

# GLOBAL The Magazine for Business Opportunities & International Markets RECYCLING

# WE RECYCLE

China Bets on Circular Economy, Page 12

Japan: A Mature Waste Market – with Opportunities, Page 16

Slowly Cracking the Chains – Iran's Waste Management is Going to Awake, Page 20

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#### Circular Economy Can Be the Solution

It is believed that the circular economy will radically transform the entire business sector in the next few years. Climate change will make our living conditions more challenging, and mankind will need to develop new ways to both conserve and produce resources such as water, food, energy, and consumables. The Technical Research Center of Finland (VTT) has asked grade schoolers to draw sketches of a fictional futuristic spaceship that has all waste and by-products of life aboard which need to be minimized and reused as efficiently as possbile.



As reported, one of VTT's current research projects involves envisioning a circular economy scenario for the future. The aim is to understand the limitations and laws of this approach in a confined and restricted environment, the Finnish scientists informed. "The goal is to find solutions to the challenges identified, as well as commercial applications for these solutions in future research projects." To detect bottlenecks and implications for people and life, worst-case scenarios will be used. This is why the project is based on the premise that phenomena such as climate change will force humans to abandon Earth and move to a kind of survival spaceship. According to VTT, the children produced a total of 86 fantastic sketches. Their ideas will serve as an inspiration for the project.

It does not take a prophet to realize that the circular economy will be an important part of the solution to the problems of the future. Today, recycling is already the method of choice when addressing the increasing amounts of waste. But sometimes new markets create new problems, as in the People's Republic of China. In this country the packaging waste is growing in tandem with e-commerce. In 2015, 20 billion parcels were shipped by courier services on the mainland, media reports said. The bulk of the waste was deposited in landfills without being processed. There are currently no regulations for processing used packaging in China, the State Post Bureau was quoted.

But recycling is on the rise in the world's most populated country: From the Chinese ministry of economy's viewpoint, the national recycling industry has achieved progresses – in parallel to China's emerging rebuilding towards a resource saving society (page 12). In contrast, the idea of the circular economy is well embedded in Japanese education, culture and legislation. It is estimated that more than 50 percent of waste home appliances are collected and recycled (page 16). And the Islamic Republic of Iran began to reconsider its waste management strategies before the trade restrictions were loosened (page 20).

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

Yours Brigitte Weber (weber@msvgmbh.eu)



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# **China Has Plenty of Opportunities**

According to China's "Medium and Long-Term Development Plan for Renewable Resources Recycling Systems (2015 – 2020)", the investment of all types of domestic and foreign capital in the recovery, sorting, and processing of renewable resources is encouraged.

As reported, the concept was issued by the Chinese Ministry of Commerce along with the National Development and Reform Commission, Ministry of Land and Resources, Ministry of Housing and Urban-Rural Construction and All-China Federation of Supply and Marketing Cooperatives during the "Green Circulation Work" media briefing in February last year. It also requires improvements to be made to the safety review system for the merger and acquisition of businesses in the People's Republic of China by foreign investors. "To promote concentration and consolidation of the industry, asset restructuring across regions, industries and types of ownership are encouraged," Hong Kong Trade Development Council (HKTDC) gave account. "Key enterprises are encouraged to integrate small and medium-sized enterprises and individually-owned businesses in the forms of modern organization including chain and franchise operations."

It is intended that by the year 2020 a number of model cities are to exist which will present recycling systems "featuring well laid-out networks, well-regulated management, diverse ways of recycling and high recycling rates for key resources, an average recovery rate of the main varieties of renewable resources at more than 75 percent for medium and large-sized cities, with more than 85 percent of recovery personnel put under standardization administration". It is also planned, that more than 85 percent of rural communities participate in recovery and more than 85 percent of the renewable resources are handled under standardized transaction and centralized processing. As reported, the plan also puts forward the cultivation of around 100 key enterprises in recycling renewable resources, with the total amount of recycled renewable resources expected to reach 220 million tons.

To achieve the national recycling goal, a number of recycling sorting gathering areas will be constructed to improve sorting and processing. It is planned to transform the Chinese renewable resources recycling industry into an intensive, large-scale industry with efficiency. "Establishment of waste products burden-sharing mechanism of vendors and consumers will be studied and recycling management systems of waste textiles and kitchen waste will be actively explored," HKTDC reported. In the People's Republic of China 200 regional recycling sorting bases and 2,000 specialized sorting centers are to be constructed. Their function will be "to link up effectively with the network of recovery sites in the urban and rural areas throughout the country, forming comprehensive renewable resources recycling systems, to collaborate with



city mineral resources bases, which mainly process and utilize renewable resources."

According to the information, the strategy takes a combination of factors into account. This includes the generation and growth trends in the main varieties of renewable resources in various regions of the country, the scale of development of renewable industry and related industries, population density, level of economic development, progress of urbanization, regional area and regional transportation conditions.

More information: Ministry of Commerce People's Republic of China http://english.mofcom.gov.cn/ China Association of Circular Economy  $\Rightarrow$  http://en.chinacace.org/



# **Opportunities in India**

In February this year, the "Make in India" week was a flagship event that was aimed at propelling the Indian economy by forging foreign engagement with Indian industry in the form of partnerships and investments.

During this advertising campaign by the Indian government hundreds of posters placed in strategic locations across the main cities in India featured Frost & Sullivan's number 1 ranking of India for growth, innovation and leadership, the consulting firm reported.

India's Prime Minister Narendra Modi had highlighted the staggering growth rate of the country's economy (according to the World Bank, +7.5 percent in 2016) and the vast opportunities for foreign direct investments in the region during his visit to the UK in November 2015. According to Frost & Sullivan, the positive outlook on Indian investments had also been backed up by Moody's recent ratings, the World Economic Forum's global competitive index, and the United Nations' recommendations.



During his visit PM Modi had underlined how foreign direct investment inflows have soared up by 40 percent in India this year, compared to last year, restoring global players' trust. "India is on the threshold of a big IT revolution," he was quoted. "We are encouraging it to fast-track the services to our 1.25 billion people. New technology and renewable energy is our new mantra. Whatever we do, we will do in a cleaner and greener way. Energy efficiency, water recycling, waste-to-energy, clean India and river cleaning are among those initiatives. These initiatives provide additional avenues for investment in modern technology and human resources." A variety of strategic programs have also been launched, such as the "Make in India" manufacturing initiative, the Digital India and Skills India campaigns and the Start Up India campaign.

# Global Electronic Scrap Recycling Market Expected to Reach 34.32 Billion US-Dollar

According to a new report published by market intelligence company Transparency Market Research, the global electronic scrap recycling market is growing rapidly.

In 2014 this segment was worth 11.03 billion US-Dollar, and the prospects for the future are even better. The report "Electronic Scrap Recycling Market – Global Industry Analysis, Size, Share, Growth, Trends and Forecast 2015 - 2022" predicts that this market could reach 34.32 billion US-Dollar by 2022, growing at a CAGR (compound annual growth rate) of 15.7 percent

from 2015 to 2022. In 2014, Europe accounted for around 29 percent of the overall electronic scrap recycling market. It is expected to maintain its dominant position throughout the forecast period. Growth in this region is expected to be driven by stringent government regulations and huge profits generated through the recovery of precious metals from electronic scrap. As reported by Transparency Market Research, Asia Pacific is expected to witness fastest growth during the forecast period. China, South Korea, and Japan were identified as the key markets.

www.transparencymarketresearch. com/pressrelease/electronic-scraprecycling-market.htm



# **Investment Opportunities in Georgia**

The Caucasus republic Georgia is on its way to build up a sustainable waste management. With the support of foreign donors the country plans to establish modern regional landfills, build up environmentally friendly transfer stations for waste, invest in new waste containers and refuse vehicles as well as implement projects regarding waste separation, treatment, conditioning and processing.

The Germany Trade & Invest (gtai), Germany's promotional organization for economy, reports that the old environmentally unfriendly landfills and illegal dumping grounds should be closed or rather be re-cultivated. According to market experts, the capital requirements for these projects would amount to at least 170 million US-Dollar until 2025. The new waste management law, which is in effect since January 2015, is orientated towards German, Austrian and Bulgarian legal norms in this section. Until 2019 municipal waste shall be separated. Moreover, a long-term management strategy for 15 years and actions plans for five years are planned. The Georgian law even governs future responsibilities of manufacturers and distributors of products, to reuse or dispose of packaging environmentally friendly. However, limited public finances and insufficient local know-how stand in the way of a quick implementation of new regulations. According to gtai, Georgia therefore strongly focuses on support from abroad.

According to statements, the Solid Waste Management Company of Georgia Ltd (SWMCG), which is active in the area of competence of the ministry of regional development and infrastructure, is responsible for all communal landfills with exception of the ones in the capital Tiflis (municipality/ Tbilservice Group) and in the autonomous republic of Adjara (municipality Batumi/ Higiena 2009).

The ecological reconstruction of existing landfills (until ca. 2018), as well as the planning and establishment of new central and regional landfills (until 2022/23) as a replacement for the nowadays operated communal dumping grounds, resides with the SWMCG. The company is the contact for foreign businesses wanting to engage in waste management as well as perspectively intended projects within the waste processing of Georgia.

The Georgian Waste Management Association (WMA) plans to enforce the so far underdeveloped recycling activities in Georgia. According to gtai, the aim of the organization is to convey contacts between domestic and foreign companies as well as to encourage the exchange of experiences.

Furthermore, the organization plans to forward waste and recycling projects in cooperation with local authorities and the private sector. Lastly, the Georgian Waste Management Association wants to contribute to the creation of a business-friendly legislative for the recycling industry.

http://waste.gov.ge/en/



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# **USA: Paper Mills Prefer Separately Collected Recovered Paper**

Paper mills using recovered fiber as feedstock, reject the use of recovered paper sorted from "one-bin programs", reported the Washington-based Institute of Scrap Recycling Industries (ISRI) in February this year.

This is the main result of a survey of paper mill buyers in North America who are responsible for sourcing recovered fiber for their paper mills, about their thoughts and experiences with materials from mixed waste processing centers.

Those centers "advise their residential customers that there is no need to separate recyclables from solid waste (including organics) prior to collection, claiming that the valuable recyclables will be successfully separated in a Material Recovery Facility (MRF)like environment post-collection," ISRI gave account. "While there have been other recent studies about mixed waste processing centers, this is the first known study that exclusively solicited views of recovered paper buyers regarding their opinions and views about the ability to successfully use the recyclables sorted from such 'one-bin' programs."

Some highlights of the survey's initial results are as follows:

- 82 percent of the respondents purchase recovered fiber for between one to six mills, and 49 percent of respondents purchase material in the range of more than 100,000 tons of recovered fiber per year, but less than 500,000 tons of recovered fiber per year.
- Of the respondents, 25 percent purchase "some" material from dirty MRFs, but these mills purchase less than ten percent of their required



tonnage from mixed waste processing centers.

- Of those that purchase recovered fiber from mixed waste processing centers, 70 percent find the quality to be "worse" than most other recovered paper, and 90 percent of those mill buyers have had to "downgrade" or "reject" the paper from the mixed waste processing centers, at a higher rate than recovered paper from "regular" MRFs.
- 62 percent, or nearly two thirds of those surveyed feel that ISRI specs should contain a statement as part of the paper specifications that sounds: "paper recovered from onebin programs, separated in mixedwaste processing centers, is not fit for use in USA paper mills."
- Of the 75 percent of respondents who do not purchase recovered fiber from mixed waste processing

centers, the top eight reasons given, for not purchasing it, were contamination, odor, low quality, exhibit a higher level of prohibitives and outthrows versus what is acceptable, internal quality standards prevent purchasing, too risky, excessive moisture and quality will not meet the mills' customers' needs.

According to ISRI, the survey was conducted confidentially via an online questioning between January 11 and January 31, 2016. An independent, third-party research firm was utilized to conduct the study. In order to achieve a high response rate, the survey was limited to less than ten critical questions. All major mill groups using recovered paper in North America were invited to participate in the survey, both members, as well as nonmembers of ISRI.

# **Europe: Revised Guidelines on Paper for Recycling Quality Control**

According to the Confederation of European Paper Industries (CEPI), the revised guidelines include also recommendations for Paper for Recycling suppliers and paper mills. "The objective of the guidelines publication is to



achieve greater harmonization, to improve the implementation of the EN 643 Standard and to facilitate commercial relationships between paper mills and paper for recycling suppliers," the European association stressed. The revised guidelines put a strong emphasis on the inspection procedure for quality control at the paper mill and explain what controllers should consider during an inspection in order to decide if a load should be accepted, conditionally accepted or refused. After a general control, further important parameters for quality control are named, i.e. bale conditions, moisture control and control of unwanted materials. The control procedure recommended is described in detail and illustrated by a decision tree at the end of the document.

The publication can be downloaded at <a>www.cepi.org/node/20273</a>

# **Maximum Storage Capacity with Legioblock**

Legioblock is a flexible construction system which creates maximum storage capacity for your waste, bulk and recycling materials.

Each product has its own specific characteristics, such as density and angle of repose. All these aspects have an effect on the storage height and therefore maximum capacity. "With Legioblock we are able to construct different types of structures, which guarantees your optimum storage capacity," the provider, Dutch A. Jansen BV assures.

According to the information, Legioblocks are cost-effective, combine high-quality with proven reliability and are fire-resistant. The concrete blocks are a total building solution for: storage bays, retaining walls, concrete firewalls, industrial buildings, salt storage and silage pits.

#### Flexible construction system

Storage bays for all bulk materials are quickly and easily build with Legioblocks. The interlocking blocks are easily stacked and placed, without the need for mortar or adhesives. This way, the blocks can be moved and reconfigured at any time, enabling businesses to adjust their storage capacity to changing needs. This makes it the ideal solution to optimize storage capacity in a short amount of time.

As reported, Legioblock concrete stackable blocks are over four hours fire-resistant and only degrade marginally when exposed to fire. The temperature rise on the non-exposed side of the concrete wall is so low, that fire propagation through heat transfer cannot take place. Furthermore, a Legioblock firewall stabilizes the stored materials, thereby preventing the fire from spreading horizontally.

"We offer a complete building solution including design, static calculations, transport and construction," A. Jansen BV underlines. "Various roofing systems can also be offered. You have only one point of contact for the realization of your entire project."

On the website **c** www.legioblock. com, there is more information about the flexible building system.





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# USA: New Single-Stream Material Recovery Facility for Chicagoland

Since several weeks Lakeshore Recycling Systems (LRS) operates its new material recovery facility in the village of Forest View, Illinois.

Receiving 110,000 tons per year of residential and commercial material from the Chicagoland area, the company also serves all 605 Chicago public schools and eight city colleges.

The single stream system, which LRS officially opened in mid-March, was designed, engineered, manufactured, and installed by Canadian-based Machinex. As reported by the provider, the system includes sorting technologies, such as a series of disc screen separators: a Mach OCC, to sort the cardboard; a Mach One to separate the newspapers; and a Mach Ballistic to be used as a finishing screen to increase the quality on mixed fibers. The Mach Hyspec Optical Sorter sorts PET bottles with an efficiency up to 98 percent, the information says. Also included into the system are ferrous and non-ferrous separators to sort metal containers, a Closed Door Baler for plastic film, and a Glass Cleanup System to obtain marketable glass. Lakeshore also chose the new Ma-



chinex High Capacity II-Ram Baler. The capacity of the system is reported to be 22.5 tons per hour.

Serving Chicagoland for over 17 years and headquartered in Morton Grove, Illinois, Lakeshore Recycling Systems (LRS) collects, diverts and recycles more than two million tons of waste per year. The company operates six Material Recovery Facilities (MRFs), a fleet of fuel-efficient natural gas-powered trucks, and is run by over 540 full-time employees.

Since the early 1980s, Machinex designed and installed machinery for material recycling facilities. The company has realized "over 350 turnkey facilities in partnership with leading MRFs in Canada, the United States, Europe, and Australia".

www.machinexrecycling.com

# **Beijing Enterprises Holding Buys German Company**

Chinese Beijing Enterprises Holding Limited, controlled by the Beijing Municipal Government, has reached an agreement with EQT Infrastructure II, a fund owned by the global private equity group EQT, to buy the German company EEW Energy from Waste. The agreement is only subject to clearance under the German Foreign Trade and Payments Ordinance.

The transaction was expected to close at the end of February 2016. The equity purchase price amounts to 1.4 billion Euro (about 1.6 billion US-Dollar). According to the seller, the transaction represents the largest Chinese direct investment in a German company to date.

EQT Infrastructure II, which is a 1.925 billion Euro fund investing in medium-sized infrastructure businesses in the Nordic region, parts of Continental Europe, and North America, acquired a 51 percent stake in EEW in March 2013, and developed the business in partnership with E.ON, one of Europe's largest energy groups. In April 2015, the fund purchased the remaining 49 percent of the shares after



Photo: EEW Energy from Waste

E.ON announced its group restructuring program.

With this acquisition Beijing Enterprises Holding intends to expand its energy-from-waste business. The company is a professional public utilities provider with focus on gas business, water services business, green industry, solid waste treatment and beer business.

EEW is active in Germany, Luxembourg and the Netherlands. The company operates 18 Energy from Waste plants with an installed waste capacity of around 4.7 million tons, producing in total six TWh of energy. In 2014, EEW generated sales of about 539 million Euro.

### **Taiwan: New Recycling Fee Rate Discount Measures**

To encourage manufacturers to design environmentally friendly products, the Taiwanese Environmental Protection Administration (EPA) has tightened the eligibility criteria for discounted recycling fee rates.

Since January this year, a 15 percent discount is given to all Green Mark products. As for IT products, only those that carry the Green Mark or the Energy Saving Label are eligible for a 30 percent reduction (five percent for printers). EPA has established new measures that came into effect in January 2016. These include revisions to the online reporting of industrial waste, amendments to the Regulations Governing Air Quality Models and Simulations, discounts on recycling fee rates for environmentally friendly products, the tightening of mercury maximums for cylindrical batteries, and the banning of chromate copper arsenate as a wood preservative. Since Taiwan began rolling out its recycling measures in 1997, its recycling rate climbed from 5.88 percent (288,000 tons) to 55.59 percent, or 1.012 million tons, in 2014. According to EPA, the daily per capita garbage collected was at an all-time low of 0.383 kilogram. The authority will continue to work towards increasing resource efficiency and sustainable cyclical use of resources to attain its 2017 target of a recycling rate of 65 percent, EPA said in a report.

http://web.epa.gov.tw/en/

# Taiwan's E-Waste Recycling

Taiwan's progress achieved in e-waste recycling reflects a documentary, which was jointly produced by the National Geographic Channel and the Taiwanese Ministry of Foreign Affairs (MOFA).

Since its debut in October last year, the film has been shown in more than 40 countries, Taiwan Today reported.

According to the information, the documentary titled "Megastructures: Urban Mine" highlights the state-of-the-art facility of Super Dragon Technology Co. Ltd. (SDTI) in northern Tai-wan's Taoyuan City ( www.sdti.com. tw/en/about-sdti/company-profile. html). Built by using reclaimed mate-rials and jointly developed with Taipei city-based Miniwiz Sustainable Energy Development Co. Ltd. ( www. miniwiz.com/miniwiz/en/projects/ar-chi/sdti-waste-recycling-facility), the facility is said to be able to recycle 99

percent of all e-waste, extracting such precious metals as gold, platinum and silver in the process.

At a conference in Taipei City in November 2015, MOFA Vice Minister Vanessa Shih said the program will help the audiences to have a better understanding of the achievements and contributions of Taiwan's public and private sectors in combating climate change. "While Taiwan is not a member of the United Nations Framework Convention on Climate Change, the country has never been absent from the global effort to tackle this severe challenge," she was quoted. Related government measures in this regard included the promulgation in July of the Greenhouse Gas Emission Reduction and Management Act, with Taiwan being one of the few countries in the world to adopt such legislation, the Vice Minister said. In addition, in its intended Nationally Determined Contribution unveiled in September, the government pledged to reduce its 2030 emissions by 50 percent from the business-as-usual scenario to 214 million tons, or 20 percent lower than the 2005 level.

Information about "Megastructures" **t** http://natgeotv.com/me/ megastructures/about



### **PV Module Take-Back and Recycling in Japan**

Since March this year, PV CYCLE's take-back and recycling solution for electronic and electrical solar energy equipment is also available in Japan. The Belgium headquartered industrial association offers its waste management service for production and post-consumer waste to Japanese companies and commercial owners. "The Japanese PV market is the natural fit for our expansion to other

regions of the world: a 23-GW market with a long history in PV module installation and a high environmental commitment on the part of consumers and companies," said Jan Clyncke at the signing ceremony of the first Japanese PV collection point under the Government-funded Akita Photovoltaics Recycling Model Project (APV). PV CYCLE supports the project with its expertise and its collection

box. 14 collection points have been opened to collect small quantities of PV panel waste.

According to PV CYCLE, the organization guarantees average recycling rates between 90 and 97 percent. The association today covers PV modules, inverters, batteries and other equipment falling under WEEE or Battery legislation in its portfolio.

# **The Chinese Way to Recycle Carbon Fiber Waste**

According to Chinese media reports, a team of researchers from Shanghai Jiao Tong University has developed a new technology and equipment for recycling carbon fiber composite waste material.

The total amount of carbon fiber composite waste material in the world is expected to reach 50,000 metric tons by 2020. As reported, the amount of carbon fiber will exceed more than 25,000 tons and will be worth more than 760 million US-Dollar, according to experts' estimations. Therefore, recycling is worthwhile and the carbon fiber in the composite waste material still has a high recycling value. The technology developed by Shanghai Jiao Tong University researchers is said to be undertaken on a large-scale operation, with an annual processing capacity exceeding more than 200 tons. "Earlier, only three companies in Germany, Japan and the United States had an industrialized technology for recycling carbon fiber composite waste material," the publication "China Daily" gave account.

Thus far, the Chinese technology has been listed in the 2015 automotive industry standards to guide the recycling and reuse of automotive materials by the China Automotive Technology and Research Center.

# Hong Kong: Suez Renews Contract with Shatin Transfer Station

The Paris headquartered Suez environnement SAS has renewed the contract to design, modify and operate the Shatin Transfer Station in Hong Kong. The new contract covers an operational period of ten years with a contract value of about 54 million Euro.

As reported by the French-based company, the Shatin Transfer Station currently has a design throughput of 1,200 tons municipal solid waste per day and processes waste collected in urban population centers for onward transportation to the North East New Territories Landfill. Under the new contract, Suez is responsible for the design, modification and operation of the station. This includes construction and design to modify existing facilities, maintenance work and replacement of machinery as needed to meet the expanded maximum throughput of 50,000 tons per month.

Furthermore, the company has to ensure disposal of permitted waste at designated or alternative landfills and will perform environmental monitoring and take measures to mitigate the environmental impact of facilities. Suez has been operating in Hong Kong for more than 28 years and is currently responsible for treating 70 percent of the waste of the city's 7.3 million residents. According to the information supplied by the company, it currently operates six out of seven transfer station contracts and two of the biggest landfills in the world that treat almost 3.8 million tons of waste per year. It also manages the restoration, aftercare and after-use of seven closed landfill sites in Hong Kong.

### Averda with Operations in the Republic of Congo

This year, the Lebanon-based waste management group Averda has launched its operations in the Republic of Congo, which started in August 2015, during a formal reception attended by representatives of the Congolese Government and Brazzaville Municipality. Since April the company is responsible for the cleanliness of the capital's nine districts.

"In January 2016, Averda has also been contracted by the Municipality of Brazzaville to design, build and operate the first cell of the city landfill, deploying the most up-to-date international standards of environmental compliance in this highly specialized waste disposal area", the company announced. The company employs more than 1,000 Congolese people.

# **Ethiopian Cement Company Gets Energy from Waste**

The Egyptian Company for Solid Waste Recycling (ECARU), a subsidiary of Qalaa Holdings' Tawazon, will supply Ethiopia's Messebo Cement Company with a waste to thermal energy solution. As reported, it has signed a fiveyear contract with Ethiopia's Messebo Cement to supply Biomass which will be used as a source of energy to replace coal gradually. As stipulated by the agreement between the two companies, ECARU will be the technology and service provider responsible for collecting, transporting and processing local biomass that will be converted to environmentally friendly alternative solid fuel. According to Qalaa Holding, the contract with Messebo Cement, which is located in Mekelle, 780 kilometer from Addis Ababa with a production capacity of two million tons of cement per annum, is renewable beyond the stipulated five-year time period under the same terms and conditions.

Tawazon, Qalaa Holdings' subsidiary company for investment in the region-

al solid waste management industry, controls two companies: the Egyptian Company for Solid Waste Recycling (ECARU), a solid waste management service provider, and Engineering Tasks Group (ENTAG), a solid waste management technology provider.

Together, these two companies form a waste management enterprise with extensive operations in Egypt and an international project book in Oman, Malaysia, Sudan, Nigeria, Libya, Saudi Arabia, Qatar and Syria.

### **Green Fence Recycling Corporation Invests in South Carolina**

Green Fence Recycling Corporation, a startup recycling firm established in 2014, is investing 2.5 million US-Dollar in a new facility. It is planned that the enterprise will create 40 jobs in Mullins (Marion County, South Carolina) over the next five years. The 65,000-square-foot facility was expected to be fully operational in February 2016. Green Fence Recycling offers sorting, shredding and cleaning services for the recyclable plastics industry. Representing the company's headquarters, its Marion County facility will serve both the U.S. and China markets, focusing on the processing of mixed rigid plastics and polypropylene, as well as PET fines washing. The Coordinating Council for Economic Development in South Carolina has approved job development credits, as well as a 100,000 US-Dollar grant to Marion County to assist with the costs of real property improvements.





# **China Bets on Circular Economy**

From the Chinese ministry of economy's viewpoint, the national recycling industry has achieved progresses – in parallel to the country's emerging rebuilding towards a resource saving and environmentally friendly society.

"Presently, there are a total of more than 100,000 recycle enterprises in China, recycling iron and steel scrap, waste plastics, nonferrous metal scrap, waste paper, waste tire, scrapped cars, electric appliances and electronic products, and vessels over 160 million tons, three times more than that in 2000, and valuing nearly 480 billion Chinese Yuan Renminbi (CNY)\*), twelve times higher over 2000," a press release of the Chinese Ministry of Commerce said in 2015. "The recovery rate of scraped steel, nonferrous metal, electric appliances and electronic products surpasses 70 percent. With the industrialization speeding up in China, the scraped commodities increase, as well as the varieties. Recovering the renewable resources is faced with new requirements and new challenges."

According to China's "Medium and Long-Term Development Plan for Renewable Resources Recycling Systems (2015 – 2020)", the recycling rate shall cross 75 percent in large and mid-sized cities by the end of this period. According to the information, recycling volumes of 220 million tons are intended. Furthermore, both the dimensions and the recycling industry's technology spectrum shall grow to a large extent. Even the adoption of a "standard operation mechanism" is planned.

The suggestions for the 13th five-year plan (2016-2020), which should be dismissed officially in March, allows more space for the environment protection. Therefore, in China the traditional production shall be redirected to an environmentally friendly production. This implies "low-carbon production systems and the encouragement of companies to perform technology updates", informed the government-run news agency Xinhua in November last year. However, the country's economic development should stand in the first place. For this economic development an annual growth of 6,5 to seven percent is going to be located.

#### **Involvement of foreign investors**

China has opened the waste and recycling industry for foreign companies and encourages investments in this sector. This applies to the construction and the running of waste management plants as well as to sorting and recycling machines or facilities. Beyond that, investors are encouraged to act in recycling (electronic scrap, end-of-life vehicles, metals, rubber, and batteries).

Landfills, waste incinerating plants or recycling centers are usually co-financed by the public sector and they are therefore written out partially as public-private partnerships (PPP), reports Germany Trade & Invest (gtai), Germany's promotional organization for economy. Also the development of joint ventures with local disposal and recycling companies is a common practice.

Several proposals are already under construction or contractually secured. A few examples:

- The "Sino-German Metal Eco-City" in Jieyang (Province of Guangdong) shall be accomplished until 2020
- According to the information of gtai, a recycling park emerges in Pingtan (Province of Fujian), in which endof-life-vehicles, shipwrecks and veteran electric appliance and electronic device shall be rehashed; the aim is to trade annually one million tons of steel scrap, 20,000 tons of copper and 20,000 tons of waste plastics
- The facility for ship-breaking and recycling, which emerges in Jiangmen (Province of Guangdong), shall have an annual capacity of 400,000 tons at command after its completion
- A recycling facility for old tires will be build in Huai An (Province of Jiangsu) with a planned capacity in the amount of 600,000 tons/years
- As soon as the respective manufacturing line is built, around 100,000 tons of industrial waste, like ceramic, slags, and fly ash shall be annually used for the brick's production
- Furthermore, facilities for the thermal exploitation of municipal waste are emerging, for example, in Hengyang (Province of Hunan) and Xiaoxian (Province of Anhui). These two refuse incineration plants are going to deal with around 745,000 tons of waste per year.

# High amount of waste produced through economic growth

The swift economic growth of the past years has brought disadvantages for the People's Republic, which, according to recent estimates, is going to have more than 1,4 billion inhabitants by 2020. Those disadvantages are connected with an improvement of the living standard and the expansion of the production. Also the amount of waste has increased vastly due to this development. According to gtai information, all in all 179 million tons arose in 2014, four percent more compared to the previous year. In the industrial sector amounted the occurrence of solid waste to around 3,3 billion tons as well as 31,6 million tons of hazardous waste.

According to gtai, around 90 percent of the municipal wastes are treated at least slightly and 70 percent are deposited. The German business development council ascertains, that even though the landfill's capacity should rise by 100.000 tons to around 520.000 tons per day in 2015, it is by far not sufficient.

Considering the limited landfill's capacity and increasing environmental pollution through existing and outdated landfills, more and more waste is burned. According to gtai, 164 municipal waste incineration plants were in operation in late 2013. In the past year the industry insiders estimated that the quantity of appropriate facilities would mount to 220; the then available daily incineration capacity was declared with around 216.000 tons. A daily capacity of 17.000 tons should be realized in the rural areas of the People's Republic at that time (2015).

According to expert opinion, the huge amount of water and organic substances puts high requirements on the thermal exploitation of municipal solid waste. Low incineration temperatures lead on to higher pollutant emissions. The Chinese limit value would have been lower than the European, but those limit values would have been hard to observe even with modern filter technology. According to statements, an energetic utilization of waste for energy generation also faces difficulties, especially as there supposedly are resistances of the population against such facilities.

#### No area-covering recycling system

An area-covering recycling system is not (yet) realized regarding the recycling of utilizable waste. Gtai reported that sorting and recycling facilities can be found especially in pilot projects with support of the government. According to information, 25 recycling centers for packaging waste as well as 50 distribution centers should be build nationwide by the end of 2015.

It is assumed that for the new five-year program (2016-2020) further enhancements of the recycling rate for industrial waste to 72 percent will be codified. According to Chinese sources, 62,2 percent of the industry's solid waste has been recycled in 2013. However, 836,7 million tons ended up in landfills. At the end of the year, around 434 million tons of waste were stored on the area of the companies, partially due to missing disposal opportunities.

# Bottlenecks regarding hazardous waste treatment

A significant demand for incineration capacity of hazardous waste exists in China. According to Germany Trade & Invest (gtai), the promotional organization for Germany's economy, the increased restrictions on emissions intensify the situation. Currently, new projects are being planned and built, often in terms of PPP (Public-Private Partnership). Nevertheless, the time slot for the ongoing expansion is restricted to a few years. After that, over capacities might impend.

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Even in the recycling of end-of-life vehicles progresses have been made. The respective industry is located in the setup, especially as the economics ministry of the People's Republic supports the remodeling of demolition and re-



cycling plants. According to statistics in 2014, China's recycled yellow label cars (heavy-pollution vehicles) and old cars grew by around 90 percent on a year-on-year basis, the Chinese Ministry of Commerce informed in 2015. Experts are expecting that the recycling quote for motor vehicle scrap is set by 95 percent in the new five-year plan (2016-2020).

There are not enough capacities in place for the preparation and exploitation of sewage sludge either. Thereby, according to expert opinion, recycling of phosphor from industry sludge will gain in importance one day considering the enormous amount of sludge.

#### **Aim: Green Manufacturing**

China has imported recovered paper, waste glass and scrap metal for many years in order to use these exploitable materials as secondary raw materials. The "Green Fence Policy" is in force since February 2013 and this regulation states that it is not allowed to import any waste, which's degree of pollution with non exploitable materials oversteps the mark of 1,5 percent. Meanwhile, companies have to possess licenses if they want to become active in the recycling area. However, there still remains a considerable volume in the unregulated black market. Therefore, the Government attempts to support the development of a sustainable waste management industry through pilot projects.

Furthermore, China aims at a more environmentally friendly production. A concurrent draft already exists. The "Implementation Plan for Green Manufacturing Projects" shall be a part of the strategy "Made in China 2025". The target is a clean, low-carbon, recycling, and sustainable green manufacturing system, the Chinese Ministry of Industry and Information Technology (MIIT) was quoted by Hong Kong Trade Development Council (HKTDC).

\*) 1 CNY = 0.153 US-Dollar (March 4, 2016)

### Armenia: A Step Forward to Develop Solid Waste Management

The European Bank for Reconstruction and Development (EBRD) is providing a 5.5 million Euro loan to Armenia for the implementation of modern solid waste management solutions.

The loan amount includes a previously signed and newly added EBRD sovereign loan, which will allow for an extension of the geographic coverage of the Kotayk Solid Waste Management to the adjacent Gegharkunik region.

The new landfill – the first in Armenia that is compliant with EU regulations – will be located in the city of Hrazdan in the Kotayk Province and managed by twelve participating municipalities – Hrazdan, Abovian, Charentsavan, Tsakhkadzor, Byureghavan, Yeghvard, Nor Hachn, Sevan, Martuni, Gavar, Vardenis and Chambarak. It will operate as a commercial unit with modern solid waste management systems, covering the collection and disposal of municipal solid waste. The services will generate major environmental and social benefits for some 500,000 people in the area. The EBRD loan is complemented by grant financing of 5.5 million Euro, provided by the European Union Neighbourhood Investment Facility (EU NIF) with a contribution of 3.5 million Euro and a 2.0 million Euro grant from the Eastern Europe Energy Efficiency and Environment Partnership (E5P) fund.

The Austrian government will support the implementation of the project and the corporate development of the landfill management company. Additional grant funds are provided by the EBRD's Shareholders' Special Fund and the Early Transition Countries Fund.



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Markets

# Japan: A Mature Waste Market – with Opportunities



Japan has always lived with natural resource scarcity due to geological and geographical limits. Meanwhile the idea of the circular economy is well embedded in Japanese education, culture, and legislation. As the Minister of Environment underlined, Japan has a solid system for waste management and recycling. Some call it the best – the plastic recycling rate is about twice that of the UK –, some call it the most complicated, as in the town of Kamikatsu the people must separate their waste in 34 different bins. But Japan's waste management is developing. And offers restrained opportunities for foreign know-how and investment.

ikewise Europe, Japan has come to the conclusion that exploiting waste as a profitable resource instead of a costly burden, by creating a circular economy, would be a good way to resolve simultaneously several challenges. Numerous policies and laws implemented - since the 1970s - have advanced the circular economy in Japan, but the greatest progress in legislation took place since 2000. The Law for the Promotion of Efficient Utilization of Resources was ratified in the year 2000 to minimize waste by producers and consumers alike. The Construction Recycling Act was enacted in 2000 as well as the Food Recycling Act. The Law on Re-utilization of End of Life Automobiles came into force in 2002. The Home Appliance Recycling Act from 1998 was upgraded by the Small Home Appliance Recycling Act enacted in 2012. By now, the third Fundamental Plan has been set in 2013 aiming at promoting recycling, but also reinforcing reduce and reuse, focussing on the recovery of useful metals and forcing initiatives for security and safety as well as international cooperation for 3R initiatives. The

plan mentions the importance on the view point of LCA. Besides that, the Extended Producer Responsibility (EPR) principle exists as a concept. The World Economic Forum balanced in 2013: "This will doubtlessly ensure that Japan continues to be one of leading nations in this field."

#### 98.6 percent waste reduction rate

According to latest data of the EU-Japan Centre for Industrial Cooperation, the total waste emissions reached 44,870,000 tons in fiscal year 2013 representing a daily waste emission of 958 grams per person. In that year, the waste reduction rate lay at 98.6 percent. With approximately 80 percent, incineration is the most widely used method for treating waste in Japan, because of size reduction, respondance to the limited landfill sites and the hygienic standard. In 2013, the number of waste incineration plants reached 1,172, but began to decline while the capacity per plant rose marginally: 28.0 percent of all plants were equipped with power generation facilities, and the total power generating capacity increased. The direct landfill disposal rate was 4,540,000 tons respectively 1.4 percent. As of spring 2014, the available capacity amounted to 107,410,000 cubic meters. Given the same amount in the future, this corresponds to 19.3 remaining sustainable years.

#### A recycling rate of 20.6 percent

A total of 9,270,000 tons of waste have been recycled resulting in a recycling rate of 20.6 percent of total waste in fiscal year 2012. Japan's recycling rate for metal is said to be 98 percent and partly as high for other materials. Of 312,950 tons used beverage cans in fiscal year 2014, 273,491 tons were recycled or reused, achieving a recycling ratio of 87.4 percent; the can-to-can recycling rate lays at 63.4 percent. The decreasing rate in recent years can be explained by an increase of scrap export. The majority of electronic appliances/electrical products are recycled, and up to 89 percent of the materials they contain are recovered. It is estimated that over 50 percent or even more of the targeted waste home appliances are collected and recycled compliant to legislation. However, around one third is exported to foreign and mainly developing countries as used items, scrap or resources.

The yearly disposal of waste plastics in Japan is roughly estimated at ten million tons/year assembling from 4,540,000 tons of domestic (general) plastic waste and 4,860,000 tons of industrial plastic waste. In 2014, 50.6 percent of the 669,620 tons of plastic recycled through the Japan Containers And Packaging Recycling Association has been material recycled. But according to the Plastic Waste Management Institut, in 2011 out of 9,520 tons of plastic waste totally 2,120 tons were mechanically recycled and 4,960 tons were thermally treated.

#### Industry waste recycling stable at 52 percent

As the Handbook on Resource Recycling Legislation and Trends in 3R points out, Japan's industrial waste amounted to 381.206.000 tons in 2011. Two thirds of that waste result from the electricity, gas, heat and water sector (25 percent), agriculture and forestry (22 percent), construction (20 percent) and paper (eight percent). The total quantity of industrial waste discharged in Japan has been slowly decreasing in recent years. The recycled amount remains stable at 52 percent, while intermediate treatment include processes such as sorting, crashing, dewatering and incineration. The several responsibilities for waste are delegated to the national government and the prefectures. The municipalities are in charge of the collection, treatment and disposal of municipal solid waste within areas under their jurisdiction, while waste generating business operators are responsible for the managing of industrial waste generated from their corporate activities.

#### 23,045 waste disposal businesses

In 2009, the Japan External Trade Organization reported a total of 23,045 establishments of industrial and general

waste disposal businesses throughout Japan, 59.4 percent of the establishments with less than ten employees. Regarding the recycling of packaging waste from households, the Japan Containers and Packaging Recycling Association in 2014 listed 53 companies active in the recycling of glass bottles, 45 for paper, 54 for plastic, 52 for PET bottles and some companies recycling several waste types. The number of contracting business entities for glas bottle recycling was 3,235, of PET bottles 1,292, of paper 60,598 and of plastics 76,388 contributing to a taking-back volume of 1,433,134 tons. The numbers of contracted municipalities added to 1,247, 1,202, 148 and 1,081 with a taking-back volume of 1,176,585 tons. Recycled glas bottles reached a sales volume of 317,165 tons, PET bottles of 158,296 tons, paper of 24,702 tons and plastics of 393,740 tons. Most of the material succeeds in a sales rate of 100 percent.

The five largest corporations represent more than half of the non-metal waste management industry. Regarding the recycling of metal waste and scrap, the main players in 2010 were Asahi Holdings Inc. (19.4 percent production share), Hanwa Co. Ltd (11.7 percent), Mitsui Mining & Smelting Co. Ltd (10.2 percent), Dowa Holdings Co. Ltd (6.4 percent) and Matec Inc. (2.6 percent).

#### The 3.11 earthquake and Fukushima

It must not be forgotten that the land was struck by "The Great East Japan Earthquake", also called "3.11 earthquake". The earthquake off the Pacific coast of Tōhoku was followed by a tsunami and the destruction of the Fukushima power station on 11th of March 2011. It caused enormous, widespread damage primarily along the Pacific coast in the Tohoku region. Four years later, the Minister of the Environment Yoshio Mochiduki stated: "We have focused our efforts on issues including decontamination, treatment of designated waste and disaster waste, and the establishment of interim storage facilities for contaminated waste."

By numbers, as of the end of March 2015 the government estimated that there were approximately 802,000 tons of disaster-related waste in a region encompassing eleven municipalities within Fukushima Prefecture. Until February 2015, approximately 54 percent of that waste, or 430,000 tons, was being stored at temporary storage sites. At the end of December 2014, approximately 157,000 tons of waste have been declared "designated waste," including incinerator ash and sewage sludge, rice straw, and compost. "Currently, this waste is being temporarily stored at waste incineration and sewage treatment facilities in accordance with established guidelines," the annual Report on the Environment 2015 showed. Within Fukushima Prefecture, waste under 100,000 bq/kg was scheduled to be stored at the existing managed waste disposal site in Tomioka, while waste exceeding 100,000 becquerel per kilogram will be taken to an interim storage facility.

According to the annual report, significant progress has been made, with more than 80 percent of the planned decontamination work both in and outside of Fukushima Prefecture completed. The rest of the scheduled decontamination work is also nearing completion. More than

#### Markets

70 percent of the planned decontamination work for houses, farmlands, pastures, and roads both in and outside of Fukushima Prefecture has been commissioned, and decontamination efforts are steadily moving forward. The revised Japan Environmental Safety Corporation Law prescribes the government's responsibility with regards to the Interim Storage Facility for soil and wastes generated from decontamination work in Fukushima Prefecture. And it stipulates that the government will take the necessary measures to complete final disposal of the waste outside of Fukushima Prefecture within 30 years from the commencement of interim storage.

#### Several opportunities for foreign know-how

The third Fundamental Plan for Establishing a Sound Material-Cycle Society (2013) estimated the size of the market related to sound material-cycle society at approximately 39 trillion yen with approximately 990,000 people employed. The plan identifies various issues that Japan is currently facing, sets priorities and recommends measures to implement. According to the EU-Japan Centre for Industrial Cooperation, this opens potential business opportunities for EU companies too – under certain circumstances.

- As the Plan remarks, new measures should be taken to foster the reduction of waste and reuse of products in order to decrease the overall quantity of waste, thereby lessening the need for "recycling" - an opportunity for businesses that can provide products or services related to these two Rs.
- Current recycling processes often result in a deterioration of the material quality and still high costs. Efficient and reasonably priced recycling processes could enjoy a competitive advantage.
- The energy situation following Great East Japan Earthquake required generating energy from waste including biomass is perceived as necessary, with subsequent business opportunities for biomass and waste-to-energy or other incineration businesses including technology transfer.
- In the aftermath of the Earthquake, the disposal of radioactive substance contaminated waste and other toxic waste such as PCB waste or asbestos waste still require a specific know-how by specialized companies.



- Various New Town programs incentivising more sustainability give a chance to companies to implement innovative processes and technologies. The small scale of local recycling zones seems particularly adapted to SMEs.
- To tackle the issue of illegal dumping and/or inappropriate treatment, the government pleads for a reinforcement of the "responsibility of waste generator", including preventive and punitive measures. Wanted: Re-organisation including a reduction of the number of facilities and the development of final disposal sites.
- The Plan provides Japan to promote the 3Rs in the Asia Pacific region. But US and European waste management and recycling industries appear to be more advanced in overseas operations.
- Although a large number of facilities across the country do not cause need for additional capacity, there might be some demand for repair works and/or partial replacements to extend the life of existing facilities or to improve the technology.
- Incineration is the most widely spread disposal method and landfill shortage is among the main concerns. In that context, the stopping of slag poses serious concerns. Solutions for an effective use of bottom ash would be welcomed.

There are several waste streams with business opportunities to be mentioned. As bio-products will become more popular, this will open chances in the field of biomass, anaerobic digestion - especially separation technologies for anaerobic digestion system - and organic fertilizer.

556,000 tons of e-waste were collected and treated in 2013, but reports estimate that only 24 to 30 percent of e-waste are treated in Japan. The treatment of large volume stocks of PCB wastes is too highly desirable: Although the Japan Environmental Storage & Safety Corporation is the only authorized entity for the treatment of pure PCB wastes, private companies can obtain a certification to handle low-concentrated PCB waste.

Japan has to face increasing volumes of marine litter as a consequence of the 2011 tsunami consisting of waste washed up on the beaches and million cubic meters of tires from artificial reefs.

#### No promenade

But accessing the Japanese waste market is no promenade. The market is tough and competitive with strong domestic players who already have the indispensable network and references. The decision making process is particularly long and several meetings are necessary to reach an agreement. Japanese tend to favor national products and manufacturers. Japanese are loyal to their existing business partners. And if the foreign technology is not at least 40 percent better than the domestic is, Japanese will buy national. Japan usually expects free maintenance and after-sale service. The prejudice exists that the domestic market is just so different from the European one that foreign technologies or practices cannot possibly match with the Japanese demand. As contracts on public facilities are subject to public tenders, the resulting administrative structure and responsibilities sharing between national, prefectural and local government might appear unclear and complex to foreigners.

#### Still in evolution – but whereto?

The Japanes waste market is not wide open, but offers opportunities and possibilities. In the words of the EU-Japan Centre for Industrial Cooperation, "the Japanese waste market is a mature market but it is still in evolution due to environmental, economic, social, and political circumstances, domestically, and around the world. Resource scarcity and energy dependence call for a circular economy, further exploiting waste as a resource. The overall reduction of waste generation is also one of the main objectives."

However, it cannot be excluded that Japan will mediumor long-term focus on Asian partners. The so called "3R Initiative" contains a variety of initiatives developed to establish sound material-cycle societies in Asia, including adopting the Hanoi 3R Declaration at the fourth conference of the Regional 3R forum in Asia held in March 2013. As part of Japan's efforts to contribute to reducing global environmental impact, the country will "continue to promote international cooperation between multiple countries through the Regional 3R forum in Asia and the Pacific". And likewise the above mentioned, pivotal 3rd Fundamental Plan for Establishing a Sound Material-Cycle Society underlines: "Developing nations, mainly in Asia, as seen in Japan during its high economic growth period, are facing serious problems related to the rapid increase in waste generation. We need to share with these countries the wealth of experience and knowledge we possess on waste related issues and recycling, in order to take the lead in contributing to the establishment of a sound material-cycle society on a global scale."

# **New Zealand: A Proposal to Reduce Packaging Waste**

In their report "The InCENTive to Recycle" Milford-based (Auckland) advocacy consultancy Envision recommends bringing back bottle refunds (cash for containers) to lift recycling rates in New Zealand.

According to Envision, the report, funded by a number of councils and businesses, calls for the reintroduction of a mandatory container deposit scheme (CDS) – where empty bottles can be returned to recycling centers or shops for a small refund. "You won't see bottles lying in the gutter, tossed over banks or drifting out to the sea when they are worth ten cents," said the report's lead author Warren Snow. "There's nothing like a financial incentive to get people to recycle."

The authors estimate that bringing back a "bottle refund" or "Container Deposit Scheme" would cost the beverage industry half a cent (0.5 cents) per container, but would increase beverage container recycling every year by 45,000 tons. The move would create thousands of jobs and divert 180,000 cubic meters of waste from landfill - saving New Zealanders between 26 and 40 million NZ dollars (about 16.9 to 26 million US dollar) per year in waste disposal costs. But, despite the scheme enjoying success in other developed countries, the report suggests corporate packaging and beverage industry groups are fighting to stop container deposits being introduced in the country. Since 2008, the New Zealand Government has given out nearly seven million NZ Dollar in



taxpayer funded grants for initiatives to recycle beverage containers.

"In spite of this taxpayer support, New Zealand's beverage recycling rates are low compared to progressive countries like Canada, South Australia and countries in Europe – which have mandatory deposits on drink bottles," the New Zealand company said. In these places recycling rates of 85 to 98 percent were routinely being achieved compared to New Zealand's significantly lower estimated rates of between 25 and 40 percent. "These countries also enjoy less litter, new recycling jobs and reduced costs for local governments." Envision New Zealand has developed a model for a Nation-wide Bottle Deposit Scheme and found it would lift recycling rates to 85 percent, create up to 2,400 new jobs and enable businesses to set up 200 or more drop off points where people can claim their refund. "Many of the drop-off points would be startup businesses spread right across the country as seen in South Australia, British Columbia and all through Europe", the consultancy underlined.

The key recommendations of the report are that:

- Government declare beverage containers a priority product under the Waste Minimisation Act 2008 with a national recovery target of 85 percent.
- To achieve the target, the Government would require the establishment of a national Container Deposit Scheme (CDS) requiring producers to put a minimum refundable deposit on beverage containers to ensure they are recycled.

The report also calls for local government, recyclers, environmental organizations and responsible beverage companies to work together to make the case to Government to introduce a Container Deposit System for New Zealand starting in 2017.

Photo: Borna Mirahmadian | Dreamstime.com

Markets

# Slowly Cracking the Chains Iran's Waste Management is Going to Awake

The trade embargo, worldwide imposed by the UN, USA and EU on Iran, has seriously retarded their national economy. In the forefront of the trade facilitation the country began to reconsider its waste management strategies. The newly obtained freedom of trade gives reason to suppose even more progress.

he current population of the Islamic Republic of Iran is 79,671,411 as of Sunday, February 7, 2016, based on the latest United Nations estimates. Figures on the amount of waste in Iran are not as current. According to the freshest information from the Tehran Waste Management Organization, the annual waste production rates in Iran are said to be 7,200,000 tons, of which 70 to 75 percent are organic material convertible to compost, 20 to 25 percent recyclable dry materials and five to ten percent other wastes. A look at the composition of Iranian municipal waste offers that most of it is organic waste. Statistics of Karaj Municipal, at the end of 2008, stated that 70 percent of gathered waste were corruptible materials, sludge, and gathered sediments of the city. In Mahabad Town, 75 percent of household waste consists of food waste and putrescible material. And in Tehran, 68 percent of total household waste analyzed 2013 was organic.

The organization of waste collection is not that uniform. In Tehran, Iran's capitol and biggest city, 57 percent of the recycled materials were collected from door-to-door services, 34 percent of households served by curbside sorting collection schemes and nine percent by buyback centers. In Mahabad Town, about 37 percent of the households separate their recyclable waste from discarded waste before delivering it to the waste collection crew and selling it to the itinerant and informal sectors. And in Mazandaran Province at the West Coast, the collection in all cities is done by the municipalities except Noshahr in which 20 percent of the waste is gathered by the private sector and 80 percent of the remaining by the municipalities.

#### **Running out of space**

Excluding PET treatment, most of (municipal) waste was and is brought to landfills. For example the province of Mazandaran contains ten landfills which are used to dispose and eliminate about 21,600 tons of waste per year from twelve municipal districts. The before mentioned Isfahan composting and recycling plant was designed to treat 844 tons of MSW per day by aerobic decomposition of organic waste and also by recycling of polymer materials like PET into re-usable polymer materials. But about 500 tons are rejected every day from the composting lines and remain untreated. Not to forget the Kahrizak landfill near Tehran, more than 45 years old. In 2008 it was amplified by the Arad-Kouh recycling site, considered to be the greatest one in the Middle East and equipped with processing lines, a fermentation site and a sanitary landfill cell, capable of "dumping 600 tons of waste". 2013, the Aradkooh Processing Center announced 55,800 tons of compost produced from processing, aeration and fermen-

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#### Markets

tation in nine months. Nevertheless, in spite of "recycling machines" hospital waste, food waste, e-waste and even construction debris is reported to be disposed of. In fact some of the sorted "dry" waste goes directly to garbage incinerators; some others like glass fragments are sent to be melted into new glass products. But from 5,600 tons of solid waste that enter the Kahrizak (Aradkouh) landfill every day, 700 to 800 tons (twelve to 15 percent) are converted into compost. The remainder cannot be recycled and turned into compost, if mixed with garbage longer than for 48 hours, Javad Nasiri, an official of the Renewable Energy Organization of Iran, is cited. So the material is stored and not used for farming. On top of that, according to the Islamic Republic News Agency, 50.000 tons of Tehran construction waste - six times more than the household waste - are to be treated daily. The 18 sites near south Tehran have merely capacity to handle 20 percent of the waste; the rest has to be transported to landfills with the majority ending up in Abali, the second landfill site of Tehran: A newspaper described Abali in January 2016 "to be running out of space".

#### Industrial waste: 62 percent to landfill

Following a case study on industrial plants located between Tehran and Karaj dated May 2015, the machinery and equipment industry generates 23 percent of all industrial waste; the food sector and the metallic minerals industry succeeds with approximately 20 percent. The major hazardous waste-generating industries include chemical and plastic, electronics and metallic minerals. 45 percent transport and disposal of industrial waste is delivered by the private sector, 31 percent by industrial owners and 24 percent by municipalities. The most common way for industrial waste storing until final disposal is warehouse (33 percent) and keeping waste in open space (23 percent).

The primary option for disposal of the waste lies on landfilling: About 62 percent of industrial solid waste is buried, ten percent burned, and eleven percent disposed in an unknown manner. Compared to landfilling the rate of recycling and reuse is low: 17 percent, resulting of the lack of a recycling system. Another source, relating to the industrial estate of Rasht, illustrates that 21.2 percent of the industrial units state to recycle together with other management activities such as source reduction, incineration and sanitary land fill; 4.45 percent of the units specify to recycle their solid wastes, and 1.51 percent incinerate their solid wastes - without precise controlling of air pollution. And a study, published end of 2015, even reports that in coastal cities like the province of Mazandaran the waste of ports, industrial zones and industries contain dangerous substances. It is said that they are not separated from other wastes and discharged into municipal landfill, resulting in leachate penetrating into the surface waters and contaminating water resources extensively.

#### Partly incapable of action: the government

The responsibility for governing waste affairs is organized hierarchically: a national level with ministries and environmental agencies, a regional level with governors or provincial, a local level, consisting of municipalities and city councils, and a fourth level of the stakeholders, where most of the program implementation and actual instructional action is happening. The national level consists of the Ministry of Health, Treatment and Medical Education focusing on healthcare waste inspectorate, the Ministry of Interior for supervision and coordination and the Department of Environment for enforcement responsibilities. Additionally, the Ministry of Agriculture Jihad and the Ministry of Mines and Industries contribute to regulations dealing with other hazardous wastes. Allegedly, there is no independent organization responsible for waste management at provincial level. At local respectively city level, the responsibility of solid waste management is fixed by the Waste Management Law. But Iranian municipalities transferred many operations, control and development functions to the Solid Waste Management Organization. And there are sub-contractors who are in charge of collecting waste and disposals.

Following an analysis on the "Status of Waste Governance System in Iran" in 2013, Iran has initiated significant progress in the legal and institutional framework during the last few years. A waste law was ratified targeting necessary structures, responsible organizations, committees for inter-agency communication and the role for an increasing private sector in service provision. But the governance still is hierarchic, leaving the MSW management system top-down organized.

#### **Small innovations**

In spite of the hampering governance, Iran's waste management shows several small innovations. A recently published study from the Japanese Hokkaido University, Sapporo, for example identified the following trends in waste production: Although the generation of municipal solid waste in Tehran increased by ten percent during the fiveyear period, the amount of waste directly disposed of to landfill halved and resource recovery almost doubled. An increase in the capacity of a waste-processing facility contributed significantly to these changes. The estimated result of biodegradable fraction going to landfill in 2012 decreased to 49 percent of its value in 2008. And in Rasht city - due to an increase in population and changes in lifestyle - quantity and quality of MSW have changed. The small town near the Caspian Sea has to deal with problems like lack of resources, infrastructure, suitable planning, leadership and public awareness.

However, the present situation of solid waste management in this city – 400 tons per day – has been improved since the establishment of an organization responsible only for solid waste management: Source separation of wastes and the construction of a composting plant are the two main activities of the Rasht Municipality in recent years.

Several new plants increased the capacity for treating municipal waste. The building of the largest mechanized waste recycling site in southern Iran started in March 2013: Inaugurated on Qeshm Island, Persian Gulf, the Qeshm Investment Development Company has purchased the automatic facilities of the site from the Netherlands to recycle garbage by using the most modern recycling machinery and technology. The new Arad kooh rejects incinerator plant includes a waste pit and input. The rejects are a result of processed domestic waste. It has been collected for some years in Arad kooh Proceeding Centre: The plant possesses an input capacity of 200 tons rejects wastes, generates 3 MWh of electricity, and is said to be the first project applicable in metropolitan of Tehran.

#### The first solutions

In September 2011, a study stated urgent need for the implementation of legislation dealing specifically with e-waste, demanding the implementation of Extended Producer Responsibility program and allocation of funds to prepare suitable equipment and facilities for the managing and recycling in Iran.

In 2011, PhD Candidate M. Adl from the Islamic Azad University, Tehran, plead for "basic concepts of recycling and its role in the automotive industry, and then recycling strategies methods such as design for recycle, formulating a database and creating a recycling network in this industry is also discussed in Iran as a developing country". In view of over 320,000 old cars scrapped in Iran in 2014 and forecasted 350,000 in 2015, this issue is more and more waiting for a solution.

In November 2014, the Japan International Cooperation Agency (JICA) was waiting to start to support the project of the Municipalities and Rural Management Organization (MRMO), Ministry of Interior, for the development of appropriate solid waste management in municipalities of the Islamic Republic of Iran. Before the commencement, JICA, together with an expert of solid waste management from Japan, conducted a preparatory survey in Tehran and Mashhad, and reached an agreement with MRMO and Mashhad Municipality on the scope of JICA's cooperation for the project. In November 2014 Hamid Reza Maleki, as the representative and a member of the board director of Iran's Waste Recycling Union, negotiated with Esfahan Steel Company (ESCO), the first and largest manufacturer of constructional steel products in Iran. Talking about the establishment of a steel recycling industry, he stated that since Iran's main steel industries are operating in Isfahan Province, this very province possesses the biggest market for the metal recycling purpose.

In June 2015, an Austrian trade delegation visiting Iran underlined the country's willingness to develop cooperation with Tehran on – among others – recycling and waste water treatment.

In Tehran, the Chairman of the Iranian Chamber of Commerce, Gholam-Hossein Shafeyee, referred to the lack of water resources in Iran and the importance of recycling for the country and said Tehran is interested in using Vienna's experiences in these fields as well as the development of Iran's steel industry.

In July 2015, Tasnim News Agency cited Abolfazl Roghani Golpayegani, managing director of Mazandaran Wood and Paper Industry Company. He announced plans to launch a paper recycling plant with 120,000 tons in annual capacity. The plant is expected to become operational in 2016 and would be the country's first large-scale paper recycling unit.

In November 2015, the managing director of Tehran Municipality's Waste Management Organization Medical announced that waste incinerators will soon go into operation in Tehran with the ultimate goal of generating electricity. As Hossein Ja'fari referred, almost all of the hospitals in Tehran are under a contract to collect and deliver their waste to the organization. He added that the organization had nearly doubled the C&D waste recycling rate and was aiming to increase treatment by 5,000 tons.



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According to Germany Trade & Invest, the are some small waste-to-energy projects and two biogas plants. Currently the Iranian Environment Agency is under discussion with a French provider of waste-to-energy technology on potential projects in Iran. Administrator Masoumeh Ebtekar has already visited a 75 MW waste-to-energy plant in France. The French enterprise is interested in investing in Iran.

#### **The Waste Recycling Industries Union**

Meanwhile, the Iranian recycling sector has begun to be well organized. The before mentioned Hamid Reza Maleki presented the formation and fields of the Union in 2014 as follows: "Iran's Waste Recycling Industries Union is operating under the supervision of Iran Chamber of Commerce, Industries and Mines established in 1386 (= 2007) consisting of 15 task groups which are as follows: wornout cars recycling; oil, gas and petrochemical waste recycling; organic waste recycling (compost, compost vermin); metal waste recycling; polymeric waste recycling (plastic, rubber, pet); cellulosic waste recycling (paper, carton, card boards); worn-out batteries recycling; electrical and electronic parts recycling; water and sewerage recycling; machinery recycling; recycled materials suppliers; glass recycling; construction waste recycling; hazardous material transport; waste handling and energy (waste extinction and burning)." The website "Global Companies" offers a schedule of nearly 50 Iranian companies engaged in several branches of waste recycling.

#### **International relations**

A number of international meetings is determined. At the 8 of March 2016, an Iranian delegation has visited the Bavarian Umweltcluster, interested in issues like industrial waste and waste water, land recycling and ecological monitoring. Project Iran 2016, the 2nd International Trade Exhibition for Construction Materials, Equipment and Environmental Technology was held from 24 to 27 April 2016 at the Tehran Permanent Fairground to once again connect international expertise to the Iranian market, and contribute in shaping the tremendous potential of the country's promising construction sector. Motto: "The embargo has been lifted. A new construction market has opened." The business tour "NRW goes to Iran", organized by the IHK East-Westfalia, will take place from 22 to 26 Mai 2016 in Iran and features visits of facilities, company meetings and expert conversations.

At 11 and 12 April 2016 the 1st edition of the "Iran PET Market, Applications & Recycling" took place in Tehran, an international symposium aiming at local and international operators in the industry. As the packaging sector in Iran is expected to grow and accelerate, this meeting meant an opportunity for investments and expansions for the PET industry. Packaging and production cost of PET in the water and beverage sector; competitiveness of Iran's PET trade and barriers to export; and Pegah's approach to PET recycling and trends in the dairy sector were subjects of the discussions. The key question was: "How soon will Iran's PET sector be integrated into the global market?"

#### And then?

According to market researcher Frost & Sullivan, Iran's economy is expected to recover on account of the upturn in private consumption and the successful diversification into the non-oil sector. The lifting of sanctions has "catalyzed a ripple of positive boosters" to the Iranian economy and economic growth is expected to pick up in 2016/2017 driven - among others - by restored access to foreign assets. This will probably boost the Iranian steel market; its structure has turned under the pressure of economic sanctions from a net importer to an exporter. According to Germany Trade & Invest, Iranian government estimates that realizing the high targets for growth declared in the 6th Five-year-plan (2016/17 to 2021/22) will need investment of 1,000 billion US-Dollar. One third is expected to be covered by foreign direct investment, combined with technology transfer and significant increases in productivity. Iran already shows great interest in a cooperation with German businesses as much as the German mechanical engineers are interested in business relationships to Iran.

Without a doubt the next years will push industrial productivity and – delayed – private consumption, forcing the amount of waste and accordingly necessity, structure and policy of waste recycling. Although, it might take some time.

# The European Market for Plastic Sorting and Recycling

The demand for plastic recycling plants in Europe will increase significantly. By 2025, sorting and recycling plants with an estimated capacity of 5.2 million tons will be commissioned, German consulting firm ecoprog GmbH has found out. This is a growth of 25 percent; the number of plants will increase by about 300. Within the waste management sector, recycling will thus be one of the most important growth markets in the next years. As reported, Europe has almost 1,200 active plastic sorting and recycling plants. However, this portfolio will not be large enough as recycling becomes increasingly more important.

The EU Waste Framework Directive will be the main market driver. By 2020, 50 percent of the plastic in municipal solid waste have to undergo material recovery. "Almost no EU member state has yet reached this goal, which creates financial challenges for many countries," ecoprog said.

More information: www.ecoprog.com/en/publications/waste-industry/plastic-recycling.htm

# **New Tool for European Packaging Waste Legislation**

Due to the Belgian VAL-I-PAC, European companies can now easily find all the basic information on packaging waste legislation in the 28 member states of the European Union. The organization assuming the recycling obligations for industrial packaging in Belgium, has gathered all this information on a new website <a> www.</a> wikiwasteschemes.com.

As reported, the diversity of regulations in Europe is of great concern to

many companies. Europe may have free movement of goods and services. However, in practice, companies which want to expand into the European market frequently get lost in a maze of rules and laws.

Often the companies seeking to become commercially active in neighboring countries first have to figure out how they can comply with the packaging laws in those other European countries. VAL-I-PAC would like

to share its expertise with other countries. "In order to help our clients, we had gathered a great deal of information on the European packaging waste legislation. We first intended to only use that information internally, but then we noticed growing interest for it. Therefore, we decided to share our knowledge. Meanwhile, we have received many positive reactions from environmental coordinators and similar organizations abroad, among others," the Belgian organization explains.

# Israel: Reduction of Plastic Waste

"A new law aimed at motivating Israelis to use environmentally friendly reusable bags at supermarkets has been passed," the national Ministry of Environmental Protection reported. "The Knesset (Parliament) approved the law in a second and third reading on March 28th, after the Internal Affairs and Environment Committee

unanimously agreed to put it before lawmakers." The law puts a complete ban on distribution of "thin" plastic bags, with a width of less than 20 microns.

As of January 2017, Israelis will have to pay for plastic bags at large supermarket chains which will have

to charge a fee for bags that are between 20 and 50 microns, and to note the charge on the customer's bill. The money that is paid for the bags will be transferred to the Ministry of Environmental Protection's Maintenance of Cleanliness Fund. It will be used to fund projects aimed at reducing air pollution throughout Israel.



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# **Cable Box: A New Compact Recycling Line in Containers**

On the occasion of the ISRI (Institute of Scrap Recycling Industries) event in Las Vegas in April this year, the French manufacturer MTB has released a new mobile system to recycle either Aluminum or Copper cables.

According to the information, the new "Cable Box" integrates within combined containers a complete cable recycling line. The system allows for snap set-up and installation. "Compact, mobile, efficient and economical, the Cable Box's achievement is to retain all the equipment of a standard MTB recycling line and condense it all in classic containers of 20 and 40 feet." the provider underlined. "This concept Plug'n'Run is fully integrated and ready for use without any assembly operation required. Only a connection of containers will be necessary, making this concept equipment both easily movable and extremely versatile."

#### **Specifications**

Designed to process up to two metric tons of cables per hour (depending on the type of cable to be shredded), this set-up combines the "Shred' Box", a 40 feet container dedicated to size reduction, and the "Sort' Box", the other container of 20 feet dedicated



to sorting. This line integrates the optional "R' Box", in a 20 feet container, dedicated to the air filtration.

The "Shred' Box" includes a shredding module, which consists of a compact shredder, able to process all common cables as well as a granulation module, which consists of two granulators successively reducing the size of the material to achieve the optimum sorting size. The "Sort' Box" includes air density tables, vibrating screens and magnetic over-band, exactly as it is on MTB standard cable recycling line; it allows to recover at the end of the process: ferrous, copper big granules, copper fine, flakes (aluminum, tin, brass) and plastics. "A version of the Cable Box to value other types of waste is under study, " the French manufacturer informed.

♥ www.mtb.fr

# **New Balance Crane for Recycling Purposes**

Finnish-based Metso Corporation is convinced that the new balance crane MBC 95/29 helps recyclers to increase profits by saving energy and maintenance cost, even in difficult times. The producer, headquartered in Helsinki, has combined its knowledge of both mining and recycling to develop this crane.

"With the durability of heavy mining equipment, the new MBC 95/29 surpasses the speed, agility and efficiency needs of the recycling industry," Metso says. Like all Metso balance cranes, the new product would incorporate the counterbalance principle, "resulting in 50 percent less energy to move the load, and making it up to 80 percent more efficient than comparable hydraulic excavators". According to the provider, the new crane model has also been designed for optimum safety, durability, and reduced maintenance costs.

Metso has coupled its knowledge and experience through a technology transfer agreement with the European company HOICO, owner of the Sobemai technology. "Sobemai stands out for having been the original inventor of the equilibrium/balance crane tech-



The MBC 95/29 is easier to manipulate than excavators, is up to 80 percent less expensive to run, and much safer to operate, says the producer

nology, as well as for its installed base of over 100 machines – most of which are involved in recycling throughout Europe and the rest of the world," the Finnish company explained.

Metso has expressed the view that its balance crane is well applied in the recycling business because it has a long reach, effectively manages scrap stockpiling, and efficiently feeds shredders and shears. "While the use of balance cranes in Europe was primarily motivated by environmental needs, these advantages, along with the economic benefits, are now being noticed in the North American market," the company underlined.

www.metso.com/metal-recycling

# IFAT: The "Perfect Offer" Made by Komptech

At the IFAT 2016 in Munich, the Austrian-based Komptech will present a selection from its broad range of products. In addition to realistic live demonstrations, the company will devote plenty of attention to its visions.

"The Shredder of The Future" is one of the pioneering projects. In 2015, Komptech did a project with the Industrial Design Department of the Joanneum University in Graz, Austria. The design concepts that resulted will be presented at the company's booth 405/504 in Hall C2, using a 3D printer. The new Topturn X 4.5 is as well already reality - and the highlight of the show. At its booth Komptech will introduce the new turner which is tailored specifically to the space requirements of small and medium-sized compost facilities. With a 4.5 meter wide intake, powerful drive and intuitive controls, the machine "is perfect for all users who have big plans for small sites", the provider said.

#### **Outdoor presentation**

According to the information, the company's development work is concentrated on user benefits, and is heavily oriented towards innova-



tions and solutions based on existing resources. This perfectly matches with the motto of this year's IFAT: "resources. innovations. solutions.", Komptech underlined. "The mobile machines for the live outdoor presentation were not chosen at random, but based on the themes of the show. The Multistar L3, Hurrifex, Cribus 3800, Crambo direct and Axtor 6010 will cover the gamut from construction waste recycling and processing contaminated biomass, to prepping green cuttings and trunks."

What goods are the best recycling intentions when the final product is so contaminated by contraries and foreign matter that it cannot be used to replace the primary products as intended? This applies in equal measure to biomass and construction waste recycling.



At the VDBUM live demonstration near the eastern entry, the Hurrifex mobile stone and light material separator and the Multistar L3 star screen will deal with contaminated biomass. The Cribus 3800 drum screen revolves around mineral feedstock.

www.komptech.com

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### **Screening Machines – Made in Germany**

Zemmler Siebanlagen GmbH has just celebrated its 15th anniversary.

Heiko Zemmler, CEO, looks back on a successful development. Founded as spare part and used machine trade of a Danish manufacturer, he has started producing and developing his own Multi Screen range in Brandenburg, Germany since 2008. Meanwhile the company has developed six machine types in different sizes. The screening machines named by the length of the trommel starting from MS1600, MS3200 over MS4200 and MS5200 to MS6700.

According to Zemmler Siebanlagen GmbH, the company is not just anoth-

er producer of screening machines. All products contain the double trommel technology. The trommel is constructed to screen three fractions in just one working stage compared to competitors. The machine performances have a throughput from 30 to 180 cubic meters per hour. In addition, the double trommel is stringed by wire screens which allow an adjustment to different applications. The mesh sizes can be chosen from two to 80 millimeters; they are changed simply and fast without special tools, replacing the entire trommel (an extra trommel is 80 percent more expensive than



Zemmler screening machines will be presented at the IFAT in Munich

wire screens). Zemmler also offers different options to each machine type so the manufacturer is able to react on customer wishes. Various applications are possible.

The sturdy trommel with wire screens regulates a clean sieving with highquality end products according to the manufacturer. "Due to the cleaning brush at the outer trommel, the Multi Screen also guarantees a clean sieving and constant throughput in case of difficult and sticky material", Zemmler Siebanlagen says. The German provider receives enquiries from all over the world. Machines have been delivered to China, Chile or Africa. Especially in Europe Zemmler has a broad network of traders. In response to the increased number of orders and to ensure a continuous high-quality product, the German company will move to bigger production halls midyear.

A Zemmler Multi Screen MS 1600 can be visited at the IFAT in Munich from 30th May to 3rd June 2016 (Hall C1 Booth 200).

www.zemmler.de

### ITAD Market Expected to Reach 18.18 Billion US-Dollar

According to a new market report<sup>\*)</sup> published by Transparency Market Research, the IT Asset Disposition (ITAD) Market is expected to reach a value of 18.18 billion US-Dollar by 2024, rising from 9.89 billion US-Dollar in 2015.

The market is estimated to expand at a CAGR (compound annual growth rate) of 7.1 percent from 2016 to 2024. Asia Pacific is expected to observe the fastest growth during the forecast period, followed by the Middle East, Africa and Latin America.

Rapid changes in technology have resulted in the reduction of the life cycle of IT equipment. Organizations need to upgrade equipment to remain competitive in the market. This leads to the generation of a large amount of discarded IT assets, worldwide. ITAD ensures safe disposal of these assets. "This is one of the key factors driving the ITAD market around the globe," the market researchers underlined. "Another important factor fueling the market's growth is the growing demand for used computers, mobile devices, and other electronic equipment from educational institutions, small-scale enterprises, and individual customers, as this equipment is readily available at low prices." According to Transparency Market Research, ITAD service providers are seeking to expand globally and hence are entering into various partnerships to execute IT asset disposal efficiently. The introduction of automation in ITAD helps service providers keep a record of every asset in an enterprise and helps asset managers to plan strategy for asset disposition. This is another factor likely to boost the market's growth in the near future.

<sup>\*) &</sup>quot;IT Asset Disposition Market - Global Industry Analysis, Size, Share, Growth, Trends, and Forecast 2016 - 2024"



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### **Multi-Purpose Splitter Separates up to Three Fractions**

German supplier Doppstadt has completed the product range with the separation technology of their co-operation partner, German Anlagenbau Günther GmbH, which is able to separate up to three re-usable material streams.

According to the company, the new Splitter X2 loosens, separates and doses various materials. A pretreatment is only required in certain circumstances. "Mixed construction waste can be treated as well as stones and soil, metal scrap, slag and landfill residues," Doppstadt underlined. "The Splitter is equally suited for mobile and stationary applications."

While high individual weights can cause failures, damages or even machine breakdowns of conventional screening systems, the Splitter discharges contaminants sideward or in running direction. As reported, materials such as wires cannot get caught, textiles will neither get wrapped nor form a braid. "Since the spirals are only fixedly suspended on one side they turn out the materials by rotation, the separation is carried out almost without plugging or wrapping,"



In the multi-purpose Splitter X2 spiral shafts discharge heavy and cubical materials to one side, light and long pieces swim on top and are discharged in running direction, smaller pieces fall through the shafts

the provider assured. "Furthermore, the system is self-cleaning without requiring a manual cleaning like screening systems." The development and sales of the new Splitter is the first co-operation of the Doppstadt Group and Anlagenbau Günther GmbH in the field of mechanical engineering. Doppstadt sales the whole products range of the Splitter separation solutions and takes over the after-sales service and the worldwide spare part supply. According to the information, both enterprises vouch for the quality and reliability of the new product with their good reputations.

www.doppstadt.com

# **New Magnetic Separator Recovers Printed Circuit Boards**

Bunting Magnetics has developed a magnetic separator that separates and recovers Printed Circuit Boards (PCBs).

According to the British manufacturer, the High Intensity Separation Conveyor (HISC) has an exceptional construction and was originally designed to separate very weakly magnetic materials such as abraded and shredded stainless steel. During on-site tests at a UK plastics recycling company, the HISC was also found to efficiently separate and recover PCBs. "The separation of Printing Circuit Boards is an issue for many recycling companies, especially those involved in WEEE (Waste Electrical and Electronic Equipment)," states Bunting Magnetics. "PCBs contain a number of components mounted on a non-conductive substrate including capacitors, resistors and active devices. A PCB will contain gold, palladium, silver, cop-



per and different hazardous materials, and cannot be disposed of in landfill. Once recovered, there are companies who specialize in recovering the precious metals from the PCBs, but firstly, these need to be recovered from a waste stream." The HISC Magnetic Separator is commonly installed after primary magnetic separation and eddy current separation and is used to either remove weakly magnetic materials from the primary product to produce a clean recycled material (e.g. UPVC window frames, recycled plastics, etc.), or recover valuable materials (e.g. stainless steel and PCBs). Bunting Magnetics: "The strength of the magnetic field is far greater than standard magnetic separators, extending the separation capabilities from just removing ferrous and strongly magnetic materials to materials that have a very low magnetic susceptibility."

www.buntingeurope.com

# **Meat and Bone Meal as a Source of Phosphorus**

Slaughterhouse waste is processed into meat and bone meal and subsequently fed to livestock or is incinerated. According to the German Fraunhofer Institute for Factory Operation and Automation IFF, this meal could be put to better use, because it contains phosphorus, a scarce mineral used as fertilizer. A new system burns meal, producing ash that could be used as the raw material for phosphorus fertilizer.

Researchers at the IFF in Magdeburg are proposing this new method. Approximately three to four percent of the raw material (meat and bone) is phosphorus, a mineral that is not abundant and is expensive. It is primarily used as agricultural fertilizer. As much as 16 percent of the ash is phosphorus. That is as high as in natural deposits located primarily in China, Morocco and the USA. "Just like the phosphoric material extracted from those deposits, the ash could be processed into fertilizer," says Patric Heidecke, research manager at the Fraunhofer IFF. "In purely mathematical terms, this could cover about five percent of annual demand for phosphate fertilizer in Germany."

#### **Separating Heavy Metals from Ash**

Although the meat and bone meal is already partly flammable, it is mixed with other fuels to ensure the incineration. On the one hand, this dilutes the phosphorus in the ash produced and, on the other hand, undesired substances also end up in the ash through other substances. Another problem is that the byproduct contains heavy metals such as mercury



All over the world, phosphorus is a scarce raw material, which is used as fertilizer, for instance. Meat and bone meal contains phosphorus. A new process utilizes this resource significantly more efficiently

and lead, which are not allowed to land in a field later, too. However, the ash from waste incineration plants contain either of these contaminants.

As reported by IFF, the researchers have factored all of this into their research. The principle entails loading meat and bone meal in a fluidized bed unit heated to 850 degrees Celsius. Air flows continuously from below into a combustion chamber and mixes the meal with hot quartz sand. The mass ignites and the organic particles burn completely. The heat is drawn off and can either be used directly or is converted into electricity. The combustion gas produced, which also con-



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#### **Processing Methods**

tains a large part of the ash because of the vortex, is conducted into a cyclone separator, which separates the "good", clean ash from the "bad", which contains the toxic heavy metals. The researchers slow the stream of air to do this. The ash descends to the floor while the heavy metals and ash particles, which are smaller than one tenth of a millimeter, remain airborne. They are trapped and disposed of later. What parameters have to be set for combustion to produce a maximum of heat, on the one hand, and to prevent the formation of undesired contaminants such as nitrogen oxides, on the other hand? The researchers studied this in a wide-ranging series of tests. They used a fluidized bed unit that is approximately four meters high and produces 150 kilowatts of power.

"A unit with ten megawatts of power could also be built without any diffi-

culty, however", says Heidecke. Now it is planned to build the first commercial unit at a field partner's facilities. "This concept will have established itself in ten years," the expert is certain, "since it is not only suitable for meat and bone meal as fuel but also for sewage sludge". Although the fertilization of fields with sewage sludge is still permitted at this time, the sludge contains heavy metals as well as nitrate, which can eutrophy bodies of water.

# **Turning Waste Cotton into New Fiber for the Fashion Industry**

According to VTT Technical Research Centre of Finland, old worn-out cotton clothing that is not suitable for reuse can be turned into new fibers for the textile industry using a new cellulose dissolution technique.

A group of Finnish organizations have launched a project in the course of which the new production technique will be tried out in practice at all stages of the value chain. Last year, cellulose wet-spinning has begun at VTT's popup plant in Finland. It is planned that the first clothing line made of the new recycled fibers will be out towards the end of 2016.

For the purpose of the Circular Economy of Textiles (TEKI) project, VTT and Ethica have brought together a group of Finnish organizations representing different activities in the value chain. Their common goal is to promote the recycling of textiles while adding value to their business activities or creating new business. Ethica's role in the project is to research and model the potential of a closed-loop textile ecosystem more comprehensively and to gauge consumers' interest in operating models that are based on the principles of circular economy and recycled materials. The project





Helsinki Metropolitan Area Reuse Centre Ltd has collected and pre-processed cotton textiles thrown away by consumers that could not be reused as clothing or used as material for recycled products

also aims to study the technological requirements of dissolution-based recycling.

As reported, old worn-out cotton can be dissolved to make cellulose solution. Cellulose fiber can be produced using the same technique and equipment as has been used to make viscose fiber. VTT assures that the new production technique is considerably more environmentally friendly than the technique used for viscose, as no carbon disulphide is needed in the dissolution process. Compared to virgin cotton, the new technique also reduces the water footprint by more than 70 percent and the carbon footprint by 40 to 50 percent.

# Phases of the circular economy pilot project

The pilot phase of the TEKI project, funded by Tekes (Finnish Funding Agency for Innovation) and the participating businesses, began in May 2015. Helsinki Metropolitan Area Reuse Centre Ltd collected and pre-processed cotton textiles thrown away by consumers that could not be reused as clothing or used as material for recycled products. Suez Environnement, an international industrial and services group, crushed and grounded the material. The task of VTT is to turn the material into a cellulose carbamate solution using a technique developed in-house and to fiberize the solution in the organization's plant in Valkeakoski. Pure Waste will turn the fibers into thread and the thread into knitted fabrics. Seppälä will design and produce a line of prototypes and, once the pilot phase of the project has been completed, manufacture a commercial clothing line for its customers towards the end of 2016. The company will also involve its customers in the project by running a used clothes collection campaign in its stores in the spring of 2016.

The aim is to sell the garments in RePack packaging. Using recyclable RePack packaging means that customers receive products without the usual packaging waste. In addition, customers can use the packaging to return any old textiles they may have to the Helsinki Metropolitan Area Reuse Centre for recycling.

# Three Days in the World of Automobile Recycling

According to the organizers, the International Automobile Recycling Congress IARC 2016 – which took place in Berlin, Germany, from 16 to 18 March – was a success.

More than 220 representatives of the global automotive recycling sector had come together to discuss current political conditions and the latest trends in recycling technology. The congress team had prepared almost 30 presentations and a panel discussion for the participants. In addition, the congress was accompanied by an exhibitors' forum comprising 24 companies.

The talks and discussions at the IARC showed that even 15 years after the enactment of the EU end-of-life vehicle directive, there is no danger of running out of topical issues to discuss. Quite the contrary in fact, as the increasing application of composite materials and carbon fibre-reinforced plastics as well as the broader use of lithium-ion batteries are factors confronting end-of-life vehicle recyclers with an array of new challenges that will need to be met during the next few years.

#### **Cooperation needed**

Right at the beginning of the conference, the keynote speech held by Dr. Kay Oppat, Chief Operating Officer of the Scholz Group, soon became a source of animated discussion. In his speech, Dr. Oppat called for the formation of a think tank consisting of representatives from automotive manufacturers, suppliers and recycling companies. The underlying idea is to find a common approach to in-



The IARC congress was accompanied by an exhibitors' forum comprising 24 companies

crease the availability of end-of-life vehicles. Professor Julian Allwood from the University of Cambridge was of a similar opinion. He was convinced that the recycling of end-oflife vehicles offers great potential for innovation and in his keynote speech he encouraged those members of the recycling industry attending the IARC to demand support in achieving this aim.

#### **Technical matters**

The main focus of further speeches dealt with finding and developing suitable measures and treatments that will enable that the set recycling, reuse and recovery targets are met. In addition, a separate block of presentations addressed the topics wasteto-energy and gasification processes. Other items on the agenda were field reports, new methods of research and the presentation of innovative treatment processes. Here, the IARC participants had the choice between attending presentations in the congress hall or presentations as part of the "Company Spotlight and Tech Talks", which were held as a supporting program in the exhibitors' forum.

#### Car recycling in China, India, Turkey and Brazil

Country reports are another regular feature of the IARC. This year, Wei Sun from Volkswagen (China) Investment Co. provided listeners with an insight into the development of end-of-life vehicle recycling regulations in China.

He informed the attendants thatthe focus of the Chinese government for ELV recycling is changing



into environment protection and resource efficiency;

- the recycling related requirements for new vehicle products are already integrated into the type approval process in China and effective now;
- car manufactures are already involved into the area of end-of-life vehicle recycling and would be required to take more responsibility there.

According to Wei Sun, considering the national plan for new energy vehicles popularization and application in China, soon more regulations and standards regarding the HV-battery recycling are going to be released and come into effect.

Captain N S Mohan Ram of the Indian company TVS Motor Company Limited provided information on endof-life vehicle recycling in India. As reported, India has to create a viable and environmentally sound car recycling industry, as the number of ELVs will grow. In his opinion this is a great opportunity for European nations to interact positively with Indian authorities in setting up corresponding systems. He also sees a large potential market in India for European manufacturers of recycling equipment and consultants, because there is a need for tailor-made solutions with greater use of manual labor to suit local conditions.

Cagri Akin from the Turkish company Remer/ÖTASAD reported on the car recycling sector in Turkey and informed that in 2014 around 10,460 vehicles were recycled. It is estimated that in 2023 this number will increase to 350,000 vehicles. In Turkey, a training center on ELV dismantling will be developed. The purpose of the demonstration and training facility will be to raise the general level of knowledge in waste management with a focus on ELV recycling. Furthermore, Arturo Rufino of the company JR Diesel and Bruno Garfinkel of the insurance company Porto Seguro gave an insight in ELV recycling developments in Brazil.

The common thread running through all presentations, however, was the firm aim to improve the recycling of end-of-life vehicles through greater efforts to achieve a circular economy.

On the third day of the congress, the attendees had the opportunity to experience current practical approaches at first hand. They had a choice of four different plant tours: to ArcelorMittal in Eisenhüttenstadt, Callparts Recycling in Ketzin, CCT Stegelitz in Möckern or Volkswagen in Wolfsburg.

# **First International Exhibition & Conference in Oman**

May 23 – 25, 2016, Muscat (Oman)

Oman Waste and Environmental Services (OWES) is Oman's largest environmental event and actively supported by reputed local and international regional entities like Be'ah, Haya, PAEW, and EcoMENA.

According to the organizer, the exhibition & conference on waste management, sustainability and environment-related products, services and technology brings together policymakers, domain experts, engineers, technology companies, scientists, researchers, students, entrepreneurs, equipment suppliers and other professionals on a single platform to discuss environmental challenges in Oman and explore plausible solutions. More than 100 top environmental specialists from different parts of the world are expected to participate.

The objective of the two-day conference is to provide a venue for environment and waste management industry, investors, regulators and researchers to discuss major environmental challenges and to explore emerging opportunities and latest developments in local, regional and global contexts. The conference will serve as a solid platform to showcase industrial development and research trends in environmental monitoring, pollution abatement, climate change mitigation, solid waste management, hazardous waste management, recycling, waste-to-energy and related areas.

http://owes-expo.com/

### IFAT 2016

May 30 – June 3, 2016, Munich (Germany)

In the opinion of the organizers, IFAT is the "World's Leading Trade Fair for Water, Sewage, Waste and Raw Materials Management". They could be right, as the high level of demand from companies wishing to exhibit at this fair is an indication of the status of the sector's innovations platform and expo for environmental technology. The event takes place between May 30 and June 3, 2016 at the Messe München exhibition center. According to the information, the organizers are optimistic that there will be more than 3,000 exhibitors in Munich. "In some sections of the fair (water and recycling), we have waiting lists," Stefan Rummel, Managing Director of Messe München GmbH, was quoted. "We are very pleased about this further rise in interest, particularly from abroad." For the event in 2016, IFAT will be taking up a total of 230,000 square meters of exhibition space. 115,000 square meters of this are dedicated to the section on water and sewage, and 115,000 square meters to recycling and municipal technologies.

More than 135,000 visitors from all over the world are expected to attend the "World's Leading Trade Fair for Water, Sewage, Waste and Raw Materials Management".

www.ifat.de

# 21st International Congress for Battery Recycling ICBR 2016

September 14 – 16, 2016, Antwerp (Belgium)

Organized by the ICM AG, the event is worldwide recognized as the top conference in battery recycling technologies and marketing, where scientists, engineers, producers and recyclers meet to share their views and discuss their business. This unique congress cannot be missed by anyone involved in that field of growing importance and continuous evolution of battery recycling. Over 200 international experts from industry, authorities and academia will discuss and present the following topics:

- Effectiveness and efficiency of the newest Batteries Directive
- Preparation of the revision of the Batteries Directive

- Results of EU Recycling efficiency methodology
- End user behavior vs. battery collection
- Economic aspects of take back
- Safety aspects in lithium batteries transport and storage
- Urban mining of batteries: A source of raw materials
- Eco-design: An important issue for batteries removability?
- New concerns under REACH: Substances in articles
- Can electric mobility respond to the EU 2020 Energy Policy?
- Energy storage: Opportunities for a second use of batteries?
- New trends in battery recycling: Primary and rechargeable

 Best available technologies for battery recycling

An exhibition area is integrated into the conference facility, where vendors meet their clients. A cocktail reception and networking dinner create an excellent atmosphere to get in touch with business partners, colleagues and competitors. The participants may register to the following plant tours to: Accurec Recycling GmbH (ڪ www.accurec.de), DK Recycling und Roheisen GmbH ( www.dk-duisburg.de) in Germany; Bebat (🗢 www. bebat.be) or Revatech (S www.revatech.be) in Belgium.

⇒ www.icm.ch



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### Venice Symposium 2016

November 14 – 17, 2016, Venice (Italy)

According to the organizers, IWWG -International Waste Working Group / Eurowaste srl, the aim of the Venice 2016 Symposium is to focus on the advances made in the application of technologies for energy recovery from biomass and waste and to encourage discussions in these fields. The previous Symposium of this event, held in 2014, was attended by nearly 580 scientists and operators from approximately 62 different countries.

The sixth edition of the Symposium, which will be held in the Italian town Venice from 14th to 17th November 2016, will feature: three days of scientific presentations; one day of guided technical tours at biochemical and thermo-chemical plants; six parallel oral sessions, poster sessions and an exhibition by companies working in the field.

The Venice Symposium 2016 will include the following topics:

- Biomass and waste characterization as a potential energy source;
- Renewable fuel; Anaerobic digestion;

- Refuse-derived fuel / Solid recovered fuel;
- Thermal treatment;
- Economic aspects;
- Decision tools;
- Policies and legal aspects;
- Climate change and sink;
- Eco-toxicological aspects and Health issues;
- Public acceptance;
- Experiences and new developments;
- Developing countries.

www.venicesymposium.it

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