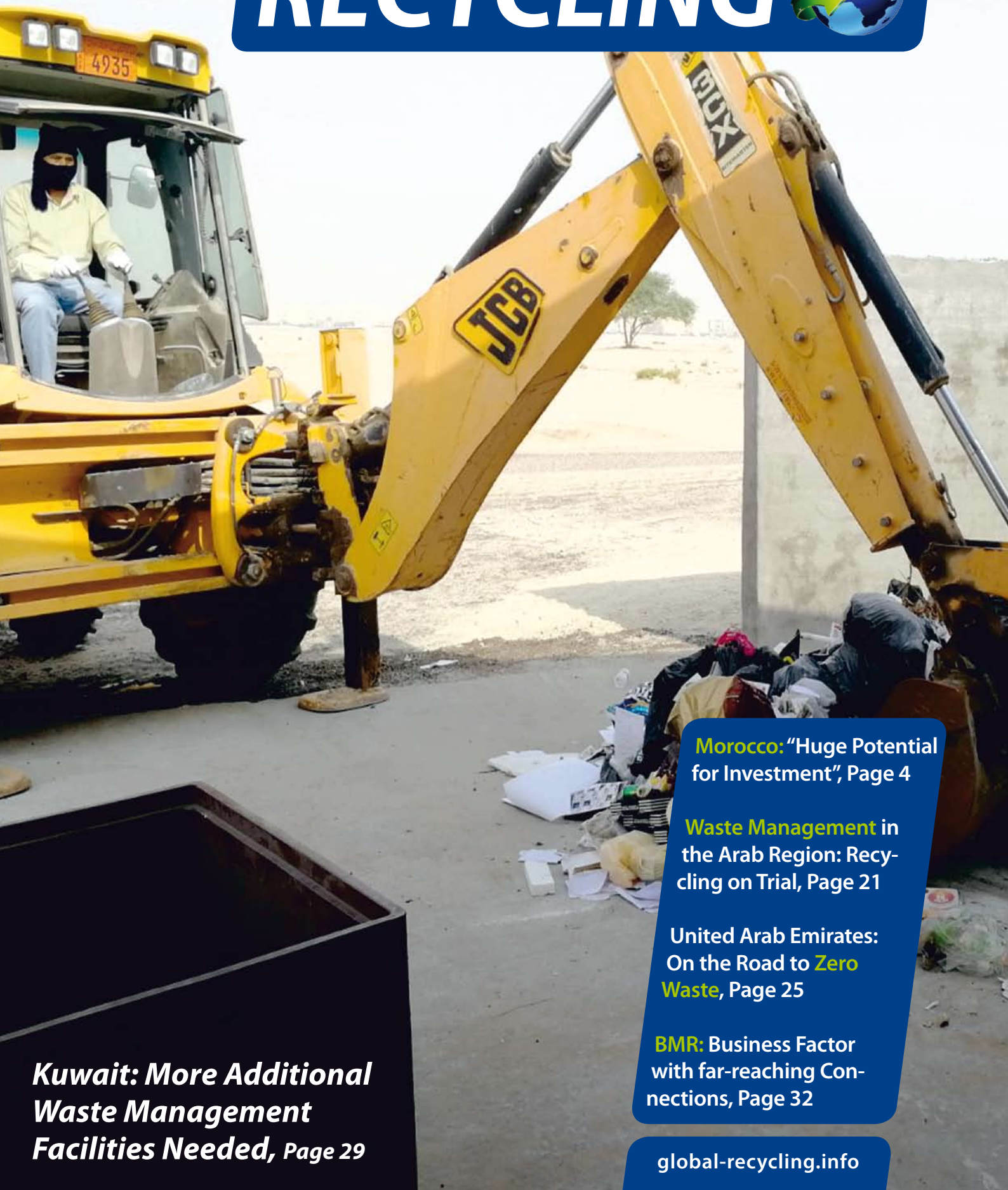


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*The Magazine for  
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## Recycling: Who Takes the Glory?

When the second official Global Recycling Day takes place on 18th March 2019, this international event is bringing cities, organizations, enterprises and proponents together to support the promotion of recycling. "This year, the theme is 'Recycling into the Future', focusing on the importance and power of youth, innovation and education in ensuring a brighter future for the planet," the Global Recycling Foundation announced. The organization, established by the Bureau of International Recycling (BIR) in 2018, anticipates that the Global Recycling Day 2019 will be more successful than last year's event when over 13 million people took part in raising recycling awareness and celebrating initiatives around the world.



It seems as if there will be a very bright future for recycling, the recycling industry and the use of recycled material. However, there are some clouds darkening the clear blue sky of profitable perspectives. In January this year, BIR informed that an Expert Working Group is reviewing the Annexes I (hazardous constituents), III (hazardous characteristics) and IV (waste is defined by it going to any of the operations listed in Annex IV) and related aspects of Annex IX to the Basel Convention. In this context, the European Union "has put forward proposals that have shocked recyclers, particularly in developing countries," the world recycling association gave account. "Changes to the Basel Convention's Annexes will have widespread repercussions across the world as nearly all countries will change their national laws on waste to align with the Basel Convention. For example, Annex IV currently defines 'what operations are recycling' and therefore 'who is a recycler.'" A series of proposed modifications to this Annex would restrict those operations legally defined as recycling in the future. "Those changes would seriously disadvantage the majority of developing countries and small island developing states around the world that only have, and depend on, their mechanical recycling operations," BIR fears. "How will all those developing countries report on meeting their UN Sustainable Development Goals on recycling if they have no recycling?" According to BIR, there are thousands upon thousands of companies around the world that are currently defined as recycling operations. "If the EU gets its way, these businesses would legally no longer be recyclers," the association stated. Therefore, it calls on all its members to make a polite request of their environment ministries to oppose the proposed narrowing of the legal definition of recycling at the Basel Convention.

This raises the question of who takes the glory for recycling. A part of it gets the manufacturing industry, which has intensified the use of secondary raw material for its products. However, without collection, sorting and treatment of waste from various sources and of different components – as the recycling industries have done for many years – there would be no recycled material. That is why the recycling sector – along with the international trade of these materials – is highly relevant for global recycling.

Beyond that, a growing number of authorities spring into action to cut the amount of waste. In August last year, 23 global cities and regions signed the declaration towards zero waste of C40 Cities, an organization which connects 96 of the world's greatest cities to take climate action. The aim is, inter alia, to increase the diversion rate to 70 percent by 2030. Signatories include Dubai in the United Arab Emirates as well.

With regard to waste management, there will be a change in the countries of the Middle East and North Africa (MENA). In Morocco, the waste sector is getting increasingly more interesting for investments (page 4). The United Arab Emirates is on its way to zero waste (page 25). Kuwait is pursuing the same goal, but needs additional waste management facilities (page 29).

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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## Gulf Countries: Economic Growth in 2019

The economic prospects for the six countries in the Gulf Cooperation Council (GCC) – Bahrain, Kuwait, Oman, Qatar, Saudi Arabia and the United Arab Emirates – look good.

According to the latest World Economic Outlook projections of the International Monetary Fund (IMF) from January, the countries of the Middle East and North Africa, as well as Afghanistan and Pakistan, will enjoy economic growth of 2.4 percent in 2019 and 3.0 percent in 2020. The economic prospects of Saudi Arabia were assessed at 1.8 percent this year and 2.1 percent in 2020. The Institute of International Finance (IIF) said, that in the GCC region “expansionary fiscal policy will continue to drive non-oil growth”. The institute expects “overall growth to moderate to 2.0 percent in 2019, dragged down by compliance with the recent OPEC+ deal”.

The figures of the World Bank, published in November 2018, support these estimates. “A sustained increase in oil prices over the past two years has driven an economic recovery in the Gulf Cooperation Council (GCC) countries, but government-led reforms need to continue to keep up the momentum,” a press release said, citing the World Bank’s biannual Gulf Economic Monitor. Economic growth for the GCC region was expected to reach two percent in 2018, “up from negative 0.3 percent in 2017, thanks in part to higher oil production and a slower pace of fiscal consolidation”. With fiscal and external imbalances narrowing, the region had remained largely immune to the financial volatility that beset other emerging market economies in mid-

2018, the World Bank wrote. According to its estimation, the economic growth for the region is expected to strengthen gradually in the medium term to 2.7 percent by 2020 “as high energy prices and rising government spending lift output and sentiment”. Growth in Saudi Arabia is anticipated to rebound to around two percent in 2018-2019 from a contraction in 2017 and to strengthen similarly across the GCC countries. “Gulf countries have implemented some notable reforms in recent years, including the rolling back of costly and distortionary subsidies, the implementation of a VAT, and business environment and labor market reforms,” Issam Abousleiman, World Bank Country Director for the GCC, was quoted. “But it is critical that GCC countries stay the course, not least because any loss in momentum could hinder their ability to draw in long-term investors that are crucial for diversification efforts.”

Looking forward, there are several downside risks to the regional economic outlook, the World Bank underlined. “Global trade tensions, global financial volatility, and geopolitical tensions could dampen global demand and trade, affect access to and cost of financing and weigh down hydrocarbon prices. A key domestic risk for the GCC region is a slowing in the pace of reforms due to higher oil prices.” The Gulf Economic Monitor would focus the reform lens on some key areas where further progress is needed,

the World Bank informed. Governments should “note that spending better rather than spending more will likely be the key to unlocking productivity gains from infrastructure spending,” the financial institution said. Business environment and labor market reforms would be needed as well to increase private investment. The Gulf Economic Monitor also draws attention to a separate but critical aspect of long-term sustainability: the management of water resources in the region, as GCC countries have some of the highest levels of water consumption globally and are highly dependent on energy-intensive water desalination.

### Recycling is on the rise

The Gulf countries have taken action and are aiming to treat waste in a manner that makes sense for the economy and the environment. “As governments aim to crack down on waste, this has led to a flurry of recent announcements regarding new legislation and initiatives to tackle the problem through a variety of innovative means,” one can read – for instance – on the website of the World Future Energy Summit, which took place in January this year. “While some of these measures involve greater education and support for recycling in the home, many of them are in direct support of cleantech investments and the exploration of innovative new green waste management solutions.”

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# Morocco: “Huge Potential for Investment”



Morocco's National Program for Household Waste Management of 2008, funded by Dirham 40 billion (3.7 billion Euro), aimed at the improvement of waste collection and recycling as well as overhauling the country's landfills.

“The strategy has borne fruit, with official waste collection rates doubling from 44 percent to 85.2 percent between 2008 and 2016. This has been aided in part by the construction of 22 new landfill and trash treatment centers,” investment and economic reporting agency Oxford Business Group balanced in 2018. Three additional centers under construction are provided to boost the national treatment rate of household waste from currently 53 percent to 81 percent.

## Waste segregation not yet organized

However, the upswing in recycling proceeded much slower. In 2014, a comprehensive review on behalf of the United Nations gave account of a recycling rate of eight to ten percent. Furthermore, there was no segregation structure for recyclable household waste regarding glass, paper and paperboard, aluminum, plastic and metals waste, no recycling system for cells and batteries, no data on used tires, and no centralized or even organized waste collection for electrical and electronic equipment waste. Moreover, 30 million tons of construction waste produced yearly were

mostly not segregated and dumped along roads, rivers or on unused plots of land. The review also indicated, that the recyclable household waste – collected and recycled by unofficial waste pickers – was sold to wholesalers and sent to Casablanca to transform it into energy, to reuse the material or to export the waste. In sum: “Waste segregation has not yet been organized. There is an informal recycling sector, in which valuable waste items are recovered by waste pickers at the landfill sites. ... Until recently, all waste was disposed of in illegal dumpsites.” Omar Agodim, Morocco project coordinator of the Global Cleantech Innovation Program, formulated it even sharper: “Take our country, where our landfills are completely full, and we have no solution except digging bigger holes.”

## Supported by World Bank

However, there were other solutions. A program from 2009 to 2011 – supported by the World Bank – for example, totaling 271.3 million US-Dollar, had already resulted in the establishment of a National Commission of Solid Waste Management; an effective result-oriented incen-

tive mechanism allocating national financial resources to support municipalities; professional collection services benefitting two third of the urban population; a higher municipal service tax; an increase of the disposal rate to sanitary landfills from ten percent in 2008 to 37 percent in 2013; the closing or rehabilitation of 21 open dumpsites; the creation of 15 controlled landfills; the approval of 25 environmental impact assessments; and the piloting of social inclusion activities for about 150 waste pickers.

### No benefit for all regions

But it seems that the effects of this measures did not benefit all regions. A scientific study on the province of Khenifra in 2017 pointed to six communities that "had no idea about the law of waste management in Morocco. In addition, the municipalities have never tried to pilot a selective collection or compost because of the heterogeneity of the waste and the difficulty of sorting. This may explain the orientation of municipalities to landfilling method." And even in April 2018, Catherine Hansen writing for online platform EcoMENA was skeptical: "While this reform is expected to do wonders for the urban population, one can only hope the benefits of this reform trickle down to the 43 percent of the Moroccan population living in rural areas."

### A series of strategic actions


In 2013, the German Society for International Cooperation (GIZ) underlined: "Recognizing the risks posed by mismanagement of waste to the environment, Morocco has undertaken a series of strategic actions to reform the waste management sector." This includes the Environmental Protection and Management program (2002-2017), the National Solid Waste Program (2008-2022) or the National Master Plan for Hazardous Waste Management (adopted in 2013). Several measures were taken too, partially in collaboration with international organizations. Already in 2014, the World Bank suggested the set-up of "various pilot projects" regarding electrical and electronic equipment waste and "several programs" for collecting and incinerat-

ing plastic and plastic bags at cement plants. In October 2015, agreements were finalized between three ministries and some industrial stakeholders focusing on the recycling of 140,000 tons of newspapers, 70,000 tons of used lubricating oils, and 105,000 tons of used cooking oils.

Additionally, this will create about 15,600 jobs, improving working conditions of employers "working in the informal sector and in poor conditions", Environmental Minister Delegate Hakima El Haiti was convinced. And likewise, she was sure of an upcoming producer involvement: "Our main objective has been to consolidate the principle of shared responsibility by encouraging industries to take their responsibilities and organize themselves to reduce pollution." According to the Oxford Business Group, the Moroccan state furthermore expects that this initiative will lead to the creation of 10,000 and 11,000 jobs in the liquid and solid waste management segments, respectively, by 2020. And in November 2016, Dutch development bank (FMO), European Investment Bank (EIB) and Banque Marocaine du Commerce Extérieur (BMCE) signed a financing contract. Consisting of a term loan of 20 million Euro and a comprehensive technical assistance division, it is to support BMCE, known for initiating sustainable finances, towards an improvement of solid waste management practices and standards. The loan will support the national waste management ambitions to rehabilitate or close all existing dumping sites until 2020 and reach a recycling rate of 100 percent by 2030, the EIB gave account.



### Revival of private waste infrastructure


In 2013, the GIZ too criticized that "today only eight percent of industrial waste is disposed of through the private sector. The remaining 92 percent is handled by the informal sector either in unauthorized dumps, controlled landfills for municipal solid waste, or it is stored." Since then, the Moroccan private waste infrastructure has revived. Meanwhile, French firm Suez and its subsidiaries are active in providing waste management services to regional companies, municipalities and the industry. As a producer




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of biofertilizers and biopesticides, Eléphant Vert from Switzerland turns organics into compost and biogas via decomposition. French cement company Lafarge Holcim is investing in a sorting center for mechanical-biological treatment and the extraction of fuel for cement and clinker production. Since February 2018, Geocycle Morocco runs the first municipal solid waste pre-processing platform in Morocco with a capacity of treating up to 90,000 tons per year, increasing the lifetime of Oum Azza landfill and creating sustainable local green jobs. And the Moroccan-French company Pour Et Par le Soleil operates a solar microwave oven that takes advantage of pyrolysis to decompose organic and other waste thermo-chemically. For the company's CEO Hamza El Baroudi, the oven is not only "the first machine worldwide able to do this" – to transform 27 tons of waste into 18 tons of charcoal each day – but expects also "tremendous market opportunities in Africa and Morocco".

### Interested in investments

The waste sector of the North African state is getting increasingly more interesting for investments. In April 2018 for instance, the Dutch Ministry of Foreign Affairs offered – in the framework of public-private partnerships – a Mo-

roccan municipality council to subsidize a part of the cost for a waste-to-energy conversion, while hiring a Dutch company to do the work. The Hassan II Fund is based on a framework agreement related to the support to industrial investment in 2015: It offers – among others – final financial contribution for building and equipment – capped at 15 percent of the total investment and capped at 30 million Dirhams (2.77 million Euro) – to companies specialized in the recycling of metallic and plastic waste or processing of phosphorus/phosphates. And the Industrial and Investment Development Fund – 2015 established in the course of the 2014-2020 Industrial Acceleration Plan and running up to 2020 – promised "direct aid" to projects of investment of over 20 million Dirhams / 1.84 million Euro (before tax) or the creation of at least 50 permanent jobs.

To say it with the words of Kimmo Tiilikainen: "Morocco offers huge potential for investment in sectors related to the green economy and, by virtue of its assets, notably stability, is a gateway to the African market." Tiilikainen – Finnish minister of Environment, Energy and Housing – visited Morocco in January 2018, accompanied by a large delegation of 19 representatives of companies operating in the sectors of water, waste management, energy and bio-economy.

## Automobile Recycling in China Set to Grow

**The "China End-of-Life Vehicle (ELV) and Dismantling Industry Report, 2018-2022" has been added to the offering of the market research store of the Irish company Research and Markets.**

As reported, automobile ownership has been climbing steadily in China over the recent years, at a compound annual growth rate of 15.2 percent between 2010 and 2017. According to the forecast, it will continue to rise in the upcoming five years, up to estimated 313.1 million units in 2022, despite a decline in both production and sales in 2018.

As automobile ownership increases in China, more vehicles are due to be scrapped. As estimated, there were a total of 7.3 million end-of-life vehicles (ELV) in China in 2017, with a scrap rate of four percent, but a mere 30 percent of them were recycled, ResearchAndMarkets gave account. "In the first eleven months of 2018, 1.469 million ELVs were recycled in China, 15.1 percent more than in the same period of 2017, with the full-year recycling rate expectedly ranging at 20.0 percent."

"Among 650 to 700 Chinese car dismantling firms for the moment, most are small sized with low annual re-

cycling rate of ELV and scattered resources, though their dismantling networks already take shape," the information said. "As yet, big players are Shenzhen GEM High-Tech, Jiangsu Huahong Technology, Miracle Automation, Henan Yuguang Gold & Lead, Tus-Sound Environmental Resources and Beijing Capital."

Despite China boasts a huge number of ELVs, its scrap rate remains far lower than the level of six to eight percent in the developed countries, and a mere 0.5 to one percent vehicles out of automobile ownership are

recycled compared with a staggering five to seven percent in developed nations. "That's largely because ELV subsidies are directly given to vehicle owners but in small amounts, and professional dismantling firms buy their cars at a low price due to weak profitability, which leads to an influx of scrapped cars to the black market which offers a higher price," the company described the situation. The forthcoming new version of the Measures on Management of ELV Recycling, a policy allowing recycling and remanufacturing of five automotive assemblies (engine assembly, steering assembly, transmission assembly, front and rear axles, and frame), would promote market growth. With the subsequent issuance of related rules, the ELV and dismantling industry were hoping to boom with output value hitting 43.43 billion Renminbi Yuan (editor's note: more than 6.3 billion US-Dollar) and recycling rate at 24.5 percent in 2022.



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## New Global Alliance Launched

In January this year, global companies from the plastics and consumer goods value chain launched a new organization “to advance solutions to eliminate plastic waste in the environment, especially in the ocean”.

The “Alliance to End Plastic Waste (AEPW)”, currently made up of nearly thirty member companies, has committed over 1.0 billion US-Dollar with the goal of investing 1.5 billion US-Dollar over the next five years to help end plastic waste in the environment. According to the information, the organization will develop and bring to scale solutions that will minimize and manage plastic waste and promote solutions for used plastics by helping to enable a circular economy. “The Alliance membership represents global companies that are located throughout North and South America, Europe, Asia, Southeast Asia, Africa, and the Middle East,” the press release said.

The Alliance is a not-for-profit organization that includes companies that make, use, sell, process, collect, and recycle plastics – chemical and plastic manufacturers, consumer goods companies, retailers, converters, and waste management companies. As reported, AEPW has been working with the World Business Council for Sustainable Development as a founding strategic partner.

### Projects and collaborations

The Alliance to End Plastic Waste announced an initial set of projects and collaborations that reflect a range of solutions to help end plastic waste:

- Partnering with cities to design integrated waste management systems in large urban areas where infrastructure is lacking, especially those along rivers which transport vast amounts of unmanaged plastic waste from land to the ocean. This work will include engaging local governments as well as stakeholders and generate economically sustainable and replicable models that can be applied across multiple cities and regions. AEPW will also be looking to collaborate with other programs working with cities, such as the Project STOP, which is running in Indonesia.
- Funding the Incubator Network by Circulate Capital to develop and promote technologies, business models and entrepreneurs that prevent ocean plastic waste and improve waste management and recycling with the intention of creating a

pipeline of projects for investment, which will focus on Southeast Asia.

- Developing an open source, science-based global information project to support waste management projects globally with reliable data collection, metrics, standards, and methodologies to help governments, companies, and investors focus on and accelerate actions to stop plastic waste from entering the environment. AEPW will explore opportunities to partner with leading academic institutions and other organizations already involved in similar types of data collection.
- Creating a capacity building collaboration with intergovernmental organizations such as the United Nations to conduct joint workshops and training for government officials and community-based leaders to help them identify and pursue the most effective and locally-relevant solutions in the highest priority areas.
- Supporting Renew Oceans to aid localized investment and engagement. The program is designed to capture plastic waste before it



**The following companies are the founding members of the Alliance:** BASF, Berry Global, Braskem, Chevron Phillips Chemical Company LLC, Clariant, Covestro, Dow, DSM, ExxonMobil, Formosa Plastics Corporation USA, Henkel, LyondellBasell, Mitsubishi Chemical Holdings, Mitsui Chemicals, NOVA Chemicals, OxyChem, PolyOne, Procter & Gamble, Reliance Industries, SABIC, Sasol, SUEZ, Shell, SCG Chemicals, Sumitomo Chemical, Total, Veolia, and Versalis (Eni).



reaches the ocean from the ten major rivers shown to carry the vast majority of land-based waste to the ocean. The initial work will support the Renew Ganga project, which has also received support from the National Geographic Society.

Furthermore, in the months ahead, the Alliance will make additional investments and drive progress in four key areas:

- Infrastructure development to collect and manage waste and increase recycling;
- Innovation to advance and scale new technologies that make recycling and recovering plastics easier

and create value from all post-use plastics;

- Education and engagement of governments, businesses, and communities to mobilize action; and,
- Clean up of concentrated areas of plastic waste already in the environment, particularly the major conduits of waste, like rivers, that carry land-based plastic waste to the sea.

As is emphasized, research from the Ocean Conservancy shows that nearly 80 percent of plastic waste in the ocean begins as litter on land, the vast majority of which travels to the sea by rivers. In fact, one study estimates that over 90 percent of river-borne plastic

in the ocean comes from ten major rivers around the world – eight in Asia, and two in Africa. Sixty percent of plastic waste in the ocean can be sourced to five countries in Southeast Asia. “While our effort will be global, the Alliance can have the greatest impact on the problem by focusing on the parts of the world where the challenge is greatest; and by sharing solutions and best practices so that these efforts can be amplified and scaled-up around the world,” Peter Bakker, President and CEO of World Business Council for Sustainable Development, was quoted.

➔ [www.endplasticwaste.org](http://www.endplasticwaste.org)

## Turning Greenhouse Gases into Chemicals

**German Carbon2Chem aims at using emissions from steel production as raw material for chemicals. A pilot plant produces already synthetic fuel methanol and ammonia from steel mill gases.**

Ammonia is a chemical used to make fertilizers to improve food production. Steel mill gases come from steel production and contain, among other things, CO<sub>2</sub>. “It is the first time in the world that steel mill gases, including the CO<sub>2</sub> they contain, have been converted into ammonia,” ThyssenKrupp, a German multinational conglomerate with focus on industrial engineering and steel production, announced in January this year. “It represents a further milestone in the Carbon2Chem project, which is being funded by the Federal Ministry of Education and Research (BMBF) to the tune of around 60 million Euros.” Back in September 2018, the project succeeded for the first time worldwide in producing the chemical methanol from steel mill gases.

### The project

Carbon2Chem is a major project coordinated by ThyssenKrupp in collaboration with institutes of the Fraunhofer Society and the Max Planck Society and involving 15 further partners from research and industry. “Implemented on an industrial scale, the technology has the potential to convert around 20 million tons of the annual CO<sub>2</sub> emissions from the German steel sector. It can also be used

in other CO<sub>2</sub>-intensive industries,” the company informed. The project Carbon2Chem is based on the fact that steel mill gases contain chemical elements such as carbon (in the form of carbon monoxide and CO<sub>2</sub>), nitrogen and hydrogen. As a result, they can be used to produce carbon- and hydrogen-containing synthesis gas, a starting material for the manufacture of various chemicals such as ammonia, methanol, polymers and higher alcohols. Synthesis gases are currently extracted from fossil fuels such as natural gas and coal. Carbon2Chem not only converts the CO<sub>2</sub> contained in the steel mill emissions, but it also saves the CO<sub>2</sub> that was previously created during the production of synthesis gas.

### Technical Center in Duisburg

The first ammonia, as well as the first methanol production, took place in the Carbon2Chem technical center in Duisburg, a pilot plant in which laboratory results are validated under practical industrial conditions using gases from regular steel mill operation. This work forms the basis for transferring the technology to industrial scale. In addition to gas cleaning and water electrolysis systems from ThyssenKrupp, the technical center

includes various laboratory rooms, some of which are already being used by project partners: Covestro AG (research into the production of isocyanates), Clariant (catalyst for methanol production and chemicals for the gas cleaning system), the Fraunhofer Society and the Max-Planck Institute. ThyssenKrupp has invested 33.8 million Euros in the technical center, while 8.5 million Euros from the BMBF funding has also been allocated for equipment and operation.

According to the information, Carbon2Chem is attracting a great deal of interest, also from outside Europe. Worldwide, there are around 50 steel mills, that would be suitable for Carbon2Chem, the project partners are convinced. Moreover, ThyssenKrupp is already conducting talks with interested parties from various regions about how the technology could be transferred to other CO<sub>2</sub>-intensive sectors. “Carbon2Chem can make an important contribution to meeting the target formulated at the 2015 UN Climate Change Conference of achieving greenhouse gas neutrality in the second half of the century,” ThyssenKrupp emphasized.

➔ [www.thyssenkrupp.com/en/carbon2chem](http://www.thyssenkrupp.com/en/carbon2chem)

# Paper Mill Sludge Generates Business in Finland

The City of Tampere is looking for a solution for the processing of paper mill sludge.

In 2014, the City of Tampere purchased some of the lands and waters previously used by the forest industry to build the future city district of Hiedanranta. The purchased cove in Näsijärvi came with an enormous mass of wood-derived waste materials, also known as paper mill sludge or “zero fiber”. Now, Hiedanranta is serving as a development platform for projects aiming to find usage for paper mill sludge that would be financially sensible and clean up the water areas.



In November 2018, a seminar on the procurement process of handling and utilization was organized for potential operators; 150 participants signed up to hear about the paper mill sludge experiments underway in Hiedanranta, among other topics. The research on the value chain of paper mill sludge has yielded preliminary, technically and financially promising results on utilizing sludge for the production of chemicals and biogas or methane and as a soil conditioner or fuel after quick composting, the City of Tampere gave account. The research would continue – among other things – with estimates on whether profitability can also be expected for the projects at an industrial scale.

According to a research, the lakebed in Lielähti contains 1.5 million cubic meters of paper mill sludge, covering

an area of 35 hectares with sediment that, in places, is several meters thick, the City of Tampere informed. The municipality has acquired the area along with its environmental responsibility, and the goal is to find a financially and environmentally sustainable processing solution in order to make the area viable for recreational use. “At the moment, the paper mill sludge causes unpleasant odors at times and hinders the lake’s ice cover in winter and is, therefore, not suited as a milieu for the planned housing development.” The plan is to remove the sludge at least from the vicinity of the shore to enable the recreational use of the area.

## Operators interested in paper mill sludge

The City of Tampere has attracted a great deal of interest with its desire,

and several operators and research institutes have expressed their willingness to provide their know-how, participate in the project and test their own methods.

According to Project Development Director Reijo Väliharju from the Hiedanranta development program, various methods for processing paper mill sludge have already been studied. The participants considered both processing the sludge on-site in Hiedanranta and delivering it to waste processors, energy companies and other material refiners. The mass-stabilization of paper mill sludge and utilizing it in park infrastructure has also been examined.

Stored at the bottom of a lake for decades, the paper mill sludge, its characteristics and potential processing methods were being studied by

## 100 years of forest industry

The future district of Hiedanranta in Lielähti used to accommodate forest industry that operated in the area for over a century until 2008. The sediment of Näsijärvi lake in front of the former paper mill has accumulated wood-derived waste fibers from the pulp industry. The sludge was first dumped directly into the waters as sewage and later submerged in a banked-up basin for several decades.

The accumulation of sludge reflects the previous decades’ more lenient attitude towards industrial waste and, in fact, the operations always complied with the legislation of that time. Similar paper mill sludge deposits can be found elsewhere in Finland as well as around the world.

“The challenge is both extremely demanding and very interesting, and its solutions play a substantial role not only in Tampere but possibly around the world, as paper mill sludge is not unique to the waters of Näsijärvi. Success requires mutual problem-solving between businesses, the city, and universities as well as combining different types of expertise and viewpoints,” Associate Professor Leena Aarikka-Stenroos from Tampere University of Technology was quoted, one of the participants of the research cooperation and process.



several businesses, experts, research institutes and higher education institutions.

### City in two research projects

At the moment, the City of Tampere is running two publicly funded research projects related to paper mill sludge: the "Blue Bioeconomy" project for utilizing the paper mill sludge in the lakebed of Hiedanranta, also known as the "Zero Waste from Zero Fiber" project, and the "CircVol 6Aika" project with its paper mill sludge challenge and building a business network.

The "Zero Waste from Zero Fiber" project – aiming to utilize the paper mill sludge in the lakebed of Hiedanranta – studies microbiological processing methods designed to refine the sludge into as high-value products as possible. Depending on the processing chain, paper mill sludge could thus be refined into organic chemicals, biogas and soil conditioner, among other things. The project has been funded by the City of Tampere, and the "Blue Bioeconomy" priority project of the Finnish Ministry of Agriculture and Forestry managed by the South Savo Center for Economic Development, Transport, and the Environment.

The "CircVol 6Aika" project aims to utilize large-volume secondary flows and landmasses in the urban environment. The project is part of the coop-



eration project for sustainable urban development between the six largest cities in Finland – Helsinki, Espoo, Vantaa, Tampere, Turku, and Oulu – and has been funded by Leverage from the EU 2014–2020, the European Regional Development Fund and the Helsinki-Uusimaa Regional Council.

### Goal: Solution path in 2019

In 2019, the City of Tampere aims to find a solution path for the processing of the sludge. As reported, cooperation with companies is vitally important. According to the information, the businesses should be given the opportunity to discuss their views on the used procurement process and to offer necessary solutions. "We want to have an open and diverse dialogue with businesses and developers to

find the best solutions for paper mill sludge. The seminar featured the most up-to-date information on the processing options which we hope inspires the operators to find new business opportunities," Project Development Director Reijo Väliharju was cited.

A city district of up to 25,000 residents and 10,000 businesses is planned in Hiedanranta with connections to the upcoming tramway line. The goal is to develop the area into a carbon-negative district that supports sustainable environmental development in an intelligent manner. An open-minded culture of experimenting is one of the means of achieving this goal.

➔ [www.tampere.fi/en/hiedanranta](http://www.tampere.fi/en/hiedanranta)

Source: City of Tampere

Photo: pixabay

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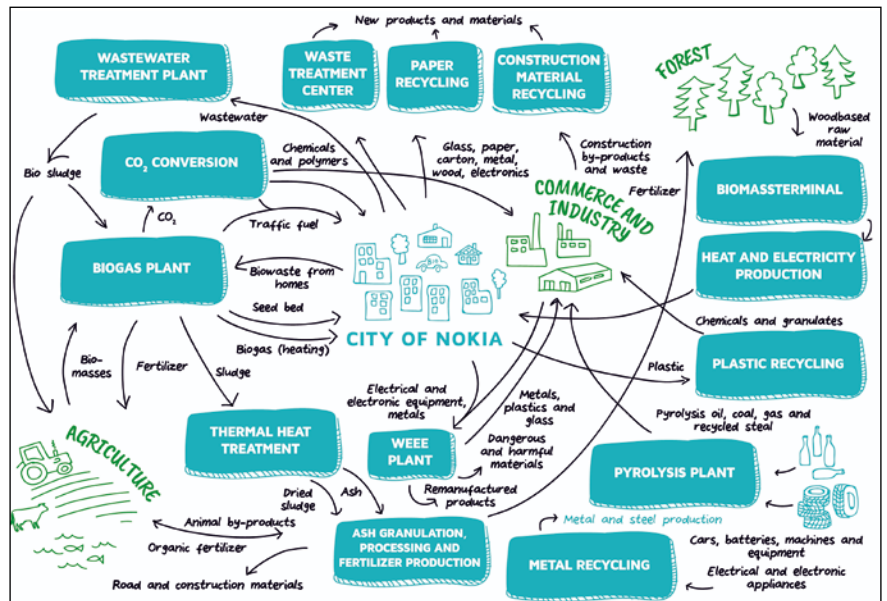
## Ecological Technologies Made in Finland

The Technical Research Centre of Finland (VTT) and the Town of Nokia are to study the use of bio-based carbon dioxide as a raw material in the ECO3 business park, which is dedicated to bio-economy and circular economy.

The aim of VTT's and Nokia's joint venture is to study the financial viability of various carbon dioxide recycling solutions in Nokia's ECO3 business park. "The solutions to be explored focus on the use of bio-based carbon dioxide in the production of liquid and gaseous fuels and as a raw material for chemicals," VTT gave account.

The goal is for the experiments with bio-based carbon dioxide to create conditions for finding potential investors as well as various kinds of demonstrations. The Town of Nokia's development subsidiary Verte Ltd was pooling interested and suitable partners to participate in the project. A report on the project is due to be published in the spring of 2019.

"There are already examples of new business based on the use of carbon dioxide to produce, for example, fuels, construction materials, plastics and chemicals elsewhere in the world. Interest in new ways to use carbon dioxide has grown considerably both in Finland and globally. Nokia's ECO3 business park has potential in terms of both the recovery and use of carbon dioxide," VTT's Senior Scientist Janne Kärki was cited who is responsible for coordinating the project.



Source: Town of Nokia

ECO3's potential for innovative circular economy concepts

### The ECO3 business park

ECO3 is a new kind of industrial-scale, multi-sector bio-economy and circular economy competence center in the Kolmenkulma Eco-Industrial Park in Nokia. It is both a nationally important competence center and a demonstration and piloting environment, which the Town of Nokia and its development subsidiary Verte Ltd are developing in collaboration with local businesses and universities. According to the homepage, investing

companies are welcome "that drive further growth, and their networks of sub-contractors, as well as innovative companies that want to internationalize". As reported, the area is suitable for all companies interested in developing the bio-, water- and circular economies; the nutrient cycle; biomass products; renewable energy production and technology or the wood- and forest-based business.

- ➔ [www.eco3.fi](http://www.eco3.fi)
- ➔ [www.vttresearch.com](http://www.vttresearch.com)

## New Sustainable Water and Waste Fund

The provider of investment services, Fidelity International has unveiled a Sustainable Water and Waste fund.

As reported by special media, the new fund – which is managed from Luxembourg – will look for sustainable investment opportunities within the water and waste management sectors. The aim is to provide investors with long-term capital growth, primarily through investment in the equity securities of companies throughout the world, which maintain sustainable characteristics, the provider underlined. The fund may also invest in companies, which demonstrate improving sustainable characteristics.

The new investment opportunity "will focus on companies which are involved in the design, manufacture, or sale of products and services used for or in connection with water and waste management sectors. As this fund may invest globally, it may be exposed to countries considered to be emerging markets. The fund may invest its assets directly in China A and B shares."

- ➔ [www.fidelity.lu/funds/factsheet/LU1892829315](http://www.fidelity.lu/funds/factsheet/LU1892829315)



## USA: National League of Cities Recommends Circular Economy

To improve municipal waste management practices, boost local green jobs and help address climate change, the National League of Cities (NLC) – in partnership with the American coffee company Starbucks – has released the new action guide “Recycling Reimagined”.

According to the organization, the guide provides cities with the tools they need to establish a circular economic framework for recycling and recommendations for how to achieve zero waste. As stated, Americans generate more waste than any other country in the world. However, the United States Environmental Protection Agency (EPA) “suggests that as much as 75 percent of all waste is recyclable and compostable, even though over half of that material ends up in landfills”.

NLC is convinced that the “circular economy” model aims to keep resources within a closed loop of reuse, regeneration and recycling. “A circular economy closes the loop by connecting the two ends of the linear cycle – using waste as a feedstock for production and limiting actual disposal. It



ultimately aims to achieve zero waste by prioritizing the highest and best use of materials and resources, the organization underlined. A 75 percent diversion rate by 2030 could produce 1.1 million new jobs and reduce carbon dioxide by 276 million tons, as well as save billions of dollars.

“Recycling Reimagined” offers case studies from cities and includes recommendations and data for city leaders looking to build sustainable waste management systems in their

communities. Recommendations for achieving zero waste include:

- Performing waste characterization studies
- Doing continuous outreach and marketing
- Prioritizing the best use of materials and resources
- Considering instituting standardized recycling and composting programs
- Using city procurement to boost sustainable products and end markets
- Building partnerships and regional support
- Finding innovative funding models
- Investing in infrastructure and improved technology
- Piloting programs

➔ <http://nlc.org/recycling-reimagined/case-studies>

Photo: TSUNG-LIN WU / fotolia.com

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## Canada: New Producer Responsibility Organization

The new organization operates under the name YES Environmental Services & Solutions (YESS) and is run by “female power”.

YESS President Sarah Webb, Operations Director Carmelina Macario and Customer Service Representative Megan Chivers have over 35 years of combined experience in developing and running waste management and product stewardship programs for both governments and businesses. Together, they are providing their cli-



ents with customized services, solutions and advice on how to efficiently and responsibly recover and recycle product and packaging waste. Based in Burlington Ontario, YESS includes

partners like Retire Your Tire. Its specialized services and solutions cover creating customized independent producer responsibility (IPR) programs for applicable jurisdictions; developing and managing full circular economy producer programs; helping clients manage their IPR requirements and meet their compliance reporting obligations; establishing collection networks, managing collection and processing providers; and negotiating fair and transparent pricing across multiple materials.

## Oman: Novel Glass Recycling Plant

In the Sultanate of Oman, a new glass recycling plant is to be built and is expected to be operational by the end of 2019. The fully-automated facility (capacity: 650 tons/day) is to be built in Sohar. According to the information, it will be the first glass recycling plant in the Cooperation Council for the Arab States of the Gulf (GCC). The plant is specifically designed to meet the needs of varied glass manufactur-

ers within the GCC region in terms of specifications, volumes, and pricing, Glass Scan Technologies, the exclusive project partner for this investment, informed. The company will deliver the patented technology.

As reported, Glass Scan Technologies have the rights, the proprietary know-how, and the strategic industry partners to support the implementation

of the legal frame, assist the introduction of glass recycling to the public, arrange and operate waste glass collection, build and operate a recycling glass plant and control and manage all relevant data. The equipment will be supplied by the Austrian manufacturer Binder + Co AG.

The project has investors from the government as well as private sectors.

## United Arab Emirates: Enviroserve Wins Prize for Electronic Recycling

In October last year, the company Enviroserve was among the winners of the Middle East Waste & Recycling Awards (MEWAR Awards), presented by Waste & Recycling Middle East magazine in Dubai, United Arab Emirates (UAE).

UAE based Enviroserve won the prize for the Electrical & Electronic Equipment Recycling Company of the Year (WEEE Processor). According to the company, this award “is just the tip of

the iceberg as Enviroserve has much more in store for the recycling industry in the Middle East with the highly-anticipated opening of The Recycling Hub at Dubai Industrial City set for early 2019”.

In January last year, the foundation was laid for the facility, which “features state-of-the-art equipment designed in Switzerland that creates minimal impact on the environment through its zero-to-landfill and zero-to-air pro-

cess”. The company is convinced that The Recycling Hub will be the largest fully-integrated electronics recycling facility in the Middle East, Africa and Caucasus Region (MEAC) with a processing capacity of nearly 40,000 tons of electronic waste annually. “Enviroserve has partnered with industry leaders, WiseTek, to open a new unit at The Recycling Hub that provides IT Asset Disposition (ITAD) and secure IT destruction services,” the Arab recycling specialist emphasized.

## Taiwan: Heat Recovery ORC Power Plant from Biomass Fuel

After Malaysia, India, South Korea, The Philippines, Singapore, and Japan also Taiwan gets a Turboden ORC heat recovery plant. The new ORC\*) plant – according to Turboden the biggest of its kind in Taiwan – will recover saturated steam at low pressure from biomass fuel to produce 10 MW electricity. The high conversion efficiency

\*) The Organic Rankine Cycle’s principle is based on a turbogenerator working as a conventional steam turbine to transform thermal energy into mechanical energy and finally into electric energy through an electrical generator, Turboden informs on its website. Instead of generating steam from water, the ORC system vaporizes an organic fluid, characterized by a molecular mass higher than that of water, which leads to a slower rotation of the turbine, lower pressures and no erosion of the metal parts and blades.

of the ORC (very suitable for low-temperature sources), the reliability and the experience of the company would realize that Turboden turbogenerator ensures a secure income from the sale of electric energy throughout the power plant life.

➔ [www.turboden.com](http://www.turboden.com)



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# Technology of the Company Tehnix Is Successful in Entering the World Market

The President of MWE visited Tehnix.

As a continuation of the IFAT 2018 in Munich, at the end of January, the company Tehnix was visited by the President of Municipal Waste Europe, Mr. Patrick Hasenkamp. The purpose of the visit was to get acquainted with modern sustainable technologies for circular municipal waste management in accordance with the EU waste package.

Mr. Hasenkamp visited the Tehnix plants in Prelog and Krk and concluded that Tehnix technology has a really high degree of recycling and has given strong support to its implementation, not only in Croatia but also in Europe.



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# Continuous Development



Sales Manager  
Fredrik Olofsson

## Interview with Thomas Sörensson, the CEO of Scandinavian Enviro Systems AB.

**N**owadays, Scandinavian Enviro Systems AB is best-known for efficient tire recycling as well as recovering valuable resources. Nevertheless, it all started in 2001 when the newly founded company was trying to further develop the CFC technology (Carbonization by Forced Convection) to enable the manufacture of products of very high quality. Since that time the Swedish company was able to verify this technology, validate a second patent called EHD (Enhanced Heat Distribution), build several pilot plants as well as a full-scale plant in Asensbruk, Sweden. The company has steadily developed further and will continue its progress in 2019. Thomas Sörensson, the CEO, explained in more detail the company's current as well as future plans and projects.

*According to your website, Scandinavian Enviro Systems AB works with the CFC technology (Carbonization by Forced Convection) that changes "the chemical composition and the physical phase of the tire material during the process" to produce extremely high-quality end products. What is the main difference to other attempts to retrieve the valuable resources within tires?*

Our patented technology that has been finetuned and optimized as well as deeper protected over the years started with our founder Mr. Bengt-Sture Ershag. The team around him, led by COO Olov Ershag has been involved in the process of bringing the technology to the mature, scalable and industrialized stage it is now. There are a few key benefits of our technology that ensures the high quality and equally important consistent quality level of the valuable recovered Carbon black material.

First of all, our choice of technology enables us to process a mix of shredded tire material with a diameter of 20-150 millimeters including steel wire. The benefit of that is the low cost of pre-processing before the pyrolysis. Some technologies require either much smaller granulates and need the steel to be removed before the process or, in some cases, whole tires, and that will impact the efficiency of filling the reactor and definitely the possibility to control the quality in the process. Secondly, the technology is utilizing a batch-process. This ensures a controlled environment for the pyrolysis to take part and a possibility



## Advertorial:

to monitor and manage the stages of the process to reach the required quality. Further, the material is lying still inside the reactors, minimizing the mixing of particles and gas during the gasification of the volatiles. Such particles will mainly affect the oil and will need to be filtered out at a later stage in some way. This is not a problem in our case. I will not go into the core of our patents, but one of the main benefits is also the flow of gas through the tire bed. The process is efficiently using the pyrolysis gas both for energy transfer and distribution. Since we are using convection energy instead of radiation or conduction that is used in many conventional pyrolysis methods, we can better control the process and the complete material volume quality. There will be no condensation inside the reactor causing char to build up in the vessel. We are also eliminating the risk of forming new carbon due to too high temperatures in some areas or surface of the vessel, such carbon is not having the properties of Carbon black and will be contaminating the material. Since we monitor and manage several parameters in the controlled environment, we know exactly when each batch is finished and will meet the requirements. Some of those parameters are obviously temperature, weight, gas flow and time.

Due to the control of the pyrolysis and the fact that we do not form carbon residue on the vessel surface we have no need for cleaning inside the reactors. This limits the maintenance time. In addition to the process described above, we have developed a range of supporting systems and equipment to optimize our plants as module based, large

scale industrial plants with high automatization grade.

*After Enviro and Canada-based recycler TreadCraft Limited have extended the Memorandum of Understanding in June last year, the company has decided to establish a joint venture for co-ownership of a recycling plant. In this regard, you mentioned that joint ownership is conforming to Enviro's new business model. Which innovations does the new business model entail?*

Yes, TreadCraft is one of the partners where we have very mature projects under planning. During the last 12-18 months, we have experienced rapid growth of interest from serious and professional companies who have also found pyrolysis to be the future technology for efficient recovery of the valuable resources from end of life tires. I would say that all of them have done their homework and studied in detail both alternative technologies, our peers and the interesting development in the market for sustainable materials.

SES dedicated a part of last year to significant strategic analysis of the underlying forces of the market, their positions and movement. Based on our technology and the



Tire recycling plant



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achievements so far with our material being introduced in the rubber and tire industry, we explored how to best capitalize on our own position. With the profitable and sustainable technology, we possess, in combination with access to the market and know-how, there is no reason why we would not make sure that we aim for a position in the very front of the value chain of the recovered Carbon Black materials. Our unique technology also deserves a well-managed strategy to ensure the quality of the output material over time. It was natural for us to take the step forward and take part in the ownership, operation management as well as sales of the materials to further improve the sustained profitable growth for our shareholders.

The growing interest from tire collectors and recyclers in combination with very ambitious targets for sustainability and implementation of recovered materials in the tire industry is amplifying the need of our technology.

***Are there any plans for additional arrangements for joint ownership in the foreseeable future?***

We have several MoU's with joint venture target at the moment. Several in North America and that is a region that has specific strategic importance due to restrictions in the production of virgin Carbon black, tightened environmental regulations and as a result increasing price levels. The need of alternative recycling methods is also clear. Furthermore, we have a MoU with the Danish company WindSpace, and that project is perhaps maturing fastest at the moment. Europe is our home market and has obvious benefits, in other words, we need to make priorities

in our selection of partners. In addition to the above, we have several projects that also might end up in joint ventures but are a bit less mature, or both parties did not find a MoU necessary to proceed to the next stage of commitments.

***Due to the CFC technology, Enviro is able to extract pyrolysis oil from end-of-life tires that can ultimately be used as fuel – according to the company's latest researches. How are you going to proceed further to make the most of the corresponding result?***

Well, it is actually no news that the pyrolysis oil can be used as fuel. The research we are conducting in close cooperation with the Swedish Institutes of Research (RISE) and several of the leading stakeholders in the value chain has focused on new technologies. The ambition from the refineries is to limit the usage of fossil fuels both to meet their own sustainability targets and to meet more strict regulations and taxes related to fossil use and CO<sub>2</sub> impact. The initial result of blending our oil with fossil to 20 percent has been very positive and are promising in the development of more industrialized infrastructure. Larger scale testing is in early-stage planning, and we find a growing interest from many of the leading refineries to further establish cooperation. We expect this utilization of the oil to further strengthen our technology and business case in terms of environmental aspects and definitely from a financial perspective. Our oil has already since a few years been approved to be used in industrial diesel-fueled equipment from Wartsila with very limited pre-processing.

🌐 [www.envirosystems.se](http://www.envirosystems.se)

## IKEA Holding Invests in Recycling Technology

**Ingka Group (Ingka Holding B.V. and its controlled entities) has bought ownership stakes of two recycling technology providers in Europe.**

The management of Umincorp, a Dutch sorting technology provider, is convinced that the investment by Ingka Group enables them to take the next step in making their sorting solution for post-consumer mixed plastics available to a wider market while continuing developments on complementary sorting technologies.

The company is the developer and supplier of Magnetic Density Separation (MDS) based solutions, a technology originally invented by the Resources and Recycling Group of Delft University of Technology. According to the information, the technology uses ferromagnetic fluid and engineered magnets to recover post-consumer mixed plastics at higher yields and polymer purities than existing sorting technologies. "The value-creating

technology is able to lower the total cost involved in the chain of plastics recycling," the company underlined in a press release. Umincorp was established in 2012 as a sorting technology solutions developer, based on the patented Magnetic Density Separation technology, which is successfully being applied commercially on an



industrial scale to different flows for different customers in a factory in the Netherlands. Umincorp is a founding partner of the Plastic Recycling Amsterdam (PRA) Joint Venture with Milieu Service Nederland.

Ingka Group owns also a minority share of 24 percent of Austrian company Next Generation Group, a developer and manufacturer of technology and equipment for the plastics recycling industry. As reported, the investment "will enable the company to further develop new technology and expand its service offering in order to better serve the plastic recycling industry". Next Generation Group supports the supply growth of secondary raw plastic materials by offering a full range of post-consumer, post-industrial and PET recycling equipment.

Photo: ALBA Group





# Waste Management in the Arab Region: Recycling on Trial

Increasing quantities of waste have become a problem for countries of the North African and Middle East nations, especially for more than half the region's population living in urban centers and being affected by often seriously inadequate waste management systems.

Whether these states are called the Middle East and North Africa (MENA), Gulf Cooperation Council (GCC), Mashreq & Maghreb or Arab Region: What unifies the countries is the trial to develop and install tailor-made technical, financial and organizational solutions – with varying degrees of success and often slow progress.

Researchers at the University of Rostock characterized Arab countries by not yet established proper waste legislation, clear legal standards and long-term strategies, not functioning organizational structures, the lack of separate collections of recyclable materials, a high percentage and variety of decomposable material in municipal solid waste, and the existence of hazardous substances in residual waste. Furthermore, it should not be forgotten deficits of trained personnel, unequal service between rural and urban areas and the absence of a reliable database.

## Discrepancy between costs and revenues

The centralization of authority at the national level – if not divided between different, partly responsible ministries,

departments and governmental levels – and the absence of effective cost recovery mechanisms must be taken more seriously. According to development expert South-South Cooperation, the governments either fund collection and disposal of municipal solid waste the most – in Tunisia, Lebanon and Yemen – or offset the discrepancy between costs and revenues of waste disposal – in Algeria, Egypt, Syria, Jordan and the Palestinian Territory. Cost recovery is partially implemented in Algeria, Egypt, Syria, Jordan, Lebanon (Zahlé only) and the Palestinian Territory; in Morocco, Tunisia, Yemen and Mauritania costs cannot be recovered by the services. In Egypt and in Jordan, cost recovery arrangements are made through the electricity bills.

The low financial cover ratio of municipal solid waste treatment is obviously the debt of too small recycling rates. In 2014, waste processing in Algeria contained 60 to 65 percent of discharging by landfill, 30 to 35 percent of burying, seven percent of recycling and one percent of composting. In Saudi Arabia, municipal waste consists of food waste (40 to 51 percent), paper (12 to 28 percent), cardboard (seven

percent), plastics (five to 17 percent), glass (three to five percent), wood (two to eight percent), textile (two to six percent), metals (two to eight percent) etc. depending on the population density and urban activities of that area. The waste is collected and sent to landfills or dumpsites after partial segregation and recycling. The main recycling is concentrated on metals and cardboard, covering ten to 15 percent of the total waste and mostly carried out by the informal sector, the online-platform EcoMENA gave account in June 2017.

### Missed public awareness

These quotas are partly explainable by hitherto omitted public environmental consciousness in the region. In August 2017, a survey was carried out in Oman to understand the degree of waste management awareness. Only twenty percent of the respondents were aware of any local program for recycling, and none of those were informed of any active recycling program in their neighborhood or workplace. Few of the interviewed had heard of plastic bottles collection somewhere in the city, and few remembered people salvaging empty aluminum soft drink cans in the streets and parks. They assumed that the disappearing of this recycling was caused by fallen prices of cans several years ago. One year later, a survey in Qatar on waste awareness showed similar results: Half of the surveyed people recycle either at home (11 percent), work (16 percent) or both (23 percent). But the other half has never recycled. 71 percent of men and 58 percent of women do not recycle. Besides that, the collection focus lies on the volume of waste, not on its quality: "The volume of the plastic waste generated is higher, followed by food waste (19 percent) and paper (12 percent). Metal, electronic waste and glass are the least amounts of waste generated in Qatar," EcoMENA summarized.

### Insufficient governmental framework

The low recycling rates in the region also result from political circumstances. Without question, in these years the MENA region went through a critical period of turmoil, death and destruction and was partly affected by political rumors as well. David Newman, President of the International Solid Waste Association, described the situation in 2015 as follows: "As their economies have suffered, citizens have been less able to pay for waste and other taxes. As a result, infrastructure has become run-down or has been closed, international companies have deserted the area, and private investors look elsewhere." In fact, some of the politics curbing a better infrastructure for waste were also obviously homemade.

According to a study of Ernst & Young in 2014, the most important barriers to the propagation of cleantech were insufficient governmental policy rules and regulations (43 percent on average) and cost of technology (28 percent), followed by subsidies for fossil fuel-based energy (16 percent) and limited experience of potentially financing banks (13 percent). With regional differences: In the Gulf states, politics accounted for 59 percent, in the Levant and North African 46 and 45 percent respectively.

### The will was there

Already in 2010, Global Information Society Watch reported: "Many governments are aware of the necessity of implementing e-waste strategies due to the increasing amount of e-waste in recent years and the expected acceleration of e-waste in the decades to come. Governments and the private sector have shown successful collaborative initiatives and are expected to continue along this path," the organization was quoted. Further need for take-back programs and recycling addressed by national governments and the assistance by mostly multinational companies of the communication equipment branch was noticed. The political will was there, for example in Algeria, where the National Program for Integrated Management of household and similar waste (PROGDEM) since 2002 designed the launch of 122 class 2 technical landfill centers and 146 controlled landfills, the rehabilitation of 101 unauthorized dumps as well as the achievement of 32 landfills, 29 sorting centers and 26 transfer stations. For 2014, the rehabilitation of 348 medical waste incinerators, the completion of two class 1 facilities for the management of hazardous industrial waste, and the start of a landfill for hazardous waste were planned.

### No lightning start

However, the prosperity of, for example, e-waste recycling in the Arab Region until 2014 was no lightning start, according to a detailed study published by the Regional Solid Waste Exchange of Information and Expertise Network in Mashreq and Maghreb Countries (Sweep-Net). The organization reported the business of a battery and a hazardous waste recycling plant in Algeria; showed the existence of the Egyptian Electronic Recycling Company, the WEEE collection companies Recyclobekia and Ecycle, and the planning of a specialized recycling plant in Egypt; stated the formal e-waste management being "in its early stages of development" in Morocco, including governmental projects, bilateral cooperation with the German international cooperation GIZ on waste management and the setup of a hazardous waste treatment plant in cooperation with the German bank of reconstruction (KfW, a German government-owned development bank); in Tunisia a recycling facility was almost operating, run by Agence Nationale de Gestion des Déchets; collection and transfer of e-waste with a capacity of 1,000 tons/year were envisaged.

But for the Palestinian Territory, Syria, Mauretania, and Jordan no e-waste related data were available – partly not even quantities – and reliable information were impossible to find. This also applies to Lebanon, where a lack of process and disposal facilities and no legislation to manage e-wastes is witnessed. But the Sweep-Net study also confessed a "spreading awareness on the e-waste issue", told of a public-private partnership with GIZ and Hewlett Packard and mentioned a take-back-program by mobile phone producer Nokia. However, Rafael Widmer, Project Associate at the World Resources Forum, still in August 2017 had to add: "In almost all GCC countries, there is minimal to zero legislation on e-waste, with minor differences between the respective counties."



## Not beyond the beginning stage

One might interpret that the glass is half empty and notice that “in nearly all Arab states, waste management developments are still in their infancy”, as researchers at the Rostock University did in 2015. But others might see the glass as half filled, because “most governments in the Arab states have recognized the waste management problems and want to implement suitable solutions.” In 2016, another group of researchers at the Rostock University stated a developing environmental awareness relatively pronounced in recent years. The experts saw “numerous waste-industrial activities”, but had also to concede that “many projects and plans have been stopped after the tendering phase or processing of the study and not implemented, as legal, organizational, financial and technical framework for their implementation is lacking”.

This applies especially to the waste-to-energy sector. In 2015, Egypt ran a handful of independently led treatment facilities whose operating has not yet managed to produce proof of its reliability. In Saudi Arabia, several of the mechanical-biological waste treatment facilities were only operated for a short space of time. Lebanon had a few small plants for sorting and composting, while in Kuwait the only facility in place ran merely occasionally. So in spite

of an awoken interest for energy recovery from waste, the region did not move beyond the beginning stage.

## Implementations in North Africa

Meanwhile, the governments had started the implementation of their recycling plans. Morocco, supported by the World Bank, aims to increase the rate of recycled material to 20 percent by 2022 while improving the conditions of waste-pickers. Oum Azza is said to be the Maghreb’s largest modern landfill facility for the decomposition of organic waste to biogas. And the total investment for a National Special Waste Elimination Center is estimated at 90 million Euro between 2015 and 2035. In Egypt, the National Solid Waste Management Program investment has been wrapped up, supported by 20 million Euro from the EU, and another 41 million Euro by KfW, GLZ, Swiss Cooperation and the Government of Egypt. For Algeria, the Dutch Ministry for Foreign Affairs recently released an information paper on “Business opportunities in waste management in Algeria” – commissioned by the Netherlands Enterprise Agency – that reports about plans of 125 new landfill sites in the coming five years. When the program is finished, the country will have 300 controlled landfill sites. According to the information, this should be enough infrastructure to receive 75 percent of the municipal solid waste of the



country. In 2017, the Jordanian government offered “Investment Opportunities in Waste to Energy Projects” and invited qualified private sector developers, joint ventures or consortia with in-depth experience in waste-to-energy-BOO(T) schemes to apply for participation in submission of proposals for the design, financing, construction, commissioning, ownership, operation and maintenance of such a plant in the country.

### Implementations in the Middle East

In October 2017, the Public Investment Fund in Saudi-Arabia announced to establish a Saudi Recycling Company to support and operate its investments in domestic recycling projects, covering all recyclable materials and each stage of the value chain. The local facilities management market is expected to be worth approximately 44 billion Euro by the end of 2030. In 2017, Oman was closing all of the 317 local dumpsites, planned the establishment of ten to 11 engineered landfill sites and 18 to 25 transfer stations, and completed the privatization of its municipal waste management by offering Environmental Services Holding Company – known as Be’ah – to foreign companies like Spain’s Urbasar, Dubai-based Averda and a joint venture between Oman’s Al Ramoos and Veolia headquartered in France. And in June 2018 the Federal National Council of the United Arab Emirates passed a new federal law on integrated waste management – the first in the region. Additionally, planned and in different states of construction are a facility for 900 tons a day in Sharjah, a cement waste-to-energy plant for 28 million Euro in Abu Dhabi, a waste-to-energy plant of approximately 480 million Euro value

for a capacity of 2,000 tons a day in Dubai and another for daily 900 tons in Sharjah.

### A radical move to be made

In total the residential states of the Arab region have set ambitious targets, but – according to the Rostock researchers – they still lack centralized authority at the national level, practical know-how amongst decision-makers, effective cost recovery mechanisms, and sustainability of the intended projects. Solutions have to be found that are feasible under the given or expectable conditions.

Cooperations with international institutions should be featured – for pilot projects, apprenticeships, higher education schemes or institutional development. Targeted knowledge transfer is wanted to realize “multi-purpose decentralized waste management centers” like small composting plants, recycling centers and simple sorting plants in the plural of municipalities. And to launch industrial-scale pilot projects in large cities in conjunction with international specialized companies.

This meets accurately what Abhay Bhargava, Associate Director & Regional Head at Frost & Sullivan, noted in August 2016: “GCC will have to make a radical move towards integrated waste management with emphasis on ‘waste-to-value’ methods such as recycling and waste-to-energy coming into the picture. This can already be seen in the form of the recent tenders for waste management in the GCC, as well as in the Middle East and North Africa (MENA)”.

## Waste-to-Resources 2019

May, 14 – 16, 2019, Hannover (Germany).

Legal regulations, e.g. EU Waste Framework Directive, sparse natural resources and climate protection by more efficiency require increased utilization of recyclables from all kinds of waste. Under the patronage of the German minister of the environment, Waste-to-Resources 2019, the 8th International Symposium and exhibition MBT, MRF and Recycling will again be a leading platform for the international exchange of knowledge about material and energy recovery from waste. Key aspects in 2019 are:

- Options to reach the recycling rates of the EU waste framework directive
- Climate protection by circular economy
- Latest plants and plant concepts
- Liquefaction and carbonation
- Production, refining, and utilization of refuse-derived fuels
- Putrescible organic waste and anaerobic digestion
- Production, purification, and application of biogas
- Processing of plastics and other recyclables
- Processing and utilization of mineral waste



The conference will be held from the 14th to the 16th of May, 2019 in Hannover, Germany. On the day before the conference, an introductory seminar to mechanical and biological waste treatment (MBT) in English is available. On the three conference days, there will be continuous simultaneous translation provided. Hence, it will be possible to hear and discuss all those presentations in English, French, and German. Participants from 41 countries made use of it at the previous event in 2017.

More information about the conference, exhibition and accommodation at ➔ [www.waste-to-resources.eu](http://www.waste-to-resources.eu).





# United Arab Emirates: On the Road to Zero Waste

The United Arab Emirates (UAE) has begun to intensify its recycling efforts. One important goal is to divert 75 percent of waste from landfills by 2021.

This strategic objective is part of the country's Vision 2021, a long-term plan, launched in 2010, "that aims to make the UAE one of the best countries in the world by the year 2021 when the UAE would celebrate the Golden Jubilee of its formation as a federation", the website of the government informs. The United Arab Emirates is a federation of seven emirates – Abu Dhabi, Dubai, Sharjah, Ajman, Um Al Quwain, Ras Al Khaimah and Fujairah – that united in 1971. The rulers of the emirates form the Federal Supreme Council. One of the rulers serves as the President of the United Arab Emirates; federal capital is Abu Dhabi.

In UAE, federal government authorities handle core policy and service delivery portfolios including foreign relations, interior policies and services as well as environmental policy, education and health, to name but a few. Local governments are responsible for the delivery of municipal services such as waste management, local urban planning, land usage, sewerage, sanitation, economic licensing, local roads, public transportation and so forth in accordance with federal policies, strategies and standards. However, each emirate has considerable autonomy to shape their development trajectories using UAE's national vision – Vision 2021 – as a template for forward planning.

In 2014, H.H. Sheikh Mohammed bin Rashid Al Maktoum, Vice President and Prime Minister of the UAE and the Ruler of Dubai, launched the "National Agenda" to guide efforts towards Vision 2021. It specifies a wide-ranging work program centered around six national priorities and 52 National Key Performance Indicators (NKPis). One priority is a sustainable environment and infrastructure. According to the report "The United Arab Emirates and the 2030 Agenda for Sustainable Development – Excellence in Implementation: Executive Summary", published in 2018 by the National Committee on Sustainable Development Goals, one of the key priorities for the UAE is to ensure economic and social development with an appreciation for environmental sustainability. "The Vision 2021 National Agenda focuses on improving the quality of air, preserving water resources, increasing the contribution of clean energy and implementing green growth plans," the authors stated. "The Agenda also highlights the importance of infrastructure and aims for the UAE to be among the best in the world in the quality of airports, ports, road infrastructure, electricity and telecommunications infrastructure."

Furthermore, in January 2017 the UAE government formed a National Committee on Sustainable Development Goals

(SDGs), which is responsible for the national implementation of the goals, monitoring and reporting of progress towards targets and stakeholder engagement. The process to develop the SDGs was launched by the UN Conference on Sustainable Development (Rio+20) in June 2012. The UAE was part of the negotiations and represented the Arab Group. In September 2015, the UN member states adopted the 2030 Agenda for Sustainable Development. The SDGs include a set of targets and indicators that aim to help, guide and measure sustainability for both the private and public sector.

### The waste situation

As reported by the publication "Arabian Business" in 2017, the United Arab Emirates is considered to be one of the largest producers of waste in the Gulf region. The estimated population of more than 9.2 million are said to have generated about 29 million tons of waste in that year. Only 20 percent of this amount was recycled, according to official estimates. The volunteer-driven initiative EcoMENA quantifies the per capita rate of municipal solid waste (MSW) from 1.76 to 2.3 kilograms/day. "According to a recent study, the amount of solid waste in UAE totaled 4.892 million tons, with a daily average of 6,935 tons in the city of Abu Dhabi, 4,118 tons in Al Ain and 2,349 tons in the west-

ern region," Salman Zafar wrote in June last year. And the World Future Energy Summit, which took place in January this year in Abu Dhabi, informed on its homepage, that the UAE currently has a waste generation ratio of between 1.9 to 2.5 kilograms per person per day, with around 77 percent of the waste ending up in landfill sites.

In Abu Dhabi, the largest emirate in the country occupying 84 percent of the national landmass territory, the estimated population of 2.65 million (around mid-2014 according to government data) generated 9.657 million tons of solid waste in 2017 (2016: 9.675 million tons). As reported by the Statistics Center Abu Dhabi, non-hazardous waste formed 98.1 percent, while hazardous waste accounted for 180,410 tons or 1.9 percent. In 2017, the amount of non-hazardous solid waste in the Emirate of Abu Dhabi was 9.477 million tons, down from nearly 9.599 million tons in 2016. Of the total quantity 3.959 million tons was construction and demolition waste, 3.169 million tons industrial and commercial waste, 933,505 tons agriculture waste and 1.372 million tons municipal waste; included in the total amount are also other wastes on the scope of 42,861 tons. According to the information, the daily per capita municipal waste was roughly 1.29 kilogram/day. The recycling rate in the Emirate of Abu Dhabi was 28.4 percent in 2017. In that year, nearly 2.688 million tons



The world's largest energy-from-waste plant is to be built in the Emirate of Dubai

Photo: Hitachi Zosen Inova



of waste were recycled, while 7,514 tons went for incineration and 209,188 tons were composted; 561,940 tons were landfilled, and 6.010 million tons were disposed of at dumpsites and through other specialized companies. "The total number of waste management projects in the Emirate of Abu Dhabi reached 32 projects in 2017," the Statistics Center informed.

Dubai is the second largest emirate of the UAE. Its population size was estimated to be more than 2.446 million individuals at the end of 2015. In the first quarter of the year 2017, a total amount of 6.4 million metric tons of non-hazardous waste (domestic, horticulture, construction and demolition as well as sludge) was treated. Of the domestic waste, 681,629 tons ended up in landfills, while 153,251 tons went for recycling. In that year the recycling volume of domestic waste totaled 877,544 tons. For non-hazardous waste, the Emirate of Dubai has one treatment facility and four landfill sites – and no incineration plant.

Sharjah is the third largest emirate in the UAE. According to the statistics of the UAE Federal Competitiveness and Statistics Authority (☎ [www.fcsa.gov.org](http://www.fcsa.gov.org)), the waste generated by the about 1.2 million people in this emirate totaled 2.845 million tons, which were collected and managed in dumps in 2016. In that year, in the Emirate of Ajman the collected and managed waste volume was 960,809 tons, in the Emirate of Um Al Quwain 201,055 tons, in the Emirate of Ras Al Khaimah 991,671 tons and in the Emirate of Fujairah 479,833 tons; with nearly 19.529 million tons the Emirate of Dubai generated the largest waste volume, followed by the Emirate of Abu Dhabi with 9.682 million tons. All in all, the – collected and dumped – waste volume in the country in 2016 was about 34.690 million tons, the statistical data said. Hazardous waste accounted for 0.7 percent of the total waste quantity.

### Waste management in UAE

As is reported by the official portal of the UAE government, the country now handles its waste issues through recycling and converting waste to energy and resources, new technologies and improved waste separation and collection systems. Here are some examples.

The government of Abu Dhabi has established the Center of Waste Management, Tadweer, in 2008. The company is responsible for the policy, strategy and contractual systems of waste management across the emirate. According to WAM, the UAE news agency, Tadweer had collected 1,147,844 tons (daily average of 6,376.90 tons) of waste, in the Emirate of Abu Dhabi during the first half of 2018. The waste was collected through its operational service contracts, which provide local waste collection and transportation services, but does not include industrial and commercial waste that is separately collected by environmental services providers licensed by Tadweer. The waste was transported to the company's facilities where it was "recycled, treated and disposed of, in compliance with the highest international environmental standards". One of the commonly-used treatment methods is converting agricultural and organic wastes to organic fertilizers, WAM reported. The Abu Dhabi Center of Waste Management has adopted "a comprehensive waste management strategy that focusses on reducing waste and minimizing waste disposal and treatment costs," Dr. Salem Al Kaabi, Acting General Manager of Tadweer, was quoted. "Since early 2018, Tadweer has intensified its efforts to address the environmental challenges facing the emirate of Abu Dhabi and mitigate the adverse impact of waste on our environment. As part of this priority, we have implemented several innovative projects, such as Abu Dhabi's first civic amenity for recyclable materials in Abu Dhabi City, as well as other types of recycling centers."

Furthermore, the company and Etihad Airways (the national airline of the United Arab Emirates) will collaborate on the waste-to-fuels project, the publication "Bioenergy International" wrote in October last year. The aim is to explore how municipal solid waste (MSW) can be converted into jet fuel to be used on Etihad Airways' flights. According to the information, the two companies will explore the possibility of developing a long-term project with additional partners and will start with an initial feasibility study to develop a flagship waste-to-fuel facility in Abu Dhabi. "The project is anticipated to show environmental benefits in reducing the overall carbon footprint of the aviation sector while being cost competitive with conventional jet fuel production based on average oil prices," the publication wrote.

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In the Emirate of Dubai, the opening of “The Recycling Hub” was set for early 2019, the UAE-based company EnviroServe announced in November last year. The electronics recycling facility (value: more than 30 million US-Dollar) features zero-to-landfill and zero-to-air process, the information said. It will be the final destination for waste electronics from South Africa in the south to the Caucasus in the north. According to EnviroServe, the plant will be “the world’s largest fully-integrated electronics recycling facility” with a processing capacity of nearly 40 million kilograms of electronic waste annually. “The Recycling Hub” also features a brand protection service, a IT refurbishment center and a refrigerant gas reclamation division. At its core, the facility is using state-of-the-art Swiss technology. “The new facilities will recycle only through granulation processes which means that no chemicals or water is involved in this process,” the website of Switzerland Global Enterprise (🔗 [www.s-ge.com](http://www.s-ge.com)) described the recycling procedure. “The dust that comes of this process will also be captured and processed. The plant will also be completely solar-powered with photovoltaic panels installed throughout the building.”

Furthermore, the “world’s largest energy-from-waste plant” is to be built in the Emirate of Dubai. Zurich-based Hitachi Zosen Inova (HZI), together with BESIX Group (Belgium’s largest construction company operating in the Middle East) has been selected by Dubai Municipality to realize this project. Forming a joint venture partnership, the two international companies will collaborate on delivering the engineering, procurement, and construction of the turnkey plant and a minimum of 30 years’ operation and ownership of the resource recovery facility. Located at the waste landfill site in Warsan, Dubai, the facility will treat 5,000 tons of non-recyclable municipal solid waste from the Dubai area per day, making a total of 1.825 million tons a year that are to be converted into renewable energy, HZI informed. The 171 MW of electricity generated

would be fed into the local grid as baseload energy and would power around 120,000 homes. In addition, there will be metals recovered and construction materials produced from the bottom ash. The plant is due to come on stream in 2020.

The Emirate of Sharjah, which is heading for zero waste to landfill, had set up a municipal waste management company Bee’ah (the Arabic word for environment) in 2007 in the form of a public-private partnership. As reported by the UAE government, the company has developed a state-of-the-art waste management center to process and recycle waste. In 2012, Bee’ah introduced two-stream waste collection and a new tipping fee structure to incentivize waste reduction and to regulate landfill contents. Bee’ah holds ownership of the region’s first and the world’s largest gasification plant, the company underlines on its homepage. The facility has the capacity to process around 160,000 tons of non-recyclable waste annually, generating a gross output of 35 MW (megawatts) of energy.

In confirmation of Bee’ah’s commitment to exploring alternative energy sources, the company has entered into a partnership with Masdar (the Abu Dhabi future energy company) to develop a new waste-to-energy facility, which will incinerate up to 35 tons of solid waste per hour. “The power produced by this facility will be added to that produced by Bee’ah’s gasification plant, to supply a total of 90 MW of green energy, to the Sharjah electricity grid”. As could be read in the specialist press, the facility is due for completion by early 2021; it aims to achieve the emirate’s zero-waste-to-landfill target and the UAE’s goal of diverting 75 percent of its municipal solid waste from landfill by 2021.

Last, but not least in the Emirate of Ras Al Khaimah a two MW facility is operational, the UAE government informed.

## Business opportunities in United Arab Emirates

According to published information regarding investments, the UAE emirates has realized measures to create a favorable environment for foreign investors. The strategic plan Vision 2021, promoted by the government, would favor foreign direct investment (FDI). Information on investing in the UAE can be found at 🔗 [www.government.ae/en/information-and-services/business/why-invest-in-the-uae](http://www.government.ae/en/information-and-services/business/why-invest-in-the-uae).

The second edition of “Doing Business in the UAE Guide” was published in August 2018. The handbook is aimed towards giving stakeholders, investors, companies and business owners from the UK and the rest of the world basic knowledge about the UAE – including an overview of its economy, culture of doing business, potential opportunities for trade & investment and best practices across various economic activities. It is available on the website 🔗 [www.UAE.DoingBusinessGuide.co.uk](http://www.UAE.DoingBusinessGuide.co.uk).

In the Emirate of Sharjah, there are opportunities in the sector environment and renewable energy. As reported, this applies to the implementation and utilization of renewable energies, energy efficiencies as well as green building construction and equipment. The Sharjah Investment and Development Authority can be reached at 🔗 <http://shurooq.gov.ae/invest-in-sharjah/>.

UAE tenders can be found at 🔗 [www.tendersinfo.com/global-united-arab-emirates-tenders.php](http://www.tendersinfo.com/global-united-arab-emirates-tenders.php) or at 🔗 [www.dgmarket.com/tenders/list.do?sub=environment-6](http://www.dgmarket.com/tenders/list.do?sub=environment-6).





# Kuwait: More Additional Waste Management Facilities Needed

In April 2017, the Kuwait official environmental portal Beatona announced that “Kuwait pushed towards ‘zero landfills’ by creating recycling plants. Efforts are still underway as three landfills are remaining. Experts expect Kuwait to reach ‘zero landfills’ over the next few years”. This assessment seems to be slightly too optimistic.

There can be no doubt, that landfilling is the prevalent solid waste management method. In October 2016, Kuwait counted 18 landfills. But as most of them were acting as dumpsites and did not meet international environmental standards, 14 sites facing capacity and environmental issues were closed years before, and only four sites were left in operation. And – as a study underlined in 2014 – no landfill met the criteria of a sanitary landfill. This will not be enough to face the future. A forecast in 2014 saw the increase of “population solid waste” from 1.42 million tons in 2012 to 2.31 million tons in 2025 and – moreover – the rise of construction waste from 5.02 million tons to 7.51 million tons. Two years later a study warned: “The incremental population in Kuwait results in a dramatic increase in the MSW and unfortunately the waste management system in the region has not been properly managed, yet.” According to its researchers, no governmental scheme existed in Kuwait for municipal waste recycling and segregation of waste occurred manually at landfill sites.

## Poor practices

“Kuwait had been plagued by the problem of waste management and rehabilitation”, Sheikh Abdullah Ahmad Al-

Hammoud Assubah, Chairman of the Board of Directors of the General Environment Authority, confessed in January 2018. He blamed the “cleaning companies” for exploiting inappropriate quarry pits for purposes of filling and disposing of. In fact, the previous collection and transportation of municipal waste involved poor practices by municipalities and contractors, as no segregation of materials was performed and the waste was delivered directly to the disposal sites. Although the composition of the Kuwaiti MSW stream is comprising of 21 percent paper and cardboard, of 13 percent plastics, of five percent textiles and of three percent glass and metals each – raw materials fitting perfectly for recycling.

## Revenue of 137 million US-Dollar

According to a study on an “Integrated Solid Waste Management System” published in 2016, 76.2 percent of Kuwait’s waste could be recyclable. By installing seven recycling plants, 95 percent of waste tires and organic waste, 90 percent of construction and demolition waste, glass and metal, 80 percent of paper and 50 percent of plastic could be recycled. The remaining non-recyclable materials would be sent to a sanitary landfill. The raw materials

produced by the recycling plants could generate revenue of 137 million US-Dollar per year. The estimated total profit from the system would reach 450 million US-Dollar in 2040; meaning a payback period of 9.5 years since the beginning of the project.

### Only a few recycling companies

The reality looks somewhat different. The cited study also pointed out that “only a few recycling companies” were active in Kuwait, “dealing with a small portion of the discarded materials”. Or – as the Kuwait Direct Investment Promotion Authority (KDIPA) expressed it – “waste recycling as a concept is relatively new in Kuwait with only a few active players”. But it would urgently be necessary because of factors like strong growth in the energy sector, growing construction activities, increasing population and rapid urbanization. They will force the annual solid waste generation to rise from 12.5 million tons in 2014 to – anticipated – more than 17.1 million tons by 2019. According to KDIPA, the Kuwait Environment Public Authority (KEPA) and the Kuwait Municipality decided to take initiatives to encourage better management of solid waste, “moving away from the past practice of dumping untreated waste at landfill sites”. The Kuwait Government was even seeking “to involve the private sector in the area of solid waste treatment with a view to bring in international expertise and private sector efficiencies”.

### The Kabd Municipal Solid Waste Project

In October 2014, a project to build Kuwait’s first plant for the thermal treatment of waste was launched. The one million tons waste-to-energy plant was considered to be “an effective solution to address Kuwait’s waste management problem”, the Partnerships Technical Bureau, responsible for Kuwaiti PPP projects implementation, estimated. The solid waste treatment plant with a capacity of 3,275 tons per day will consist of four combustion lines, combustion furnace, energy recovery boiler, fuel gas cleaning system, slag treatment plant and turbine generator. In August 2017, a consortium joined by Constructions Industrielles de La Méditerranée, Gulf Investment Corporation and Al Mulla Group was selected as preferred investor for the so-called Kabd Municipal Solid Waste Project. It is planned to receive 50 percent of total Kuwaiti municipal solid waste and is rated as “an example for subsequent waste to energy projects in the MENA region”. The commissioning of the new plant has not yet been reported.

Of 32,000 tons of total solid waste that are produced per day in Kuwait, only 6,700 tons or 21 percent are recycled and used as recyclates for reusable products such as scrap plastic products, flakes, and other scrap materials. As KDIPA gives account, high-value waste components such as metals have attracted interest from recycling companies. But for more complex components such as plastics or less valued materials like fibers, wood, glass and paper there is more need for the establishment of adequate facilities. The study on the “Integrated SWM System” certifies “minimalistic attempts” of recycling occurring for plastic solid waste, metal and steel in processing lines of private

holding companies, but also poor waste recycling and accumulation levels. Incentives could be offered by lowering manufacturing and energy costs for recycled materials and increase the demand for waste recycling. Therefore – argues the study – implementing an Integrated Solid Waste Management System (ISWMS) action plan could achieve financial and environmental benefits.

### Pilot projects for hazardous waste

Regarding the 5.21 million tons of hazardous waste in 2014, about one-third was oily water, another third asbestos and another third contaminated soil. Oil contaminated soil and oily sludge are attributable to activities of the Kuwait Oil Company, treated by bioremediation or soil washing processes and recycled back to crude oil recovery plants or re-used for various backfilling purposes. As the country also plans to increase its oil production capacity nine-fold (and thus to quadruple the recoverable crude oil from oil sludge), the Kuwait Oil Company is said to undertake pilot projects to explore technologies for prevention of environmental contamination and potential for recovery of oil. Following KDIPA, this “is an opportunity for international specialists to bring in comprehensive technology solutions to address these issues in Kuwait”. Even more, as “separately there are around 114 square kilometers of oil wells that were created as a result of oil spills from damage caused by the retreating Iraqi army in 1991”.

### The recycling branch could disappear

Shakir Al-Essa, General Manager of Safya International Import and Export Company, does not admit that Kuwait is an attractive environment for investments in recycling. He even fears that the by-date recycling branch could completely disappear. Before the financial crisis year 2008, the small operating recycling companies could treat their materials and sell their products to several customers inside and outside Kuwait. The competition was effective, and the price of metals was high. Later on, the government issued decisions to ban the export of metals: Prices fell, and the ministry of commerce froze them. Even the number of thefts on recyclable products like refrigerator or man-hole covers decreased by the devaluation of metal. Furthermore, the new public-private partnership could harm the existing companies. The recycling process needs collecting municipalities, material separating companies and recycling factories. If the resources will be taken over by the consortium, the factories will run out of material. The same will happen, if the waste for the new project is taken from landfills: 90 percent of the factories’ resources originate from landfill material; their loss through usage by the new investor would lead to the closure of the small companies and the ruin of the grown structures. “This will kill the business of recycling factories”, Al-Essa is convinced.

### Need for additional facilities

In June 2016 – after controlling and limiting toxic fumes – KEPA transformed the Al-Qurain dump site into a public park and delivered it to Kuwait Municipality. Dr. Mohammed Al-Ahmad, Deputy Director General for Sector of En-



vironmental Monitoring Affairs, commented that handing over the park came in accordance with the new environmental protection law and fulfilling requests to forward landfills to competent entities.

The act and its justification show that something is changing and improving the national waste management and

its policy. Experts even estimate, that 95 percent of waste should and could be recycled. But measured by actions, Kuwait still has a way to go. Or, as the Kuwait Direct Investment Promotion Authority phrased it: "In comparison to European countries, landfills remain the dominant method of solid waste disposal in Kuwait, driving the need for additional waste management facilities."

## National Waste Masterplan for the Emirate of Kuwait

**The State of Kuwait has taken action and commissioned a draft of a waste management plan for the country issued by the Kuwaiti Environment Public Authority.**

The assignment went to the Recycling Management Department of the Germany-based Fraunhofer Institute for Environmental, Safety and Energy Technology (UMSICHT). According to the information, the project (volume: 18 million Euro) began in January 2017 and will run for four years until 2021.

In October last year, Fraunhofer UMSICHT began investigating the quantities, compositions and recycling routes of waste in Kuwait. The German scientists and the on-site team in Kuwait started up a sorting station for household and household-like waste at the decommissioned Jleeb landfill to obtain accurate information about its composition and chemical properties. "The data obtained will then be used to identify the appropriate strategy for future waste management," Fraunhofer UMSICHT gave account. "This involves, among other things, the material value and pollutant contents as well as the combustion properties of the waste. The waste is divided into three-grain size ranges by screening and into more than 50 different fractions by manual sorting. In order to ensure a high scientific standard, the sorting personnel is comprehensively trained."

The four-year project consists of several phases. The first stage is a comprehensive inventory and collection of primary data. In addition to municipal waste also commercial and industrial waste, construction waste, agricultural waste, hospital waste, industrial wastewater and sewage sludge is examined with regard to volume, composition, sources and disposal routes.



Ready sorting station with containers for more than 50 sorting fractions

For this analysis, the sorting station at the Jleeb landfill was built.

In the second phase, the landfills of the country are explored regarding their extent, composition and the hazard potential for humans and the environment. In addition to the simulation of landfill gas and seepage water quantities, drilling is also carried out, and gas, seepage water and groundwater measuring points are set up. Furthermore, geophysical investigations are conducted, and waste samples are taken.

In a third step, a web-based, interactive geoinformation system (Environmental Monitoring Information System of Kuwait, eMISK for short) is to be developed to make the data usable for authorities and government and to inform the public. "This system will enable individualized situation analyses, graphical data evaluation and the localization of waste producers, waste

treatment plants and landfills," Fraunhofer UMSICHT informed. "The aim is to create an information system, which provides real-time data on the environmental situation of all sites of landfills and waste facilities. In addition, the eMISK monitoring system should display exceeded limit values or make the path of the waste visually traceable – all this conveniently via smartphone!"

As reported, in the last phase of the project, a national waste management plan for the State of Kuwait will be drawn up. "To this end, the existing legal framework of the country will be further developed, and a financing model for the implementation of the waste management plan will be created. A roadmap sets waste management targets, indicators and action plans for the implementation of waste prevention and recycling measures and for the remediation of landfills over the next 20 years."

# Bureau of Middle East Recycling: Business Factor with far-reaching Connections



The Bureau of Middle East Recycling (BMR), founded as the association of the recycling industry in this part of the world, aims at expanding the course of the sector in the region and strengthening the cooperation with worldwide traders and consumers.

**B**MR is a non-profit, non-religious and non-political organization to represent its members and provide them with the proper forum for exchanging commercial, technical, economical, legal and environmental information relating to recycling trade in the Middle East. Furthermore, it is focused on unity among the enterprises of the recycling industry in the region, "which is one of the largest geographical sectors dealing with million tons of scrap which yields billions of US-Dollars," the association points out on its homepage.

In view of the development in the countries of the Middle East regarding more recycling and recovery, GLOBAL RECYCLING has asked BMR's new president Nasser Aboura about his assessment of the future perspectives of the sector. In October 2018, he took over the function as president of the Bureau of Middle East Recycling from Salam Sharif who led the association for more than ten years.

*Mr. Aboura, which goals do you pursue as the new President of the Bureau of Middle East Recycling?*

BMR was formed in 2008 post the global financial crisis as during that time period our industry was experiencing issues such as defaults and it started that our industry experienced unprecedented defaults from some parties. The need to have a governing body to help and protect our members' interests was crucial, and hence the establishment of BMR.

Since then, BMR has grown to become the main Recycling Association in the region, working alongside other international associations such as ISRI, BIR, MRAI, CMRA and other regional associations to serve our industry and promote recycling. We will continue on this path we have started, and we will provide more services to our members to help them mitigate through this turbulent and unpredicted markets.



We will be focusing on our members' interests, keeping them well informed on issues worldwide and having more interactive activities and workshops to keep our members aware and everyone involved.

***The recycling industry with the main focus on the metal sector is a major economic factor in the Middle East. Therefore, how would you assess subsequent developments of the organization?***

We have more than 160 members, and our aim is to keep growing our community and increase the number of conference participation and BMR memberships.

***The United Arab Emirates are planning to drastically reduce the disposal of waste in the years to come. Moreover, they want to achieve the goal of "Zero Waste" until 2030. Could you let us know to which extent the members of the BMR are going to contribute with their expertise to the implementation of the "2030 Agenda for Sustainable Development"?***

With a rising population and fast development, the UAE is amongst the biggest waste generation countries in the world. Wastes are recyclables and thus having considerable values. Recycling is an important factor, amongst others, in achieving the government target of zero waste. Promoting waste management and recycling waste will benefit all stakeholders which will achieve the sustainable environment which is one of the main pillars of the 2030 Agenda of Sustainable Development.

BMR members being deeply involved in recycling will play an important role in the implementation of the policy as wastes and scrap are valuable resources and recycling them is an important step in creating the circular economy resulting in sustainable development and eventually zero wastes.

***According to your opinion, how is the realization of the vision for 2030 going to have an effect on the economy of the United Arab Emirates and the Middle East?***

Utilizations of all resources and encouraging the circular economy will help sustainable development. Recycling waste will definitely add up to the UAE economy. Recycling rather than burying all that waste in landfills, will, of course, have added value as this important resource

is being utilized, as well as saving the environment, reducing carbon footprint, and reducing energy consumption. This is the importance of recycling and BMR's role is to support it.

***Apart from other activities, the BMR organizes the "BMR International Conference" every year. In 2019 the conference will be taking place in Dubai from 10th to 11th of March. The meeting is considered to be the main event for metal recycling in the Middle East. Do you know if there are any plans to expand the event and include other recycling sectors as well?***

We are in full gear in our preparations for our 8th International Conference, and the agenda is being finalized.

BMR is representing all sectors whether non-ferrous, ferrous, plastics or paper. Our board members represent a wide variety of recycling sectors representing metals, plastic, and paper. We already have coverage in our previous conferences in other sectors, and this year will be the same.

***The BMR supports free trade and pursues the goal to strengthen the cooperation between distributor and customer. Can you name certain countries with which you have an extremely close commercial relationship? To which extent does the geographical location of the Arab peninsula strengthen those trade relations?***

Located at the center between the East and West, the Middle East is strategically positioned to hold a strong and close relationship with a majority of our consuming markets from as close as Asia to as far as North America.

Key partner countries that we work closely with include India and Pakistan, as well as China, Japan and Korea. We also enjoy solid relations with the EU as they are an important strategic market for our region. This also translates into our BMR members who extend from all over the globe.

***Mr. Aboura, thank you very much for this interview!***



Nasser Aboura, BMR President

Photo: BMR



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## Joint Global Operation of Custom Administrations

**Operation “Demeter IV” targeted illegal trafficking of waste.**

As reported by Belgium-based World Customs Organization, in total 75 customs administrations participated in the joint global operation last year, which yielded over 326,133 tons and 54,782 pieces of different types of waste. Throughout the operation – conducted between 4 June and 8 July 2018 – customs officers shared intelligence and applied risk assessment, profiling and targeting techniques to identify and control high-risk consignments shipped on all routes and via all means of transport.

“The most frequently seized commodities included mineral slag (283,671.925 tons), plastics (9,816.018 tons), e-waste (245.277 tons and 14,826 pieces), waste rubber (1,032.970 tons), municipal waste (518.420 tons), clothes (5,371.804 tons), paper (25.705 tons), batteries (62.226 tons), and metal scraps (8,212.226 tons),” the organization described the results of the investigation. “A total of 214 seizures were reported, comprising 199 cases involving waste. The largest seizure was a shipment of smelting slag (approximately 180,000 tons) from

Spain, intercepted by China Customs.” Operation “Demeter IV” – initiated by China Customs and coordinated by the Regional Intelligence Liaison Office for the Asia/Pacific region (RILO A/P) and the World Customs Organization (WCO) – was supported by the Secretariat of the Basel Convention and its Regional Centre in Beijing (China), INTERPOL, EUROPOL, the European Union Network for the Implementation and Enforcement of Environmental Law (IMPEL), and UN Environment’s Asia and the Pacific Office.

### **Goal: a long-term mechanism for global cooperation**

“Operation ‘Demeter IV’ once again demonstrates the commitment of the WCO and the international Customs community to tackle illegal trafficking and protect public health by enhancing cooperation and law enforcement,” the WCO Secretary General, Kunio Mikuriya, was quoted.

The debriefing on the operation was held in November 2018 in Shanghai

(China) and was attended by over 150 representatives from 53 WCO Members and 11 international organizations. “During this meeting, Mr. Ni Yuefeng, Minister of the General Administration of China Customs, referred to the operation as a major success in terms of international collaboration,” the World Customs Organization gave account. “He went on to say that ‘China Customs will continue to work with international organizations and other Member countries and regions to construct a prosperous, clean and beautiful world together.’” The representative of China Customs had proposed that Member Customs administrations “establish a long-term mechanism for global cooperation, aimed at monitoring transboundary movements of solid waste and combating related smuggling activities”.

As announced, the “Demeter” concept will be pursued, and plans are already being made for a similar operation in 2019.

➔ [www.wcoomd.org](http://www.wcoomd.org)

## Brazil: Rio Gets a Pilot Plant to Explore Energy from Waste

**A national technology to process and explore energy from organic waste started being tested in the city of Rio de Janeiro.**

As reported, the pilot plant is installed in a processing facility of the City Company of Urban Cleaning (Comlurb) in the Caju neighborhood and has in January completed a month in operation. According to the information, it is able to extract 100 to 150 cubic meters of biogas per processed ton, with 50 to 60 percent of methane concentration. The technology, which produces fertilizer and natural gas from waste, was developed by the Federal University of Minas Gerais (UFMG) in partnership with companies Methanum Tecnologia Ambiental and Comlurb. The operation of the pilot plant, which was funded by the Brazilian Development Bank (BNDES – Banco Nacional de Desenvolvimento Econômico e Social), will allow testing the efficiency parameters of the methanization technology by anaerobic composting and widening the scale. With a processing capability of 30 tons per day, the plant has an estimated monthly biogas production capable of feeding a fleet of 1,000 cars or generating enough energy for just over a thousand houses.

The unit consists of modules the approximate size of a container, which receive the waste and are sealed for a period of two to three weeks, while the bacteria introduced into the compartment degrade the organic matter and produce methane. The gas is stored while the remaining material is removed and used as fertilizer. The plant also has a generator to produce electric energy from gas combustion. “The Comlurb plant in Caju neighborhood was chosen because it receives solid waste from different neighborhoods, with different consumption and waste production standards, offering enough diversity to simulate the conditions of different Brazilian towns,” the information said. “In addition, Comlurb already has a conventional composting plant with in situ aerobic digestion, which allows comparing the results of the two technologies.”



## Steelanol: Converting Carbon-Containing Gas into Fuel

In January this year, the first foundation pile of the ArcelorMittal's Steelanol plant in Belgium has been driven into the ground, the first of 1,800 piles that will support the future installations of the plant.

In June last year, the international steel and mining company ArcelorMittal has begun construction of new premises at its site in Ghent to house a new installation, which will convert carbon-containing gas from its blast furnaces into bioethanol. "If proved successful, the new concept has the potential to revolutionize blast furnace carbon emissions capture and support the decarbonization of the transport sector," the company is convinced.

As reported, the technology in the gas conversion process was pioneered by the USA-based company LanzaTech with whom ArcelorMittal has entered a long-term partnership. The technology uses microbes that feed on carbon monoxide to produce bioethanol. "The bioethanol will be used as transport fuel or potentially in the production of plastics," ArcelorMitt-



tal announced. "This is the first installation of its kind on an industrial scale in Europe and once complete, annual production of bioethanol at Ghent is expected to reach around 80 million liters, which will yield an annual CO<sub>2</sub> saving equivalent to putting 100,000 electrical cars on the road." Commissioning and the first production is expected by mid-2020. ArcelorMittal's long-term aspiration is to become a zero-waste business, with all materials used or generated during steel production recuperated, treated and reused in the production chain or becoming the raw materials for other industries. The steelmaker works to-

gether with specialized partners in order to roll out this bioethanol technology, including Primetals Technologies Ltd. (London) and international strategic consultancy E4tech. Funding was obtained from various sources, including the European Union's Horizon 2020 program, to carry out further research and development and scale up the project.

Last year, the company Emile Egger & Cie SA was awarded a contract for the most critical pumps in the steelanol process. Sulzer Chemtech, one of the leaders in separation and mixing technology, was appointed to provide distillation equipment. According to the provider, this will help to convert waste gases from the steel manufacturing process into approximately 80 million liters of bioethanol annually.

➔ [www.steelanol.eu](http://www.steelanol.eu)

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## Products with Chemically Recycled Plastics

The German chemical concern BASF has for the first-time manufactured products based on chemically recycled plastic waste, the company informed some weeks ago.

According to the information, BASF wants to make a significant contribution in reducing the amount of plastic waste. "With our ChemCycling project, we are using plastic waste as a resource. In this way, we create value for the environment, society and the economy. We have joined forces with partners throughout the value chain to establish a working circular model," Dr. Martin Brudermüller, Chairman of the Board of Executive Directors and Chief Technology Officer (CTO) of BASF, was quoted. As reported, the chemical concern is already developing pilot products, including mozzarella packaging, refrigerator components and insulation panels, with ten customers from various industries. "Manufacturing products that meet high quality and hygiene standards – which are specifically required for food packaging for example – is possible because the ChemCycling products supplied by BASF have exactly the same properties as products made from fossil resources." This way of recycling offers opportunities for innovative business models for the chemical company and its customers, Stefan Gräter, head of the ChemCycling project, is convinced. As a next step, BASF intends to make the first products from the ChemCycling project commercially available.

At the beginning of the production chain, oil derived from plastic waste by an oiling process is fed into the Production Verbund. As an alternative, syngas made from plastic waste can also be used. The first batch of this oil was fed into the steam cracker at BASF's site in Ludwigshafen in October. "The steam cracker is the starting point for Verbund production," the company describes the process. "It breaks down or 'cracks' this raw material at temperatures of around 850 degrees Celsius. The primary outputs of the process are ethylene and propylene. These basic chemicals are used in the Verbund to make numerous chemical products. Under the mass balance approach, the share of recycled raw material can be mathemati-



Dr. Andreas Kicherer and Dr. Stefan Gräter talk about the different types of plastic waste and their recycling

cally allocated to the final certified product. Each customer can select the allocated percentage of recycled material."

### Technological and regulatory challenges

Both the market and society expect the industry to come up with constructive solutions to deal with plastic waste. Chemical recycling is a complement to other recycling and waste management processes. "We need a wide range of recovery options for plastic waste, since not every solution is suitable for each type of waste or possible for each product application. The first choice should always be the solution that performs best in a life cycle assessment," explained Andreas Kicherer, sustainability expert at BASF.

However, technological and regulatory conditions have to be met before the project is market-ready, the company points out. "For one thing, the existing technologies to transform plastic waste into recycled raw materials such as pyrolysis oil or syngas must be further developed and adapted so that consistently high quality is assured. Furthermore, regional regulatory frameworks will considerably influence to what extent this approach

can be established in each market. For example, it is essential that chemical recycling and the mass balance approach are recognized as contributing to the fulfillment of product and application-specific recycling targets."

### "Responsible handling of plastic waste is crucial"

Plastics offer many benefits in technical applications, medicine and everyday life and they are often a better alternative to other materials. According to the company, the challenge lies in responsibly managing post-consumer plastics. "Functioning waste management systems and responsible consumer behavior with regard to plastics are crucial to solving problems such as pollution from plastic litter. To this end, BASF is involved in various projects at the association level and internationally.

For example, the company is member of the World Plastics Council and participates in two programs of the Ellen MacArthur Foundation. Furthermore, BASF has implemented Operation Clean Sweep, an international initiative of the plastics industry to prevent the loss of plastic pellets, flakes and powder in the environment."

➔ [www.basf.com](http://www.basf.com)



## Itronics Starts R&D to Recover Tin and Copper

In January this year, USA-based Itronics Inc., a producer of fertilizers and silver products, announced that it has recently started research and development to recover tin and copper from the silver bullion being produced by its printed circuit board refining pilot plant.

According to the company, tin was on the list of 35 minerals deemed critical to the "U.S. National Security and the Economy" published by the U.S. Department of Interior on May 18, 2018. "Our recovery of all of the tin contained on the circuit boards positions the company to be a world leader in tin recovery from discarded printed circuit boards, a technology advancement of global importance," Itronics' President Dr. John Whitney was cited. It would also position the firm to be the first domestic printed circuit board refiner to recover tin and antimony.

As reported, Itronics had previously announced that its technology recovers all the copper, tin, silver, gold, and palladium (palladium is a Platinum Group Metal, PGM) carried on the discarded circuit boards being refined. "The technology also recovers all the

antimony, which is a fire-retardant mineral that is used to make the circuit boards fireproof," the American firm underlined. "These metals are contained in the company's silver bullion which is sold to a finish refiner for separation and sale."

Itronics has performed laboratory testing which indicates that the copper and tin may be separated from the other metals contained in the bullion. It will pursue development of this new metal separation technology. "The long-term plan is to become a producer of high purity metals, including the strategic metals tin and antimony, using the company's hydrometallurgy and pyrometallurgy technologies. Itronics would benefit if the U.S. decides to provide incentives to increase domestic production of 'critical minerals', including tin, antimony, and palladium."

According to the U.S. Department of Interior, there is no mine production of tin in the United States. All the new tin that is required by the U.S. economy is imported, the company gave account. The most important foreign countries in order of importance that supply tin to the United States are Indonesia, Peru, Malaysia, Bolivia, and Brazil.

According to Itronics, the company is now operating its printed technology, which refines circuit boards extracted from e-waste, on a pilot scale at its manufacturing plant in Reno, Nevada. The circuit boards are converted into energy which is used in the refining process, and silver bullion and silver-bearing glass which are sold, thereby eliminating the waste from the environment.

➔ [www.itronics.com](http://www.itronics.com)



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## 2018 Marks a Record Year of Sales for Eriez Eddy Current Separators

In 1969, Eriez Magnetics was the first company to patent both permanent magnetic and electromagnetic Eddy Current Separators (ECS).

Just a few years before, at a product seminar held in front of Eriez Headquarters and industry guests, the world's first Eddy Current Separator was demonstrated by Bill Benson who developed the unit alongside Eriez Research Engineer, Tom Falconer. Today, thanks to the benefit of more powerful magnetic materials, Eriez' Eddy Current Separators are successfully installed worldwide in the recycling industry.

In 2018, a record number of over forty Eddy Current Separators units were sold into the European market, providing recycling companies with optimal recovery of valuable non-ferrous metals from all waste types.



Eriez has over 25 years of experience in manufacturing Eddy Current Separators, and the design has been refined through extensive research development and material testing. As a result, Eriez has developed a comprehensive line of non-ferrous metal separators in different configurations



and size ranges to fulfil the diverse requirements of the industry.

The very first developed were the HD and LC models, designed for the separation of aluminium cans that marked the beginning of the evolution of Eriez Eddy Current Separators. The following generations, the ST and LT units, saw a deeper field design of the LT model enabling increased performance when processing larger particle sizes +50 millimeters whilst the ST model was designed for smaller non-ferrous metals and PET waste. Today, the RevX-E ST22 ECS unit offers unprecedented recovery of non-ferrous metals as small as 1-2 millimeters and continues to be at the forefront of the industry. For complete metal recovery, Eriez manufacture a range of modular systems to separate ferrous

and non-ferrous metals, designed to incorporate additional separators including overband magnets and magnetic drums, into stand-alone systems.

Due to the increasing sales of ECS units, a new extension to Eriez' European manufacturing facility, was completed in autumn 2018. The investment of the new facility is set to increase the production capacity of Eddy Current Separator rotors by a third, per year.

The launch of the brand new 326 square meters manufacturing facility has been documented in an exclusive video and can be viewed on YouTube at [www.youtube.com/watch?v=7OD71rtd63w](https://www.youtube.com/watch?v=7OD71rtd63w) – please view in 720pHD.

## Befesa Expands its Recycling Services into China

**Befesa S.A., a leading European company regarding steel dust and aluminum salt slags recycling services, has signed an agreement with the Jiangsu Changzhou Economic Zone to develop its recycling services business in China.**

According to Befesa, the company will acquire the land use right in the Chinese city of Changzhou to build its first electric arc furnace (EAF) dust recycling plant in the country. With this step, Befesa confirms its entry into the Chinese market. The plant in development is designed to recycle 110,000 tons of EAF dust per year and will represent the company's seventh EAF steel dust recycling site globally, along with the existing sites in Europe, Turkey and South Korea. The ramp-up of the operations is expected for the second half of 2020. China is considered as the largest steel producer in the world, with more than 800 million tons of crude steel per year, representing around 50 percent of global production. By 2030, the People's Republic of China is expected to produce more than 200 million tons of EAF steel. In addition, environmental protection has become a key priority for the Chinese Government. Steel dust was officially classified as a hazardous waste material in 2016.



## Chinese Steelmaker Intends to Use more Scrap

Chinese Nanjing Iron and Steel Co., Ltd. has placed an order with Germany-based SMS group to supply new ConSo R6 injectors for the electric arc furnace No. 3 of its plant in Luhe district, one of 11 districts of Nanjing, the capital of Jiangsu province. Erection and commissioning of the equipment are scheduled for 2019.

The SMS group's scope of supply includes three ConSo R6 injectors, water-cooled copper boxes, the respective valve stations, an integrated flashback detection system as well as supervision of the erection and commissioning activities. As reported, the main goal of the upgrade is to cope with the future reduction of hot metal by replacing it with scrap in the

charge. "For this purpose, efficient injector technology is required. Furthermore, the upgrade will reduce operating costs and increase productivity."

The injector design was developed using computational fluid dynamics (CFD). The new lightweight construction, ten percent lighter than previous versions, is – according to the information – particularly easy to maintain. "The SMS group ConSo R6 water-cooled copper boxes in monoblock design are not susceptible to cracking and effectively prevent water leakage. The integrated flashback detection system allows continuous monitoring of the ConSo R6 injector.

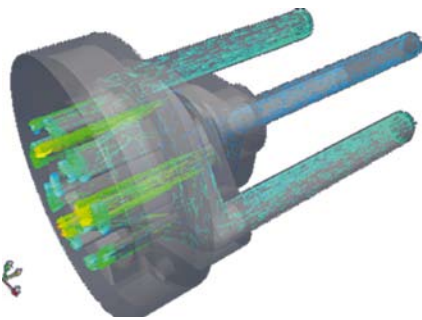
The injector, which can be operated in burner or oxygen injector mode, additionally provides for automatic management of the melting profiles,



3D design of the SMS group ConSo R6 injector

ensuring excellent efficiency," the German company emphasized.

➔ [www.sms-group.com](http://www.sms-group.com)



Design study with computational fluid dynamics (CFD)

Source: SMS group

## New Markets, Advanced Technologies and Project Finance for Waste Conversion in the Circular Economy



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## Efficient Crushers “Made in Italy”

The Italian company Bongioanni S.p.A. is not only a producer of machines and complete lines for the primary processing of wood as well as the manufacturing of clay bricks and roofing tiles, but also a provider of equipment for the recycling industry.

According to the company, which was established in 1907, the range of machines dedicated to the crushing of diverse types of waste – from industrial facilities and commercial establishments, as well as private households – stems from its long-standing experience. The crushers of Bongioanni Recycling Technology “are manufactured with components made in the workshops of Bongioanni Macchine or by reliable partners, in order to assure the customer of the total quality control at all stages, from the project to the final assembly of the product,” the provider points out. All the processes are certified by the quality standards ISO 9001/2015. A widespread and efficient after-sales service completes the offer.

The ambition of the firm is to capture the needs of customers, converting them into customized products, the Italian machine builder underlines. In order to demonstrate the equipment’s ability, the crushers will be presented at the following events:

- Rem Tech Expo in Ferrara (18-20 September 2019), where the manufacturer will showcase a new inert crusher with a Live presentation.
- Ecomondo in Rimini (5-8 November 2019).



Photo: Bongioanni Macchine SpA

### Numerous advantages

“The crushers of Bongioanni Recycling Technology benefit from the same characteristics that have always made Bongioanni a successful company: power, high performance, groundbreaking automatic control systems, efficiency, reliability, ease of use and maintenance, versatility,” the Italian manufacturer emphasizes.

According to information provided by the company, the recycling machinery has strong points at all stages:

- application of electronics to mechanics
- automation of industrial processes
- high efficiency and performance
- electric motors
- advanced software and inverters management
- optimum debris-steel separation
- user-friendliness
- ease of maintenance
- ergonomics
- safety at worksites
- environmental sustainability

➔ [www.bongioannimacchine.it](http://www.bongioannimacchine.it)

## German Company Ordered Complete Tire Recycling Plant

**Austria-based international technology Group Andritz has received an order from Pyrum Innovations AG to supply a complete tire recycling plant for their thermolysis facility in Dillingen (Germany); start-up is planned for spring 2019.**

As reported, the new recycling equipment from the house of Andritz will process car and truck tires with a maximum diameter of 1,200 millimeters and a width of 300 millimeters. In the first section of the plant, the used tires will be shredded by a Universal Rotary Shear UC1300, and in a second and third step the material is granulated further in the Universal Granulators UG1600S and UG1000H. In the final section of the plant, the Universal Cutting Mill USM1000 will granulate the material precisely into the defined particle size of six millimeters smaller. The complete tire recycling process would be capable of producing approximately one ton of granulate per hour, the technology provider informed. This rubber granulate obtained will be further processed in the thermolysis plant to be converted into oil, gas, and coke. In addition, the Andritz scope of supply includes the entire conveying, separating and screening technology and as well supervision of installation and commissioning work.

➔ [www.andritz.com](http://www.andritz.com)



Photo: Andritz



## A Convenient Combination for Screening and Shredding

In processing biomass and waste wood, it takes efficient purpose-designed machinery to get the best results from varying feedstocks.

Komptech, an international technology supplier of machinery and systems for the mechanical and mechanical-biological treatment of solid waste and biomass, has studied different processing methods very closely regarding output quality and operating costs. In tests of high and low-speed shredders, throughput and energy consumption were measured, and the granular size composition was determined by screening. To evaluate operating costs, the company compared single-stage processing with high and low-speed shredders and two-stage processing with a combination of low-speed shredder and screener to return overlengths. As reported, the two-stage version turned out to be the most economical setup, taking due account of various conditions. "In this context, it is naturally important that the low-speed shredder have a certain 'resistance' to metallic contraries, as are often present in used wood," Komptech gave account.

### Effective and economical: Crambo and Multistar One

In these tests, biomass and waste wood processing was most effective when a Multistar One star screen was used. Shredding is done by an



The Multistar One makes treatment of waste wood and biomass even more efficient

upstream Crambo. The Multistar One then separates out a defined useful fraction and returns the overlengths to the shredder. With a feed hopper for precise material transfer to the generously dimensioned screen deck, a discharge conveyor with four meters height and a return conveyor that can pivot through 220°, the Multistar One provides a throughput of up to 200 cubic meters per hour.

The current for the electric motors can come either directly from the grid or from a combination of an additional hydraulic pump on the shredder and a

hydraulic generator on the star screen. With its compact crane lift frame and variable conveyors for flexible setup plus electric drive, the Multistar One is a very efficient as well as economical star screen, the provider underlined. The drive train of the Crambo direct shredder would combine the functionality of hydraulic drive with the efficiency of mechanical drive. "That means top economy while retaining all benefits like overload protection, reversibility and adaptation to the material."

➔ [www.komptech.com](http://www.komptech.com)

## Grapples for Better Handling of Bulk Materials

Caterpillar's new orange-peel grapples GSH420 and GSH520 are designed for a wide range of applications.

According to the information, handling shredded scrap (long structural beams, car bodies) is as well included as handling rocks at construction sites and waste at recycling and transfer stations. The performance and efficiency of the new Cat grapples, which are to replace the GSH15B series grapples, help waste-handling operations, meet the challenges of increased environmental regulation, growing pressure to recycle a mix of materials and stringent budgets, the provider emphasized. "The new grapples feature horizontal placement of the cy-



linders, thus creating a profile that allows for effective material penetration and efficient bulk-material handling. The design enhances the strength, reliability, and durability of the new grapples, which are available in four-tine and five-tine shell configurations and in closed or semi-open versions. In addition, the GSH420 and GSH520 feature a redesigned rotation system. The new grapples are designed to work with the Cat MH3022, MH3024, and MH3026 material handlers."

➔ [www.cat.com/products](http://www.cat.com/products)

## Congress Greencities 2019



March, 27 – 28, 2019, Malaga (Spain)

The Spanish Greencities Congress will be the setting for the second edition of the Circular Economy Forum 2019. "This new meeting will address the Spanish strategy in this area, as well as the main trends in production, aspects relating to the useful life of products or the process of transforming waste into raw material," the organizer of the event, FYCMA (Palacio de Ferias y Congresos de Málaga), informed.

Greencities, Foro de Inteligencia y Sostenibilidad Urbana, invites professionals, companies and institutions linked to sustainability and the design of new models focused on the circular economy to attend the second edition

of the Circular Economy Forum, organized by the event together with the Environmental Sustainability Area of Malaga City Council. This specialized meeting held last April its first call in the framework of Greencities, reaping great success and postulating key to the sustainable development of intelligent territories. Thus, it returns with the aim of analyzing both the national strategy and the one carried out at the local level to supply these aspects of the first order in the agenda of the global economy.

As announced, in this second edition the meeting will feature the participation of leading experts on the subject to address issues such as trends in the

design and manufacture of products for the circular economy, which leads to a reduction in the consumption of raw materials and also helps to prolong the life of products, another of the issues that will be undertaken. The experts will also bring attendees closer to the process that makes it possible for waste to become raw material again. On the other hand, this space will host success stories from Spanish and international cities that are already working on the change of production model and will have an impact on the regulations of the Circular Economy, unraveling the current moment in which it is.

➔ [www.greencities.malaga.eu](http://www.greencities.malaga.eu)

## bauma 2019



April, 8 – 14, 2019, Munich (Germany)

According to the organizers at Messe München, bauma is more than the world's leading trade fair: "it is the heartbeat of the industry. It sets the pace. Dynamizes the market. And drives business. With one paramount goal: to always already focus on the next challenge." The trade fair for the construction, building material, and mining machine industry is the largest international meeting place and

most important multiplier for the industry. "The reason: bauma's global network and digital touchpoints do not only reach the trade visitors at the exhibition itself but the entire industry around the globe. A reach that is of benefit to both exhibitors and visitors. Because to be present at bauma means to have access to all markets, to all target groups, to all decision-makers." This applies also to handling

machines for the recycling industry. This year's bauma will have a new record number of exhibitors: More than 3,500 exhibiting companies from 55 countries will be there. bauma PLUS allows even more companies to present their products and services. Virtual reality will bring the construction site into the trade fair hall.

➔ [www.bauma.de](http://www.bauma.de)

## IE expo China 2019



April, 15 – 17, 2019, Shanghai (China)

IE expo China 2019 will take place from April 15 to 17, 2019 at Shanghai New International Expo Centre.

According to the organizers, the event will cover all the high potential markets in the environmental area. Furthermore, it will offer an effective business and networking platform for Chinese and international professionals in the environmental sector, and a technical-scientific conference program accompanies the event. Along with the increased market demand

and enormous support in the environmental industry from the Chinese government, the business potential in the environmental industry in China will be huge, the information says. "Undoubtedly, IE expo China 2019 will be a 'must' for the environmental players to exchange ideas and develop their business in Asia."

As reported, IE expo China 2018, which was held in the Shanghai New International Expo Centre (SNIEC), once again underlined its position as

the number one environmental technology show for China and Asia. More than 66,000 visitors from 59 countries and regions came to Shanghai. "This equals a 21 percent increase compared to the previous year," the organizers underlined. "The exposition also saw an increase in exhibitors and floor space: 1,762 exhibitors represent on show space of 128,000 square meters (three additional exhibition halls)."

➔ [www.ie-expo.com](http://www.ie-expo.com)



# Chinaplas 2019

May, 21 – 24, 2019, Guangzhou (China)

The trade fair Chinaplas is a prominent platform for innovative technology and communication for the plastics and rubber industries. At its 33rd edition, "Circular Economy" will be one of the main topics. "To foster circular economy is a global consensus and is a major Chinese economic and social development strategy to achieve sustainable development," the exhibition company underlined. "As such, great potential and bounteous market opportunities arise with it."

In addition, the organizers are also paying attention to new market trends and demands. Topics will be the new business opportunities that the "Belt and Road Initiative" has spawned in the plastics and rubber industries; changes in the world economic situation; opportunities and challenges for plastics innovations resulting from Sino-US trade debate, to name but a few. Therefore, the exhibition company is striv-

ing to expand overseas markets and has launched publicity in ASEAN (Association of Southeast Asian Nations) countries and key countries along the "Belt and Road Initiative", sending staff there to invite local associations and enterprises to visit the trade fair. "The aim is to help exhibitors explore new business opportunities so as to increase return on their investment."

## Plastics Recycling, Recovery & Sustainability Conference

In addition, a "Plastics Recycling, Recovery & Sustainability Conference" will be organized at Chinaplas in order to facilitate mastery of advanced technology and promote technological innovation. The entire industry chain, from policies and regulations, through recycling technologies to back-end innovative applications,



will be analyzed and explained by experts. Industrial trends, opportunities, challenges, and solutions will also be discussed.

The trade fair is organized by Adsale Exhibition Services Ltd. and Beijing Yazhan Exhibition Services Ltd. and co-organized by China National Light Industry Council – China Plastics Processing Industry Association, China Plastics Machinery Industry Association, Guangdong Plastics Industry Association, Messe Düsseldorf China Ltd. and the Plastic Trade Association of Shanghai. The event is also supported by various plastics and rubber associations in China and abroad.

➔ [www.ChinaplasOnline.com](http://www.ChinaplasOnline.com)

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## Plastics Recycling Technology 2019

June, 18 – 19, 2019, Düsseldorf (Germany)

After the successful launch event in 2017, the Plastics Recycling Technology conference returns in 2019 and examines the latest technologies for increasing the volume of plastics being recycled, the organizer, AMI, emphasized. It also explores ways to improve the quality of reclaimed materials so that they can be used in higher value applications. "Leading experts gather

at Plastics Recycling Technology 2019 to explore the future of plastics recycling and to look at new ways of boosting productivity, quality and profitability," AMI announced. Speakers would provide an analysis of the European recycling market, introduce innovations driving the recyclability of packaging and discuss strategies to optimize the plastics recycling lines.

"In addition, the conference covers the circular economy and relevant regulations, the growing importance of additives and delves into developments in chemical recycling, including case studies of exciting new applications across these various topics."

➔ [www.ami.international/events/event?Code=C0973](http://www.ami.international/events/event?Code=C0973)

## Conference "E-Mobility & Circular Economy"

July, 1 – 3, 2019, Tokyo (Japan)



ICM AG, a Swiss company organizing international conferences in the fields of recycling cars, electronics and batteries, will hold its first conference on "E-Mobility & Circular Economy EMCE" in Tokyo (Japan). According to ICM, the International Energy Agency expects the number of electric cars on the road to increase from two mil-

lion in 2016 to 70 million in 2025. At EMCE 2019, the participants could learn what the impacts on Technology, Eco-design, Energy Storage, Power Distribution and the Circular Economy, Recycling and Raw Materials' Supply will be. Furthermore, the industry would present their newest generation of services, technologies

and future designs. The conference will be the ideal platform to exchange information, meet new business partners and get easy access to new potential clients in a hi-tech, professional and relaxed atmosphere, the organizers emphasize.

➔ [www.icm.ch/emce-2019](http://www.icm.ch/emce-2019)

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