3/2020
6. Volume
24,- EURO

GLOBAL RECYCLING

The Magazine for Business Opportunities & International Markets

global-recycling.info

eREC

Digital Recycling Expo and Conference for Circular Economy and Waste Management
3.–8. May 2021 and 4.–9. October 2021

The Recycling Expo and Conference "eREC" is a virtual platform for the recycling industry that facilitates the national and international exchange between companies and customers. Companies can use this platform to present themselves, their newest products, and innovations and enjoy the advantages of online networking. Accordingly, the digital recycling expo and conference is the best opportunity to present oneself to customers without any travel costs involved.

Furthermore, every exhibitor can create his virtual stand and upload brochures, videos, or information material accessible to all visitors. Moreover, visitors can visit all booths, see new products, and get in touch with the exhibitors via live chat option. Apart from presenting the newest products and ideas, every exhibitor has the chance to take part in the extensive framework program – either as a passive participant or as an active speaker. All visitors can access the framework program and take part in webinars or live contributions, which focus on different topics of the recycling industry.

Just a few clicks and all visitors, exhibitors, and speakers can easily access the virtual world of the new "Digital Recycling Expo and Conference for Circular Economy and Waste Management".

Join us – it is time to go online.

www.erec.info

Become a partner or an exhibitor! Phone: +49 (0) 81 41 / 22 44 13, E-Mail: mail@erec.info

Recycling: Opportunities in Times of Covid-19

Brigitte Weber
Editor-in-Chief

Interest in recycling is still unabated: The high level was reflected in the attendance at eREC, the new digital expo and conference, which serves as a virtual platform for the international recycling industry. The first edition of eREC was generally well-received. Between 31st August and 5th September this year, nearly 4,450 persons signed up for the new "Digital Recycling Expo and Conference for Circular Economy and Waste Management", and more than 3,000 visitors attended the webinars. The next eREC expos will take place in May and October 2021 (🌐 www.erec.info).

In times of the Covid-19 pandemic with the social distance requirements, international business negotiations are performed via media like the internet. In this respect, online communication and its continually rising significance have led to a worldwide increase in the number of transactions using e-commerce. That applies to the recycling industry as well.

It is not without reason that many market indicators – despite the worldwide crisis caused by the coronavirus – are showing "a stable increase in activity levels among leading industries", as stated by the Bureau of International Recycling (BIR) in September concerning the construction and white goods sectors. These lines of business are, for example, important to stainless steel producers and their raw material suppliers. In China, industry operations have returned to normal, the world recycling association wrote in September. Although, the details for the new "recycled materials" qualification system regarding copper, brass, and cast aluminum alloys had to be officially announced. The non-ferrous metal scrap generation in Mexico is also improving, but not quite at the pace of demand. Regarding ferrous scrap, the corresponding industry would see "very little impact" from Covid-19. But there is still uncertainty in other sectors: textiles, plastics, tires, and rubber. The paper and board sector both enjoy high demand from the mills in Europe and Asia.

There are more opportunities. Jamaica begins with measures for green Covid-19 recovery and intends to improve its waste management (page 5 in this issue). Australia is on its way to implement a circular economy (page 20), and Scotland has, too, set ambitious targets (page 26). Brine, a residue of desalination, contains not only salts but also magnesium, gypsum, sodium chloride, calcium, potassium, chlorine, bromine, and lithium (page 30). Moreover, learn more about the pelletizing disc SCARABAEUS from page 38 onwards. It is suitable and in multiple uses for the transmission of fine-grained particles into larger agglomerates with defined particle size distribution.

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

Yours
Brigitte Weber (weber@msvgmbh.eu)

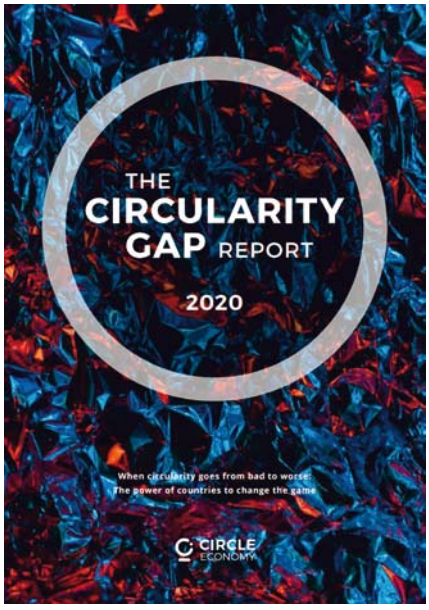
Cover Photo: Hans-Jürgen Schwanke

THE POTENTIAL OF RECYCLING

According to Circle Economy, an impact organization dedicated to accelerating the transition to a closed loop, the world is only 8.6 percent circular. This is the finding of the "Circularity Gap Report 2020", which was presented at the World Economic Forum in January in Davos. Of all the minerals, fossil fuels, metals and biomass that are worldwide used each year, only 8.6 percent are cycled back, the organization informed. This had fallen from 9.1 percent in the two years since the first report was launched in 2018.

The report, published as part of the Platform for Accelerating the Circular Economy (PACE), found out that the global economy is consuming 100 billion tons of materials a year "for the first time ever", but the cycling rate of resources had gone into reverse. The reasons for this trend are high rates of extraction, ongoing stock build-up and low levels of end-of-use processing and cycling.

As the authors state, countries are the critical facilitators of the circular economy. "Some countries operate well within the ecological boundaries of our planet, but without satisfying basic social needs. Other countries do fulfill societal needs but do so by overshooting the sustainable means of the planet. Therefore, all countries are developing," they are convinced. "All countries are unique when it comes to their ecological footprint and ability to provide for their people. Some face similar barriers, and many are confronted with the same global trends. This year's Circularity Gap Report examines and extrapolates common challenges and opportunities experienced by distinct country groups and provides action pathways for each." In this report, the countries of the world are differentiated into "Build", "Grow" and "Shift" countries.



Source: CGRi

"Build" countries

According to the definition, these states have a low material footprint per capita. "As a result, the impact of their economic activities often falls within the regenerative capacity of the planet," the authors inform. "Natural capital, rather than human capital, is their dominant source of wealth, which means that the focus is on extraction and sale of raw materials, while investment in education and skills is insufficient."

The good news is their potential, the report underlines. These countries are still building-up their basic infrastructure for public services, which means that "they have an opportunity to apply circular strategies such as modular, passive and flexible design". In construction, they could also prioritize the use of regenerative resources in buildings and avoid, by design, the operational inefficiencies which characterize infrastructure in "Shift" countries. "The decentralized nature of the informal economy prevalent in 'Build' countries also provides a platform on which to develop distributed professional services that allow welfare to grow, while providing decent health and safety conditions."

The authors, therefore, recommend the following measures:

- Design circularity into new stocks: In countries like India, where up to 70 percent of the buildings needed in 2030 are to be built, "there is huge scope to benefit from innovative construction techniques such as prefabricated buildings and 3D printing, which can make development fast, cheap and eco-friendly". Plastics could be made into tiles and cement recovered from concrete demolition waste.
- Empower the informal economy: One example: Some 240,000 smallholder farmers in Africa and Asia have used text messages to rent tractors through the Hello Tractor scheme. Education could help develop the entrepreneurs to create new circular businesses and a workforce with the skills to fill them.
- Build up a sizeable, sustainable bio-economy: For instance, through recycling of waste from agriculture, forestry and fisheries. As reported, a program in Niger has helped subsistence farmers reclaim degraded land and increase crop production by protecting and managing the growth of trees, benefiting 2.5 million people.

"Grow" countries

Most "Grow" countries have already experienced a degree of economic growth and industrialization, the authors of the report state. As a result, resource use is characterized by fast economic growth and associated material consumption, rapid stock build-up and an expanding industrial

sector (also responding to demand from "Shift" countries).

Designing new infrastructure, buildings and consumer goods in a circular manner, simultaneously considering both enhanced durability for lifetime optimization and end-of-life scenarios, were key strategies for these countries to become more circular. "Alongside this, professionalizing and improving the labor conditions in the informal parts of waste management in these countries also bears potential to reduce the environmental impact of both industrial and consumer waste."

Key recommendations for these countries are:

- Foster smart consumption: This could be done through new technology and design to increase material efficiency and introducing sharing business models, the authors advice. In Brazil, for instance, HP was building a zero-waste factory, promoting take-back schemes, and using reverse logistics to remanufacture, reuse and recycle products.
- Design circularity at all levels: "Consumer goods should be built to last, easy to maintain and designed to be disassembled or recycled at end-of-life. Long-term infrastructure being built now must be durable, adaptable and upgradeable." As reported, China has built eco-industrial parks where the waste of one business becomes the feedstock for another.
- Transform the informal economy: In Brazil, a mobile phone app is linking residents with informal waste collectors who sell recyclable materials to scrap centers. In Ghana, where up to 10,000 people work in Accra's Agbogbloshie scrapyard dismantling everything from toasters to aircraft, a program offers training to become designers and manufacturers so they can get greater value from their work, to name but a few examples.

"Shift" countries

These countries maintain the highest proportion of services as part of their GDP (gross domestic product), the report underlines. Yet, their material consumption were ten times greater than that of the "Build" countries. Furthermore, they produce high volumes of waste, "although what they process in-country themselves is usually managed relatively efficiently". However, concerning their high consumption levels the true impact of "Shift" countries "extends far beyond their national borders, with much of the environmental and social costs incurred elsewhere". Therefore, these states "need to stop passing the buck and take responsibility for these impacts, regardless of where they occur". To that end, they could start incentivizing the dematerialization of consumption by aligning their tax regimes with sustainability ambitions.

The authors recommend:

- Shift to smart ways of consumption: This includes circular design, extending product lifetimes and using fewer materials.
- Take responsibility for the impact of imports and exports: "Shared standards for health, safety and the environment should be applied throughout the value chain, including waste processing," the authors emphasize. "Innovative schemes use waste as a resource, for example Interface is collecting used fishing nets in the Philippines and using the waste nylon in its carpet tiles."
- Drive the renewable energy transition: This means decarbonizing "Shift" economies and creating abundant renewable capacity, storage and smart grid systems. A transition to 100 percent renewable energy in the US would see a net increase of two million jobs, halve energy costs for consumers and save taxpayers 600 billion US-Dollar in healthcare costs and 3.3 trillion US-Dollar in climate costs, the authors refer to findings of Stanford University research.

To bridge the circularity gap, the authors of the report suggest global collaboration. This would enable identification of key data needed to measure and track circular performance – and provide the necessary infrastructure and alliances to collect, retrieve and share data. Furthermore, global trends should be translated into national pathways. This would enable countries to set goals, peer review, measure and benchmark performance, plus track progress against their ambitions. Last, but not least, a global coalition for action should be built. "This will bring together front-running businesses, governments, NGOs and academics to collectively boost capacity and capability to better serve societal needs more sustainably," the authors are convinced.

www.circularity-gap.world/2020

Photo: TSUNG-LIN WU / stock.adobe.com

JAMAICA
BEGINS WITH MEASURES FOR GREEN COVID-19 RECOVERY

Jamaica has overhauled its energy policy to create a post-pandemic recovery package anchored in higher carbon emissions targets for farms and forestry.

Photo: jemacb / Pixabay

As reported by non-for-profit organization Sci. Dev.Net in July this year, the island country in the Caribbean Sea hopes to cut emissions by almost one third over the next decade, by optimizing water and energy use and diversifying food production. "The announcement comes as countries worldwide struggle to manage their economies during the Covid-19 outbreak, often using measures many fear will set back sustainability goals." This year, governments were expected to present ambitious climate plans to meet obligations under the Paris Agreement, the information said.

Jamaica's new policy is a revision of its 2030 energy policy and includes assessments and modeling to take into account the importance of agriculture and forestry to the economy. "The previous policy reduced the island's dependency on oil in its energy supply mix, from 95 percent in 2010 to about 50 percent at the end of 2019." Under the new targets, Jamaica would hope to reduce greenhouse gas emissions from changes in land use, for development and increased agricultural activities, and deforestation by up to 28.5 percent by 2030, Sci.Dev.Net gave account. Agriculture would contribute about six percent to the country's total emissions, while land-use change and forestry account for 7.8 percent of emissions.

According to Carlos Fuller, a climate negotiator attached to the Caribbean Community Climate Change Centre (CCCCC), Jamaica's new measures "will create new economic opportunities and generate employment for Jamaicans".

New Garbage Trucks for Jamaica

In July this year, NSWMA was provided with twenty brand-new Shacman F3000 compactor garbage trucks, which were handed over at a ceremony held at the office of the Jamaican Prime Minister.

Each parish received one of the new vehicles, while the major cities, Kingston and Montego Bay, as well as "highly populated areas" – like St Catherine to service Portmore, Clarendon to service the Longville Park and Mineral Heights housing schemes – were provided with an additional truck. The remaining two trucks are to be used across the island for commercial collection.

As reported by the newspaper Jamaica Gleaner, the NSWMA previously had 130 trucks in its fleet with 64 being added within the last four years alone.

The activities required to achieve the more ambitious NDC (nationally determined contributions) provide "Jamaicans with the opportunity to create new economic prospects, which will generate more employment, capacity building initiatives, development and deployment of new technologies, stimulate foreign direct investment and lead to a healthier and enhanced quality of life," he told Sci.Dev.Net. There is hope the country will pave the way for a regional trend towards improved emissions policies. "There will be a significant decline in regional emissions if countries with high emissions like Trinidad and Tobago, Cuba and the Dominican Republic … take Jamaica as a precedent," CCCCC deputy director and science advisor, Ulric Trotz, was quoted.

Predictions for the island's economy are bleak, as Jamaica's government is projecting a 5.1 percent economic contraction. The new energy policy could prove crucial to Jamaica's economic recovery, Helen Mountford, vice president for climate and economics at the World Resources Institute, is convinced. "Jamaica is taking the kind of action needed both to tackle climate change and rebound from the Covid-19 crisis in a way that will strengthen its resilience to future shocks," she said.

Developing an integrated waste management

The aim to improve the situation also implies to Jamaican waste management. In March this year, the National Environment and Planning Agency (NEPA) together with the National Solid Waste Management Authority (NSWMA) hosted part one of a policy dialogue session focusing on developing an Integrated Solid Waste Management Public-Private Partnership Project for the country.

According to NEPA's press release, the dialogue benefitted from presentations made by the heads of ministries, departments and agencies, which provided greater insights into the integrated waste management system that is required to address the nation's waste management challenges. An update on the intended project was presented by the enterprise team secretariat housed in the Development Bank of Jamaica. In December 2019 and January this year, the Jamaican government – through the Development Bank of Jamaica – had sought for experts "as transaction advisors to assist in structuring and implementing a competitive tender process to select a reputable private investor for a Proposed Integrated Solid Waste Management Project on a design, build, finance, maintain, operate and transfer basis". The goal is the realization of a public-private partnership project to be implemented over a period of 12 - 16 months. As described, it "will include a waste-to-energy facility with pre-sorting, energy recovery and minimization system to be constructed at appropriate site(s)".

Part two of the dialogue was planned for July 2020; it was intended to bring together the heads of ministries, agencies and the political directorate in the waste management sector.

Jamaica's waste situation

According to the NSWMA Annual Report 2018/2019 (the financial year ended on 31 March 2019), the organization collected 907,981 tons of residential waste – against a set target of 800,000 tons which was exceeded by 107,981 tons (11.9 percent) – and presented an increase of 231,892 tons (25.6 percent) over the previous period. Nearly 700-thousand tons of solid waste was collected, or over 70 percent of the total solid waste generated island-wide, minister of local government and community development Desmond McKenzie wrote in the report. "Adherence to the collection schedule of once per week in the last financial year was nearly 80 percent, and compliance with the sweeping schedule for major roadways and town centers was almost 90 percent." The main reasons for this improved performance were the procurement and introduction of new collection units and repairs to dysfunctional units.

> The aim to improve the situation also implies to Jamaican waste management.

As emphasized by the minister, the prevention of unlawful waste disposal and the penalizing of those who persist in this activity is just as important.

In 2019, nearly 17 years since the passing of the National Solid Waste Management Act, 2002, the NSWMA was – by its own account – on the cusp of finalizing three seminal regulations to bolster its mandate as regulators of solid waste management:

- "The National Solid Waste Management (Disposal of Solid Waste Facilities) Regulations, 2019", which will primarily establish a licensing regime for the operation of solid waste facilities.

- "The National Solid Waste Management (Disposal of Hazardous Waste) (Electronic & Electrical) Regulations, 2019": Aim is the taking back of certain categories of hazardous waste from Jamaica's waste stream.
- "The National Solid Waste Management (Public Cleansing) Regulations, 2019": It is intended to ensure compliance by citizens, developers, organizers of entertainment events and others with provisions to, among other things, prohibit the wanton discarding of solid waste from public and private transportation, littering, prohibiting depositing of solid waste and noxious substances in watercourses etcetera.

As reported, the island's disposal sites will be profoundly transformed once the government-appointed enterprise team would finalize the development of an integrated solid waste management system "that will engage private investors in the solid waste industry". Since its appointment, the team had completed a pre-feasibility study wherein it explored options for public-private partnerships (PPPs). "These potential changes will see an integrated solid waste management system (ISWMS) in which every type of waste will be transformed into some form of value-added product," NSWMA wrote.

Impact of Coronavirus

Like other countries in the world, Jamaica suffers from the novel coronavirus, Covid-19 and the measures adopted by the government to limit its spread. Therefore, the performance of the country's economy is negatively impacted: In the first quarter of 2020, it declined by 2.3 percent when compared to the similar quarter of 2019. "This was the result of declines in both the services and goods-producing industries of 2.5 percent and 1.9 percent respectively," the Statistical Institute of Jamaica informed at the end of June. According to the World Bank, Jamaica and its population of 2.93 million people are also vulnerable to natural disasters and the effects of climate change. The country "is an upper-middle-income economy that is nevertheless struggling due to low growth, high public debt and exposure to external shocks".

In 2013, Jamaica launched an ambitious reform program to stabilize the economy, reduce debt and fuel growth, and to gain national and international support, the World Bank gave account. Public debt fell below 100 percent of GDP (gross domestic product) in 2018/19 and is expected to decline below 60 percent by 2025/26, in line with the provisions of the Fiscal Responsibility Law. The rate of unemployment also fell to a historic low of 7.2 percent in October 2019, "which is almost half the rate at the start of the reform program".

Opportunities

Jamaica continues to welcome investors from across the globe, the governmental agency JAMPRO assures on its homepage. The national agency promotes business opportunities in export and investment to the local and international private sector. For example, the webinar "Jamaica: Scaling up investment in Clean Energy" organized at the end of July this year, revealed information about Jamaica's Integrated Resource Plan (IRP), which is the country's 20-year plan that describes the annual generation capacity requirement for the period 2018 - 2037. The overall energy target to be achieved by the year 2037 is 1,260 MW (megawatts) of wind and solar, 330 MW of LNG (liquefied natural gas) and 74 MW of hydro/biomass/WTE.

The event officially kicked off JAMPRO's energy promotion activities for the second half of the year, as the agency seeks investors to join other renewable energy projects like Wigton Windfarm and Eight Rivers Energy Company's Paradise Park Solar Farm.

More Information about JAMPRO and opportunities in Jamaica can be found under www.dobusinessjamaica.com.

There are also tenders, which are published at www.jamaicatenders.com/ and www.globaltenders.com/government-tenders-jamaica.php/.

RUSSIA: 25 WASTE-TO-ENERGY FACILITIES

The Russian state development corporation Vnesheconombank (VEB.RF) as well as the state corporations Rostec and Rosatom have signed an agreement to build at least 25 municipal solid waste-to-energy plants. The total cost of the project is estimated at 600 billion Russian Rubles (more than eight billion US-Dollar); one-third of the amount will be contributed by VEB.RF. According to media reports, the construction of the 25 waste-to-energy plants would prevent 81 landfills. Russia generates over 60 million tons of communal waste per year; this figure grows roughly three percent per year, online publication russiabusinesstoday.com informed. The Moscow region alone, with 17 million inhabitants in the city and suburbs, would create over eight million tons of waste.

EUROPEAN COOPERATION FOR IMPROVING WASTE MANAGEMENT

Photo: OptiWaMag/Interreg Europe

The new OptiWaMag project – launched by six partners – is made possible by the financial support from the European Union – the Interreg Europe program and European Regional Development Fund (ERDF).

According to the information, Europe faces major challenges in waste management due to the high population density and growth in waste generation. Moreover, the increased economic activities and growth in the tourism sector raise the waste generation. The resource efficiency and proactive use of resource-efficient economy can contribute to economic, social and territorial cohesion by improving the lives of people regardless of income, background or status.

In the OptiWaMag project – "Optimization of waste management in urban spaces and in households" – six partners from Greece, Hungary, Italy, Latvia, Portugal and Sweden collaborate. The partnership is led by the County Administrative Board of Östergötland from Sweden. The project (August 2019 – January 2023) aims to demonstrate how the development of the current waste infrastructure and the recently used waste management practices can deliver sustainable, smart and inclusive growth through the exchange of good practice. Its official kick-off meeting was held in September last year in Linköping, Sweden.

www.interregeurope.eu/optiwamag

USA:

WASTE MANAGEMENT IN THE CITIES

Reportlinker.com has announced the release of the report „Opportunity Assessment of Waste Management in US Cities – by Waste Management Outlook, Key Initiatives and Cities – Forecast to 2023".

According to the information, there is an increasing focus on waste recycling and energy generation and adoption of smart waste management systems – based on Internet of Things (IoT) – to drive the market. As estimated by the research firm MarketsandMarkets, the waste management investments in US cities are expected to grow from 1.0 billion US-Dollar in 2018 to 1.7 billion US-Dollar by 2023, at a compound annual growth rate (CAGR) of 10.4 percent during the forecast period.

An example: Seattle, a major city in the US, has increased its overall recycling rate for 13 consecutive years (2003–2016). In 2016, the city recycled 58.8 percent of its municipal solid waste with an annual increase of 0.8 percent. The city would aim to achieve an overall 70 percent recycling rate by 2022, the information says. "Key factors driving the waste management assessment in the select major US cities include an increasing focus on the collection of waste materials and transportation to recycling facilities, sorting material type and selling them to manufacturers to make new products, state governments' increasing focus on waste recycling and energy generation, and increasing adoption of smart waste management systems."

www.reportlinker.com/p05779293/Opportunity-Assessment-of-Waste-Management-in-US-Cities-by-Waste-Management-Outlook-Key-Initiatives-And-Cities-Forecast-to.html?utm_source=GNW

PARTNERSHIP FOR CIRCULAR ECONOMY SOLUTIONS

Stora Enso, a global provider of renewable solutions in packaging, biomaterials, wooden constructions and paper, and Olympic Stadium in Helsinki, Finland, have signed a partnership agreement to develop low-carbon, eco-friendly operations at the stadium by promoting the use of renewable materials and circular economy. As reported by Stora Enso, the company and Helsinki Olympic Stadium share the aim of promoting the use of renewable materials in customer and foodservice packaging to reduce the climate impact of stadium operations. "In addition, the aim is to ensure that materials get recycled to a high degree," the paper manufacturer underlined. "Packaging made of renewable materials has a high recycling rate throughout Europe, and it typically has a low carbon footprint that is further reduced when recycled." Olympic Stadium promotes the goal of a carbon-neutral Helsinki by 2035 following the Helsinki City Strategy 2017–2021. Circular economy solutions are enabled through cooperation with partners of the Olympic Stadium, including the food and catering service company Compass Group and the future recycling partner, the information said.

USA: STEEL PRODUCER BOUGHT MEXICAN METALS RECYCLING COMPANY

Steel Dynamics, Inc., one of the largest steel producers and metals recyclers in the United States, has announced the completed acquisition of Mexican company Zimmer, S.A. de C.V. as part of its raw material procurement strategy to support its new Texas flat roll steel mill, which is planned to begin operations mid-year 2021. The transaction was funded with available cash. As reported, Zimmer is headquartered in Monterrey and operates a ferrous and nonferrous scrap metals recycling business.

The company's primary operations were comprised of six scrap processing facilities strategically positioned near high-volume industrial scrap sources located throughout Central and Northern Mexico. The company also operates several third-party scrap processing locations. "These combined facilities currently ship approximately 500,000 gross tons of scrap annually and have an estimated annual processing capability of two million gross tons," Steel Dynamics gave account.

www.steeldynamics.com

ICE CREAM BRAND USES TUBS MADE WITH RECYCLED PLASTIC

Ice cream brand Magnum became the first to use SABIC's certified circular polypropylene "TruCircle" that uses feedstock made from recycling used, mixed plastic. Over seven million tubs made with recycled plastic are rolled out across Europe in 2020 and due to be launched globally from 2021 onwards.

According to manufacturer SABIC, after a successful pilot launch in Spain, Belgium and The Netherlands last year, the full roll out across all European countries is another step to offer more sustainable packaging to consumers. The new tubs have been developed in close collaboration of Unilever and SABIC. The material uses post-consumer mixed plastic as feedstock, which is broken down into its molecular building blocks, to create virgin plastics which are then used to produce these new recyclable ice cream tubs. As emphasized, by end of 2020, Magnum will use an estimated 160,000 kilograms of certified recycled plastic material.

TIDY PLANET DELIVERED ITS FIRST ROCKET COMPOSTER IN AUSTRALIA

The company Tidy Planet has shipped its first-ever Rocket Composter unit to Australia, where it will help a not-for-profit community farm to divert 200-300 kilograms of food and green wastes from landfill per day.

The A900 Rocket Composter was expected to be installed on the Rail Trail near Buckley Park Community Farm and to be in operation in September this year. The composting project is funded by the Victorian Government's "Pick My Project" community grants initiative. Food and green wastes will be collected from the surrounding residences before being fed into the Rocket to produce nutrient-rich compost for use in the on-site gardens.

INITIAL SALES SUCCESS

According to Metso Waste Recycling, its new K series of pre-shredders has got off to a strong start.

The machines of this series have been sold to customers in many different countries, the provider underlined. In Germany, three major recycling companies have already made purchases – and many more have shown an interest. Two models are available: the smaller M&J K160-2HS and the slightly larger M&J K210-2HS. Designed especially for sites with a five to 45 tons per hour production requirement, M&J K series pre-shredders can process various materials such as municipal solid waste (MSW), commercial and industrial waste (C&I waste), construction and demolition waste (C&D waste), green waste, wood and other bulky waste.

www.metso.com/waste

CROSS-INDUSTRY PLATFORM BATTERIESTRANSPORT.ORG

The industry associations of the European Union and the USA for advanced rechargeable, portable and automotive batteries – in cooperation with the battery recycling, medical equipment, automobile and electric mobility industry – have launched BatteriesTransport.org, an information platform on the legal requirements for the safe transport of batteries and battery-containing vehicles and equipment. The professional transport of battery-related articles – via air, sea or road – is subject to international, national and regional regulatory frameworks, which include comprehensive administrative and operational measures to ensure safe transport at all times. The requirements apply to lead-, lithium-, nickel- and sodium-based batteries likewise. With the aim of facilitating access to battery-specific transport, packaging and reporting information, and raising awareness, BatteriesTransport.org makes available free and easy-to-understand content on the requirements as set out by the United Nations, the European Agreement concerning the International Carriage of Dangerous Goods by Road (ADR) and other transport regulations.

www.batteriestransport.org

MAXIMIZING THE ECONOMIC VALUE OF SCRAP METAL

■ Panizzolo Recycling Systems: Interview with Guilherme Pina, Owner of Ecofuturo

Ecofuturo is a young family-run industrial company. Located halfway between Lisbon and Porto, over the years, it has decided to specialize in the refining of electric motors and small waste from WEEE, to enhance the individual granulated metals.

Owner Guilherme Pina has a clear vision of the future, both in Portugal and throughout Europe. Having moved away from traditional trading activities, he preferred to invest in machinery and technologies to maximize the economic value of scrap metal. In the following interview, you will learn more about Ecofuturo and its collaboration with Panizzolo Recycling Systems.

Mr. Guilherme Pina (right) and his father with the copper granule from the Compact Refining Plant

Can you tell us more about the company's history?

Ecofuturo was founded in 2014 in Marinha Grande, the same place where my grandfather started his business of collecting and trading metal and ferrous turnings sixty years ago. He was one of the first in this area. We have grown together with companies in the automotive sector, while the second generation has also expanded the field of action to other medium-light scraps.

When I started working in the company, I realized that investing in recycling plants offered greater growth opportunities. The general Portuguese mentality was – and still is – strongly linked to selling as it is, and unfortunately my grandfather's company made no exceptions. For this reason I decided to change my path and founded Ecofuturo together with my parents and brothers. Right from the start we were able to distinguish ourselves due to our industrial mentality. The path is still long, but we have already obtained positive feedback and we aim to be recognized for the quality of the granulated metals we obtain in output. To date, 60 % of our outputs are sold in Portugal, both to specialized companies and directly to the foundry.

The patented refining hammer mill designed by Panizzolo

How did you develop the corporate treatment cycle?

At first, we focused on the recycling of electric cables and small WEEE and then, in 2018, we started to focus on the treatment of electric motors. We tried working with Chinese treatment plants. But, the quality of the metals was not what we had expected, the productivity was very low while the breakages were more and more frequent. In those years, we were expanding our presence to the national and Spanish market and, therefore, we

Photos: Panizzolo

wanted to invest in a more performing and professional system.

Why did you choose to work together with Panizzolo Recycling Systems?

I began to understand that the best investment was in the complete enhancement of the copper granulate from electric motors and small WEEE. I carefully analyzed what the European market offered, finding Italian companies very well prepared in this field. Finally, I chose Panizzolo Recycling Systems' refining plant, as it immediately seemed to be the most suitable for achieving our production and quality goals.

Visiting Panizzolo, I particularly appreciated the transparency, honesty, and experience of Mauro Panizzolo and his team. The company is growing thanks to its direct experience in scrap grinding, learning every day from its grinding processes, and developing the treatment and refining cycles in their plant near Padua. We chose Panizzolo also for the modularity of the elements and the simplicity of maintenance. In the first case this will allow us to quickly install any upgrades, according to our production needs, while in the second case we can easily maintain a constantly high quality of workmanship.

Can you tell us more about the benefits of working with the Panizzolo refining plant?

Before Panizzolo, our refining cycle was based on a Chinese plant that caused problems. For example, the pre-ground from electric motors had to be processed over and over again, discarding many metals before reaching the final output. The production ratio between pre-grinding and refining was low, about 200 - 300 kg/hour, with long periods of storage of both incoming and outgoing material, not to mention any delays due to the turbine being blocked. In the input, there is commonly a percentage of steel, aluminum, and iron, which increased the abnormal wear of the blades, also causing them to break.

Today with the Compact Refining Plant, we can avoid these problems. The refiner hammer mill does not fear the heaviest metals, in a single step, it recovers and maximizes the quality of the metals, saving time, effort, and the operators involved.

How will the future for scrap companies in Portugal look like?

Soon, I expect to see a market increasingly oriented towards waste treatment, with the gradual disappearance of traders focused only on exports. In the coming years, the survival of Portuguese companies will depend on their ability to initiate a path of professionalization both from an organizational and production point of view. The national and European market increasingly wants to structure, organize and modernize waste treatment cycles for the reintroduction of the secondary raw material.

In the next few years my goal will be to expand and consolidate our presence in the Portuguese and Spanish market and, once the plant is fully operational, I do not rule out the possibility of further investing in a Panizzolo hammer mill to improve and implement the cycle of pre-grinding of the scrap I buy.

www.panizzolo.com

Goal:

DEVELOPMENT OF POLYSTYRENE CONTAINING RECYCLING MATERIAL FOR USE IN THE DAIRY INDUSTRY

US-headquartered manufacturer of plastics, latex, and synthetic rubber Trinseo collaborates with Coexpan, the Grupo Lantero division that specializes in the manufacture of rigid plastic foils and thermoformed products, to provide solutions for the packaging industry at a global level. The two companies aim to validate various polystyrene recycling technologies "to develop polystyrene containing recycled content that is fit for use in the global dairy industry's form fill seal ("FFS") market".

With materials and input supplied by Trinseo, Coexpan will be testing recycled polystyrene across various technologies at its Innotech (Coexpan & Emsur Innovation Technology Center for Rigid and Flexible Packaging). As reported, the dairy FFS packaging market, which has historically preferred the use of polystyrene due to its technical superiority over alternative polymers, has recently seen greater interest in alternative materials owing to misperceptions regarding the circularity and recyclability of polystyrene.

Trinseo and Coexpan regard recycled polystyrene (r-PS) as a game-changer for the FFS market. "Polystyrene offers a unique potential for not only closed-loop recycling but also a lower carbon footprint and extended lifecycle due to its simplicity and ease to fully recycle, giving polystyrene a major competitive advantage vs. all alternatives." Industrial volumes would come online by the third quarter of 2022.

www.trinseo.com
www.coexpan.com

Japan:

PLANIC TO BEGIN WITH PLASTICS RECYCLING IN 2021

The company aims to launch operations in 2021, to annually recycle roughly 40,000 tons of plastics, taken mainly from automobiles and home appliances.

In 2019, Japan-based Toyota Tsusho Corporation, the trading arm of the Toyota Group – in collaboration with Veolia Japan K.K. and Kojima Sangyo Co., Ltd. – have established PLANIC Co., Ltd. It is planned that this firm, which – according to Toyota Tsusho – is to be Japan's largest recycled plastic processing company, will collect mixed plastic from recycling and other facilities, sort and compound mixed plastic based on material type to recycle them back into plastic raw materials. The company's mission is to recycle used plastic from automobiles and home appliances. Furthermore, PLANIC will also "carry out the material recycling of product plastic, which includes used palettes and containers, and packaging materials from distribution centers and shopping centers, to return them to their raw material state". As the collected plastic is a mixture of different types of plastics, one issue would be that they have to be sorted by material. "Galloo Plastics S.A., which possesses a plastic car-to-car recycling technology, licensed the necessary technology (Machinery provider is Ad Rem N.V.). PLANIC's goal is to process high quality recycled plastic at a low cost by being the first in Japan to utilize an advanced gravity separation technology."

In Japan, there are two types of plastic recycling: thermal recycling plastics for use as a heat energy source and material recycling for reuse to manufacture plastic products. "Much of the waste plastic in Japan is not used efficiently, including simply being incinerated, dumped into landfills, or exported overseas," Toyota Tsusho explained. "In Japan, the 3R's campaign – Reduce, Reuse and Recycle – is being carried out to promote the recycling of plastic resources. However, there are critical issues, including the acquisition of necessary sorting techniques and improvement to operational efficiency, that stand in the way of the spread and enhancement of material recycling – i.e. turning plastics back into plastic raw material."

- www.toyota-tsusho.com/english
- www.gallooplastics.eu/en
- www.adrecyclingmachines.com

USA:

NEW SOLUTION FOR PLASTICS RECYCLING

In August this year, ePac Flexible Packaging and RePurpose Technologies (RPT) announced their partnership to help create solutions that ensure plastics are recycled and kept from landfills. The intention is that the companies create recycling facilities starting in 2021.

According to the information, ePac – a company based entirely on digital printing from HP – and RPT – which offers engineered product solutions through purpose-driven recycling – want to realize a "community-based model, which can be replicated easily, provides a transparent and economically viable solution that can once and for all cure the grave problem of our overflowing landfills". ePac operates a network of 14 US community-based flexible packaging facilities focusing on supporting the growth of small and medium-sized companies. "Through the power of digital printing every package produced can be serialized with a unique code that allows it to be tracked from production through reuse," a press release says. "Using IoT/Blockchain technology, data can be collected to provide tracking information to brands and retailers, while educating consumers about the package they just discarded and incentivizing them to practice a sustainable lifestyle." RPT would utilize proprietary formulations and patented technology to manufacture high demand products from co-mingled plastics. "Through a 'plastics only' collection process specifically designed to reduce handling and carbon footprint, RPT's platform allows direct consumer engagement and traceability to ensure no plastic is left behind."

By forming this partnership, ePac and RPT intend to create replicable recycling facilities starting in 2021 that are able to create a circular community-focused solution. The ability to track and trace every package would provide supply chain transparency to all parties in the value chain.

- www.epacflexibles.com
- www.repurposetechnologies.com

"FIRST STEEL RECYCLING PLANT IN INDIA"

End of July this year, Tata Steel – a globally active steel producer belonging to the Indian Tata Group – has announced that the company would soon commission its steel recycling plant being set-up in Rohak in the Indian state of Haryana. Some days before, the first raw material consignment of ferrous scrap for trials had taken place.

According to Tata Steel, the new facility is the first in India. The scrap processing plant will have a capacity of 500,000 tons per annum. The Build, Own and Operate (BOO) partner is Indian M/s Aarti Green Tech Ltd, a subsidiary of M/s Aarti Steels Ltd. "It is the first such facility in India, equipped with state-of-the-art scrap processing equipment such as shredder, baler, material handler, and so on," the company underlined. The material would be procured from various market segments, for example, end-of-life vehicle scrap, obsolete household scrap, construction and demolition scrap, and industrial scrap. "This scrap would be processed through mechanized equipment, and the high-quality processed scrap would be supplied to Electric Arc Furnaces (EAFs), Induction Furnaces (IFs) & Foundries for downstream steel making, satiating their long-standing demand," the steel producer described the future use of the secondary raw material.

Green step towards sustainable steel production

As emphasized by the company, Steel Recycling Business is a definitive green step by Tata Steel towards sustainable steel production and ecosystem. "The steel produced through the recycled route entails lower carbon emissions, lower resource consumption, and lower energy utilization." Furthermore, in India, the National Steel Policy envisages a steel production of 300 million tons per year by the financial year 2030; to reach this goal, steel recycling would play a pivotal role.

"Steel Recycling through the Electric Arc Furnace (EAF) route is a global trend, and going forward it would become imperative for India's sustainable growth aspirations," Yogesh Bedi, Chief of Steel Recycling Business at Tata Steel, was quoted. The recycling business "is yet another pioneering initiative from Tata Steel to enable circular economy and a sustainable tomorrow."

As reported, the initiative aims to provide the much-needed raw material fillip to the steel industry by making available quality processed ferrous scrap, streamlining the currently unorganized scrap supply chain, lowering the dependency on imports, and enhancing the transparency and efficiency in the entire value chain.

www.tatasteel.com

A NEW WHEEL LOADER FOR RECYCLING

USA-based Taylor Machine Works, Inc. has introduced the T-1025, RECYCLER Wheel Loader.

By the company's own account, for more than 90 years, the Taylor name has become synonymous with purpose-built machines specifically designed to meet the requirements of its customers. "We listened to the needs of those working in the recycling industry and made the decision to round out our fleet with the Taylor RECYCLER Wheel Loader series, to provide our customers one source for their heavy lifting equipment needs," Robert Taylor, President and Chief Operating Officer for the Taylor Group of Companies, is quoted in a press release.

Photo: Taylor Machine Works

According to the manufacturer, the new Taylor T-1025 RECYCLER features a panoramic view cab and well-positioned lift arms, that optimize operator visibility and comfort, while allowing for a clear line of sight to the attachment. Key features such as ride control, auto-lube and air conditioning were all offered as standard appliances. The loaders are also equipped with Cummins Tier 4 Final engines and feature auto-idle speed control, which optimizes engine speed and helps reduce fuel consumption. With a full turn tipping load of 25,354-lbs (about 11.5 metric tons), max hinge pin height of 182 inches (about 4.6 meters) and a max dump reach of almost 4 feet (1.21 meters), the T-1025 RECYCLER would navigate "loading and clean-up duties with ease".

www.taylorforklifts.com

GERMAN PLANT MANUFACTURER BROADENS PRODUCT PORTFOLIO

Germany-based Stadler Anlagenbau GmbH has announced the acquisition of a majority stake in weeeSwiss Technology AG, which specializes in the design, construction and operation of turn-key waste electric and electronic equipment (WEEE) recycling plants.

The two companies intend to harness their combined know-how in the joint development of new solutions, processes and technologies for WEEE recycling. These efforts would benefit from the resources of Stadler's innovation and test centers in Altshausen (Germany) and Krsko (Slovenia). They would also build on the existing collaborations that weeeSwiss has established with Swiss universities, a press release said.

With this move, Stadler extends its offering to include the recycling of electronic waste. "WEEE is the fastest growing waste stream across the world, currently amounting to annual volumes around 50 million metric tons," the internationally active company underlined. "The demand for recycling this material is rising fast, as legislation to regulate the management of electronic waste comes into force across the world to address the environmental impact of this waste and foster a circular economy where its component materials are recovered and reused. The growing public awareness of the importance of using more efficiently natural resources is also a factor in the push for recycling. On the other hand, electronic waste is a source of many materials that are in great demand for new low-carbon technologies and electronics, which translates into business opportunities for recycling operations."

Photo: Stadler

weeeSwiss has more than 25 years of industrial experience in WEEE recycling technology, and today supports its customers around the world with its operational and market know-how. The company offers e-waste recycling operators full engineering, procurement and construction (EPC) services. Its process begins with a detailed analysis of the customer's requirements, followed by the design of recycling process and factory layout, then installation and start-up. The company also delivers specially developed training programs "to ensure the customer's staff is able to operate the plant to the highest standards".

www.w-stadler.de
www.weeeswiss.ch

ORGANIC CHEMICALS PRODUCER AWARDED WITH TWO CERTIFICATIONS

SCS Global Services, a leader in third-party environmental and sustainability certification, auditing, testing and standards development, has awarded dual certifications to MKS DevO Chemicals, based in Turkey. The company, a leading organic chemicals producer in Europe, Middle East and North Africa (EMENA), has achieved, after undergoing an assessment, Recycled Content Certification for its patented product Sultan Black Recycle and Certified Recycling Program for its production facility Bandirma Chemical Complex (BCC). As reported by SCS, "MKS DevO is the world's first company to produce a sulfide-free sulfur black dye, Sultan Black Recycle, with recycled content which is also recyclable". While Sulphur Black dye would mostly be used in denim fabric production and produces millions of square meters of wastewater annually, Sultan Black Recycle is a sustainable alternative for denim production. "Until now, denim has been dyed by virgin sulfur black dye," SCS informed. "The MKS DevO dye contains 51 percent post-consumer recycled content collected from waste sludge from the dyeing process." Besides, BCC has also been certified under the SCS Recycling Program. "The facility recycles spent dye process water through ultrafiltration systems," SCS informed. That would allow capture of the dye to be recycled and the elimination of dye in discharged wastewater.

www.scsglobalservices.com
www.mksdevo.com

Bali:

NEW WASTE PROCESSING FACILITY

End of July, the ground-breaking for a new waste processing facility took place. It is a partnership between Project STOP, the Alliance to End Plastic Waste and the Jembrana Regency in Northwest Bali.

Representatives from Project STOP, Government officials and the Alliance to End Plastic Waste celebrate the ground-breaking of a new facility in Jembrana, Bali

Photo: Alliance to End Plastic Waste

According to the information, the facility is the regency's first-ever solid waste management service that would benefit as many as 150,000 residents, and – as sustainable full waste management and recycling system – create new jobs. The facility, which is expected to be fully operational by the end of this year, will be equipped with sorting and waste processing systems, residue handling equipment and other supporting facilities to manage and recycle both organic and non-organic waste from households and businesses. "Waste management is a priority during the Covid-19 pandemic. Waste services for the community must continue to run to create a clean and healthy environment," I Wayan Sudiarta, head of Jembrana's Environmental Office, was quoted. Launched in 2017 by Borealis (a provider of solutions in the fields of polyolefins, base chemicals, fertilizers and melamine) and SYSTEMIQ, Project STOP (Stop Ocean Plastics) – supported by industry and government partners – works with cities to create effective waste management systems that eliminate plastics leakage into the ocean and creates circular systems in Southeast Asia. The Alliance to End Plastic Waste is an international nonprofit organization partnering with government, environmental and economic development NGOs and communities around the world to address the challenge to end plastic waste in the environment.

- www.stopoceanplastics.com
- www.endplasticwaste.org
- www.borealisgroup.com

AUTOMATED BUNKER MANAGEMENT SIMPLIFIES RECYCLING

With its new automated bunker management for waste sorting facilities, German Sutco Recycling-Technik GmbH is taking a further step towards reducing the burden on sorting and processing plant operators.

In a research and design project supported by the German Federal Ministry for Economic Affairs and Energy, the plant construction firm laid the foundations and gathered the training data for conversion to a fully automatic bunker management operation in a sorting facility for packaging waste. The project's goal was to increase the overall efficiency of the sorting process up to its final stage, conpressing the secondary raw materials produced from the waste into bales.

A sorting plant for packaging has on average over 10 to 20 bunkers for storing the sorted materials as in these plants the materials supplied (packaging waste of all kinds) – such as the plastics PP, PET, HDPE, LDPE alongside paper, Tetra and aluminum – need to be cleanly separated from each other and collected in shelters at the end of the sorting process.

These bunkers fill up at varying rates, depending on the material. "For example, sheeting has low density, meaning that the corresponding bunker may have to be emptied up to five times an hour, while the aluminum shelter may only need emptying once a day," Sutco Recycling Technik described the situation. "Previously, once a bunker was full, the press operator would have to withdraw the contents manually and transfer it via a conveyor belt to the press." In the research project, the company developed automated bunker management, "determining the perfect time to empty the bunker using fill level measurements. The system only empties the individual

bunkers when they contain a volume suitable for one, two or three bales."

As reported, during manual operation, the press operator could not keep an overview at all times of the filling speeds of all the bunkers, empty them at exactly the right moment and also consider the activity status of the corresponding bale press in each case. "Not until the introduction of the specially designed software by Sutco, using a mathematical model to process recorded data and measurements by the millisecond, could this complex process be optimized," the German provider underlined.

Self-adjusting programs and bunker prioritization

As reported, the greatest challenge is the flexible design of material-dependent self-adjusting programs. For each material, an automatic comparison of the bale length and bunker fill level is constantly carried out. In this way, Sutco bunker management not only ensures the guaranteed production of desired bale qualities but also independently optimizes its own processes, constantly increasing its precision, the company assured.

With regard to the different fill speeds of bunkers, Sutco developed a prioritization model in which the processing status of the press is coupled to the fill level of the bunker in question. "The program takes account of the different fill levels of the bunkers and, where these are the same, gives priority to the bunker that will fill quickest."

For new and existing plants

In new plants, one advantage of the bunker management is the much lower space requirements for the bunkers, Sutco informed. "The standard buffer reserve capacity of up to 60 percent of bunker volume is no longer required (e.g. for aluminum)." In existing plants, the automatic operation would help to avoid malfunctions in the sorting process, streamline processes before the press through optimal bunker use and automatically guarantee the desired bale quality (shape and density). Further advantages of the production of uniform, equally sized bales would include greater efficiency in transport and bale storage, as well as in wire usage.

"Bunker management can be added to all Sutco sorting and processing plants and in existing Sutco RecyclingTechnik facilities. The exclusive system, as a special feature for sorting plants, is optimally adjusted for use with the horizontal balers provided by our sister company unoTech GmbH," the provider emphasized.

www.sutco.de

Photo: Sutco Recycling Technik

PAINT INGREDIENT FROM PAPER SLUDGE

Multinational paints and coatings company AkzoNobel and Alucha, a firm that develops recycling solutions, are collaborating on a technology that turns paper sludge into resources for making paint.

Alucha, which won the partnership in the 2019 Paint the Future global startup challenge, has developed a technology that recovers calcium carbonate – a mineral that goes into things like plastics, paper, and paints – from paper waste. Paper sludge is left of paper once the fibers have broken down so much that it cannot be recycled anymore. This sort of waste is the paper industry's biggest waste stream. "Together, we can help make something useable out of it," a press release on the AkzoNobel homepage underlined. "Today, calcium carbonate comes out of mines and quarries in great quantities. It goes into plastics, paper, paints, pharmaceuticals and all sorts of everyday life products which will be thrown away and end up in landfill or incineration facilities," Gijs Jansen, Alucha CEO, is cited. "Either way, you lose the calcium carbonate and burning it will generate carbon dioxide (CO_2)." Alucha's technology to recover calcium carbonate would mean less waste in the landfill or incinerator, and also less reliance on mining.

What AkzoNobel finds especially exciting about Alucha's technology is that the calcium carbonate recovered from paper sludge is an "essential raw material we use in our paint", the multinational company underlined. This non-commodity supply would offer a relatively low cost and efficient way to make the products more sustainable and circular. "At AkzoNobel, we intend to buy this mineral from Alucha and become their launching customer," Rinske van Heiningen, AkzoNobel's Director of Sustainability, announced. "In the coming months, we'll be testing the calcium carbonate Alucha collected from its pilot phase at the Sassenheim laboratory in the Netherlands. We've decided to use the recycled calcium carbonate in a filler to start with. Because of the filler's relatively small scale, it'll be easier to test, integrate and launch."

Now Alucha is creating a consortium of partners to establish the "world's first circular calcium carbonate 'mine'".

- www.akzonobel.com/en
- www.alucha.com

Less Waste – More Resources: AUSTRALIA'S NATIONAL WASTE POLICY

Australia is planning to implement a circular economy – with all the advantages that this brings.

The country's National Waste Policy, published in 2018, provides a framework for collective national action on waste management, recycling and resource recovery until 2030. Up to now, the country has landfilled a large part of its waste or taken it to other countries. But the attitude towards waste has changed fundamentally: "The value of resources and embodied energy in waste are now recognized. There is an economic opportunity and growing desire to see our resources recaptured and recirculated within our economy," the Australian Government as well as the country's state and territory governments and the Australian Local Government Association underlined, when they explained, why waste resource management is so important. As reported, Australia generates about 67 million tons of waste per annum, which equates to roughly 2.7 tons per person. Every year, 37 million tons are making their way into recycling, while two million tons of the waste volume are dedicated to energy production. In the financial year 2018/2019 (July to June), about 4.5 million tons of waste

Photos: Hans-Jürgen Schwanke

were exported, mostly to Asian countries. In 2018, more than 21 million tons were landfilled, special media referred to the latest National Waste Report last year; organics accounted for about 10 million tons.

Although Australia is recovering 58 percent of its waste, the materials lost to landfill – such as plastics, paper, glass, metals, textiles, masonry, food and other organic materials – "are resources that are going to waste", the policy paper informed. From 2014 to 2015, waste management services in Australia were valued at 12.6 billion Australian Dollar (9.07 billion US-Dollar), and the sale of recovered materials was valued at 2.9 billion Australian Dollar (2.08 billion US-Dollar). Waste-related activities added a total value of 6.9 billion Australian Dollar (nearly 5 billion US-Dollar) to the economy, accounting for 0.43 percent of GDP (gross domestic product). Furthermore, around 50,000 people are directly employed in waste-related activities, including employees in the waste and material recovery industries, the business sector and local governments, the authors of the paper wrote. For every 10,000 tons of waste that is recycled, 9.2 jobs were created (compared with 2.8 jobs if the same amount of waste was sent to landfill). "Better management of waste can have a financial benefit for everyday Australians," the authors stated. "Moving to a more circular economy has the potential to create new jobs and benefit the economy overall."

As emphasized, applying the circular economy principles to waste management in Australia would require changes to product design, production, use and reuse, recycling and disposal. "It is a whole-of-system approach that requires accounting of the full cost and life-cycle of materials." At the same time, this approach would help to minimize reliance on virgin materials and maximize the economic value of resources. "Some materials, such as particular hazardous waste products, may still need to be disposed of. Most other manufactured goods and materials are resources that can be reused, recycled and reprocessed over and over."

National Action Plan

To implement this policy, in 2019 the National Waste Policy Action Plan was set up; the described goals and actions "will guide investment and national efforts to 2030 and beyond". There are seven targets, which are to be measured against baselines in the 2018 National Waste Report:

- "Ban the export of waste plastic, paper, glass and tires, commencing in the second half of 2020
- Reduce total waste generated in Australia by 10 percent per person by 2030
- 80 percent average resource recovery rate from all waste streams following the waste hierarchy by 2030
- Significantly increase the use of recycled content by governments and industry
- Phase out problematic and unnecessary plastics by 2025
- Halve the amount of organic waste sent to landfill by 2030
- Make comprehensive, economy-wide and timely data publicly available to support better consumer, investment and policy decisions".

Different areas of Responsibility

While the Australian government has set the direction with the National Waste Policy, the implementation of the National Waste Policy Action Plan is the responsibility of the country's states, which can also enact legislation in the field of waste management. The city councils are responsible for the collection and disposal of household waste, usually together with private companies; contracts are then assigned through public tendering. Many municipalities handle the disposal of commercial waste as well. However, this is not standardized, because depending on the region, the companies themselves have to sign contracts with disposal companies.

As far as waste for recycling is concerned, the materials intended for recycling – such as paper, plastic packaging and glass containers – are usually collected in Australian households in one bin. However, local authorities can determine which materials are to be collected in which garbage cans.

Product Stewardships

The Product Stewardship Act 2011, which was reviewed in July this year, provides the framework to effectively manage the environmental, health and safety impacts of products, and, in particular, those impacts associated with the disposal. According to the information on the homepage of the Department for Agriculture, Water and the Environment, it presents "a flexible and practical approach to product stewardship by recognizing that each product, material and industry is unique". It would allow products to be regulated or product stewardship arrangements to be accredited by the Australian government in a voluntary, co-regulatory and mandatory manner. Voluntary arrangements are MobileMuster, the official recycling program of the mobile phone industry, and FluoroCycle, the national recycling program for mercury-containing lamps.

The National Television and Computer Recycling Scheme (NTCRS) was established in 2011. The Product Stewardship (Televisions and Computers) Regulations provide the legislative framework for the scheme. Its operation is managed by four co-regulatory arrangements, Australian and New Zealand Recycling Platform (ANZRP), Ecycle Solutions, Electronics Product Stewardship Australasia (EPSA) and MRI PSO. As reported, more than 1,800 collection services have been made available to the public, and more than 360,000 tons of TV and computer e-waste have been collected and recycled. The Tire Stewardship Australia (TSA) has been

established by tire importers to administer the national tire product stewardship scheme, launched in 2014. Through the scheme, TSA aims to increase domestic tire recycling, expand the market for tire-derived products and reduce the number of Australian end-of-life tires that are sent to landfills, exported as baled tires or illegally dumped, the department describes the tasks. TSA is responsible for administering the scheme and conducting education, communication and market development activities. The Australasian Recycling Label (ARL), an initiative of Planet Ark and APCO (Australian Packaging Covenant Organization), has been endorsed by all Australian governments to help make the recycling of plastics and packaging easier. It provides recycling information so Australians can put the right packaging in the right bin.

Regarding food waste, the Australian government intends to halve the volume by 2030. Each year, Australia produces around 7.3 million tons of food waste across the supply and consumption chain, the Department for Agriculture, Water and the Environment reported. Food waste would cost the national economy billions a year. "The environmental cost is also high, with food waste accounting for about 5 percent of our national greenhouse gas emissions." Over 1,460 giga-liters of water is used annually to grow Australian produce which is then discarded. The 2017 National Food Waste Strategy provides a framework for collective action to halve food waste, as well as actions identified in the National Waste Policy Action Plan. To reach this aim would be a significant challenge that could only be achieved by working in collaboration with food supply chains, all tiers of government, consumer groups and non-government organizations, the information says. Therefore, suitably experienced and skilled entities were invited to submit a partnering proposal until September this year "to establish

"Better management of waste can have a financial benefit for everyday Australians."

an independent, long-term governance entity". The Australian government is providing up to 4 million Australian Dollar (nearly 2.9 million US-Dollar) over four years to establish the governance entity.

Recycling facilities

"Right now, there are 193 material recovery facilities in Australia. Most are hand-sorted; nine are semi-automated, and nine are fully automated. These are nowhere near sufficient to sort Australia's annual recycling," the online publication The Conversation, a network of not-for-profit media outlets that publish news stories written by academics and researchers, reported in August last year. The sorting would take place by mechanical-biological treatment plants and material recovery facilities. According to the information, the nine more modern facilities in Australia use automated optical sorting systems to take out the manual and mechanical sorting. "A new facility in New South Wales can detect eight different types of material: aluminum, cardboard, glass, HDPE plastic, mixed paper, newspaper, PET plastic, and steel," the author Jeff Seadon from Auckland University of Technology wrote. He is convinced that as worldwide demand for high quality, clean recycling material increases, Australia must upgrade its technology. "Incentives and financial help for recycling companies may be necessary to see Australia develop a viable domestic recycling industry."

Governmental support

Australia's waste and recycling industry will be transformed by the Recycling Modernization Fund (RMF), which would generate 600 million Australian Dollar (about 434 million US-Dollar) of recycling investment, the Australian Department of Agriculture, Water and the Environment is convinced. "By mid-2024 when the full waste export ban comes into effect, Australia must recycle around 650,000 additional tons of waste plastic, paper, glass and tires each year." The Australian government would invest 190 million Australian Dollar into this fund. That would contribute to recycling infrastructure investment and "drive a billion-dollar transformation of Australia's waste and recycling capacity". More than 10,000 jobs would be created, and over 10 million tons of waste diverted from landfills. Furthermore, the government has set up a separate process to deliver a national solution for mixed-paper recycling, the information on the department's homepage says. The Australian government was inviting states and territories to partner with industry (and other states) to submit project proposals for new paper processing facilities that contribute to a national solution; the closing date was in July this year.

There are also announcements from states. The Australian and ACT (Australian Capital Territory) governments intend to provide 21 million Australian Dollar to upgrade the ACT Material Recovery Facility (MRF). The upgraded plant would have the capacity to improve the quality and marketability of 23,000 tons of paper and mixed cardboard, 1,800 tons of mixed plastics and 14,000 tons of glass from the ACT and five regional New South Wales councils annually, the interested reader could learn. Work is expected to begin in 2020, and completion is expected to largely achieved in 2021-22.

Western Australia is funding new plastics and tire processing infrastructure. As reported, 15 million Australian Dollar will be provided to process plastics and tires across the state. Access will also be provided to industrial zoned land valued at 5 million Dollar for processing infrastructure. The Australian government will contribute 20 million Dollar. "State funding will need to be matched or exceeded by industry investment. The total combined investment in local processing is likely to be greater than 60 million Dollar. Projects in regional and remote Western Australia are encouraged."

Opportunities

Although the Australian economy is impacted by the coronavirus pandemic and the country – as media reported – is set up for its first recession in 29 years, there are tenders. The Australian government's investment promotion agency Austrade works to inform investors about growth opportunities in different areas, including a circular economy. Interested enterprises can find the corresponding information on the internet: https://www.austrade.gov.au/International/Invest/opportunities

Tenders are also published at www.australiantenders.com.au/search/tenders/ or www.globaltenders.com/tenders-australia.php/.

Developing a Role for Energy from Waste

According to research from think tank Infrastructure Partnerships Australia, energy recovery from waste could help divert 13.7 million tons of landfill each year by 2030 and reduce emissions by up to 5.2 million tons of CO_2-equivalent each year. The report, Putting waste to work: Developing a role for Energy From Waste, outlines a series of key recommendations required to support the roll-out of energy recovery facilities and unlock close to 14 billion Australian Dollar in private investment by 2030, a press release said.

www.infrastructure.org.au

AS CITIES GROW, THE INTERNET OF THINGS CAN HELP US GET ON TOP OF THE WASTE CRISIS

Total global waste is expected to double from nearly two billion tons in 2016 to an estimated four billion tons by 2050 as consumer-oriented urban populations grow. As population growth increases consumption and waste, managing this waste is becoming an ever-greater challenge. The Internet of Things (IoT) can be used to develop smarter and more effective ways of managing and reducing waste.

IoT is a monitoring technology which enables accurate tracking and collection of real-time data. It can help with problems such as timing of waste collection, and waste treatment and disposal.

How a smart city manages waste

IoT can enable automation, through cyber-physical systems, that changes the way waste management takes place. Some cities are already using a combination of IoT and sensors to operate smart waste management systems. For example, Songdo in South Korea is a purpose-built smart city that uses a combination of IoT and sensors to operate its waste management system. Songdo aims to recycle 76 percent of its waste by 2020 through its highly efficient and convenient waste management system. The city is connected by a truck-free waste management system. Automated waste disposal bins are located throughout the city. Pneumatic pipes suck waste directly from premises into an underground network of pipes and tunnels.

The system connects to a central waste-processing facility called the "Third Zone Automated Waste Collection Plant". Waste is automatically sorted and recycled, buried, or burned for energy. Some of the reported key benefits are greater energy efficiency and reduced landfill and energy costs.

World is 'off track' on SDGs

In 2018, 4.2 billion people or 55 percent of the world's population lived in cities. By 2050, two-thirds of the world's people will be urban. Increasing urbanization has serious environmental sustainability implications and creates significant burdens on infrastructure including waste management. Sustainability planning is critical – it includes investing in public transport systems, creating green public spaces and improving urban planning and waste management. The scale of the problem of urban waste makes smarter approaches to recycling and resource recovery essential.

Managing waste is a major challenge for cities worldwide. At the United Nations Sustainable Development Summit last September, UN Secretary-General Antonio Guterres called for delivery of the Sustainable Development Goals (SDGs) to be accelerated. The summit formally adopted a new sustainable development agenda and 145 SDG acceleration actions. Forty-two of these actions are related to SDG11 – Sustainable Cities and Communities.

Australia's waste crisis

Australia, with a fast-growing population of about 25.5 million, is struggling with a waste crisis. Australia's fastest-growing city is Melbourne in Victoria. The state has doubled the amount of waste it generates in the past 20 years. Problems have mounted in New South Wales and Queensland too.

In August 2019, SKM Recycling, which has operations in Victoria, Tasmania and South Australia, went into receivership. The company received a A$10 million government bailout to pay for repairs and maintenance of waste-sorting machines. Nevertheless, councils were forced to send their recyclable materials to landfill after the Environment Protection Authority ordered the company's glass recycling service to stop operating. Infrastructure Victoria has proposed a six-bin rubbish collection system to reduce contamination of recyclable wastes. Single-use plastic bags have been banned since November 1, 2019. The ban is part of state government measures to reduce plastic pollution and the amount of waste going to landfill and to strengthen Victoria's recycling industry. Similarly, e-waste is banned from landfill.

The state government has invested A$135 million in creating a stable and productive waste and resource recovery sector. Melbourne continues to modernize its waste management.

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

The city council installed CleanCUBE solar-powered waste compactors in high-density parts of the city in 2018. Besides reducing the footprint of public litter bins by 49 percent, the city has greatly reduced the average number of waste collections and therefore of waste trucks roaming the streets. This has eased traffic congestion and reduced carbon emissions. But will such measures be enough to cope with urban population growth?

What more can be done?

Infrastructure Victoria is advising the state government on how to create a strong and sustainable recycling and resource recovery industry. Its preliminary report proposes several options, including:

- tackle food waste, which makes up more than one-third of household rubbish going to landfill
- push manufacturers to use more recycled products
- reform the landfill levy to create an incentive to reduce disposal of waste to landfills and encourage greater re-use and recycling of resources, with funds raised by the levy able to be used to the support recycling and resource recovery sector
- ban single-use plastics.

The report also proposes a "waste-to-energy" policy – converting food waste to low-emissions electricity.

The authors suggest Melbourne (and other Australian cities) can further develop its waste-management strategy and policy to promote resource efficiency with IoT. Having IoT embedded in waste-management systems will improve resource efficiency, tracking and measurement. IoT also acts as an accountability mechanism (for waste management governance and reporting) for cities' waste management.

Using IoT in this way will strengthen recycling industries and specifically enable Australia to be at the forefront of implementing the SDG 2030 agenda.

■ The authors: Dr David Teh is a Sessional Lecturer and Tutor, College of Business, RMIT University, Melbourne; Dr Tehmina Khan is a Lecturer in Accounting, RMIT University.

Photo: NadinLisa / pixabay

Making Things Last:
SCOTLAND COUNTS ON CIRCULAR ECONOMY

Scotland has set ambitious targets. “Biodegradable municipal waste will be banned from landfill from 2021, and we have a target to send no more than five percent of all waste to landfill by 2025,” the Scottish Government proclaimed in February 2016. Therefore, the Government published a “strategy plan” for a circular economy named “Making Things Last” in order “to build a strong economy, protect our resources and support the environment”. But it seems that the way to reach this will not be easy.

Admittedly, Scotland's household recycling rate has increased substantially in the last decade. Latest figures published in September 2018 indicate a quote of 45,6 percent or 1.12 million tons of recycled waste respectively – for the first time more than the amount of 1.11 million tons sent to landfill. But the rate of growth in these recycling rates has been slowing down since 2014, and the Scottish Environment Protection Agency (SEPA) had to admit "that further intervention is required to stimulate growth in household recycling rates in order to achieve national recycling targets for 2025".

Largest amount: paper and cardboard wastes

The most considerable type of household waste recycled or reused in 2017 was paper and cardboard wastes with 226,495 tons or 32.0 percent of all waste recycled or reused respectively, followed by 104,679 tons of glass waste, 94,037 tons of construction and demolition waste and 89,426 tons of wood waste. Recycling and reuse of plastic wastes resulted in 51,833 tons, 50,275 tons came from metallic wastes, and about 90,000 tons were discarded or fell under "others".

Scotland reused around 89,000 tons of material, including 12,000 tons of furniture, 9,500 tons of electrical items and 66,000 tons of textiles, with a totaled turnover of approximately 244 million pound sterling (276 million Euro). Household waste composted or digested amounted to 416,753 tons, while 1.11 million tons were sent to landfill. Waste managed by other diversions from landfill added up to 230,983 tons, of which 175,296 tons (75.9 percent) were managed by incineration, followed by 44,378 tons otherwise treated (19.2 percent) and 11,308 tons of non-certified composting or digestion (4.9 percent).

Many targets have been set

But the Government wants more: By 2025, Scotland expects to reduce total waste arising in Scotland by 15 percent against 2011 levels, to reduce food waste by 33 percent against 2013 levels and to recycle 70 percent of remaining waste. Furthermore, no more than five percent of remaining waste should be sent to landfill until 2025, and the EU ambition for all plastic packaging to be economically recyclable or reusable is aimed to be realized by 2030 (not regarding Brexit changes).

Many targets have been set with the aim of reducing waste. For example, Scotland's Zero Waste Plan (2010) is setting out a concept of waste as a resource. The Waste (Scotland) Regulations 2012 is providing principles for the collection, transport and treatment of dry recyclable waste, food waste, and related matters. In the Safeguarding Scotland's Resources Program (2013), advocating the reduction of waste and the creation of a more resource efficient and circular economy. In the Single Use Carrier Bags Charge (Scotland) Regulations (2014). In the Charter for Household Recycling in Scotland (2015), launched by the Scottish Government to bring more consistency to recycling services. In the Making Things Last Strategy (2016) mentioned above, targeting a strong economy, protected resources and supported environment. And in the Climate Change Plan (third report, 2018), expecting waste sector emissions to fall by 52 percent over the lifetime of the Plan.

Financial consequences

According to a paper on an "Economic Assessment of the Zero Waste Plan for Scotland" in July 2011, the financial consequences of meeting or not meeting the Plan targets can be numbered. The costs for management of household waste under a business as usual scenario would rise from 256 million pound sterling in 2010 to finally 319 million pound sterling in 2025, while in the zero-waste scenario they would merely increase from 256 million to 296 million pound sterling – a benefit of 23 million pound sterling. In the commercial and industrial waste sector, the continuing sequence of events would change from zero to 98 million pound sterling, whereas the zero-waste scenario would reach 106 million pound sterling – ending in additional costs of 8 million pound sterling. And the scenarios of the construction and demolition sector would result in a benefit of about 5 million pound sterling. So, the situation for all waste streams including household, commercial and industrial, construction and demolition waste streams shows a net financial saving of 18 million pound sterling per annum, amounting to 178 million pound sterling in net present value terms over the period 2011-2025. Between 2010 to 2025, the sorting and pretreatment of waste – depending on the starting point – could lead to savings in environmental costs of a total of 1,544 million to 1,177 million pound sterling, respectively.

Not at zero costs

Of course, the change to a zero-waste economy was not possible at zero costs. The paper offers numbers: "Over the period examined, the additional capital cost of the Zero Waste Plan Scenario for all waste streams is of the order 472 million pound sterling. The total capital requirement for ZWP is around 1.16 billion pound sterling." And: "The additional facilities required to manage household waste are likely to incur an additional capital requirement of around 350 million pound sterling, the total figure being 490 million pound sterling." The higher capital costs than those under the business as usual scenario are "reflecting

the reduced reliance on landfill, and increasing reliance on both biological treatment, and non-landfill residual waste management". According to Eunomia Research & Consulting, haulers and exporters will see an economic benefit, whereas private collection contractors and local authorities will bear the greatest costs. Local authorities, the paper recommends, could raise capital funding through payments of the gate fee type, so that the costs of supporting infrastructure effectively come from revenue spending rather than capital budgets. "Much depends on how the relevant facilities are to be procured."

The Circular Economy Investment Fund

The Zero Waste Plan was launched in 2010, the legislation to enact it introduced in 2014, and in addition, a Circular Economy Investment Fund was established in April 2016 by the Scottish Government. It was the first fund of its type in Scotland, supporting small to medium enterprises "to commercialize innovative technologies and processes which help to accelerate a circular economy and is administered by Zero Waste Scotland". The fund was designed to subsidize organizations wishing to explore and pioneer circular approaches and develop and bring new business models and innovative technologies to market. From 1st of April 2016 to end of December 2017, the fund made 16 payments that aggregated to 4,547,870 pound sterling (about 5.1 million Euro). The funding ranged from 3,200 pound sterling for Jaw Brew, a circular microbrewery in Glasgow taking waste grains from brewing to make an energy-rich food bar, to 581,507 pound sterling for Xanthella, looking at algal production from whiskey by-products. The investments supported in the main printing, biotechnology, collection serving, consultancy, furniture re-use, lighting, mattress recovery, copper recovery, polymer recycling, brewing, timber re-use, chitin extracting, plastics sorting, hydrocarbon producing, coffee grounds recycling, R&D equipment re-use and WEEE-re-use companies. Jill Farell, chief operating officer of Zero Waste Scotland, is quoted with the information that the fund offers grants to businesses rather than investments and that none of the details of the projects had been revealed before November 2017. But she confessed that it needs a long time before projects prove to deliver real tangible results.

Some success stories

However, some waste handling companies wrote success stories. The online-magazine insider.co.uk described, for example, how the William Tracey Group improved, reacting to the first environmental taxes, starting alternative forms of recycling, investing in infrastructure and expanding through acquisitions and strategic alliances. The author of the article analyzed the Scottish waste policy and market and titled: "How the business of waste in Scotland is a real growth industry." To give a second example, in October 2016 Swiss-based Hitachi Zosen Inova and Spanish-based FF Medio. Ambiente S.A. signed a contract for the planning, constructing and building of a waste-to-energy facility. The plant is provided to annually treat 155,000 tons of non-recyclable domestic and commercial waste from Edinburgh and adjoining councils and to deliver electrical energy to 32,000 households.

The landfill ban on biodegradable waste

But there will be a drop of bitterness. In June 2017 at the Waste Evidence Session, Zero Waste Scotland answered questions posed by the Environment, Climate Change and Land Reform Committee on the issue of Scotland's waste. Amongst others, during the session, the consequences of the 2021 landfill ban on all biodegradable municipal solid waste have been pointed out. Moreover, the Scottish Environment Protection Agency and Zero Waste Scotland concluded "that a 0.4 to 1.2 million tons shortage in non-landfill residual treatment capacity is very likely, meaning Scotland will need to export this waste to elsewhere in the UK or EU member states for treatment in order to comply with the ban". This – so the experts – could be diminished by improved recycling of dry recyclates and food waste and additional incineration capacity.

In March 2019 this proved to be true when Eunomia Research & Consulting published a report examining the current and future markets for the disposal and recovery of biological municipal waste. The study, commissioned

"Key regions of Scotland could be at the heart of an estimated £1 billion boom for circular economy businesses in Scotland".

by the Scottish Government, can be summarized in the sentence: "The alternative waste management options that will be needed may not be available at sufficient scale, or at an affordable price at the point when the ban commences." Of 32 local authorities accountable for residual household waste, 14 have fulfilled the financial investment needed to comply with the ban in 2021. Three authorities have only long-term solutions, six secured merely interim solutions, and nine authorities have not taken alternative arrangements. Commercial waste operators are also not adequately prepared for the ban: First of all, they concentrate on transporting waste either to landfill or treatment facilities in Northern England or to thermal treatment plants abroad. Given that waste continues to be exported further, the possible costs reach a total of 943 million pound sterling or 1.1 billion pound sterling respectively. If new treatment facilities come on stream, the costs are instead estimated at 414 million or 449 million pound sterling respectively, the study promises.

100 million pound sterling Landfill Tax gift

According to the Scottish Environmental Services Association, the voice of Scotland's resources and waste management industry, industry investment in nearly 950,000 tons of additional treatment capacity had been made to help meet the 2021 ban. But "a lackluster residual waste policy framework coupled with an uncoordinated approach to public procurement has proved the greatest hurdle to securing the additional investment needed to close the capacity gap further". As there is no landfill ban planned for England, industry experts believe this will mean that the majority of this waste will move across the border to England." SESA's policy advisor, Stephen Freeland, got to the heart of the consequences: "This will be a 100 million pound sterling Landfill Tax gift to the English revenue."

"The ban will have a negative overall economic impact on the Scottish economy", the study by Eunomia balances. But it also points to some environmental impacts through additional haulage required for the export and the possibility of building additional thermal treatment capacity "necessary to provide a long-term solution". And above all: The study only focused on the results of the ban, but not on the substantial economic and environmental benefits to be expected from the increase in reuse and recycling.

Investing in Scotland's future

These benefits could be enormous Zero Waste Scotland is convinced. So, in October 2018, the organization released that "key regions of Scotland could be at the heart of an estimated £1 billion boom for circular economy businesses in Scotland". The news was related to Edinburgh, North East Scotland, Tayside and Glasgow. For Aberdeen and Aberdeenshire for example the predicted economic benefits would add up to approximately 625 million pound sterling, including 286 million pound sterling for the construction and built environment sector, 250 million pound sterling for the energy infrastructure sector, 52 million pound sterling for the food sector, the drink sector, and the bio-economy, and 37 million pound sterling for the manufacturing sector. First Minister Nicola Sturgeon was positive: "Scotland is already leading the way with its ambitious and challenging targets for recycling which are above and beyond the EU targets. However, we want the narrative to move beyond recycling to re-use, repair and remanufacturing of items." Consequently, the official 2019/20 Scottish Budget is "Investing in Scotland's future" among others more than 20 million pound sterling for zero waste, supporting the transition towards a more resource-efficient, circular economy, including design and implementation of a deposit-return scheme.

DESALINATION BRINE: RAW MATERIALS IN DEEP SLEEPING BEAUTY SLEEP

Worldwide, 15,906 operational desalination plants turn fresh or brackish water into around 95 million cubic meters of desalinated water for human use and 142 million of brine daily. Although 177 nations feature such plants, only four nations – Saudi Arabia, the United Arab Emirates, Kuwait and Qatar – produce 55 percent of global desalination waste.

Photo: Siemens AG

Desalination plants are traditionally accessed to two different types of technology. During the thermal process – mostly in Multi-Stage-Flash plants for evaporation –, the saltwater is repeatedly boiled and condensed. That is a method especially successful in removing salt, but requires lots of energy and turns 75 percent of the water imported into warm, slightly saltier wastewater. The other treatment technique is reverse osmosis (RO) that pressures saltwater through a semi-permeable membrane to keep back the salt. The remaining brine is around 50 percent saltier than the feed water but is not heated. Besides that, RO is cheaper and more efficient, as the technology requires less pressure and therefore energy. And the processing results in fifty percent freshwater and fifty percent brine. According to international water treatment company Lenntech, meanwhile, two-thirds of desalination plants resort to membrane processes. Today, Reverse Osmosis facilities account for 63 percent of the total desalination operations, followed by 23 percent of Multi-Stage Flash plants, eight percent of Multi-Effect Distillation, and some Electrodialysis or Electrodialysis Reversal facilities.

Treatment for disposal

The more or less voluminous resulting by-product is called brine, concentrate or reject. It may be either recycled for use in the facility's process or treated for disposal. If water, heat, salt, or easily recyclable components of the brine cannot be used, it must be prepared for disposal. Samco Water Technologies suggests a treatment system consisting of membrane filtration – usually starting with ultrafiltration and ending with reverse osmosis –, evaporation of excess water to dry solids, crystallization of all the leftover impurities to filter them out as a solid, and the utilization of an ion exchange (IX) system to separate ionic contaminants. The purified brine can then be treated by membrane filtration, precipitation, carbon adsorption of organics, oil and water separation, precipitation for metals and ion exchange polishing. For this separation technology for purified brine – calculated for a system of 100 gallons per minute – about 750,000 to 2,500,000 US-Dollar must be invested. The ion exchange is figured at one to 1.5 million US-Dollar. And further treatment like crystallization might cost another 10 to 20 million US-Dollar, not to mention the operating and energy costs.

Huge disposal investment

For the disposal of brine, several options exist. According to the Lenntech website, the most common conventional processes in the USA are surface water discharge (45 percent), sewer disposal (27 percent), deep-well injection (13 percent), land application (8 percent) and evaporation ponds (4 percent). But even if the environmental impacts of these versions are not priced in, their construction costs for the disposal of theoretical 40,000 cubic meters per day – depending on the recovery rate – are huge, the Lenntech website clarifies: The discharge to seawater, lakes, rivers or other bodies of surface water totals up to 6.5 - 30 million US-Dollar; directing it to a publicly owned treatment work or sewer means 1.5 - 6 million US-Dollar; injecting brine into deep wells like porous rock formation underground needs 5 - 25 million US-Dollar; ponds for evaporation amount to 140 - 180 million US-Dollar; and "land application" – another word for spray irrigation – devours 30 - 40 million US-Dollar.

Number of technologies growing

If recycled, brines may be functional for further use like industrial cooling or deicing and acid or caustic production. According to Samco, the material can be "recycled and reused" in hydrometallurgical processing, applied in the generation of sodium hypochlorite or lithium carbonate, and in chlor-alkali manufacturing plants. There is a treatment method to prepare the concentrate for industrial use. Other methods were developed to lower the processing costs and the environmental impact of brine. There are some "common technologies" for brine treatment covering chemical precipitation, coagulation, electrocoagulation,

oxidation-based technologies like ozonation and UV/H_2O_2 treatment, and – not very effective – biological processes. They are utilized to remove organics or organic compounds. New membrane-based technologies like forwarding osmosis, membrane crystallization and membrane distillation appear to be cost-effective methods. Meanwhile, several scientific publications like "Comparative study of brine management technologies for desalination plants" or "A review of the management and treatment of brine solutions" offer comprehensive comparisons on the plenty of processing methods. Some prefer osmosis, membrane distillation and electrodialysis as most promising for minimizing brine volume, others even deliver a comprehensive review of worldwide laboratory, pilot and industrial-scale experiments.

Brine – merely a residual?

It seems that nowadays brine has been interpreted as desalination residual from which some constituents may be useful. Brine is interpreted as a deliverer of secondary raw materials. Merely a scientific article in 2017 on "management and treatment of brine solutions" and an UN-backed paper, published by the UN University in January 2019, qualify its potential as "recovery of valuable resources". Rightly, for brines are a composition of various elements compounds. An Arabian Golf Case Study explains that chlorine is added to the intake seawater to reduce biofouling, copper-nickel alloys are commonly used as heat exchanger materials, and ionized and unionized ammonia (NH_3) species may occur. Another source states chloride (Cl-), sulfate (SO_{42}-), potassium (K+), sodium (Na+), magnesium (Mg_2+) and calcium (Ca_2+) as the common components of brine. A comprehensive paper giving an "Overview on the treatment and management of the desalination brine solutions" indicates "multifarious contaminants" including "heavy metals, nutrients containing nitrogen and phosphorus [ammonia (NH_3), nitrate (NO_3 –), and phosphorus (K)] derivatives". And Lenntech indicates the existence of calcium carbonate ($CaCO_3$), calcium sulfate ($CaSO_4$), barium sulfate ($BaSO_4$), possibly calcium phosphate ($Ca_3(PO_4)_2$) and – increasingly – antiscalants like polyphosphates, phosphonates or polycarbonic acids in brine. Regarding heavy metals appearance, lower quality stainless steel equipment leads to a higher concentration of iron, chromium, nickel and molybdenum, while lower-quality materials at the heat exchanger increase the copper and nickel concentrations.

Photo: Cabeza Cuadrada/stock.adobe.com

Metals: Recovery of a valuable source

The UN University paper "The state of desalination and brine production: A global outlook" in January 2019 admitted that the desalination plant effluent is composed of a large number of salts and metallic ingredients including magnesium, gypsum, sodium chloride, calcium, potassium, chlorine, bromine and lithium. They would offer "economic opportunities to use brine in aquaculture, to irrigate salt-tolerant species, to generate electricity, and by recovering". With better technology, a large number of salts and metals in the desalination plant effluent could be mined, notably even strontium, lithium, rubidium and uranium. That is why a detailed comparative study from 2014 explained that metal recovery is a provider of "new and plentiful sources of many valuable and scarce metals around the world" and judged its potential profitability "higher than any other technology", suitable to "avoid the impact produced by mines or other extraction technology". The Global Outlook-Paper followed this diction in 2019 and found metal recovery "a valuable source of many scarce metals".

More attention needed

Anyway, the authors of the before mentioned "Overview"-article criticized in June 2020, that this technology to recycle metals "needs more attention and research to increase productivity and improve performance" and adequately more development "to be exploited on an industrial scale". The research is on a laboratory or pilot scale, and it is difficult to determine the applicability on an industrial scale. That seems to be a drawback of every real brine material recovery. The high economic costs and energy demands of brine treatment and mineral recovery methods remain a significant barrier to a more widespread application, one can read in the UN University paper. Consequently, the official press release to this publication runs prosaic: "The needed technologies are immature. However, the recovery of these resources is economically uncompetitive today."

Maybe the methods to recover the ingredients of brine are not yet marketable. But the interest for the issue is awakening. In February 2019, Massachusetts Institute of Technology published a study showing "that through a fairly simple

process the waste material can be converted into useful chemicals – including ones that can make the desalination process itself more efficient". It discussed direct electrosynthesis of sodium hydroxide (NaOH) and hydrochloric acid (HCl) from seawater desalination brine as an emerging alternative solution. At approximately the same time, the Red Sea Development Company (TRSDC) together with King Abdullah University of Science and Technology (KAUST) launched an international competition "challenging the world to find new solutions to protect marine habitats from brine discharge". The Aquatech 2019 in Amsterdam featured a separate session on Water Nexus and Sustainable Brine Management and finalized it with the presentation of the competition's best "Brains for Brine Challenge". And estimations suggest there are already 40+ technology companies trying to enter the brine concentration market, on-line magazine Aquatechtrade.com gave account.

"The good news is that efforts have been made in recent years and, with continuing technology refinement and improving economic affordability, we see a positive and promising outlook."

From problem to opportunity

Perhaps new technology can boost the development of resource recovery. In May 2019, a group of researchers at the Columbia University in New York developed a radically different desalination approach called "temperature swing solvent extraction" (TSSE) for hypersaline brines. The method found by Ngai Yin Yip, assistant professor at the university, works membrane-less and is not based on evaporative phase-change. It refers to a solvent with temperature-dependent water solubility. Added to the brine at room temperature, the solvent floats above the concentrate and detracts water from it. After a while, the solvent can be separated, drawn off and warmed up at 70° C. This temperature change forces the solvent to de-mixing from the water that settles down and gets collected. According to the university announcement, TSSE removed up to 98.4 percent of the salt, which is comparable to reverse osmosis, and a high-water recovery of more than 50 percent for the hypersaline brines, also comparable to current seawater desalination operations. This approach "has a clear path to commercialization" and might "be transformational for the water industry". Perhaps it could even boost resource recycling from the dewatered and thereby concentrated brine.

Dr. Vladimir Smakhtin, a co-author of the paper from the UN University, is convinced of the progress: "The good news is that efforts have been made in recent years and, with continuing technology refinement and improving economic affordability, we see a positive and promising outlook." And another co-author, Dr. Manzoor Qadir, is as well sure that "there is a need to translate such research and convert an environmental problem into an economic opportunity."

WASTEWATER DOESN'T LIE: CORONA-VIRUS RECOGNIZED VIA WASTEWATER TREATMENT PLANTS

The uncertainty caused by the Corona-Virus or Covid-19 respectively is based on nescience about the number of people infected. Wastewater based epidemiology delivers a relatively new method to gain insights into the dissemination of the pathogen. Which possibilities this procedural method offers and which difficulties might occur are issues researchers all over the world try to investigate. Wastewater treatment plants play a key role.

Photo: Couleur / Pixabay

A wastewater-based approach was already successful in fighting another virus. In 2013, polio was actively being transmitted in Israel. Several years ago, the national health department had set up a sewage surveillance system. The installation detected the germs in wastewater and gave the alarm. The Ministry of Health reacted, saved time to vaccinate the public, and none of the infected children was paralyzed.

Developing a method for detecting

This is a method whose perfection researchers all over the planet are chasing after. At the Arizona State University in Massachusetts, Rolf Halden and Olga Hart are tracking SARS-CoV-2 in US-wastewater. In Switzerland, scientists at the École Polytechnique Fédérale de Lausanne (EPFL) and the Swiss Federal Institute of Aquatic Science and Technology (Eawag) are developing a method for detecting the novel coronavirus in wastewater samples. Gertjan Medema, a microbiologist at KWR Water Research Institute in Nieuwegein, the Netherlands, detected genetic material of the virus in several treatment plants. Scientists in Valencia, Spain, found viral RNA in a series of longitudinal metropolitan wastewaters samples, while researchers from the Spanish National Research Council and Valencia University developed a molecular analysis system. Scientists from the Sorbonne University and Eau de Paris conducted a study on viral genome quantification in Paris wastewaters. Researchers from The University of Queensland and Australia's national science agency CSIRO achieved the first step in developing an early warning surveillance system.

To estimate the prevalence

Specialists at Newcastle University, UK, and the University of Santiago de Compostela, Spain, worked with water industry partners Northumbrian Water and Labaqua, part of the SUEZ corporation, to monitor sewage from across networks in Spain and North East England to develop a way to estimate the prevalence of the Covid-19 virus across the regions. Under the aegis of the KTH Royal Institute of Technology in Stockholm, Sweden, wastewater was tested in Italy's northern region, in Spain's Catalonia, in some Turkish as well as Indian cities and parts of the Netherlands for two weeks. In Germany, experts from the Helmholtz-Center for Environmental Research, the German Association for Water, Wastewater and Waste and the Institute of Technology Dresden teamed up with several sewage treatment plant operators to investigate representative wastewater samples.

Undergoing an RT-qPCR process

Wherever those samples were collected, the next steps consist of preparing the material to concentrate the coronavirus from the sewage. The processing is difficult and complicated, as the viral substances must be separated from faeces and urine, even if an infected person might approximately excrete between 0.15 and 141.5 million viral genomes per liter of wastewater generated. According to the KTH Royal Institute of Technology, the samples then mostly undergo a multi-stage process called reverse-transcription quantitative polymerase chain reaction (RT-qPCR). "This stage basically unwinds the viral RNA and converts it into DNA, which is then further replicated so there are millions of copies – enough for a quantitative PCR instrument to detect the virus." Sequencing techniques are used to confirm the viral presence in wastewater samples.

First achievements

The technique seems to work. In February 2020, specialists from EPFL and Eawag analyzed samples from Lausanne, Zurich and Lugano in Switzerland: They found a signal in wastewater from Lugano – where only one case had been identified at that point – and from Zurich, where only six had been realized. In March 2020, sewage samples in the Netherlands were analyzed against SARS-Coronavirus-2. Not only that fragments of nucleocapsid protein gene and envelope protein gene – as indicators of the SARS-Coronavirus-2 – could be found: The research funded by KWR Water Research Institute detected them as recently as the first cases of Corona were reported. The study's participants valued this as proof of a tool for monitoring the virus's circulation in the population. Another study on raw wastewater samples from wastewater treatment plants in Paris showed that the number of genome units increased accurately following the increasing level of regional Covid-19 diseases. And a decrease in genome unit quantities was observed as the number of new diseases declined as a consequence of the lockdown. More than that: The viral genomes were detected before the exponential growth of the epidemic began. The researchers assessed this as a method of quantitative monitoring for additional information. Comparably, in mid-March researchers at the Massachusetts Institute of Technology, Harvard, and Biobot, a startup that analyzes wastewater, examined sewage samples in Massachusetts. They predicted the infection of a few thousand people in the area – at the time just over 400 people were officially affected by the coronavirus.

A quicker route to „see" the virus

Studies have shown that SARS-CoV-2 can appear in faeces within three days of infection, and it is estimated that it takes between half a day and three days for the sewage to move from toilets to the treatment plants. That is much sooner than people need to develop symptoms, find a hospital and get an official diagnosis. Tamar Kohn, an environ-

mental virologist at the Swiss Federal Institute of Technology in Lausanne, is convinced: "Seven to ten days can make a lot of difference in the severity of this outbreak."

The samples are informative, the scientific community is on the same page. Epidemiologist Noel McCarthy, professor at Warwick Medical School, finds it useful that sewage monitoring can quantitatively reflect human infection. Researchers in the Netherlands told Deutsche Welle that "sewage water is a quicker route to 'see' the virus in the population". At the end of a wastewater sampling in the region of Valencia, Spain, the scientists balanced "that wastewater analysis is a sensitive and cost-effective strategy for Covid-19 epidemiological surveillance". In an interview, Christoph Ort, contributor at Eawag, was confident that indications "will not only be detectable but also quantifiable – or countable, so to speak". Warish Ahmed from the Australian public research agency CSIRO interprets the method as one that "could be used as an early warning tool for pandemic surveillance" and "a cost-effective way of tracking community-level infection". The authors of the Paris study consider it an "alternative and possibly early tool", especially "when investigations in humans are difficult for logistic, ethical or economic reasons". And Zhugen Yang, biomedical engineer at Cranfield University underlines that "sewer sampling gives a fairly inexpensive, evidence-based image of the actual viral load in a community."

Chemical reagents of 225,000 US-Dollar

The expectations on wastewater-based epidemiology – especially in terms of the coronavirus – are rising, and so do the estimations concerning the method's coverage. In the opinion of environmental engineer Christoph Ort, sewage samples reflect what is excreted by the public within a few hours. For "wastewater doesn't lie". Therefore, he is sure that – according to current knowledge – one should be able to detect a few diseased individuals among 100,000 healthy people. Another source cites him with the words: "With samples from 20 large treatment plants distributed across Switzerland, we could monitor wastewater from around 2.5 million people." Rolf Halden goes beyond that. He is the director of the Center for Environmental Security at ASU's Biodesign Institute that studies wastewater from U.S. cities. His technique has the sensitivity and the potential to detect the signature of a single infected individual among 100 to two million people. If his method would be fully applied in the United States, about 70 percent of the population could be screened for SARS-CoV-2 by involving the national 15,014 wastewater treatment plants "at an estimated cost for chemical reagents of 225,000 US-Dollar".

Haldens vision: "You could get a huge return on your investment and save many lives." More than that: If a new testing system, of which Halden designed the program, would be fully funded, it could be implemented at the more than 100,000 wastewater treatment plants worldwide.

Two challenges to be accepted

However, according to the German Association for Water, Wastewater and Waste (Deutsche Vereinigung für Wasserwirtschaft, Abwasser und Abfall; DWA), we have to slow down. As mentioned in their latest press release, there are at least two challenges to be accepted. Firstly, the low concentration of viruses and RNA are subject to huge fluctuations, which makes it difficult to reliably record the sewage waste samples. And secondly, the sensitivity of common detection methods are not sufficient for the highly diluted and no more infectious viruses.

Material concentration is a well-known problem. Scientists representing the Queensland Alliance for Environmental Health Sciences in Australia, for example, realize the need to find out how much viral RNA is excreted in feces and extrapolate the number of infected people in a population from concentrations of viral RNA in wastewater samples. To quantify the scale of infection in a population from wastewater samples, researchers will also need to ensure that they are looking at a representative sample of what is being excreted by the population and not just one snapshot in time. Moreover, factors like temperature, organic matter and aerobic microorganisms influence the results. Already in 2009, an article provided information that at room temperature the coronavirus is reduced by 99.9 percent within 10 days, whereas at 4° C the inactivation lasts 100 days. But depending on the right local factors, like temperature and drain size, Rolf Halden and his colleague Olga Hart suspect to detect the virus if just one in every 114 people using the sewerage system is infected. And to avoid bad results and loss of information, Olga Hart additionally wants to measure close to virus hotspots.

Working on optimization

To find a solution for the second problem – the equipment –, scientists are working on the "bottleneck" of monitoring and optimization of sample preparation. Three methods stand at disposal: Lyophilization, Bar percolation and Polyethylenglycol precipitation. They have their pros and cons. The first is free of water, but lasts long; the others require a lot of personal or material. And all techniques can only function successfully if the sequences are automated and the results continuously evaluated. That is possible, says Zhugen Yang, biomedical engineer at Cranfield University's Water Science Institute, U.K., counting on sewer sampling: "Using computer models that incorporate data on how many viral particles individuals shed and how they become

diluted in sewage, it is even possible to translate detected viral concentrations into estimates of absolute numbers of infections in a sewage system's catchment area." Of course, this should happen more quickly as the handling of the material EPFL and Eawag collected: As reported, it would take a few weeks to analyze the over 300 samples currently in frozen storage.

Discover at an early stage

René Kallies, virologist at the Helmholtz-Center for Environmental Research, Germany, is optimistic to get results "under the threshold of 50 infected persons per 100,000 locals". But he confesses that it is still a long way until integrated monitoring of wastewater will be operationalized. However, the method sounds "very promising", Saxonian's minister of science Sebastian Gemkow gave account: "If wastewater monitoring will function and be practicable across the country, it contains a huge potential in handling with the current SARS-CoV-2-pandemic and perspectively for comparable future pandemics." Practically spoken: "If we expect another wave [...], we can hopefully discover it at an early stage", argues Saria Otani, molecular microbiologist at the Technical University of Denmark, Kopenhagen.

PILOT PLUG AND PLAY RECYCLING FACILITY IN DUBAI

End of June this year, Proteco – a division of Singapore based company Yes Full Circle (YFC) – has launched a pilot facility that provides integrated brand protection, secure destruction and closed-loop/zero-landfill recycling solutions.

According to the company, the facility uses proprietary technology to provide full traceability to confirm and validate the destruction and recycling process. "The audit trail is stored on Green Secure, a secure blockchain platform, enabling traceability from the point of collection to the final endpoint of material post destruction."

The pilot facility is the only one of its kind in the United Arab Emirates (UAE) with seven different technologies that are designed to process a variety of materials ranging from consumer over industrial goods to counterfeit and confiscated goods, YFC emphasized. "In addition, it is a unique service with the capability to provide both onsite and offsite brand protection/destruction services." Furthermore, it was capable of same-day live stream destruction. "The second phase of the facility involves the use of extended digitization, artificial intelligence, and robotics, resulting in further game-changing innovation, both upstream and downstream."

Yes Full Circle intends to launch eight more facilities across the Middle East, including three in the UAE alone. A significantly larger circular economy/closed-loop facility was expected to be operational in the first quarter of 2021, the company underlined.

YFC has regional offices in Singapore, India and the United Arab Emirates. Backed by Singaporean investors and family offices, it leverages its experience and technology to roll out circular economy solutions. As reported, in Dubai, its Proteco division provides zero-landfill brand protection services. Moreover, in India, it has begun the rollout of tech platforms supporting circular economy ecosystem development across four cities in two states in a phased manner.

www.yesfullcircle.com

ENHANCEMENT OF RECYCLING OF STEELWORKS REMNANTS BY THE SCARABAEUS®

Most metallurgical processes are characterized by a gas flow stream through a material bed. Thus fine particles are carried away and have to be filtered after the metallurgical devise. Every modern metallurgical plant, no matter if based on the blast furnace process, oxygen steelmaking process, electric arc furnace, or direct reduction process consists of filters and wet separation for the exhaust gases.

In the past, the dust and sludges had been landfilled. For several decades different extraction processes for special reasons are in industrial use, and only little amounts of the remains were discarded as dumps. Most recycling-processes are faced with very small particle sizes of the steelwork remnants. Therefore, agglomeration is necessary to improve transport, storage, and utilization properties, especially the reintroduce into the metallurgical process. The pelletizing disc SCARABAEUS® is perfectly suitable and in multiple uses for the transmission of fine-grained particles into larger agglomerates with defined particle size distribution with a smooth surface.[1]

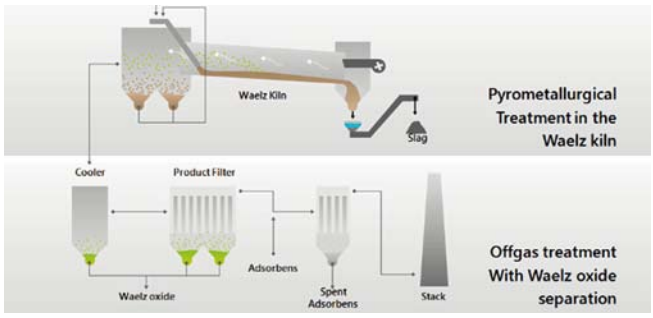
Photos: HAVER NIAGARA GmbH

As an example of the use of the SCARABAEUS® in the recycling of steelworks remnants, such as blast furnace dust and sludge, converter dust and sludge, electric arc furnace dust, metallurgical debris, mill scale, mill scale sludge, and various slags will be focused in the following. Since these metallurgical waste materials contain impurities such as zinc and lead, the reuse of these residual materials in the blast furnace or direct reduction plant may be problematic. Some of these materials are landfilled, anyhow the very most proportion is recycled to zinc, nickel, molybdenum, or chromium.

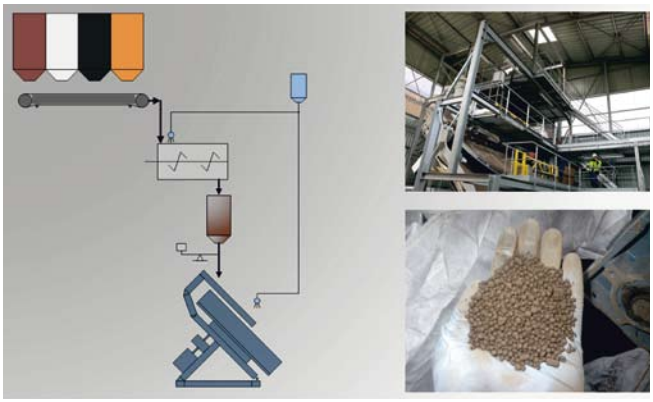
Worldwide approximately 6,750,000 tons of electrical arc furnace dust are produced annually. The dust contains 1,600,000 tons per year (tpy)of zinc. About 35 Waelz kilns with an average capacity of 75,000 tons per year are installed worldwide. They process 3,400,000 tons of electric arc furnace dust[2] every year.

In zinc recycling, zinc-containing residues are reduced by carbon carriers in rotary kilns. Zinc and lead sublimate and are re-oxidized in the airflow in counterflow and are transported and separated in downstream waste gas purification plants. In the production of Waelz oxide, lime is used for slag formation. Before the Waelz process, the zinc-containing components dust and sludge (approximately 74 weight percent), coal (approx. 19 wt. %), and lime (approx. 7 wt. %) are homogenized and pelletized. In opposite to the dust, the pellets have got improved transport and storage properties and most important-significantly enhanced utilization properties.

As the Waelz kiln works in counterflow, the risk of discharging unprocessed materials and contamination of the product is high. Defined particle sizes of the steelwork's remnants pellets are a pre-requisite for Waelz kiln optimization. Typically the pellets have a moisture content of approximately 14 wt. %. The target size of the pellets is mostly approximately four to eight mm. The capacity of the SCARABAEUS® in the recycling sector is approx. 50,000 to 150,000 tpy.



Scheme of Waelz kiln, edited [3]



As early as 2010 Haver Engineering GmbH developed a pelletizing process, which was adapted to the individual particle size requirements of the Waelz kiln process[4]. One year later, Haver Niagara GmbH delivered a SCARABAEUS SC 4200 for this process to realize the project in Germany. The plant was running with a vertical intensive mixer to blend the feed materials and charge them directly into the rotary kiln. To optimize the kiln capacity and the Waelz oxide output, the customer decided to produce agglomerates in the SCARABAEUS (better reaction with the process gas in the kiln due to the higher permeability of the pellets). It was possible to increase the zinc output significantly using the combination of a mixer and a pelletizing disc with a capacity of approximately 17 tph (tons per hour) instead of only using the vertical intensive mixer as they did before.

The target of the project was to increase the total throughput and optimize the zinc recovery. Due to the pellet production, the customer could not only achieve the set targets – they exceed them.

The basic idea of the customer was using an agglomerate with high porosity to have a fast gas diffusion through the agglomerates into the inner core. Comparing the nature of agglomerates generated in a mixer and in a disc, a general difference is the density of the agglomerates. Usually, pellets produced in a mixing process have a higher density due to relatively high energy input into the material by the agitators and a more coarse particle size distribution compared to the roll agglomeration in a SCARABAEUS®, which is characterized by its segregation effect.

The process chamber of the SCARABAEUS® is made by an inclined, rotating, flat cylindrical pan. Due to rotation of the pan, the fine material is pulled along to the disc's uppermost point and then rolling down onto a material bed. Caused by the special movement of the material itself and the addition of water onto the material, nucleation and

growing occur as a result of the settings of the pelletizing disc. Typically, final pellets with a very tight particle size distribution are discharged continuously over the board of the SCARABAEUS®. If necessary, a changeable rim height could be used to increase the tightness of particle size distribution.

Due to the porosity of the pellets and the tight particle size distribution what leads to a high pellet bed/bulk permeability, the capacity of the kiln and the zinc recovery increase.

In the following years, that process was adapted on similar or comparable processes. Pelletizing discs with diameters from 2.2 to 5.2 meters are to be found nowadays in the recycling of steelworks remnants.

Haver & Boecker Niagara supports the customers in developing and optimizing their processes, machines, and plants. In the test facility of Haver Engineering are various test equipments for pelletizing available. The objective of Haver Process Engineering is to meet customers' technical requirements and economic benefits. Therefore, it is necessary to concentrate on the whole pelletizing process, starting with raw materials preparation, dosing, mixing, and binder treatment. The core-components of pelletizing are focused in detail to minimize the efforts of final product classification, material circulation, as well as de-dusting, safety, and environmental protection. Applying recognized technical norms and standards with tailor-made processing leads to a production process that saves energy and resources.

Sources:
[1] Eberhard Gock et al; Verwertung von deponierten eisenreichen Filterstäuben der Stahlindustrie durch Pelletierung. Recycling und Rohstoffe. 2013
[2] Noël Masson, Pascal Briol, PBSIM & BFS Consulting Engineering; Zinc One Resources Inc.: A Brief Summary of Zinc Oxide Processing Methods Available for the Bongará Deposit. 2017
[3] Eckhard von Billerbeck et al; Verarbeitung von Filterstäuben aus der Elektrostahlerzeugung im Wälzprozess. Mineralische Nebenprodukte und Abfälle. 2014
[4] Jan Lampke et al; Solid and compact. Aufbereitungstechnik 03/2011. 2011

■ Contact:
Dr.-Ing. Jan Lampke
Tel.: +49 3731 419295
j.lampke@haverengineering.de
www.haverniagara.com

NiMH Batteries:

BETTER PERFORMANCE THANKS TO RECYCLING

Swedish researchers have found out that a new method for recycling old batteries can provide better performing and cheaper rechargeable hydride batteries (NiMH).

"The new method allows the upcycled material to be used directly in new battery production," Dag Noréus is quoted. The professor at the Department of Materials and Environmental Chemistry at Stockholm University, together with other researchers, has conducted the study published in the scientific journal Molecules. The new recycling consists of mechanical washing and separation of reusable electrode material and corrosion products from old, used electrodes. "More than 95 percent is useful and several steps can be saved in the manufacture of new batteries that also get better performance. Recycling will be easier as it avoids costly remelting and reduction included in the conventional battery recycling."

Hydride batteries, so-called NiMH batteries, are based on a nickel electrode and a hydrogen electrode, where the hydrogen is stored in a metal hydride. The battery is one of the four basic types of rechargeable batteries available on the market today. The others are based on lithium, nickel-cadmium or lead.

NiMH batteries were developed during the 1990s and are used, for example, in hybrid vehicles such as the Toyota Prius, but also in electric toothbrushes and electric razors, that is, in appliances used near the body, where you want safer batteries that do not risk exploding like those of lithium. NiMH is also considered more environmentally friendly as it does not contain toxic heavy metals.

The research was initially focused on finding metal hydrides that could store large amounts of hydrogen in solid form. When successful, the first use was in rechargeable batteries. The high hydrogen content doubled the battery capacity compared to batteries of nickel-cadmium. "The new thing with our study is that the material gains better properties when used in new batteries after passing a simplified recycling process. This is not a new battery, but a significant improvement of the usefulness of rechargeable hydride batteries."

The study has been conducted with the battery producer Nilar in Sweden.

www.su.se/english

DRIVE TECHNOLOGY FOR SAVING ENERGY

Sytronix variable-speed pump drives from Rexroth meet the needs of the recycling industry.

According to the worldwide active provider, the Sytronix variable-speed pump drives for recycling applications are energy-efficient and will significantly increase the energy efficiency of channel balers, scrap shears and scrap presses. Furthermore, these products represent a ready-to-install solution based on proven standard components.

With the modular, standardized Sytronix system, the electric drive system, the frequency converter and the constant or variable displacement pump are combined with other standard components to produce a high-performance unit with low overall costs. Thanks to a wide range of control outputs such as the motor speed and swivel angle, Sytronix achieves optimum efficiency for each cycle. The resulting energy savings reduce operating costs and CO_2 emissions, the company assured.

The Sytronix variable-speed pump drives make recycling applications much quieter, more reliable and more energy-efficient

"Unlike conventional hydraulic drive systems with a constant energy supply, Sytronix variable-speed drives work according to the 'energy on demand' principle," Bosch Rexroth explained the technique. The power consumption would depend on the current power requirement in the cycle. "As a result, energy can be saved, especially in pressure-holding mode. An optimized switching principle also helps to increase energy efficiency, especially in conjunction with flow-optimized manifolds from Rexroth. These were trimmed for minimal pressure loss with the help of simulations and 3D sand core printing." Adjustable axial piston pumps would also help to reduce power consumption by controlling the flow via the swivel angle while the electric motor is running in the optimum speed range. Additionally, the variable-speed pump drives would allow downsizing to reduce costs. "Thanks to their overload capacity, a smaller pump is usually able to cope with power peaks when the flow is suddenly raised by increasing the speed," the provider emphasized.

The modular Sytronix approach opens up numerous new possibilities for machine manufacturers, Bosch Rexroth informed. They would also benefit from the company's global service and the opportunity to standardize their machines for various target markets. "Sytronix drives can be used anywhere in the world regardless of the mains frequency."

www.boschrexroth.com

Photo: Bosch Rexroth AG

GLOBAL RECYCLED GLASS FIBER MARKET

The international market research and consulting firm QY Research has lately published a report titled "Global Recycled Glass Fiber Sales Market Report 2020."

As underlined by the company, which was established in 2007 in Beijing (China), the researchers have critically examined the key growth factors and advancements associated with the global market. In 2019, the market size for recycled glass fiber was – according to QY Research – nearly 43.735 million US-Dollar ($ 43734.7 K), and it is likely to attain more than 69.304 million US-Dollar by the end of 2026. The researchers estimate that the market will grow at 7.1 percent from 2020 to 2026. Increasing focus on sustainable development is expected to trigger the market growth in the future, the company emphasized. "Additionally, advancements in grinding and sorting technology are likely to make the recycling of glass fiber simpler, thus opening doors for recycled glass fiber market." Stringent regulations to use recycled glass fiber across several regions were likely to aid market growth. Nevertheless, there are factors such as high investment cost and complex manufacturing process, which might hamper the market growth. According to the information, the Asia Pacific (APAC) region may emerge as a lucrative regional market in the forthcoming years. "This is attributed to a surge in the number of construction and industrial activities in this region," QY Research wrote. "China, Japan and India are the key contributors to the regional market growth as the consumption of glass fiber is high in these countries."

www.qyresearch.com/sample-form/form/1544807/global-recycled-glass-fiber-sales-market

NEW WASTE COLLECTION VEHICLES FOR SINGAPORE

The words "Don't trash it, repurpose it" can be read on the new Mercedes-Benz Econic waste collection vehicles in Singapore, which were ordered by the local waste management company, Sembcorp.

Today, around six million people live in the booming Asian metropolis Singapore where they produce just under 5,000 tons of waste – every day. That is why waste disposal is top of the agenda for the city state's government. A year ago, Sembcorp ordered a three-axle Econic with a steerable rear axle and rear-loader body manufactured by Zenith for test purposes, the German automobile manufacturer reported in August this year.

Photo: Daimler

Singaporean waste management company Sembcorp ordered Mercedes-Benz Econic waste collection vehicles

After the first Econic successfully passed the test phase in South-East Asia, Sembcorp ordered three more Econic 2630 L ENA/6x2. In the main, the trucks collect household waste in Singapore's city center and on the exclusive island of Sentosa before delivering it to the recycling process. The Mercedes-Benz truck is equipped with a low DirectVision cab so that the driver is always at eye level with other road users. It is also endowed with state-of-the-art safety assistance systems, the manufacturer informed. Depending on the driving situation, four exterior cameras would make the entire area around the truck visible to the driver on a display. "Blind spots are thus reduced to a minimum. The emergency braking system Active Brake Assist, Lane Keeping Assist and autonomous intelligent cruise control complete the safety package." Thanks to the low-entry design, the crew can enter the vehicle simply using two steps. "An advantage that pays off when the job involves climbing in and out of the cab frequently," the carmaker underlined with regard to the waste collection team. "As a result, older drivers can be employed longer at Sembcorp, and time off due to back and joint problems is reduced significantly."

www.daimler.com/en/
www.sembcorp.com

ISRAEL: NO NEW WASTE-TO-ENERGY PLANTS

Some months ago, the Israeli Ministry of Environmental Protection had begun to promote the establishment of three energy recovery facilities in the country, which were to be realized at the Morasha Junction, in Hiriya, and in the Northern Ashdod Industrial Zone. These waste-to-energy facilities "will treat municipal solid waste that would otherwise be sent to landfills," the ministry wrote in May. Their establishment were part of Israel's four billion New Shekel (about 1.2 billion US-Dollar) Strategic Plan for the Treatment of Waste by 2030, aimed at reducing landfilling and its environmental hazards. According to the country's 2030 strategy, by that year, Israel will be recycling 51 percent of its waste; 23 percent will be treated at energy recovery facilities. Only 26 percent of waste would be landfilled.

"The proposals provoked widespread public opposition," the newspaper Haaretz informed online in August this year. The construction of a facility near the Morasha junction was vehemently opposed; also, Ashdod-area residents organized to try to stop the incinerator slated for that city. "In the case of Kfar Adumim, the Green Now Association, in cooperation with representatives of area settlements, filed a petition with the High Court of Justice against the decision. The main reasons given by the opponents were fears of air pollution and bad odors that would be emitted by the incinerators."

COMPANY PLANS TO REALIZE RARE-EARTH SEPARATION TECHNOLOGY

Canada-based Innovation Metals Corp. (IMC) has received funding support for the Phase-One commercialization of its "RapidSX" rare-earth element ("REE") separation technology from its joint venture partner Hexagon Energy Materials Limited.

According to the information, Innovation Metals Corp. executed a binding investment agreement whereby Hexagon has secured an option to acquire a 49 percent interest in its "RapidSX" technology for the separation of REEs, using an advanced, proprietary and low-cost approach. IMC developed and piloted this technology with the assistance of 1.8 million US-Dollar in funding from the U.S. Department of Defense, resulting in the production of commercial-grade separated REE oxides at the pilot scale. The two joint venture partners have agreed to form the joint venture American Innovation Metals ("AIM"). While IMC will contribute the RapidSX technology and the expertise for REE separation, Hexagon will contribute commercial and marketing skills. Furthermore, it would intend to invest two million US-Dollar into the construction of the RapidSX commercial demonstration plant and pay four million US-Dollar to IMC as deferred consideration, payable from Hexagon's share of future AIM cash flows.

As reported, the RapidSX technology combines the time-proven chemistry of solvent extraction with a new column-based platform, which significantly reduces time to completion and plant footprint, as well as lowering capital and operating costs. "This would potentially mitigate current concerns about the extreme concentration of the REE supply chain in China, with greater participation by Western producers and manufacturers," IMC stated. Its technology "has also been successfully applied to the separation and purification of other metals in solution, such as Ni, Co and Fe in leach solutions produced from Ni laterite ores, as well as Li from Li brines."

AIM would serve as the incorporated joint venture vehicle for Hexagon and IMC to commercialize RapidSX, a press release said. The future demonstration facility would have a planned production capacity of 60,000 to 80,000 kilograms of REE oxides per year, with construction and commissioning planned for completion in the fourth quarter of 2020.

As underlined by IMC, there is a substantial market opportunity. In 2018, the market size of primary REE oxides was 184,000 tons with a market value of 3.2 billion US-Dollar, the company referred to analyses. According to projections, it is forecasted to grow 60 percent (to 293,000 tons/year) in terms of market size, and more than 85 percent (to 6.3 billion US-Dollar) in market value by 2025. Certain sectors are projected to have significantly higher growth rates, the company stated.

www.innovationmetals.com

RapidSX™ Commercialization and Development Facility in Kingston, Ontario

Photo: Ucore Rare Metals Inc.

RESPONSIBLE BUSINESS EUROPE

October 22-23, 2020, Online

At this year's Reuters Events Responsible Business Europe 2020, about 6,000+ global peers, CEOs, CSOs, CFOs, heads of sustainability, investors, and communications will convene for a two-day live virtual event, the organizers are convinced.

Increasingly the world realizes an economy that does not work for its society or environment is not an economy fit for the 21st century, the information said. Businesses must embrace a new purpose, one that would help address main societal issues and environmental issues as part of their recovery. "Not only is it the right thing to do, but increasingly society expects it, and investors are demanding it." And in doing so, companies would realize more resiliency and sustained success. The agenda includes also a keynote "Putting Circularity at The Heart of The Recovery Strategy". Delivering a circular economy and eliminating waste is a huge global challenge. And the Covid-19 pandemic has compounded this challenge, including increasing waste and falling revenues, to name but a few.

www.events.ethicalcorp.com/rbs/

ECOMONDO & KEY ENERGY 2020

November 3-6, 2020, Rimini (Italy)

The 2020 edition will be held as scheduled at Rimini expo center, and it will focus on the Green Deal as a pillar of the European recovery plan. "The continent's economic rebirth is based on Green Economy in all its forms," the organizers informed. "A crucial act, which makes Europe the world's first political subject to indicate the target of zeroing CO_2 emission from now until 2050 to which a 'green restart' from the effects of Covid-19 has been added." Italy would reveal its intelligence with a business ecosystem that intends to play a crucial role in the country's economic and social rebirth, and wants to show it at the 24th edition of Ecomondo, the Green Technology Expo organized by IEG (Italian Exhibition Group). Four expo macro sectors of the circular and green economy: Waste and Resources; Water, Bioeconomy; Remediation and Hydrogeological Risk. As the organizers assure, Ecomondo will be a safe and connected exhibition, including brand-new features and opportunities to meet, both in person and digitally: a new show model to get back to growing business and building relationships in the circular economy.

www.ecomondo.com

GLOBAL RECYCLING – The Magazine for Business Opportunities & International Markets

6. Volume 2020
ISSN-Print 2365-7928, ISSN-Internet 2365-7936

Publisher:
MSV Mediaservice & Verlag GmbH
Münchner Str. 48, D-82239 Alling GT Biburg, GERMANY
Tel.: +49 (0) 81 41 / 53 00 20, Fax: +49 (0) 81 41 / 53 00 21
E-Mail: msvgmbh@t-online.de
Responsible for the Content: Oliver Kürth

Editors:
Brigitte Weber (Editor-in-Chief)
Tel.: +49 (0) 26 43 / 68 39, E-Mail: weber@msvgmbh.eu
Dr. Jürgen Kroll, E-Mail: kroll@msvgmbh.eu

Advertising Sales:
Diana Betz, Tel.: +49 (0) 81 41 / 53 00 19, E-Mail: betz@msvgmbh.eu
Julia Huß, Tel.: +49 (0) 81 41 / 22 44 13, E-Mail: huss@msvgmbh.eu
Melanie Stangl, Tel.: +49 (0) 81 41 / 22 44 13, E-Mail: stangl@msvgmbh.eu

Advertisement Price List No. 37 currently valid.

Media Planner 2021: www.global-recycling.info/media-kit

Publication Frequency:
The magazine appears three times a year. If the magazine cannot appear due to force majeure, such as a strike, this shall not give rise to any claims against the publishing house. Attributed contributions do not necessarily represent the opinion of the editors. For unsolicited sent-in manuscripts and photo material the publishing house does not assume any liability. No part of this publication may be reproduced, included in online services and the Internet or transmitted by any means without written permission of the MSV GmbH. All information have been compiled with the greatest care, however, no responsibility is taken for the correctness.

Printers:
StieberDruck GmbH, 97922 Lauda-Königshofen

Closing for the Next Issues:
1/2021 – 10.03.2021 (Release Date: 08.04.2021)
2/2021 – 11.06.2021 (Release Date: 08.07.2021)
3/2021 – 13.09.2021 (Release Date: 08.10.2021)

facebook.com/eurecycling
twitter.com/recyclingportal
instagram.com/msvgmbh/
de.linkedin.com/company/msv-gmbh
global-recycling.info • eu-recycling.com • recyclingportal.eu

AD REM
ADVANCED DESIGN OF RECYCLING MACHINES

PLASTICS RECYCLING FROM WEEE AND ASR

- Recovery of PS, ABS, PP, PE
- High accuracy separation
- Plastics from WEEE and ASR

Each year, millions of tons of plastics end up in landfill. With Ad Rem, we have made it our mission to provide recycling companies all over the world with the technology to prevent this from happening.

Our flotation systems can turn any WEEE or ASR plastics mix into a new resource, saving not only a valuable commodity, but also 80% of energy as compared to virgin plastics production.

With our technology, we can help you to "close the loop" in a profitable way. The Ad Rem plastic separation system reveals the true potential of your waste materials.

Ad Rem — Krommebeekstraat 14, Menen (Belgium)
+32 56 52 11 30 — info@adrecyclingmachines.com
www.adrecyclingmachines.com

valtech group

TIGER DEPACK

PACKAGING AND CONTENT RECOVERY SOLUTION

the Solution designed to recover Everything

Tiger DePack HS 5 UNIT

PATENTED




SSO: heterogeneous material originating from waste collections from the roadside, markets, shopping centres and large-scale retailers as well as from stations, ports and airports. **FAULTY/EXPIRED PRODUCTS:** Foodstuffs, cosmetics and detergents




OUTPUT stream characteristics:

- With a near 100% recovery of the wet material,value can often be added to the dry fraction or redirected to the responsible chain
- The vertical separation system ensures the recovery of the highest quality material possible.

info@tigerdepack.com - www.tigerdepack.com - tel. 0421 231101

Tiger Depack a Brand by Cesaro Mac Import - Via delle Industrie 26 - 30020 Eraclea (VE)