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GLOBAL RECYCLING

*The Magazine for
Business Opportunities
& International Markets*



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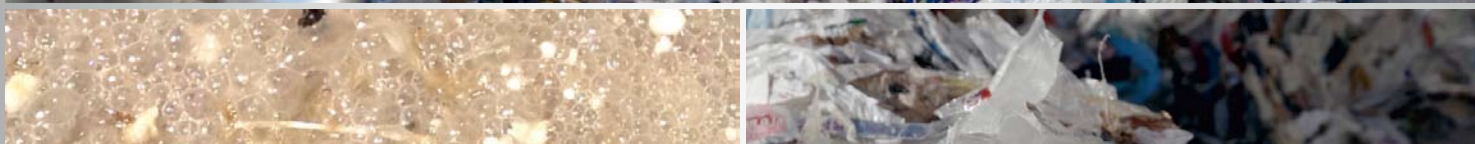
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Recycling Is of Central Importance!

Plastic waste in the oceans was one of the priorities at the Group of 20 summit in Japan, which took place on June 28 and 29. Ahead of the summit, in mid-June, environment and energy ministers of major economies of the Group of 20 met in Japan and agreed to adopt a new implementation framework for actions to tackle the issue of marine plastic waste on a global scale. As reported by the media, the Japanese government wants Japan to lead the world in reducing marine plastic garbage, including developing biodegradables and other innovations. According to the German Federal Ministry for the Environment, Nature Conservation and Nuclear Safety, the Group of 20 is targeting, among other things, a closer collaboration for the construction of environmentally appropriate waste disposal as well as for recycling processes. The countries should report on a regular basis how they avoid waste and how they dispose of waste safely. Moreover, scientific topics should be included in the exchange of information as well. Regarding innovative measures, product design, circular economy, and resource efficiency matter particularly.



Recycling is representing a crucial solution to the problems of the environment. The recent convention of the Bureau of International Recycling in Singapore in May this year demonstrated how important the subject has become. During this event, the report on this year's "Global Recycling Day" revealed that several hundred media hits reached more than 687 million people around the world. Other statistical highlights were millions of online impressions on social media, global events, and a growing number of companies engaging with the "Day". The keynote speaker Dr Gabrielle Walker insisted in her presentation at the BIR convention that climate change is no longer the preserve of "tree-hugging" environmentalists but instead has become "something which hard-headed businessmen need to be thinking about, and are thinking about" – not least because of the associated "risks to financial stability". According to the expert strategist who assists businesses in their response to global challenges such as sustainability and the circular economy, the last 18 months have brought "a seismic shift" in the attention paid by the business community to the many risks associated with climate change, she underlined. Dr. Walker agrees with experts that more recycling can deliver extensive cuts in carbon emissions. "This is going to put the recycling industry right in the spotlight," she said. The most striking example is metal recycling. According to experts, raising the electric arc furnace (EAF) production to 40 percent in world steelmaking would cut global carbon dioxide emissions by 400 million tons.

Given the quantities of e-waste generated every year – nearly 50 million tons in 2018, according to estimates – and its value of over 60 billion US-Dollar, recycling should be a priority. According to the report "A New Circular Vision for Electronics – Time for a Global Reboot", published by the World Economic Forum, recycling rates globally are low. One of the reasons is the complex waste stream which contains up to 60 elements from the periodic table. In this issue, you will find an overview of the market (page 28) and the opportunities associated with a circular economy. Furthermore, the American electronic recycling and e-waste company ERI describes, how it continues to follow its "Green is Good" motto and maintains a core commitment to sustainability and the environment (page 15 onwards).

A further focal point is the recycling of tires. You will find the information regarding Europe, the USA, China, and other parts of the world from page 4 onwards and on page 9.

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

Yours Brigitte Weber (weber@msvgmbh.eu)



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Thailand Investment Year 2019

The Kingdom of Thailand is stimulating big investments in targeted industries that will drive economic transformation and support investors' success, the national Board of Investment (BOI) expects.

At the annual seminar themed "Thailand Investment Year – What's New?" which took place in March this year, Thailand's Prime Minister, Prayut Chan-ocha, and five key government agencies informed about government's support and policies in 2019. As reported by the Board of Investment, which hosted the seminar, the government aims to enhance national competitiveness under the 20-year National Strategic Plan.

On this occasion, the attendants learned that there are several opportunities for the country. The first is the economic situation as the country enjoyed economic growth during the past four years. According to the information, last year the country recorded 4.1 percent GDP (gross domestic product) growth, low inflation (only one percent), strong current account surplus of seven percent to GDP, over 200 billion US-Dollar of international reserve and low public debt of 45 percent below GDP. Furthermore, the national financial sector, especially the capital market, is considered to be strong.

The spending in both government and people sector, combined with the growing tourism industry that has contributed to almost 20 percent of GDP, would help balance the country's dependence on exports. A relative new engine of growth is the "Eastern Economic Corridor (EEC)", designed to be a large modern economic hub, home to targeted industries under the Thailand 4.0 initiative, the information said. One of the preferred sectors consists of the biofuel and biochemical industry, which are anticipated to see rapid growth in the future. According to experts, the two industries can easily be integrated with current and pre-existing industries within Thailand. In establishing a comprehensive biochemical industry, Thailand's existing lactic acid and succinic acid from ethanol production industry would serve as a bridge between the current ethanol industries and the future chemical indus-



try establishment. "This will allow for the enhancement of current biofuel industries to produce second-generation biofuels (biofuel not derived from food substances, e.g. corn cobs, or wastes) and make way for technological research and development of third-generation biofuels (biofuels which are produced from strands of cultivatable strands of seaweed)."

Infrastructure development in EEC has made significant progress, with most projects being under bidding and negotiation, BOI reported. Special investment promotion measures have been introduced to support development in the industrial sector, the area of society and environment, and local development. These measures would be the key driver to attract more investment.

Apart from the trade connection between CLMVT region (which comprises Cambodia, Lao PDR, Myanmar, Vietnam and Thailand) and the Greater Bay Area (which covers Hong Kong, Macao, Guangdong and Shenzhen) with ASEAN (Association of Southeast Asian Nations), Thailand's third opportunity is the country's

Chair of ASEAN in 2019 (motto for the chairmanship in this organization is "Advancing Partnership for Sustainability").

Last, but not least the three-day coronation of King Maha Vajiralongkorn in May this year was a significant event in Thai history. The ceremony represents a remarkable symbol of the country's unity and stability, BOI emphasized. "Investors are aware of the importance of this royal ceremony, which will further boost foreign confidence in Thailand's long-term potential." According to media reports, King Maha Vajiralongkorn has been serving since shortly after his father King Bhumibol Adulyadej died in 2016 following a 70-year reign. Vajiralongkorn's official coronation has been delayed until after a year-long mourning period for his father.

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Tire Recycling Riding On

The materials of end-of-life tires are useful for nearly endless applications. The way these tires are collected (or disposed of), recycled (or burnt) and brought to market (or stored), are not endless, but differ widely from country to country. However, the global progress of recovering the material can hardly be stopped.

European Union: Recycling increased

In June 2013, the Tyres-Committee of the Bureau of International Recycling carried good news: "Latest figures suggest that the tire recovery rate in Europe has reached an all-time high of 98 percent compared to 75 percent as recently as 2004, thus reducing landfilling to very low levels." According to ETRA, the European Tyre Recycling Association, at that time the recovery rate of end-of-life tires (ELT) in Europe was 96 percent on average. Most countries reached 100 percent, five nations ranged between 90 and 70 percent, while the rates of the Balkan states laid lower or were unknown. The main treatment methods for rubber were recycling and incineration with energy recovery at the ratio of 54 to 45 percent.

In 2016, the volumes' situation in EU28 showed 117,000 tons of end-of-life tires used for civil engineering, public works and backfilling as well as 1,630,250 tons recycled. 999,750 tons went to energy recovery, 160,000 tons were landfilled or ended unknown; tires on stock reached 49,000 tons. Used tires arising added up to 3,515,000 tons and the reuse of part-worn tires by retreading, reuse or export included 561,000 tons. So, a total of 3,306,000 tires

was treated, reaching a treatment rate of 95 percent, according to the European Tyre & Rubber Manufacturers Association (ETRMA). In the long term, the energy recovery of ELT between 1995 and 2014 declined from 53 to 37 percent, reuse and retreading of part worn tires was reduced from 34 to 27 percent, while recycling rose from 13 up to 35 percent.

Different systems

In 23 European nations, the handling of ELTs is managed by an Extended Producer Responsibility and followed through in various ways from a single ELT management company dealing with ELT collection and treatment in a country (such as in Portugal, the Netherlands or Sweden), through multiple ELT management companies (such as in Italy, France or Spain) or through individual producer responsibility (in Hungary). Free market systems operate among others in Austria, Switzerland, Germany, and the UK: Here the operators contract under free market conditions and act in compliance with the legislation, that sets the objectives to be met but does not designate those responsible. Under the tax system – applied in Denmark and Croatia – the country is responsible for the management

of ELTs: A tax is levied on tire producers and subsequently passed on to the consumer. Fazilet Cinaralp, Secretary General of ETRMA, noted in 2016 that the tire industry “clearly supports the EPR model when it is backed by clear statutory requirements and provides a separate line on the invoice, showing the environmental contribution for ELT management, ensuring full transparency for both national authorities and to the end consumer.” But the CEO added that “EU harmonized end-of-waste criteria for ELT granulates and powder are also needed to ensure a level playing field between virgin and secondary raw materials.”

Material recovery mostly by granulation

Looking at the utilization, 1.1 million tons were energetically recovered by 81 percent in cement kilns and by 19 percent in urban heating and power plants in EU28, Switzerland, Norway, Serbia, and Turkey. The material recovery of 1.9 million tons took place mostly by granulation (75 percent), by incorporation in cement (15 percent) and among others one percent by steel mills and foundries and one percent by pyrolysis. Latest statistics indicate that 75 percent of Europe’s ELTs destined for material recovery – equivalent to more than 1.4 million tons per annum – are channeled into granulation, for which end-use applications “remain a challenge”, Fazilet Cinaralp gave account in October 2018.

Looking for new markets

Already two years ago she had underlined that the figures indicate a “saturation of the ELT granulation market in Europe”. It would be time for new markets for rubber granulate to be found to further develop European tire recycling. ETRMA’s “End-of-life Tyre Report 2015” proposes a higher use of rubber in concrete – “this market is sure to grow” –, more adoption of rubberized asphalt – “a very promising market” –, an utilization in the surface of athletic tracks – “by nature, perfectly suited to the criteria” –, possibilities in noise mitigation and anti-vibration solutions and applications in the transport area, as “the rail and tramway sector offers a huge potential for the use of tire-derived materials”. In this sense, a series of projects have been launched by ETRA: Anagennisis focusing on innovative reuse in concrete, Eco-Lanes developing infrastructure for surface transport, Isol-Eco searching a viable solution for tire textiles, Persuade developing and testing new road pavements, Roadtire innovatively using recycled tire rubber in road construction, Smart Project optimizing the use of only recycled tire granulate and powder without additives, Twincletoes converting a waste bi-product, TyGRe Project recovering high added-value products from selected waste streams, and Woodrub innovating environmental friendly products made from recycled wood and recycled tire rubber.

The necessity of sustainable treating end-of-life tires in Europe was emphasized by Elroy Fimrite at the 23rd Annual European Tyre Recycling Conference in March 2016. The President at EFG America LLC, a devulcanization technology firm, believed and stated “that there were finite sources of natural rubber, and when the Chinese economy, in

particular, was in a position to expand fully, there would be only one solution for the tire manufacturers and that would be to fall back on recycled tire rubber materials”.

USA: value of the material recognized

Around 300 million tires are annually scrapped in the United States, according to the U.S. Tire Manufacturers Association. In the past, scrap tires were often dumped illegally in lakes, abandoned lots, and along the side of the road. Nowadays, the United States has recognized the value of the material. Latest figures published by the association in 2017 indicate that 4.189 million tons of scrap tires were generated, of which 3.411 million tons went to market or were destined for sale – a utilization rate of 81.4 percent. Adding this, the baled and the landfilled material (646,000 tons), the managed tire scrap reached a rate of 96.9 percent. 1,736,340 tons respectively 43 percent were used as tire-derived fuel in cement kilns, pulp and paper facilities and industrial boilers. 1.013 million tons respectively 25 percent got granulated for ground rubber solutions, 315,000 tons respectively eight percent fulfilled civil engineering purposes, and 109,000 tons respectively three percent were exported.

Scrap tire material volume declined

Between 2009 and 2017, the percentage of scrap tire material dedicated to the market to total generated material declined from 85.3 – with an all-time height of 95.9 in 2013 – to 81.4 percent. The tire-derived fuel usage diminished from 2.085 to 1.736 million tons: The share of fuels used in cement kilns has increased from 2009 to 2017 from 604,000 to 806,000 tons and the use in utility boilers from 326,000 to 427,000 tons. But the utilization in pulp and paper mills sank from 716,000 to 503,000 tons, while the share of fuel burned in industrial boilers or dedicated to energy recov-



ery declined to zero. And even the ground rubber market lost volume: The market distribution declined from 1.354 to 1.013 million tons. In spite of the fact, that ground rubber applications accounted for 25 percent of scrap tire usage in 2017. The number of stockpiled scrap tires that had reached one billion tons in 1990 was cleaned up by 94 percent in 2017, leaving 60 million stockpiled tires to go – mostly in Colorado and Texas.

The decline is predominantly caused by negative public opinion. Or as ISRI President Robin Wiener expressed it in October 2018: “The market in America has dipped by perhaps 30 percent over the last two to three years owing to negative media reports of safety concerns – even though some 100 studies have concluded that no such safety risk exists.” The Safe Healthy Playing Fields Coalition gives an example: This national acting coalition is “working to alert communities, schools, and individuals to rising concerns over the hazards of synthetic turf athletic fields”. It operates an internet website to counter “misinformation and inaccurate studies” and published in January 2017, that “currently 4,760,000,000 pounds of loose, unencapsulated, pulverized waste tires are spread across play surfaces of more than 12,000 fields in schools, sports centers, and playgrounds”, affecting hundreds of thousands of players and families, including school children across the US”.

Federal states enacting schemes

Even if, as the Coalition underlines, “no government agency has concluded artificial turf is safe”, the federal states in Northern America started to enact schemes for supporting scrap tire treatment. 44 of 50 states have storage and disposal regulations, 36 require financial assurances for processors, and 17 demand financial assurance for haulers. 38 states allow the landfilling of cut or shredded tires, 24 allow their mono-filling, and ten allow the landfilling of whole tires. 30 states display a stockpile cleanup program, while in 23 states a stockpile cleanup program is operating. Several tire recycling grants are offered, for example in Kansas by the Bureau of Waste Management, in Nebraska backed by the Department of Environmental Quality, in Ohio by the Environmental Protection Agency and the Lorain County Community Development Department, and in California for the funding of road repair programs using recycled tires.

Several associations and organizations are active in the scrap tire branch. For example, the Rubber Pavements Association (RPA), dedicated to the promotion of greater use of high quality, cost effective asphalt pavements containing recycled scrap tire rubber and associated with among others the International Tire and Rubber Association, the European Tyre Recycling Association, the Scrap Tire Management Council, and the National Asphalt Pavement Association. The Synthetic Turf Council represents companies who consult, design, install, test, maintain and reclaim synthetic turf sports systems and synthetic grass for landscape and recreation, as well as manufacturers and suppliers of related materials and equipment. The Tire Retread & Repair Information Bureau has the mission to promote and defend the tire retread and tire repair industries world-

wide. The Canadian Association of Tire Recycling Agencies is made up of tire recycling agencies in the provinces and territories of Canada and has programs in place to ensure the proper management of end of life tires. [Information on the Rubber Manufacturers Association (RMA), established in 1915 as the Rubber Club of America and in 2010 heralding the 20th anniversary of the creation of its Scrap Tire Management Council (STMC), can no more be found.]

For a competitive free market system

Not all associations are convinced of the political course in scrap tire recycling. In 2015 the Tire Industry Association (TIA), an international non-profit confederation, had published a statement underlining promotion and support for a competitive, market-based management system for the flow of scrap tires and scrap tire materials. In contrast to the “highly successful” free enterprise system of scrap tire management, the legislation in some states introduced an Extended Producer Responsibility or Product Stewardship bills, “that would restrict or interfere with the free flow of scrap tires to selected markets”. It “would create an additional level of management or oversight, would add costs without any significant benefit, would remove the retailer from direct negotiations with their suppliers and would replace an efficient well established free market-based system for managing scrap tires with an unproven system.” TIA Executive Vice President Roy Littlefield was sure: “TIA supports a competitive free market system that does not interfere with the free flow of scrap tire recyclable materials.”

China: dangerous and unsafe practices

Published in September 2010 by China’s Ministry of Industry and Information, a new strategic policy document set the path for the country’s tire industry – covering all parts from encouraging investment in regional natural rubber production over improvements in energy efficiency in tire factories to the responsible disposal of waste tires. Such rules were obviously necessary as in 2012 a reporter from the Qilu Evening News wrote about the practices in China’s small tire recycling branch: “The report outlines dangerous and unsafe practices; the attempted repair of irreparably-damaged tires; burning of tires in the open and other; ‘no questions asked’ practices,” the contemporary witness was quoted. This reflects the situation of the tire industry that is highly fragmented and often works on very limited margins. “Most of the mid-scale Chinese producers operate on wafer-thin margins, thus, even a marginal change in raw material prices often results in a number of hardships for the mid- and small-scale producer”, the China Rubber Industry Association gave account in Summer 2018.

Anyway, China’s automobile industry has been developing fast. According to a China tire industry report, China was the world’s largest automobile manufacturer and the largest sales market between 2009 and 2016. “The increased production volume and reserve volume of automobiles in China stimulates the demand for automobile tires.” And the demand for appropriate materials. As China is regarded to be the world’s largest producer of natural rubber and

has other rubber resources and purposes of the usage of rubber, recycled tires are only one option to advance the material stock. This is shown at the China Rubber Industry Association, where the “tire branch” ranks among 14 other subdivisions, even if the total generation amount of scrap tires in China and the U.S. is estimated to reach 500 million and total weights of about ten million tons.

Attention growing

To facilitate the industrial transformation and upgrade as well as improve the whole level of the renewable resources industry, the Ministry of Industry and Information Technology in 2015 confirmed the so-called “Major national resources recycling demonstration engineering” and released a notice. It launched nine projects of tire rubber waste utilization. The listed schemes included amongst others projects for 300,000 tons of waste tires rubber construction, for tire recovery and whole industry chain resources recycling, for major intelligent clean demonstration engineering of 130,000 tons, for disposal and recycling of 200,000 tons per year, and for the improvement of an 11,000-ton waste tires production line.

In the same year, the automobile industry began to pay attention to rubber recovery. Li Guo Qing, managing director at China Automobile Parts Holdings Ltd, saw a growing request in China to recycle rubber tires and other rubber waste products. He was quoted with the words: “China being the world’s biggest automobile market represents a huge demand for this technology. There is an enormous gap in the market for those looking for ways to dispose of used tires.”

The Catalogue for Investment

In 2015 too, the Chinese government reacted to the climate change, adopted the 13th Five Year plan and released a Catalogue of Industries for Guiding Foreign Investment. According to business information China Briefing Magazine, the Chinese government – to reform the country’s recycling industry – needed among others investment in foreign technology and expertise to develop urban recycling facilities and modern treatment and reprocessing practices. The Catalogue was revisited in 2017 and includes a need for capital spending on the manufacturing of equipment for the collection, treatment and recycling of used and waste plastics, electrical appliances, rubbers and batteries. And offers foreign financial input at recycling and treatment of waste and used electrical and electronic products, automobiles, electromechanical equipment, rubbers, metals, and batteries.

First joint ventures

The industry followed the call. In December 2011, UK based supplier of mechanical components Blue Diamond Technologies and its Canadian Affiliate ECO/BDT formed a joint venture with Insigma Technologies of China. Matter: the establishment of overall 13 facilities for the production of reusable crumb rubber, clean steel, and fiber from used vehicle tires. In March 2014, Sweden-based En-

viro Systems AB signed a memorandum with state-owned Vanlead Group, southern China’s largest tire manufacturer, for a tire recycling plant in China. It was planned to use Enviro’s reclaimed carbon black material in Vanlead’s tire production of 30,000 tons of tires annually. In June 2015, the Central China Rubber Resources Recycling Industrial Park in Xiangyang broke ground. 340 million US-Dollar funding was planned to make it the country’s largest rubber recycling park with a capacity of 300,000 tons per year for rubber modified asphalt and 100,000 tons per annum for recycled rubber.

Industry 4.0 rubber recycling

In October 2017, US-based tire recycling systems producer ECO Green Equipment announced the completion of a new rubber powder tire recycling plant in Maanshan, China. The new system providing the latest tire recycling technology for the city was handed over to the Anhui GVG New Material Co., Ltd. In December 2017, Swiss cleantech startup Tyre Recycling Solutions signed a strategic alliance with the Longjiang Environmental Protection Group to open a factory in China by 2019. And in January 2018, Chinese tire manufacturer Doublestar announced to build an innovative scrap rubber recycling plant in Zhumadian. Nearly 93 million US-Dollar investments are intended to deliver an annual capacity of 200,000 tons to completely recycle scrap tires and produce carbon black, fuel oil, synthetic gas, and steel wire. According to Doublestar, the plant will become the world’s first “Industry 4.0 plant” for scrap rubber recycling, which will use innovative machinery for procedures such as rinsing, sorting, conveying, storage, drying and pyrolysis process.

A scientific study comparing tire recycling in the United States and China comes to the conclusion: “Management policies on scrap tires in the U.S. are more comprehensive and stricter than those in China. ... In the U.S. co-disposed as an alternative fuel is the main outlet for scrap tires, while in China they are mainly recycled to produce reclaimed rubber.”





A global trend

Of course, waste tire recovery is not limited to Europe, the USA, and China. The struggles to treat the material in a financially available and under circumstances environmentally acceptable manner are spread globally. In India for example, the Gujarat Pollution Control Board in 2011 had to shut down 45 oil-producing pyrolysis units since they used substandard and polluting technology imported from China – equipment meanwhile banned in China itself. Redisa, the Recycling and Economic Development Initiative of South Africa, started a system in

which waste pickers would collect 30 million waste tires, based on “the polluter pays” principle. But instead of creating jobs and improving the environment as promised, it turned out to be a “get-rich-quick scheme for a small group of individuals”.

In Russia, tire manufacturers have to fulfill recycling norms including 20 percent in 2017-2018, 25 percent in 2019, and 30 percent in 2020. Additionally, in January 2017 EcoTyres Union was founded in Moscow for independent compliance with the recycling targets of used tires by international tire manufacturers like Bridgestone, Continental, Hankook, Michelin, Nokian Tyres, Pirelli, and Yokohama. In Colombia, mining company Carbones del Cerrejon Ltd. inaugurated Latin America's first large-tire recycling plant in 2016. And Australian's Tasmania ABC.net reported that Launceston City Council had given the green light to Phoenix Rubber Products to develop a tire recycling plant for the production of traffic calmers, bollards and playground and equestrian surfaces – products that currently have to be imported, while waste tires are bailed and exported to China for recycling.

The fields of activity for waste tire recycling are increasing. Stated in numbers, the elastomers market will grow by 13 percent per year from 2018 to 2025, according to Global Market Insights Inc.

New Foreign Investment Screening Regulation in Europe

The new EU framework for the screening of foreign direct investments has officially entered into force on 10 April 2019.

It is based on a proposal tabled by the European Commission in September 2017 and will be instrumental in safeguarding Europe's security and public order in relation to foreign direct investments into the Union. “This new framework will help Europe defend its strategic interests,” President of the European Commission, Jean-Claude Juncker, was cited. “We need scrutiny over purchases by foreign companies that target Europe's strategic assets. I want Europe to remain open for business, but I have said time and again that we are not naïve free traders. The adoption and entry into force of this proposal in an almost record time shows that we mean business and that when it comes to defending Europe's interests, we will always walk the talk.”

According to the European Commission, the new framework will:

- create a cooperation mechanism where Member States and the Commission will be able to exchange

- information and raise concerns related to specific investments;
- allow the Commission to issue opinions when an investment poses a threat to the security or public order of more than one Member State, or when an investment could undermine a project or program of interest to the whole EU;



- encourage international cooperation on investment screening, including sharing experience, best practices and information on issues of common concerns;
- set certain requirements for Member States who wish to maintain or adopt a screening mechanism at national level. Member States also keep the last word whether a specific investment operation should be allowed or not in their territory;
- take into account the need to operate under short business-friendly deadlines and strong confidentiality requirements.

The EU has one of the world's most open investment regimes and is the main destination for foreign direct investment in the world, the commission underlined. Foreign direct investment stocks held by third-country investors in the EU amounted to 6,295 billion Euro at the end of 2017, providing Europeans with 16 million direct jobs.

Global Tire Material Market Will Grow

According to USA-based Zion Market Research, the global tire material market is expected to generate revenue of around 98.56 billion US-Dollar by the end of 2024.

In 2017, the market was valued at approximately 73.9 billion US-Dollar. The CAGR (compound annual growth rate) was projected to increase by about 4.2 percent between 2018 and 2024, according to the report titled "Tire Material Market by Type (Elastomers, Reinforcing Fillers, Plasticizers, Chemicals, Metal Reinforcements, and Textile Reinforcements) and by Vehicle Type (Light-weight Commercial Vehicle (LCV), Passenger Car (PC), Heavy Trucks, and Buses): Global Industry Perspective, Comprehensive Analysis, and Forecast, 2017-2024". Following the report, the upturn in the automotive production is the major factor driving the market. "The tire materials used in the automotive tires provide better traction, stability, and greater adhesive properties. Moreover, an increase in the number of automotive vehicles and passenger vehicles leads to the rising demand for the tire materials," Zion Market Research underlined. In addition to this, advanced technologies such as eco tires, flat run tires, nitrogen using tires, and others were further boosting the market growth due to the rising demand for the specialized materials, which strengthens tires and sidewalls.

The Asian Pacific market is estimated to increase at the highest rate during the upcoming years in terms of both volume and value. According to the information, the growth in this region is due to the easy availability of raw material. "India and China are considered to be the major countries contributing to the growth of the tire material market. Infrastructural facilities and skilled and cheap labor force are the aspects attracting most of the international automotive manufacturers to invest in the Asia Pacific."

North America is also expected to show significant market growth during the forecast timeframe. The massive automotive market, high consumer spending and high prices of the vehicle would lead to the projected rise, the market research company

is convinced. It expects the USA to be the dominant country in the region. Expansion in the production of passenger and commercial vehicles is driving the market in this region. For instance, approximately 12 millions of passenger and commercial vehicles are produced in the United States. "Moreover, major manufacturers such as Goodyear Tire and Rubber Co. and Cooper Tire and Rubber Co. are headquartered in this region," the company pointed out.

Recycled elastomers market is on the rise

The research firm Global Market Insights, Inc. forecasts the global recycled elastomers market share to surpass six billion US-Dollar by 2025. In its latest report on recycled elastomers market featuring the key industry trends across the raw material, application, and regional landscape, the expanding home and gardening sector is cited as the major driving factor fueling the demand for recycled elastomers. As reported, in 2017 the United States home and garden market was worth 272 billion US-Dollar and was expected to surge by another ten billion US-Dollar by the end of last

year. "The improving living standards in these economies will further boost the recycled elastomers market demand," the researchers predicted.

As per the report, the growing sports industry will also positively influence the recycled elastomers industry outlook, with the extensive application of these materials in playground surfaces. Crumb rubber derived from the tires are the most widely used infill materials for synthetic turf grounds.

In terms of revenue, the recycled styrene butadiene rubber market will register a CAGR of 13 percent over 2018-2025. Driven by the increasing investments in construction projects, recycled elastomers market share from infrastructure applications will record a CAGR of ten percent over 2018-2025, Global Market Insights said. The Asia Pacific recycled elastomers industry, in terms of volume, would record a y-o-y growth rate of 13 percent over 2018-2025.

➔ www.zionmarketresearch.com/report/tire-material-market

➔ www.gminsights.com/industry-analysis/recycled-elastomers-market



Indian Scrap Cars: “Rust in Peace”

End-of-Life Vehicle recycling in India is ripe for improvement.

According to figures of the Society of Indian Automobile Manufacturers, the domestic sales increased between 2012/13 and 2017/18 from 17.7 to 24.9 million vehicles. However, the rising number of end-of-life vehicles does not correspond to a quantitative or qualitative increase of scrap car treatment. Dr. Lakshmi Raghupathy, former Director at the Ministry of Environment, Forest & Climate Change of India and now consultant for environment & waste management, described the recycling situation in her country on the 21st of March at the IARC in Vienna.

As the Indian speaker underscored, the shape of Indian scrap yards lack regulation and proper infrastructure and can be summarized by “Rust in peace”. The informal sector provides the major service by searching, collecting and salvaging reusable replacement parts. Small units are operating in the heart of the cities, offering potential employment for the urban underclass. The primitive manual treatment leads to air pollution, contamination of water and release of heavy metals into the soil. So better practices, access to more environmentally sound technologies, increased training of operations and efficient capacity building is urgently needed.

Policy framework still necessary

Several rules were notified to regulate amongst others the end-of-life vehicles sector: by setting directives to ozone-depleting substances, batteries, hazardous wastes, solid waste management, e-waste management, and plastic waste management. The automotive industry developed standards in-line with European Directives of 2000 and 2005, the Indian Automotive Research Association (ARAI) together with the Society for Indian Automobile Association (SIAM) and the Ministry of Road Transportation and Highways developed the ‘Automotive Industry Standards for End-of-Life Vehicles’ in 2015, and the government prepared a concept note on a voluntary vehicular fleet modernization policy in 2016.

A national policy framework is still necessary to control generation, collection, treatment, recycling and disposal of end-of-life scrap, said Lakshmi Raghupathy. The policy instruments to be developed include regulatory tools, financial instruments as well as incentives for assessment and capacity building. Guidelines are needed for the identification of end-of-life vehicles and for the prescription of environmentally sound management

procedures. This would regulate the collection channels, clear the necessary automobile recycling stages and integrate the informal and unorganized sector – responsible for the collection, decontamination, dismantling and salvaging – into the formal and organized sector – commissioned for processing and resource recovery.

Potential for the Indian steel industry

According to the information, meanwhile, the Global Automotive Research Center (GARC) in Chennai, India, is housing the facilities for comprehensive testing services, provides certification testing and research as well as development support to the national automotive vehicle and component manufacturers. And CERO is India’s maiden organized auto shredding venture and vehicle recycling unit treating specialized steels and other non-ferrous metals from automobiles. In its own words, this project aims to reduce environmental footprint through eco-friendly practices of recycling scrap vehicles, symbolizing an effort towards creating a zero waste and zero pollution eco-system.

End-of-life cars on average scale up to 1,600 kg and contain 65 to 70 percent steel, 15 to 20 percent rubber and plastic, seven to eight percent aluminum and one to 1.5 percent copper. As Lakshmi Raghupathy outlined, this could be a potential for the Indian steel industry: The country could scrap seven million vehicles or 25 percent of total cars, generate six to seven million tons of additional steel scrap in initial years and create a branch of around 2.9 billion US-Dollar, likely to increase in the future. The Indian government is quoted to estimate a fourfold growth of turnover for the automobile sector in the coming years. But recycling still takes place mostly in the informal sector, and political regulations or guidelines on End-of-Life vehicle treatment are absent. So, the circular economy could be “a road to future”.



Photo: O. Künth

India's Waste Treatment Market to 2025

Research and Markets is offering a new report on the "Waste to Energy and Waste Management Market in India – 2019".

The Indian garbage will offer a business opportunity of 14 billion US-Dollar by 2025 for the waste treatment industry. The growing economies across the globe are observing an increase in urban population, rise in per capita income level and increasing consumption level. "With India growing on similar grounds, increase in purchasing power has led to more affordability and accessibility of the resources that increased the levels of municipal as well as industrial wastes across the Indian states." On the country, close to 62 million tons of waste is generated on an annual basis "which will increase by two times by 2030," the authors of the report stated. The increase in municipal solid waste (MSW) and industrial waste has led to a rise in public health concerns and environmental impacts due to the production of greenhouse gases. Of the total generated municipal solid waste, close to 45 percent is actually

treated. More than 50 percent of the total solid waste generated remains untreated and dumped on the landfills due to the lack of efficient waste management system in India. "As municipal solid waste (MSW) holds close to 75 percent of the total waste generated in India, there lies an investment opportunity for the private players to convert a pile of garbage into the income streams," Research and Markets underlined.

Business opportunities

- In 2017, the Indian company NTPC invited national and international players to set up about 100 waste-to-energy pollution free plants across the country, one could read in "The Economic Times".
- India has the potential to generate approximately three gigawatts (GW) of electricity from waste by 2050.

- The government allows 100 percent FDI (foreign direct investment) under the automatic route for urban infrastructure areas including waste management subject to relevant rules and regulations.
- The central government has been implementing Swachh Bharat Abhiyan (a nation-wide campaign in India from 2014 to 2019 that aims to clean up the streets, roads and infrastructure of India's cities, towns, and rural areas), emphasizing waste management at different stages of generation, collection and disposal.
- Municipal solid waste management sector in India is projected to see capital and O&M (operation & maintenance) requirement of close to 65 billion US-Dollar by 2030.
- India has the potential to generate approximately 90 million tons/year of waste by 2030-2032.

➔ www.researchandmarkets.com

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Potential Business Options through Recycling

Can an emerging asset class stem Indonesia's tide of plastic waste?

Ever since pictures and videos of a polluted ocean at Nusa Lembongan in Bali went viral across social media, Indonesia's negative role as the world's second largest ocean polluter has been in the global spotlight. In 2017 the government pledged as much as one billion US-Dollar a year to dramatically reduce the amount of plastic and other waste products polluting its waters. The ambitious President Regulation No. 97/2017 – A Roadmap Towards 2025 – calls for a 30 percent waste reduction and the processing and managing of at least 70 percent of the country's waste not to end up in landfills.

Numbers vary, but currently Jakarta leads with a recycling rate of meager 7,5 percent, other areas average at 2-3 percent. A whopping 80 percent of waste in Indonesia's ocean area comes from 87 cities in Indonesia, mostly from Java island. But it is not easy to be sustainable in one of the world's largest emerging economies.

Indonesia's iconic beverage producer, SOSRO relied for many years on its own glass bottle deposit system but was forced by other market players to move towards plastic or PET. Soegiharto Sosrodjojo, the President Director of the group, explains: "We are not proud about selling all the PET volume for our beverages. We want to tell the market that glass bottles or cans are actually better than plastic in many ways, for safety, taste, preservation or the environment, but in terms of convenience, it is difficult to beat PET. But the question is, can you be responsible in throwing it away?" This is indeed the question we all have to ask ourselves and where public awareness will need to grow considerably. Soegiharto wants to go further: "We are ready to speak about environment, but we cannot do it fully on our own. This sort of movement has to be sup-

ported by big organizations, big players as well as the Government having to be 100 percent behind this."

The Indonesian government seems to realize this and has become the first country to sign up to The Global Plastic Action Partnership (GPAP), which is hosted by The World Economic Forum, aiming at fast-tracking circular economy solutions in coastal countries battling plastic waste.

What everyone agrees on is that major investments in the sector are imperative. The Indonesian Government has commenced the development of Waste-to-Energy (WTE) power plants in eight big cities, which is regarded as national strategic projects. WTE is seen as a catch-all to get rid of waste and generate "green" electricity at the same time. The progress of the projects has been dampened by the 2018 ruling of Indonesia's Supreme Court that incineration of waste is against the law because it produces hazardous pollutants. This can indeed be the case if a lack of sorting leads to a "wet" waste mix. The trash in Indonesia is to a large extent comprised of organic and other non-flammable materials which make it difficult for incineration plants to reach the high temperatures necessary to produce electricity and avoid toxic emissions and ash by-products. WTE works as a short-term solution to manage the waste crisis, but in long-term Indonesia will have to establish effective waste sorting systems to run the WTE plants properly.

There has indeed been a modest increase in expanded recycling processing capacity in the region since China essentially closed its market for the world's plastic waste, a policy named "National Sword". Even though Indonesia is considered mature in terms of investment in fin-tech and

e-commerce, solid waste management remains off the radar for most venture capitalists and investors. ETAPAS President Director Reza Bath, who is launching an app-based recycling trading platform coupled with environmental actions and awareness programs, acknowledges that it has been difficult getting to where he is today. "Investors are quick to put money in the tenth e-commerce company or the next peer to peer lending site but haven't yet put their head around waste management, let alone a company that is not a replication of a Western or Chinese solution. Venture capitalists like to call themselves innovators, but when you have a truly innovative idea that doesn't exist in the market, you meet blank stares," he explains. "Till date we've had to rely on angel investors even though we have a database of several thousand traders and orders of more than a million US-Dollar. We hope that we can attract foreign investors with greater appetite once we launch the App and have the payment gateway ready to execute trades," he concludes.

It might indeed take some time before investors truly embrace the topic of waste management, mainly because the sector is not yet able to offer evidence-based track records. We still need to see a solid pipeline of investable opportunities necessary to build confidence and unlock large-scale capital. Yet, when considering the impact of plastic in economic terms, it is estimated that plastic does 13 billion US-Dollar in damage to marine ecosystems annually. Plastic is being produced mainly for a first-use cycle, where 95 percent is lost to the economy thereafter (worth 80 to 120 billion US-Dollar annually). This is a massive problem, but also a major opportunity.

Author: Rolf Hajek

Rolf Hajek is senior director at Dreyer-Media, a UAE based agency that produces country investment reports worldwide which are published with prominent media outlets from the US and mainland China. Through its contacts, the company further specializes in investment facilitation and consults on international business expansion projects.

OECD: Raw Materials Will Double by 2060

The expansion of global economy and the rise of living standards is set to force the world's consumption of raw material to nearly double by 2060. The global materials use will increase to 167 Gigatons (Gt) in 2060 from 90 Gt today, according to a new report preview on the *Global Material Resources Outlook to 2060* published by the Organisation for Economic Co-operation and Development (OECD).

The report predicts the world population soaring to ten billion people, an average global income per capita approaching the current OECD level and per capita growth rates emerging higher than in the OECD. Economic growth coupled with growing investment, infrastructure and construction will solidly increase the global materials use, especially of non-metallic minerals and metals increasing strongly. A changing demand from agriculture and industry to services will alter the economy and decrease the materials intensity (materials use per unit of output). Despite production growth, technological improvements are expected to slow down the material usage. In figures: The level of 2011 with 79 Gt will rise by 283 Gt caused by economic growth, but lowered through structural change by 112 Gt and technological change by 84 Gt, resulting in projected 167 Gt in 2060.

Greatest share: non-metallic minerals

The future increase of material use from can be monitored at metals (8 Gt to 20 Gt), fossil fuels (14 Gt to 24 Gt), biomass (20 Gt to 37 Gt) and non-metallic minerals (37 Gt to 86 Gt), the latter including a share of sand, gravel and crushed rock. This material with a value of 24 Gt in 2011 will soar to 53 Gt in 2060. The use of primary and secondary metals is predicted to grow fastest, especially in BRIICS states (Brazil, Russia, India, Indonesia, China, South Africa) and developing countries. The non-metallic minerals use will increase rapidly – in the short run – because of investment demand, construction needs and lacking high-valued recycling. This increase concerns mostly developing countries; China is expected to be saturated with construction materials.

The recycling industry, currently a tenth the size of the mining sector in

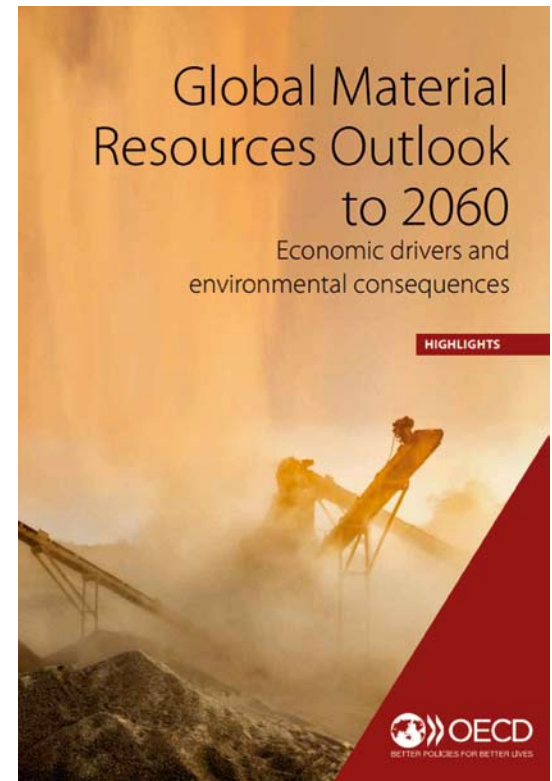
terms of GDP share, is likely to become more competitive than the mining of minerals and grow, but it will remain a much smaller industry than mining primary materials. Although the share of recycling in the global economy is ten times smaller than the share of mining, recycling will economically increase until 2060 by the factor 3.7 compared to mining with factor 2.6. Primary and secondary iron and steel will grow by factor 2.8. Primary non-ferrous metals are expected to put on by factor 3.0. Secondary non-ferrous metals will experience a mild decrease by 2060 effected by relatively high labor costs for the secondary production methods.

Material intensity rate will further decrease

From 1980 to 2017, the global material intensity rate decreased by -1,1 percent. In the future it will decrease by -1,3 percent: The annual growth of global GDP is estimated at 2,8 percent, while the usage of global materials use will rise by 1,5 percent per year. The resulting decrease of annually 1,3 percent is expected to be moderated after 2025 due to trends like more service and booming constructions slowing down. The change in material intensity from 2011 to 2060 – phrased in tons per US-Dollar – will mostly affect Eurasia (0.9 to 0.5), Asia (1.4 to 0.5), Middle East and Africa (0.8 to 0.5) as well as South America (0.8 to 0.4), less OECD America (0.5 to 0.3), OECD Europe (0.4 to 0.3) and OECD Pacific (0.6 to 0.5). Nevertheless, the level of material use is projected to rise between 2011 and 2060 from 27 to 38 Gt in China, from 9 to 23 Gt in India, and from 24 to 67 Gt in non-OECD countries, excluding China and India.

Objectives should be alike

Summarized, the figures show countries at different levels of material resources usage and of decoupling



materials use from economic growth. But the objectives of resource efficiency and circular economy policies should be alike: increasing recycling, increasing the share of secondary resources, reducing waste streams, boosting economic growth, boosting employment and avoiding environmental impacts, not to forget opportunities for substituting secondary for primary materials. "This multitude of policy objectives requires a carefully balanced policy mix," the report concludes. Angel Gurría, Secretary-General of the OECD, is quoted with the words: "This Outlook can help decision makers understand the direction in which we are heading and help to assess which policies can support a more circular economy."

The preview of the "Global Material Resources Outlook to 2060. Economic drivers and environmental consequences" can be downloaded under www.oecd.org/environment/waste/highlights-global-material-resources-outlook-to-2060.pdf.

Pacific Region: Programs for Waste Management and Climate Change Adaptation

Two programs amounting to almost 32 million Euro were signed by the European Union (EU) Commissioner for International Cooperation and Development, Neven Mimica, on the occasion of his visit to the Pacific. The goal is to promote sustainable waste management and support adaptation efforts to the effects of climate change. "They underline the EU's strong commitment to the Pacific region as well as reinforcing the strong cooperation between the Pacific

region and the EU," a press release said. As reported, the Pacific-European Union Waste Management Program will provide 16.5 million Euro to manage waste in the region. This would aid the Pacific area to address issues relating to health and well-being, marine litter and biodiversity conservation. It will be implemented in partnership with the SPREP (Secretariat of the Pacific Regional Environment Programme) with other key regional partner agencies.

Signing up the The Global Climate Change Alliance Plus – Scaling-up Pacific Adaptation Programme (GCCA+ SUPA), the EU will allocate 14.89 million Euro to help the region adapt its plans and strategies towards climate change. According to the information, it will be implemented in partnership with SPC (the Pacific Community), SPREP (Secretariat for the Pacific Regional Environmental Programme) and USP (The University of the South Pacific).

New Stainless Steel Recycling Site in Thailand

In April, Oryx Stainless (Thailand) Co., Ltd., a market leader in stainless steel recycling in Thailand and South East Asia, celebrated the opening of its new site in Bangpakong (Chachoengsao province, Thailand).

More than 200 guests from Thailand, all over Asia and Overseas traveled to Bangpakong to congratulate staff, management and shareholders of Oryx Stainless to the successful start of the modern state-of-the-art facility, the internationally operating company group reported. After the old yard run out of capacity, the new factory

would form the basis for the further dynamic growth of Oryx Stainless in Thailand over the coming years.

According to the Thai company, the quantities delivered to the stainless-steel industry during 2018 stand for about 350,000 tons of carbon dioxide savings. The corporate group in total

contributed more than 2.2 million tons of CO₂ savings.

Oryx Stainless is planning to open another facility with the successful Thai operation being the blueprint for further expansion in Asia.

➔ www.oryx.com

New Pilot Facilities Planned

Swedish mining company Luossavaara-Kiirunavaara Aktiebolag (LKAB) intends to invest in pilot plants for phosphorus and rare earth metals.

The company will invest 45 million Swedish kronor (converted into US-Dollar: nearly five million) in pilot plants as part of a pre-feasibility study "to define a process that enables recycling of mine waste through innovative processing, producing critical raw materials. Lab tests conducted during the year confirmed that we can produce more phosphorus and rare earth metals than estimated," President and Group CEO Jan Moström informed in

February this year. LKAB intends to build two pilot plants for development and preparation for full-scale industrialization: one in the orefields and one in Uppsala. "The orefields plant will produce apatite from tailings sand. The plant in Uppsala will be run by the Ragn-Sells innovation company EasyMining, which has developed the patented technology for extracting pure monoammonium phosphate (MAP) and rare earth metals (REE)

from apatite," a press release said. According to the information, full-scale industrial production of MAP would correspond to an estimated 500 percent of Swedish demand and production of REE would amount to about two percent world production. The pilot phase will continue through 2020. A decision to go ahead with full-scale production may be taken in 2021.

➔ www.lkab.com

Kenya: Plastic Bottle Recycling Initiative at Schools

In Kenya an initiative to engage schools in safe disposal and recycling of plastic bottles was launched by the national Ministry of Environment and Forestry and the industry, businessdailyafrica.com reported. Students in Nairobi schools would be trained in the best practice of plastic waste management. Plastic waste bins would also be distributed in homes and schools. "Students can be a part of environmental transformation," Mucai Kuniya, Vice Chairman of the Kenya Association Manufacturers (KAM), was quoted.



ERI: Making the World a Better Place, One Electronic Device at a Time

ERI processes electronic waste in an environmentally responsible way in eight certified locations serving every zip code in the United States. Apart from IT and electronics asset disposition services, data destruction and cybersecurity the company continues to follow its “Green is Good” motto and maintains a core commitment to sustainability and the environment. Empowered by its mission to protect people, businesses and the planet, the company, spurred by innovation, is prepared to deal with the growing heaps of e-waste working through the global waste stream.

These days, the saying “the quicker, the better” applies to almost everything – from mass media to various industry sectors, particularly with consumer electronic devices. Every day, this trend is reflected in the ways those devices are being improved, boosted and adjusted to the needs and wishes of the customers. Constantly, users are confronted with faster, sleeker smartphones, more efficient laptops or more advanced tablets. Hence, electronic equipment which does not fit into the format of the newest technology ends up being discarded and replaced by the latest and greatest devices on the market. The mindset to discover new gadgets without consideration for the enormous waste stream that comes along with this trend results in large amounts of unwanted electronic waste full of harmful components such as lead, cadmium and mer-

cury, which end up in landfills. Companies that are working toward sustainability goals and trying to establish an image of environmental responsibility are already reacting to the modern surge of e-waste and are looking for ways to have their unwanted or out-of-date electronics recycled responsibly. This ambition leads in the right direction, but what about the sensitive and private data those devices still contain? And how can the desire for sustainability as well as an adherence to circular economy principles be satisfied while dealing with the data privacy issue and the overall swelling waves of e-waste in general?

These are the questions that matter most to the US-based company, ERI. The enterprise is a fully integrated IT and electronics asset disposition provider and cybersecurity-



focused hardware destruction company. Its mission is to safeguard organizations, people and the environment through fighting against hardware hacking and providing an efficient and sustainable method of gaining control over the constantly growing glut of e-waste. The whole concept of ERI's work goes back to 2002 when Aaron Blum started a small recycling company. Two years later Blum partnered with his friend, social entrepreneur John Shegerian. Both were keen on the idea of recycling electronics and decided to get Shegerian's wife Tammy and mutual friend Kevin J. Dillon on board to realize their plan. The four became the founders of ERI.

A relocation of the company to Fresno and the establishment of new industry standards such as totally green facilities and customer-friendly transparent tracking systems led to a series of problem-solving innovations and steady, continuous growth. The founders decided to expand the business to different areas in the U.S. In 2007 Massachusetts was chosen as the place for the second facility. Afterward, more facilities in Colorado, Indiana, Texas, and Washington followed. Today, ERI has established eight certified facilities with the total capacity to process more than a billion pounds of electronic waste annually, servicing every zip code in the US.

Expansion of services and facilities

Even though ERI initially solely focused on end-of-life electronics at first, over time, IT asset disposition (ITAD) was added to the company's range of services. The process refers to the secure and responsible reusing and recycling of redundant and discarded electronic assets. In general, every organization has the responsibility to conform to both federal and state laws with regard to data security, information privacy, and environmental protection. ERI pays close attention to address those issues to help protect its clients' reputations and prevent costly fines which come with regulatory violations.

After its expansion of services and placement of facilities throughout the U.S., the company did not stand still. Due to ERI's wish for more effective shredders and to meet growing demand, the company decided to design its own machines. Today, materials ranging from smartphones and televisions to computers and printers are processed in the company's innovative, enormous e-scrap shredding sys-



The four founders of ERI: Kevin Dillon, Tammy Shegerian, John Shegerian and Aaron Blum (from left to right)

tem, the largest and most efficient of its kind in the world. Always innovating, ERI's spectrum of electronics processing technology, techniques, and service delivery methods also include a self-contained flat panel shredder system, patented electronics collection bins and a proprietary CRT glass separation technology.

Bringing e-waste solutions to major cities

ERI's commitment to sustainability and the environment is also reflected in its aim to bring e-waste solutions to major areas such as various major metropolitan areas in the States. Consequently, working directly with ERI, New York City has initiated a citywide e-waste residential collection program called ecycleNYC. The award-winning program has now collected more than 20 million pounds of electronics from New Yorkers for responsible recycling. Similarly, the city of Los Angeles teamed with ERI and started the Electronics Recycling Mail Back Program. As a result, the residents of Los Angeles can now order an ERI Mail Back box online for a small fee. People can use this box to pack up obsolete electronics and send the packages to the city or drop them off at one of the city's electronics recycling centers.





Fighting Cybercriminals

Every year, a million tons of e-waste is not disposed of properly. Computers, tablets and household appliances end up in landfills, are illegally traded or stockpiled. ERI is aware of those facts and actively works to tackle the significant issues of hardware hacking and data mining by providing solutions for guaranteed data destruction along with responsible recycling practices. A growing and often overlooked threat to society on a global level, has been the emergence of cybercriminals and hackers. They are searching for sensitive data and private information that discarded electronic devices often contain. Thus, it became inevitable – not only for businesses and government agencies, but also for individuals who want to secure their personal data – to make use of responsible and fully integrated ITAD and e-waste recycling services. ERI specializes in the destruction of all data via on-site or mobile, off-site destruction methods and recognizes that it has become essential that outdated devices must be responsibly processed – both in terms of the environment and from a data destruction standpoint. According to ERI's principles, that process should be done on-site by certified electronic recyclers and should always include complete, physical data destruction. Guaranteed data destruction is key. Some companies believe their data is being wiped when they drop devices off for recycling and that is not always the case. Also, unethical and illegal shipping of e-waste abroad has become an additional layer to the hardware hacking issue because it leads to the wholesale liquidation of national security and the privacy of the corporations and individuals who once used the devices. "Recycling

these devices is important, but it must be done the right way," underlined John Shegerian.

In come the robots

Despite the company's already highly advanced technologies and innovations, ERI continues to introduce industry-changing technological advancements. The latest innovation from the e-waste recycler is its employment of two A.I. driven robots called SAM and ERNIE. These machines are tasked with separating out commodities after the company's proprietary shredding process.

The company is constantly growing – according to ERI, approximately 10 to 15 percent per year – and the robots help to increase sorting accuracy and free up the other employees to perform ITAD and data wiping services. Hence, SAM and ERNIE help to enhance the sorting efficiencies. Furthermore, the robots can efficiently separate shredded materials such as aluminum, printed circuit boards, yellow brass, capacitors, and copper products into a clean stream. The picking is done via a vacuum system, and the new technology can currently achieve about 70 picks per minute. The company is convinced that artificial intelligence will play a leading role in the future and future plans include that ERI will have added robotics and AI to all of its facilities by next year.

Maintaining transparency

One of the most important elements of ERI's mission is its transparency. "We strive to exhibit the most radical transparency of any recycling company in the world," says John Shegerian. "We host over 100 in-person audits a year at our facilities by our clients and certifying bodies. And our downstream is the most direct and transparent that has ever been achieved in our industry because two of our minority strategic investors (LS-Nikko Copper and Alcoa) take much of our shredded commodities for beneficial re-use. This allows us to be right in the middle of the Circular Economy while transparently accounting for where all our commodities go."

In order to further enhance its transparency, the company has developed its own online asset tracking system called MyTrackTech to provide customers with real-time updates on their account activities. The online IT and electronic asset disposition portal is a configurable solution. Moreover, it is securely accessible 24/7 and can export key data on demand, run asset reports, or order services. Through MyTrackTech, the company's clients can enjoy the benefits of real-time visibility into all aspects of asset disposition.

With the massive and continuous increase in the amount of e-waste forcing its way into the waste stream, there is no shortage in terms of need for ERI's services. ERI remains prepared to recycle any type of electronic device – from phones and televisions to computers and printers – and to recycling them in innovative and responsible ways that protect people, companies and the planet.

➔ www.eridirect.com



Focus on Customers, Quality and Service: Tailor-Made Crushers “Made in Ellerau”

bomatic GmbH based in Ellerau near Hamburg supplies the recycling branch with customized shredders for more than 20 years.

One company focus are machines for the shredding of car and truck tires as well as technical rubber. bomatic manufactures machines for the complete process from the pre-crushing through to the granulates. For a long time, bomatic banks on the idea to develop each machine according to the customer's needs and then build those high-quality machines in Ellerau. Obviously, the company also takes care of maintenance and service.

The company has established a successful position for itself in the market by pursuing this strategy. “In the past years, customers had to see for themselves if the crushers, which they bought, are really suitable for their needs. However, nowadays, we build machines our customers are looking for,” explains Marion Böttcher, managing director of bomatic. “The focus on our customers is our strength but at the same time a daily challenge.” For example, the company has designed and build a shredding plant for used tires according to the customer's needs. Now the customer has a two-level crushing plant which reliably crushes car, truck and tractor tires in palm-sized pieces since the middle of 2018. The facility was planned and built in combination with band conveyors and an electrical control system. The core parts are composed of rotary shears of the type bomatic B1350DD with 2 x 55 kW in the process of pre-crushing and the type bomatic B1000DD with 2 x 22 kW in the process of secondary crushing. How-



ever, in the last few years, bomatic did not only produce machines for the crushing of tires but also for other products, that need to be processed. Thus, the company delivered crushing plants for fire extinguishers, zinc die-cast sprues, food waste, renewable raw materials, and many more.

Four different product lines

Nowadays, bomatic relies on four different product lines. Up to today, the rotary shears are one of the most important components of the product portfolio. These shears are available in customizable sizes and designs.

The Unicrex-Granulators – single shaft machines, which have been developed to granulate pre-crushed solids – are able to granulate, for example, tires, refrigerators or e-waste in very small granulates and prepare these granulates for further recycling.

The Vertical-Shredder Rotacrex has become a popular product since the first launch in 2012 and is available in three different sizes. The machine crushes or opens the material by impact plates in a way they are sortable for the further process. The adjustment of the grain size can be regulated through a slider located at the outlet.

Additionally, bomatic offers an extremely robust four-shaft shredder, which especially stands the test with in the crushing of hard disks and data carriers. Due to the four-shaft technology, it is possible to integrate a perforated screen underneath the slowly running cutter blocks and thus obtain homogeneous sized granulates.

The company's performance spectrum encompasses the whole production process from the construction and projecting to the installation through to the initial operation at the customer's site. Repair work, as well as maintenance, are important parts of bomatic's business. Therefore, the company has in stock all of the standard wearing parts. Thus, bomatic provides its customers with these parts as quickly as possible. Due to that, the construction of a third hall has been commissioned, of which one half will function as a storage area. Furthermore, there will be enough space for a technical center, which is currently being established.

Moreover, the company already invests in new machines. At the moment a new series, which was constructed for a special case of application, is currently undergoing test operations.

➔ www.bomatic.de



Award-Winning Sustainable Recycling

Austrian-based company Saubermacher won the TRIGOS Steiermark 2019 award in the category of climate protection. The price has been awarded to the High-Tech-Recycling Facility – which has been opened the previous year – for the recycling of lithium-ion batteries. The environmental pioneer has received the award during a gala in the old university in Graz.

The internationally operating company has won the price for its sustainable economic activities. At the location of Redux Recycling in Bremerhaven (Germany) – a company of the Saubermacher Group – the recycling facility for lithium-ion batteries has won the outstanding first place in the category of climate protection. During years of research work, Saubermacher and Redux developed processes and techniques. Now, the facility processes all kinds of lithium-ion batteries and is equipped with a capacity of 10.000 tons per year. With this innovative proceeding, Redux reaches recycling rates, which are above the legal target value by up to 40 percent.

Production of raw materials 4.0

Lithium-ion batteries are heterogenic to a high degree regarding their composition and have a high energy content even at the end of their life. Accordingly, the recycling of these batteries is difficult. Thus, high-security standards are necessary. Therefore, Saubermacher and Redux rely on a multilevel procedure with a sorting line as well as mechanical processing. "We are able to reach recycling



Valentin Stein – Saubermacher AG, Herta Stockbauer – Hostess and Chairwoman of the BKS Bank, Gerhard Ziehenberger – Member of the Executive Board, COO, Saubermacher AG, Stefan Siegl – Saubermacher AG, Laudator Teresa Habjan of the IV Steiermark and Hans Roth – Saubermacher AG (f.l.t.r.)

rates of up to 70 percent in contrast to other methods", informs Gerhard Ziehenberger, COO of Saubermacher AG. It is possible to recover secondary raw materials such as stainless steel, aluminum, copper or active material. The energy, which is recovered in the course of discharging, is injected in the operating network of Redux.

Social responsibility

Every year the TRIGOS Steiermark is awarded to companies which live for social and public responsibility by conviction. "Saubermacher attaches high importance to the ecological and social responsibility since business formation. To recognize our responsibility towards the company, society and the environment is a matter, that is extremely close to my heart. Therefore, we have even put this into writing – in the company's code of ethics," explains Hans Roth, owner and chair-

man of the supervisory board of Saubermacher, who is delighted at winning the award.

About Saubermacher

Saubermacher Dienstleistungs AG is an international waste management and recycling company based in Feldkirchen near Graz (Austria). The family business was founded by Hans and Margret Roth in 1979 and is a competent partner for around 1.600 municipalities and about 42.000 companies. The company employs about 3.200 staff members in Austria, Germany, Czech Republic, Hungary, Slovenia and in the United Arab Emirates. Saubermacher has won first place in the sustainability assessment of GRESB. Accordingly, the environmental pioneer is the most sustainable waste management company worldwide.

➔ www.saubermacher.at



Photo: Saubermacher AG

Photo: Hannes Krainz

Songwon Partnered with German Company

South Korean Songwon Industrial Co., Ltd. announced that it is able to package its products in 20 kilogram PE-bags made with 50 percent recycled Polyethylene (PE). The chemical company and manufacturer has collaborated with the German packaging specialists, RPC bpi Nordfolien, to develop PE-bags for packaging 20 kilograms of product "using recycled materials originating from different waste streams, including industrial printed bags that have already been used". All of the solvents that are required for de-inking are also recycled continuously in a closed loop process. According to the company's information, the recycled bags were successfully trialed on various customers to make sure that they met Songwon's quality standards and those of the customers for strength, color stability and handling. The company intends to continue the smooth transition to the new recyclable packaging over the next months.

➔ www.songwon.com, www.nordfolien.com

Peru: New Steel Mill

The Peruvian Corporación Aceros Arequipa S.A. (CAASA) has awarded German-based SMS group an order covering the supply of mechatronic equipment for a new steel mill and a billet caster with six strands for its Pisco site in Peru.

The plant is designed for an annual capacity of 1.2 million tons and will produce billets with sections of 130, 160 and 180 millimeters. Commissioning is scheduled for 2020. SMS group's scope of delivery includes basic and detail engineering, supply of all mechanical and electrical components, the entire electrical and automation system including an integrated process control system (level 2) which monitors the steel quality from the scrap yard to the billet storage area, as well as the supervision of erection and commissioning.



According to SMS group, the company will supply a 120-ton AC electric arc furnace "equipped with innovative technology to secure high productivity levels. A Condoor automated slag door will reduce downtimes and thus make the process more efficient. The Conso injection system, in combination with the Aereg electrode controller, will permit over 180 tons of steel to be produced every hour in a steady

and continuous process. SMS group's scope of supply also includes a ladle furnace meeting all requirements with regard to the respective steel composition." The steel mill will be equipped with a gas cleaning plant capable of processing over 2.2 million cubic meters of process gas per hour, with the frustum exhaust hood from SMS group permitting the gases produced during furnace charging and

tapping to be captured and extracted more effectively. SMS Concast, an SMS group company, will supply a continuous billet caster with six strands. The caster will have a casting radius of nine meters and be equipped with the proven Convex mold, a technology that is both widespread and well-established on the market. "The special inside geometry of the mold allows for a greater transfer of heat across the whole mold, with a uniform degree of solidification in the corners. The efficient strand shell guidance in the mold with maximum symmetrical cooling not only increases the casting speed but, at the same time, improves the quality of the cast product."

The Conflow tundish stopper is used to ensure a stable flow of steel and a reliable casting process. Constir, an electromagnetic stirrer used as a mold and final stirrer, ensures the required metallurgical quality. A new alternating oscillator allows for high flexibility and thus enhanced productivity.

Photo: SMS group GmbH

Canadian Company Intends to Increase Rare Metal Recycling

Canada-based company GéoMégA has developed a rare earth separation technology, ISR, and is securing a supply of feed material, among others magnet waste from Europe.

Its subsidiary company Innord Inc. has entered into a non-binding Letter of Intent with Rocklink GmbH, German-based rare earth, cobalt, and minor metals recycling company to acquire up to 100 tons per year of feed material for extracting and refining rare earth oxides using its proprietary ISR technology. The agreement



shall be in effect for a minimum of two years starting from the effective date of the definitive agreement while the amount could be increased to up to 200 tons per year following a mutual agreement between the parties, GéoMégA reported. The Letter of Intent would more than double the potential annual feed supply and as well open the door to the European market for Innord. The corporation would continue securing an additional supply of feed material to have more than 50 percent of the targeted annual processing capacity (500 tons per year) secured.

"Innord is excited to begin working with Rocklink, a leader in procurement, recycling and trade of rare earths, cobalt and other minor metals

from production residues and end-of-life scraps. Their extensive network and knowledge of the end-of-life market, especially in Europe, is second to none. Both companies have the same goals which is increasing rare metal recycling by offering sustainable and environmental solutions which bring cost efficiencies to the producing companies. We believe that as end of life magnet recycling is becoming a focus point for the permanent magnet industry, Rocklink's recycling approach and Innord's ISR processing technology will set an example for permanent magnet recycling outside of China," commented Kiril Mugeran, President and CEO of GéoMégA and Innord.

➔ www.ressourcesgeomega.ca

Photo: Geomega Resources Inc.

INGEDE: Successful for Deinking Issues

In 1989, leading European paper manufacturers founded the “International Association of the Deinking Industry”.

Deinking is a key process in paper recycling and means the removal of printing ink. The association, which celebrated its 30th anniversary, supports research in the field of deinking utilizing the work of well-known research institutes to fulfill the needs of its members. INGEDE also cooperates with other players in the field of recycling, as with printing ink and machinery manufacturers, paper finishing industry and suppliers of additives.

The annual events of INGEDE – as the symposium in February this year – coincided with the association’s

30th birthday. The meetings saw an increased number of attendees, over 50 percent more than two years ago, the association informed on its homepage. According to the information, the INGEDE Symposium is the only international meeting covering all aspects from recyclability and paper recovery to the treatment of paper for recycling. With more white packaging entering the recycling stream, these fibers would become increasingly interesting for deinkers.

A brief history of INGEDE

“INGEDE contributes to recycle paper to the highest level of purity and brightness while the world is still consuming natural resources as if they were unlimited,” was one of the key messages of Bernhard Steinbeis, the association gave account. Steinbeis was INGEDE’s founding chairman in 1989, the first in a row of five, followed by Erwin Krauthauf, Rolf Maisch, Ulrich Höke, and today Thomas Krauthauf. At the symposium in Munich, Thomas Krauthauf reported about the successes of INGEDE in the past – the first issue and the reason to join forces within

INGEDE was to prevent the spread of water-based flexographic newspaper printing. INGEDE continued providing orientation for printers, converters, and their suppliers to improve recyclability; then also developing standards and methods to improve the quality of paper for recycling. INGEDE’s methods for incoming inspection of paper for recycling are internationally accepted standards today as well as the methods to evaluate the recyclability of printed products.

Ongoing tasks and challenges are new printing technologies and more complex paper products as well as the declining availability of white fibers in the paper for recycling, just to name a few. In his welcome address, Steinbeis did not only bring some allusions to politics but he also briefly touched upon the financial aspect of INGEDE membership: “The fees charged per ton of paper for recycling did not really hurt. INGEDE reduced the fee from 15 to seven cents per ton of paper for recycling while the world around is greedy without end.”

➔ www.ingede.com



Photo: Brigitte Weber

Spanish Ecotic Utilizes Sourcing Platform to Manage WEEE Materials

Ecotic, a private Spanish non-profit Waste Electronic and Electronic Equipment (WEEE) management organization, has processed more than 97,000 tons of waste in 2018, leveraging the sourcing platform of USA based management company Jaggaer.

The organization collects and recycles – in response to the legal requirements on producers and distributors of electrical and electronic equipment – WEEE including air conditioning, appliances, communications equipment, electrical and electronic tools, medical devices, and all types of computer equipment. The entity would serve more than 6,000 collection points throughout the Iberian Peninsula, including clean points and distributors, a press release informed. By 2019, Ecotic expects to manage over 120,000 tons of waste through the platform. According to Jaggaer, its collaborative sourcing platform has allowed the Spanish organization to channel the information of more than 100 managers and carriers through a workflow that involves distributors, processors, processing centers, recyclers and industrial consumers. The solution would also ensure “that all potential suppliers comply with the requirements for financial solvency. Ecotic joins the many companies that have taken advantage of Jaggaer’s expansive spend management technology to bring transparency, efficiency, time and cost savings to their processes.”

Jaggaer considers itself as the world’s largest independent spend management company with over 2,000 customers connected to a network of 3,7 million suppliers in 70 countries. The company offers a complete SaaS-based source to pay eProcurement solution with advanced spend analytics, sourcing, supplier management, contract lifecycle management, saving tracking and intelligent workflow capabilities.



Better Waste Management to Combat Climate Change

In March this year, the Thai Public Broadcasting Service reported that Thailand's Ministry of Natural Resources and Environment would propose to the cabinet a total ban on the import of plastic waste into the country.

According to the information, the imports of plastic waste are to end at the beginning of 2020. At the same time, the country "will increase recycling of locally-generated plastic waste by as much as 100 percent within ten years, with the application of new measures that will require plastic products to contain a certain percentage of recycled plastic." Natural Resources and Environment Minister Gen Surasak Karnjanarat was quoted that he is confident that Thailand has the technology and facilities to reach this goal.

As further reported by the Thai Public Broadcasting Service, in the Kingdom of Thailand about two million tons of plastic waste are generated each year, but only 500,000 tons are recycled. The currently imported volume of plastic waste is being used for the production of plastic products to save cost.

Managing municipal solid waste

The "Thailand State of Pollution Report 2017", published by the Pollution Control Department of the Ministry of Natural Resources and Environment, pointed out that in that year the amount of municipal solid waste had not decreased compared to prior years. In 2017, about 67 million Thai people generated approximately 27 million tons of municipal solid waste. The volume had increased by 1.15 percent due to the population growth, city expansion, urbanization, consumption behavior and tourism.

According to the Pollution Control Department, the country's waste management had a good trend. After being segregated at source approximately 8.51 million tons of waste (or 31 percent) was utilized, representing an increase of 47 percent compared with the previous year – the lion's

share was recycled waste (84 percent); the amount of utilized organic waste reached about 15 percent. The remaining waste of 11.69 million tons (43 percent) was collected and went for proper disposal, an increase of 22 percent over the previous year. 7.17 million tons (or 26 percent) of the waste was improperly disposed of (by open dumps, open burning or illegal dumping in public areas or water sources). As stated, this disposal method had decreased by 39 percent in 2017.

The improvements in waste management resulted from the government's policy after having put the waste management on the national agenda of 2014, the authors of the report underlined. Furthermore, the campaign of raising awareness of the people about waste reduction by sorting the waste at the source had supported the positive trend of waste management.

In the year under review, there were 3,101 municipal solid waste disposal sites countrywide. Out of this number, 2,867 disposal sites were in operation (234 sites were already closed particularly the small solid waste disposal sites in villages, or community and the waste storage areas which were almost full). The operating sites had 2,914 waste disposal systems. Out of this number, 677 disposal systems – such as mechanical-biological treatment, incinerators with air pollution control, segregation, compost and correct landfill systems – were properly implemented, “while 2,237 disposal systems were not implemented correctly and needed to be improved to minimize the environmental impact,” the report stated. “Such impact would cause trouble to people living around the waste disposal sites, which might lead to the opposition to the disposal sites construction in the future.”

The re-utilization of waste to be used as fuel for electricity generation according to the government policy and the goal of the Ministry of Energy has also supported the waste management of the local administration organization, the reader could learn. At that time, there were 32 waste power plants of the generating capacity of 190.491 MW (megawatts). “In order to promote private participation in waste management, the extension of time for the support of purchasing electricity from waste power plants

(Feed-in Tariff: FiT) which will come to deadline in September 2019, should be considered,” the Thai Pollution Control Department proposed.

Other wastes

In 2017, out of the estimated 618,700 tons of municipal hazardous waste, the biggest amount came from electrical and electronic equipment (WEEE), accounting for 401,300 tons or 65 percent. The rest of about 216,600 tons (or 35 percent) was household hazardous waste – such as batteries, dry cell batteries, chemical containers and spray bottles – which were thrown away with general solid waste.

“In managing the municipal hazardous waste system, the local administration organizations and related agencies set up a receiving point for hazardous waste in the village or community to be collected and transported to the provincial hazardous waste storage centers which comprise presently 80 centers,” the “Thailand State of Pollution Report 2017” said. As a result, the proper management of municipal hazardous waste had increased by 10 percent (or 60,600 tons). However, this was not considered adequate. “The issuance of regulatory guidelines for segregation municipal hazardous waste from general solid waste and the enforcement of a law requiring responsibility of the private sector for the management of waste from electrical and electronic equipment should be accelerated,” the Pollution Control Department urged. On the subject of industrial waste, out of the total amount of 32.95 million tons in 2017, which has been under an appropriate management system, 31 million tons was non-hazardous and 1.95 million tons hazardous waste. Approximately 20.8 million tons of this waste type had been utilized by burning for energy, making compost, sorting for selling, and sea reclamation or landfilling. As underlined, there are treatment and disposal facilities in each region of the country. “However, the problem of illegal dumping of hazardous industrial waste in old pits, unseen places along the roadsides or in the landfills of general waste needs more monitoring.”

To improve the country's waste management in the future, the Pollution Control Department suggested:

Waste management and climate change

The Kingdom of Thailand has committed to climate-change prevention and intends to reduce greenhouse gas emissions economy-wide by 20 percent from the projected business-as-usual (BAU) level by 2030, the World Bank stated 2017 in an account related to policy analysis activities. The country's baseline emission in 2030 is projected to be 555 MtCO₂ (million tons equivalent CO₂) in the BAU scenario.

According to the information, the “level of contribution could increase up to 25 percent, subject to adequate and enhanced access to technology development and transfer, financial resources and capacity building support through a balanced and ambitious global agreement under the United Nations Framework Convention on Climate Change (UNFCCC).” The national road map would cover three sectors including waste, energy and transport as well as industrial processes and product use.

As reported, Thailand's preparation phase for its Nationally Determined Contribution will last from 2017 to the year 2020, while the implementation phase will be scheduled from 2021 to 2030.

- Setting up rules/regulations or requirements by designing products and packaging to be environmentally friendly (eco-design) to reduce the amount of waste.
- Reducing the amount of waste by sustainable management such as waste utilization, waste to energy, making organic fertilizer etc.
- Reducing the production and consumption of products, which are made from non-biodegradable plastic and single-use product.
- Setting up the permit system for disposal areas of municipal solid waste, hazardous waste and infectious waste to be implemented by private and public sectors.
- Ending the improper waste disposal sites by having no open dump within five years by local administration organizations.
- Allowing a charging fee for packaging for products, which are difficult to eliminate and accelerating the law enforcement to expand the role and responsibility of private sector (producer) in managing hazardous waste of electrical and electronic equipment.
- Cancellation of the use of agrochemicals prohibited by the international Convention or which there is scientific evidence of their harm to people's health.
- Developing the role and responsibility of the private sector in managing the chemical residues or deteriorating chemicals as well as the product waste.

In 2019 alone, the country intends to eliminate 7.7 million tons of waste, according to the National Solid Waste and Hazardous Waste Management Master Plan (2016-2021). As Thais could read in the newspaper "The Nation" in December last year, the Pollution Control Department has issued four guidelines for local administrative bodies and related agencies "to effectively manage garbage and waste" – and also to minimize the negative impacts on people's health:

- A guideline for the selection of appropriate technology for garbage and waste management.
- A guideline focusing on the incineration/combustion method, which will be divided into four groups.
- A guideline on underlying characteristics for refuse-derived fuel (RDF) made from waste in communities, which details the physical attributions (such as net calorific value, moisture, and bulk density) and the chemical attributions (such as chlorine amount, ash, and mercury/cadmium/heavy metal amounts) as well as methods for sample collecting, analysis and testing and transporting.

- A guideline on basic design and construction of waste separating and processing for the RDF production and measures to prevent and reduce negative impacts on the environment.

Business opportunities

The goal of the Thai government to reduce the country's waste volume creates also business chances with regard to recycling. As reported by the newspaper "Bangkok Post" in October last year, there is a demand for waste-to-energy plants. The national power development plan for 2014-2036 has set a goal to achieve 550 MW (megawatts) from waste-to-energy power projects by 2036. According to the information, at that time 33 waste-to-energy projects were in operation with a combined capacity of 203 MW, while 55 projects were in the development phase. However, Thailand has – in the opinion of sector representatives – potential in more waste-to-energy power projects, the newspaper wrote.

The Bangkok-based international law firm Pugnatiotius Ltd. – a provider of transactional legal and tax advice on foreign investments in Thailand's manufacturing and service industries as well as property developments and acquisitions – is convinced that there are opportunities in Thailand's recycling sector. The areas mentioned include – in addition to waste-to-power plants – waste management, waste-reusing schemes, waste-reducing strategies, plastic waste, e-waste and hazardous waste.

For investors who wish to set up an operation in Thailand, the best contact point is the Office of the Board of Investment (BOI), which operates under the Prime Minister's Office and is the principal government agency for encouraging investment. On its homepage, one can find announcements like the "Promotion of Smart City Development" (☞ www.boi.go.th/index.php?page=boi_announcements), guides like the information about special measures for investment stimulation in the Thailand Investment Year 2019 (☞ www.boi.go.th/un/guides) and hints how to do business with BOI (☞ www.boi.go.th/index.php?page=doing_biz_boi).

The Asian Development Bank (☞ www.adb.org) publishes project data sheets, documents and tenders from many Asian countries, including Thailand.



Photo: Daniel Nebreda / Pixabay



Bornholm Turning Away From Incineration: Forming the Spearhead for Denmark?

“Bornholm will become the world’s first industrialized community to achieve 100 percent waste recycling and reuse”, news agency BusinessWire emphasized at the end of January. Within 13 years, citizens, businesses and tourists on the Danish island want to improve waste handling, sorting and treatment, so that by 2032 all regionally produced waste will be reused or recycled.

As Bornholm has a fully developed infrastructure and an isolated small population, the island appears to be the perfect object to realize the “Bornholm showing the way” vision of BOFA, the local municipal waste company. Additionally, it is a perfect time now, as the island’s waste incineration plant will be amortized in 2032, and the local government has to decide whether to allocate funds for updating the existing plant, to build a new facility or to initiate an innovative comprehensive scheme handling and treating waste as a resource that can be recirculated. BOFA wishes to make Bornholm the first region in Europe without waste incineration.

The idea growing nationwide

Bornholm may be an “isolated” island, but the idea to reduce or even replace incineration by other waste treatment methods has been growing in Denmark nationwide. The country wants to carry out a change from what Zero

Waste Europe called a “passion for burning garbage”. At the end of 2005, 29 waste-to-energy facilities treated roughly a quarter of the total waste generated in Denmark. In 2010 the country’s municipal solid waste was incinerated by 55 percent, recycled by 42 percent and landfilled by three percent, according to Eurostat. And in 2016 Dansk Affaldsforening, the communal interest group for the waste sector, indicated a recycling rate of 69 percent, an energy recovery rate of 27 percent and a landfilling quota of four percent. In the same year, the number of combustible waste imports was expected to rise up to 400,000 tons annually.

In 2011, a governmental paper “Denmark without waste” had reported that a total of 61 percent of Denmark’s waste was recycled, 29 percent incinerated and six percent landfilled. “This means that far too many of the valuable materials today end in waste incineration plants or at landfills. Therefore, more waste must be recycled, and the quality

of the recycled material must be improved,” the report commented. In her foreword to “Denmark without waste. Recycle more – incinerate less”, Danish Minister for the Environment Ida Auken balanced in November 2013: “Over recent decades in Denmark, we have been incinerating almost 80 percent of our household waste. Even though this has made an important contribution to green energy production, materials and resources have been lost which could otherwise have been recycled.” And she added: “Now, we are going to change this.”

820,000 tons less waste incinerated

Put in concrete terms, this meant a “conversion” of the Danish waste sector: “The Government will modernize organization of the incineration sector to ensure that waste incineration is at the most efficient plants and that the waste sector supports recycling,” the official paper underlined. A new Resources Strategy for Waste Management consisted of six fields of “initiatives” including more recycling of materials from households and the service sector, more recycling of materials from waste electronic equipment and shredder waste, a switch from waste incineration to bio-gasification and recycling, better exploitation of important nutrients such as phosphorus, improved quality in recycling construction and demolition waste and a Green conversion opening new commercial opportunities.

The expected changes included an increase in recycling from 1.4 million tons in 2012 to 2.6 million tons in 2022 and a decline of incineration from 2.8 million tons in 2012 to 2.3 million tons in 2022. “With these initiatives, a total of 820,000 tons less waste will be incinerated in 2022 than would otherwise have been the case,” the paper proclaimed.

Strengthened conditions

The Danish municipalities are primarily responsible for the waste area, especially for household waste. Most incineration plants are owned by municipal or inter-municipal companies. The municipal cooperation ensures the establishment of the necessary incineration capacity and of the principles of proximity and self-sufficiency. The waste-to-energy facilities are operated by nonprofit companies, based on a cost coverage principle. With regard to recycling, in many cases capacity is ensured by the municipality establishing agreements with private recycling companies. Most types of waste that are recycled are processed abroad, but there are many Danish enterprises – private and public – which separate and pre-treat the waste before it is exported. Irrespective of whether it comes from households or businesses, waste is primarily collected and transported by private companies. Recyclable commercial waste separated at source is subject to market conditions.

In September 2016, the Danish Ministry of Energy, Supply and Climate published a strategy named “Supply for the Future” that strengthened the conditions for waste incineration: It envisaged the authority for companies to decide the place for treatment of combustible waste instead of assigning it to the municipality. Municipalities collecting

household waste are accordingly asked to search a competitive and cost-effective tender for incineration. And waste incineration plants operated and owned by municipalities have to be transformed into municipally-owned companies and driven on market terms. The aforementioned case study additionally proposes fiscal incentives around incineration of plastics by considering a differentiated tax rate between plastic separated and unseparated material for incineration.

28 waste incineration plants still running

Notwithstanding the purpose to reduce energy recovery, a new waste-to-energy unit for 200,000 tons per year was commissioned in Roskilde in 2013, I/S Nordforbraending installed a new unit for its waste-to-energy facility with 90,000 tons per year in 2016, and Amager Bakke, a waste-to-energy plant with a capacity of 2 x 280,000 tons of waste annually that was built on green field in Copenhagen, commenced its operations in 2016. Amager Bakke was heavily criticized by Zero Waste Europe: With a 500 million Euro figure it is “the most expensive of its kind”, showed several technical childhood diseases, has a far too high processing capacity and is – in one word – a costly mistake for the city of Copenhagen. The organization prophesizes: “With less waste around to burn moving forward, Copenhagen’s new, shiny furnace will have much more downtime, leading to profit losses and monetary burdens for citizens in years to come.”

Maybe. But there are still 28 waste incineration plants running in Denmark, whereof 22 are dedicated waste incineration plants that primarily convert household and industrial waste to energy. Four are multi-fuel plants that both incinerate household and industrial waste as well as biomass and natural gas. The remaining two are for incinerating hazardous waste, public-private partnership State of Green gave account. And more than 20 percent of all district heating and five percent of electricity is delivered by waste incineration plants.

Alternatives for future waste management

Their future has been analyzed by the TopWaste-Report, a result of a Danish strategic research project and published by the Technical University of Denmark, Department of Management Engineering. The researchers looked for alternatives for future waste management in Denmark and thought about combustible waste and related imports. At the moment – the paper summed up – the imports of such sort of waste towards Denmark uses the existing incineration over-capacities and substitutes the use of fossil fuels. But “in the long term, imports of combustible waste towards Denmark would require an investment in over-capacity and will depend on the evolution of electricity and district heating markets, the availability of waste and the willingness of countries to pay to get rid of it.” The question at planning for the future of Denmark’s incineration capacity arises whether the country with its extensive district heating networks and very high thermal efficiency should count on waste imports or on national resources. “On the other hand, the system can be locked in to large

investments which might negatively impact recycling and/or the economy of incineration plants.”

Investment in incineration is not offered

There are a lot of challenges for energy recovery in Denmark at present, Klaus Fafner, Projekt Manager at engineering consultation agency Rambol, certified in late 2017 at the IX. International Investment Business Forum Renewable Energy and Energy Efficient Modernization of Industry. Along with technical challenges and the “appetite to risk”, he mentioned high investment costs, long development timescales, deterring risk-reward profiles, cost-driving “immature” supply chains and complex stakeholder arrangements. And he referred to a political environment characterized by unavailable support for heat networks, an unstable national policy and insufficient leverage of

local planning policy. In fact, “Denmark without waste II. A waste prevention strategy,” following the first paper already in April 2015, nearly did not lose a word about incineration and may be seen as an indicator to a new political course. Likewise, the Resource and Waste Management Plan for the City of Copenhagen in 2018 got along without reference to incineration. Nevertheless, the investment agency Copenhagen Capacity wrote, that “new supply strategy enhances opportunities for foreign companies in the Danish waste management sector”. Invest in Denmark, incorporated into the Ministry of Foreign Affairs, counts on bioenergy industry, “the biggest contributor to Denmark’s green energy transition – offering lucrative opportunities for international companies that are looking to invest”. And adds: “For international players, the investment opportunities (in a strong bioenergy cluster) are substantial.” Investment in incineration is not offered.

European Recyclers’ Strategy on Technical Plastic Parts

Engineering plastics today are the third most widely used material, after packaging and building and construction applications and represent 16 percent of the total EU demand.

According to the association Plastics Recyclers Europe (PRE), engineering plastics are extensively employed in both the automotive and the electrical & electronic (E&E) sectors as they are lighter, more durable, provide increased safety and overall have a better environmental performance when compared to other materials. Consequently, engineering plastics are the preferred material, replacing heavier and less resistant and less sustainable constituents. Taking into consideration the growing digitalization, their production and use will continue to grow very fast. “This means that Europe will be facing a growing amount of waste from technical plastic parts,” PRE pointed out. Recycling rates would remain low, even though facilities and technologies to treat them do exist and are operational on an industrial scale. “To give an example, only 300,000 tons of waste from electrical and electronic equipment (WEEE) was destined for recycling at specialized European facilities in 2017, whereas the recycling capacity needed amounts to around three million tons.”

tee the conditions necessary for the recyclers of technical plastic to boost further investment with the goal of transforming this material into a high-quality product. The change will need to implement an improved and increased collection system as well as additional sorting infrastructure, PRE emphasized. These measures should be complemented by enabling free WEEE material circulation across the Member States. A consistent and stable legislative framework is also a prerequisite to boost investors’ confidence. The EU measures should lead to harmonized and balanced rules, which increase the legal certainty for the end-of-waste criteria. Additionally, legal requirements should enable the appropriate management of substances of concern. EU wide certification for recycling facilities would ensure waste traceability and guarantee the highest standards to which a

recycler must operate. The quality of the output material of a facility is key to its viability and success.

The PRE Technical Plastic Parts Strategy Paper further elaborates on the measures that need to be taken to advance the treatment of this stream in the EU and presents the state of play in its production and recycling, the European association underlined. “The advancing in the recycling of technical plastic parts will depend equally on the strengthened collaboration and coordination of the actions of the electronic appliances’ manufacturers, automobile manufacturers, sorting centers, waste managements and recyclers, which is a must.”

➔ www.plasticsrecyclers.eu/sites/default/files/2019-04/PRE_Technical%20Plastics_strategy_paper_2019%20FINAL%20DIGITAL.pdf



According to Antonino Furfari, Managing Director of PRE, there is a need to reach for the untapped material, which is not fully exploited yet. This would require extra effort to guaran-

The Future for



Could be Bright

A plea for the circular economy by the E-waste coalition, a group of seven UN entities that have come together to increase cooperation and more efficiently provide support to Member States and Parties to address the e-waste challenge.

According to the report “A New Circular Vision for Electronics – Time for a Global Reboot”, published by the World Economic Forum, a “more circular electronics system, one in which resources are not extracted, used and wasted, but valued and re-used in ways that create decent, sustainable jobs” could generate huge economic benefits. As reported, e-waste is the fastest-growing waste stream in the world. In 2018, it was estimated, that the global “mountain” of this kind of waste reached nearly 50 million tons. Such e-waste is worth at least 62.5 billion US-Dollar annually, the authors of the “Global E-Waste Monitor 2017” had estimated. This amount of money would be “more than the gross domestic product (GDP) of most countries,” the report “A New Circular Vision for Electronics – Time for a Global Reboot” described the economic dimension. “In fact, if e-waste was a single nation, its GDP would be on a par with that of Kenya. Furthermore, 123 countries have less GDP than the global pile of electronic waste,” the report refers to figures of the International Monetary Fund. “In the right hands, however, it could be worth considerably more,” the authors are convinced.

The scale of e-waste

As reported, in 2016 about 44.7 million metric tons of e-waste was generated globally. According to the information, this amount was equivalent to just over six kilograms for every person on the planet.

“One-half of all e-waste is personal devices, such as computers, screens, smartphones, tablets and TVs and the rest is larger household appliances, as well as heating and cooling equipment. The scale of global e-waste defies comparison, yet the weight is more than all the commercial aircraft ever produced,” the authors of “A New Circular Vision for Electronics” vividly depicted the situation. “Imagine the mass of 125,000 jumbo jets – it would take London’s

Heathrow Airport up to six months to clear that many aircraft from its runways. If you find that difficult to envisage, then try the mass of 4,500 Eiffel Towers, jam them all in one space, side by side, and they would cover an area the size of Manhattan. Of this total amount, 36 million tons of e-waste are discarded in landfill, 21 burned or illegally traded and treated in a sub-standard way every year.”

By the year 2021, the annual volume of global e-waste is expected to surpass 52 million tons. Estimates by the United Nations University in Vienna indicate that by 2050 the amount could top 120 million tons annually. “According to the Organization for Economic Cooperation and Development (OECD), by 2060, the world’s consumption of raw materials is set to double,” the authors underlined.

Low recycling rates

Recycling rates globally are low. Even in the European Union (EU), which leads the world in e-waste recycling, just 35 percent of e-waste is officially reported as properly collected and recycled. Globally, the average is 20 percent, the authors stated. The remaining 80 percent “is undocumented, with much ending up buried under the ground for centuries as landfill”.

Currently, recycling some types of e-waste and recovering materials and metals is an expensive process, the authors of the report conceded. The remaining mass of e-waste – mainly plastics laced with metals and chemicals – poses a more intractable problem. The waste stream is complex, containing up to 60 elements from the periodic table. In some cases, it contains hazardous chemicals, such as flame-retardants, of which some are Persistent Organic Pollutants listed under the Stockholm Convention. “There is also confusion in global consumers’ minds in terms of how they handle e-waste,” they wrote. “In many cases, it is

treated as normal household waste, but it must be separated. Different streams of e-waste must also be dealt with separately, including batteries, light bulbs, smartphones, cables or computers.” This lack of awareness about how to recycle – and worries about data security – would mean there are vast tranches of residual electronics sitting in drawers, garages, bedrooms and offices across the globe waiting to be dealt with. “An opportunity in waiting,” the authors said.

According to the information, in total, 1.3 million tons of discarded electronic products are exported from the EU in an undocumented way every year. “There is a complex web of trans-shipment ports so that e-waste avoids detection by authorities.” At the same time, shipments of secondary materials from consumer countries to centers of production with the intention of re-integrating materials into new products would benefit from clear international definitions on secondary materials, the authors of the report think. Shipments of used products for repair, refurbishment or direct re-use are subject to legislative uncertainties.

Economic value

There is a lot of economic value in e-waste: A ton of smartphones would contain 100 times more gold than a ton of gold ore. “The earth’s richest deposits of valuable materials are sitting in landfill sites or people’s homes. More needs to be made of these resources.” The latest forecasts would show that e-waste is worth more than 62 billion US-Dollar annually – and was worth three times the output of all the world’s silver mines.

An example: In 2017, 1.46 billion smartphones were sold. At retail, each unit contains electrical components worth more than 100.49 US-Dollar. If just the raw materials are recycled, they could be worth up to 11.5 billion US-Dollar, the report informed. More effective use of products would



be a second life, which keeps the materials at a higher value; corresponding markets were well developed.

In 2016 alone, 435,000 tons of phones were discarded, despite containing billions of dollars’ worth of materials. “To capture this opportunity, it will be important to move towards a circular economy for electronics.”

The economic benefits of employing a circular economic model in the electronics and electrical sector could be enormous, according to the report. “Since e-waste is a growing resource and given resource scarcity and price fluctuations for some metals and minerals on the horizon, there is a growing economic case for the recovery of these precious resources. This, combined with better designs and technology for resource recovery, will produce more profitable yields of materials, reinforcing the case.”


If developed in the right way, “employing a circular economy for the electronics and e-waste sector could create millions of jobs worldwide,” the authors are convinced. “Some may be in low-paid and low-skilled work as more e-waste is reclaimed into the system, but over time, this will change with a wide range of job opportunities emerging. This will give rise to the need, for instance, new designers, circular economists and urban mine specialists and EaaS (electronics as a service) officers. The future is bright.”

Collaboration wanted

This report combines data and research from throughout the UN system to make the case for a new vision, the representatives of the different entities, which form the “E-waste Coalition”^{*)}, stated in the foreword. Describing and analyzing challenges and opportunities, and laying the groundwork for the process of systemic change is just the first step, they admitted. To make a circular economy for e-waste happen, in their opinion, the following conditions are required:

- **Vision:** Society needs to collectively rethink the rules of the game and create a vision around which government, consumers and industry can rally.
- **Awareness:** The public needs to learn more about this growing global challenge and opportunity.
- **Collaboration:** This coalition seeks to work with multinationals, small and medium-sized enterprises (SMEs), entrepreneurs, employers’ associations, academia, trade unions, civil society and associations in a specific and deliberative process to bring about change. Public-private collaborations through platforms such as PACE (Platform for Accelerating the Circular Economy) and the E-waste Coalition will play an important role.
- **Action:** Coordinated action by all actors is needed within and across national borders.”

^{*)} The coalition brings together: the International Labour Organization (ILO); the International Telecommunication Union (ITU); the United Nations Environment Programme (UNEP); the United Nations Industrial Development Organization (UNIDO); the United Nations Institute for Training and Research (UNITAR); the United Nations University (UNU) and the Secretariat of the Basel and Stockholm Conventions.



The Swiss Example: Using Recycled Concrete

Reaching for the sky with construction and demolition waste recycling: A report, provided by ICLEI – Local Governments for Sustainability (a network of over 1,500 cities, towns and metropolises committed to building a sustainable future), on a study visit in Zurich.

Construction and demolition waste (CDW) is one of the largest waste streams in the European Union (EU). According to the European Commission, 25-30 percent of all waste generated in the EU consists of CDW materials – many of which could be recycled. The question then is if recycled concrete can be used to build houses and what the pros and cons are. To shed light on this matter, the EU-funded project UrbanWINS recently organized a study visit to Zurich, a city that has been using recycled concrete and other construction materials over the last 15 years.

Growing urban areas demand an ever-larger amount of construction material. Concrete is among the most popular, and it is highly flexible, resistant and stable. However, an increase in the demand for concrete translates into a growth of environmental pressures. Conventional concrete production requires gravel and sand as filling materials – they make up to 80 percent of the weight of concrete. Seemingly abundant, they are finite and scarce resources, and their mining and transport degrade the environment. Furthermore, cement is energy and CO₂ emission intensive in production.

Instead, the mineral components of CDW can be used to produce new concrete. This type of urban mining for new buildings increases their resource efficiency and

makes the construction sector less dependent on scarce resources. This avoids mining and landfilling, and protects precious landscapes and habitats. It can also improve the energy balance of new buildings, especially if materials are recycled and reused locally. It is a step towards closed-loop resource use.

Today cities are keen to learn about this type of innovation to meet the growing demand for housing in urban areas while using resources more efficiently and in an environmentally friendly way. “We just started a project involving recycling concrete,” explained Roni Järvensivu, Environmental Quality and Safety Senior Specialist of Helsinki Region Environmental Services Authority, who joined the UrbanWINS study visit. “We have roughly 500,000 tons of concrete waste, but our company only treats about 20,000 tons, so with this visit we would like to learn about new ways to reuse it.”

The city of Zurich has been a frontrunner in concrete recycling with over 15 years of experience. To showcase this expertise and inspire European public authorities in the field, the City’s Environmental and Health Protection Service hosted a three-day visit for practitioners, as part of the CityMatch activity run by ICLEI Europe, under the umbrella of the UrbanWINS project.



The city is pushing the boundaries of what was thought possible. Newer buildings achieve rates of up to 50 percent recycled components in the concrete. Other countries, such as Finland, still maintain a maximum of ten percent of added non-concrete mineral materials for producing concrete.

The Zurich Art Museum, the Kunsthaus, is currently undergoing a major extension. The new complex designed by architect David Chipperfield is made almost entirely of concrete with recycled aggregates and CEM III/B cement (where conventional clinker is replaced by slag sand), including the indoor space shaped by bare concrete. Recycled materials are also used in Zurich's road construction and maintenance: In the sub-base (foundation layer) up to 30 percent of recycled concrete is used, and for the road base, up to 60 percent of reclaimed asphalt is permitted and used, or even up to 80 percent on sidewalks and places with low traffic. Tests with a new mixture of reclaimed asphalt look very promising in terms of quality. The amount of reclaimed asphalt may increase in the future.

"Mining urban waste materials for new construction does make sense, but only if these are locally available," remarked Philipp Noger of Zurich's Office of Building Construction. "Recycling construction materials is particularly useful in dense urban areas, where a constant stream of construction and demolition waste occurs. Using recycled concrete within near distances is often cheaper than new concrete. In the end," the architect highlighted, "we also

need to design for reuse and recycling, to reduce the overall amount of mixed materials resulting from demolition."

Attendees of CityMatch were impressed by the possibilities that recycled materials offer. "This three-day visit has been an eye-opener for us on how to use recycled concrete in buildings," said Roni Järvensivu. Margherita Carè, the architect for the Metropolitan City of Rome Capital, added that their plan is to "go back home and see how we can change our standards for using recycled concrete, taking the Swiss examples as a baseline."

Despite the advantages, many local governments are not aware of the possibilities to work with CDW as a resource. The European Commission wants to change that. One of the objectives of the Waste Framework Directive (2008/98/EC) is to provide a framework for moving towards a European recycling society with a high level of resource efficiency. It challenges Member States to prepare a minimum of 70 percent of their CDW for reuse, recycling or recovery by 2020.

From demolition to new resource

A precondition to successful reuse of CDW is the sorting of construction materials upon demolition. "It takes years of experience to reach the levels of recycled components in the final product that we have in Zurich right now. We refined our recycling process to the point that recycled mineral aggregates can be used without any impacts on the quality of the construction material," said Michael Strauss,



The UrbanWINS project and its CityMatch activity

Cooperating with the Procura+ European Sustainable Procurement Network, CityMatch is an exchange program for professionals to provide a forum for learning and substitution on waste management and sustainable procurement. The activity is part of UrbanWINS, an EU-funded project that supports eco-innovation in waste prevention and management with the involvement of citizens and pilots actions in eight European cities. For this second edition of the CityMatch, experts from the Metropolitan City of Rome Capital and the Helsinki Region Environmental Services Authority traveled to Zurich to learn about the circular procurement and the reuse of concrete used for buildings (recycled concrete) and road construction (concrete and recycled asphalt).

The UrbanWINS project is now finished. In April this year, the "UrbanWINS Final Conference – The city as a living organism: understanding its metabolism to reduce its resource consumption" took place in Brussels. Partners and stakeholders from all the countries involved and people interested in many different fields came together to share the experiences and outcomes from the three years of intense work and engage in lively and creative workshop sessions.

responsible for quality control of materials from Eberhard Bau AG. The civil engineering and recycling company is a pioneer in providing recycled aggregates for the construction sector. The sorting and recycling process results in gravel that can replace up to 50 percent of natural sand and gravel in concrete production.

Challenges ahead

Recycling CDW for producing new concrete does address resource scarcity, whereas it does not solve the issue of CO₂ emissions which results from concrete production. Producing clinker, the key element of concrete requires a production process that causes CO₂ emissions. As a result, as much carbon dioxide is released into the atmosphere each year as Europe's 300 million cars: 1.5 billion tons. Using slag ashes – a leftover product from iron smelting – can improve the CO₂ balance of concrete by reducing emissions related to the production process by 25 percent. However, concrete remains a CO₂ intense product. For a low- to zero-carbon future, the construction sector will also need to look into other materials.

For more information → www.urbanwins.eu / Twitter: @UrbanWINS

"Reusing Waste as a Resource Is a Chance"

Interview

Short Interview with Sonja Gehrig, Project Manager of Sustainable Public Procurement and Cooperation, Environmental and Health Protection Service at the City of Zurich, and Philipp Noger, Architect at the city's Building Surveyor's Office.

Why did the City of Zurich decide to start using recycled concrete?

Sonja Gehring: As a city, Zurich has the goal to reduce its impact on the environment as much as possible. Reusing waste as a resource is a chance for us to achieve this goal in a sector that traditionally has a large environmental footprint. In the late 90ies, the city of Zurich started to monitor the amounts of construction and demolition waste and looked for possibilities to put this material to better use. We had already implemented a range of measures to improve waste sorting practices on demolition sites. In cooperation with a local concrete company who developed new technical solutions to reuse concrete and mineral materials, we started to build schools and other public buildings with recycled concrete. Soon other compa-



Sonja Gehrig

nies followed, and a market emerged. This way, we are able to reduce landfilling and protect scarce natural resources. In the long term, this strategy also saves money for the city of Zurich and brings new opportunities to the companies involved with recycling concrete. A major impact had the construction of the Letzigrund stadium, where time-pressure led to the direct use of recycled excavation materials on site.



Philipp Noger

Photos: ICLEI

What are the main difficulties you have encountered?

Philipp Noger: On the one hand, we had to convince many stakeholders in the construction sector that using recycled materials in concrete is safe and aesthetically appealing. On the other hand, we need to find ways to better reuse mixed mineral aggregates, which consist not of pure concrete, but of a mix of mineral materials. Not for all concrete qualities, concrete from mixed mineral aggregates could be used. The Research and Development departments of our suppliers are busy improving their processes to deal with this issue.

Do you have any law in place to support the use of recycled concrete?

Philipp Noger: Since 2007, the city of Zurich started to promote the use of recycled concrete for new public buildings. And since 2015, the use of CEM III/B (cement containing slag ashes with a reduced carbon impact by -25 percent of CO₂) is preferred, wherever possible. One of the major Swiss certification systems for ecological buildings (Minergie-ECO) now requires the use of recycled concrete. These developments and the administration of Zurich's general demand for recycled concrete have caused an overall spike in demand to which the market has responded by producing more and more recycled construction materials. This showed us that supply follows demand, and policymakers can push the market towards higher recycling rates.

Are you planning to use any other recycled materials in the future?

Philipp Noger: Aside from increasing the share of recycled materials in new concrete and asphalt, we are currently looking into recycling insulation materials. This is not yet done at a large scale, but we see – especially concerning insulation materials – an upcoming necessity to reduce our material consumption and waste production by closing this material loop as well. Also in terms of asphalt, tests with a new mixture of reclaimed asphalt are very promising that the previous difference of quality could be eliminated at a share of recycling materials of 60 percent or more in the road base. The amount of reclaimed asphalt may be increased in the future.

Author: Paula Land, Officer, Sustainable Economy and Procurement, ICLEI – Local Governments for Sustainability

Recycled Construction Waste in Europe

The European construction industry is working towards producing high-quality materials from recycled waste, enhancing the sector's sustainability and reducing its environmental impact.

In the southern Belgian province of Namur, concrete and bricks from demolished buildings are being turned into eco-friendly road surfaces.

A local company recycles 180,000 tons of concrete, tarmac, sand and mixed soils at its two plants, much of which is deployed to regenerate the region's highways or to build new ones. Richard Marchand, director for production and transport at Hublet, adds that they apply a double quality check, with an interior and external quality control on the recycled concrete.

Initial skepticism in the industry fueled by concern about poor-quality recycled products has given way to greater confidence in techniques and standards for reprocessing of construction and demolition waste (CDW), and this, in turn, has encouraged innovations in the sector as entrepreneurs seek to reduce costs without compromising on quality or environmental standards.

CDW is the largest waste stream in the EU by volume, with about 850 million tons produced annually. Previously, most of this ended up being dumped. But today, scrap metals can be recycled almost endlessly; asphalt can be crushed and reconstituted; clean and untreated wood is turned into lumber and chipboard; and both gypsum, used to build walls, and glass from windows and tiles can be refashioned into a multitude of new products.

Belgium is among the leading European countries for the recycling of CDW. Germany is the first EU country by volume, with about 68 million tons recycled every year, but proportionally the Netherlands is the best, with about 90 percent of material recycled. However, only just over half of all CDW in the EU is recycled, which means that member states have major work ahead of them to meet the target of 70 percent recycled and reused by 2020, as outlined in the 2008 Waste Framework Directive. Environmental organizations believe it is an impor-

tant target, with Legambiente, an Italian NGO, estimating that its achievement could lead to the closure of 100 quarries in Italy.

To add momentum to this process, in 2016 the European Commission published a CDW Management Protocol, whose goal is to improve waste identification, source separation and collection, and waste processing. From the industry perspective, it is essential to make sure that there are no hazardous substances in material recovered from a demolition site – such as asbestos, leaded paint and polychlorinated biphenyls – that may affect health, environmental or building quality standards.

Promotion of recycled aggregates

"We encourage the promotion of recycled aggregates where economically, environmentally and technically feasible, respecting the given technical standard," says Alev Somer from the European Aggregates Association (UEPG). Construction engineers often prefer to trust primary raw materials, so "it's essential that demolition waste is suitable and can meet the same standard as the primary material."

Brussels has launched ten pilot building sites, involving a partnership of

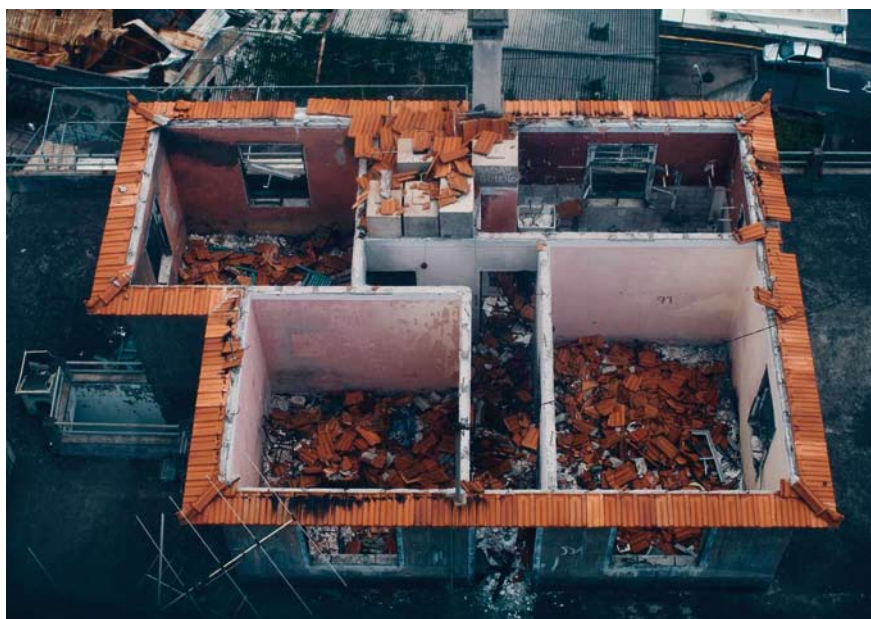
local government and building companies. The scheme encourages constructors to separate metal, woods, gypsum, concrete, and hazardous substances such as empty silicone sealant guns before sending to the recycling centers. Just one example underlines the potential of CDW: Around 120 square meters of tiles from a demolished building was reused on the same site for a new construction, insulation material was recycled for a new roof, and wood and glass were used to build a greenhouse at a farm on the outskirts of Brussels.

Finally, Somer points out that "recycled aggregates can only cover 12 to 20 percent of the total demand for aggregates for the foreseeable future." Eighty percent of the demand still would need to be supplied by natural primary aggregates, even in countries where recycling rates reach near 100 percent.

Therefore, for the aggregates industry, the only way to reduce waste in the future is to encourage the application of an optimal construction design philosophy to have built-in adaptability and minimal end-of-life demolition.

➡ www.bresaer.eu

Source: Margherita Sforza/Youris.com

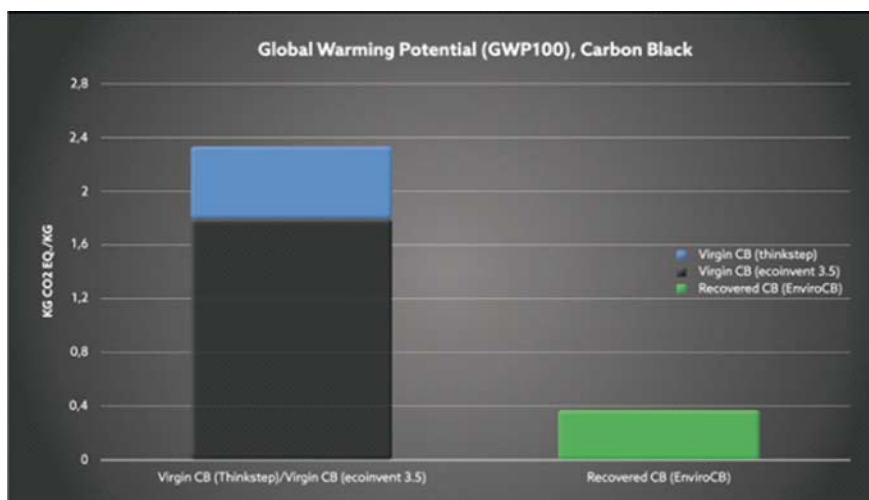


Enviro's rCB Reduces CO₂ Emissions by Over 79 Percent – Better Than Earlier Estimates

Enviro's recovered carbon black is demonstrably a good environmental choice, according to a new life-cycle analysis (LCA) from the IVL Swedish Environmental Research Institute.

Recovered carbon black leads to CO₂eq emissions that are 79-84 percent lower than the emissions from the production of virgin carbon black – a figure considerably better than earlier estimates of 60 percent. "It's fantastic to learn what great environmental benefits Enviro's recovered carbon black can bring. The whole industry is looking for materials to reduce the impact on the climate, so this is very good news, both environmentally for the industry, and in terms of the economic potential for Enviro", says Thomas Sörensson, Enviro CEO.

The IVL Swedish Environmental Research Institute, together with Enviro, has carried out a life-cycle analysis (LCA) of Enviro's recovered carbon black (rCB) EnviroCB and the other materials that are extracted through the company's pyrolysis techniques: oil, steel and gas. The purpose of the analysis was to provide an overall picture of these materials' environmental impact, and the results show, among



The diagram shows a comparison between virgin CB and Enviro's rCB for CO₂-emissions. Thinkstep and Ecoinvent 3.5 are two different global databases for LCA data linked to specific commodities, which in this case are both virgin CB rubber grade

other things, that for each kilo of recovered carbon black that replaces virgin carbon black, total emissions are reduced by 1.43-2.00 kg of CO₂. "Enviro's recovered carbon black provides the tire, rubber and plastic industries with a fantastic opportunity to introduce a recyclable material that

heavily reduces the worldwide environmental impact. The other recycled materials – oil, steel and gas – provide a further reduction in greenhouse gas emissions." One of the indexes used is Global Warming Potential, GWP, which makes it possible to compare the greenhouse effect for greenhouse

First Recovered Carbon Black Conference: Major Interest from the International Tyre and Rubber Industry

Michelin, Continental and Hexpol were some of the international companies from the tire and rubber industry that participated in the Recovered Carbon Black Conference – the first international conference with the sole focus on recovered Carbon Black (rCB). One highlight was Elysium Nordic presenting the plant project in Denmark, which is led by WindSpace A/S and Enviro.

"We presented where in the project we are at the moment and how we, as climate-focused investors, view the major potential in the rCB market. We received very positive responses, and the presentation also resulted in interesting discussions about the considerable potential of pyrolysis technology in Europe," says Jens Elton Andersen, CEO and partner of WindSpace and Elysium Nordic. Enviro's Sales Manager Fredrik Olofsson also spoke at the conference. He presented Enviro's ongoing discussions on commercial commitments from the tire and rubber industry and on expanding the global production capacity of rCB. "I focused on the progress we're making with introducing EnviroCB as a natural part of the production in the tire and rubber industry, and how we work to meet the ever-growing demand for rCB by expanding production capacity," says Fredrik Olofsson. In addition to players from the rCB segment and international tire and rubber manufacturers, the leading producers of virgin carbon black also participated in the conference. They showed great interest both for rCB as a product and various commercial issues that exist within the segment. "The tire and rubber companies all had one thing in common – they stated distinct strategies regarding the introduction of rCB in the production process. We had several interesting discussions and meetings with these companies during the conference," says Fredrik Olofsson.



Fredrik Olofsson, Enviro
Sales Manager

gases at a joint scale with the greenhouse effect for carbon dioxide (see graph). "If the 9,000 metric tons of recovered carbon black produced by one of Enviro's plants in a year were to replace virgin carbon black, the resulting reduction in greenhouse gas emissions is 12,900-18,000 tons, which would correspond to more than 40,000 single-leg flights from Stockholm to New York (🔗 <https://www.icao.int/environmental-protection/CarbonOffset/>). In addition to this, we have emission reductions combined with recycled oil, gas and steel." More stringent environmental

laws, producer responsibilities, and an ongoing worldwide shift to more sustainable production is leading to increased interest both in Enviro's rCB, EnviroCB, the other recycled materials (oil, steel and gas), and the business of Enviro's plant facilities. "The carbon black market is expected to grow by about 8.8 percent annually in the coming years, and the demand for Enviro's recycled materials will increase accordingly. These two driving forces are the basis for Enviro's changed business model, which involves partial ownership of future plant facilities, allowing us to better capitalize

on the company's leading position." LCA is a method for identifying and measuring the total environmental impact during the life cycle of a given product, from raw material extraction, through manufacturing processes and use, and up to the waste management stage, including all transports and energy expenditures that occur in between. The LCA done by Enviro and the IVL Swedish Environmental Research Institute was carried out in accordance with ISO 14040/14044 for life cycle analysis.

🔗 www.envirosystems.se

End-of-life Tires as an Alternative Fuel

According to Tana Oy, a Finnish manufacturer of landfill compactors, waste shredders and waste screening technologies, the future for tire-derived fuel (TDF) looks good.

This alternative fuel made from end-of-life tires presents a cost-efficient alternative for fossil fuels and can increase the profits of cement manufacturers, the company said. "Due to rapid urbanization, there is an increasing need for cement especially in developing areas in Asia, South-America, and Africa. The cement and lime industry is growing, but the smartest actors in the field already look ahead. In the future, profits lie in sustainable solutions such as alternative fuels."

The energy consumption of cement kilns is one of the largest expenditures in cement production. As reported, using TDF could save fuel costs as the heat value of tire shred were almost equal to oil and 25 percent better than that of coal. "Additionally, TDF decreases the NOx emissions produced by cement plants and makes



cement producers less affected by the changes in the oil price."

The material available in areas of rapid urbanization "is often mixed waste that needs to be separated, shredded and screened before it can be safely used. If the quality of the refuse-derived fuel (RDF) input material is not consistent, cement producers cannot maintain certain temperatures in the kiln and produce poor-quality clinker," Josef Imp, Tana's Vice president, Sales, is quoted. Producing high-quality fuel

cement kilns often demands several machines; that reduces the cost-efficiency of alternative fuels.

With a proper waste shredder, cement manufacturers were able to produce alternative fuel of the required particle size in one pass, the Finnish company is convinced. The Tana "Shark" could turn even difficult material like end-of-life tires into alternative fuel. "The consistent quality of the tire-derived fuel (TDF) results in high-quality clinker. Moreover, it gives better control over the CO₂ and NOx emissions in the form of more efficient incineration." Compared to RDF (refuse-derived fuel), there is less variability in TDF which makes the burning process easier to manage, Tana Oy informed.

🔗 www.tana.fi

Photo: Tana Oy

Recyclable Fiber Is Finalist for Belgian Innovation Award

Belgian producer of polyolefin fibers Beaulieu Fibres International was nominated for the 2019 essenscia Innovation Award, the most prestigious prize for industrial innovation in Belgium. The company was named for its recently introduced UltraBond fiber. Formally introduced in early 2019, it is a patented polyolefin bonding staple fiber "that eliminates the need for latex or other chemical binders to bond nonwovens," Beaulieu Fibres International informed. UltraBond would help manufacturers make a significant contribution to the circular economy through the production of 100 percent recyclable carpets. "In addition to making recycled PP available for the plastics production chain and reduced waste generation, their total lack of water usage and reduced energy use result in significant environmental advantages and financial savings. There is also a reduction in the VOC level of the carpet. This all leads to a significant reduction in a needle punch carpet's ecological footprint to the tune of a 35 percent reduction in CO₂ emissions during the full production process."

Ways to Liberate the Valuable Metals

Should scrap merchants be paying greater attention to e-waste recycling?

'A throwaway society' is one of the primary reasons why countries worldwide now face a mounting e-scrap (or WEEE – Waste Electrical & Electronic Equipment) problem. In fact, the global magnitude of the issue is driving ongoing legislative changes with increasingly tricky targets to meet. But apart from the environmental implications of electronic 'waste', could savvy reuse and recycling practices represent commercial opportunities for operators too? Marcus Brew, managing director of WEEE shredding specialist Untha UK, offers his thoughts:

Smelting old scrap to produce new metal is one of the most long-known 'circular' concepts there is. This goes some way to explaining why metals recycling is a 5.6 billion pound sterling industry in the UK, for example. But ever-changing economic forces make this a volatile market for operators to trade in.

So, is there an answer to safeguard profitability levels?

Many recyclers and scrap merchants rely only on traditional, cumbersome shear equipment to cut metals down because the perceived high-wear nature of metal shredding is deemed too cost prohibitive. However, dependence on this basic shear methodology means alternative sorting, grading, separation, and size-reduction processes are overlooked, and metal recyclate quality typically remains low as a result.

Machinery such as high-speed hammer mills – which work by smashing material into smaller pieces with repeated impact blows – typically create vast amounts of dust. This dust is



useless, costly, and it poses a fire and operator wellbeing risk. This process struggles to achieve the particle refinement required for downstream separation technologies to effectively do their job.

Mindful of the limited revenue potential associated with these approaches, recyclers elsewhere are investing in more sophisticated processing lines to liberate the valuable metals that would otherwise remain 'locked' in complex products such as uPVC windows, end-of-life vehicles and e-scrap (or WEEE).

The integration of an overband magnet will then help extract ferrous metals, an eddy current separator (ECS) can separate out any non-ferrous metals, and an optical sorter can finally clean anything that the ECS has not already refined. The greater the level of quality metals recovered, the higher the revenue potential. The recovery of high-worth Platinum Group Metals (PGMs) and Rare Earth Metals (REMs) could make for a particularly profitable operation.

Appropriate licensing must be sought, of course, as in many countries the collection and processing of e-scrap are highly regulated, and rightly so. This is irresponsible, not to mention

the illegal handling of WEEE remains a notable problem worldwide. But the important thing to note is that entry into this market could represent a significant commercial advantage for those traditionally involved in scrap metal alone.

I read an article in 2018 which stated that: 'Given that the fate of up to 80 percent of global e-waste is unknown, there is considerable scope for businesses to capitalize on an overlooked opportunity.' With e-waste levels sadly rising, the size of this opportunity could arguably continue to grow.

Five ways to ensure e-waste recycling best practice

1. It is crucial to ensure the ethical and professional handling of this inherently hazardous material stream, by a specialist operator. Globally, the illegal handling and export of e-waste remains a significant problem, partly due to knowledge limitations/awareness and also because of the level of high-value precious metals that are locked away within such equipment.
2. Remember that the reuse of e-waste should take priority over recycling, for maximum environmental benefit. So, if simple repair works can be carried out to increase the fu-

ture lifespan of the equipment, this route should be taken, if possible. Recycling should be the next best option, once reusability has been exhausted.

3. The manual breakdown of equipment, by trained professionals, is often the preferred methodology. This approach is admittedly labor- and time-intensive, however, the high-value nature of the materials inside means that this is usually a worthwhile exercise.
4. Organizations that consider this manual methodology uncommer-



cially viable will typically prioritize a machine-driven approach. When investing in recycling equipment, seek out proven, hard-wearing technologies that can demonstrate their e-waste recycling performance. This

can be a very tough material stream to process. So with shredders, for example, seek a slow-speed, high torque drive to increase resistance against unshreddables, a reinforced frame for operational stability and ideally double collar cutting disks for a stronger cutting force. Such factors are key to long-lasting machine performance, and therefore ROI.

5. Try to prioritize particle homogeneity of any shredded material, to aid optimum onward processing and therefore revenue potential.

Handling Batteries from Hybrid and Electric Cars

Interview

The Dutch company ARN Recycling exists since 1995 and is mainly involved in the recycling of vehicles. However, since 2008 and due to the introduction of new regulations that came along with the “Battery Management Decree (Bbb)” – which addressed the management of batteries – the firm from the Netherlands is also highly engaged in the recycling of batteries from hybrid as well as electric cars.

Due to the company’s expertise in this field, the Communications Manager Martijn Boelhouwer provides an insight into the regular procedure of battery recycling at ARN Recycling.

Your company offers businesses to participate in the ARN Management Plan that supports businesses in complying with requirements that go hand in hand with battery management. What exactly is the substance of the ARN Management Plan?

ARN and Stibat (Dutch Battery Foundation) have implemented a system for the collection, logistics and processing of discarded batteries with a negative residual value. According to the Battery Management Decree (Bbb), car manufacturers and importers are required to take back both starter batteries and propulsion batteries from hybrid and electric cars, after use. By taking part in the collective system (for which they pay a management fee), they are transferring their obligations to ARN and Stibat. ARN takes care of the collection and processing of starter and propulsion batteries with a negative residual value (Lithium-ion batteries) and reports on this. ARN also reports on batteries with a positive residual value (lead-acid and NiMH batteries) accordingly.

In 2017, ARN presented a new method, using a battery box. According to your website, this packaging system is used to “safely transporting end-of-life batteries from electric cars”. How does this system work?

ARN has invested in order to enable collectors to safely transport batteries not safe for transport (in official terms: ADR, category 9, damaged or defective batteries liable to rapidly disassemble, dangerously react, produce a flame or a dangerous evolution of heat). Special battery boxes have been procured for the transport of non-transport safe batteries.

What is the major challenge when transporting end-of-life batteries from electric cars?

Safety in dismantling is a main issue. Safety is also essential in the processing of end-of-life vehicles. A non-dismantled lithium-ion battery in a shredder can pose a risk to both people and machinery. To raise awareness of such risks at companies in the chain, ARN has made an information video in collaboration with a shredder and provides training to car dismantlers.

On your website, you mention that “waste batteries must be dismantled and processed responsibly” since they contain hazardous

materials. Which key factors does a responsible dismantling and processing of batteries imply?

Lead-acid starter batteries contain hazardous materials, such as lead and sulphuric acid. If these substances are released, they pose a danger to people and the environment. Waste batteries must thus be dismantled and processed responsibly. The Battery Management Decree gives guidance on how to go about this.

➞ www.arn.nl



French-Singaporean Cooperation on E-Waste

In March, Nanyang Technological University (NTU), Singapore, and the French Alternative Energies and Atomic Energy Commission (CEA – Commissariat à l'énergie atomique et aux énergies alternatives) launched a research center to develop innovative e-waste recycling technologies.

The new center – named the NTU Singapore-CEA Alliance for Research in Circular Economy (NTU SCARCE) – will focus on four research thrusts that address the recycling and recovery of materials from common e-waste such as discarded lithium-ion batteries and printed circuit boards. According to the information, CEA's first research center outside of France will look at formulating advance e-waste separation and extraction techniques that are eco-friendlier and more energy efficient than current methods. The joint research center is supported by the Singaporean National Environment Agency (NEA) under the agency's Closing the Waste Loop (CTWL) Research and Development (R&D) Initiative. Together the three organizations are contributing 20 million Singapore Dollar (nearly 15 million US-Dollar) into this collaboration, the French partner informed.

The NTU-CEA research center has four research thrusts that will look into recycling and recovering materials from:

- lithium-ion batteries;
- silicon-based solar panels;
- printed circuit boards from discarded e-waste; and
- detoxifying plastic parts in e-waste.

"For example, the joint lab will look into developing eco-friendly methods to recycle lithium-ion batteries, and extract up to 75 percent of metals such as cobalt, nickel, lithium and manganese," CEA announced. One of the solutions would involve using "green chemistry" – a method that



NTU Singapore and the French CEA have launched a joint research center to develop solutions for the recycling and recovery of resources from e-waste

focuses on using chemical processes and earth-friendly products that minimizes the use and generation of hazardous substances.

Novel methods

Printed circuit boards are also important e-waste products. These are thin copper plated or etched circuitry boards where integrated chips and other electronic components are mounted on. These boards often consist of metals such as copper, aluminum, gold and silver, as well as valuable organics and ceramics, which are often lost during incineration. Current industrial recycling processes emit harmful pollutants and/or liquid waste that require costly treatment processes so that they can be safely released into the environment. "Researchers will develop novel methods to separate and recover as much organics and ceramics for a variety of

applications." As reported, using the same principles of recovering precious materials and reducing environmental harm, the lab will target sustainable solutions to process solar panel e-waste and toxic plastic materials. Researchers would explore ways to extract silicon and metals from solar panels, which could help reduce the costs to produce new panels. The goal is also to develop a systematic approach to safely sort, detoxify and recycle hazardous plastic materials from e-waste.

In Singapore, about 60,000 tons or 11 kilograms of e-waste per person are generated each year. "This lab will support the nation's mission to find new ways to recycle e-waste in a sustainable and eco-friendly manner while at the same time extract materials that can be re-used again," NTU Professor Madhavi Srinivasan, co-director of the center, was quoted.



Cooperation Secures Plastic Waste for Fuel Production

Norwegian companies Quantafuel and Geminor have entered a cooperation agreement to secure deliveries of plastic waste to Quantafuel's plants for fuel production.

Since 2007 energy firm Quantafuel AS has developed and tested its own patented catalyst solution that converts plastic waste into low emission fuels and products for the petrochemical industry, a press release said. The Norwegian company had previously opened a test production facility in Mexico, and in the third quarter of 2019 the first Scandinavian plant, located in Skive in Denmark, would be ready for production of diesel. "The new cooperation sees Geminor as a main supplier ensuring that the optimal volume and quality of plastic waste is delivered to Quantafuel's plants."

Plastic becomes fuel

Geminor is an international recycling company focusing on refuse-derived fuel (RDF), solid recovered fuel (SRF), recycled waste wood, hazardous waste for energy recovery and paper & cardboard, plastic and other types of waste for material recycling in the North-European market. According to the information, it has logistic hubs and offices in Scandinavia, Finland, UK and Germany, handles more than 1.4 million tons of feedstock every year and holds contracts with more than 80 waste-to-energy and recycling facilities.



As reported, Quantafuel has developed a technology in which it produces chemicals from plastic. These chemicals could be used to make new plastics. "Every year, Europe has to get rid of millions of tons of plastic waste, so the access to plastic is enormous. Our challenge is to provide a steady supply of high-quality, non-recyclable plastic waste so that the production volume is satisfactory and the end product is of good quality," Chief Commercial Officer of Quantafuel, Thomas Steenbuch Tharaldsen, is quoted. "It is important for us to have international access to good plastic material, and in this respect, Geminor becomes an important partner."

The company's production plant in Skive, which will be the first of several facilities in Europe, will convert up to 20,000 tons of plastic waste into chemical products annually. It is planned, that the capacity over the next few years will be increased to around 60,000 tons. Quantafuel's goal is to establish several production facilities in Europe, in places and in countries that adapt tax incentives and waste policies to environmental goals and provide the basis for the introduction of innovations to combat growing waste volumes.

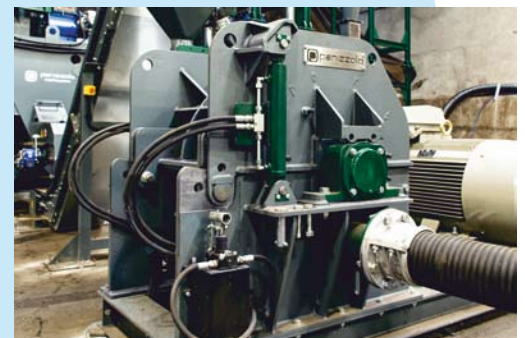
➔ www.geminor.no/en

➔ www.quantafuel.com

Photo: Geminor

Panizzolo Recycling: End of Waste Treatment for Armored Cable (SWA)

At the end of its cycle, the armored cable becomes a tricky waste to be introduced into the recycling system. The classic plants are not designed to process this kind of waste. Unlike normal electric cables, there is an iron foil under the sheath, while the central part can be made of copper or aluminum.



The recent European bloc to China and India export imposed the need to introduce efficient recovery solutions in member countries. At this request of treatment, Panizzolo promptly answered with its range of recycling solutions. Keywords are treatment, flexibility and maximum profitability. Stationary and mobile hammermills (with patented interchangeable cradle) and refining plant (with patented hammermills) allow the enhancement and the separation of iron, copper and aluminum, without losses of inert materials. The grinding logic simplifies the recovery cycle and maximizes the profitability of metals at the moment of sale.

➔ www.panizzolo.it

Photos: Panizzolo S.r.l.



Molinari Installed its Biggest Shredder for Tires in Europe

It was set up in one of the principal plants for ELT in the north of Italy, within an important expansion program.

This time Molinari played at home and was ready to install its biggest shredder of 46 tons in one of the most important Italian realities concretely active in the green economy. The machine is used for shredding End of Life Tires collected by the Ecopneus consortium to prepare them for the following processing phases that make them recyclable.

The order was commissioned in November 2018 during the Ecomondo exhibition in Rimini, and the installation was scheduled for May. It is a double shaft shredder with independent shafts. The central blades are placed on a traverse collocated at the center of the two shafts. One of the most innovative features of this machine is that the distance between rotary and fixed blades can be easily and rapidly adjusted.

Tires are among the most difficult materials to treat: They are made by rubber, harmonic steel and synthetic fiber. The rubber is elastic by definition and the steel very weary, so all you need are sharp blades capable of cutting rather than tearing and high structural rigidity of the machine. These aspects are particularly important when you want to combine the optimization of energy consumption with a clean cut (with few spiders).

The Molinari project was born taking into consideration these characteristics – necessary conditions to face the tire shredding market. The company has decided to make innovations despite the traditional pro-

cessing schemes. The first innovation concerns the fact of having a screen installed directly on the machine. Thanks to that, the material remains in the grinding chamber until it is reduced to a size that allows its passage through the holes of the screen. The second novelty, the most important, is the one concerning the adjustable cutting system, which makes it possible to recover the millimeters of wear lost during the working operations, keeping productivity and energy saving constantly over time. Rubber is a difficult material to treat because of its elasticity. In fact, it absorbs a lot of energy, transforming it into heat and not into cutting energy. Molinari managed to overcome this problem with an innovative rotor and a new blades design. The blades are trapezoidal and have a thickness of 68 millimeters. They are hardened and can be re-sharpened by 20 millimeters.

These are all aspects that the customer considered a lot before choosing Molinari among a group of factories considered top players in the shredding world. The robustness of the machine also allows treating tires with big dimensions, which could be the object of interesting opportunities to get new market shares.

The shredder is the biggest shredder for tires installed by Molinari in Europe. The country that showed greater interest in the factory from Bergamo was France, a difficult country if we consider that it is the only one which self-regulated to produce shreds (the so-called pieces of shredded tires that



come out of the shredders) of quality, classified according to well-defined standards. After the first Molinari shredder was installed for a test phase just to see if it could produce shreds responding to French specifications, three more machines were sold in less than 12 months.

The success was given thanks to the saving in terms of energy consumption but above all by the possibility of having already calibrated output dimensions of the shreds, without the need of adding external screens and bulky recycling systems. For these and many other reasons, the largest TP series shredder for tires produced by Molinari was chosen and requested, seeing also in a short amount of time, the recognition, at a national and international level, of the commitment and work done in the recent years. With this project, Molinari affirms that Italy is also ready to catch up with the other large European and non-European international markets, which see on the one hand the need to manage increasingly important quantities of tires to be ground, on the other they represent an unmissable opportunity to export Made in Italy technology.

➔ www.molinari-recycling.com

Technical specifications:

- 2500 mm rotors length
- 860 mm rotors diameter
- 120 rotary blades
- 13 fix blades
- 500 kW rated output
- 4.0 compliant to the requirements

Photos: Molinari srl



Orkel's Aim: "Waste is a resource, do not waste it, bale it!"

In general, circular economy, waste to energy and zero waste goals are not merely fancy concepts, but concepts that need to be urgently implemented worldwide. The company Orkel, based in Norway, has tackled those issues and thus developed the Orkel Compaction Technology to deliver innovative solutions to the waste management industry.

Therefore, the Hi-X Compactor was designed to allow efficient baling of fine materials like RDF, solid waste, compost, saw dust and many others. Now, this robust solution achieves specific benefits in baling both fine and rougher materials.

It all started when Orkel understood the huge potential and needs in the waste management segment. Certainly, turning waste into a resource is a strategic and profitable solution. Moreover, waste can be a highly valuable resource, and the best use and management of materials can generate a very positive impact on the environment and contribute significantly to the fight against climate change. And this is extremely important for the Norwegian-based company since the whole team is very concerned about sustainability and works constantly to find solutions to reduce the



human impact on nature and divert waste from landfills in the near future: A virtuous cycle that can be a benefit for everyone and the generations to come.

According to Orkel, customers in Norway, Portugal, Italy, United States, Chile, and recently Taiwan are already

baling waste and maximizing their logistics with the Orkel Hi-X Compactor. Especially the case of Orkel's newest customer in Taiwan shows that the company was able to see that the advantages go beyond easy transport and efficient handling. Therefore, the additional advantages should not be forgotten: reduced volume, simplified storage, reduced fire risk, no odor, and control over materials. In other words, the customers can be sure that materials do not end spreading in the wind, or end up in the city, roads, agricultural fields or worst case, in oceans and nature.

Hence, the Orkel Hi-X can convert the waste problem into a solution by saving time, money and storage space and thus the company is pursuing their aim: Waste is a resource, do not waste it, bale it!

➞ www.orkel.com



Photos: Orkel AS

European Union: Trade in Recyclable Raw Materials

In 2018, exports from the EU member states to non-EU countries amounted to 36.8 million tons. According to the statistical figures of Eurostat (the statistical office of the European Union), this volume represented an increase of 69 percent compared with the end of 2004. The value of these exported recyclable materials, which included plastics, paper and metals, was 14.0 billion Euro. Turkey and China were the main destinations for these materials. In 2018, EU exports of recyclables to Turkey stood at around 12.8 million tons (-4 percent compared with 2017). However, EU exports to China decreased by more than half from the peak of 12.4 million tons in 2012 to 5.1 million tons in 2018 (-46 percent compared with 2017). India, which received 4.6 million tons of the EU's recyclable raw materials last year (+79 percent compared with 2017) was also a significant partner along with Indonesia, to which the EU sent 1.9 million tons in 2018 (+98 percent compared with 2017). In contrast, imports of such waste from non-EU countries into the European Union decreased by 35 percent since 2004 (9.1 million tons) and stood at 5.9 million tons in 2018, worth 9.2 billion Euro. Last year, the largest tonnage of such materials were imported from China (1.6 million tons, down by -1 percent compared with 2017), Norway (1.1 million tons, up by +9 percent compared with 2017) and the United States (0.8 million tons, up by 8 percent compared with 2017).

New Portable XRF Spectrometer

As a provider of solutions regarding materials characterization, Malvern Panalytical has launched a new generation of Epsilon 1 X-ray fluorescence (XRF) spectrometers.

"This compact yet powerful instrument is a mainstay across industry, enabling fast and reproducible elemental analysis – but now with greater flexibility and precision than ever before," the company describes its new product. As reported, the comprehensive upgrade has focused on harnessing all the power and sensitivity of a larger benchtop XRF instrument in a compact system – the Epsilon 1 has a footprint of only 0.15 m².

Epsilon 1 is suited for the characterization and analysis of any type of sample in many industry segments such as cement, cosmetics, environmental, food, forensics, metals and coatings, mining and minerals, nanomaterials, petrochemicals, pharmaceuticals, polymers and RoHS-2. Its "precision has been enabled by the integration of a high-power X-ray tube and a new detector, which together deliver a threefold improvement in sensitivity,



along with rapid measurement capabilities," the manufacturer emphasizes. "Trace metals in pharmaceuticals, foods, soils and metal ores can now be quantified more quickly and accurately than ever before in an instrument of this size. The system's robust design prevents damage to its analytical heart by dust or oil, and ease of operation has also been improved

with the addition of a brighter touch-screen."

For out-of-the-box simplicity and functionality without costly and tedious setup procedures, Epsilon 1 is available in a number of pre-calibrated versions which are dedicated to specific applications. The Epsilon 1 Lube Oil delivers ASTM 6481-compliant elemental analysis of unused lubricating oils; the Epsilon 1 Sulfur in Fuels quickly quantifies sulfur content in fuels according to ASTM D4294-10 and ISO 20847; the Epsilon 1 Academia enables rapid characterization of unidentified samples, using Omnia software for standard-less analysis; and the integrated camera in the Epsilon 1 for Small Spot Analysis simplifies the investigation of very small objects, inclusions or inhomogeneities.

➔ www.malvernpanalytical.com/epsilon1

Photo: Malvern Panalytical

New Overband Magnet from Bunting Magnetics

Bunting Magnetics is offering a new low-profile electro overband magnet, which was launched at Bauma 2019.

The new product, called the 'ElectroMax', is 185 percent stronger than equivalent permanent overband magnets and 25 percent lighter, the provider explained. It "is ideally suited for any application where there are weight and size suspension limitations. Traditionally, mobile plants such as screens and crushers use

permanent overband magnets for tramp metal removal. For more difficult tramp metal separation applications, additional magnetic power is required".

The ElectroMax would provide this boosted separation force whilst remaining compact and light – two im-

portant features for any mobile plant. "The ElectroMax electromagnetic coil produces a high gradient magnetic field that, for one specific model, is up to 250 percent more powerful than its equivalent permanent overband magnet", Bunting Magnetics, one of the leading manufacturers of magnetic separators and metal detectors, quarrying and mining industries, underlined. This would enable the removal and separation of smaller and more challenging shapes of iron contaminants. "The additional magnetic strength also aids the lifting and removal of heavier tramp ferrous metals."

As reported, there are four models in the ElectroMax range. These are designed for suspension at a height of 450 millimeters over conveyors with widths of 1, 1.2, 1.4 and 1.5 meters.

➔ www.buntingeurope.com

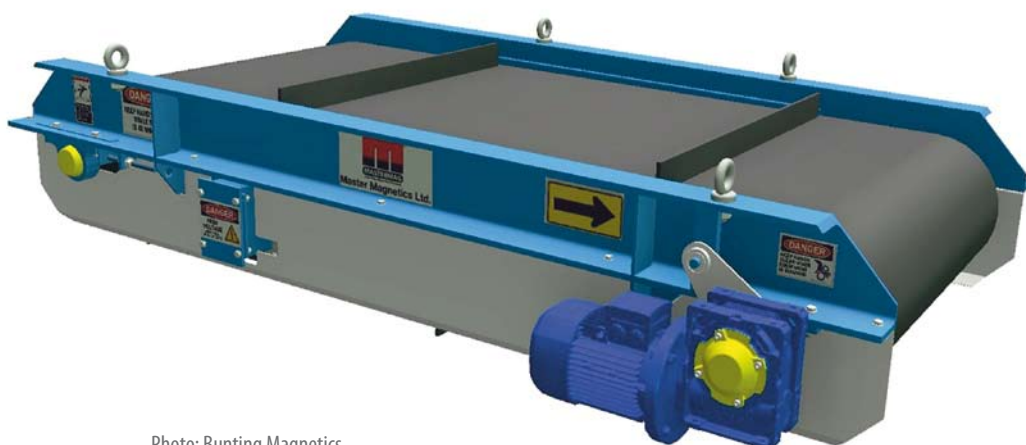


Photo: Bunting Magnetics

International Conference on Environmental Science and Technology

September, 4 – 7, 2019, Rhodes (Greece)

The Organizing and Scientific Committee of this event invites experts, scientists, entrepreneurs as well as representatives of public administration and social initiatives to participate in the 16th International Conference on Environmental Science and Technology (CEST2019). The conference, which will be held on the island of Rhodes in September this year, is organized by the University of the Aegean (Greece) together with the South Aegean Region and is supported by the University of Salerno (Italy) and the Imperial

College London (UK). The main organizer is the multi-disciplinary Global NEST (Network of Environmental Science and Technology), an international scientific movement that has been successfully developing for the last three decades with members from more than 60 countries; it is an international scientific movement focusing on innovative environmental issues. CEST2019 coincides with the celebration of the 30 years anniversary (1989-2019) of CEST series, the organizers emphasize. During the conference,

participants will have the opportunity to present and discuss their research with scientists from around the world, attend presentations covering all the latest trends and innovations in the field of environmental science and technology, meet with the speakers, expand their network – and enjoy the island of Rhodes. The scope of thematic areas includes inter alia the circular economy, solid waste management, and water treatment.

➔ <https://cest2019.gnest.org/>

Sardinia Symposium

September 30 – October 4, 2019, Forte Village, Cagliari (Italy)

The seventeenth edition of the Sardinia Symposium, organized by the IWWG – International Waste Working Group, will be held in Forte Village, Santa Margherita di Pula (Cagliari),

from September 30th to October 4th, 2019. In these five days, it will be structured in eight parallel tracks. "Sessions A and B will cover general topics of great interest, which will be

examined in detail in sessions C, D, E. At the end of each session ample time will be devoted to discussion," the organizers announced. "Sessions F and G will be dedicated to workshops



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primarily addressed to experts. Workshops will be seeded by a selected number of introductory lectures delivered in order to open discussion between participants.

Session H will be held entirely in Italian and will feature contributions on key contents at a national level." According to the information published

on the homepage, the previous edition was attended by 676 participants (researchers, technicians, administrators and operators) with the presentation of more than 550 scientific papers, selected according to quality by the scientific secretariat from a total of 864 offers of papers. The conference included 88 oral sessions and 40 specialized workshops for a total of eight

contemporaneous tracks, discussion forums and roundtables, a continuously accessible poster area and an extensive exhibition space for companies working in the field of waste management. Several workshops were devoted to the presentation of innovative international projects.

➔ www.sardiniasymposium.it

ISWA World Congress 2019

October, 7 – 9, 2019, Bilbao (Spain)

The 29th edition of the ISWA World Congress is expected to attract more than 1,200 experts, decision-makers and visitors from around the world. It is being organized by ATEGRUS, the association's national member in Spain, in cooperation with the International Solid Waste Association – ISWA.

At this global meeting – which includes high-level plenaries as well as technical site visits and a cultural and social program – waste management professionals, government officials, industry leaders, policy makers, scientists

and young professionals meet to exchange views and opinions to advance scientific and technical knowledge for sustainable solid waste management. The Congress will be based on a scientific program with a broad range of issues.

This edition of ISWA World Congress 2019 will also include a Latin America and the Caribbean Special Session "to present the experiences and challenges that define these countries, attending their sensibilities and the necessities their own citizens are

demanding," the international association announced. "These policies require an important effort and a unit of action on waste management that particularly prioritizes a sustainable development in Latin America, designing a comprehensive strategy as a joint global challenge necessary for fighting, among other priorities, against the climate change." This parallel session will be developed in Spanish or English, which is the official language of the Congress.

➔ www.iswa2019.org

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