S.p.A. “employs an innovative process to melt the polyethylene and aluminum into EcoAllene”, a material consisting of both components. In this way, the costs of recycling could be reduced. In February 2021, the company won the “Impresa Ambiente Award” for “Best Product” in Italy. Stefano Giacchetto, CSR of Ecoplasteam, told GLOBAL RECYCLING about the company’s specialty.

From the beginning, Ecoplasteam focused on finding a solution to the problem of recycling polylaminates, “PolyAl” (plastic-aluminum), which derive from recycling food containers. In which way does your solution solve this problem?

From the beginning, the beverage cartons, after consumption, are thrown away and go to the paper mills that extract the cellulose from the cartons. The PolyAl inside, on the other hand, is waste. Usually, it goes to landfill or incinerator, but now there is a new green solution, Ecoplasteam. We can manage this waste to create a new raw material, called

Photos: Ecoplasteam S.p.A.

EcoAllene. But why is our solution innovative? Our solution is innovative because we do not separate the plastic (polyethylene) and aluminum inside the beverage carton, but we keep them together. Our innovative process is therefore unique in the world.

Ecoplasteam uses a process to treat these elements of polylaminates to create a third material. But what are the main differences to other companies which address this problem?

There is only one main difference, but it is a major one that makes a big difference. We keep the PolyAl together. That means we do not use solvents and other chemicals. Our competitors try to separate the aluminum and polyethylene parts and thus use chemical solvents and pollute the environment.

Can you tell us more about EcoAllene, the new material derived from recycling polylaminates?

Our material is like a virgin low-density polyethylene. Thus, it can be used for the same applications. We can add fillers to our base material to create different "formulations", one for each sector, for example, formulations for toys, stationery, household items, etcetera. You can see some examples on our website. But we have many other applications.

According to your website, EcoAllene has a wide variety of use. Which companies can benefit from using this material?

As I said, our material has a variety of applications. Our most famous customer is Carioca, an Italian company that produces markers, pens and other stationery products. Gerbaldo Polimeri, who, with our material, has developed a special formulation for rotational molding and now produces jars. Moreover, we have clients making household utensils, CTP company is one of them.

What is the production capacity of your plant in Spinetta Marengo (Alessandria)?

Stefano Giacchetto

Our factory in Alessandria produces 6,000 tons/year of EcoAllene.

Ecoplasteam was born and developed as a start-up. How would you describe the company's first steps?

The first step, for all start-ups, is to find investors, money to turn the idea into reality. Our project is very innovative, so this step was easy, many investors were interested in our business. We quickly reached our goals. The second important step was finding customers, which was not easy. The plastics sector is full of large and established companies. Thus, it was not easy to convince companies to do production tests with our new material. After a bit of word of mouth, however, everything was easier. Now customers call us directly. There is almost no need to look for them.

How rapidly has Ecoplasteam expanded to its present level?

It took years of work to reach this level of development. For the first two years, the increase was low. But when the product took the market, the growth became rapid. Nowadays, we double our sales every year, and in 2022 we will reach full capacity. Therefore, the next step will include the opening of a new plant.

Technology never stands still. So, what are your plans and goals for the future?

As I said, we plan to open a new plant in 2022, but we want to open more plants in the next three years. PolyAl is a big problem, and Ecoplasteam offers a good and green solution. We want to do our part in this phase, a crucial moment for us and future generations. We have to do something, and EcoAllene is part of that. Taking the waste and bringing it back to life is the only way to a more sustainable world.

www.ecoplasteam.com/en/

RECYCLED GRAPHITE FOR NEW BATTERIES

If the experts are right, the mineral graphite will have a steep "career" in 2022. This mineral is the key element that forms the anode of lithium batteries. "Without it, there will be no energy revolution, and the trillion-dollar EV market might not exist," third party publisher and news dissemination service provider FN Media Group, LLC, informed in December last year. In 2019, the global graphite market was valued at 14.9 billion US-Dollar. By 2027, it would be expected to be valued at nearly 22 billion US-Dollar. "It might be worth much more than that."

As reported by author Tom Kool, each EV (electric vehicle) battery contains 20 to 30 percent of graphite, "which means that graphite demand will soar in tandem with EV demand". While EV giants had been busy scrambling for lithium sources worldwide, there were concerns about a lack of graphite supply. Some 90 percent of graphite anodes used in batteries come from China, the information revealed. For the USA, this mineral would become a national security issue.

USA-based Graphex Group Ltd – a world leader in graphene technologies and products used in electric vehicle (EV) battery and energy storage production – had long-term contracts in China and was working with some of the largest firms. Now, they were "looking to jump into the US and European markets to help supply the growing battery manufacturing industry just beginning to be established, where new supplies of graphite are feeling the squeeze. Graphex's President John DeMaio is making a push with the expansion of their USA-based team to focus on the North American and European expansion plans to be an integral part of the supply chain being created to support the western EV industrial complex currently being built."

According to FN Media Group, in 2019, the demand for spherical graphite (also known as battery-grade graphite) in China alone was 200,000 tons and increased to 240,000 tons in 2020. At that time, the need for graphite was expected to reach 1.9 million tons by 2028. Furthermore, in September 2021, the International Energy Agency (IEA) had forecast that the electric mobility and low-carbon energy sectors would demand 25 times more graphite per year by 2040 than today.

Significant more recycling

A way to ensure the graphite supply is recycling from spent lithium-ion batteries (LIBs). According to the publication AZO Materials, the graphite anodes have the same cycle capacity as virgin graphite anodes. "Because of its pure constituent materials and stable carbon structure, wasted graphite has gained a lot of interest as a key building material for anodes." But the majority of current recycling systems were pyrometallurgical and hydrometallurgical, "which necessitate multiunit operation, high energy consumption, and financial burdens," the publication referred to the study "Critical strategies for recycling process of graphite from spent lithium-ion batteries: A review", conducted by Liu, J., Shi, H., Hu, X., Geng, Y., Yang, L., Shao, P., & Luo, X. in 2021. As stated, there was no graphite recovery technology in operation in the industry because of the inability to balance the link between pollution and cost.

However, new capacities for battery recycling will come on stream. In Europe, for example, the Scandinavian companies Northvolt and Hydro have collaborated to establish a "first-of-its-kind battery recycling facility" in Norway, which – under a joint venture named Hydro Volt – was planned to come online in 2021 in Fredrikstad, outside of Oslo. Hydro Volt is to secure end-of-life EV batteries via Batteriretur, a well-established Norwegian recycling company.

The principal intent for the plant will be for initial collection and handling of batteries followed by processing them up to the point of recovering aluminum, copper, steel, plastics, electronics and electrolyte. Once these materials are set aside for processing by third parties, or in the case of aluminum, by Hydro, the remaining material is a fine, black powder. This compound material, referred to as black mass, contains metals nickel, manganese, cobalt, graphite and lithium and requires special treatment, which will be undertaken by Northvolt in Sweden. Initial black mass volumes will be directed to Northvolt's pilot recycling plant at Northvolt Labs in Västerås.

At commissioning, the Hydro Volt facility is planned to have the capacity to process more than 8,000 tons of bat-

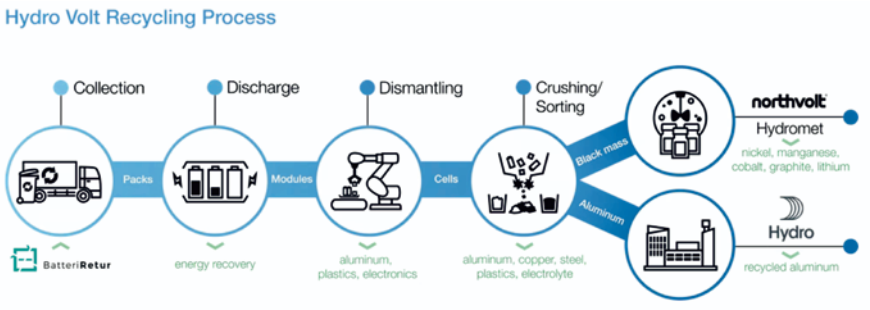


Illustration: Northvolt AB

teries per year – roughly the equivalent of 23,000 moderately sized EV batteries. In a second phase, expansion of the Hydro Volt plant could see capacities ramp up in line with increases in the availability of end-of-life batteries. There are more initiatives. In November last year, Northvolt reported that its recycling program, Revolt, has produced its first lithium-ion battery cell featuring a nickel-manganese-cobalt (NMC) cathode produced with metals recovered through the recycling of battery waste. The company now turns its attention to the scaling-up of recycling capacities to fulfill its aim of producing cells with 50 percent recycled material by 2030.

To secure this, Revolt Ett, the company's "first giga-scale recycling plant" under development adjacent to Northvolt Ett Gigafactory in Skellefteå (Sweden), would be expanded beyond its initial design to enable recycling of 125,000 tons of batteries per year, the company announced. With construction beginning in the first quarter in 2022 and operations in 2023, the recycling plant would receive incoming material for recycling from two sources: end-of-life batteries from electric vehicles and production scrap from Northvolt Ett.

Europe's largest battery recycling plant

In addition to becoming Europe's largest battery recycling plant, Revolt Ett would be the "only large-scale facility in Europe" capable of recycling lithium in addition to nickel, manganese, cobalt and other metals, Northvolt is convinced. "Recovered materials from Revolt Ett will supply neighboring Northvolt Ett cell manufacturing Gigafactory with recycled metals sufficient for 30 GWh of battery production per year (half of Northvolt Ett's total annual cell output)." In America, Canada-based Li-Cycle Holdings Corp. announced in December last year that it would proceed with the construction of its first commercial Hub facility, which is being developed near Rochester, New York.

Because of the rapidly growing demand for lithium-ion battery recycling, Li-Cycle intends to increase the input processing capacity of the Hub by over 40 percent, from 25,000 tons to 35,000 tons of "black mass" annually (equivalent to approximately 90,000 tons of lithium-ion battery equivalent feed annually). With its increased capacity, the Hub would be able to process battery material that is equivalent to approximately 225,000 electric vehicles ("EVs") per year, a press release said.

- www.northvolt.com
- www.hydro.com
- www.li-cycle.com

VOLKSWAGEN GROUP ESTABLISHES EUROPEAN FIRM FOR ITS BATTERY BUSINESS

The company's scope will include new business models – and partnerships – based around reusing discarded car batteries and recycling the valuable raw materials they contain.

The new European company (Société Européenne) will have to consolidate activities along the value chain for batteries – from processing raw materials to developing a unified Volkswagen battery to managing the European gigafactories, the car manufacturer announced last year. Volkswagen Group would thus create "efficient and future-proof structures for the rapidly growing battery business". As part of its NEW AUTO strategy, the concern wanted to become the world's leading manufacturer of electric vehicles.

Volkswagen is planning to establish six gigafactories in Europe to cover the growing demand for battery cells within the Group. Battery cell production in the Salzgitter facility is set to start in 2025. The gigafactory in Lower Saxony would produce unified battery cells for the Volkswagen Group's volume segment. In its initial phase, the factory would have an annual capacity of 20-gigawatt hours; later on, this is planned to double to 40-gigawatt hours. Based on the current planning round, the Volkswagen Group is investing in developing battery cell production in Salzgitter. All in all, two billion Euro has been earmarked for the construction and operation of the Salzgitter gigafactory up to the start of production.

The site in Salzgitter, Lower Saxony, will bring together development, planning and production control under one roof. Thus, it will become the Volkswagen Group's battery center. "There are plans to build additional gigafactories at sites in Spain and Eastern Europe. The exact locations for gigafactories 3 and 4 are due to be decided in the first half of 2022. Volkswagen intends to open two more battery cell factories in Europe by 2030."

Optimized battery cell manufacture

Parallel to the development of these five gigafactories by the newly formed European company, the Swedish company Northvolt AB – in which Volkswagen has a stake of around 20 percent – will be building another factory in Skellefteå in northern Sweden. That will produce battery cells for the premium automotive segment starting in 2023. Northvolt already has an established partnership with the Volkswagen Group for premium battery cells.

Volkswagen is forging ahead with the industrialization of battery technology at all levels of the value chain, the Group underlined. The company has agreed to two strategic partnerships with Umicore and 24M and a long-term supply agreement with Vulcan Energy Resources. "The goal of the partnerships is to aid the manufacture and procurement of primary materials as well as to optimize battery cell manufacture at the planned gigafactories," Volkswagen underlined. Those alliances were "designed to build know-how in battery technology and optimize cost management".

Over the next five years, the Group intends to invest about 52 billion Euro in the development and production of new electric vehicles. "The NEW AUTO strategy also covers the development of the new business field batteries, charging and energy". In addition, the manufacturer wants to create dedicated technology platforms that enable cross-brand synergies.

www.volkswagenag.com/en.html

Obtained raw materials can be reused in a closed loop

Photo: Volkswagen AG

CEMEX ACQUIRED WASTE MANAGEMENT COMPANY IN MEXICO

Mexican multinational building materials firm CEMEX, S.A.B. de C.V. has announced the acquisition of Broquers Ambiental, a company that focuses on the separation, recovery, and treatment of urban solid waste generated in the city of Queretaro.

According to CEMEX, this acquisition is part of its Future in Action program, aimed to achieve carbon neutrality. All waste processed at the Broquers plant would be used as a climate-friendly fuel to power its operations in Mexico. "Thanks to this process, CO_2 emissions into the atmosphere are reduced by replacing fossil fuels, one of the most significant contributors to global warming." Prior to the acquisition, the construction materials company transformed over 500,000 tons of waste to fuels for its operations in Mexico, avoiding the emission of more than 730,000 tons of CO_2 per year or the equivalent of planting 12 million trees.

Photo: RealPhotoItaly / stock.adobe.com

As reported, Broquers expects to increase the current staff by 50 new employees this year to expand its processing capacity. The Mexican company had been the first plant of its kind in Mexico to have sophisticated waste separation equipment in line with European standards for waste treatment. "This results in a fast, highly efficient, and safe industrial process that solves the challenge of Queretaro's municipal waste in a local, sustainable, and environmentally friendly way." Broquers would continue "to operate ordinarily and comply, as before, with all the conditions stipulated in its concession title for the treatment of urban solid waste in the municipality of Queretaro". Also, the transaction would not represent any legal or financial impact on the city.

www.cemex.com

BB ENGINEERING GMBH DELIVERED MELT FILTER FOR PET RECYCLING TO THAI MANUFACTURER

In 2021 German-based BB Engineering GmbH delivered a melt filter for recycling PET flakes to polyester manufacturer Indorama Polyester Industries (Thailand).

The company, which is part of Thai-based Indorama Ventures, will be using the type NSF38 filter in its recently assembled recycling system to produce rPET granulate from flake PET bottle waste. As described by the German provider, the device enables continual filtering as the system switches from one filter to the other during the process, without any conversion shutdowns. It allows the processing of consumer waste, for example, in the form of shredded PET bottles into high-quality rPET granulate. Then this granulate is processed into fibers in spinning systems.

The NSF38 is a switchable filter with a filter surface area of approximately 16 m^2 on each side, with throughputs of between 1,000 and 1,900 kg/h. The

Melt filter for recycling PET flakes: NSF38

Photo: BB Engineering

filter inserts each contain 19 pleated filter candles (60 x 1,000mm Ø). The filter medium comprises a sintered metal fiber nonwoven with a filtration fineness of 25 µm. That ensures that the melt remains free of contaminants and gel particles, which, in turn, enables the production of high-quality end products.

About BB Engineering GmbH

BB Engineering GmbH is a German machine building company founded in 1997 as a joint venture between Oerlikon Barmag, a subsidiary of Oerlikon Textile GmbH & Co. KG, and Brückner Group GmbH. Today, the company employs more than 160 employees at its location in Remscheid, Germany, focusing its business on the development, engineering, design, and manufacturing of extrusion and filtration technologies as well as complete spinning lines (VarioFil) and recycling technologies (VacuFil, Visco+) for the plastics and textiles industry. The services offered range from the design and planning phases through to the implementation of projects.

www.bbeng.de

VEOLIA SOLD “NEW SUEZ”

End of January, French-based Veolia Group announced the completion of the sale of the “new Suez” to a consortium of investors. According to the group, this transaction “includes the main remedies approved by the European Commission to preserve competition in environmental services following the combination of Veolia and Suez”. It would allow for creating a “new Suez” from both an industrial and a social perspective, representing revenues of around seven billion Euro and a workforce of 35,000 employees.

As reported, the “new Suez” includes Suez’s Water and Recycling & Recovery activities in France, international assets in Italy, Central Europe, Africa including Morocco, Central Asia, India, China and Australia, as well as global digital and environmental activities, “thus preserving real growth prospects and strong capacities for innovation in France and worldwide”. For Veolia, this sale would mark the culmination of the combination with Suez, and “a starting point to enter the future of a global champion of ecological transformation with a solid balance sheet”. The group, present on five continents and employing nearly 179,000 people, intends to become the benchmark company for ecological transformation. In 2020, Veolia served 95 million inhabitants with drinking water and 62 million with sanitation, produced nearly 43 million megawatt-hours and recycled 47 million tons of waste. In the same year, it achieved consolidated sales of 26.010 billion Euro in 2020.

www.veolia.com

Advertorial:

McCloskey International Limited / McCloskey Environmental (MCE)

NEW BRAND IDENTITY – PROVEN QUALITY

McCloskey International, a globally active manufacturer of industrial machinery, unveiled a new brand identity focused on recycling and environmental solutions.

The company, founded in 1985, is recognized as a leading provider of crushers, vibrating screeners, trommels, and stacking conveyors for use in infrastructure projects, mining sectors, waste management and recycling industries. To date it has assisted in diverting millions of tons of waste from landfills. Now, the firm intends to further expand its expertise under a new brand entity – "McCloskey Environmental (MCE)".

What goals does McCloskey pursue with the new brand name of its business unit?

For a number of years our dealers and customers have had a requirement for recycling and organic processing materials. With the new McCloskey environmental brand we intend to diversify the McCloskey product offering and fulfill that need. Waste processing is evolving right across the globe, as we all become more conscious of how much waste we produce and how that waste can be recycled.

The drive is very much towards smarter waste processing solutions and at McCloskey Environmental that is what we aim to bring to market.

Does the new brand identity also lead to new solutions for the recycling sector?

The McCloskey Environmental brand mission statement is "Building smarter machines to help minimize the worlds waste". Our focus is to be innovative with the solutions we bring to market; innovative in terms of machine efficiency and performance, while also looking at how we power our machines.

Electrification is a key focus for us as we try to find alternate power solutions to the traditional diesel hydraulic, which has been the industry standard for mobile machinery for a number of years. We will offer electric hydraulic power for products we bring to market.

Do you also consider partnering with other companies to provide holistic solutions?

This is something we have been actively pursuing over the past number of months, and we have been very fortunate to find a number of very strong partners with extensive industry experience and a reputation of high performance. McCloskey Environmental will of course look towards further cooperation with companies whose values and goals align with that of our own brand.

McCloskey has developed significantly in recent years. In how many countries do you currently offer your machines and services?

The formation of McCloskey Environmental is part of a wider expansion strategy within McCloskey to diversify its product offering and to obtain greater market share right across the globe. McCloskey products are offered globally across all geographies, supported by aftermarket parts hubs located strategically within regions.

Which machine highlights from McCloskey can visitors expect at IFAT 2022?

On stand FGL 811/22 at IFAT 2022 we will be showcasing our new ESS-300, a slow speed, single shaft, primary shredder that can also be used in a secondary application with the installation of screens under the cutting chamber. In addition to that we will have a very strong marketing presence with information around the products we are offering. We would urge everyone to come visit us and discover what McCloskey Environmental has planned for the future

www.mccloskeyenvironmental.com

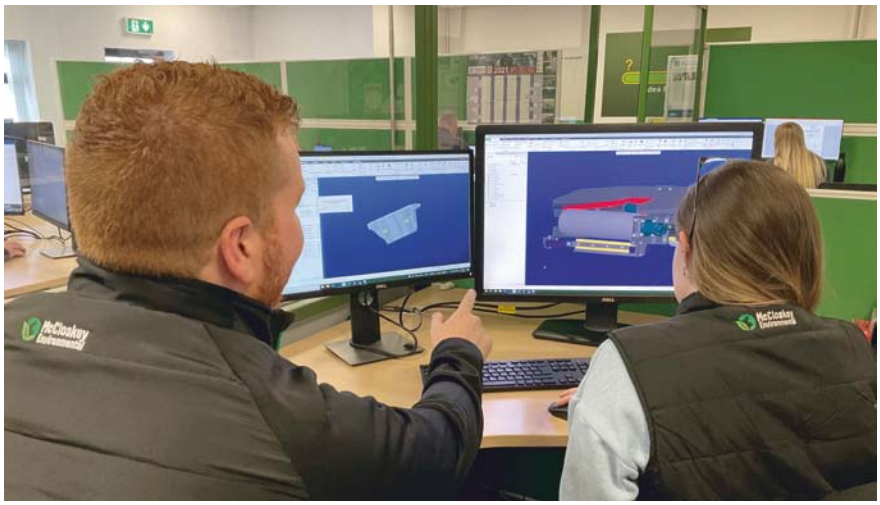


Photo: McCloskey

BARRIER TECHNOLOGY WITHOUT HAMPERING PAPER RECYCLING

According to a study*) commissioned by DS Smith and Aquapak, bio-digestible barrier coatings increase paper recycling rates and fiber yield.

DS Smith, an international manufacturer of packaging and recycled paper, and Aquapak, a producer of water-soluble polymers, have been working together to find a solution to the issue of non-recyclable paper packaging. The use of paper products not suitable for recycling has increased "as the industry has moved to replace conventional, hard to recycle and single-use plastics," the companies underlined. That means that the paperboard is rejected "because paper mills cannot process the paper and plastic combinations. Instead, they are incinerated or go to landfill."

To provide a solution to this problem, Aquapak has developed "Hydropol", a commercially available fully soluble, bio-digestible barrier polymer, both companies informed. The polymer could be adhesive- or extrusion coated onto paper "and brings several benefits to fiber-based packaging, including oil and grease resistance together with a high gas barrier. It is non-toxic, marine safe, dissolves in water, and subsequently biodegrades but still provides the much-needed functionality required for food, drink and household product packaging," Aquapak and DS Smith assured.

www.dssmith.com
www.aquapakpolymers.com

*) For full results of the study "Considerations for process, product and environmental fate testing of soluble bio-digestible barriers for paper and board packaging", visit https://www.aquapak-polymers.com/request-white-paper-2/

Change in Possession:

BLACKSTONE ACQUIRED RECYCLED FIBER MANUFACTURER SUSTANA

In December last year, international asset manager Blackstone has announced that funds managed by its Blackstone Tactical Opportunities business have acquired Sustana Group, an American leading manufacturer of sustainable recycled fiber, paper and packaging products, from an affiliate of H.I.G. Capital.

Headquartered in De Pere (Wisconsin, USA), Sustana uses post-consumer materials and the high standards for environmental sustainability to produce a comprehensive suite of recycled fiber, paper and packaging solutions for customers throughout North America. It would assist a diversified customer base through four facilities, "all of which have leading energy efficiency, water conservation systems, wastewater treatment technology and recycling of process by-products," Blackstone gave account.

www.sustanafiber.com
www.blackstone.com

GLOBAL PAPER AND PULP MARKET: OUTLOOK 2026

According to Indian-based company Industry Research, the global paper and pulp market size, which was worth 65,510 million US-Dollar in 2020, is expected to reach 88,150 million US-Dollar by the end of 2026 with a CAGR (compound annual growth rate) of 4.6 percent during 2021-2026. As underlined by the market research firm, the report is a historical overview and in-depth study on the current and future market. It would represent "a basic overview of the paper and pulp market share, competitor segment with a basic introduction of key vendors, top regions, product types, and end industries".

Photo: DIE PAPIERINDUSTRIE e. V.

www.industryresearch.biz/enquiry/request-sample/15947572

ADDITIVES FOR MECHANICALLY RECYCLED PLASTICS

BASF has launched IrgaCycle, a new range of additive solutions to address the imminent needs in plastics recycling.

The plastics industry is seeking ways to incorporate higher content of recycled polymeric material in all major applications to meet sustainability goals while facing growing consumer concerns and stricter regulatory requirements to reduce plastic waste. According to the multinational chemical company, a major challenge was to mitigate quality deficiencies of polymers arising from thermal and mechanical stress during the recycling process. “Recycled plastics often contain impurities and polymer contaminants that accelerate polymer degradation, which change the material properties. Consequently, recyclers and plastic converters are facing quality and performance issues while processing recycled polymeric material,” BASF stated. “Formulated additive packages improving the properties of these recycled plastics can be a solution for this challenge.”

The new IrgaCycle solutions address specific quality issues associated with recycled resins

Photo: BASF

As pointed out, the company’s IrgaCycle range includes additives that can help increase the percentage of recycled content in several end-use applications such as packaging, automotive and mobility, building and construction. These products would address specific quality issues such as limited processability, poor long-term thermal stability and insufficient protection from outdoor weathering. “At launch, the product line includes a range of different additive formulations, with more to follow in the future.” The additives are ready to use and easy to apply in the recycling steps, BASF assured. “The granulated non-dusting product form ensures safe and easy dosage during converting or compounding of reclaimed material.” The IrgaCycle additive range is offered as part of the VALERAS portfolio.

www.plasticadditives.basf.com

USA: VINYL SUSTAINABILITY COUNCIL CONFERRED RECYCLING AWARD

The recycling company Lakeland Polymers received the 2021 Recycling Award for their Flex-Tech Gas Hose Recycling Program from the Vinyl Sustainability Council (VSC). “Lakeland’s innovative reprocessing strategy allows them to turn scrap from two different types of plastic into a reusable feedstock for alternative applications,” VSC director Jay Thomas was cited. “This type of product innovation keeps PVC out of the landfill.” As reported by VSC, Lakeland Polymers takes pride in addressing and solving challenges for its customers. In February 2021, the company partnered with Texan firm Flex-Tech Hose to find a solution for a PVC and co-polyester waste issue. It developed a custom recycling process that allowed the incompatible materials in the scrap to be processed into a reusable form. “Lakeland processes over 45,000 pounds a month of PVC scrap material from Flex-Tech in this program,” VSC gave account. “So far, the partnership has diverted over 325,000 pounds of PVC from landfills extending the life and sustainable use of vinyl.”

www.vantagevinyl.com/vinyl-sustainability-council
www.lakelandpolymers.com

United Arab Emirates:

ADVANCED OIL RE-REFINERY PLANT TO TREAT OILY WASTE AND SLUDGE

In progressively developing economies such as the United Arab Emirates (UAE), sustainability across all sectors is valued as an integral component of development efforts, and waste management is treated as vital.

In line with this, the country has seen heavy investment in technology and innovation as it works towards its agenda for sustainability and its mission to achieve a circular economy. In particular, sustainability is driving the actions of many organizations in the marine, oil and gas, and industrial sectors. To meet their green ambitions, they are looking across the value chain for improvements. One such area is oil re-refining – waste oil is regarded as hazardous waste due to its high concentration of heavy metal, organic substances, and perpetual organic pollutants, which needs to be treated in an environmentally responsible way.

Thanks to advanced technology, waste oil can be transformed into a renewable resource. With the recent launch of an advanced Oil Re-Refinery Plant, the Environmental Solutions vertical of UAE-based Dulsco Group establishes itself as a leader in the oil re-refining industry. The 14,000 square meter plant, located in Jebel Ali, can process around 2,000 tons of oily waste and sludge. That amount is generated by the marine, oil and gas, and industrial sectors per month.

As a regional and international trade hub, daily marine traffic into Jebel Ali and the Port of Rashid in Dubai is high, requiring a facility for safely disposing of marine waste. The state-of-the-art facility is the only plant of its kind in the Gulf region that is fully compliant with International Maritime Organisation (IMO) and Marine Emergency Mutual Aid Centre (MEMAC) standards – a testament to the company's pioneering spirit and unwavering commitment to excellence and sustainability. Dulsco is also the only waste management company approved for treating all types of marine wastes falling under MARPOL classifications under annex I, II, III, IV and V.

According to Dulsco's COO, Environmental Solutions, John Grainger, the Oil Re-Refinery Plant adds to Dubai's goal of providing a fully integrated resolution to the maritime industry's various oily wastes to help protect the environment and the UAE's vital natural resources. "The plant is another addition to our portfolio of infrastructural projects that we have embarked on and has been designed to meet the highest technical and environmental standards. With safety as a priority, the design, equipment, systems, controls and processes have all been implemented to keep employees, the environment and process integrity safe." The fully integrated and Programmable Logic Controlled (PLC) plant, with a central control room, processes all oily waste received to produce both light and heavy fuels. These are then recycled back into the industry.

The light oil generated in-house is also used as fuel for its process operations. In addition, the facility treats and converts the recovered water from its process and turns it into irrigation-quality water in its water treatment facility. The water regenerated is also re-used in its boiler or provided to end-users for irrigation.

The facility thus recovers all potentially reusable fractions from the waste and creates value from waste. That reflects Dulsco's leadership in innovative sustainability practices and contribution to promoting the circular economy in the UAE. "As the global focus on environment and climate continues to grow, our priority is to play a leading role in implementing sustainable infrastructure in the UAE. We do this by ensuring that our values are applied through investment, expertise, and education in circular economy best practices and recycling projects," concludes Mr. Grainger.

www.dulsco.com

Photo: Dulsco

Japan:

MEGURI – FUTURE BRAND FOR RECYCLED PLASTIC PRODUCTS

Japanese company Sumitomo Chemical has launched "Meguri", a new brand for plastic products obtained through recycling technology.

The brand name "Meguri" means "circularity" in Japanese. Young employees of the company came up with the idea. According to Sumitomo Chemical, it will cover different recycled plastic products, such as acrylic resin (PMMA, poly-methyl-methacrylate), polyethylene and polypropylene produced by chemical or material recycling technologies. Announced on August 23, 2021, the company will start promoting the new brand with the recycled acrylic resin obtained from a pilot facility for chemical recycling, which is to be constructed at the Ehime Works in Niihama City (Ehime Prefecture, Japan). The new facility is scheduled to begin pilot tests in fall 2022 and start providing samples in 2023. In parallel with this project, the company plans to develop a recycling system for PMMA, from the collection of used acrylic resin to the recycling and reprocessing into products, aiming for early commercialization of chemically recycled PMMA. Furthermore, Sumitomo Chemical plans to include polyethylene derived from municipal waste, jointly developed with Sekisui Chemical Co., Ltd., and polypropylene compounds for automotive parts made by recycling used plastic. The company also intends to expand the lineup of "Meguri" and "increase production and sales of these products, while also building an alliance with customers, other companies in the industry, local governments and other stakeholders for collecting plastic waste, to help develop a circular economy."

Meguri
CIRCULARITY FOR ALL

Graphic: Sumitomo Chemical Co., Ltd

www.sumitomo-chem.co.jp

SENEGAL'S WASTE MANAGEMENT: THE PRIVAT SECTOR IS WANTED

"Senegal suffers from a chronic deficit of access to solid waste management services", the World Bank wrote in 2017. Five years ago, the country produced over 2.4 million tons of solid waste per year, out of which 1.08 million tons stayed uncollected. What has been done or must be rendered to assure nationwide collection and sanitary treatment of waste?

A paper of the European "Integrated Waste Management in West Africa" project from 2012 explained that municipal solid waste generated in Senegal was composed of two-third valuable material like metals, glass bottles, organics, and plastics and one-third of toxic substances like pharmaceutical products, oils, chemicals, car batteries and dry batteries from electronic devices. In Dakar, the country's capital, about 44 percent of waste generated was organic waste, coming from groundnut shells, fish waste, poultry excrement, industrial waste, fertilizers, and garden waste. Additionally, around 18 percent of waste generated or about 9,500 tons in Dakar were composed of plastics including 14 percent consisting plastic bags and four percent bottles and old plastic shoes, all descending from some 40 plastic processing industries. Most times, it was mixed with household waste. The rest contained 13 percent paper and cardboard, four percent metals, and 21 percent of all other waste types.

80 percent to landfill

It must not be forgotten that, even in 2019, the waste collection was uneven across regions. In Dakar, an average waste collection rate of 84 percent could be reached. In contrast, the rate at 33 percent ranged much lower in regional capitals and only at 22 percent in secondary municipalities. And, as the World Bank asserted, the existing collection

Photo: Comugnero Silvana / stock.adobe.com

services are “irregular and unreliable”, delivering waste management “with rudimentary and spotty services” and paving the way for open dumping and burning in Senegal’s secondary municipalities. In the solid waste management city profile, which the Climate and Clean Air Coalition published in about 2017, one could read that “80 percent of collected waste is transported to the landfill but not disposed of” and that “there is not yet in Dakar selective collection at the source of different waste streams”.

Meanwhile, at least the waste composition seems to have changed. A country report published by the European Commission in November 2020 shows an average waste by weight generation of twelve percent organic waste, eleven percent plastics, six percent paper and cardboard, six percent of partly sanitary textiles, two percent of glass, metal, and wood each, but also 47 percent of “fine elements” like sand and stone – the latter possibly damaging collection equipment like collectors. In this regard, the Commission also sums up that “landfill remains the main means of disposal of collected waste” as well as biomedical and industrial – including hazardous – waste. The landfills are characterized as unenclosed, missing adequate systems for treating gases and liquids like leachates. “Incineration, composting, and other biological treatments are the exception.”

No sanitary landfill in operation

The World Bank described the situation with the words: “There is no fully functional sanitary landfill in operation in Senegal.” Several years ago, the construction of three landfills was initiated, but the Saint-Louis facility was not properly operated and turned into a dumpsite. Moreover, the Thies landfill lacked resources and was never completed, and the Sindhia plant could not meet public consent. In 2019, news spread about constructing three new landfills in Tivaouane, Touba and Kaolack supported with 35 million US-Dollar by the Islamic Development Bank. It was also reported that the World Bank was to lend money to the Senegalese government to improve providing solid waste management services. The aim was particularly to gradually close down the Mbeubeuss site in Dakar and to establish another treatment and disposal site as a public-private partnership instead.

An emerging recycling industry

Despite these conditions, a recycling industry has developed. While in 2006, enterprises like Tremex, Recuver, Refemetal, and Cosem SA still treated several 1,000 tons of metal per month and mostly exported it to Spain. However, Someta, the Société Métallurgique d’Afrique, is now the biggest player. It started at a time when Senegal’s president Macky Sall’s decree on an export ban of scrap and ferrous by-products was suspended and a Chinese and some other finance partner supported the investment of 400 billion CFA-Francs (690 million US-Dollar) for a facility to absorb iron and other metal scraps in Western Africa. Sinapro is a scrap iron and steel company in Dakar, collecting iron, non-iron, and computer scrap for sale. The mechanics company Selmeg recycles up to six tons of aluminium a year, according to the German Company for International Cooperation (GIZ). The GIZ summed up this sector in 2021: “The metal recycling market is well-established.”

Concerning non-ferrous recycling, Gravita Senegal is a leading West African manufacturing, recycling and processing unit for lead metal, oxides, and products. The company manufactures remelted lead and polypropylene chips. Various sources include scrap from batteries, battery plates, and concentrates. According to the enterprise, Gravita manufactures lead metal by smelting and recycling followed by refining, alloying, and manufacturing lead oxide.

About 40 plastic processing companies

ProPlast is an integrated plastic recycling company specializing in the recycling of plastic waste. As a leader in Senegal, ProPlast is collecting plastic waste, transforming it, and selling recycled plastic. According to the Afrik 21 online magazine, the company will purchase more than 100 tons of plastic waste each month through about twenty “Récuplast” kiosks. Another source indicates that the units at Thiès and Kaolack specialize in the recovery, milling, and granulation of high-density polyethylene (HDPE) with an estimated combined processing capacity of up to 20 tons per year. Another plastic collecting, processing, and producing company is Transtech Industries, established in 1993. The enterprise is specialized in the production of furniture partly made from recycled plastics. “There are about 40 plastic processing companies in Senegal, concentrated

> “This market offers attractive prospects for investors interested in setting up a sorting and treatment system for special waste.”

in the Dakar region", the EU Commission gave account in 2020. According to GIZ, the Senegalese plants currently collect and purchase around 8,000 tons of plastic a year, although the actual demand for recycled plastic exceeds 15,000 tons. "This market is showing strong growth and solid development potential."

In 2021 the only paper and cardboard processing facility was Pronat. The Pronat plant consumed two tons of paper a day, covering less than one percent of national recyclable waste and less than the potential demand of seven percent. Besides that, "recycling used paper to egg trays in Senegal is feasible and profitable", says the Beston company, shipped an automatic egg tray machine from Seychelles to Senegal, and started producing 3,500 to 4,500 pieces of paper egg trays per hour in 2021. But now, the Klingele Paper & Packaging Group – with financial support from the German Development Finance Institution – wants to start a new sheet plant with two production lines in summer 2022. There, corrugated cardboard sheets from Spain will be processed into finished packaging to be predominantly used in agriculture, the fish industry, and the wider food sector.

Attractive prospects for investors

"E-waste was not yet locally regulated", the EU Commission wrote in 2020. However, the first authorized recycling center for e-waste working according to international regulations in Senegal was SetTIC, founded in 2013. Today, the company is recycling up to 70 tons of e-waste a year and wants to expand into LED lights and ink cartridges. SetTic benefits from the USAID and I&P Acceleration in the Sahel programs with a funding of 35.5 million FCFA (62,000 US-Dollar). SonaTel promotes recovery and recycling throughout the supply chain. But despite government efforts and the setup of a dismantling center, the EU Commission realized that "e-waste was not yet locally regulated". And the electronic company Gainde 2000 identifies a "non-existence of an organized WEEE management network in Senegal". It is questionable, whether "e-waste turns out to be an emerging market" – as the GIZ suggests – or not.

According to GIZ, industrial waste is treated by Sococim, whose cement plant processes tires, rags, solvents, and, on occasion, paper and plastics. And the Korean Green Growth Trust Fund, in cooperation with the World Bank Group, published a study in 2017 on "Use of alternative fuels in the cement sector in Senegal: opportunities, challenges, and solutions". But still, there are very few facilities in Senegal authorized to treat ordinary industrial waste, healthcare waste, and hazardous industrial waste. So "this market offers attractive prospects for investors interested in setting up a sorting and treatment system for special waste", the GIZ suggested.

Time to turn waste into energy

That does not apply to the organic waste reuse and recycling market, which is judged as "embryonic". There are some projections in Senegal to turn biomass to energy, for example, the bio-coal Typha valorization project or the Pilot Biogas Initiative in Ferlo, involving the development of 40 bio-digesters with animal waste being used as the feedstock. In an article on "Improvement of the Waste Management System in Senegal" published in 2018, the authors propose that "energy can be generated from animal waste, for example, at the Mbeubeuss dumpsite. The biogas heat can produce heat for onsite use and deliver excess electricity to the local grid". The same could be valid for rice, maize, and coconut residues produced in small farms and collected and processed centralized. In October 2019, "the Africa report" recommended online: "Now is the time to turn Africa's waste into energy." In February 2020, the government showed interest in a waste-to-energy plant in the Kaolack region, more precisely in Sibassor. According to Senegal's Minister of Urbanism, Housing and Hygiene, the project is "zero-waste"-bound and targets to ensure that the country achieves a zero-waste status.

Ambitions of "zero waste"

The EU Commission is convinced, that "Senegal has ambitions of 'zero waste' with many initiatives and attempts at enforcement to make this a reality". But it is also sure that "very little is implemented due to infrastructure and funding challenges". For that matter, waste management in Dakar and Senegal as a whole is fragmented and complex: "There is open discharge, no biological treatment, no formal recycling, no waste disposal infrastructure. There are collectors on waste sites who sell recovered materials (plastics, cardboard, metals, glasses, etc.) to the private sector. All this is managed and executed informal."

Until 2015, the responsibilities for waste management in Senegal were spread over several ministries; this made coordination difficult. According to the report "What a Waste 2", published by the World Bank Group, this policy created financial gaps and led to payment delays that discouraged private entities. The national government reacted by launching a National Waste Management Program in 2014, installing a Waste Coordination Unit in 2015 that structured a realistic relationship by devolving responsibilities to the private sector and adopting an Integrated and Sustainable Solid Waste Management Strategy in 2015, together with the creation of seven so-called Waste Management Agglomerations. The aftermath: "The waste management sector recovers 15 percent of operational costs, with the remaining 85 percent coming from the central government budget", the Waste 2-report indicated.

Supported policy

The investment climate improved, not at least because of a new private-public partnership law in 2015, including the following consequences:

- Already in January 2014, the Senegalese government – with the XOF 17.5 billion- (EUR 26.67 million-) support of the Islamic Development Bank – launched the Sustainable Solid Urban Waste Management Project (PGDSU) to improve solid waste management systems in the Dakar region and the communities of Tivaouane, Kaolack and Touba Mosquée.
- Among others, the Training and Awareness Project on Sorting and Collection of Household Waste was supported by the Metropolitan Agency for Household Waste (Syctom) in Île-de-France and the European Union.
- In November 2020, in Tivaouane, an anti-waste communication campaign started as the first stage of the local Plastic Waste, Waste Water and Waste Electrical and Electronic Equipment Management Project, supported with three million Euros by the Grand Duchy of Luxembourg.
- In February 2021, the Senegalese Minister of the Economy, Planning, and Cooperation, as well as President and Vice-President of the European Investment Bank, formally agreed to the new financial support of CFAF 75 billion (114.5 million Euro) for improving the drinking water supply and promoting integrated solid waste management.
- And in May 2021, the Project for the Promotion of Integrated Management and Economics of Solid Waste (PROMOGED) started. The funding of 295 million US-Dollar will come from the World Bank, the French Development Agency (AFD), the Spanish Agency for International Development Cooperation (AECID), and the European Investment Bank (EIB).

Money and efforts are needed

As can be seen, these activities would not have been realized without external financial support. Or as the EU Commission explained it: "Senegal and Africa in general, are highly dependent on external markets and already suffer from a lack of private sector investment." In 2017 and 2019 the World Bank defined it more precisely: "Investments and operation and maintenance are critically underfunded, and the funding available to the sector is limited." As proof, the bank charged up necessary expenses against actual revenues: The annual budget needed for Senegalese waste management is estimated at around FCFA 45 billion (US-Dollar 75 million), but the revenues in 2016 amounted to a budget of FCFA 24 billion (US-Dollar 40 million) consisting of the SWM tax (FCFA 5 billion), transfer from central government (FCFA 13 billion) and cross-subsidies (FCFA 6 billion). The balance: "This represents a shortfall of FCFA 21 billion." Furthermore, the bank criticized the lack of resources in secondary municipalities, because only 23 percent of the central government transfer was spent for them. Money and efforts are needed to install a functioning waste management infrastructure in Senegal. The GIZ has formulated the needs: Amongst others, 400,000 regulation bins for storage, about 1,550 waste handling and collection vehicles, then 200 standardized waste collection points, 15 recycling centers, 15 waste sorting and transfer facilities, ten controlled dumps, as well as eight treatment and disposal facilities – totaled: XOF 250 billion (381.12 million Euro) –, and finally a program for the more than 40 uncontrolled dumpsites – worth: XOF 50 billion (76.22 million Euro).

So, it must be agreed with the World Bank that "there is a need to unleash the potential for private-sector dynamism, investments, and professional SWM". Likewise, the GIZ is certain that Senegal's plastic processors require significant investment, that waste streams like rubble, tires, green waste, bulky waste, old vehicles, or WEEE offer interesting investment opportunities, and that ordinary industrial waste, health-care waste, and hazardous industrial waste offers attractive prospects for investors. And the "What a Waste 2"-report argues: "While Senegal has so far improved waste services without a traditional public-private partnership, the structural transformation in governance has created a more stable, attractive waste management sector for investors and waste management companies."

BARRIER MONOMATERIAL FILMS IMPROVE RECYCLABILITY

Spain-based Emsur Grupo Lantero's Packaging Division has launched "EM-Full RFlex", its new range of PE and PP-based flexible packaging. The new PE and PP-based product line has been developed to improve the recyclability of flexible packaging by replacing conventional duplex structures with mono-material substrates, the company gave account. The solution would provide excellent barrier properties. Furthermore, it was transferrable to different markets and fast-moving consumer goods (FMCG) packaging applications, such as bags, pouches and doy packs. As stated, the new product line is the result of the collaboration between Emsur Group, Innotech (R+D+I Centre), Emsur's Saymopack (Valencia) and Emsur SPO (Ballée) production sites.

Sri Lanka:
SYSTEMATIC APPROACH FOR REALIZING SOLID WASTE MANAGEMENT

The South Asian Democratic Socialist Republic of Sri Lanka aims at national waste management consistent with the country's conditions.

Like in other countries worldwide, increased industrial activity and lifestyles have led to fast-growing waste piles. The problem of waste management "was persistent for many years but came to the fore especially after the collapse of the Meethotamulla waste disposal site in 2017 taking lives with it," Prof. Mallika Pinnawala, Professor of Sociology from the Sri Lankan University of Peradeniya, was cited by online publication "Sunday Observer" in October last year. She was contributing to the project for Sri Lanka's Western Province solid waste management master plan initiated in 2019 and funded by the Japanese International Cooperation Agency (JICA). However, the undertaking had to halt due to the pandemic, but the plan was to resume by the end of 2021. As reported, the objective is to promote solid waste management practices and strengthen the planning capacity for solid waste management.

Since the Sri Lankan government established the country's "National Strategy for Solid Waste Management" in 2000, it has been working on solving problems in this field, JICA wrote in October 2018. Commencing with a survey in 2002, the Sri Lankan government and the Japanese organization have been cooperating in structural developments and training-based human resource development in local authorities. In 2011, they implemented the "Project for

Photo: sezerozger / stock.adobe.com

Development of Pollution Control and Environmental Restoration Technologies of Waste Landfill Sites Taking into Account Geographical Characteristics in Sri Lanka" with Japanese Saitama University and other organizations. According to the information, the five-year initiative created sustainable and applicable guidelines for planning, managing, and preventing pollution at waste disposal sites. "It also developed technologies for low-cost, low-maintenance and low-environmental impact facilities using materials that can be procured locally."

The waste situation

According to an analysis on "Plastic Waste Management", published by Sri Lankan Centre for Environmental Justice (CEJ) and the global network IPEN in 2021, around 22 million inhabitants of Sri Lanka generated 7,000 metric tons of solid waste per day. The most populated Western Province – where the economic capital Colombo is located – accounted for about 60 percent of waste generation.

Examples of Projects

Last year, a solid waste-fired thermal power station was under construction at Kerawalapitiya in Sri Lanka. The function of this facility is to use 630 metric tons of waste from Colombo and Gampaha suburbs to operate a 10-megawatt power station. Another plant under construction in Karadiyana would receive 500 metric tons of municipal solid waste per day from the WPWMA (Western Province Waste Management Authority). Most of the plastic waste would be burned at these two plants soon, the CEJ and IPEN informed.

Moreover, another undertaking is planned: the "Metro Colombo Solid Waste Management Project". It consists of two transfer stations (loading at Meethotamulla and unloading at Aruwakkalu), transportation and a sanitary landfill. The 1,200 tons of solid waste collected from the Colombo Municipal Council (CMC) area will be transferred (distance 170 kilometers) to the landfill (an abandoned lime quarry leased out to Holcim Lanka Pvt Ltd) at Aruwakkalu in the Puttalam District. Its operational lifetime has been set to ten years.

As reported by Sri Lanka Railways in 2020, power cars specially made for Aruwakkadu Waste Processing Facility had arrived in the country. The solid waste will be brought from the Kelaniya Transfer Station by rail transportation to the Aruwakkadu area.

In contrast, the country's "National Action Plan on Plastic Waste Management 2021 – 2030" stated that the generation of all municipal solid waste in Sri Lanka was currently about 10,768 metric tons per day; the collection by local authorities were only 3,458 metric tons. One-half of the uncollected waste, which contains plastics, goes to open dumps and the environment. The number of open dumpsites is estimated at 349.

As reported by CEJ and IPEN, short-term biodegradable waste accounted for a share of 54.5 percent in 2016, while the amount of polyethylene plastic/shopping bags was 10.5 percent. "In 2017, Sri Lanka was ranked fifth in the list of countries that release plastic and polythene waste to the ocean," the authors of both organizations wrote. Plastic waste generation in Sri Lanka was estimated at 1.59 million metric tons per year. Mismanaged plastic was calculated at 5.0 percent.

According to the CEJ/IPEN analysis on plastic waste management, Sri Lanka had more than 400 companies engaged in plastic processing. A total sum of 15 billion Sri-Lanka-Rupees (about 74 million US-Dollar today) had been invested in plastics re-processing in Sri Lanka. Almost half of this had come through foreign direct investments. "Out of this 66 percent of this total investment is exclusively for re-processing of plastic products for the export market." The main polymers used for producing single-use plastics were HDPE, LDPE, PET, PP, PS, and EPS. The report stated that the capacity of the local plastic processing industry at that time was nearly 140,000 metric tons per annum with an annual average growth rate of around 10 to 12 percent.

Sri Lanka exports plastic: primary forms and finished products. Nearly 40 percent of the total exports of plastic products are going to the USA market, the figures (2019) of the country's Export Development Board were cited. Products such as sacks and bags, apparel/clothing accessories, and cellulose manufactured through plastic processing, are directly and indirectly sold abroad. As far as Sri Lanka's im-

The objective is to promote solid waste management practices and strengthen the planning capacity for solid waste management.

Investment Opportunities

Sri Lanka's Investment policy aims towards realizing national sustainable development goals and is grounded in the country's overall development strategy. The Board of Investment (BOI) of Sri Lanka, established in 1978 under the name "Greater Colombo Economic Commission", is the apex agency for foreign direct investment in the country. "In carrying out its primary function of investment promotion, the BOI aims at sector-based investor targeting, while specializing in aftercare, navigating and regulating investor operations to reach its true and highest potential throughout the lifespan of the enterprise", the homepage (https://investsrilanka.com) informs.

There are also several portals where one can find tenders regarding waste management and treatment in Sri Lanka: www.etenders.lk, www.tendersontime.com/sri-lanka-tenders, www.tendernotices.lk

ports are concerned, every year around 500,000 metric tons of total plastic (raw material and articles made of plastic, furniture and toys) enter the country. The lion's share (70 percent) of the imported plastic is used locally. According to estimations, Sri Lanka earned two million US-Dollar foreign exchange via imports and exports of plastics.

As reported, the government has taken many initiatives to improve waste management systems in the country, such as developing policies, strategies, guidelines, legislation, and the provision of infrastructure facilities for waste management. The local authorities of the respective areas are responsible for waste management in Sri Lanka. For example, the issue of plastic waste is more acute in the Western Province, CEJ and IPEN informed. Here, a new authority has been established and regulations formulated. Furthermore, several recycling projects were implemented. Additional projects are planned.

Although the Sri Lankan government had taken legal and policy interventions, the "National Strategy for Solid Waste Management (2000)" and the "National Policy on Solid Waste Management (2007)" were not implemented properly due to various reasons. Therefore, the "National Waste Management Policy" was formulated in 2018. In this policy – although not directly identified – plastic waste is included. The Sri Lankan government introduced a range of prohibitions on plastic materials such as bans on "the manufacture of polythene or any polythene product of twenty (20) microns or below in thickness for in-country use", to control plastic waste, CEJ and IPEN gave account. The same applies to the sale or use of polythene or any polythene product, which is twenty (20) microns or below in thickness. According to the information, "polythene" means using raw materials (like polyethylene, polypropylene, polystyrene, polyvinyl chloride, polyethylene terephthalate) for carrying, packing, wrapping or packaging. Some exceptions exist inter alia for medical or pharmaceutical applications. By 2021, single-use plastic items – like sachet packets used for shampoo or gel, plastic bottles containing pesticides, cotton buds and toys – are banned. In addition, Sri Lanka has prohibited the import of post-consumer material.

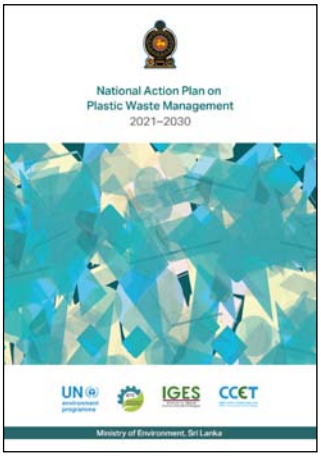
National Action Plan on Plastic Waste Management

Last year, the "National Action Plan on Plastic Waste Management 2021 – 2030" was published. The Sri Lankan Ministry of Environment has drawn up the report with technical assistance from the IGES Centre Collaborating with UNEP on Environmental Technologies (CCET) and financial support from the Ministry of Environment Japan (MOEJ).
The plan describes the actions that Sri Lanka needs to follow on the principle of the 3Rs (Reduce, Reuse, Recycle), and covers the entire lifecycle of plastic waste management from importation and processing to use, collection and disposal. One of the key activities of the plan "is to facilitate collection of segregated plastic waste and its recycling as a profitable business to produce quality raw material for the plastic industry," the information says.

There are 11 main goals, amongst others the aim to achieve 80 percent collection of recyclable and non-recyclable plastics and e-waste containing plastics from households. Regarding recycling, goals 9 and 10 are important:

- Increase plastic waste recycling from four percent to 15 percent by 2025, ensuring quality, health and safety requirements.
- Increase PET bottle collection and recycling rates from 27 percent to 100 percent by 2025 to ensure the production of safe, high-quality, durable products.

Concerning disposal, the plan requires to "limit final safe disposal of plastic waste to non-recyclable and/or non-reusable residual plastics by 2025 and/or reused by 2025".



Source: Ministry of Environment (MoE), Ski Lanka

■ www.unep.org/ietc/resources/report/national-action-plan-plastic-waste-management-2021-2030

“EVOLUTION SERIES” OF COATING PRODUCTS FOR ENHANCED RECYCLING

Flint Group Narrow Web has introduced two new UV-flexo coatings, which improve the recyclability for shrink sleeves and pressure-sensitive labels.

Photo: Flint Group

According to the company, the two new coating products, only available in North America, would soon be available in Europe and other regions. Using different chemistries, the “Evolution Deinking Primer” for shrink sleeves, and the “Evolution Caustic Resistant Overprint Varnish (OPV)” for self-adhesive labels, were designed to increase the yield of material in the recycling process. “Both coatings have been recognized by the Association of Plastic Recyclers to comply with the critical guidance for PET packaging,” Flint Group Narrow Web assured.
As reported, the Evolution Deinking Primer is a coating used on shrink sleeve materials that makes the ink release in the caustic bath of the recycling process. “When used with crystallizable polyester shrink sleeve material (CPET), the primer keeps the ink anchored to the substrate through the usable life of the sleeve but releases it in the caustic bath. The ink is removed from the sleeve material without contaminating the valuable bottle flake. The materials are rinsed and pelletized into recycled polyester (rPET) for reuse.” The product would work with Flint Group’s EkoCure® XS flexo inks that are specially designed for shrink sleeves.

The Evolution Caustic Resistant OPV is a UV-flexo overprint varnish to facilitate recycling PET bottles utilizing pressure-sensitive labels. “The varnish minimizes contamination of the wash water and bottle flake in the caustic bath by keeping the ink secured to the label substrate. When immersed in the float-sink bath, the label is released from the bottle and floats to the surface where it is separated from the bottle recycling stream.”

As stated by Flint Group, both products are “plug and play” solutions that enable better recycling without impacting the quality or application performance.

www.flintgrp.com

PolyAl:
A TWITTER FORGES AHEAD

The recycling of used beverage containers like TetraPak is difficult. Parts of these liquid food cartons are compounds, arduous to separate and to recover sorted. Even after recovering 75 percent of cardboard, a foil mixture of polyethylene (PE) and aluminum (AL), as well as high-density polyethylene (HDPE) originating from the caps, remains. Is this mixture called PolyAl recyclable?

The Dutch industrial designer Dave Hakkens is skeptical: In his eyes, "plastic-aluminum mix is usually moist, and may have parts of paper fiber, and other materials such as metal, sand, glass and wood coming from the household collection streams". The material is said to be bulky and heavy as it often contains water, which increases expenses so that the logistics costs are high compared to the material value. Accordingly, this so-called reject in earlier days has mostly been thermally used in cement plants or could only be converted into few products after extrusion. On the other hand, the material properties of PolyAl compared to LDPE show a slightly higher heat conductivity, a unique and sparkly appearance, and an aluminum content (up to 20 percent) that may affect mechanical properties but is generally not an obstacle for extrusion.

Gasification plant Corenso closed

There can be no doubt that the industrial handling of the material causes difficulties. Packaging blogger Bruno Rey characterized the situation in June 2018 like this: "Today, only about half of the globally available plastic-aluminum mix is recycled, and it presents a series of problems: very

Photo: O. Kürth

few uses, variable quality, logistic costs." Obstacles occurred by separating aluminum and LDPE at the deployment of two Stora Enso facilities, for example.

In 2001 Corenso, owned by paper giants Stora Enso and UPM-Kymmene, opened a recycling plant using a bubbling fluidized-bed gasification technology developed by VTT (Technical Research Centre of Finland) in Finland. The plastic was turned into gas, and the aluminum was removed from the gas as a fine powder. Aluminum recovery from the process was specified at about 3,000 tons a year. The resulting material was said to be fit for the metal industry. But it contained coal-like particles, required further reprocessing, and could additionally be hampered by oxidation. The plant closed in 2010. Today, Corenso is a European and Chinese supplier of coreboard and cardboard tubes.

CLEAN – a LIFE Project

The progression of another Stora Enso plant suffered a similar fate. The Finnish producer of paper and cardboard packaging resorted to a new pyrolyze plant in Barcelona and the use of confectionary production waste, in partial replacement of virgin cellulose, the so-called ECO paper. Bruno Rey commented that "the evaporated gas can be used to generate electricity while the aluminum remains un-oxidized and can be recycled and remelted without problems to be used to make new aluminum products". The aluminum was left in the reactor as small flakes, that were cooled down, cleaned up (by filtering), compressed into briquettes, and sold back to the aluminum industry as a raw material. The technique executed and titled "CLEAN – Converting Laminates into Energy and Aluminium for the benefit of Nature" was even a LIFE Project, supported by the EU in 2010. The team planned to build and operate "Europe's first facility that can fully recycle brick cartons" and foresaw the construction of three plants in the next five years.

Barcelona Cartonboard plant sold

But in 2015, Stora Enso decided to focus on "high-quality virgin-fiber products" instead of "recycled-fiber-based consumer board" and divested its Barcelona mill, which closed in 2016. Stora Enso's head of division Jari Latvanen argued: "Despite positive results development in recent months, the Barcelona mill requires further development effort and investment if it is to remain on a profitable path. I believe that the mill can operate more efficiently under the new ownership." (Barcelona Cartonboard was signed over to Munich-based private equity fund Quantum. Two years later, it was signed over to the Reno De Medici Group, Europe's second-largest producer of carton board made of recycled fibers.)

Resistant to mold and mildew

These samples not only illustrate that in 2015 the separation into two streams of polymers films and aluminum flakes was at least "done in relatively large scale in a few countries (e.g. through gasification in Finland or pyrolysis in Spain)", as Dave Hakkens gave account. They also prove that for the beverage carton recycling branch PolyAl recovery was (and is) not primarily targeting the recycling of aluminum. NBR, for example, a Spanish recycling company, recently invested in a technology to turn used plastic into plastic pellets to be sold. In cooperation with TetraPak, NBR tested the best use for the material – making plastic pellets or other products such as ACM boards and injected hoses. French Guéry SAS delivers a special PolyAl – the material is described as "highly resistant to impact, weathering, oils, dyes and acids", water-repellent, resistant to mold and mildew, and 100 percent rot-proof.

TetraPak cooperation

Moreover, the international cooperation of TetraPak demonstrates the use of PolyAl first of all for plastic and paper purposes. Since 2007, TetraPak has been working with the Brazilian recycler Revita and recently invested in a new process on Revita's plant, which increases the capacity to process and clean PolyAl. Malaysian Think City KL, a partner since February 2018, recycled PolyAL panels and tiles to

build concept micro houses. Newly installed equipment at BioPappel, the biggest manufacturer of paper products in Mexico and Latin America, now also allows the recovery of up to 85 percent of PolyAl from used duplex beverage cartons. And since more than ten years, Indonesian PT. Leo Graha Sukses Primatama recycles used beverages cartons into recycled paper; in 2018, they started recycling the polymer and aluminum layers of these cartons into roof sheets.

Brazil producing roofing tiles

Many recycling activities for used beverage cartons in Brazil led to the same final result: In 2019, a total of 15 companies processed PolyAl to produce roofing tiles and plates. The biggest recycler of Tetra Pak used beverage cartons in Brazil has 18 machines installed and a capacity to treat 400 tons of PolyAl per month. Tetra Pak helped to develop the system and is also involved in the production process. Among the Brazilian companies, the plasma-based melting process developed by Alcoa Aluminio and TSL Ambiental stands out. A scientific article on the pyrolysis of TetraPak characterizes their facility as "the first plant in the world that can separate the paper, aluminum and plastic components used in packaging cartons by using plasma technology". According to one source, the 1,500°C plasma melted aluminum was contaminated with residual fibers, and so the operation was ceased in 2010. But another source tells of temperatures up to 2,000° C that still enable liquidation, low concentration and recycling of both Al and Al2O3.

Global demand for PolyAl

The material of PolyAl is going to be needed globally – in a wide range of processing and recycling materials. In South Africa, retail designer and manufacturer Barrows Global created a new product out of PolyAl. Unlike temporarily usable units made of corrugated board and plastic, the company delivers a display with a permanent upcycled core structure. "The Barrows' vision is to divert 35 million long-life cartons from landfill in PolyAl units", the Engineering News gave account. Also reusable for other presentations, the material requires 90 percent less corrugated board, needs 37 percent carbon, and saves up to 20 percent of costs; the displays are to be uplifted and recycled into new units at the end of 24 months. In Australia, Re>Pal company with its main factory in East Java, Indonesia, uses a unique and trade marketed technology process called ThermoFusion that delivers "zero waste pallets made from 100 percent waste plastic". The company is sure to re-recycle TetraPak material into Re>Pal pallets ad infinitum with other materials or new TetraPak recycled material. In Malaysia, the Careton Project started in 2012. Since then, it provided enough roofing tiles and panel boards – recycled from Tetra Pak – to build over 150 homes and community infrastructures. In 2019 the team planned to recycle and convert drinking packs into about 1,000 PolyAl panel boards.

An investment in future

In the Netherlands, Fauna Birdproducts BV put some products such as bird feeders on the market made from PolyAl by Recon Polymers BV, an environmentally aware Roosendaal located start-up. In Germany, Palurec GmbH, founded as a wholly-owned subsidiary of Fachverband Getränkekartons für flüssige Nahrungsmittel e.V. (FKN), has invested in the construction of a recycling plant, targeting a recycling rate of beverage cartons to far beyond 90 percent. Cooperating with Veolia and TetraPak, Furukawa Electric in Japan in 2019 announced a new technology to regenerate single-use plastics and waste paper into higher strength reinforced plastics using a unique single process; the material can be used in cable-related products. Plastigram Industries in the Czech Republic GI has developed and tested the difficult-to-process remains of used beverage cartons after paper recycling on an industrial scale technology for recycling. According to the company, the process allows for the recovery of plastics in the form of LDPE re-granulate, HDPE regrind and aluminum powder. A key objective of the industry's new pan-European recycling platform EXTR:ACT is to focus on scaling up the recycling of the PolyAl fraction. Moreover, the platform wants to monitor technologies that may contribute to this aim. And recently, in March 2021, Tetra Pak Arabia signed an agreement with the Saudi Top Plastic factory aiming at recycling the PolyAl materials. "Our investment in recycling is an investment in our future", Said Hussam Nasser, Sustainability Manager Arabia Area at Tetra Pak, underlined.

In 2016, the treatment of used beverage cartons and especially of PolyAl had become accepted globally. According to Rodney Reynders & Hussam Nasser, active recycling of used beverage cans (UBCs) in 2016 was practiced in 43 countries, accompanied by trans-border shipments taking place in several markets. Decidedly active PolyAl recycling was practiced in 24 countries. And 160 active recycler entities (some with several sites) were recycling PolyAl, while 37 plants were recycling polymers and aluminum. Its recycling outputs included secondary raw materials and agglomerated materials for the manufacture of molded products.

Relying on PPP

At least in 2017, TetraPak was "relying on public-private partnerships with materials recovery facilities and communities, including in China, to overcome the export hurdle", according to an article by the GreenBiz online magazine. Apart from smaller volumes of post-consumer cartons exported to China, most of the material is treated locally. A

Tetra Pak Group spokeswoman is quoted by GreenBiz, “that the company is working on the ground in China to secure local infrastructure for carton recycling.”

Chinese initiatives

China itself was also interested in separating the plastic and aluminum from PolyAl in its own country. According to a dissertation paper at the University of Exeter, the commercialized technology of Shandong Tianyi Plastic Company Limited (Tianyi) reached a separation purity of 99.5 percent already in 2009. Meanwhile, the price of the material has increased from around ¥ 1,200 per ton for the mixture of plastic and aluminum to ¥ 2,000 per ton for separated plastic grains and ¥ 9,000 per ton for aluminum. Jun Yang, Founder and CEO of recycling enterprise Fulun, is cited: “After we implemented the PolyAl separation line, the value of the UBCs has increased by 30 percent, and our monthly sales increased by 25 percent.” The Hangzhou Fulun Ecological Technology Co., Ltd. company was founded in 1994, putting a long-term focus on recycling aluminum composite paper-plastic packaging. As the company’s website indicates, Fulun possesses a beverage box “paper separation” and “aluminum-plastic separation” patent technology, that for the first time in China, reduced the “abandoned beverage carton” to “paper, plastic, aluminum”. As well as Beijing-based recycler Xinhongpeng Paper Industry Co., Ltd., which also installed the technology with Tetra Pak’s support, Fulun agreed to recycle more UBCs with the “extra profit”. In 2019, a paper on “Sustainable Initiatives in China” made clear that Xinhongpeng processed about 10,000 tons of waste packages every year, with an annual output of about 6,000 tons of recycled paper and 250 tons of aluminum powders. The company planned to increase its waste handling capacity to 30,000 tons per year.

China import ban until 2018

Of course, China was keen on imports. One of these transports – 200 tons from the carton recycling facility of Sonoco Cores & Paper Ltd. in Halifax to the Xiamen LH Environment Protection Industry Development Co. Ltd. – is illustrated by its Duty-of-Care documents in 2014. As described by ACE UK, the Alliance for Beverage Cartons and the Environment Ltd, acting as waste producer, the carton recycling facility in Halifax separated the fiber from the PolyAl. As a Green List waste, it was exported under code B3010 as „Polyethylene“ to China to be delaminated for the aluminum and both elements recycled. Four years later, in June 2018, the facility in Halifax with investments made in 2013 got into difficulties following the Chinese National Sword and its restrictions. The import ban for several types of waste imposed by Chinas left the rest of the world on about PolyAl. The owners of the Halifax plant had to react. Mandy Kelly, ACE UK senior recycling manager, disclaimed that any of the material was landfilled. But she could not deny that the company had “temporarily” incinerated material in energy recovery facilities.

Since then, no official statements, data or figures on shipped or banned quantities of PolyAl are available. But it can be suspended, that this material – former classified and exported as Polyethylene – is further exported to China. Waste and scrap ethylene polymers and remnants and waste and scrap polyethylene terephthalate and remnants are mentioned in the list of solid waste to be included in the Catalogue of Banned Import Solid Waste Effective as of the End of 2018. And it is implausible that PolyAl was among the 14,000 tons of all plastic waste exported from the EU to China in 2019 – residual from about 1.4 million tons in 2016.

Four recycling technologies in principle

Not just since then, scientists have investigated the possibilities of PolyAl-treatment using different processes. TetraPak associates Rodney Reynders and Hussam Nasser speak of four recycling technologies in principle. Accordingly, they speak of the thermo-mechanical principle through pyrolysis, gasification or volatilization, where heat is used to separate the polymers from the pure aluminum. The mechanical by agglomeration or densification recycles PolyAl as a multi-material compound or as a separation of the components for further material recycling. The chemical method uses delamination or solvent separation to transform the PolyAlinto separate material streams. And finally, the recycling of the carton by composite extrusion, where the multi-material compound of PolyAl and fibers can be mixed with other polymers and bonding materials.

Foto: Petra Hoeß, FABION Markt + Medien / abfallbild.de

Only few technologies put into practice

According to a study on current trends and new developments in 2017 by Jan Zawadiak et al., many technologies based on material recycling of PE-AL to high-quality products "have not been fully mature, yet". They reach from simple hot-pressing of the material to injection – or rotational – molding procedures into finished products. Depending on the technique, the results have to deal with unwanted coloration or uneven textures and face difficult marketing. The acid-based delamination was the first industrially performed technology, which was able to obtain aluminum in a very pure form. But it depends on fiber content and HDPE contaminants. The solvent-based PE extraction is based on dissolving PE and separating dissolved particles, but the removal of solvent seems to be problematic. Additionally, different levels of organic carbon contamination can affect the purity of aluminum. The conclusion of the study ran: "From many perspective technologies, only a few have achieved industrial level implementation." (Few in that sense means few technologies, not the number of plants referring to them.)

Problematic, but effective

A study on the "Application of Switchable Hydrophilicity Solvents" by Chiara Samorì et al. in 2017 was concerned with techniques for the separation of LDPE and aluminum. It evaluated that the thermal approach is problematic because the quality of the recovered aluminum could be hampered by oxidation and/or char residues. And the chemical strategy for solubilizing the LDPE and precipitating the aluminum has to deal with few and questionable solvents. Besides that, too harsh conditions could influence the extrudability of the recovered LDPE or the melting of aluminum flakes and could affect the commercial value through quality and purity. Nevertheless, the study supports the application of switchable hydrophilicity solvents resulting in a recovery rate for aluminum of > 99 percent and efficiency for the metallic form of 86 percent.

Microwave-induced pyrolysis most viable

An apparently successful separating technique is driven by Enval, a spin-off from the University of Cambridge and a part-financed project of the European Union. During the process, shredded plastic aluminum laminates are mixed with carbon. The carbon is exposed to microwaves. The plastic component degrades to form a mixture of hydrocarbons, cooled down, and separated into suitable gas and oil. "The fragile aluminum foil remains undamaged during this process and can be recovered in solid form, clean and ready for reprocessing. According to the group's website, the "process is the only one in the world capable of recycling plastic aluminum laminates by splitting them into aluminum with a low-carbon footprint and high-value oil." The material reaches a purity exceeding 98 percent and a minimum metal yield of 80 percent. It can be reintroduced to the re-smelting process. Depending on the feedstock, 200 to 400 tons of aluminum can be produced annually. The first plant in Alconbury began operation in 2015; a second plant was being planned for the north of England. In the opinion of Gordon L. Robertson, author of a comprehensive and detailed overview on the different methods, a novel microwave-induced pyrolysis process appears to be the most commercially viable.

Without profitable or subsidized economics, beverage carton collection, sorting and recycling will not expand.

A theoretical yield of 100 percent

Recycling technology is only as good as it may help to produce marketable goods. The study of Zawadiak et al. in 2017 expressed it that way: "An important factor that will shape the industry is the possibility to expand the market for finished goods directly made out of PE-Al." Already in 2015, Dave Hakkens said that there is "a need for solutions within Europe to create more valuable applications from the polymer-aluminum mix produced", especially in countries with small volumes and impossible separation of used and collected beverage cartons. For Gordon L. Robertson, it is clear that there are several recycling options for aseptic beverage cartons, ranging from construction materials utilizing the whole carton with hydrapulping to recover the paper fibers and various processes for the treatment of PolyAl residual. But he presumes, "that the focus in future years is likely to be on recycling cartons into construction materials where there is a theoretical yield of 100 percent compared with 75 percent for hydrapulping".

For further expansion of TetraPak material and particularly PolyAl recycling, Gordon L. Robertson points out that well-considered investment, sufficient recycling capacity and the development of economically viable markets for the materials are needed to be successful. Moreover, first of all, adequate collections and sorting infrastructures in many countries are necessary. Without profitable or subsidized economics, beverage carton collection, sorting and recycling will not expand.

Poland:

AIM TO TRIPLE THE RECYCLING CAPACITY OF BEVERAGE CARTONS

Photo: Tetra Pak International S.A.

The investment in a complete recycling solution is set to improve recycling throughout Central and Eastern Europe, Tetra Pak and Stora Enso informed in a joined press release. Stora Enso will invest 17 million Euro into a new repulping line at Stora Enso's Ostrołęka production unit in Poland. As reported, the line will triple the annual recycling capacity of used beverage cartons in Poland from 25,000 to 75,000 tons. "This will allow recycling of the entire volume of beverage cartons sold in the country as well as ones from neighboring countries, including Hungary, Slovakia and the Czech Republic."

Apart from Stora Enso's investment, Tetra Pak – along with Czech company Plastigram – will invest a total of 12.1 million Euro to build an additional line, which is to recover and separately recycle the polymers and the aluminum, using a patented separation technology. The company has developed and tested on an industrial scale a technology for recycling PolyAl, the remains of used beverage cartons after paper recycling. According to the information, both lines are expected to be operational by the beginning of 2023. The separated materials will be used as raw materials for various end applications. Recycled fibers will be integrated into Stora Enso's recycled board. The separated polymers and aluminum will be given a second life in the form of different kinds of products, such as crates and foils.

"The investment aims to contribute to the development of a circular economy at a country level," Stora Enso and Tetra Pak underlined. "It will also be fully aligned with the European Green Deal. The collected cartons will be managed in an environmentally sound manner, making full use of the materials resulting from the recycling process."

www.tetrapak.com, www.storaenso.com, www.plastigram.eu

Advertorial:

RECYCLING OF SLAGS AND FURNACE BRICKS IN NON-FERROUS METALLURGY

Haver & Boecker Niagara: With a view to optimized process flow for the recycling of non-ferrous metals.

Photo: Haver Niagara GmbH

Non-ferrous metals are indispensable for the economy of highly technical industrialized countries. On the one hand, they provide a basis for existing technologies in electronics and electrical engineering, mechanical and automotive engineering, and the construction sector. And on the other hand, they also form the essence of future-focused technologies in many cases. Against this background, non-ferrous metals are an integral part of different options for minimizing climate-damaging greenhouse gases. Nevertheless, the primary and secondary metallurgical processes of non-ferrous metallurgy rank among the most energy- and raw material-intensive processes worldwide, but also offer great potential for improvement along the entire value chain.

Accordingly, Haver & Boecker Niagara is working intensively on optimizing the process flow in the treatment of non-ferrous metals by developing technically sound solutions that meet economic efficiency, sustainability and climate protection.

Resource-saving handling of non-ferrous metals

Based on the statement of the Federal Republic of Germany, represented by the Federal Ministry for the Environment, Nature Conservation and Nuclear Safety, non-ferrous metals can be remelted and refined repeatedly without affecting the quality of the metals. Every form of recycling, however, is always associated with energy consumption. Therefore, for sustainable resource management, the focus has to be on reducing the total material input.

With that in mind, it is important to know the production of non-ferrous metals also generates different internal waste streams during production, such as slags, drosses, sludges and filter dust. These wastes are often recycled internally or externally as well. Overall, recycling offers major advantages in resource conservation compared with primary production. However, this process is not yet optimally mature at present.

In addition to the issue of material efficiency, energy supply is also a key factor. The energy consumption for melting the raw materials depends on the metal and the type of melting furnace used. Production from secondary raw materials (recycling) is generally associated with much lower energy consumption. That is particularly clear in the case of aluminum, where the saving compared with primary aluminum production is around 95 percent. Optimized processes and heat utilization have already significantly reduced energy consumption in recent years, the German Federal Ministry for the Environment, Nature Conservation and Nuclear Safety further note.

The solution for resource-saving melting furnaces

It is often necessary to adjust the granulometry of the non-ferrous metals-containing materials to operate the melting furnaces in a resource-saving manner and close to the process engineering optimum. The Head of Sales and Projects Department at Haver Engineering GmbH, Dr. Jan Lampke, takes a closer look at this process: “In plain language, granulometric adaptation of the materials containing non-ferrous metals means: dust and sludges must be pelletized, bucket excavated material, furnace bricks and slag must be crushed!”

On the other hand, the interplay between environmental protection and economic efficiency should not be ignored: “There is no doubt that the greatest lever for energy and resource savings is tailor-made process engineering that understands the technical requirements and meets the economic benefit”, adds the expert.

Dr. Lampke emphasizes the close cooperation with customers and the expertise of the service and sales staff as decisive factors for the development of efficient processing techniques in the field of non-ferrous metal-containing materials: “Our service and sales staff have kept up an intensive exchange with our customers worldwide for more than 130 years. Thus, our engineers not only have experience in the development of innovative machines for packaging and processing technology but also in the operation of the plants. This know-how has been used in plant engineering for decades. Storage, feeding, mixing, pelletizing, screening, packing, and conveying are our core competencies, which are profitably and forward-looking interlinked by intelligent automation technology. In this context, the processing of raw and residual materials is not rocket science, but only the intelligent linking of different machines and processes, whereby the material properties of the raw materials, as well as the products, always represent the decisive component of the selection process.”

Niagara customized processing plant for the recycling of furnace bricks and slag

The company’s years of experience, in-depth knowledge in the field of processing of non-ferrous materials, and the ability to develop sustainably and, at the same time, economically efficient solutions have led a well-known customer from the non-ferrous metallurgy sector to entrust the team with the realization of its vision, namely the development of a customized processing plant for the recycling of furnace bricks and slag.

The plant, which consists of a three-stage crushing process with an intelligent rejection of non-crushable foreign bod-

ies and various classification stages, will soon be installed at the customer's site. Up to 100,000 tons of non-ferrous slag and furnace bricks with a feed size of up to 0.5 m will be crushed to 0/2 mm so that the recycle can be pneumatically conveyed to or into the kiln. This is a classic brownfield project, whereby the stationary plant is implemented in the existing recycling process. The limited space available and the connection to the complex plant infrastructure represent an additional limiting component for the compact plant.

The project manager, Mr. Benjamin Gurra, emphasizes the importance of the in-depth research and development analyses in Haver & Boecker Niagara's new technical center at Haver Engineering GmbH for the success of the project: "As part of a feasibility study, the furnace bricks and slags were first analyzed and the target parameters defined with the client so that the physical and chemical properties of the relevant non-ferrous metal-containing materials were then determined at the HAVER Institute and tests were carried out at the HAVER ENGINEERING GmbH technical center for crushing, classification and analysis of the pneumatic conveyability of the crushed material", shares Mr. Gurra.

The Haver & Boecker Niagara team further clarifies that these findings allowed the entire plant layout to be modeled and calculated using Niagara NIAflow, a simulation software for all types of mineral process engineering applications. This simulation allowed the comparison and evaluation of different concepts. Thus, the preferred option could be worked out as part of the basic engineering to check how the required plant constellation could fit into the existing infrastructure.

All further steps were also in line with the already preserved Niagara Project Management System, with the client placing great emphasis on the early involvement of all stakeholders. In particular, he took into account the relevant authorities, especially to prove that all resulting restrictions from the German Federal Immission Control Act (BImSchG) regarding harmful environmental effects due to air pollution, noise, vibrations and similar processes were met and even exceeded.

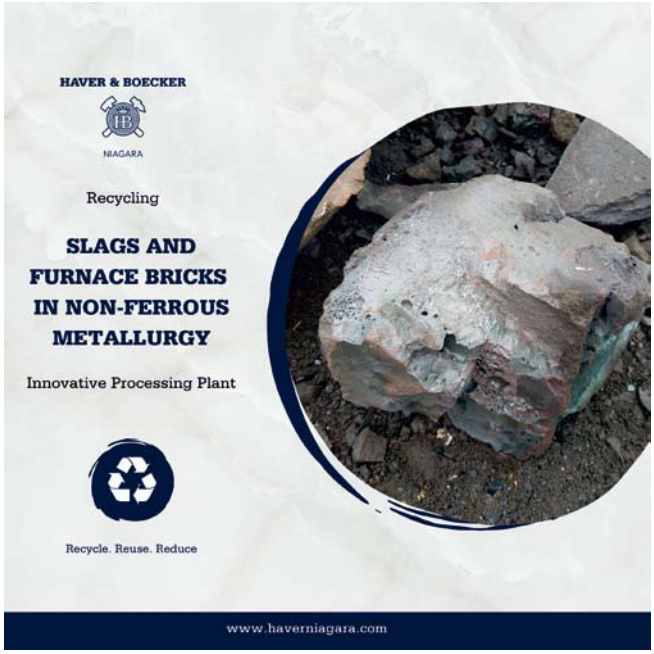
Haver & Boecker Niagara: The heaviest machine in Europe

The Niagara team has achieved another feat in this project: the construction of the heaviest screening machine in Europe. Dr. Metodi Zlatev, Head of Sales and Projects Department, provides additional information: "In a few months, also in the non-ferrous recycling sector, the heaviest screening machine in Europe with a weight of 61 t (including insulating frame to minimize dynamic forces) will be used for screening bucket spoil. However, this dimension is not so much a result of the process engineering aspects, but rather to the high safety requirements of the operation due to the enormous cyclic loads."

"The high-performance screening machine for efficient dry and wet classification is actually used in typical mining applications but will also be able to demonstrate its advantages in metallurgy," believes Zlatev. "Last but not least, our machines and plants are also used in iron and steel metallurgy. For example, in the recycling of blast furnace slags, granulated blast furnace slags, and in the very material-specific recycling of individual steel mill residues," adds Zlatev.

Based on all these innovative solutions and Haver & Boecker Niagara's diversified product portfolio, Niagara Team is confident that today's reality, characterized by the enormous impact of environmental, economic and political changes, must be separated from the term "impossible". Thanks to its unconditional dedication, years of know-how and innovation-promoting collaboration with customers, this project to optimize the process flow of non-ferrous metals processing has been achieved and the impossible has been attempted to reach the possible. As a result, Haver & Boecker Niagara offers the Perfect Flow for every process, plant and customer. Be part of this vision – move the future in its Perfect Flow together with Haver & Boecker Niagara!

www.haverniagara.com



Source: Haver Niagara GmbH

NEW TECHNOLOGY TO MAINTAIN THE MECHANICAL STRENGTH OF PLASTIC WASTE

Japan-based chemical company Green Science Alliance has received a license agreement from Fukuoka University to carry out a new recycling technology that can recover the mechanical strength of plastic waste relatively simple and effective.

Professor Shigeru Yao from Fukuoka University, Japan, has been researching plastic waste from the polymer physics aspect of view. Therefore, the Japanese researcher and developer of advanced materials in the field of energy and environmental science gave account. “He has clarified that the deterioration of mechanical strength of plastic waste is not due to chemical break down of polymer main chain; however, it is caused by inner crystal structural changes within plastic.”

According to Green Science Alliance, professor Yao had observed that mechanical strength, especially toughness, can be recovered by optimizing the re-pelletizing process. “In addition, he has theoretically and experimentally elucidated first time in the world that the mechanical strength of plastic waste can be regenerated as strong as a new plastic pellet under certain processing conditions. He has also developed a new type of extruder, which can reproduce this revolutionary plastic recycling technology with low cost but high efficiency.”

Until now, it was common sense that mechanical properties of plastic products were decayed over years and the plastic pellets made from plastic waste were also mechanically weak, the company explained. Therefore, using plastic pellets made from plastic waste was limited due to their poor properties. “However, plastic pellets reprocessed by this new innovative technology are expected to create new plastic molding products from plastic waste with high mechanical strength. This can be an amazing technology to reduce plastic waste quantity in the world.” This technology can be classified as material recycling, Green Science Alliance emphasized. Mechanical strength recovery is changeable depending on the type of plastic waste and on re-pelletizing process conditions. “However, the detailed development and analysis are under progress.”

Green Science Alliance has obtained a license agreement with Fukuoka University and installed the new extruder, that can carry out this technology in the company. They intend to further research and develop the technology by cooperating with Fukuoka University and other companies for performing custom testing, measuring, and analyzing properties of pellets made from various types of plastic waste. For a long-term plan, Green Science Alliance aims at supplying a large number of plastic pellets made from plastic waste as their business.

Some of the company’s other technologies (biomass biodegradable resin, next-generation rechargeable battery, fuel cell, solar cell, quantum dot, metal-organic framework, etc.) are registered by the United Nations Organization (UNIDO’s platform “STePP”, WIPO GREEN). Moreover, they were selected as finalists on the startup incubation program of UNOPS GIC KOBE Japan in 2020, the information said.

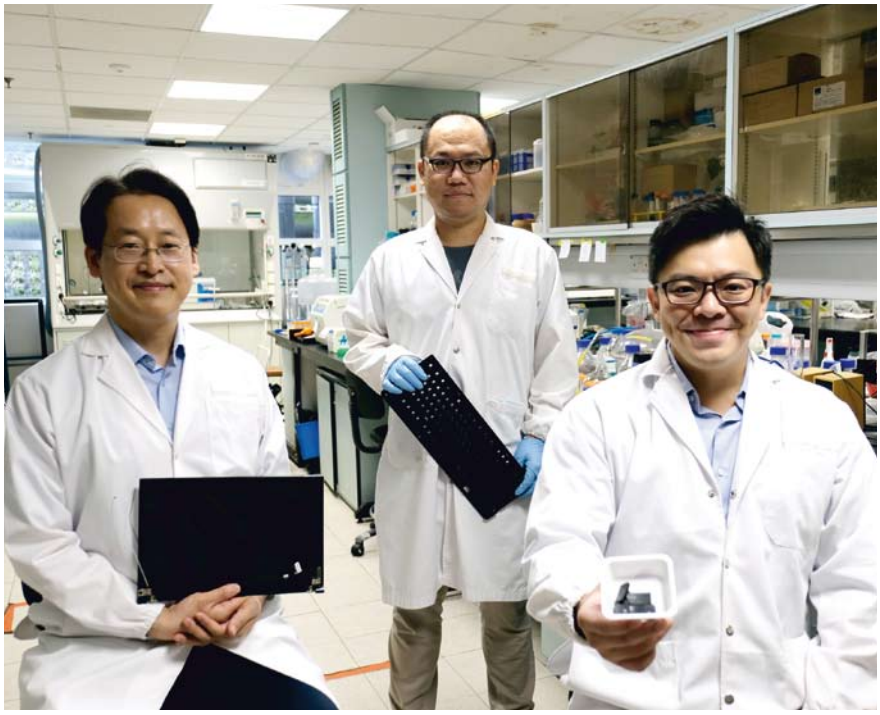
www.gsalliance.co.jp/en
www.fukuoka-u.ac.jp

NTU SINGAPORE SCIENTISTS DEVELOPED UPCYCLING METHOD FOR E-WASTE PLASTICS

E-waste plastics are rarely recycled due to their complex composition and hazardous additives. Scientists at Singaporean Nanyang Technological University (NTU) have developed a new use for e-waste plastics: repurposing them as an alternative to the plastics used in laboratory cell culture containers, such as Petri dishes.

The team of NTU Singapore-CEA Alliance for Research in Circular Economy (SCARCE) repurposed the e-waste plastics, subjecting them only to sterilization before being trialed in lab experiments. The team found that over 95 percent of the human stem cells seeded on plastics scavenged from discarded computer components remained healthy after a week, a result comparable to cells grown on conventional cell culture plates.

According to the information, these findings, described in a study published online in the scientific journal Science of the Total Environment, indicate a potential new sustainable use for e-waste plastics, which account for about 20 percent of the 50 million tons of e-waste produced worldwide each year.



Scientists at NTU Singapore have developed a new use for plastics found in e-waste, which is rarely recycled – by repurposing them as an alternative to the plastics used in laboratory cell culture containers, such as Petri dishes

Repurposing them for cell culture in the lab would not only allow maximum value to be recovered from e-waste plastics, but also help to reduce the amount of plastic waste generated from biomedical research, said the NTU research team. As reported, a study in 2015 had estimated that 5.5 million tons of lab-related plastic waste, including cell culture dishes, were generated globally in a year. “These new findings build on a 2020 study led by the same NTU team, which investigated the effect of e-waste plastics on six different human cell types and found healthy cell growth despite the hazardous elements to be found in e-waste plastics,” the university informed. According to Assistant Professor Dalton Tay of the NTU School of Materials Science and Engineering and School of Biological Sciences, who led this interdisciplinary study, repurposing e-waste plastics for immediate use rather than recycling them enables extending the lifespan of e-waste plastics immediately and minimizes environmental pollution. “Our approach is in line with the zero-waste hierarchy framework, which prioritizes the reuse option through materials science and engineering innovation.” Providing an independent point of view, Professor Seeram Ramakrishna, Board Member of the Plastics Recycling Association of Singapore and Chairman of the Plastics Recycling Centre of Excellence, said: “With plastic a critical component in our manufacturing and logistical processes, we are in urgent need of sustainable solutions to plastic waste to mitigate its impact on the environment and social costs. Innovative solutions, such as the idea developed by Asst Prof Tay and his team to repurpose e-waste plastic, could serve to address the ubiquitous plastic waste problem in Singapore and around the world, and move us towards plastics circularity.”

www.ntu.edu.sg

Photo: NTU Singapore

Advertorial:

PICVISA COMMITTED TO THE CIRCULAR FASHION ECONOMY

By Silvia Gregorini, Head of Development at PICVISA

"The equivalent of one garbage truck of textiles is wasted every second, while less than one percent of the clothing is recycled into new clothes", says a report that informs about a new vision for a circular system.*)

The circular economy model calls for a new textiles economy, in which clothes are designed differently, worn longer, and recycled and reused much more often. Textile reusing and recycling is possible if fabrics are separated – and grouped – according to their composition: cotton, silk, wool or synthetics. Thus, as with other materials (the heterogeneity of fabrics is similar to that of plastics), making a correct classification is essential.

PICVISA is a technology company that offers solutions based on artificial intelligence and vision through its AI-powered computer vision software and hardware. The company can monitor and sort textiles in-feed on moving conveyor belts, ensuring proper separation of several different textile categories.

How can customers use PICVISA AI technology?

PICVISA AI textile recognition system is deployed globally on moving conveyor belts in sorting facilities. By automating textile composition analysis, PICVISA provides waste managers, producers and regulators with actionable insights to increase textile recycling and reuse rates. By building solutions for monitoring, auditing, and sorting of large textile flows, the company contributes to unlocking the linear, which will, in turn, support the transition to a circular economy.

Successful stories

Reducing the cost of manual sampling, enhancing product quality or informing on waste generated end-to-end are among the most common problems affecting Picvisa's customers.

That is also the case for Coleo Recycling-Col&bri in Galicia (Spain). The textile recycling company was looking to automate the manual sorting of textile fractions into different fractions according to material and color. In response to Coleo Recycling's need, Picvisa developed a software for detecting textile clothes according to their chemical composition and color. After that, the system transferred them into specific containers. The system can classify up to 24 different materials simultaneously. That means each material is detected and transferred to the right container.

David Puyuelo, Director of Col&bri Partners says, "Thanks to PICVISA, we can process 5,000 tons/year of material collected from industrial and domestic. We can feed piece by piece without previous shredding into an optical unit that identifies and classifies by material and color and separates into up to 24 different outputs. The composition analysis is carried out in continuum and real-time. Thus, creating metrics and data sets that we can use to inform our decision-making on how to optimize the textile selection and sorting processes." EU legislation plans to start the selective textile recollection before January the 1st, 2025, and to set objectives on how to reuse and recycle this waste. Therefore, cities need to implement new selective collection and selections systems for textile waste. Picvisas' technology and experience can help meet these objectives and increase the circularity of the textile consumption model.

Textile sorting by PICVISA:

Photo: PICVISA

*) https://motif.org/news/circular-fashion-economy/#:~:text=What%20is%20Circular%20Fashion%3F,are%20no%20longer%20of%20use.

www.picvisa.com

Fondi-Metal Srl: **MANUFACTURING SECONDARY RAW MATERIALS**

Fondi Metal, located in the industrial area of Carini, a few kilometers from Palermo, has a long history as a family-run business. Panizzolo spoke to the owners Baldassarre Marino, his son Paolo and his son-in-law Piero, all of them are pioneers in metal recycling in Sicily.

Fondi Metal was able to face and overcome all the changes and challenges that, over the years, have shaped the scrap recovery sector. By choosing a path in direct contrast with those of other Sicilian colleagues, the company has recently decided to invest in new technologies for enhancing its metal scrap. What were the reasons that led Fondi Metal to make this decision?

Could you tell us more about your company and your history?

Baldassarre: A long family tradition stands behind our business, and Fondi-Metal is the culmination of almost 80 years of work. When I was still very young, I started to work as a scrap dealer alongside my grandfather and my father. Our main job involved dealing with scrap and the purchase,

Photos: Panizzolo

manual sorting, and resale activities. The changes in the sector, combined with labor costs over the years, have led us to focus on certain types of waste and shift operating areas. Therefore, in the nineties, Fondi-Metal was founded in Carini, in the province of Palermo.

Today the Fondi-Metal business is still managed by our family. However, we have completely renewed the business and, nowadays, we deal with the processing of metal and non-metal scrap. We purchase waste to be recycled directly from producers or other dealers who, in turn, are supplied by various industrial, artisanal, and commercial enterprises. Our flagship product is aluminum, which is fed into the Panizzolo recycling plant to obtain a refined and high-quality material, characteristics that allow us to sell a "furnace-ready" product directly to foundries in Central and Northern Italy. We sell other types of ferrous scrap directly to Acciaierie di Sicilia.

Why did you decide to work with a Panizzolo plant?

Paolo: I first saw these machines at a fair. Intrigued as I was, I did further research. Immediately interested, I contacted the company for an initial quote. We purchased the first Panizzolo metal scrap recycling plant, consisting of a Flex 500 Mobile hammermill and an eddy current separator. A significant trait of this machine was the low energy consumption for hourly production. Thanks to its 90-kW motor, we can achieve productivity that can reach up to 3.5 tons/hour of the finished product. This way, we can significantly increase the profitability of aluminum compared to traditional trade. We also chose this mill, because we wished to expand our product range. It should be considered that in Sicily, there are very few of us who think the future lies in the recycling of scrap and not in trading. Together with the mill, we also purchased two types of interchangeable cradles, one more suitable for the recycling of aluminum profiles or in any case of semi-soft materials, and the other dedicated to aluminum casings.

What do you think of the plant you are currently using?

Piero: After the training provided by Panizzolo's technicians, we quickly learned that the machine is easy to use and service. The product output is of high quality. That allows us to recycle and sell materials directly to foundries as secondary raw material. Given the distance between our business and the Panizzolo headquarters, it was essential to choose a partner who could provide remote assistance. Panizzolo has always been available and helped us to solve problems. We were, therefore, able to calibrate the machine remotely and monitor it in the best possible way, thanks to the Panizzolo management and control software.

What are your plans and goals?

Baldassarre: The last years have marked a turning point in our business. We wish to continue like that, and our goal is to steer more and more towards the recycling of aluminum. Our main goal is to increase production. In Sicily, only a few companies are offering this type of service. But the market is still new. We will need to expand our machine inventory, an excellent opportunity for a new collaboration with Panizzolo.

www.panizzolo.com, www.fondimetal.it

TOMRA RECYCLING BRINGS WASTE WOOD FULL CIRCLE WITH GROUNDBREAKING SORTING SOLUTIONS

TOMRA Recycling has further strengthened its waste wood sorting solutions with a deep learning-based technology that utilizes the expansive power of its artificial neural networks. As a pioneering add-on solution for AUTOSORT®, GAIN deep learning technology extracts numerous material characteristics of wood chips as they move along the high-speed conveyor belt and analyzes them for high-precision sorting of non-processed wood and MDF.

For more than ten years, TOMRA has been a front-runner in the global wood recycling sector with its X-TRACT sorting system. The high-throughput x-ray transmission (XRT) sorting unit quickly became popular with panelboard manufacturers and recyclers to produce a high-quality waste wood fraction by removing impurities like inert materials, glass, and metals. The recovered wood fraction produced by X-TRACT can then be used for either chipboard or energy production.

Over the years, as the industrial sector focused more on sustainability, there has been a significant increase in demand for high-quality waste wood suitable for recycling. Since these materials are challenging to sort with conventional technology, TOMRA was determined to find an innovative solution to meet industry trends. With their in-house team of software engineers and application experts, they trained their artificial neural networks with thousands of images of non-processed wood and processed wood products such as MDF (medium-density fiberboard), HDF (high-density fiberboard), oriented strand board (OSB), and coated materials.

In combination with the ultra-flexible AUTOSORT® machine, GAIN deep learning technology brings a new dimension of sorting performance for the recycling and wood processing industries. Based on the extensively labeled data in the TOMRA neural network, GAIN recognizes patterns and properties of individual wood chips and instantly connects this information with data scanned by sensors. Wood chips are then categorized by material type and separated according to the customer-defined sorting task.

Photos: TOMRA Recycling

Valerio Sama, Jose Matas and Murat Sanli

The primary use of recycled waste wood is currently in particleboard manufacturing. The wood-based panel industry aims to meet very strong market demand and improve product quality by increasing recycled content, resulting in a two-fold benefit for the manufacturer. Recycled wood is up to 40% cheaper than fresh wood and generally dryer, resulting in a significant decrease in energy consumption during the drying stages. Integrating TOMRA's wood sorting solution in recycling and wood processing plants enables operators to create high-purity non-processed wood fractions, which can be used in particleboard production on an industrial scale.

Jose Matas, Segment Manager Wood at TOMRA Recycling, comments: "Given the market conditions and industry trends, sensor-based sorting offers wood-based panel manufacturers an incredible opportunity to reduce costs and improve sustainability. Using high-quality recycled wood materials in production helps them achieve higher yields and create superior quality wood-based panels."

TOMRA Recycling is the first company to use deep learning technology to detect and separate Wood A from Wood B and recover MDF from processed wood composites. Due to a dedicated team, the provider has also established proof of its commitment to bringing waste wood full circle and enabling the production of panelboards made with 100% recycled wood materials. The company's team of industry-savvy experts, waste wood application specialists, and service key account managers offer a wealth of experience and profound knowledge of wood recycling and processing.

■ To learn more about TOMRA's deep learning technology for wood sorting visit https://solutions.tomra.com/en/gain-deep-learning

„BULKINSPECTOR" ENSURES PROCESS SAFETY

Precise measurement of the (skeletal) density of bulk materials and other solids to determine the correct parameters for production or further processing still represents a challenge for personnel and technology. At the same time, the degree of precision in determining this data often affects the profitability of the process, especially with small quantities and expensive materials, since too many rejects already entail high costs when processing starts. German company Siebtechnik Tema – the global umbrella brand of Siebtechnik GmbH and the former Tema Group – has addressed this problem by developing a gas pycnometer that fully automatically measures the volume and mass of a solid with very high precision. The innovative „Bulkinspector" provides the kind of safety in process preparation that is needed for trouble-free production and further processing, the supplier assures.

www.bulkinspector.com

The „Bulkinspector" enables automated, precise measurement of the skeletal density of bulk materials

Photo: Siebtechnik Tema

START-UP OF ANOTHER BIOGAS PLANT IN JAPAN

German-based company Weltec Biopower GmbH has commissioned a biogas plant in Saitama Prefecture, 40 kilometers north of Tokyo.

The facility – which is equipped with a 450-kilowatt cogeneration power plant – is the fourth project to be rolled out by the German manufacturer in Japan. In terms of substrates, the operator uses organic leftovers from the vicinity. “Since the raw material mix varies, Weltec ensures a steady biogas output with its biological service.” This service would also comprise another plant of the same customer.

As underlined, Japan continues to use nuclear power, even after the reactor accident in Fukushima back in 2011. “However, renewable energies are consistently expanded and already account for a fifth of the power generated.” Leftovers are the preferred substrates in Japan, the company informed.

The biogas plant in Saitama digests some 12,000 tons of organic waste into energy. The substrate mix consists of organic waste and cattle manure from a nearby farm belonging to the operator. The largely liquid organics are introduced to the digester using a central pump. Solid feedstocks are transported by a dosing feeder with a capacity of 27 cubic meters (m^3). To ensure efficient digestion of this mixture, Weltec Biopower has set up a stainless-steel digester with a capacity of 2,823 m^3. Its diameter measures 25.34 meters (m), and its height is 6.3 m. The upstream substrate storage tank, made of stainless steel, has a capacity of 336 m^3, a diameter of 9.31 m and a height of 5.03 m. The 525-m^3 digestate storage tank (diameter 11.64 m, height 5.03 m), too, is made of high-quality stainless steel. Finally, the digestate is separated, and the solid phase is dried using special technology for reducing the volume. Most of this residue is used as compost and some of it as fertilizer.

The German manufacturer has provided the customer with an all-inclusive package with individual after-sales service. Further information on the energetic utilization and use of all types of organic waste and wastewater will be available at the IFAT in Munich (Germany), hall A4, stand 217.

www.weltec-biopower.com

Photo: Weltec Biopower

4S SHREDDERS MADE IN ITALY

According to the Italian company Satrindtech, the manufacturer provides four-shaft shredders, which offer modular design and flexibility for several applications.

“The 4S shredders offer major pluses that will surely be appreciated by operators in the recycling business,” the manufacturer of industrial shredders and plants for waste processing underlined in a press release. “Its innovative concept and design are based on equipment modularity and compactness, that allow flexibility in application and possible upgrade to higher power/capacity or to a larger shredding chamber in just a few operations.” The machines were customized in size, motor power and blades to process a wide range of materials, such as paper, cardboard, plastic, hospital waste, WEEE, wood, aluminum and plastic post-consumer products, packaging and much more.

Four-Shaft Shredders 4S

As reported, the 4S shredders are electrically driven, with further advantages and cost-saving operation compared with hydraulically driven models. Furthermore, the machines are modularly constructed and maintenance-friendly. “Machine downtime is drastically reduced for maintenance, as full dismantling is no longer required,” the manufacturer, who will exhibit at IFAT, informed. “Just to mention some typical frequent operations, replacement of the blades is done quickly and safely by removing the four shafts from the top, while the screen is easily removed by sliding it out from the front side.”

www.satrindtech.com

Photo: Satrindtech

EREMA AT CHINAPLAS 2022

The Austrian manufacturer will present solutions to meet the needs of the Chinese recycling market.

This year, Shanghai is the venue of Chinaplas from 25 to 28 April, making this trade fair a home game for the Erema subsidiary in China. The team from the company's Shanghai subsidiary will present the entire range of recycling services, post-consumer and in-house recycling solutions at the trade fair stand 2.1F53.

Vacurema basic

Photo: Erema

As reported, the engineering company has enjoyed a very successful year in China with significant growth in turnover and orders for all of these applications. The increase in demand is strongest in the PET recycling sector. Ten Vacurema systems and, for the first time, a Vacunite system for bottle-to-bottle applications were commissioned during the past calendar year. There were also three Intarema TVEplus systems with ReFresher modules for recycling post-consumer material. A team of technicians from Austria was on the road in China for ten months to commission these systems on-site at customers' plants, right across the country. The great demand for Vacurema technology is due to its high flexibility for bottle-to-bottle recycling because it offers a wide spectrum of applications – including food contact packaging materials, the Austrian machine builder underlined. "Processes include inline preform technology, which enables post-consumer PET flakes to be processed directly into preforms, proven Vacurema prime systems, and the Vacunite systems, which brings together the power of Vacurema technology with vacuum-assisted Solid State Polycondensation (SSP). Delivering highly efficient decontamination, the best color values, top IV stability, low energy consumption end-to-end, and a compact design, this process meets the very highest specifications for producers of food contact compliant rPET pellets." With its Intarema TVEplus RegrindPro technology featuring the ReFresher module, Erema would play a major role in making recyclates suitable for high-quality applications in the cosmetics and food industries, opening up new sales markets for their customers.

The company also expects further growth in the production waste recycling segment as a result of China supporting companies in implementing suitable recycling solutions.

www.erema.com

FUTURE FACILITY FOR SWEDEN'S PLASTIC RECYCLING

With the ability to handle 200,000 tons of plastic packaging per year, the future "Site Zero" recycling facility in Motala, Sweden, will be the largest and most modern plastic recycling facility worldwide.

Source: Video Screenshot Swedish Plastic Recycling

That is the conviction of the Swedish company "Swedish Plastic Recycling" (Svensk Plaståtervinning), which is continuing to invest in the treatment of plastics and has awarded German-based Sutco RecyclingTechnik GmbH the contract to construct its second facility, "Site Zero" (Motala II). The manufacturer of treatment and sorting systems for waste management drew up the concept for "Site Zero" together with the Norwegian engineering office Mepex Consult and the client, Swedish Plastic Recycling. In 2017, Sutco RecyclingTechnik GmbH had designed and built Motala I – at the time, the most efficient and modern plastic treatment facility in Europe.

The future plant – to be completed in 2023 – will be designed to sort twelve different types of plastic packaging and then recycle them in a carbon-neutral, emissions-free way. The sorting capacity at the 60,000 square meter site is planned to run from PP, HDPE, LDPE, PET trays, colored and clear PET bottles, PP foil, EPS, PS, PVC, two kinds of polyolefin mixtures all the way to metal and non-plastic waste.

According to Swedish Plastic Recycling (Svensk Plaståtervinning), with "Site Zero" the company will be doubling its annual capacity. "Thanks to cutting-edge technology, it will be possible to recycle practically all types of plastic," the company stated on its homepage. At the future facility, zero packaging would go to incineration. "Site Zero will be completely climate-neutral with zero emissions." The facility would be powered by renewable energy, "and the small amount of non-recyclable plastic and other waste will be sent to energy recovery without climate emissions, so-called CCS (Carbon Capture Storage). There are also plans to produce renewable energy by covering the building's large flat roof with solar panels."

From 2023 onwards, Motala I and Motala II will be fitted with Near Infrared (NIR) sensors and approximately five kilometers of conveyor belt. Thus, according to the information, every single piece of packaging waste produced in Sweden can be processed. Between 2019 and 2023, the total investment scope will be about one billion Swedish Krona (more than 115 million US-Dollar). The Swedish Environmental Protection Agency (Naturvårdsverket) also contributes with the financing of just over 180 million Swedish Krona (nearly 21 million US-Dollar) through its climate investment program "Klimatklivet".

- www.sutco.de
- www.svenskplastatervinning.se/en

Plastics:

FROM RECYCLING TO UPCYCLING

Researchers have developed a clean and cost-effective way to upcycle used plastic, transforming it into valuable nanomaterial and high-quality fuel, Australian RMIT University reported.

As stated, the new method from researchers at the university can produce high-value products from plastic – carbon nanotubes and clean liquid fuel – while simultaneously upcycling agricultural and organic waste. The two-step process would convert organic waste into a carbon-rich and high-value form of charcoal then uses this as a catalyst to upcycle the plastic. According to lead researcher Associate Professor Kalpit Shah, upcycling two massive waste streams through one circular economy approach could deliver significant financial and environmental benefits.

The new plastic upcycling approach would offer a sustainable alternative for the production of carbon nanotubes (CNTs), the Australian university gave account. "These hollow, cylindrical structures have exceptional electronic and mechanical properties, with applications across a broad range of sectors including hydrogen storage, composite materials, electronics, fuel cells and biomedical technologies." The global market for CNTs was projected to reach 5.8 billion US-Dollar by 2027.

Turning old into new

The new method starts with converting agricultural or organic waste to biochar – a carbon-rich form of charcoal often used for improving soil health. The biochar is used to eliminate toxic contaminants – such as Polycyclic Aromatic Hydrocarbons (PAHs) – as the waste plastic is broken down into its components of gas and oil. "The process eliminates those contaminants and converts plastics into high-quality liquid fuel."

At the same time, the carbon in the plastic is converted into carbon nanotubes, which coat the biochar. "These nanotubes can be exfoliated for use by various industries, or the nano-enhanced biochar can be used directly for environmental remediation and boosting agricultural soils." According to the information, the study is the first to use low-cost and widely available biochar as a catalyst for making contaminant-free fuel and carbon nanomaterials from plastic. Shah, the Deputy Director (Academic) of the ARC Training Centre for Transformation of Australia's Biosolids Resource at RMIT, said even though the study only investigated one type of plastic, the approach would apply to a range of plastic types. "We focused on polypropylene as this is widely used in the packaging industry," he was cited. "While we need to do further research to test different plastics, as the quality of the fuel produced will vary, the method we've developed is generally suitable for upcycling any polymers – the base ingredients for all plastic."

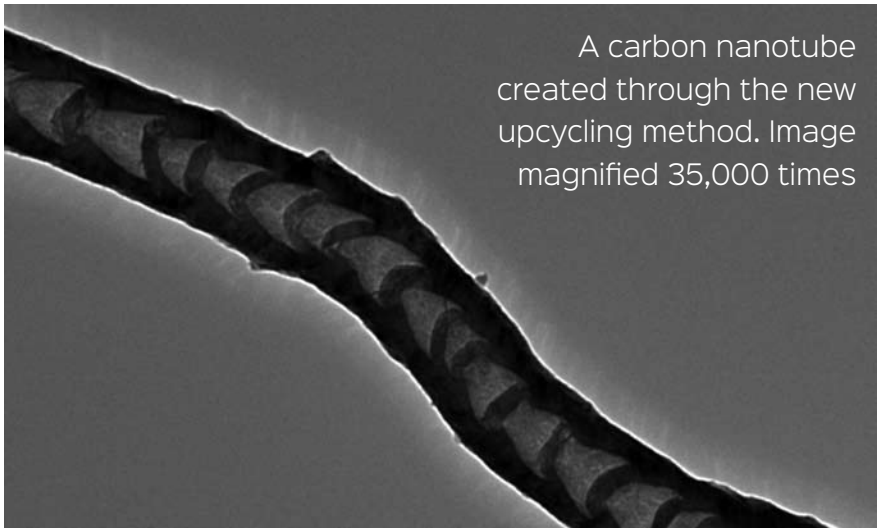
Hyper-efficient reactor

The experimental study, conducted at a lab-scale, could also be replicated in a new type of hyper-efficient reactor that has been developed and patented by RMIT, the press release said. The reactor is based on fluidized bed technology and would offer a significant improvement in heat and mass transfer to reduce overall capital and operating costs. The next steps for the upcycling research would involve detailed computer modeling to optimize the methodology, followed by pilot trials in the reactor.

The team from RMIT's School of Engineering is keen to collaborate with plastic and waste industries to further the research and investigate other potential applications of the upcycling method.

An Australian Research Council DECRA Fellowship supported the research.

www.rmit.edu.au



A carbon nanotube created through the new upcycling method. Image magnified 35,000 times

Photo: RMIT University

ORKEL: THE PORTABLE SOLUTION FOR ADAPTABLE WASTE MANAGEMENT

Starting as an agricultural machinery manufacturer, Orkel has developed its equipment for the waste management sector due to the skyrocketing demand for a portable solution. Today, Orkel's industrial compactor range provides machinery equipped to handle household waste, which has been widely implemented into Taiwan's waste management strategy.

Working closely with the customers allowed for a unique insight into the Taiwanese customer Feng Hong's daily operation, resulting in a viral response online due to the staggering photos provided. Pictured is Feng Hong's latest project in the county of Yunlin, Taiwan: A governmental clean-up project where Feng Hong was hired to uncover old landfills before commencing the process of handling the abandoned waste. Originally consisting of municipal waste, most of the biodegradable waste was already decomposed from the prolonged age of the landfill, leaving the remaining waste consisting of mainly plastic and other resilient waste groups.

Initiating waste baling, Feng Hong utilized the Orkel Hi-X evo compactor rigged with bale wrap consisting of partly recycled plastic. After an extensive operation, they calculated the weight of each high-density bale to fall between 600 - 800 kg. Once transferred from loose material to dense compartments, the bales were secured and stored as pictured, providing a more efficient storage and transport option.

The bales are shipped to waste processing plants once capacity allows it. There they are opened, and the material sorted for further processing. Eventually, most waste bales end up either recycled or used for energy generation in local energy plants. As an increasing number of countries worldwide become aware of the importance of a robust national waste management system, the demand for insight into material properties grows more apparent. To initiate a dialogue around the "baleability" of your material, you find the email of the company's Global Waste and Sustainability Manager Miriam Gjønnes Karterud below.

■ miriam@orkel.no
www.orkel.com

Photos: Orkel

MOBILE TROMMEL SCREEN TRM831

The conference and trade show "COMPOST 2022", held in Austin (Texas) in January this year, was the venue for the launch of the new EDGE TRM831, the biggest trommel screen the Irish company EDGE has produced to date.

According to the manufacturer, the new mobile trommel screen offers high production rates with extensive stockpiling capacities "thanks to its end discharge conveyor design and remote 180° radial fines conveyor". With a 2.3 meters (m) X 9.3 m long drum and a hopper capacity of 12 cubic meters, the TRM831 would provide "excellent screening and unrivalled production rates" results.

Photo: Edge Innovate

As emphasized, the TRM831 incorporates design features such as a remote 180°radial fines conveyor as standard, an eco-power saving functionality that reduces unnecessary running costs and a user-friendly HMI control panel for the easy adjustment of machine parameters. An intelligent load management system would ensure that the trommel screen is always operating at optimum performance with minimal supervision. "A large hopper opening combined with class-leading belt widths allow for the quick and smooth flow of material through the trommel." The new EDGE FTS Radial was also on show: A portable feed stacker designed for processing lower density organic materials such as mulch, compost and soils. Used to optimize the conditions of biological decomposition, the FTS Radial would allow compost windrows to release excess heat, aerate and untangle. "The high speed, high torque turning drum ensures high throughput and complete mixing of the feed material. An irrigation system fitted as standard allows operators to add moisture or nutrients to the feedstock whilst processing."

Completing this lineup at the "COMPOST Demo Day" was the VS420 and TRT620R, showcasing EDGE's commitment to organic recycling solutions.

www.edgeinnovate.com

ONLINE TOOL FOR DIGITAL MONITORING AND ANALYSIS OF METAL RECYCLING MACHINES

Metso Outotec's Metal Recycling business has realized a new Index operating and production data collection system, which transfers relevant data from the recycling machine directly to the customer's equipment.

According to the company, Metso Outotec Metal Recycling has taken the next step in terms of digitization and, with Index, introduced an intelligent way to increase machine productivity, optimize the cost-benefit ratio and identify limiting parameters at an early stage. "Accessible via mobile app or from the dashboard any time, one click is all it takes to find out immediately how high the current capacity utilization is, which material is currently being processed, how many operating hours the equipment has already been running for, or what the general condition of the metal recycling machine is," Peter Thomas, Director of Products and Technology for Metal Recycling in Metso Outotec, was quoted. All the equipment data could be visualized, displayed and analyzed in the Index web portal and, if necessary, transferred to programs and systems designed for controlling purposes. "We are talking about modern workflow and performance monitoring, which serves as the perfect basis for evaluating the various key performance indicators (KPIs)." The server used to back up data is currently one of the most secure servers on the market, the engineering firm assured. It "is located in Europe and is therefore subject to European data protection regulations".

The monitoring and analysis tool will be available as standard equipment in the Lindemann shears EtaCut II, EtaCut, PowerCut/LUC, PowerCut Wings/LIS and LU. In addition, customers would have the option of retrofitting their current stock shears of the previously mentioned machine types with Index. As reported, Index will soon be available also for presses and shredder systems for Metso Outotec's metal recycling customers.

www.mogroup.com

DOPPSTADT GROUP TO SHOWCASE SMART PROCESSING SOLUTIONS AT IFAT

Reliable technology presented in a personal meeting: The Doppstadt Group showcases smart processing solutions for the waste management and recycling industry at the IFAT from May 30 to June 3, 2022. For the first time, the Doppstadt booth will exclusively be on the outdoor grounds of the Munich Exhibition Center. On 1700 m² the environmental technology expert will showcase, among other things, the flexible METHOR multitool and the mobile-modular processing concept. Furthermore, Doppstadt takes a new approach towards an economic future with electric drives. Presenting the new Doppstadt Academy and the after sales, used machinery and recruiting departments complete the varied supporting program.

The METHOR multitool can flexibly be adapted to various conditions of application. Therefore it is a smart solution for more versatility

"After four years, we are happy to be able to welcome our customers at the IFAT again," says Gerd Schreier, Managing Director of the Doppstadt Group. "During the past years, we have been developing our technologies and systems continuously. The IFAT, as the world's leading trade show for environmental technology, is the perfect place to introduce our innovative processing solutions to the public."

For the first time, the Doppstadt Group exhibits its products exclusively on the outdoor grounds of the trade fair, not in Hall B6 as usual. "This year, we have a large number of exhibits. In Hall B6, there is not enough space to showcase our solutions appropriately," Schreier explains. On 1700 m² Doppstadt offers enough space to explore all the exhibits in compliance with the current hygiene and distance rules. Furthermore, the environmental specialist will demonstrate the machines live on the grounds of the VDMA (Verband Deutscher Maschinen- und Anlagenbau – German Mechanical and Plant Engineering Association). Doppstadt will also showcase smart processing solutions at the VDMA presentation on plastic recycling.

Flexible, economic and efficient: Doppstadt solutions at the IFAT

One focal point of the exhibition is the METHOR. This multitool can flexibly be adapted to various conditions of application. Therefore, it is a solution for more versatility. Several optional tools, such as shredding tools and counter blades, which enable the METHOR to adapt quickly, precisely, and economically to different shredding tasks, will be part of the exhibition. Furthermore, the company will showcase the new optional attachments from the separation and windsifting portfolio.

Due to the high flexibility, the Doppstadt mobile-modular processing concept stands out. The solution combines screens and components to form an efficient plant concept. Users benefit from high profitability and legal certainty for different processing requirements. At the IFAT, the mobile-modular processing concepts for commercial waste, construction and demolition waste, as well as biowaste applications will be presented. They have already proved their worth many times in the market. With further innovations such as electrified drives,

"After four years, we are happy to be able to welcome our customers at the IFAT again," says Gerd Schreier, Managing Director of the Doppstadt Group

Photos: Doppstadt Group

the company paves the way towards an economic future. „We are working on the electrification of our entire machine portfolio," Schreier explains. „With our leading-edge processing systems, we want to make a valuable contribution to climate and environmental protection."

Personal exchange: live and virtual

In addition to smart processing solutions, Doppstadt will also present the new Doppstadt Academy with its extensive range of training courses, where customers and sales partners learn the optimal handling of the Doppstadt solutions. The after sales team will also be present and at your disposal. Doppstadt also makes use of the IFAT for recruiting new specialists. At a special stand for recruiting, interested visitors have the opportunity to get to know the company on the spot.

Although the IFAT 2022 is scheduled to take place physically, Doppstadt also relies on an additional digital program. In this way, customers and partners can get online impressions of the trade show and the innovations from Doppstadt through live presentations. „Whether face-to-face or online – we look forward to an exciting exchange," says Schreier.

■ The Doppstadt Group will participate in the IFAT 2022 from May 30 to June 03, 2022 on the outdoor grounds of the Munich fair at booth 709/1.

www.doppstadt.de

Samoa:

SUSTAINABLE E-WASTE MANAGEMENT THROUGH PACWASTEPLUS PROGRAM

In October last year, a Memorandum of Understanding (MoU) was signed to enable an e-waste management project implementation to commence formally in Samoa.

According to information provided by the Secretariat of the Pacific Regional Environment Programme (SPREP), the solution to the e-waste problem in Samoa would be addressed by a project partnership between the Ministry of Natural Resources and Environment (MNRE) and SPREP, administered through the European Union (EU) funded PacWastePlus program. The ministry, also with technical support from PacWastePlus, will work towards providing safe e-waste collection, dismantling facilities and incentives to the community to encourage them to return e-waste for recycling, and reducing e-waste deposited into landfills, illegal dumping, and burning.

The Pacific-EU Waste Management Program (PacWastePlus) is a 16.5 million Euro and 72-month project funded by the European Union and implemented by SPREP. It addresses the cost-effective and sustainable management of waste as well as pollution and broader impacts, including human health and wellbeing, climate change, disaster management, biodiversity conservation and resource recovery. Priority waste streams include hazardous wastes (specifically asbestos, e-waste and healthcare waste), solid wastes (specifically recyclables, organic waste, disaster waste and bulky waste), and related aspects of wastewater.

www.sprep.org

NEW SCREEN FOR NON-WRAP CARDBOARD

Canada-based Sparta Manufacturing has introduced its new patent-pending Non-Wrap OCC Screen for single-stream and commercial recyclers into the market.

The machine's "specially shaped and sized steel discs optimize the separation of the larger OCC (cardboard) from the smaller paper, film and mixed recyclables", the manufacturer described its advantages. "And its unique, bi-directional corkscrew motion defies the wrapping (and associated maintenance and cleanup) that

Photo: Sparta Manufacturing

plagues traditional OCC screens. The result – increased uptime, production, and recovery efficiency".

The patent-pending screw style design would direct the cleaned-up, larger OCC off the end of the screen, allowing Sparta's Non-Wrap OCC screen to readily replace recyclers' standard dual and triple deck OCC screens (with no changes needed to infeed or takeaway conveyors). "If you find yourselves spending 1-2 hours per day cutting tightly wrapping film plastic and more off your OCC screen's shafts, it's time to stop banging your head against the wall", Rutger Zweers, Sparta's vice president of Sales Engineering and single-stream specialist was quoted.

www.spartaway.com

IFAT MUNICH

May 30 – June 3, 2022, Munich (Germany)

The sustainable use of resources – and thus climate protection – is the major topic of IFAT Munich, held at the exhibition center in Munich. According to the organizers, international interest in the important Trade Fair for Water, Sewage, Waste and Raw Materials Management remains strong. "All exhibition sections are well booked; in some cases, the demand is even greater than the space available," Messe München gave account. In the area of "Circular Economy and Waste Management", exhibitors would include renowned European companies. The same applies to the sectors "Water & Sewage" and "Municipal Technology". Furthermore, there will be international joint pavilions from Belgium, China, Denmark, France, Great Britain, Italy, Japan, Canada, the Netherlands, Austria, South Korea, Switzerland, the Czech Republic, Turkey, Hungary, and the USA. Also, there will be exhibitors from Egypt, Australia, Brazil, Ivory Coast, Jordan, Qatar and Saudi Arabia. In terms of visitors, there are already inquiries for delegations from many countries.

www.ifat.de/en

PETROCHEMICAL & REFINING CONGRESS: EUROPE 2022

May 30 – 31, 2022, Helsinki (Finland)

Enhancing the plant's efficiency to increase the asset utilization, technology's adaptation to the current market requirements, and predictions to minimize the cost reductions remain vital for the downstream market. This could be reached through digital transformation possibilities. As for the sustainable goals and all value chains of the downstream market, representatives take part in the development of emissions reduction and fuels reusage.

PRC: Europe 2022 gathers companies and governmental bodies to network and share their experience over the industry's current situation and showcase their solutions regarding the most cutting-edge topics of downstream.

The congress business program covers the following industry topics:

- Renewables' impact and energy efficiency;
- The opportunities and challenges of hydrogen;
- Energy transition and circular economy;
- Refining trends and solutions;
- Intelligent petrochemical operations;
- Eco-friendly plastic recycling projects.

Request full information about all PRC: Europe 2022 attendees: www.bit.ly/3vpj29v

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EREC 2022

The 4th Virtual Recycling Expo from October 10 – 15, 2022 (online)

This fall, eREC (the digital expo for the recycling industry) takes place for the 4th time.

The previous three eREC events have proven that this virtual format is crisis-proof. Both time and costs are saved (no venue booking, no travel management, no accommodation, and catering). Elaborate constructions and intensive organizing belong to the past. Moreover, a digital event not only reduces traveling emissions. It also reduces CO_2 emissions in the production and set-up of exhibition space, catering, accommodation, transport, and waste disposal.

The last expo and conference already showed that sustainability is becoming more and more important thanks to the respective presentations by experts. In the meantime, eREC has become a well-established and reliable concept that guarantees planning security.

Hosted in Germany, the digital trade fair system is 100 percent DSGVO-compliant. Furthermore, the expo lives on even after the event is over since all presentations are recorded and made available on the eREC website afterward. Thus, they are an additional marketing tool for the involved companies. The format has unlimited visitors. Anyone who has access to the Internet can take part in the event. At the office, at home, or on the road: exhibitors, speakers and participants can get to know each other quickly and easily via digital networking. Experience has shown that this considerably lessens the personal hurdle of making interactive contact. People who would never have asked a question in public in a plenary session actively participate here and connect directly with exhibitors.

Be part of it

On a long-term and future-oriented basis, digital trade fairs like eREC will be a good way for people to get together and work together. Be part of it and present your products and solutions effectively, informatively, and interactively. See in real-time who is interested in what you have to offer. A selected number of sponsors and organizations will once again support eREC 2022.

■ Exhibitors and visitors can now register for eREC.

www.erec.info

Graphic: MSV GmbH

EUROPEAN CONGRESS: BUILDING MATERIALS RECYCLING 2030

June 1, 2022, Munich (Germany)

As part of the International Trade Fair IFAT in Munich (CCN, Hall C6), EQAR (European Quality Association for Recycling e.V.) is organizing a congress on the topic of „Building Materials Recycling 2030".

Topics of this event will be:

- Tendering and contracting of recycled building materials: Best Practice
- Conservation of resources and use of recycled materials
- Construction Products Regulation as a driver of the circular economy

"The combination with a visit to IFAT, the world's leading trade fair for environmental technologies, makes the EQAR Congress an easily accessible meeting with industry colleagues from the recycling sector," the German-based association emphasized.

www.eqar.info/en/

9TH SHIP RECYCLING CONGRESS

June 15 – 16, 2022, Rotterdam (The Netherlands)

Active Communications International, Inc (ACI) has announced that the 9th edition of Ship Recycling Congress will take place on 15th & 16th June 2022. "The live summit aims to once again bring together key industry stakeholders for two days of exchanging perspectives, learning and excellent networking opportunities with your peers to address current challenges of the ship recycling industry." As underlined, the event will "focus on the latest and upcoming EU regulations from 2021 and for 2022, smart technological developments, IHM requirements, the HKC ratification, and ship recycling competitiveness". Furthermore, the conference would highlight the challenges to promote a responsible and sustainable future for the green ship recycling industry by developing transparency measures and complying with human and environmental rights.

www.wplgroup.com/aci/event/ship-recycling-congress/

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93

percent lower CO_2 impact

From Tyres to Tyres

Enviro's ISCC approved recovered carbon black is paving the way for the tyre and rubber industry to become sustainable and reach climate neutrality. The recovered carbon black has a full 93 percent lower CO_2 impact than fossil-produced carbon black.

Global tyre manufacturer Michelin has presented new ground-breaking solutions incorporating Scandinavian Enviro Systems' recovered carbon black materials. Today Michelin is using the recovered material in tyres for both racing cars and racing motor-cycles. This is just one example of the tyre industry's ambitious targets of replacing fossil raw materials in large numbers.

Sustainability will be the main strategy for all companies

Enviro's recovered materials enable climate neutrality to the entire tyre and rubber industry and help companies reach The Global Goals. The patented game-changing technology enables high value material recovery from end-of-life tyres, such as carbon black, oil and steel.

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