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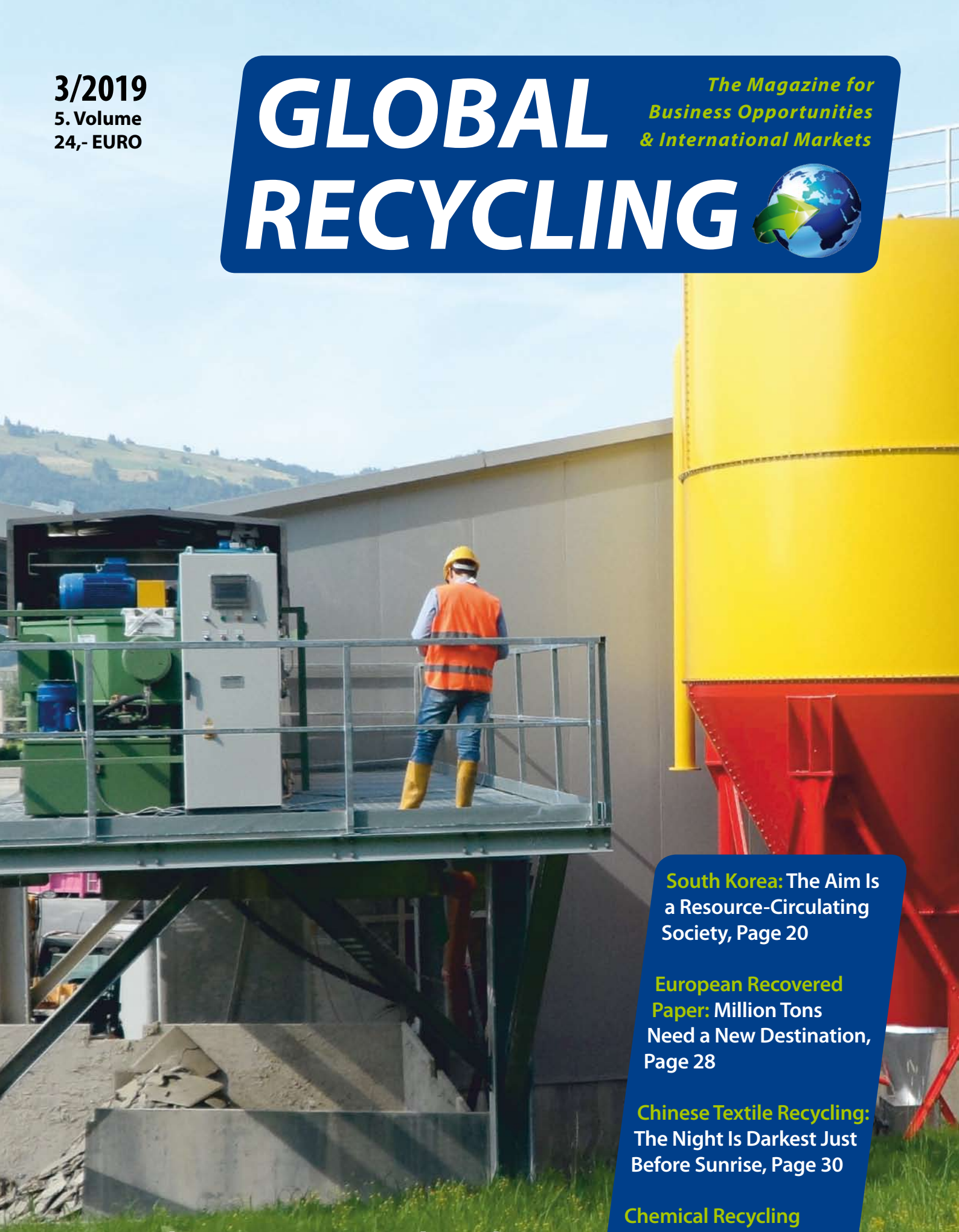
GLOBAL RECYCLING

The Magazine for Business Opportunities & International Markets



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Recycling: Water Quality Is Essential to Human Health

According to UN-Water, which is coordinating the United Nations' work on water and sanitation, a more circular and therefore more sustainable economy requires to value wastewater for its potential. "More than just an alternative source of water, safe wastewater management could help protect our ecosystems and give us energy, nutrients and other recoverable materials," the United Nations inter-agency coordination platform stresses the advantages.

However, reality paints a different picture: As described, globally – estimated – 80 percent of wastewater flows back into the ecosystem without being adequately treated or reused. This would contribute to a situation in which around 1.8 billion people use a source of contaminated drinking water and thus putting them at risk of water-related diseases like cholera and dysentery, to name but a few. "Far from being something to discard or ignore, wastewater will play a major role in meeting the growing water demand in rapidly expanding cities, enhancing energy production and industrial development, and supporting sustainable agriculture." This also applies to the industrial sector.

The costs of wastewater management would be outweighed by the advantages, "providing new business opportunities and creating more 'green' jobs," UN-Water is convinced. The realm of future business opportunities regarding the global water and wastewater market is described on pages 3 and 4. Furthermore, from page 13 onward an interview focuses on the Italian company Tecnoidea Impianti, a provider of plants for water purification and the treatment of sludge.

In September, the UN published the first global report on sustainable development since 2015, when the Sustainable Development Goals (SDG) were adopted. Entitled "The Future is Now: Science for Achieving Sustainable Development," the report finds that the current development model is not sustainable. The scientists conclude that a far more optimistic future is still attainable, but only by drastically changing development policies, incentives and actions, a press release said. As emphasized, creating economic growth just by increasing consumption of material goods is no longer a viable option: Projections would indicate that the global use of materials is set to almost double between 2017 and 2060 (from 89 gigatons to 167 gigatons) with correspondingly increased levels of greenhouse gas emissions and other toxic effects such as those from mining and other pollution sources. To change course, the world must transform several key areas of human activities, including food, energy, consumption and production, the authors say. "Developed countries need to change their production and consumption patterns, including by limiting the use of fossil fuels and plastics, and to encourage public and private investments that align with the SDGs."

Particularly concerning plastics, some initiatives are aiming at more sustainability. While the ubiquitous use of plastic has resulted in an enormous volume of waste, poor plastic waste management has caused negative environmental effects. This animated governments to implement stringent policies and regulations for the effective management of plastic waste, which will affect the markets for plastics recycling and recycled material (pages 6 and 7). On page 34, Michael Laermann addresses the question of chemical recycling. And the manufacturer SABIC realizes certified Polymers (page 27).

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

Yours, Brigitte Weber (weber@msvgmbh.eu)

Cover Photo: Tecnoidea Impianti S.r.l.

A Billion Dollar Business

According to a recent study, the global water and wastewater treatment market – valued at 4,950 million US-Dollar in 2018 – is expected to reach 6,520 million US-Dollar by the end of 2025.

The market is growing at a CAGR (compound annual growth rate) of 3.5 percent during 2019-2025, Indian Wiseguysreports.com predicted in March this year. "Increasing global water stress coupled with industrial wastewater disposal in aquatic ecosystems has led to a boost in the water reclamation requirements," the provider of market research reports stated. "In order to curb these growing issues, the consumption of effective treatment equipment systems is likely to propel over the forecast period. The rise in industrial activities and growing contamination have further demanded the treatment of water to make it suitable for end-use purposes. People awareness toward environmental pollution is also a key driver for water and wastewater treatment market." The report (➲ www.wiseguyreports.com/sample-request/3825731-global-water-and-wastewater-treatment-market-research-report-2019) focuses on water and wastewater treatment volume and value at the global, regional and company level.

Regarding the world market for water and wastewater treatment technologies, Indian company Mordor Intelligence did not give concrete figures; it assumes that the market is likely to register a CAGR of nine percent by 2024. "One of the major driving factors of the market is the rapidly diminishing freshwater resources across the world," the company pointed out. "However, lack of awareness on appropriate usage of water treatment techniques is likely to restrain the market." The report (➲ www.mordorintelligence.com/industry-reports/water-and-wastewater-treatment-technologies-market) describes the situation in the segmented market by type (oil/water separation, suspended solids removal, dissolved solids removal, biological treatment/nutrient and metals recovery, disinfection/oxidation and other types), end-user industry (municipal water and wastewater treatment, food and beverage, pulp and paper, oil and gas, healthcare, poultry and aquaculture, chemical and other end-user industries), and geography (Asia-Pacific, North America, Europe, South America, and Middle East & Africa). One of the key market trends is the domination of municipal water and wastewater treatment. According to Mordor Intelligence, the major applications of treatment technologies include preliminary treatment, primary, secondary and tertiary treatment, biological nutrient removal (BNR), resource recovery and energy generation. "North America and Europe are adopting the latest technologies in wastewater treatment at a faster rate than in other regions," the information says. "The majority of drinking water used in Israel and Saudi Arabia is generated from the desalination process, which is likely to boost the demand for municipal water and wastewater treatment technologies." Hence, the municipal water and wastewater treatment industry would be likely to dominate the market.

Business opportunities in China

There are favorable business opportunities in China. In a report, offered by ResearchAndMarkets.com, the Chinese treatment technology market is expected to witness a CAGR of 9.45 percent from 2018 to 2023 (➲ www.researchandmarkets.com/reports/4602283/).

The growth is largely fueled by extensive usage of such technologies in municipal water and wastewater treatment, the company wrote. The eastern part of China accounts about one-third capacity of the total water and wastewater treatment plants, while the northern-west China accounts the least number of plants (about one-sixth of the total number). The industry induces market growth as well. According to China's National Bureau of Statistics, the industrial sector grew by 7.2 percent between January and February of 2018, as compared to the same period a year earlier, exceeding economists' forecasts of 6.1 percent. "Increasing pressure on the industry to improve water efficiency and reduce pollution discharges is expected to drive the demand for industrial water treatment technologies." China's 13th Five-year Plan on urban sewage treatment and water recycling facilities planning would aim to spend

Photo: Mulderphoto / stock.adobe.com

around 559 billion Renminbi (about 87.5 billion US-Dollar) or 0.75 percent of its GDP (gross domestic product) on its water treatment industry. "This is expected to increase the application of improved technology in industrial processes."

Industrial wastewater treatment

The treatment of industrial wastewater is also a big business. According to a report, offered by MarketsAndMarkets (➲ www.marketsandmarkets.com/Market-Reports/industrial-wastewater-treatment-market-57745160.html), the market size is expected to grow from 11.3 billion US-Dollar in 2019 to 15.0 billion US-Dollar by 2024 at a CAGR of 5.8 percent. As forecasted, biocides and disinfectants are estimated to be the largest type of industrial wastewater treatment. "The demand for biocides and disinfectant chemicals is comparatively higher, owing to its high requirement in wastewater treatment applications of all the major end-use industries considered in the study. Biocides are directly related to human physiology and have the ability to neutralize diseases causing microbes. Moreover, the increasing environmental regulations have fueled the demand for biocides and disinfectants in industrial wastewater treatment chemical market." The zero liquid discharge (ZLD) mandate in the power generation industry plays a major role in enhancing the consumption of wastewater treatment chemicals.

The figures which are indicated by Reports and Data are slightly different. According to its current analysis, the global industrial wastewater treatment market was valued at 10.65 billion US-Dollar in 2018 and is expected to reach 16.60 billion US-Dollar by the year 2026, at a CAGR of 5.80 percent. As reported, the study (➲ www.reportsanddata.com/report-detail/industrial-wastewater-treatment-market) covers in-depth analysis of industrial wastewater treatment and challenges faced by them. Industrial waste treatment involves various kinds of procedures used for treating wastewater that is produced by industries as an undesirable by-product. Once the treatment is over, the treated industrial wastewater (or effluent) may be reused or released to a sanitary sewer or surface water in the environment. Various types of contamination of wastewater require a variety of strategies to remove the contamination. Some of them include oil and grease removal, trickling filter process, removal of acids and alkalis, removal of other organics such as paints, pharmaceuticals, pesticides by vitrification and ozonation, removal of toxic materials such as zinc, silver, arsenic with the help of advanced oxidation process.

Demand for equipment

The demand for equipment will also grow. The size of the global equipment market for water and wastewater treatment was valued at 30.01 billion US-Dollar in 2018 and is estimated to expand at a CAGR of 3.68 percent by 2025, an analysis offered by Grand View Research found out (➲ www.grandviewresearch.com/industry-analysis/water-and-wastewater-treatment-equipment-market).

The surge in investments in these types of equipment and facilities coupled with the growth of the oil and gas industries is projected to drive the market. "Increasing demand for clean water owing to rising population, industrialization, and rapid urbanization from emerging markets is resulting in a marked rise in the adoption of the equipment," the India and US-based market research and consulting firm informed. "Increasing requirements for minimized global water footprint and optimum quality yields in emerging economies such as the Asia Pacific region are anticipated to drive the market." Key equipment segments include membrane separation, disinfection, biological, and sludge dewatering. Membrane separation held the highest market share of 6.16 billion US-Dollar in 2018, Grand View Research wrote. "Rising awareness regarding the importance of nanofiltration and reverse osmosis for wastewater treatment applications is expected to play a crucial role in boosting the membrane separation product segment over the forecast period." Biological equipment was the second-highest revenue-generating segment accounting 16.83 percent of the total market share in 2018. Stringent regulations aimed at controlling water pollution in manufacturing and municipal levels through the utilization of eco-friendly means in developed markets including the U.S., Canada, Germany, and Japan is expected to upscale the requirement of biological equipment for wastewater treatment.

Global service market

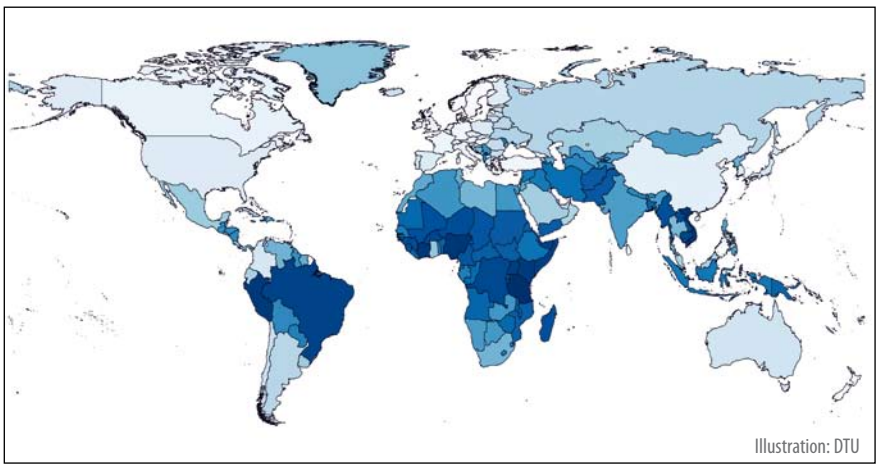
Consistently, the service market will increase. A recent study, offered by technology company ReportLinker, suggests that the global industrial wastewater treatment service market is projected to reach 28.0 billion US-Dollar by 2024 from an estimated 20.8 billion US-Dollar in 2019. According to the analysis (➲ www.reportlinker.com/p05780287/Industrial-Wastewater-Treatment-Service-Market-by-Service-Type-Treatment-Method-End-User-Region-Global-Forecast-To.html), this market will grow at a CAGR of 6.1 percent during the forecast period. This rise could be attributed to factors such as expansion in the power generation sector, water intensive processes in the oil and gas, textile, and pulp and paper industries, and increasing rate of industrialization and urbanization. "However, the fact that wastewater treatment is a very costly process and involves a huge amount of capital investment acts as the only major threat to this industry."

According to the forecast, the Asia Pacific region is projected to be the largest industrial wastewater treatment service market by 2024. "Countries such as China, India, Japan, and South Korea are among the major countries that are considered as the main industrial center points generating a large amount of industrial wastewater," a press release said. "Over the past few years, this region has witnessed rapid economic development. Also, the growth of the power generation sector in this region results in an increase in the wastewater generated, which, in turn, results in an increase in the industrial wastewater treatment service market." The pulp and paper industry in countries such as China, South Korea, Japan, and India is expected to grow at a humongous rate, thereby driving the industrial wastewater treatment service market.

Sewage Reveals Levels of Antimicrobial Resistance Worldwide

Sewage can reveal the occurrence of antimicrobial-resistant bacteria among healthy populations, an international study led by the Technical University of Denmark showed.

A comprehensive analysis of sewage collected in 74 cities in 60 countries has yielded the first comparable global data, which show the levels and types of antimicrobial-resistant bacteria that are present in mainly healthy people in these countries. The National Food Institute, Technical University of Denmark, headed the study*), which was conducted by an international team of researchers.



Predictions of antimicrobial abundance in all countries and territories in the world. Map colored according to predicted abundance of antimicrobial from light blue (low abundance) to dark blue (high abundance)

In the metagenomics study, the researchers have mapped out all the DNA material in the sewage samples and found that according to antimicrobial resistance the world's countries fall within two groups, the information says. North America, Western Europe, Australia and New Zealand generally have the lowest levels of antimicrobial resistance, while Asia, Africa and South America have the highest levels.

Brazil, India and Vietnam have the greatest diversity in resistance genes, while Australia and New Zealand have the lowest.

Sanitation and health closely linked to antimicrobial resistance

According to the scientists, the use of antimicrobials only explains a minor part of the occurrence of antimicrobial resistance in the various countries. Therefore, they have searched for other factors that could be either drivers for or indicators of the occurrence of resistant bacteria. In this work, they have used several comprehensive data sets from the World Bank, which e.g. have measured the countries' health status and stage of development.

The researchers' work revealed that most of the variables, which are associated with the occurrence of antimicrobial resistance in a country, are connected with the sanitary conditions in the country and the population's general state of health. "In the fight against antimicrobial resistance, our findings suggest that it would be a very effective strategy if concerted efforts were made to improve sanitary conditions in countries with high levels of antimicrobial resistance," Professor Frank Aarestrup from the National Food Institute and head of the study is quoted.

Using the same data from the World Bank, the researchers have also predicted the levels of antimicrobial resistance in 259 countries/territories, and they have drawn up a world map of resistance in healthy populations. According to their estimates, the Netherlands, New Zealand and Sweden have the lowest levels of resistance, whereas Tanzania, Vietnam and Nigeria have the highest levels. According to the estimates, Denmark has the sixth lowest level of antimicrobial resistance.

Reusable data

Contrary to data from traditional methods of analysis, raw data from metagenomics studies can be reused to examine other problems. The researchers from the sewage project are e.g. using data from the study to analyze the occurrence of other disease-causing microorganisms in the sewage.

As more resistance genes emerge in the future, researchers will also be able to re-analyze publicly available raw data from metagenomics studies to quickly uncover how these genes have emerged and spread.

A step closer to a global surveillance system

The scientists will use the experience gained from the project to fulfill their overall ambition of developing a worldwide surveillance system that can continuously monitor the occurrence and spread of disease-causing microorganisms and antimicrobial resistance. "Analyzing sewage can quickly and relatively cheaply show exactly which bacteria abound in an area – and collecting and analyzing sewage doesn't require ethical approval, as the material cannot be traced back to individuals. Both parameters help to make a surveillance system via sewage a viable option – also in developing countries," Professor Frank Aarestrup is convinced.

The researchers' ambition is to develop a system, which makes it possible to exchange and interpret information in real-time. As such, it would be possible to use the global surveillance data e.g. to manage diseases that threaten to spread beyond a country's borders and develop into pandemics, such as Ebola, measles, polio or cholera.

*) The study was funded through grants from the Novo Nordisk Foundation, the Velux Foundation and via the EU-funded project COMPARE. Several COMPARE partners participated in the study.

Global Markets for Plastics Recycling and Recycled Material

There are many opportunities in the sector of plastics recycling.

According to the market research store Research and Markets, the global plastic waste management market will record a compound annual growth rate (CAGR) of almost three percent from 2019 to 2023. The use of plastic has been rising across industries such as consumer packaging, healthcare, textiles, food and beverages, retail, and others. The ubiquitous use of plastic has been contributing to the generation of a huge volume of plastic waste, the company stated. Poor plastic waste management has been causing adverse environmental effects. "This, in turn, has prompted governments to implement stringent policies and regulations for effective management of plastic waste. As a result, vendors of the plastic waste management market have been collaborating with industries and governments to establish plants and designated areas for plastic waste management, contributing to the market growth."

The rising implementation of stringent government regulations and policies would impose responsibilities on plastic producers to collect and process plastic waste. "However, setting up separate recycling and disposing of facilities adds to operational cost and is also complex," Research And Markets gave account. "This gave rise to third-party organizations called the producer responsibility organizations (PROs), which are hired by plastic-producing industries for plastic waste management at a cost." The PROs avail services of certified plastic recyclers, which can also be PROs. The rising popularity of those organizations for plastic waste management would be

one of the key trends "that will have a positive influence on the growth of the global plastic waste management market".

Recycled plastics markets

The same goes for the demand for recycled material. As reported by Research And Markets, the worldwide relevant markets will grow by 2024 and focus on PET, HDPE, PP, LDPE – to name but a few. In 2018 alone, the global recycled plastics market reached a value of 35.4 billion US-Dollar. According to the forecasts, it will reach 50.5 billion US-Dollar by 2024, growing at a CAGR of 6.1 percent during the period 2019-2024. "Reduction of plastic wastes and numerous recycling programs have become a priority for both developed and developing nations across the globe," the market research store underlined. "Owing to this, governments in different regions are implementing policies and regulations for controlling waste production, encouraging the reuse and recycling of plastic wastes, and encouraging systematic waste treatment."

The demand for plastic material has been constantly increasing across several industries like food and beverage, automotive, packaging and healthcare. The development of these industries could be accredited to rising populations, inflating disposable incomes and continuous product innovations, the company informed. "In this context, higher manufacturing cost of virgin resins has necessitated the use of recycled plastic products, thereby bolstering the growth of the global recycled plastics market. Plastic manufacturers and recyclers are now being more focused on adding value and consumerism to the recycled plastic products." Furthermore, several brands were investing in research and development to enhance the quality performance of recycled plastic products and incorporate them into every plastic component that they use.

A more optimistic outlook

The American market research and consulting firm Reports And Data found out that the value of the market could be somewhat higher. According to its current analysis, the global recycled plastics market was valued at 40.26 billion US-Dollar in 2018 and is expected to reach 66.74 billion US-Dollar by 2026; this means a CAGR of 6.5 percent.

"With the rising awareness, there has been a growth in the demand for this market," Reports And Data stated. The resins manufactured from the plastic wastes can serve different purposes; this versatility of application makes the plastic re-granulate an attractive option. It can be used as a secondary raw material in various industries such as packaging, building and constructions, electronics and electricals, automotive, furniture, textiles and more. "However, it has a tough competition from the virgin plastics market." This competition would be one of the major restraining factors for the recycled plastics market. Further findings from the report suggest:

- The Asia Pacific region has been dominating the market since 2017. The region has a flourishing manufacturing sector with an abundance of cheap labor and resources. It continues to grow at a CAGR of 6.3

Photos: Andi Karg

percent. China is one of the largest producers of recycled plastics due to the abundance of resources.
- However, one of the major challenges to this market is the ban on imports of wastes and scrap plastics in China.
- Polyethylene terephthalate (PET) holds the highest market share amounting to approximately 33.9 percent and continues to grow at a CAGR of 5.5 percent. PE holds the second largest share accounting for a market share of approximately 26.3 percent due to its widespread availability in the market.
- Due to an exponential increase in the use of plastics over the years, plastic scrap is available everywhere in various forms. Thus, there is seldom a shortage of raw materials for processing and recycling plastics.

➲ www.reportsanddata.com/report-detail/recycled-plastics-market

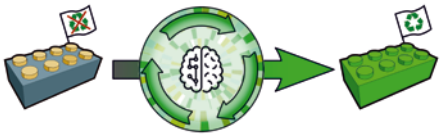
➲ www.researchandmarkets.com

"Making More Plastics Recyclable"

A German project aims at increasing the share of recyclable plastics by reducing the number of material components.

To date, it is nothing but the wishful thinking of many plastics recyclers: that recyclability is taken into account right from the very beginning of a product's life cycle, at the product design stage. A new project in Germany, titled DIMOP, aims at a solution for realizing this goal.

Many plastic products cannot be recycled, whether multi-layered food packaging, power cable sheathing or a toothbrush. This is the case, for example, when products are made of various materials that cannot be separated at all or only insufficiently. The Chair of Business Administration and Business Information Systems at Julius-Maximilians-Universität (JMU) Würzburg in Bavaria, Germany, has been working together with the German Plastics Centre SKZ and two partners from the Bavarian plastics industry. The team aims at increasing



Picture: Jan Werner / SKZ Würzburg

the share of recyclable plastics by reducing the number of material components. „We focus on the product design stage because the recyclability aspect has largely been neglected by designers so far," Jan Werner from the SKZ (a member of the Zuse Society of Independent Research Institutes) is cited. „Designers and recyclers live in two completely different worlds; there is no exchange of information." That is why designers tend to choose materials that are very difficult to recycle.

Future digital platform

The project now plans to bring together these two worlds. To achieve this, the scientists want to create a software platform which provides information on the recyclability of different plastics and material combinations. "This will enable designers to weigh criteria such as functionality, resource efficiency and recyclability against each other and choose better materials based on this," the information says. A JMU team around Norman Pytel and Professor Axel Winkelmann is in charge of creating this platform.

The DIMOP project deals with digital multi-criteria material selection to optimize the recyclability of plastic materials. It is funded by the Free State of Bavaria within the scope of ForCYCLE II, a collaborative project for more resource efficiency in the Bavarian economy, especially in SMEs and handicraft businesses. The project was kicked off in July 2019 and is set to run for three years.

Sorting: Looking for the "Holy Grail"

The "HolyGrail" project was nominated for the Packaging Europe Sustainability Awards 2019 in the "Driving the circular economy" category.

In the European project, nearly 30 partners investigated how tagging of plastic packaging could have a drastic impact on more accurate sorting and high-quality recycling. This cross-industry project ran for three years and was driven by the efforts of different partners. "HolyGrail" officially closed in May this year and was led by Procter & Gamble and facilitated by the Ellen MacArthur Foundation. The participant group consisted of representatives from the full packaging value chain, covering brand owners, waste manufacturers, resin producers and converters, retailers, technology providers/consultants and investors.

The project's aim was to develop better preconditions for a circular economy in the packaging sector. "Europe's low recycling rates are mainly related to low collection rates and poor sorting efficiency," Gian De Belder, packaging developer of P&G and project manager of the "HolyGrail", was cited. Consequently, the project's partners explored various technologies. According to the information, digital watermarks for packaging have prevailed. "Scanners read these watermarks which are invisible to the human eye. Then they can assign respective packaging, considering the packaging's material and whether the material is used for packaging food, cosmetics or detergents and cleaners."

The "HolyGrail"-Project helped 69 participants to forge ahead in the area of digital watermark-technology. The invisible codes were printed on various materials, for example on tags, foils and sachets. Furthermore, the partners have successfully experimented with various forms of PET- and HDPE-bottles, trays and boxes. "For the technology to be successful, as many forms of packaging as possible must bear a digital watermark," the project's partners are convinced. Due to digital watermarks, packaging becomes intelligent. Along the entire value chain, the stored information can be used, for example for the production, the quality assurance at the supermarket checkout, and right up to the disposal.

Photo: Willfried Wende / Pixabay

As reported by Borealis Group, one of the project partners, the technology of digital watermarks also has potential to bring disruption into other fields, such as consumer engagement and retail, through the creation of "smart/intelligent" packaging. Major retailers in the US (Wegmans, Walmart) and in Europe were already adopting the technology into their packaging. The concept would open up new possibilities currently "not feasible with existing sorting technologies", including:

- making a distinction between food and non-food packaging
- proper identification of full-body shrink sleeve bottles
- ODR packaging (opaque and difficult to recycle, including black packaging)
- distinct mono and multilayer flexible packaging
- proper identification of rigid multilayer packaging materials (e.g. thermoforms or bottles)
- safe introduction of new materials not hindering established recycling streams and proper identification of recyclable vs. compostable packaging
- ability for closed-loop recycling.

As stated, the consumer engagement aspects are particularly interesting, "as the invisible codes can be easily read by mobile phones, bringing new features – ingredient transparency, coupons/loyalty, information on product use/dosage and how to deal with the packaging at the end of life – directly to the consumer's fingertips."

The next step

As reported in the executive summary, despite having made a lot of progress in the years since Pioneer Project "HolyGrail" was initiated (Pioneer Projects are pre-competitive collaborations of participants of the New Plastics Economy Initiative, which is led by Ellen MacArthur Foundation), much work remains to be done to understand how resin-independent codes could be used at scale. Aside from proving the technologies' robustness and actual value-adding potential, stakeholders need to agree on a common identification scheme in order to make it possible to implement codes as a basis for sorting at scale, the information says. "Another open question is data ownership, how to finance the still significant investments required to retrofit machinery in recycling facilities." The project "HolyGrail" would demonstrate that the science and invention aspects necessary for improved sorting were already in place; the engineering and development aspects now needed to be addressed.

"For these reasons, a key remaining activity is to disseminate the findings of the project in the full value chain and engage more stakeholders in order to enable a potential roll-out of digital watermark/chemical tracer technology for plastic packaging. To take the technology further, a good next step would be a cross value chain pilot on a selected sorting technology in an industrial Material Recovery Facility. This could be conducted as a private partnership or partially EU- or regionally funded initiative."

➲ www.newplasticseconomy.org/assets/doc/Holy-Grail.pdf

Billions to Support the Circular Economy in the EU

The European Investment Bank (EIB) in tandem with Europe's largest National Promotional Banks and Institutions have launched a 10 billion Euro initiative to accelerate the transition to a sustainable and circular economy.

Photo: EIB

The Joint Initiative on Circular Economy (JICE) is to support the development and implementation of circular economy projects and programs in the European Union (EU). "This flagship partnership will target at least 10 billion Euro of investments over the next five years (2019 – 2023)," EIB informed. "The aim is to prevent and eliminate waste, increase resource efficiency and foster innovation by promoting circularity in all sectors of the economy." The five national promotional banks and institutions are: Bank Gospodarstwa Krajowego (BGK – Poland), Groupe Caisse des Dépôts (CDC – France) including Bpifrance, Cassa Depositi e Prestiti (CDP – Italy), Instituto de Crédito Oficial (ICO – Spain) as well as Kreditanstalt für Wiederaufbau (KfW – Germany).

According to EIB, the six partner institutions will combine their expertise, experience and financial capacity to

EIB Group's headquarters

better support the implementation of viable circular projects and program approaches. JICE "will provide loans, equity investment or guarantees to eligible projects and develop innovative financing structures for public and private infrastructure, municipalities, private enterprises of different size as well as for research and innovation projects". It would base on the ongoing initiatives led by the European Commission to build knowledge through dedicated working groups and develop financing schemes. "The joint initiative will focus particularly on investments in the EU Member States that will help accelerate the transition to a circular economy", the press release said. It will target all stages of the value chain and lifecycle of products and services:

- Circular design and production: applying "reduce and recycle" strategies to design out waste at the source, prior to commercialization.
- Circular use and life extension: enabling the reuse, repair, repurposing, refurbishing or remanufacturing of products in use phase
- Circular value recovery: recovering materials and other resources from waste, recovering waste heat and/or reusing treated wastewater
- Circular support: facilitating circular strategies in all lifecycle phases, for example with the deployment of key ICT technologies, digitalization and services supporting circular business models and circular value chains.

➲ www.eib.org

Lithuania: Scientists Invented Method of Producing Plaster Stones from Waste

In June this year, the Lithuanian Kaunas University of Technology (KTU) reported, that a group of scientists have developed a method of producing increased strength gypsum binding material using only industrial waste products.

By combining phosphogypsum (fertilizing production waste), zeolite (a waste product from oil refining industry) and an activator they have cast gypsum stone, which is twice stronger than usual. The university gave account that about five tons of phosphogypsum are generated per ton of phosphoric acid production. Globally, 15 percent of the generated volume of phosphogypsum is recycled as building materials, agricultural fertilizers or soil stabilization amendments and as a setting controller in the manufacture of Portland cement. "The rest is stored near factories, which not only occupies large land areas but also causes serious environmental contamination. In Lithuania, phosphate industry company Lifosa produces almost 500 thousand tons of phosphoric acid and 4-5 times of the phosphogypsum, which is transported to the waste piles." According to the information, the KTU research group has already applied for a patent of their invention to the State Patent Bureau of Lithuania. "Once obtaining the patent, the scientists will look into cooperation with business organizations in order to commercialize their invention," KTU emphasized. Technology transfer would be facilitated by KTU National Innovation and Entrepreneurship Centre, a one-stop shop for knowledge-intensive business to contact research.

➲ https://niec.ktu.edu/

Photo: Kaunas University of Technology

Aqua Metals Cooperates with Veolia North America Regeneration Services

Aqua Metals, Inc., which has invented AquaRefining technology, has signed a long-term contract with Veolia North America Regeneration Services LLC to provide operations, maintenance and management services at Aqua Metals' AquaRefining facility in McCarran, Nevada.

Veolia will contribute operational and technological expertise and organizational capabilities in aqueous-based process chemistries and electrolysis along with taking on responsibility for operations, supply chain, offtake and management of the plant. The goal is to bring the plant operations to 16 modules of AquaRefining capacity by the end of 2019 and to increase the future rates in 2020.

As is underlined by Aqua Metals, this partnership will expand Veolia's Regeneration Services business, "which operates seven sites in North America using technologies fundamental to circular economy processes, including beneficial reuse of high-value sulfur derivative in AquaRefining".

"Having Veolia manage operations at the McCarran plant facilitates our transition to the next phase of our business strategy which is to become a capital-light technology licensing organization that expands AquaRefining technology into battery recycling centers across the globe," Steve Cotton, President and CEO of Aqua Metals, is cited. "Licensing AquaRefining technology will enable battery recycling facilities to increase production to meet rising demand without increasing environmental impact. Recycling facilities will also gain the added value of producing a higher quality product with promising advantages for improving battery performance and lifecycle. We look forward to working with Veolia as a long-term strategic partner."

USA-based Aqua Metals, Inc. is realizing lead recycling with its patented AquaRefining technology. Unlike smelting, AquaRefining is a room temperature, water-based process that emits less pollution, the information says. Moreover, the modular systems are intended to allow the company to vastly reduce environmental impact and scale lead acid recycling production capacity by licensing the AquaRefining technology to partners. Accordingly, this would meet growing demand for lead to power new applications including stop/start automobile batteries, which complement the vehicle's main battery as well as Internet data centers, alternative energy applications including solar, wind, and grid scale storage.

Aqua Metals has built its first recycling facility in Nevada's Tahoe Reno Industrial Complex.

➲ www.aquametals.com

Circular Materials Conference

March, 17 – 18, 2020, Gothenburg (Sweden)

The Circular Materials Conference is a Nordic forum for industrial, scientific and commercial progress in the circular use of materials. It offers unique insight and debate in seminars, face-to-face meetings and networking for international key people, academic and commercial, that want to be in the industry forefront at a time when we face the challenge of transformation to circular business models for the future of our planet, the organizers describe the intention of this event. This conference will bring together leaders from the industry and academia to explore circular economy solutions, novel business models and visions of a world where no materials are wasted. "The particular focus of this year will be at the new partnerships and technologies that can speed up the transition while bringing about a more caring and truly sustainable economy for all," the organizers announced.

Focusing on industrial, scientific and commercial advances in circular materials, the event would feature keynote speeches, seminars, site visits and solutions exhibition, as well as welcome conversations, debate, face-to-face meetings and networking.

Focus areas will be:

- Metals from secondary sources/critical minerals
- Technical and commercial outlook
- Circular materials business applications
- Innovation critical materials – batteries for electric cars
- Plastic strategic research and innovation in a circular economy
- Circular economy in textiles
- AI and cascading materials innovation
- CE in fast moving consumer goods

➲ www.circularmaterialsconference.se

The Global Recovered Paper Market

According to USA-based market intelligence company Beroe Advantage Procurement B.V., the global recovered paper demand, which was predicted to be about 250 million metric tons in 2018, is expected to increase at a compound annual growth rate (CAGR) of two to three percent until 2021.

As reported, Asia – dominated by China and India – is still the major growth driver. The USA and Europe are the prime exporters of recovered paper, globally. However, these regions are witnessing negative or minimum growth rates after the import restrictions in China. Besides, "the sustainability regulations in China have become a major challenger for the global recyclers," the company emphasized. "The domestic recycling rate in China is expected to increase, due to the shortage of imports."

Regarding the end-use market, Europe and the Asia Pacific are the major regions that use recycled paper for containerboard production. "While 95 percent of the total containerboard produced in the Asia Pacific (APAC) is made from RCP (Recovered/Recycled Paper), the value is 82 percent for Europe (combining Western Europe and Eastern Europe)," Beroe stated. Similarly, for boxboard, 67 percent is recycled in the Asia Pacific area, whereas in Europe it accounts for 51 percent of the total boxboard produced.

Photo: O. Kürth

"The demand for newspaper and printing and writing paper has been on a continuous decline in the developed regions, and its share is expected to decrease even further by 2019," market intelligence said. The tissue share is expected to increase, mainly driven by the developing regions, like Asia Pacific and Latin America.

On regional cost structures of recovered/recycled paper, Beroe found that the cost of raw material is lower in exporting countries "because of the ease in availability of raw materials". In Asia, owing to the low recovery rate, raw material would be imported from these regions, pushing the share higher. "On the other hand, labor availability and average labor costs are much lesser in Asia compared to North America and Europe, bringing the labor cost contribution down," the company stated. "Other costs constitute to various verticals, like marketing, sales and distribution, general administration, and financing."

➲ www.beroeinc.com/category-intelligence/recovered-paper-market/

Launch of Balloon Recycling Program

Recycling is definitely a strong trend: In July, the toy and consumer products manufacturer Zuru Inc., which started in New Zealand and is now headquartered in Hong Kong, has announced the "Bunch O Balloons Recycling Program" in cooperation with the waste management company TerraCycle. "The partnership encourages consumers to think 'green' and recycle 100 percent of their used balloon plastics and packaging," the producer emphasized. Beginning in September this year, all "Bunch O Balloons" products in the USA, Canada, U.K., Australia and New Zealand would be fully recyclable.


Photo: roeggel / pixabay

According to the information, consumers will be able to ship or drop off used packaging, balloon pieces and fast-fill stems at TerraCycle recycling stations, "where they will then be processed and recycled into new materials".

➲ https://zuru.com

New Contract in New Zealand

The international firm Veolia has signed a ten-year contract (annual value: converted about 11 million US-Dollar) with New Zealand company Wellington Water to operate and maintain the four wastewater treatment plants that serve the capital city of New Zealand. The metropolitan area comprises four local authorities: Wellington, Lower Hutt, Upper Hutt and Porirua. The population of more than 400,000 residents combined produce about 165 million liters of wastewater every day. This water is treated at four plants – two in Wellington, one in Porirua and one in Lower Hutt – before being returned to the environment. Wellington Water is owned by the Hutt, Porirua, Upper Hutt and Wellington city councils, and Greater Wellington Regional Council. Their role is to manage the drinking water, wastewater and stormwater services of their council owners.

Veolia provides water, waste and energy management services to more than one million people in New Zealand and employs over 300 people across the country.

Danish AffaldPlus Signed Contract for European RDF

In the coming three years, Geminor will deliver a total of 150,000 tons of secondary fuels to Danish energy producer AffaldPlus.

The recently signed agreement between both companies will commence in January 2020, according to the Norway-based provider. Geminor will annually deliver 50,000 tons of Refuse-derived Fuel (RDF) from countries such as the UK, Italy and Germany, and the logistics will mainly consist of bulk shipments – but also train and road transport. AffaldPlus is owned by six municipalities on the island of Sjælland. In addition to receiving and handling waste from the municipalities, it produces electricity and district heating at its plant in Næstved. Geminor will deliver about one third of the total annual secondary fuels burned in the incinerator at AffaldPlus.


Photo: Geminor

➲ www.geminor.no

>>venture>> Prize for DePoly

Startup DePoly has won the 2019 >>venture>> Grand Prize. The company aims to close the loop on PET plastic recycling through its novel solution that allows the chemical recycling of PET plastic back to its two main components. The process results in ethylene glycol in clear liquid form and terephthalic acid as a white powder; it also generates a small number of dyes, additives and other waste.

DePoly was founded by Samantha Anderson, a Ph.D. student at the Laboratory of Molecular Simulation (LSMO) at Ecole Polytechnique fédérale de Lausanne. The next step for the start-up will be to scale up its technology from the lab to industry. In November, a pilot unit will be built.

>>venture>> is the leading competition for up-and-coming entrepreneurs in Switzerland. Founded by Dr. Thomas Knecht in 1997, the competition empowers young innovators to develop their business ideas into startup companies. A joint initiative of ETH Zürich, McKinsey & Company, Knecht Holding, Innosuisse and EPFL (Ecole Polytechnique fédérale de Lausanne), >>venture>> has been led by the >>venture foundation>> since 2013.

VZ Kanalreinigung,
Wangen, Switzerland

Tecnoidea Impianti: A Closed-Cycle Water Depuration System Made in Italy

Since day one, the company Tecnoidea Impianti, an acronym for Tecnologia Impianti di Depurazione Acqua, has focused on the design and production of plants for water purification and the treatment of sludge.

Nowadays, the Italian-based company stands out due to over 30 years of know-how, world-wide applied innovative solutions and steady creativity. Nevertheless, GLOBAL RECYCLING Magazine wanted to know how everything has started and asked Tecnoidea Impianti some questions about the past, present, and future.

According to your company, Tecnoidea Impianti has installed over 3,000 plants throughout the world, which can recover more than two million six hundred cubic meters of water per day and treat as well as dispose of sludge produced by various processing phases. But how has everything started back in 1981 when the company was set up?

Back then, the Internet was just a nerd thing, environmental awareness was yet to be discovered, and the word "globalization" wasn't even in the dictionary.

Tecnoidea Impianti was established in 1981 as a sales company operating in the marble and granite industry, and only in the next decade, we decided to start manufacturing. No computers, no 3D modeling, no video calls with overseas customers, only the passion of two partners, an office on four wheels and the idea that we could have recycled and re-used the big volumes of water used in industrial wet processes. We took our time for every major step of the company growth, one plant at a time, and today we are still selling spares for machines that have been working stress-free for more than 30 years.

Everything changed in terms of industrial design, world-wide trades, and ecology. The technology had a light-

Richi AG, Weiningen, Switzerland

Photos: Tecnoidea Impianti S.r.l.

speed progression, the green economy came to life, and our company evolved accordingly.

But there is one thing that remained the same for 35 years: the central role of the customer in our projects. We truly believe that relationships with customers led Tecnoidea Impianti where it is now, and we are proud of it.

What is the essential mission of Tecnoidea Impianti regarding water purification and treatment of sludge generated by industrial processes?

In terms of process, we are focused on a closed water depuration cycle, where we continuously re-introduce clean, usable water into our customers' production line. Along the two stages of our process – water clarification and sludge dehydration – we aim to recover and re-use up to 95 percent of the liquid. Water clarification is obtained thanks to the addition of a polyelectrolyte, highly biodegradable in less than 30 days. The last stage of the process – the dehydration of the remaining thickened sludge – is operated by our recessed chamber filter-press. The only waste of the process is a dry, solid, environmentally safe mud cake.

In which way does Tecnoida Impianti distinguish itself from other companies active in the sector of water and sludge treatment?

In two ways: quality and care of the customer. We never traded the quality of our equipment for any "just go to market" shortcut and we are not going to. The process of engineering, developing, and manufacturing of our machines must follow quality standards and procedures subject to continuous reviews. The know-how loop between us, our customers, and our suppliers ensures that our next installation will be somehow better than the last one.

The care of the customer is the fuel of this process: Tecnoidea sides its clients from the very first contact until the end of life of its machines. We do not just sell WTPs, we help and support our clients to enhance their businesses, collaborating with them to study, develop and apply the best, most innovative, and most practical solutions for each specific job.

Each plant design is tailored on single customer requirements, specifications, and limitations; on-site installation comes with qualified supervision or a complete turn-key

Isarkies GmbH, Unterwattenbach, Germany

Eng. Francesco Parolini, Chairman of Tecnoidea Impianti

package; full training to on-site personnel is provided. Remote control, assistance, and tuning is included in the package, customized spare-parts plans, fast and effective deliveries world-wide, on-site assistance … we "stay" with our customers until bedtime.

What kind of environmental policy does the company pursue?

Applying an environmental policy that includes all the guidelines required by ISO or equivalent certifications is not enough – not anymore. Rational use of resources, reduction of emissions, monitoring, and continuous improvement have been widely discussed already. But our planet has no time to wait for human procedures' implementation. Our planet needs fast-effective actions to reduce or mitigate the impact of our unsustainable lifestyle. So, here is a sneak peek of Tecnoidea Impianti "environmental action-plan":

1) Selection of km0 suppliers, good for the environment and the Made in Italy.
2) Zero paper for internal communications, even though we have to shout to each other sometimes.

Also, as mentioned at the beginning, we clean and re-cycle almost 3M cubes of water a day, all around the world. Our next goal, to be scored before the end of this year, is the total ban of single-use plastic in and around our factories. This means that also some of our suppliers will be required to modify their packaging.

Your company offers a wide range of products from single block static vertical settling tanks to automatic filter presses. Can you give an overview of the sectors in which customers can apply your products?

Our system is modular and can include a long list of pre- and post-treatments that makes it suitable for a wide and increasing range of industries: from quarries and mines where a wet washing process takes place to the world of stone cutting/processing. We recently started operations

Strabag, Bürglen, Switzerland – Details of filter-press installation and housing

at the Brenner Base Tunnel, providing the water treatment plant that will take care of the excavated material in Austria; more and more countries are requiring a proper water treatment for beton-wash. We can deal with soil-washing wastes as well as road-wash.

Wherever there is an industrial process generating a non-organic liquid waste with suspended particles, we are happy to get dirty.

According to Tecnoidea Impianti, at the moment, the company is one of the leading companies in the sector at world level in terms of global quality and applied technologies. But how does the future look like for your company?

Tecnoidea Impianti never stopped investing in its products. Dealing with a world-wide market means dealing with very different needs, different standards, and different laws. How quickly we adapt and react to local updates makes the difference between pioneers and followers. Nowadays, the world is well aware that water is a limited, thus valuable resource, and every initiative that encourages a more rational use should be pursued. More and more countries are introducing or updating their environmental regulations in this direction, Tecnoidea Impianti must be ready to turn limitations into opportunities, one plant at a time.

➲ www.tecnoidea.it

CDEnviro Presents Solutions at Ecomondo

Waste management company CDEnviro will share its expertise in landfill diversion, technologies, methodologies and circular economy practices when it is taking part at the green expo in Rimini for the first time.

CDEnviro will be joining its international peers to support and share circular economy innovation when it exhibits at this year's Ecomondo 2019 Show – the Green Technology Expo and Europe's leading event for new models of circular economy. The company designs and manufactures processing systems for a wide range of materials that are typically more challenging to recover and re-use. These materials include contaminated soils, road sweepings and digester sludges. CDEnviro also delivers solutions for major water utility companies and for some of the world's largest environmental consultancies.

CDEnviro's experts will be on hand to explain how their creative and effective solutions can divert today's waste products from landfill. By remediating contaminated soils, treating street sweepings, dewatering hydro

excavation waste and removing grit from digestate sludges, CDEnviro customers can divert waste from landfill and transfer significant cost savings to their own customers.

Andrew Wilson from CDEnviro says: "The CDEnviro team is excited to be attending the Ecomondo show. We look forward to meeting international peers who champion the circular economy. Through constructive exchanges, knowledge sharing and networking, we hope to inspire others, and be inspired ourselves, to innovate and initiate more changes for the better."

The company has had great success with diverting up to 99.7 percent of road sweepings and gully waste material from landfill. This recovered material is then used to produce high quality recycled aggregate, with a variety of engineering, landscaping and infrastructure applications in the UK, Ireland, Europe, North America and Australia.

Interested parties, who would like to know more about landfill diversion and reducing disposal costs, are invited to meet CDEnviro to discuss their available solutions at Hall A1, Stand 064 at the Rimini Conference Centre, 5-8th November 2019.

➲ www.cdenviro.com

Photo: CDEnviro

AMCS: A Complete Waste Management Solution

AMCS provides an enterprise grade cloud and software platform to help waste and recycling companies worldwide profit from the circular economy since 2004.

The company, with offices in 22 countries, offers a single digital platform that combines an industry-specific back-end (ERP) software, mobile technology, route optimization, digital engagement, and analytics. Moreover, the company's digital technology has a high value impact on industries such as waste and recycling, oil and gas, construction and ready-mix. GLOBAL RECYCLING Magazine is especially interested in the company's complete waste management solution. Therefore, Mark Abbas, the company's CMO, gives an insight into the core business of AMCS.

Mark Abbas, CMO

The AMCS platform covers the end-to-end processes of a variety of lines of businesses. What are specific advantages for the recycling industry?

AMCS offers a complete waste management solution for recycling, material trading and (international) export of raw materials. From inbound management, including material grading and recording contamination, to stock management and recycling processes, to managing outbound streams, including material sales and material trading.

AMCS Platform includes a comprehensive and technologically advanced software solution to manage your entire paper recycling business.

As a Paper recycler you are tasked with procuring fiber, processing, and producing feedstock for the papermill as efficiently as possible. From collecting recycled material from different suppliers, dealing with numerous sites, to dealing with transportation offers a challenge to effectively managing your supply costs. To assure that you are addressing these challenges, you need to have complete visibility of your operations. With AMCS's platform you can consolidate a wide range of data into one central repository. All in one platform, so integration of siloed solutions is no longer an issue. Powerful reporting capabilities allow you to easily configure the data, extract critical information and make important business decisions. From managing your scale house operations, to creating standardized or custom pricing mechanisms, carrying out demand planning, or creating supplier contracts, AMCS offers standardization and consolidation.

The benefits are significant. With AMCS Platform companies can save up to 75 percent reduction in planning, a 100 percent reduction in paper worksheets and 3x faster customer onboarding.

What are the company's core values?

Our tagline is "Digital ways to a cleaner world". At AMCS we are driven by the results we deliver and are passionately committed to our customer's success 'for life'. We consider ourselves 'digital warriors', driving practical circular economy innovations for a sustainable planet. We have defined our core values as follows:

Customer: We believe that our customers, both internal and external, deserve our respect as they are the heart of our business. We focus on forming a partnership with our customers and dedicate ourselves to their success.

Community: We believe in contributing to our communities and in protecting the environment to create a sustainable future for the next generation. We get involved and have fun supporting our local communities. We demonstrate CSR at every opportunity.

Integrity: We believe in doing the right thing for our customers, our colleagues, our investors and ourselves. We are professional, open and honest in everything we do. We take responsibility for our actions.

Process: We believe in engineering innovative processes that add value to every aspect of our business. We are process-driven, systematic, and analytic in our approach. We learn from mistakes and continuously improve.

The AMCS Enterprise Management Solution helps customers manage their paper recycling business. How does the software solution work?

AMCS Platform is more than an ERP solution. It is the heart of the AMCS platform and forms the backbone for automating all your business processes. It's a single platform solution and

Photo: AMCS

Photo: Hajohoos / istockphoto.com

Photo: fmajor / istockphoto.com

scales from medium-sized businesses to large enterprises and covers the full recycling management processes including procuring fiber, processing, and producing feedstock for the paper mill. It supports recycling companies with collecting recycled material from different suppliers, dealing with numerous sites, to dealing with transportation impact to effectively manage supply costs. To assure that they are addressing these challenges, they need to have complete visibility of their operations.

What are the main features of the AMCS Enterprise Management Solution?

1. Pricing & Contract Management
   The AMCS Enterprise Management Platform makes it easy to manage all your material suppliers, customers, and contracts from one database. Searching across multiple databases to find contracts, customers, and important account information is no longer an issue. The platform can be used to easily navigate one centralized database or quickly view and create new accounts and contracts. Create standardized pricing or create customized pricing structures based on account, material, volume and grade.

2. Inbound & Outbound Management
   Weigh suppliers' materials using AMCS scale house software, automatically entered into a centralized database. Buy side management allows you to easily factor in volume, commodity pricing, and current inventory. Manage the sell side from the same enterprise management solution. Understand costs associated with freight, and export, assure you are achieving your highest margin.

3. Material Grading
   Determine the fair value of inbound materials and establish the destination for processing based on the grade of material. Use images to record grade and provide proof of quality. Eliminate discrepancies and obtain better material using visibility and master data.

4. Inventory Management
   Capture and post inventory at the time of purchase. Understand precise quantities of different materials across your operation. Easily manage material across multiple locations. Eliminate human error and create optimized pricing based on current inventory.

5. Material Trading
   Minimize the cost of procuring, processing, and selling materials.

6. Billing and Financial Management
   Powerful custom reporting capabilities. Quickly bill customers. Full accounting module that pulls from one centralized database.

AMCS' Enterprise Management Solution allows for the consolidation of multiple systems, simplifying your business and saving you time and money.

➲ www. amcsgroup.com

Perfect Shredding with the Terminator

With the Terminator, Komptech offers the ideal machine for the defined preshredding of waste for recycling or thermal reclamation. It is very tough, contrary-resistant and highly flexible – qualities that make this universal shredder successful in a wide range of applications.

Generally speaking, waste needs to be shredded before it can undergo further processing, whether for recycling or fuel use. The Komptech Terminator is the perfect shredder for an extremely wide range of applications. Whether for waste wood, mixed construction waste, household or bulky waste, commercial waste, tires or special applications like white goods or electronics waste, the Terminator does more than just shred. It generates exactly the grain size range that is best suited for subsequent processing.

The efficient shredding of a wide variety of materials, from household and commercial waste to tyres to washing machines, is no problem for the stationary or mobile Terminator

It was the Terminator that established technology leader Komptech's reputation as a developer and builder of especially tough and well-designed machines. This low-speed single-shaft shredder can be used on all types of waste. With three different shredding units (U, F and XXF) it can do everything from coarse preshredding to reducing materials to a defined particle size. Experience in operation shows that the Terminator works dependably and without stoppages, regardless of the type of waste.

No stoppages, dependable material output

The efficient cutting geometry of the Terminator claims a high throughput with relatively low power expenditure. The grain size is easy to set at any time by adjusting the cutting gap between the counter comb and the drum. This cutting gap remains constant during shredding, ensuring consistent output quality. The large drum diameter prevents wraparounds from tapes, belts and wires. The drum also has an automatic reversing function that acts as an overload protection, as well as performing a self-cleaning function. With the wide, high output channel and powerful conveyor system, shredded material is reliably discharged without blockages, even at high throughput.

Stationary and mobile versions with many uses

Komptech offers the Terminator in stationary and mobile versions. The stationary Terminator can be hydraulically or mechanically powered. It is also available with electro-mechanical drive, which integrates very well in existing large-scale systems.

The mobile Terminator is offered in hook, trailer, or tracked chassis versions. The hook version has a towing connection for on-site repositioning. The trailer version features air-cushioned axles and integrated positioning capability for added convenience. The tracked version with two-stage drive maneuvers easily on unhardened surfaces.

Type V – Versatile in many ways

Tough, stoppage-free and well-designed – three key characteristics of the newest addition to the Terminator family: the Type V. V stands for "Versatile," in terms of the materials this impressive machine can handle and its very wide range of applications. The modular idea played a major role in the development, and the ability to easily replace all major components was designed in from the beginning. Thus, all future variants can be integrated into a single basic layout. With the Type V, for the first time, an optional reshredding unit under the drum is available, further expanding the range of possible grain sizes.

➲ www.komptech.com

Water & Wastewater Equipment, Treatment & Transport Show

February, 18 – 20, 2020, Indianapolis (USA)

In the opinion of the organizing company, Informa Exhibitions, the Water & Wastewater Equipment, Treatment & Transport Show (WWETT Show) is THE marketplace for the wastewater and environmental services industry. With nearly 600 exhibitors displaying in over 350,000 square feet of exhibit space, attendees would come to the event to get face-to-face with manufacturers and make buying decisions. Furthermore, attendees can choose from over 100 sessions. The show presents three days of seminars, including opportunities for certification. Moreover, there is an addition for 2020: a series of workshops designed to boost business. ➲ www.wwettshow.com

Photo: Komptech

Indian Circular Economy Award for Saahas

Indian non-profit company Saahas has won the Indian Circular Economy Award 2019 under the category "Not for Profit".

The Indian Circular Economy Award, which was launched by the Federation of Indian Chambers of Commerce and Industry (FICCI), is India's exclusive awards program on Circular Economy to identify and reward organizations and individuals in India that have made notable contributions and brought in a change. As reported by Saahas, the company was selected by a jury. "The award was presented by Mr. Amitabh Kant, CEO, NITI Aayog as part of the Circular Economy Symposium 2019, India's only symposium on Circular Economy," Saahas gave account.

However, this was not the only prize. In April this year, Sahaas received its first prize in the 3R Excellence Awards for Civil Society Organizations (CSOs) under the National Level Category, at the 8th Regional 3R Forum in Asia and Pacific. "This award has been given for exemplary work in the area of Waste Management through 3R (Reduce, Reuse and Recycle)," the non-profit organization underlined.

Photo: Saahas

Saahas was established in 2001 with registration under the Societies Act. Wilma Rodrigues, a formal journalist, founded it to promote waste management practices in alignment with the Municipal Solid Wastes (Management and Handling) Rules, 2000. Headquartered in Bangalore, the company is operational in Gurugram, Surat, Chennai, Hubballi and Ballari. "Over the years, Saahas has been innovating, incubating and propagating waste management programs focused on two key principles of 'Segregation at Source' and 'Decentralized Waste Management'."

➲ https://saahas.org

Shredders and Granulator "Made in Italy"

At Ecomondo 2019, which takes place in Rimini (Italy) from 5th to 8th November, the Italian manufacturer of recycling machinery, Molinari, will present its portfolio.

The company provides a complete range of shredders and granulators, "able to face any challenge of shredding". According to the manufacturer, these machines "have been designed to treat various types of waste, especially rubber, plastics, industrial and urban waste, end life tires, wood, latex, aluminum and polyurethane". By its own account, Molinari has developed to become a leading supplier of the environmental technologies for recycling and processing waste materials.

This year Ecomondo will highlight the new trends relating to the bio-economy, the different trends of the circular economy including packaging, building, electronics and the automotive industry and promote a new cultural model with strategies for the development of the main realities of the green economy. "Here Molinari is one of the leading suppliers of shredding technologies and of conveying systems. Its team provides to customers with top-quality facilities for processing a wide variety of materials to obtain a homogeneous result that is free from foreign objects."

➲ www.molinari-recycling.com

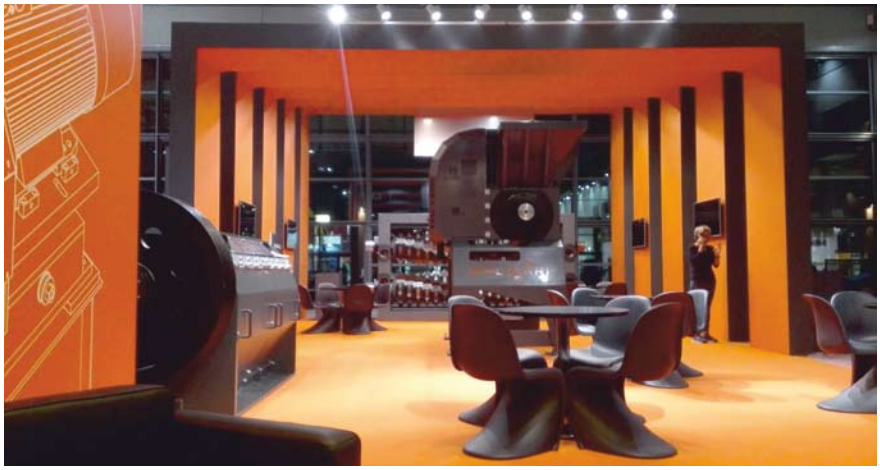


Photo: Molinari

South Korea: The Aim Is a Resource-Circulating Society

By the time China banned the import of several types of waste due to the "National Sword Policy", South Korea had to deal with a waste problem, in particular regarding used plastics and recovered paper.

In April 2018, nearly 50 recycling companies in Seoul and the surrounding region had stopped collecting plastic waste, and the garbage began piling up at apartment complexes, Haeryun Kang described the situation on koreaexpose.com. "The reasons given for the stoppage were varied," he stated and referred to the ban, rising labor costs, falling prices of recyclable materials and declining profit. According to the information, the Korean government intervened quickly "to ensure that collection would resume".

At that time, the main problem was the huge quantity of plastic waste. The Republic of Korea is the largest consumer of plastic per capita in the world, a national survey revealed in 2016, according to koreaexpose.com. A report from the Korean government informed that the volume of plastic waste was 6.9 million tons in 2015. 60 percent of this quantity was recycled within South Korea; 230,000 tons were exported. The goal of the Korean government is the reduction of plastic waste in the country by half up to 2030.

The problem with recovered paper was not the volume, but the price. In South Korea, a considerable part of the used paper is collected by elderly men and women; many of them are homeless. As reported by koreaexpose.com, the price collapse of recovered paper due to the Chinese ban had serious implication for those collectors who depend on the money. As a result, the Korean government forbade companies to lower the unit cost of used paper they buy, the information said; now manufacturers were importing more recovered paper from abroad.

South Korea's waste generation

According to the National Waste Statistics Survey, conducted by the Korean Ministry of Environment every five years, the amount of residential waste generated per person has decreased from 1.3 kilograms per day in 1994. In 2012, the per capita amount of residential waste generation was 0.95 kilogram per day. "The reduction of the amount of residential waste generation can be attribut-

Photo: VittoriaChe | Dreamstime.com

able to the implementation of the volume-based waste fee system and the separate discharge policy for recycling materials and food waste," the ministry gave account on its homepage. All in all, more than 51 million people live in South Korea and generated 48,990 tons per day (2011: 48,934 tons). On the other hand, the amount of industrial waste is on the rise. In particular, the amount of construction waste generated increased significantly between the late 1990s and the late 2000s on the back of the booming construction industry, the ministry reported, but the trend is slowing due to the downturn of the industry since 2011. In 2012, the daily quantity came to 186,629 tons per day (2011: 186,417).

In addition, the amounts of general industrial waste – which increased to a volume of 146,390 tons/day in 2012 from 137,961 tons in 2011 – and designated (or hazardous) waste (2012: 12,501 tons/day, 2011: 10,021 tons/day) are consistently on the rise due to the surge in industrial production, the ministry wrote.

High recycling rates

Officially, the Republic of Korea recycles more than 85 percent of all waste, Korean media referred to a 2017 government study. On the other hand, the media noted that illegally dumped waste could be found in rural areas of the country. Despite this criticism, the Korean waste management system is rather efficient.

According to Korea's Environmental Review 2015, ECOREA, 10.3 percent of the country's waste (including residential and business waste) was buried, 6.3 percent incinerated, 82.4 percent recycled and 1.0 percent discharged into the sea. As of 2012, 97.3 percent of construction waste and 76.5 percent of business waste were recycled, 14.9 percent of them were landfilled, 6.5 percent incinerated and 2.1 percent discharged into the sea, while 54.4 percent of designated waste (the term refers to the industrial waste specifically enumerated by Presidential Decree as harmful substances) was recycled, 16.4 percent incinerated, 23.0 percent landfilled and 6.2 percent treated by other measures (storage). "Although the percentages of waste treated by incineration or recycled have been increasing annually, the rates of waste treated by landfill and ocean dumping have been decreasing," the information said. The reduction of waste discharged into the sea is the result of the ban regarding the ocean dumping of sewage sludge, food waste leachates and livestock wastewater in 2012-2013; the treatment methods for these types of waste were being changed to incineration or recycling.

The Korean way

The success of the national waste management is associated with rapid economic growth, urbanization and industrialization of the 1970s and '80s. "A suitable legal system was not in place during that time, and due to the capacity limit of the Nanjido Landfill Site, new waste treatment facilities were required," the Korean Ministry of Strategy and Finance and KRIHS (Korea Research Institute for Human Settlements) reported in the 2016 publication "Waste Resources Management and Utilization Policies of Korea". In 1986, the "Waste Control Act" came into effect, followed by the implementation of a set of policies and systems. Before this law, waste management policies were managed under a bifurcated system involving domestic waste and industrial waste under the "Refuse Cleaning Act" and the "Environment Conservation Act".

In the 1990s, a transition from the reactive waste management scheme to a preventive one was carried out. "As the 'Recycling Promotion Act' became effective in 1992, policies and systems designed to promote recycling, such as deterring the generation of packaging materials, regulations on single-use products, the waste deposit system and waste fee system, cultivation of recycling industries, etc., were implemented," the ministry and KRIHS informed. "In 1995, the 'Volume-Rate Disposal System', which is a system of deterring waste generation that applies the principle of pay-as-you-throw, was implemented." This system, evaluated as the representative market-incentive regulation in Korea, would represent a shift from the former system, in which a fixed fee was charged regardless of the volume of waste disposal, to a system where a proportional fee is applied to the volume discharged. As reported, it provides an incentive to reduce the volume of discharge and to increase recycling. Furthermore, in 1995 the "Promotion of Installation of Waste Facilities and Assistance, Etc. to Adjacent Areas Act" was issued to prevent in advance the NIM-

BY (not in my backyard) phenomenon due to the installation of incineration facilities and to resolve and mediate social conflicts through means such as assistance projects to residents of impacted adjacent areas.

In the 2000s, a framework for a resource-recirculation society was pursued. According to this master plan, waste was not simply treated but recycled as a resource. Currently, Korea pursues a "Zero Waste" policy, which seeks to utilize wastes as a source of resources, in addition to minimizing waste generation, the authors of the publication underlined.

In 2002, the "Second National Master Plan for Waste Management" (2002-2011) was established, and in 2007 a revised plan was set up. In 2003, the "Deposit System" was changed to an "Extended Producer Responsibility" system. The legislative framework was extended by the "Construction Waste Recycling Promotion Act", the prohibition on direct landfill burial of food waste (2005) and the "Act on Resource Circulation of Electrical and Electronic Equipment and Vehicles" (2007).

From the late 2000s onwards, reducing greenhouse gases has been required due to rapid increases in the prices of resources and energy, along with global warming. Therefore, the government especially emphasized the need for resource and energy recovery from waste. In September 2011, the Korean Ministry of Environment established the "First Framework Plan (2011-2015) for Resource Circulation" to form a foundation for upcycling waste resources and thereby promote green growth aiming for a resource circulating (zero-waste) society. Besides, the "Measure for Promotion of Transition to a Resource Circulation Society" (2013) promotes the collection and transportation of recyclable resources through a free-of-charge collection of large-sized domestic electronic equipment waste, consolidation of the sorting system, increased installation of facilities for the energy utilization of waste resources "and other such foundations of a recycling society". The creation of a market for recycled products and support for the industries thereof was also announced.

The "Framework Act on Resource Circulation" (FARC) was decreed in 2016 to form a basis for the implementation of these policies; the Korean government enforced it since 2018. "As a resource-poor and heavy energy-using society, Korea faces serious environmental, economic and social threats," the Ministry of Environment wrote in the "Korea Environmental Policy Bulletin". The country intends to transform the mass production-oriented and mass waste-producing economic structure into a much more sustainable and efficient resource-circulating one at a fundamental level. The provisions of the framework "can be divided into three categories, each of which is establishing a basis for resource circulation, promoting resource circulation and supporting recycling industries," the ministry underlined. It "introduces new waste management related programs such as 'Recyclable Resource Recognition Program (RRRP)', 'Resource Circulation Performance Management Program (RCPMP)', 'Waste Disposal Fees' and so on." With the FARC the government expects to have economic, environmental and social benefits by preventing environmental pollution, but is also aware of the fact that the country is required "to make further efforts to shift the policy paradigm on waste control".

Opportunities for investment from abroad

In July this year, the country's Ministry of Trade, Industry and Energy (MOTIE) and KOTRA (Korea Trade-Investment Promotion Agency) held the first "Invest Korea Forum in 2019". Foreign investment in Korea reached 26.9 billion US-Dollar last year, attaining an all-time high, according to the information.

The Forum intends to support the achievement of more than 20 billion US-Dollar foreign investment for five consecutive years "by sharing the information on foreign investment promotion environments around the world, improving strategies and expertise of investment promotion agencies and companies," one could read on ➲ www.investkorea.org. For that purpose, it offers various programs.

According to the homepage, Korea has a well-established system for foreign direct investment (FDI) and provides various incentives to induce capital spending. Since adopting the "Foreign Investment Promotion Act" (FIPA) in 1998, the Korean government has significantly deregulated and opened up the country's capital expenditure market to foreign investors. Over time, the country's foreign investment policies have evolved toward qualitative growth, particularly for high-value-added industries that can enhance the global competitiveness and potential of the Korean economy and create more jobs.

Tenders regarding public procurement in Korea can be found at ➲ www.pps.go.kr/eng/. The Asian Development Bank informs about procurement plans in Asia (➲ www.adb.org/site/business-opportunities/main).

➲ www.investkorea.org/en/

How the Plastics Value Chain Can Reduce Plastic Waste

The existential threat to oceans and marine life is a good enough reason to cut plastics waste, profitable new business opportunities are another, the company Tomra Sorting Recycling says.

In June, the Norwegian-based company has published a new eBook, which shares transformational ideas for reducing plastic waste throughout the plastics value chain. The free-to-download publication (➲ www.tomra.com/en/pvc-ebook) spotlights how wider adoption of a circular economy is not only vital for our environment, but can also bring new business opportunities.

Photo: Tomra Sorting GmbH

Tomra's latest digital book takes the realistic view that plastic has become irreplaceable in our everyday lives because of its many advantages, but action is needed urgently to prevent an exacerbation of the threat plastic waste is already posing to our oceans and marine life, the provider of instrumentation for recycling solutions emphasized. "What we do with the plastic after use and how the plastics re-enter the circular economy remains the crux of the matter. The recovery and reprocessing of plastic depend on the plastics value chain and a shared vision for success without compromising the environment."

"By implementing effective measures in the plastics value chain, we can ensure the long-term health of our economies, communities and environment," the company that is part of the initiative "Alliance to End Plastic Waste" is convinced. In this regard, its eBook flags-up the necessary actions by all key industry stakeholders: chemical and plastics manufacturers, consumer goods companies, retailers, consumers, waste management companies, recycling facilities, and legislators.

Beyond the environmental benefits of recycling waste, the publication observes how positive economic shifts can also be expected. "Economies built on use-once-and-discard are quickly embracing new business opportunities given the advanced sorting technologies that purify and deliver high-quality recyclates," Tomra stated. A recent McKinsey report had estimated plastics reuse and recycling could generate profit-pool growth of as much as 60 billion US-Dollar for the petrochemicals and plastics sector.

Cambodia Refuses to Be a "Waste Bin"

In July this year, Asian channel CNA reported that the Kingdom of Cambodia would send back 1,600 tons of plastic waste found in shipping containers to the USA and Canada.

The Southeast Asian country does not consider itself as a bin for "out-of-date technology to be dumped in", a spokesman of the Cambodian environment ministry told the news agency AFP. According to the Canadian Global Television Network, Cambodia does not allow imports of any kind of waste, including plastics for recycling. "83 shipping containers of plastic garbage were discovered in the main Cambodian port of Sihanoukville, with what Cambodian media reports say were fake import documents labeling the containers as recyclables," the information said. The containers, which had arrived in different shipments since October 2018, were uncovered during a Cambodian campaign to crackdown on illegal imports. "The country says 11 of the containers originated in Canada, and the rest came from the United States." As reported, the Canadian government has asked officials in Cambodia for more information about the containers of Canadian waste which – as the Southeast Asian country's environment ministry says – ended up there illegally.

Waste is piling up

The Kingdom's waste production has grown by about ten percent annually, the newspaper Khmer Times stated in October last year. In 2017, the amount of garbage and solid waste in the country was estimated at 3.65 million tons, which means more than 10,000 tons per day. According to the provided information, the country's capital Phnom Penh produced the most proportion of waste with about 3,000 tons per day, followed by Sihanoukville with about 600 to 650 tons/day and by Siem Reap city with about 350 to 400 tons per day. Roughly 1.5 million tons of waste – or 41 percent of the total amount collected annually – was sent to dumpsites, while about 400,000 tons (which corresponded to about 11 percent) was recycled. "The remaining 48 percent was burned or thrown away into water bodies," the publication pointed out. The ministries of environment and tourism had repeatedly underlined that factories, restaurants and markets should properly dispose of their waste as the amount produced in the Kingdom continues to grow.

As described in the "Phnom Penh Waste Management Strategy and Action Plan 2018 – 2035", it is estimated that the capital city and its future new areas alone will have a population of nearly three million by

A Favorable Business Climate

Cambodia is an attractive investment destination for enterprises looking to expand in ASEAN (Association of Southeast Asian Nations). "With a steady economic growth of around seven percent in recent years, which is forecasted to continue in 2019, Cambodia is on a steady path of economic improvement," ASEAN Business News informed in March this year. "The growth rate is the highest amongst the fast-growing ASEAN nations. However, large-scale reforms are needed to support this growth and to make the country competitive on a global level." According to the World Bank, the country's economy performed better than expected, "driven primarily by a rapid expansion of exports and robust internal demand, as well as a surge in Foreign Direct Investment".

The country's investment laws are classified as "very open". In combination with its proximity to production facilities in Thailand and Vietnam as well as the Chinese market, "the country represents a perfect investment opportunity," ASEAN Business News wrote. As reported, 100 percent foreign ownership of companies is allowed in most sectors. The country's investment law also provides regulations governing the protection of investments from regulated prices and nationalization. "Yet the lack of Rule of Law and the high endemic corruption may partially weaken those provisions."

According to the Cambodia Investment Agency's (CIA) own information, it serves as gateway to applying for all kinds of business and investment licenses. Services include:

- Point out an accurate investment gateway, not the fake one.
- Prepare all requirements investment and business documents as needed.
- Register a new set up company/corporation, trademark and sign.
- Consult legal affairs, business and investment matters.
- Consult Environmental Impact Assessment.
- Consult Khmer nationality request.

➲ http://cia-investment.com

Tenders regarding Cambodia can be found at ➲ www.tendersinfo.com/global-cambodia-tenders.php and ➲ www.dgmarket.com/tenders/list.do?sub=tenders-in-Cambodia&locationISO=kh

2035. Concerning the annual amount of municipal solid waste (MSW) in Phnom Penh, the volume cannot be precisely estimated, due to variations in the city's population. The Institute of Technology of Cambodia assumed that the waste generation will grow until 2030. "MSW collected for landfill has increased exponentially over the past two decades due to an increase in population in Phnom Penh as well as an increase in waste generation by source," the authors wrote in 2018. Thanks to the efforts of the Phnom Penh Capital Administration, the collection service provider and residents, "a rising trend in collection amount has been seen over the years." In 2017, the average daily volume of MSW taken to the Dangkor final landfill was 2,215 tons/day; in the same year, the total amount of MSW disposal at the landfill was 808,530 tons.

The composition of MSW sampled at generation points in Phnom Penh is typical for the average Cambodian city: More than 50 percent is organic waste, followed by plastics (20.9 percent, including plastic bags, other plastics and PET bottles), papers (9.9 percent) as well as grass and wood (2.3 percent). "It is generally considered that the percentage of organic waste tends to be higher and recyclable waste lower at the final disposal site compared to at the generation stage as some recyclable wastes such as hard plastics, PET bottles, cans and metals are extracted at source by waste producers, removed by street scavengers before collection, or removed during collection by collection crews," the authors of the strategy and action plan stated.

While there is a general lack of data on the actual amount of recycled waste in Cambodia, recycling activities of limited scale are observed in Phnom Penh. Several private companies are exploring the business potential targeting both organic and inorganic wastes. In response to the increasing stream of incoming waste to the final disposal site, the capital administration is also exploring potential measures for engaging recycling companies.

"Limits to recycling capacity are posing a major challenge to both Phnom Penh and Cambodia in the transition from a society based on linear approach to waste/resource management (in which resources are extracted, processed, consumed and disposed of) to the one based on circular approach, resulting in wastage of economic assets and environmental degradation," the analysis stated. "Whilst a certain amount of recyclable waste is generated and collected nationwide, domestic recycling activities within Cambodia are limited due to the lack of recycling industry, recycling infrastructures and a market for recyclable materials and recycled products. Therefore, some of the recyclable wastes and materials are exported to neighboring countries for recycling purpose."

Cambodia's Road Map for Sustainable Development

The country's "National Environment Strategy and Action Plan, 2016–2023 (NESAP)" aims to ensure that environmental protection and sustainable natural resource management are pillars of Cambodia's socio-economic development. It intends to provide the country with a road map for achieving many of its Sustainable Development Goals as well as a detailed analysis of the state of the environment in Cambodia. The NESAP would outline priority policy and governance improvements and financing mechanisms that can help the country achieve environmentally sustainable economic development, the information said.

The NESAP also provides a detailed analysis of available funding streams and highlights the financing gaps – and opportunities – for implementing the action plan. 263 million US-Dollar of current and pipeline projects have been identified that will contribute to the plan's implementation. "Details about these projects, including which objectives and Sustainable Development Goals they contribute to, are listed in an appendix to the NESAP document."

According to the information, the funding gaps are also described. "These include gaps in funding for achieving objectives relating to technology and science transfer, public-private partnerships in green and sustainable development, and chemical and hazard waste management," the information says. "The NESAP indicates that financing requirements will be met by co-financing from the government, development partners, investment funds, and private sources."

➲ www.adb.org/publications/cambodia-national-environment-strategy-action-plan

Photo: Ellen26 / Pixabay

Saudi Arabia: Integrated Waste Management and Recycling Plan for Riyadh

It is planned to recycle 81 percent of municipal solid waste and 47 percent of construction and demolition waste by 2035.

Photo: MPR PR

The initiative, which was launched in July this year, aims to improve the collection and recycling of the waste in the city of Riyadh as part of Saudi Vision 2030 goals to preserve and protect the environment and achieve environmental sustainability by improving recycling rates, the information said. The National Waste Management Center, the Riyadh Municipality and the Saudi Investment Recycling Company, a wholly-owned subsidiary of the Public Investment Fund, signed a tripartite memorandum of understanding (MoU) to start integrated waste management and waste recycling activities in Riyadh. The agreement was signed by Abdulrahman bin Abdulmohsen Al-Fadley, the Minister of Environment, Water and Agriculture, and Chairman of the board of directors of the National Waste Management Center; Tariq bin Abdul Aziz Al Faris, Mayor of Riyadh region, and Jeroen Vincent, Chief Executive Officer of Saudi Investment Recycling Company (SIRC).

Under the MoU, the three parties will jointly work on the execution of the overall waste management strategy for Riyadh to achieve a set of strategic objectives for recycling by 2035. This notably includes the recycling of 81 percent of the 3.4 million tons of annually produced municipal solid waste and 47 percent of the approximately five million tons of construction and demolition waste per year. The strategy further aims at the removal and recycling of an estimated 20 million tons of construction and demolition waste that is currently lying in vacant plots and on roadsides around the capital. As part of an integrated waste management system, the Saudi Investment Recycling Company will build state-of-the-art recycling facilities to recycle all types of waste. This includes the recycling of municipal waste into recyclables such as fertilizer, paper, plastics and metals.

The first initiative within the framework agreement will be the recycling of construction and demolition waste into building materials for road construction and housing projects followed by the construction of a sorting facility for municipal waste, in conjunction with the Mayor of Riyadh region project "City without bins", which aims at the dual source-sorting of household waste in Riyadh.

The Mayor of Riyadh region recently launched an experiment to replace single bins in some residential neighborhoods with two bins for each house. The Mayor of Riyadh region designated green bins for materials such as plastics, paper, cardboard, glass and metal cans, while the black bins were for organic waste, residues, and components of food.

Saudi Investment Recycling Company Expands

In April this year, the Saudi Investment Recycling Company (SIRC) has announced that it has signed definitive agreements to acquire 100 percent of the shares of Global Environmental Management Services (GEMS).

GEMS, owned by Jadwa Waste Management Opportunities Fund, is active in the industrial waste management sector in Saudi Arabia, providing hazardous waste-management, industrial and engineering services to the oil, petrochemical and industrial corporations. It was anticipated that SIRC's acquisition would be completed during the second quarter of 2019.

The purchasing company, established in 2017 by the Public Investment Fund (PIF) of Saudi Arabia as part of its strategy to develop new sectors, plans to develop, own, operate and invest in various activities across all waste types in the country, including state-of-the-art treatment and recycling facilities and waste to energy solutions that will support the National Renewable Energy Program. According to the information provided by Saudi Press Agency, SIRC will be acting as "the national champion in the waste management sector by creating a range of opportunities for private sector participation, investing in companies across all waste streams and value chains, and identifying opportunities to invest in and localize proven and scalable technologies". As reported, upgrading the sector would yield significant environmental, social and economic benefits for Saudi Arabia as SIRC aims at contributing over – converted – 10 billion US-Dollar to gross domestic product (GDP), attracting up to six billion Saudi Riyal (or 1.6 billion US-Dollar) in inward investment and creating around 23,000 new jobs by 2030.

SABIC Realizes Certified Circular Polymers

The chemical company is using feedstock made from mixed plastic waste to produce certified circular polymers at its Geleen production site in The Netherlands.

SABIC (Saudi Basic Industries Corporation) – a global leader in the chemical industry – is to highlight its initiative for the production of certified circular polymers at Europe's leading plastics exhibition in October this year, K 2019. The manufacturer launched its project in 2018 with the goal of driving a value chain transformation from a linear economy to a circular economy for plastics.

According to the information, the certified circular polymers are being produced using a pyrolysis oil feedstock from the recycling of mixed plastic waste. As part of the intended project, SABIC is now introducing this alternative feedstock into its production site at Geleen, located in industry park Chemelot, in The Netherlands. The resultant certified circular polymers are to be supplied to branding leading customers – Unilever, Tupperware Brands, Vinventions and Walki Group – to use in the development of pioneering, high quality and safe consumer goods or packaging for food, beverage and personal care products.

As reported, the introduction of SABIC's certified circular polymers aims to transform the value chain, where the company, its upstream suppliers and downstream customers work in tandem to upcycle mixed plastic waste back to the original polymer for high-quality applications. While recycling by mechanical methods contributes to circularity, the rates at which it can economically recycle plastic packaging waste are limited. "SABIC's certified circular polymer process, however, enables the creation of brand-new polymers, offering a real alternative to mechanical methods and closing the recycling 'loop'," a press release said. The polymers are certified through the International Sustainability and Carbon Certification plus (ISCC+) scheme that certifies renewable content and standards across the value chain from source to end product the provider of polymers pointed out. The ISCC+ certification would work on what is known as a "mass balance system", meaning that for each ton of renewable feedstock fed into the cracker, a proportion of the output could be claimed as renewable. "SABIC intends to build a semi-commercial plant specifically to refine and upgrade pyrolysis oil feedstock, with the plant anticipated to enter commercial production in 2021," the company, which is headquartered in Saudi Arabia, underlined.

➲ www.sabic.com

European Recovered Paper: Million Tons Need a New Destination

ERPA, the recovered paper branch of the European Recycling Industries' Confederation (EuRIC), is concerned about the developments on the global recovered paper market, which negatively impacts paper recycling in Europe.

In its statement, ERPA (European Recovered Paper Association) emphasized that the European recycling industry collects and recovers waste paper into standardized quality grade recovered paper in line with EN 643 (European list of standard grades of paper and board for recycling). This secondary material for papermaking "is thus a commodity, whose supply and demand is not solely European but global". Although the paper recycling value chain is already circular in many aspects, "paper recyclers in Europe continue to face major regulatory and economic obstacles that hamper recycling and threaten their business activities. In addition, latest trade developments result in prices that have substantially decreased over the last two years."

Collection and utilization of recovered paper in Europe

Recycling rates for paper in Europe are steadily high, ERPA pointed out. In 2018, the recycling rate was 71.5 percent. This would demonstrate that the overall collection of waste paper and its recovery are effective in the EU. "The latest statistics show that Europe has collected in 2018 on average more than 56.5 million tons of recovered paper and uses more than 48.5 million tons of recovered paper to produce paper. As a result, there is a gap between supply and demand of eight million tons in terms of excess supply in Europe," ERPA explained. "This oversupply is a structural one that is lasting for more than ten years and shows that Europe's collection systems to collect paper are pretty efficient, even though there is still room for improvement in the implementation of separate collection to preserve waste paper quality." Until 2017, the majority of recovered paper oversupply – between seven to eight million tons annually – was exported towards China.

Disruptive trade practices

In 2017, China announced it would be reducing or even banning its import of global paper waste. Other Asian countries, such as Malaysia and Indonesia, have since declared to follow suit. EuRIC never challenged China's legitimate objective to enhance environmental protection and ban the imports of unrecyclable waste that can be a hazard to the environment and human health; the confederation fully supports such an objective. However, EuRIC as the umbrella organization for European recycling industries, has strongly opposed the decision taken "to anchor

Photo: HSM

import restrictions on level of impurities which are disproportionately low and discriminatory since no standardized method to measure them is in place, leaving operators in a constant state of legal uncertainty as to whether a shipment is or is not compliant". Recent trade restrictions measures announced by countries such as Indonesia were based on inspections criteria, which de facto would result in a subjective assessment. "As a result, recyclers are constantly facing inspections carried out on the basis of checks whose rules of compliances are largely unknown with the risk, financially prohibitive, of shipments being rejected and returned whenever the above-mentioned acceptance criteria are not met."

Furthermore, the absence of end-markets for about eight million tons of recovered paper over the last two years has resulted in a sharp decline of recovered paper prices. "The paper recycling sector is currently in a crisis situation with an increasing amount of companies active in paper collection and recovery which are ceasing to operate on a temporary or permanent basis, which is at odds with the objective of moving towards a more circular economy," ERPA stated. "Europe's recycling industry can no longer bear such market conditions for the third year in a row on top of regulatory barriers that need to be addressed urgently. Beyond the impact for the private waste management and recycling industry, extremely depreciated prices jeopardize the entire recovered paper collection value chain, including local authorities, which cannot finance proper collections based on the revenues generated by sales to recycling companies."

Measures needed

"The current trade restrictions set up by China and other South-East Asian countries can trigger opportunities for the European paper recycling industry, provided urgent measures are enacted," ERPA says. It strongly welcomes additional capacities announced by the paper industry in several Member States since they will increase the demand for recovered paper in Europe. "Nevertheless, building new capacities take time to be built and launched and will not be sufficient to close the gap between supply and demand," the association underlined. Therefore, the European paper recycling industry would strongly support measures and actions aiming at restoring a healthy recovered paper commodity market in Europe and globally:

- Firmer actions by the European and national authorities to prevent the implementation of trade restrictions based on discriminatory and disproportionate criteria and restore free and fair access to international markets needed to balance supply and demand;
- EU wide end-of-criteria for paper based on EN 643 standard list of recovered paper grades to incentivize quality while boosting Europe's internal market;
- Eco-design to ensure that paper can be recovered in all products once they reach end of life and phase out unrecyclable products;
- Substantially increasing, whenever technically and legally feasible, the financial contributions to companies involved in the collection and recovery of waste paper falling under EPR (extended producer responsibility) Schemes. Such a short-term measure would be essential to avoid a collapse of the existing collection and recycling systems enabling the achievement of high recycling rates;
- Measures and incentives to boost the demand of products containing recycled paper fibers and reward their environmental benefits that the market fails to internalize;
- Investments in digitalization, such as block chain technologies, to assist the elimination of illegal exporting and give a competitive market to European recycling companies in intra- and extra-EU trade of secondary raw materials.

Photo: Harald Heinritz / abfallbild.de

According to ERPA, measures and incentives could be set up via the revision of sectorial legislation, such as the Packaging and Packaging Waste Directive, stand-alone instruments setting up incentives or Green Public Procurement (GPP), taking into account the enormous purchasing power of public procurement, which is estimated to be worth 16 percent of GDP in the EU.

23rd International bvse Recovered Paper Conference

March, 19, 2020, Düsseldorf (Germany)

The Annual Main Event which is organized by the Recovered Paper branch of the German Association for Secondary Raw Materials and Waste Management (bvse – Bundesverband Sekundärrohstoffe und Entsorgung) – the International Recovered Paper Conference – will take place on Thursday, March 19, 2020.

Further information on the program and the registration forms will be published on the conference page (➲ www.bvse.de/sachverstand-bvse-recycling/tagungen.html) at bvse.de in time.

Chinese Textile Recycling:
The Night Is Darkest Just Before Sunrise

Fashion is the second most polluting industry worldwide. The states contributing to the fiber production mostly export, landfill or incinerate the amounts of used textiles. China does not make an exception but has perhaps found a recycling solution.

In the United States, more than 15 million tons of used textile waste are generated each year, and the amount has doubled over the last 20 years. According to US EPA figures for 2015, a total of 15.75 million tons of textiles in durable and nondurable goods were generated as municipal solid waste, of which 2.45 million tons – 15 percent, respectively – were recycled. 2.99 million tons – 19 percent – went into incineration with energy recovery, while 10.27 million tons – 65 percent, respectively – ended in landfills. Thus, the national textile recycling industry removes approximately 2.5 billion Pounds of post-consumer textiles each year from the waste stream, creating more than 17,000 jobs.

EU: Amount ranges between -92 and +229 percent

In Europe, the textile industry reported a turnover of 171 billion Euro in 2016 as a consequence of increasing demands and increasing volumes of clothing up to 40 percent since 1996. Following figures of Małgorzata Koszewska from the Lodz University of Technology, the collection rates now range between 15 and 20 percent across the EU countries with the rest being landfilled or incinerated. Half of the collected textiles are down-cycled, the other 50 percent is re-used, mostly by exporting to developing countries. The textile waste generation in 2014 differed widely between the European member states: Italy (439,192 tons), Germany (343,757 tons), the United Kingdom (281,235 tons) are at the top and Poland, Belgium, France and Spain above 100,000 tons following; the table ends with twelve countries below 10,000 tons. The changes of textile waste amounts from 2004 to 2014 show an average decline of 48 percent in the 28 countries of the European Union, with reductions in Portugal and Romania of 92 and 90 percent, respectively, but an increase of 55 percent in Germany, 70 percent in Belgium and even 229 percent in Poland.

China: Little recycled or reused

China's consumers produced some 20 million tons of textile waste in 2013, consisting of 69 percent synthetic fiber products, 28 percent cotton products and three per-

Photo: TexTrade GmbH / Boer Group

cent other natural fiber products. A large number of used clothes was sent to landfills or the combustion field, while the recycling rate of textile waste was less than one percent, Shi Wang from the Dalian Polytechnic University gave account. According to him, the nation's recycled textile waste now amounts to three million tons per annum and a multipurpose utilization rate of 15 percent. Figures, published by the China National Textile & Apparel Council, show the landfilling of 20 million tons of textile wastes and an amount of 14.5 kilograms of landfilled textiles per capita in 2013. According to governmental data, nearly 45 percent of industrial and consumer textiles produced in China had been wasted, and only 3.5 million tons of all textile waste collected in 2017 was recycled or reused. Another source published in August 2017 refers to 26 million tons of clothing, a reuse rate of one percent and a re-utilization rate of about 15 percent.

Obstacles for a better recycling

There are at least two accounts of the low re-utilization rate. According to Shi Wang, the Chinese traditionally gave away their old clothes to charitable organizations or poverty-stricken areas. However, meanwhile, the Chinese lost faith in these organizations due to scandals regarding illegal profits and corruption. Companies which are working on a sincerely altruistic and ethical basis and to which the Chinese can give their old clothes to without compunction can rarely bear the enormous amounts of costs for transport, storage and maintenance. The argumentation of Shanghai based stakeholder information magazine Collective Responsibility is that despite 14,000 donation stations and 10,100 charity shops the market for old clothes for charity is strictly regulated and linked with restrictions. Therefore, the amount of old clothes for donation experiences a significant decline. One way out may be opened by exports. Interviews with experts conducted for a study of the Swedish Environmental Research Institute brought to light that China exports used textiles to gradually flooding markets that were previously dominated by European and US used textiles exports. This is most visible in Eastern African markets, where China in 2016 stood for 15 import share percentage in Tanzania, 34 percent in Kenya and 45 percent in Rwanda.

Incineration increasing

Nevertheless, the export of sorted and piled second-hand clothes to Africa and Southeast Asia is at least increasingly restricted, if not prohibited or banned by the import countries leading to higher stocks of unused textiles in China. Besides that, the markets in Africa and Eastern Europe are asking for a better quality of second-hand textiles, leaving more low-grade reusable textiles for recycling which obtain lower prices. On the contrary, the method to send clothes to waste-to-energy facilities finds increasing use in China, as these incineration plants are classified as renewable power generators and allow tax refunds: The 2015 capacity of the W-t-E sector is expected to double by 2020. Singapore, for example, produced 150,700 tons of textile waste in 2016, according to NEA-statistics, of which seven percent was recycled: The remaining amount of 93 percent was incinerated, and the ash disposed of in Singapore's only landfill.

But if the production of chemical and natural waste fibers will reach the amount of 100 million tons – as the Twelfth Five Year Plan forecasts –, without further standardization and regulation of collection and recycling, the country may perhaps be "bursting at the seams with discarded clothes" and "facing a dire lack of raw materials", as the article of Shi Wang suggests, or China's municipalities and local waste industry could undergo an "unprecedented crisis", as Collective Responsibility presumes. This may be true regarding textile waste of natural fibers like cotton and wool being mechanically recycled or downcycled to material of less value. In contrast, chemical recycling of textile polyester of nylon waste can produce fibers of equal quality compared to virgin materials, as the success story of Zhejiang Jiaren New Materials Co., Ltd. proves.

The growth of Zhejiang Jiaren

The company was established in 2012. On the website, the Zhejiang Jiaren presents itself as "the largest chemical-method cyclic regenerated fiber company in the globe". The enterprise adopts the trademarked Eco Circle chemical cyclic regenerative system technology owned by Japanese Teijin Company. The process uses wasted polyester materials such as wasted garments and leftover materials as raw materials for production and manufactures them into new polyester fibers with high quality, multi-functions, traceability and eternal cyclicity, through complete chemical decomposition. The initial output consisted of 25,000 tons per year, the second-phase project aimed at 160,000 tons of output annually. A business relationship exists with global companies including Adidas, Nike, Kappahl, H&M, Decathlon, Ikea and Wal-Mart.

In 2016, Zhejiang Jiaren New Materials and Zhejiang Lvyu Environment Protection announced the building of the country's largest textile recycling base in the Paojiang New District. Furthermore, they decided to increase China's textile waste recycling capacity within two years to 600,000 tons annually or one-third of all textile waste. The Zhejiang Lvyu Environmental Protection company was designed to turn waste textiles into polyester chips to sell them mainly to domestic textile mills. Some months ago, Zhejiang Jiaren New Materials company – in its own words "the largest chemical recycling base in the world" – launched a new product made from waste textiles titled "Recycled Low-Viscosity Polyester Chips".

From place nine to place four

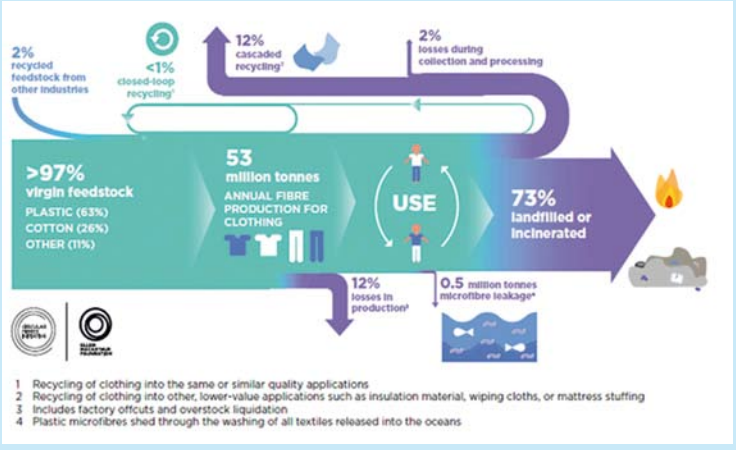
Research data presented by UK agency WRAP suggest that once textiles have been collected for re-use and recycling, the best end market is the export market. For example, in 2010, over half of the textiles collected for recycling or re-use in the UK were exported. At that time, the United Kingdom reached a share of eight percent of the total mass exported globally and came third following the USA (18 percent) and Germany (12 percent); China exported three percent and ended up on place 9. In 2016, Market research provider Euromonitor International listed the major exporters of second-hand garments: China – on position number five – reached a share of 7.1 percent in export and was not listed among the leading importing countries. According to the Observatory of Economic Complexity, in 2017 the top exporters of used clothing were the United States, Germany, the United Kingdom and – now place four – China with a 7.1 percent share in export; following the table, nothing was imported. Among the biggest exporters of textile scraps, China made the sixth place in exports with a percentage of 4.7 percent but was then the top importer with 12.4 percent.

The Green Fence 2.0 strategy in 2018 showed consequences for the imports of textiles to China; not less than 11 types of used or scrap textile materials were banned. But – as Shi Wang wrote in 2017 – "coincidentally, many textile companies in China are facing a dire lack of raw materials". This will not have changed since. According to latest World Trade Organisation data, in 2018 China was not only the top exporter of clothing with a turnover of 158.4 billion Dollar but also by far the leading exporter of textiles with 108.9 billion Dollar and a global share of 37.1 percent. And the 13th Five-Year Plan 2016-2020 maintains stable textile and apparel exports as well as China's status as a world-leading exporter – in other words: The need for production raw materials will stay constant or even rise if necessary. The demand for cotton as one component of textiles can partly be met by imports from Africa. As a study by the Carnegie-Tsinghua Center for Global Policy clarifies, China – as the world's largest cotton consumer – refers to international instead of domestic cotton prices and has been steadily increasing its sourcing from Africa. Regarding polyester fiber materials, Zhejiang Jiaren is probably the right contact.

The H&M - HKRITA project

But the question is left open: What happens to used or scrapped textiles in China if the markets cannot absorb them? For finding a solution, the H&M Foundation is funding a four-year 5.8 million Euro partnership with the Hong Kong Research Institute of Textiles and Apparel (HKRITA) to develop recycling techniques since 2016. The mechanical "garment to garment" recycling process shredders the material, recovers the fibers, spins yarn and knits new pieces of textile – the complete production line finds a place in a

The input to the global materials flows for clothing consists of 97 percent of virgin feedstock comprising 63 percent plastic, 26 percent cotton and 11 percent other material. Two percent of recycled feedstock from other industries and one percent from closed-loop recycling is added. The amount of 53 million tons of annual fiber production for clothing show 12 percent losses and half a million tons of microfiber leakage. After use, 12 percent of the material ends in cascaded recycling, two percent is lost during collection and processing, and 73 percent are landfilled or incinerated, the Ellen Mac Arthur Foundation gave account in 2017.



Global materials flows for Clothing in 2015 (Ellen MacArthur Foundation 2017)

mobile 40-foot container. The separation of blended post-consumer fabrics contains chemical, biological and physical lines. The chemical separation consists of hydrothermal treatment in a reactor ending in polyester fibers ready for spinning and cellulose powders ready for re-spinning. The biological process includes the modification of the mixed textile waste, fungal cultivation for the production of enzymes, enzymatic hydrolysis and the final product refining. The new biological method results in the recovery of glucose syrup, cellulose powder and re-spun PET yarn. The physical treatment constitutes a dry separation.

In combination, the new recycling techniques show an enhancement of the recycling material properties: cellulose powder in the form of regenerated functional cellulose fiber and superabsorbent polymers (SAP) as well as polyester in solid-state (SSP) or decolorized PET. The chemical and biological separation lines have already reached a pre-industrial scale, while the physical treatment works on lab scale. The Intellectual Property is owned by HKRITA and will be sold.

Has the Holy Grail been found?

At the session of the Textile Division during BIR Convention 2019 in Singapore, Division President Martin Böschen complained that "all the currently technical feasible methods for fiber-to-fiber recycling are not working in a commercially sustainable way, meaning they cannot compete with virgin materials". Maybe that the HKRITA approach has brought the recycling branch closer to their goals as it was previously expected. Is this the Holy Grail of textile recycling? In March 2019, The Guardian though so and reported that in Australia BlockTexx runs a proprietary technology that separates polyester and cotton materials such as clothes, sheets and towels of any color or condition. The recovered PET is polymerized to create virgin-quality S.O.F.T. branded rPET plastic pellets and polyester fiber suitable for use in textiles, packaging or building products. The recovered cellulose is processed to create S.O.F.T. branded cellulose powder for use in many industries such as textile, pharmaceutical and food.

Photo: TexTrade GmbH / Boer Group

USA: Research on Enhanced Biological Phosphorus Removal

The Water Research Foundation (WRF) in the USA has selected a team of utilities, consulting firms and universities to promote standard use of sustainable enhanced biological phosphorus removal solution.

As phosphorus limits permitted in wastewater effluent shrink to protect drinking water sources, a nationwide research effort has started work "to advance implementation of a leading-edge treatment technology for phosphorus removal and recovery". According to Black & Veatch – a global engineering, procurement, construction (EPC) and consulting company – which is heading the group, enhanced biological phosphorus removal (EBPR) has been adopted by communities worldwide to meet water quality requirements. "Yet understanding of the process's ecology, functionality and optimal design remains incomplete." The team would be completing research to establish a standard approach to EBPR's application.

With a value of 1.3 million US-Dollar plus approximately 1.2 million US-Dollar from in-kind and cost-share contributions, the WRF research project is focused specifically on the application of an EBPR configuration called "Side Stream Enhanced Biological Phosphorus Removal, or S2EBPR", Black & Veatch outlined the project in August this year. "The configuration uses anaerobic conditioning of activated sludge biomass to promote stability and consistent performance in the biological nutrient removal (BNR) process. The objectives of this project are to develop design guidelines, operational tool recommendations, and modeling best practices for S2EBPR facilities."

For this purpose, a blue-ribbon team has been assembled to complete the research over 30 months. The team includes five consulting firms: Black & Veatch, CDM-Smith, Hazen & Sawyer, Brown and Caldwell, and Gert P Environmental ApS. Five universities are participating including Cornell, Washington, Northwestern, Northeastern, and Aarhus. Utility partners include 16 companies from the USA and one from Canada. "Our industry is ready for a universally recognized and user-friendly approach to EBPR," Leon Downing, Principal Process Engineer and Innovation Leader at Black & Veatch, is quoted. "By promoting improved performance and process stability in EBPR, this research will greatly help utilities minimize their chemical and energy costs as well as achieve very low concentrations of phosphorus in their effluent." Phosphorus is essential to plant and animal growth. Yet the nutrient becomes a pollutant when deposited in waterways in excessive amounts via wastewater discharges and stormwater runoffs, fueling toxic algal blooms and contributing to hypoxic dead zones that threaten ecosystems and public health. Effective removal of phosphorus during wastewater treatment is gaining more and more scrutiny from communities and regulators. EBPR is also the precursor to enabling many of the technologies currently utilized for phosphorus, as well as carbon/energy recovery from wastewater.

Chemical Recycling of Plastic – Waste No More?

by Michael Laermann

When it comes to the circular economy transition, plastics recycling is as much of a challenge as an opportunity. Today, around 25.8 million tons of plastic waste are generated in Europe every year, with less than 30 percent of it getting collected for recycling. This is a huge loss of valuable resources to the economy, and with a huge cost to the environment. Could chemical recycling be part of the ultimate solution, making the plastics value chain more circular whilst providing a profitable new industry branch.

Plastic pollution of the oceans, the resulting damage to wildlife, and the human health risks from microplastic have ignited public concern and heated discussions around plastic reduction. The decisions by China, Malaysia and soon Vietnam to stop imports of plastic waste, and growing public pressure have prompted the realization in Europe that exporting, burning and burying are not the right solutions to the smoldering plastic crisis. European and global approaches are needed to deal with the predicted doubling of the global production of plastic over the next 20 years fueled by increasing consumption, particularly in developing countries.

In the European Union, the Waste Framework Directive (WFD) and the Packaging and Packaging Waste Directive (PPWD) already demonstrate a common understanding that plastics waste should be recycled as much as possible. More explicitly, the EU Plastics Strategy stipulates that by 2030 all plastic packaging should be either reusable or easily recyclable. With new regulation and public concern on the rise, more than 70 industry associations and major brands have forged alliances, making voluntary pledges to boost demand for recycled plastics. Under the "New Plastics Economy" commitment initiated by the Ellen MacArthur Foundation, consumer brands like Coca-Cola, Colgate, H&M, PepsiCo, SC Johnson and Unilever vowed to make all their plastic packaging either reusable, recyclable or bio-degradable by 2025. In January this year, the global "Alliance to End Plastic Waste" featuring about 30 petrochemical and packaging giants like BASF, DSM, ExxonMobil, Henkel, Procter & Gamble, Suez, and Veolia committed to invest 1,3 billion Euros over the next five years into innovative technology to help recover and recycle plastics waste from the land and the ocean.

The problem for Europe is that so little of what is collected actually gets turned into new material. In 2016, for example, from the 72.7 percent collected waste only 31.1 percent actually got converted.[1)] This modest rate is mainly due to the fact that mechanical recycling – shredding into resin pellets – only works for pure streams of plastic types, like polyethylene terephthalate (PET) and high-density polyethylene (HDPE) widely used for drinks bottles. Composite, dirty and mixed materials usually get incinerated. As a consequence, more than half of Europe's plastic converters are running short on suitable waste supply.[2)] Producers that want to use recycled material for their products cannot rely on steady supply streams of quality feedstock.

A fresh look at chemical recycling

To tackle this situation, industry is taking a fresh look at chemical recycling as a complementary solution to the mechanical reprocessing of plastic waste. The technology is not new. It has been used to turn plastic into refuse-derived fuels for decades. What is new is the growing market demand for high-quality plastic recyclate, due to significantly higher targets for the recycling of plastic in packaging products and a heightened sense of corporate responsibility.

For lawmakers, the concern is to avoid waste-to-fuel lock-ins. The revised EU waste legislation, therefore, states that

Photo: VIGE.co / stock.adobe.com

plastic waste can be considered as "recycled" only if it is not subject to energy recovery and is reprocessed into new materials that are not to be used as fuels. This definition is technology neutral but is complex when it comes to transforming plastics back into basic chemicals. The ultimate goal is nothing less than closing a gap in the waste management process to seize the benefits of a circular plastic economy.

There are four methods of chemical recycling, which are substantially different in terms of waste input and obtained products:

- Depolymerization turns mono plastic (like PET bottles) back into monomers, which can be re-polymerized into new PET-based products.
- Solvolysis (dissolution) is used to break down certain plastics (like expanded polystyrene – EPS) from construction material into monomers, with the aid of solvents.
- Pyrolysis converts mixed plastics into tar oil which can be refined for further plastics production if fed as a naphtha substitute into crackers or used as fuel.
- Gasification is able to process unsorted, uncleaned, mixed plastic waste and turn it into syngas (H2, CO), which can be used to build bigger building blocks for new chemical products.

The last two of these – pyrolysis and gasification – transform plastics and most of their additives and contaminants into basic chemicals. In theory, any kind of plastic waste can be converted. To meet the same quality standards as primary feedstock, some pre-sorting of non-organic waste or purification of the output material may be necessary. If the resulting oil and gas are used for chemical production, the final plastic products will be identical to those produced from conventional feedstock.

To this end, Air Liquide, Nouryon (formerly AkzoNobel Specialty Chemicals), Enerkem, Shell and the Port of Rotterdam are currently preparing a commercial-scale gasification facility to be operational in 2020. The objective is to produce syngas and methanol from organic waste that Nouryon would turn into chemical products. In addition to mixed plastic waste, the pilot plant will also be able to process biomass, diapers, rotten paper, and the likes.

A hurdle race

Chemical recycling through gasification still has a number of hurdles to take before crossing the finish line. Firstly, gasification plants are built at larger scale than pyrolysis, which means that the initial hurdle for investment is particularly high. Next is the dependency on waste streams that imply logistical costs such as collection and transport, followed by fluctuating flowrates and varying compositions the syngas has on the gas grid of a chemical production complex.

Pyrolysis has its challenges too. But due to their smaller scale, it has been easier for companies to keep some pilot facilities running. Even though pyrolysis is capable of handling any type of organic material, non-organic materials like metals, glass fibers, halogens and often PET need to be removed from the input stream, ideally before the process or through purification of the pyrolysis oil afterward. Remaining non-organic pollutants represent a cost

factor, making ocean litter unviable as an input material, and adding problems such as massive water consumption for rinsing.

Room for growth

Chemical recycling may still be in an experimental phase. But soon, even food-grade plastic could be commercially produced from pyrolyzed plastic waste. In December 2018, BASF with several partners announced the development of refrigerator components, insulation panels and even mozzarella packaging that consist of polymers generated from pyrolyzed plastic waste. In this ChemCycling collaboration project, waste operators deliver mixed plastic to technology providers for the pyrolysis procedure. BASF then uses the generated naphtha to produce high-quality plastic material that downstream customers use in their final products.

BASF project lead Stefan Gräter states that chemical recycling provides a valuable cleaning function in a circular economy resulting in secondary materials with "virgin" properties. Even under the optimistic assumption that packaging products could be re-designed to a large extent, mechanical recycling would still struggle to meet the required quality standards. Contaminants and additives could be accumulated in the material over several mechanical recycling cycles and might lead to poor product performance or even health risks. "From this perspective, chemical recycling is a complementary option to established recycling and waste management processes", Gräter argues. "The objective is to find technology solutions for the type of waste that is not suitable for mechanical recycling."

In order to bring it to an industrial scale, chemical recycling needs to strike a balance between economic viability, regulatory compliance, and environmental impact. In regards to the latter, a recent study by the independent research and consultancy firm CE Delft shows that gasification of mixed plastic waste and pyrolysis of sorted plastics, yield superior CO_2 reduction scores than incineration with energy recovery.[3] Compared to plastics production from crude oil, they feature a lower CO_2 impact and a better energy balance overall. Some forms of chemical recycling, like solvolysis and magnetic depolymerization, even have similar CO_2 saving scores to mechanical recycling. CE Delft, therefore, estimates a climate change reduction potential of up to 1,7 megatons of CO_2 equivalent per year in 2030, for the Netherlands alone, including imports from neighboring countries. By scaling up and using renewable energy for chemical recycling processes, the CO_2 footprint and energy balance could be optimized even further.

From a business point of view, McKinsey sees "opportunities to build a new and profitable branch of the industry based on recycled plastics" that might represent a profit pool of nearly 50 billion Euros per year worldwide by 2030. Under a scenario where much larger quantities of plastic waste are routed for reuse instead of going to landfill and incineration, they see a "potential for chemical companies to transform two areas: polymers produced from mechanical recycling, and the whole field of pyrolysis and chemical recycling of used plastics Projecting a step further, it's possible to imagine a wholly new configuration of petrochemical and plastics plants."[4]

Since chemical recycling enables conversion rates of up to 100 percent without compromising quality, there may be increasing market demand for such materials, which might be a starting shot for investments in higher capacity. Where we are today, chemically recycled plastics are still only on a par with virgin materials and more expensive than incineration and mechanical recycling. The true potential for chemical recycling to become profitable depends on the sufficient supply of suitable plastic feedstock, and the further development of pyrolysis and gasification technologies to produce high volumes of recyclates with consistent quality at a competitive price. But reaching that potential also depends on the conducive regulatory framework.

Paving the way for suitable waste streams

At a policy briefing between stakeholders and European policymakers in Brussels, European Environment Commissioner Karmenu Vella emphasized the Commission's intention to investigate further incentives and regulatory measures to increase the recyclability of plastics and make it a valuable resource: "The Commission will issue new guidance on separate collection of waste, with a specific focus on plastics and several new streams, to deliver high-quality

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Photo: Andi Karg

materials for recycling." According to Vella, improved sorting and recycling techniques can also contribute to this objective: "The Commission is eager to learn more about chemical recycling."

At the same time, Vella noted "an improved design of packaging to ensure a more effective separate collection, sorting and recycling or prevention, including repair and re-use, should be the first priority for packaging producers." By 2020, the Commission will review the "essential requirements" of the Packaging and Packaging Waste Directive to ensure better packaging design and clean up packaging waste streams, bringing EU packaging into line with the Plastics Strategy and wider circular economy principles.

Asked about additional instruments to ensure the supply of better recyclable plastics, the Commissioner pointed to the now mandatory extended producer responsibility (EPR) for packaging: "We need to ensure that the costs of the collection and treatment of waste are effectively covered and paid by producers. The fees will also need to be modulated so that products that are easily recyclable will have lower fees." In the new waste legislation, these modulated fees should put pressure on manufacturers to change the design of plastic products to facilitate their proper sorting and recycling.

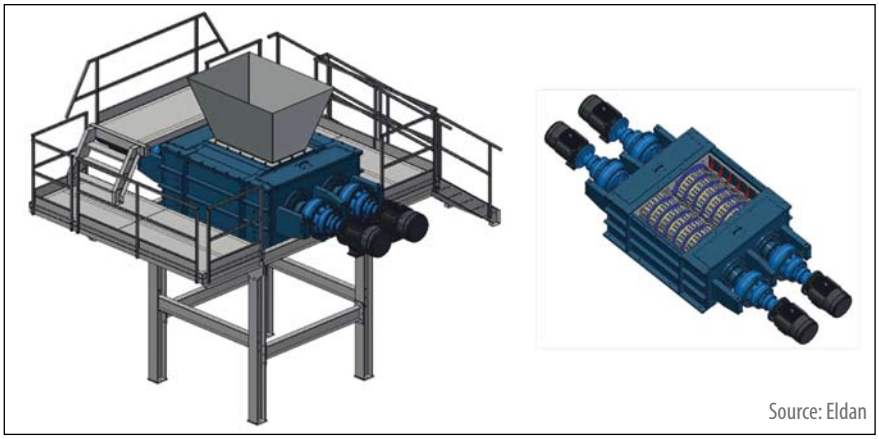
It is often said that circular approaches have to be systemic, and plastics are no exception. Scaling a systemic solution towards a circular plastics economy will require a combination of complementary technologies and collaboration between the different parties of the value chain, without favoring one over another. So, we can expect this debate to be a big one for Commissioner Vella's successor, and for the next Commission as a whole.

1) Conversio Market & Strategy, Study: "Post-consumer Plastic Waste Management in the EU28 + Norway and Switzerland in 2016",
2) European Commission, Blogpost by Karmenu Vella, "Plastics In a Circular Economy: The European Approach", 9.01.2019, ➲ https://ec.europa.eu/commission/commissioners/2014-2019/vella/blog/plastics-circular-economy-european-approach_en
3) CE Delft, " Exploratory Study On Chemical Recycling" (only available in Dutch), September 2018, ➲ www.cedelft.eu/en/publications/download/2607
4) McKinsey, "No time to waste: What plastics recycling could offer", September 2018, ➲ www.mckinsey.com/industries/chemicals/our-insights/no-time-to-waste-what-plastics-recycling-could-offer

Eldan Launches the Twin Shaft Clean-Cut Tire Shredder

Eldan Recycling, Danish manufacturer of recycling equipment, has launched their new Twin Shaft Clean-Cut Shredder for production of clean-cut tire chips from car or truck tires.

Two frequency converters ensure a very flexible operation, i.e. individual setting of rpm, overload protection, auto reverse at overload and high torque from zero RPM. And they offer up to 50 percent power saving.



Source: Eldan

"The Eldan Twin Shaft Clean-Cut Shredder will be launched to the public at the Ecomondo Exhibition in Rimini, Italy, between 5-8 of November. We are excited to see the response, as the machine will be available for the public to inspect if they visit booth 065", says Bjørn Laursen, Product Manager for Tyre Recycling Solutions at Eldan Recycling in Denmark. This year, Eldan Recycling A/S will have two different booths at the Ecomondo Exhibition together with their Italian agents at NME s.r.l. in Italy. It will be possible to visit them both in booth 193 and 065.

"The Twin Shaft Clean-Cut Shredder is the ideal machine for recyclers who want to go from complete tire into 50 mm (2") or 100 mm (4 ") clean-cut chips in one go," says Jan Kjær, Manager R&D at Eldan Recycling. He continues explaining that "the unique solutions designed for the Eldan Twin Shaft Clean-Cut Shredder has been patented."

Since 1956, Eldan Recycling A/S has been a leader in the on-going technical development of machinery and methods of making the recycling of e.g. tires, cables and WEEE an efficient and profitable business. The company delivers turnkey systems as well as single machines. The track record proves more than 1,300 plants and 8,000 single machines delivered all over the world. Eldan Recycling A/S is one of the few companies – delivering equipment to the recycling industry – with its own production facilities. This enables the information to be communicated quickly and accurate between the different departments, thereby ensuring the quality of the product and the flexibility of the production program. Eldan Recycling A/S offers a complete package of services ranging from design and fabrication to delivery, installation and after-sales service. The Redoma Recycling line is also a trademark that forms a part of the Eldan Group.

➲ www.eldan-recycling.com

Intelligent Management Systems

ECOVE adopts iO&M in Miaoli EfW Plant to improve "resource cycling efficiency", which is significantly better than the average level of other plants and recognized by competent authorities

Taiwan-based company ECOVE boosts "resource cycling efficiency" of Energy-from-Waste (EfW) plants by iO&M (intelligent operation and maintenance systems).

Once dubbed "garbage island" for its overflowing landfills and filthy streets, Taiwan now has Asia's highest rate of recycling and is a role model for the region. As the leading company of the resource recycling industry in Taiwan, ECOVE has promoted the establishment of integrated intelligent monitoring and warning systems in Energy-from-Waste (EfW) plants and waste management. These systems will provide real-time integration of management information for immediate judgment and response on business operations to ensure stable operations of each plant and improve "resource cycling efficiency". With the economic development, the problem of waste treatment and garbage disposal in Southeast Asian countries is becoming more and more serious.

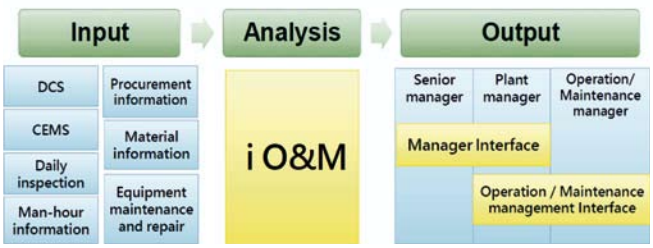
Establish iO&M System to optimize efficiency

With the idea of industry 4.0, such as cyber-physical system, big data analysis and internet of things, ECOVE develops intelligent operation and maintenance (iO&M) systems which analyze various operational data and outputs to different levels. The output information can also feedback to different user-end functions to improve plants performance.

ECOVE has developed two core management systems: Maintenance Management Information System (MMIS) and Operation Results System (ORS), which became the preliminary structure of iO&M. The company also continues to optimize the system through accumulated data in the database.

MMIS implements preset maintenance plans through computer networks and cloud database. When there is something wrong with the equipment, it can be immediately integrated into information such as work orders, acceptance for maintenance, statistical analysis on equipment failure, work records and performance evaluation, maintain human resources, spare parts, and warehousing, to improve the team's efficiency of equipment maintenance.

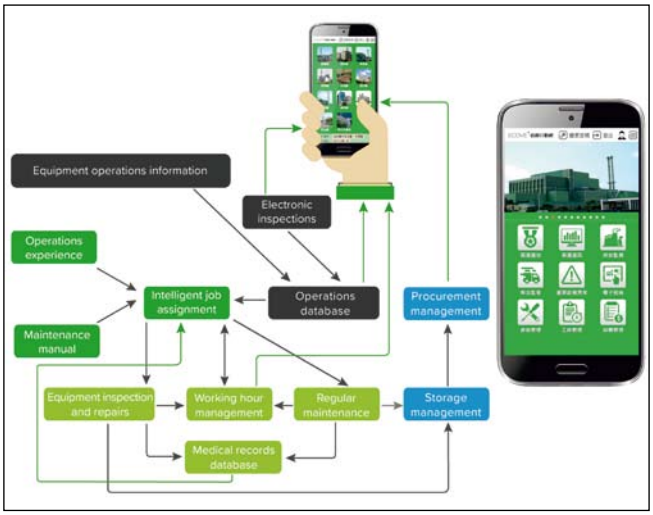
ORS continually records the operating information of each project to transmit, analyze, and feedback the information to various operating groups and the management. This accelerates decision-making and response time, and contributes to the goal of achieving remote management.



ECOVE's iO&M schematic diagram

Photos: CTCI Corporation

ECOVE establishes MMIS that includes a database for maintenance, repairs, facilities, materials, procurement, and safety and sanitation



"iO&M" utilizes mobile devices to enable managers to stay updated of the status of plant operations and help them achieve precise and in-time management

The maintenance and operational results of each EfW plant will be reported to each operation group by ORS through procedures such as information input, storage, analysis, and output. The system also combines mobile devices that keep up with the times in order to optimize the performance of each equipment system, and achieve the purpose of comprehensive management.

Leading operational performance in the industry

Through iO&M management, each plant has achieved outstanding operational performance. Taking ECOVE's EfW plants, according to "2018 statistics of 24 EfW plants in Taiwan", issued by Taiwan Environmental Protection Agency(EPA), ECOVE has imported iO&M system to its EfW plants and showed excellent performance in the following key operating indicators.

First of all, the "Availability Rate" and "Unscheduled Shutdown Hours" need to be mentioned. These are reliability indexes for maintaining stable operations for EfW plants. Managed by ECOVE with "iO&M", the plants perform an average of availability rate 6.3 percent higher than others; the average unscheduled shutdown time is 182 hours lower than the shutdown time of other plants. The tables show that ECOVE improves operational efficiency with iO&M, which are significantly better than the average level of other plants. For example, ECOVE Miaoli EfW Plant and ECOVE Keelung EfW Plant have won first place in 2018 and 2019 in the EPA Annual Appraisal, indicating outstanding performance that is recognized by competent authorities.

Oversea iO&M performance

ECOVE adopts iO&M in an oversea country too. Taking Macau EfW Plant, for instance, it has been operating up to 27 years so far. With the support of iO&M, ECOVE successfully extended the equipment's service life of the plant, maintained stable operation, and improved the electricity generation efficiency. Upon ECOVE's iO&M, electricity per waste is increased by 25 percent, which maximizes the efficiency of waste per ton, making it one of the successful cases in resource cycling.

Recycling rate or resource recycling technologies – Taiwan's technologies are among the best in the world. Furthermore, Taiwan's waste treatment experiences can be a successful example for other countries. EfW plants have been in operation in Taiwan for more than 27 years. With

2018 statistics of 24 EfW plants in Taiwan
(Availability Rate & Unscheduled Shutdown Hours)

Comparison Items	Availability Rate (%)	Unscheduled Shutdown Hours(Hour/Furnace)
Average of ECOVE's Plants	91.2	163
Average of Other Plants	84.9	345

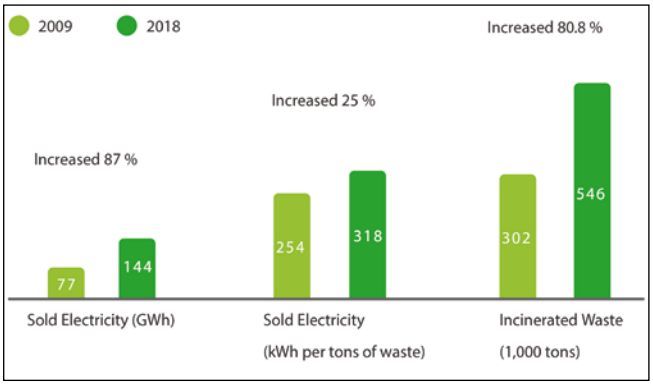
Source: https://swims.epa.gov.tw/Statistics/Statistics_Year.aspx, issued by EPA, Taiwan

2018 statistics of 24 EfW plants in Taiwan
(Incineration Loading Rate & Power Generation Per Unit Waste)

Comparison Items	Incineration Loading Rate (%)	Power Generation Per Unit Waste (Kilowatts/Metric Tons)
Average of ECOVE's Plants	90.2	563
Average of Other Plants	82.1	469

Source: https://swims.epa.gov.tw/Statistics/Statistics_Year.aspx, issued by EPA, Taiwan

ECOVE (TPEx: 6803) – an affiliate of CTCI, a global engineering services provider – is an environmental services provider specializing in Energy-from-Waste (EfW), solar power, waste management, and resource recycling, such as wastewater, solvent, and PET recycling. Founded during Taiwan's waste crisis in 1994, it quickly became a leader in effective waste management and resource recovery. With its main focus on recovering more value from otherwise wasted resources, it has continuously increased efficiency across our EfW, solar power, and recycling plants. Public and private entities in Taiwan, Macau, mainland China, Southeast Asia, India and the United States have trusted ECOVE regarding environmental services in operations and maintenance, consulting, and investment and development.



Macau EfW Plant greatly increases electricity generation efficiency under the operation of ECOVE

this extensive experience, the routine works of EfW plants have been successfully implemented based on the concept of "iO&M". With considerations given to the overall performance and equipment life cycle, this system meets the needs of long-term operation management and helps the plant to achieve intelligent management.

ECOVE, Taiwan's largest environmental resource management company, will continue to expand and develop a network of intelligent operations. The company will also improve the operations of EfW plants to effectively and efficiently control the issues of municipal wastes.

Source: ECOVE

CW Dewiring: Improves Working Safety and Lowers Labor Costs

The beginning of Cross Wrap dates back to 1992 when the founder of the Finland-based company had the vision for an innovative way of wrapping square bales and other rectangular end products. Two years later the first Cross Wrap machine was built.

Nowadays, the company has installed machines in over 50 countries. Nevertheless, in all these years, the mission has always been the same: Help companies to operate smarter when it comes to bale or package handling, wrapping, opening, and also dewiring. Therefore, GLOBAL RECYCLING Magazine wanted to know more about Cross Wrap's dewiring machine, which cuts the bale wires, separates them from the material, and coils the wires for further processing.

What are the main features and functions of the CW Dewiring machine?

The CW Dewiring machine's main features are its all automatic operation and the fact that it cuts, separates and coils the metal bale wires that are used to tie recycled plastic or paper bales. The Dewiring machine is a spin-off from the Cross Wrap bale opener machine that has been developed for the waste to energy operators, facilities and cement kilns.

The Dewiring machine's functions are gentle bale feeding with a belt conveyor, automatic bale wire gripping, bale wire cutting, wire removing and bale wire coiling. After the wires are removed from the material, the bale content is moved forward to the process from the machine. At the moment, there exists one version of the Dewiring machine for narrow box baled bales, and there is also another version for wide box baled bales.

All of the Cross Wrap machinery uses the latest Siemens automation and state of the art components in sensing as well as in running gear. The user interfaces are engineered to be user-friendly, and there are options for remote controlling, online updating and troubleshooting. One feature of the CW Dewiring is also its modular structure, which helps in layout planning and fitting it to any existing or new processing line.

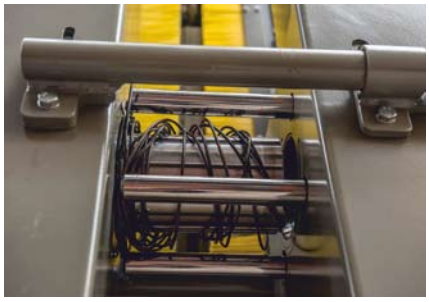
Photos: Cross Wrap Oy Ltd

In which way does the CW Dewiring machine reduce expenses?

The Cross Wrap Dewiring machine lowers labor costs by eliminating the need for manual wire cutting and bale opening. The machine only needs its feeding conveyor to be fed with bales and the opening and cutting is timed by end process infeed speed. By cutting and removing the wires automatically, the processor's benefits are high in operations that run in multiple shifts. For this the Dewiring machines payback time is short and upgrading to all automatic bale dewiring is lucrative in an economical way.

For which kind of materials is the machine appropriate?

The Cross Wrap Dewiring machine is suitable for various baled materials. For now, applications have been delivered for different materials. Machines are delivered for plastic recycling to dewire PET and HDPE-bales as well as mixed plastic bales. Another material has been recycled paper. Moreover, there have been deliveries for dewiring waste fuel bales in cases where an automatically dewiring of



tied RDF- and SRF-bales has been needed. As Cross Wrap is an engineering and manufacturing company focussing on bale handling, we also thrive on creating solutions for unfamiliar materials. Because of this, we want to encourage our present and future customers to challenge us with their needs and ideas for other materials and applications. If the material can be baled it most certainly can be wrapped, opened or dewired with a Cross Wrap machine.

In which ways does the CW Dewiring machine increase treatment safety?

The Cross Wrap Dewiring machine helps to improve working safety by eliminating the need for manual bale dewiring, bale opening, and wire coiling. All of the machines' automatic operation minimize the risks for injuries caused by manual high-tension wire cutting. The automatic operation is also safer when the material is not clean. Hazardous and unclean materials always pose a health risk for workers when the material is handled manually. Furthermore, the automatic wire coiling operation is beneficial for working safety because the coiled wires are easy to handle. In cases where the bale wires are handled manually, they can tangle and tore up workers posing a high risk of injury. By using CW Dewiring, the wires are coiled automatically to a form that takes very little space and is safe to handle.

As the CW Dewiring operation is all automatic and all machine movements are isolated behind machine frame structure and electronically operated safety fences there is no need for workers to be in harm's way. The machine controls are done from a safe position. Moreover, the usage of the latest user interface and automation technology also helps in creating a safe working environment.

➲ www.crosswrap.com

New Plant for Plastic Recycling in Thailand

The multinational group Suez will build a recycling facility that turns plastic waste into circular polymers, in Bang Phli district (Thailand). According to the company's information in June this year, the future plant near Bangkok would "contribute to Thailand's ambitious 2030 target to achieve 100 percent plastic recycling". The plan includes that it will convert 30,000 tons per year of locally collected polyethylene film waste into high quality post-consumer recycled plastic (PCR). "It will thus produce quality secondary materials for the plastic industry", the company announced. The facility would be "equipped with an advanced water treatment system that minimizes water usage and will meet the highest level of local environmental standards. Part of the energy used by the plant is powered by rooftop solar panels, further improving the site's environmental footprint." Construction works are expected to be completed by mid-2020.

➲ www.suez.com

Panizzolo Mega 1500: Decisive Role for Metal Valorization

Due to non-performing recycling plants, a considerable quantity of metals cannot be reintroduced into the production cycle in Europe every year, says Italy-based manufacturer Panizzolo.

Not having a sufficient degree of cleaning and separation, these outputs are lost in landfills, incinerators or in exports to countries with low environmental policies. "Panizzolo Recycling Systems avoids vague and illusory advertising campaigns," explains Mauro Panizzolo, owner and technical manager, "certain companies often promise high production results only on paper, without actually being able to obtain them and leaving customers at the mercy of many problems." Unlike this, the Italian company's solutions "show the concept of quality on a practical level," continues Matteo Turatto, sales manager. "From the design to the training of the operators, everything is finalized to the good functioning of the plant for long-term profitability".

Photo: Panizzolo Srl.

With thirty years of direct experience and constant research and development, Panizzolo is a valid partner in the supply of industrial shredders, hammermills and refining plants for End-of-Waste treatments. "During the valorization cycle", Panizzolo explains, "the hammermill plays a decisive role. Quality grinding frees the metal from the aggregates, simplifies the final separation phases and maximizes the commercial value, unlike unsuitable or improvised models that lead, in the medium-short term, to serious economic and productive damages".

"Even today there are few suppliers able to ensure this concrete quality," explains Turatto. "A recent example is a client from Saudi Arabia who, having important flows of scrap to be enhanced, has chosen the security of our Mega 1500 hammermill".

Seeing this hammermill in action, "Security" is the word that best represents it. "Security of the structure", thanks to carpentry, welds and armor reinforced for stresses and machining peaks. "Security of the productivity" with a 450 kW electric motor, a production of up to 19 tons/hour and a dedicated software for the management and control of the processing. "Security of the treatment", thanks to the grinding logic that uniforms the usury, to the 32 hammers (52 kg) in special casting and to the separation accessories. "Security in the quality of the outputs", thanks to the flexibility of the patented cradle and the set of interchangeable grids. "Security of the operators", thanks to a rapid access to the grinding chamber and to all maintenance operations.

The system weighs 77 tons, however the Mega 1500 remains extremely flexible in the treatment. Like the more compact Panizzolo models, the Mega 1500 integrates the patented cradle speeding up the setting of the waste and the size in output. "The most important condition for our customers," concludes Turatto, "is the final profitability of the metals at the time of sale. For this reason, our solutions must maximize their potential right from the grinding. In the Mega 1500 this is possible even in the most heavy-duty waste, with low energy consumption, high production yields and excellent output quality".

➲ www.panizzolo.it

World Sustainable Development Summit 2020

January, 29 – 31, 2020, New Delhi (India)

The next World Sustainable Development Summit – WSDS 2020 will be held under the theme "Towards 2030 goals – making the decade count". As described on the website, WSDS is the Indian TERI's (The Energy and Resources Institute) flagship event – a platform "to showcase to the world, India's plans, policies and priorities on sustainability by identifying the most topical issues, pertaining to the environment and sustainability". According to the organizers, the event is a reiteration of the erstwhile Delhi Sustainable Development Summit (DSDS) that continues the Summit Series' decades-long run in bolstering India's claim to international climate politics leadership, cementing the place among the most responsible environmental stewards. ➲ http://wsds.teriin.org

Advertorial:

Belgian Separation Technology Dominates the Global Plastic Recycling Transition

If you think about Belgium, you think about beer, chocolate and waffles. A lesser-known fact about the Belgians is that they are frontrunners in the global recycling industry. Not only can Belgian recycling companies boast one of the best recycling rates, but the country is also home to various technology providers, one of which is Ad Rem.

Ad Rem, which is short for Advanced Design of Recycling Machines, is based in the south of West-Flanders. The company was founded in 2008 as a joint-venture between machine building group Valtech and recycling group Galloo. The company provides technology for the separation of E-scrap, car shredder residues and incinerated bottom ash.

Changing market

Since the introduction of the Chinese National Sword, which came into effect in February 2018, there has been a snowball effect through the global recycling market. Mixed plastic waste which used to go to China was rerouted to other countries such as Malaysia, Vietnam and India. These countries quickly became overwhelmed by the amount of waste coming their way and started closing their gates as well. As a result, plastic waste is now being stockpiled or incinerated as there is often a severe shortage of local treatment capacity.

Adding to the chaos, an amendment to the Basel convention was announced earlier this year, effectively blocking developed countries from exporting their plastic waste outside of their borders. The pact will go into effect in 2021 and is expected to have a major impact on the global plastics recycling business.

New opportunities

This situation, described as devastating by some, is seen as an opportunity by Ad Rem. "The high landfill and incineration rates act as an incentive for recyclers to do more with their waste," says Brian Noppe, General Manager of Ad Rem. "With our unique and patented plastic separation process, we are able to extract and fully recycle the polyolefins and polystyrenes from the plastic waste at a cost that is lower than that of petroleum plastic production". The patented separation technology has already proven its worth. Galloo's recycled plastic meets all required standards as demanded by the automotive industry, automatically qualifying it for a wide array of other possible applications.

This month Ad Rem is finalizing the commissioning of two plastic separation plants with a consolidated capacity of 70,000 tons per year. One of them will process around four tons per hour of fridge plastics, which will be turned into a resource for new fridge production. The other one will increase the capacity for WEEE-plastic separation

in Belgium. Although both plants are quite big, they are only a drop in the ocean compared to the mountain of E-waste that needs to be recycled every year. Many more plants will be needed in the coming years and the potential for Ad Rem is huge.

Future prospects

This potential really comes to life with their newest project. Ad Rem will be responsible for building Japan's largest and most advanced plastic recycling facility. This facility, named PLANIC, will be based on a joint venture between Toyota Tsusho, Veolia Japan and Kojima Sangyo and will be able to process 40,000 tons of waste plastic per year. The plant will be a welcome addition to the country's processing capacity as Japan is currently left with over a million tons of plastic per year that will soon go untreated.

The added opportunities caused by the change in market dynamics has already had some considerable effects on the local communities in south West-Flanders. Since 2017, Ad Rem's number of employees has more than doubled, and while they only just moved into their new offices less than two years ago, expansion could soon again be necessary. But it is not just Ad Rem that is able to consolidate the opportunities. Since most of the machinery production is done locally, it is estimated that over 100 extra jobs were created in the region, including at various supplying companies.

Flanders as a technological powerhouse

The machine building expertise of Ad Rem in the world of plastic recycling does not come as a surprise to anyone familiar with the Flemish machine building industry. Last year, machinery was the third largest export product of the Flemish region of Belgium with a total value of over 34 billion euro, which represents over 10 percent of the total Flemish export. The province of West-Flanders, in particular, is home to many machine building companies. Unemployment in the region is at historically low levels, while companies are forced to become ever more resourceful to attract bright engineering talent.

Photos: Ad Rem

Under the wings of the Valtech group, however, Ad Rem seems to be able to do just that. As the demand for more plastic separation capacity will continue to grow worldwide throughout the coming years, the technological advantages contrived in the small region of West-Flanders will become increasingly important.

➲ www.adrecyclingmachines.com

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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.

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valtech group