



WASTE MANAGEMENT WORLD®

Special Edition
**RECYCLING/
DIGITALIZATION
and INDUSTRY 4.0**

**PLUS
Special
Ecomondo**

Rimini, Oct. 26-29
**Including Floorplan
to the Green Tech
Expo! Page 40**



Medical waste after Covid:

Lessons learned?

SCRAP METAL RECYCLING

How AI and cutting-edge sensors
create efficiency
Page 22

PLASTIC RECYCLING

Seven ideas for a more
sustainable future
Page 26

SMART WASTE MANAGEMENT

How digital solutions are
transforming our industry
Page 34

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Rudolf Loidl, Chief Editor
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OVERMANAGED AND UNDERTREATED

It feels a little cynical to come to final conclusions about effects of the global COVID pandemic while the world is still in the midst of rampant infection waves. For the treatment of health care waste, however, we can at least come to an interim conclusion, because the epidemiological and technological facts are clear.

While the whole world realized with a sigh of relief that the virus is rarely transmitted via objects – and medical waste is hence less infectious than initially feared, high income countries were confronted primarily with operational problems: Being used to high volumes of HCW and equipped with well-established collection systems, dedicated service providers and an appropriate infrastructure, there was only an increase in volume to manage – especially in hot zones at peaks of infection waves.

Lower income nations – however, were experiencing something new:

Waste volumens that were exploding – being on a par with high income regions. Countries that normally generate half a kilo of HCW now had to handle waste volumes of up to 8 kg per patient. It is obvious that these volumes cannot be disposed of properly with the existing collection, handling and disposal infrastructure. To help build such an infrastructure and to come up with suitable innovations for those regions has to be one of the main targets in the near future.

However, it cannot be said that developed countries had absolutely nothing to learn. The sudden increase in volume has exposed the vulnerabilities in the material flow of health care waste. Experiencing bottlenecks with external service providers, some health care facilities began to examine (and appreciate) on-site treatment solutions. With a quite stunning side effect:

A study found that using on-site solutions reduced a hospital's CO2 footprint to one-fifth of its original level and decreased the volume of residual waste left over following on-site treatment to around one fourth compared to incineration.

Innovations, like the one in the field of micro-units for on-site treatment of health care waste, are therefore a growing market. In a couple of years, history books will tell how this global emergency drove the global technological innovation: The story of how it boosted digitization (how many online meetings did you have today?), how it strengthened the innovation in automation and robotization and how it led to a medical breakthrough that occurs only every few decades (the mRNA technology). Maybe the books will also tell a tale of innovation in the field of waste management. It's up to us to make it happen! —



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COMPANIES INDEX

Alphabet	25
AMCS	34
Apple	25
Avient Corporation	27
Browning Ferris Industries	34
Cesaro Mac Import SRL	30
Cross Wrap	44
Eldan	31, 44
Ford Otosan	29
Forrec	31
Forst & Sullivan	16
Gient	16
Google	25
GPS Renewables	9
Hamburgs Wertstoff Initiative	27
HSM	32
HyGear	9
IEG - Italian Exhibition Group	41
Italian Trade Agency	43
Key Energy	42
Lindner	30
Max-AI	39
ML Sp. z o.o.	26
Owenbridge Ltd	9
Panizzolo	30
Pieralisi	45
Rebuy	8
Redwave	23, 33
Runi	31
Sesotec GmbH	26
SGM Magnetics	44
Tesalys	17, 21
Thales Group	28
Thermo Scientific	24
Tiger Depack	30
TOMRA	22, 32
Trebo ApS	28
Untha	32
Vecoplan	39
Veolia	28
Wastehub	35
Wimao	33
ZenRobotics	22, 38

CONTRIBUTORS



“After all, we already have technologies that can handle much more hazardous waste.”

Anne Woolridge, COO of Independent Safety Services Limited ISSL

Page 16



“Low income countries are for the first time generating waste volumes on a par with high income countries – without the same effort dedicated to waste disposal.”

Edward Krisiunas, Health Care Consultant

Page 19



“Get your basic processes up and running in a digitized way, clean up your data before you look at the fancy stuff.”

Mark Abbas, CMO and director of business development at AMCS

Page 34

“The African market will be a main focus to further our know-how, develop networking and finalize business agreements.”

Alessandra Astolfi, Exhibition Manager IEG Green & Technology group

Page 42



COVER STORY

HEALTH CARE WASTE AND COVID: LESSONS LEARNED?

One could say: nothing has changed. Or: everything has changed. A look at how the COVID-19 pandemic is affecting how health care waste will be managed in the future.

Page 14

PLUS Special Ecomondo

Rimini, Oct. 26-29
Including Floorplan
to the Green Tech
Expo! **Page 40**

Recycling

26 **Plastic Recycling: Seven Ideas for a Better Future**

From the production of heavy-duty building materials, to sorting techniques that can be applied directly on the production floor, to regional recycling models.

22 **New Solutions for Metal Recycling**

The application of artificial intelligence and cutting-edge sensor technology promises major efficiency gains in the metal scrap industry.

34 **"Move to the cloud or miss out"**

The waste industry seems somewhat reluctant to fully embrace digitization, as Mark Abbas, CMO of software expert AMCS, explains.

40 **The Green Tech World Fair**

On October 26, Ecomondo, the global benchmark event for technological and industrial innovation for circular economy, will open its doors.

PLUS: Big Floor Plan:

Where do I find whom?

50 **Good To Know: Plastics Exports to China**

How China's ban on plastic waste threw the world into disarray – in one chart.



22

NEW SOLUTIONS

for Metal Recycling

34

"MOVE TO THE CLOUD

or miss out"



Regulars

- 3 **Editor's Letter**
- 7 **ISWA Comment**
- 8 **News + Numbers**
- 30 **Product News**
- 38 **Digital Solutions**
- 46 **ISWA Info**

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Markus Benz
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THE MOST IMPORTANT EVENTS OF THE YEAR ARE COMING AND YOU CANNOT AFFORD TO MISS IT

The summer break is over in the Northern hemisphere (winter for those in the South, like me) and our attention is drawn to some of ISWA's most important annual events: the ISWA General Assembly and World Congress in early October.

After the need to cancel the ISWA Congress in 2020 as a necessary measure due to the COVID-19 pandemic we've restructured the way to deliver such an impressive event in an entirely virtual format. Together with the Hellenic Solid Waste Management Association (HSWMA), our National Member in Greece, we've succeeded in preparing an amazing event, which will catalyse the most updated information about the waste industry and the transition to a circular economy.

Unfortunately we won't be able to meet in person once again this year, but the interactive platform selected by the organizers will create a unique experience for those who will follow the leaders and experts from the sector, from both public and private institutions, from governments and bilateral organizations, from academies and research institutes to funds and development banks.

The Scientific Committee together with our team from the General Secretariat have worked hard to prepare very special sessions, with keynote speakers, practitioners and entrepreneurs, who will be sharing their knowledge and experiences with a broad audience from all over the world. Having a virtual congress gives us this benefit to bring together people from the different regions, who will be able to watch all sessions from their offices or homes, or even at the beach for those who want to make it a really unique experience. And when the Congress is over, all participants will be able to see any session of interest, streaming its content on demand. We have already confirmed more than

“EXPECT MASSIVE CONTENT AT THE ISWA WORLD CONGRESS: WE ALREADY CONFIRMED A HUNDRED SPEAKERS OVER THE THREE DAYS.”



Carlos RV Silva Filho
ISWA President

a hundred speakers with different backgrounds and expertise, distributed into plenary and parallel rooms over three days of massive content. The congress will start with sessions about definitions and practices of circular economy, closed loops and recycled markets and the relationship between circular and low carbon economies.

The opening ceremony and keynote session will present the trends and perspectives for the waste industry as a key sector to drive the green recovery after the pandemic. Our keynote speakers will talk about plastics, marine litter and new frontiers for waste and resources management.

From ISWA's side, we will launch a cutting-edge document which will present the trends and perspectives for the waste industry in the coming decade (2021-2030). It's a collective document prepared with input from each of the Working Groups, from the Regional Chapters and the YPG. We asked all of them to share with us their views about the future, focusing on some issues that will be driving the world. Not to be missed!

Among other themes, ISWA 2021 will have sessions about waste prevention, new recycling methods, energy from waste, food waste separation, hazardous waste management, textiles, financing, EPR and health care waste management after COVID-19.

You can already take a look at some of these topics in the current edition.

It's also important to say that climate change and its interlinking with the circular economy will be highlighted during the closing session when ISWA will present its guiding document for COP26.

This is a unique opportunity to receive the best information about waste and resources management directly on your computer, tablet or mobile phone. There's still time to register, but hurry up as spaces are filling up quickly. Register now at www.iswa2021.com —

**771
MILLION**

old cell phones are discarded worldwide, the German re-commerce company Rebuy found in a study. Smartphones were considered "discarded" for the study when they were no longer used but had not yet been disposed of. **This translates into 23,964 tonnes of potential electronic waste**, but also precious metals such as gold, palladium or copper, with a retail value of **1.9 billion euros**. The company wants to encourage people to recycle, donate or pass on.



Waste-pickers spend long days collecting recyclable material at the Vinča landfill in Belgrade, Serbia. October 2019.

© Dominic Chavez/International Finance Corporation

SERBIA SET TO CLOSE EUROPE'S LARGEST UNMANAGED LANDFILL

The Vinča landfill's closing comes in the wake of a recent fire outbreak that saw Serbia's capital Belgrade enveloped in smog.

Considered one of Europe's largest eco-disasters, Serbia is finally set to close the Vinča landfill next to its capital Belgrade. Instituted in 1977, the open dump site receives 1,500 tonnes of household and 3,000 tonnes of construction waste each day and is considered the largest unmanaged landfill in Europe. Being one year away from nearing full capacity volume, an overflow in waste threatens to exacerbate existing levels of atmospheric and marine pollution, prompting Belgrade authorities in their decision to shut the site down.

Methan superspreader.

4 billion cubic metres of methane were released into the atmosphere from the Vinča landfill, according to data derived sourced from Belgrade's health authorities. Methane generated by these excess tonnes of waste is generally flammable when exposed to oxygen. A desire to mitigate said fire hazard is another reason as to why the city administration seeks to shut the landfill down.

Rehabilitation of the Vinča landfill is set to occur in 2023. The new landfill, currently being constructed near the existing one, is funded by both Belgrade authorities as well as French-Japanese consortium Suez-Itchu in the form of a public-private partnership. The Belgrade project also entails the

building of a waste-to-energy plant as well as an incinerator. Within three years, existing mountains of waste (some towering as high as 70 m) are set to be transformed to green space, with gas emanating from toppling stacks set to be captured and utilized for electricity generation, should everything go to plan. Future waste will similarly form a heat and electricity resource.

Profit garnered from these ventures is supposed to offset investment expenditure relating to the construction and operation of the new site. These plans have come under scrutiny by environmental groups who claim that the new incineration plant will prove a hindrance to Serbia in its efforts to reach EU recycling standards. Activists have pointed out that waste material consisting of paper and plastic is much better off being recycled than incinerated. City representatives conceded, promising that the plant would only treat waste that cannot be reused. Belgrade is considered one of the worst European cities when it comes to air pollution, right after the Bosnian capital of Sarajevo. Serbia, as a potential EU candidate, is required to enforce certain environmental standards to accede to the Union. Investments topping 15 billion Euro will be needed to create such a sustainable municipal solid and liquid waste management system.

DIARY OF EVENTS

ISWA WORLD CONGRESS 2021
Athens, Greece
4-7 October 2021
iswa2021.com

POLLUTEC
Lyon, France
12-15 October 2021
pollutec.com

POLECO 2021
Poznań, Poland
13-15 October 2021
poleco.pl

ECOMONDO
Rimini, Italy
26-29 October 2021
en.ecomondo.com

WASTECON 2021
Orlando, Florida
1-3 November 2021
swana.swoogo.com/wastecon2021

ISWA-SWIS WINTER SCHOOL 2022
Arlington, Texas, USA
17-28 January 2022
iswa.org



Eyesore in Dublin:
Bags slashed and pulled apart by rodents, gulls and foxes

SLÁN TO BIN BAGS, HAIGH TO 'BAGBINS'

The Irish capital Dublin is testing collapsible waste containers that promise to solve Dublin's sidewalk litter problem.

Dublin City Council has opted to trial so-called 'Bagbins' in favour of conventional plastic bin bags. The Bagbin comes in the form of a cylinder in which householders can place their waste. The receptacles are intended to be hung on a specially provided post for pick-up by the relevant waste provider. Waste collectors are supposed to lift the bin off and collapse it, carrying away the bags full of waste. Manufactured by Owenbridge Ltd, these collapsible waste receptacles made from polypropylene are posited as a solution to the city's 'exploding' waste sack problem. In 2016, the city legally mandated the use of wheelie bins in household and business areas. 1,000 streets in the Irish capital, however, were exempt from this regulation due to being situated in suburbs with no front garden or direct back access. Plastic bags full of refuse have long been considered an eyesore in the city. Bags slashed and pulled apart by rodents, gulls and foxes and litter blown about by wind on sidewalks are the most commonly identified problem.

First-of-its-kind green hydrogen plant to be built in India.

HyGear and GPS Renewables will convert organic waste and landfill gas into hydrogen, essentially aiding the development of a

zero-carbon economy in India. HyGear and GPS Renewables are set to develop state of the art green hydrogen projects in India.

The Dutch hydrogen provider and the Indian bioenergy technology company will convert organic waste and landfill gas into hydrogen, making use of GPS Renewables' bio-methanation plants, downstream bio CNG installations and HyGear's on-site steam methane reforming-based Hy.GEN products.

Investment in the field has been prompted by the Indian administration's pledge to expand green hydrogen production in a bid to phase out fossil fuels and achieve energy self-reliance by 2047. (At the moment, India imports 85% of its oil, 50% of its natural gas and 30% of its coal.)

HyGear CEO Marinus Can Driel emphasized the sustainable nature of the project, stating that the use of organic waste and landfill gas to derive green hydrogen serves to contribute to a global circular economy.

"Steam methane reforming of renewable natural gas represents one of the lowest emissions and cost-effective production pathways available today for hydrogen. We look forward to contributing to India's decarbonization goals with a local biogas leader such as GPS Renewables," he said.

PICTURE OF THE MONTH



© Jorge Saenz / AP

Pink liquid waste from a tannery in Paraguari, Paraguay flooded the open field around the factory on August 13. Nearby landowners fear that once it rains the liquid will contaminate streams that drain into Lake Ypoa.



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Waste picker in Africa, plastic waste: The proposed resolution is to be considered by delegates at the UN Conference on the Environment in Nairobi next year.

USA: 50% NATIONAL RECYCLING TARGET WITHIN REACH?

The US Environmental Protection Agency (EPA) says that the current political and industrial conditions put the ambitious goal for 2030 within reach.

In October 2020, the Environmental Protection Agency (EPA) called for a 50% recycling rate in the US by 2030. Achieving said objective could be considered a watershed moment of sorts, seeing as the US recycling rate has been stuck in the mid-30% range since the 1990s. Yet, based on the current political climate, the US stands a good chance of sticking to its recycling commitment, according to Nena Shaw, acting division director of the EPA's Resource Conservation and Sustainability Division. "We are at a unique moment where there are so many policy drivers coming into alignment to positively impact our work," Shaw explained. "Congress, industry non-profits, the international community and the American public all want to see an improved recycling sector."

RWANDA AND PERU DRAFT PLAN FOR GLOBAL PLASTIC REDUCTION

75 states and the EU are backing the plan for a legally binding international treaty to reduce plastic waste presented by Rwanda and Peru at the UN Conference in Geneva.

The UNEP-organized conference in Geneva was attended in September by more than 1,000 representatives from 140 countries and non-governmental organizations. In a draft international agreement presented by Peru and Rwanda, particular reference is made to the danger posed by microplastics. The goal must be a "circular economy" that prevents large amounts of plastic waste. The proposed resolution is to be considered by delegates at the UN Conference on the Environment in Nairobi next year. According to Flasbarth, 25 countries already fully support the project, and 50 others announced their preliminary support at the conference in Geneva.

Long negotiations expected.

According to the State Secretary, however, long negotiations are to be expected. He expects it to take months or even years before an international agreement on reducing plastic waste can come into force. Berangere Abba, the French secretary of state in charge of biodiversity, warned that without joint international action, there would be "more plastic than fish in the world's oceans" by 2050. According to UNEP, some 300 million tonnes of plastic waste are produced annually. About 8.3 billion tonnes of plastic have been produced since the 1950s. About 60 percent of the waste has been disposed of in landfills or in nature. Every year, more than one million seabirds and more than 100,000 marine mammals die as a result of plastic pollution.

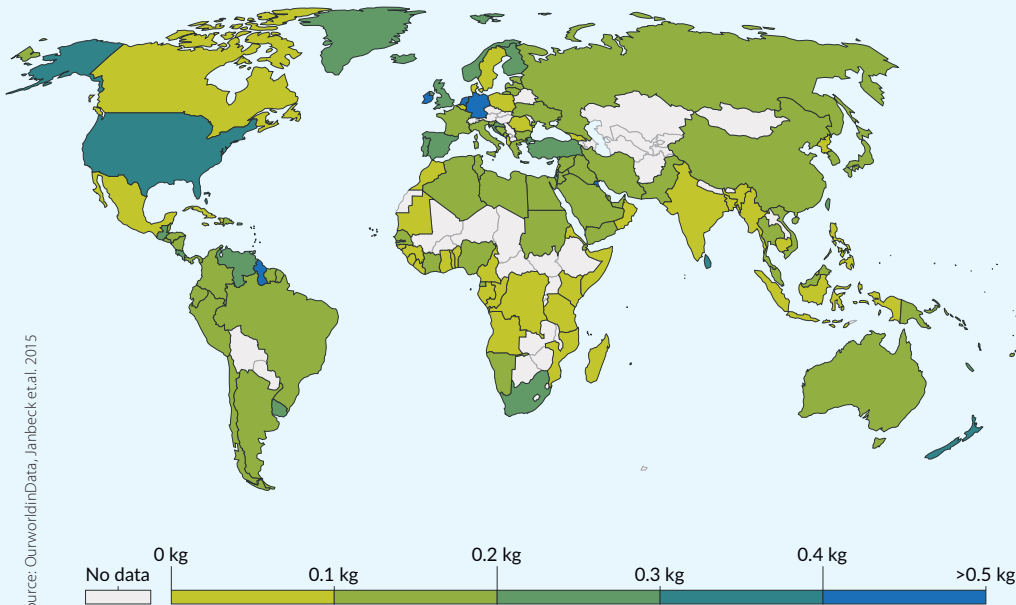
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ZENROBOTICS



PLASTIC WASTE GENERATION A FIRST WORLD PROBLEM



A map of the global daily plastic waste generation per person, measured in kilograms per person per day, shows that the roots of the plastic crisis indeed lie in the developed countries of the western hemisphere. **Global frontrunner in per capita plastic waste generation is the highly industrialized Germany with 0,48 kilograms**, at the bottom end of the list are sub-Saharan countries like Congo or Tanzania with 0,02 kilograms. The chart measures the overall per capita plastic waste generation rate prior to waste management, recycling or incineration. It does not therefore directly indicate the risk of pollution to waterways or marine environments.

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Reverse vending machine for plastic bottles: The German deposit system is a model for the EU initiative.

INITIATIVE FOR EU-WIDE DEPOSIT SYSTEM FOR PLASTIC BOTTLES GAINS MOMENTUM

A European Citizens' Initiative (ECI) for an EU-wide deposit system has been registered by the EU Commission and is starting to collect signatures.

The initiative's organizers under the umbrella of an initiative called #Returntheplastics are calling on the EU Commission to submit a proposal on how to create incentives for supermarkets to install reverse vending machines, the Brussels-based authority said on Friday. If the initiative manages to collect one million signatures from at least seven EU countries within a year, the Commission will have to react. Then it must justify whether it will comply with the request.

Meanwhile, the initiators praised the German deposit system as effective. In the EU, however, there are sometimes very different regulations. There are also countries without a comprehensive deposit system for plastic bottles, but several EU countries are planning to introduce or expand deposit systems in the coming years, including Austria, where a deposit system planned by the Ministry of the Environment with mandatory reusable quotas is under discussion.

1.8 BN

tonnes of CO₂ are emitted by the production of plastic every year, as calculated by the environmental consulting agency Dalberg Advisors on behalf of the World Wildlife Fund. If the current pollution of the world's oceans is continued, the plastic waste in the oceans will **weigh more than all the fish in the sea in 2050.**

Source: Study Plastic: The Costs To Society, The Environment And The Economy, WWF

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Awareness of the growing plastics crisis:
 Indian Prime Minister Narendra Modi and waste pickers



INDIA: LOOPHOLE IN PLASTIC BAN RENDERS LEGISLATION TOOTHLESS

India's plastic ban is seen as a leap forward, yet the nitty-gritty of the legislation speaks another tale.

India's single-use plastic ban has evoked mixed reactions from experts. Amendments to existing plastic waste management legislation will see the phasing out of 20 flexible plastic items according to an index that weighs up single-use plastics against their relative utility level as well as potential environmental impact. The items will be banned from markets as of July 1, 2022. Products to be banned include non-woven carrier bags, plastic straws, foamed cups, bowls and plates as well as disposable rigid cups, trays and containers. Yet there is a loophole in the new legislation: selected plastic commodities judged to be environmentally unsustainable as well as of negligent usefulness may still be manufactured, stocked and imported as well as sold from the July 2022 cut-off date onwards.

Concerns about loopholes.

These commodities include plastic water

bottles as well as plastic bottles for food and non-food applications, diverse plastic cutlery, multi-layered packaging and plastic films. Multi-layer as well as composite plastic films, ranging from plastic based crisp packets with aluminium coatings to pet food pouches incorporating whole layers of aluminium, are often hard to recycle due to their multi-material consistency. As plastic films are also very thin, they are more easily contaminated which also renders recycling complex. Equally concerning is the fact that compostable plastics do not fall under the purview of plastic items to be eliminated in the near future. Though technically recyclable, reality shows that treating biodegradable plastics is not feasible in the Indian context. Often, locals are liable to equate 'compostable plastic' with 'home compostable plastic', being unaware that many plastics that are technically biodegradable

are only so under industrial conditions. As such, these plastics often end up mixed with regular household waste, thereby contaminating the waste stream and rendering them unfit for recycling. The necessary infrastructure in the form of industrial processing units, found in relevant compost facilities, can also be scarce, which further complicates recycling in this instance.

In India, 43% of manufactured plastics – most of them single-use – are intended for the packaging sector. From 2021-2026, the sector is projected to grow by 27%. India has sought to curb plastic pollution since 1999, when the sale of thin polythene bags was first prohibited, yet the attempt has so far met with little success. The disparity in waste collection, sorting and recycling systems across states has similarly hampered legislative efforts to ban single-use plastics.

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HEALTH CARE WASTE: LESSONS LEARNED?



One could say: nothing has changed. Or: everything has changed.

Waste Management World looks at how the COVID-19 pandemic is affecting how health care waste will be managed in the future.

By Piotr Dobrowolski

For some observers, the findings are clear as day. When it comes to health care waste, some of the waste from the pandemic was overmanaged. Especially in the early months, when it was uncertain how infectious, for example, personal protective equipment was whose wearers had contact with actual or potential Covid sufferers.

In many places, any form of protective equipment was treated as hazardous, quickly reaching the limit of disposal capacity. In China, for example, dur-

ing the first wave of the coronavirus, all waste generated during the treatment of Covid patients was considered hazardous and had to be disposed of accordingly. Guidelines were later changed, but in many hospitals it took until well into the second wave for the vast amounts of accumulated waste to be processed.

ALL THINGS EQUAL?

Yet, as is now known, COVID-19 is highly contagious, but is rarely transmitted via objects or waste. "Waste is

IN A NUTSHELL

During the COVID-19 pandemic, as numerous hospitals and health care facilities around the world struggled to manage massive increases in waste, a topic that otherwise receives little attention came into the public eye: how to deal with health care waste.

The challenges it exposed existed, even before the pandemic. Now, however, the critical mass may have been reached to tackle them. In any case, the conditions are favourable.

- Technically, waste management has long been equipped to handle even dangerous, highly infectious health care waste. However, the waste caused by COVID-19 is generally not one of them.
- COVID-19 caused massive capacity bottlenecks. In Wuhan, for example, at the height of the pandemic, six times as much health care waste was generated daily as could be processed.
- Mobile modular container systems, such as those used in China, can be a solution to quickly create additional treatment capacity. They can be retrofitted both on-site and at existing waste treatment facilities.
- On-site treatment can reduce the carbon footprint of health care waste to one-fifth of what it would be if recycled outside of health care facilities.
- Health care waste recycling offers great potential that is currently underutilized due to regulatory and logistical hurdles.
- In countries with poor waste management infrastructure, the main challenge remains preventing health care waste from ending up untreated in landfills or dumps.
- In a long-term perspective, the COVID-19 pandemic may be an opportunity for health sectors to find a new balance between the use of disposable materials and sustainability.



Health care waste: Not too many lessons to be learned in high income countries?

not a vector, people are. Other pathogens are transmitted by waste and this is being overshadowed by the focus on COVID-19," says Anne Woolridge, Chief Operating Officer of Independent Safety Services Limited (ISSL). ISSL is a British consultancy that specializes in the delivery of health care waste management and dangerous goods safety Advisors to the National Health Service and private sector healthcare establishments. And she adds: "There was no need to develop new technologies

to deal with waste that had come into contact with the coronavirus. After all, we already have technologies that can handle much more hazardous waste."

In this sense, the pandemic has not changed the health care waste sector at all.

What is also true, however: The pandemic has brought about a gigantic increase in the volume of waste in health care facilities and in private households, for example as a result of the use of disposable masks. Reliable figures do not exist for all countries and parts of

In an unprecedented effort, the Chinese health care waste treatment equipment provider Gient built a centralized temporary plant with a capacity of 30 tonnes per day in Wuhan.



Small on-site treatment solutions for health care waste: Reduces the carbon footprint to one-fifth, a study finds.

the world. But we do know, for example: In Wuhan, at the height of the pandemic, the amount of health care waste increased to six times what the waste disposal facilities there could handle, which at peak times was about 250 tonnes a day. In Pattaya, on the other hand, the amount of health care waste increased tenfold during the fourth wave in August 2021.

EVERYTHING DIFFERENT?

Here's another figure: global production of disposable personal protective equipment increased by forty percent due to the pandemic. Some 129 billion disposable masks and 65 billion disposable gloves were produced worldwide per month to meet the demand created by COVID-19, according to the authors of a recent paper in *Environmental Science & Technology*.

At the height of the pandemic, the consulting firm Forst & Sullivan

"AFTER ALL, WE ALREADY HAVE TECHNOLOGIES THAT CAN HANDLE MUCH MORE HAZARDOUS WASTE."



Anne Woolridge
COO of Independent Safety Services Limited (ISSL)

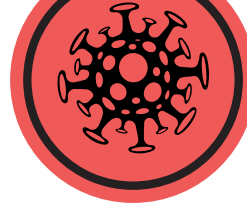
calculated that, with similar increases in health care waste as in China, the USA alone could generate the same amount in two months as the entire world did in a year. It is obvious that the world needs new ways to deal with these masses of waste.

In that sense, it's fair to say that the pandemic has completely changed the health care waste sector.

DOES IT DEPEND?

Edward Krisiunas, among others, is thinking about the consequences of this. For almost 40 years, the health care waste consultant has been involved in projects all over the world: in Africa as well as in Asia, in the USA as well as in Europe. Over the four decades of his work, Krisiunas has experienced a wide variety of ways of dealing with hazardous health care waste.

His answer to the question of what the health care waste industry can take away from the pandemic therefore



GLOBAL ON-SITE HCW TREATMENT COULD SAVE CO₂ EMISSIONS EQUIVALENT TO 1 MILLION CARS

Tesalys, a French manufacturer of on-site HCW treatment solutions, compared the environmental impact of on-site treatment solutions versus transportation and incineration in a study. The results are stunning.

In many countries, HCW is mainly collected from the health care facilities by service providers and transported to dedicated incineration plants. Alternative technologies like shredder-sterilizers are available for on-site treatment of the HCW. Theoretically, on-site treatment should have less CO₂ generation as waste is reduced in volume, avoids transportation containers and dedicated pick-up trucks as well as incineration emissions. However the avoided CO₂ had never been measured. Tesalys, a French manufacturer of on-site HCW treatment solutions, carried out a study of the environmental impact of on-site treatment solutions VS transportation and incineration of HCW.

Design of the study.

The study, led by the independent sustainable development agency Primum Non Nocere, was carried out in a private health care facility in the South of France (250 beds, 16 operating theatres) in real-life conditions. The initial situation was studied, particularly the composition and quantity of waste generated in each

of the 16 operating theatres. The environmental impact study took into account all the direct and indirect modifications associated with the deployment of the on-site treatment solution, including waste segregation procedures, conditioning of the waste, machine water/electricity consumption or transportation. This allowed a precise calculation of the CO₂ emissions which would be included in the carbon footprint of the hospital.

During the test phase, an integrated shredder-sterilizer by Tesalys was deployed. Data collected by a qualified thermal engineer included weight and volume of the infectious HCW before and after treatment, cycle duration, machine consumption, and impact of the on-site treatment on the segregation procedures.

Key findings.

The results in terms of reduction of the carbon footprint are significant, the study found (5 times less CO₂ generation than incineration) and represent an opportunity for the reduction of CO₂ emissions if on-site treatment was

deployed at national / global scale. Extrapolating the findings in terms of CO₂ emissions reduction, as much as 65,254 tonnes of CO₂ equivalent could be avoided if all the infectious waste generated in France (141,000 tonnes in 2018) were treated on-site instead of being transported and incinerated. 65,254 tonnes of CO₂eq equals the CO₂ emissions of 1,300,000 Paris to London flights. A global deployment of on-site HCW treatment solutions at worldwide scale would avoid as much as the CO₂ emissions of 1 million cars.

A significant reduction of weight and volume of waste leaving the hospital has been found. In terms of weight, during the decontamination cycle, weight of the waste increases due to the humidity of the steam sterilization process. However, a significant improvement in the segregation procedures (50% reduction in the operating theatres that were object of the study) has been identified due to the increased involvement of the medical staff during the waste generation/segregation. In terms of volume, the STERIPLUS system has contributed to reducing the volume of waste treated by 66%. The treated waste being considered as household waste, compaction is possible (30%), thus making a total reduction in volume of 76% of the initial volume.

The study has shown other positive impacts of the on-site treatment of HCW, like the elimination of biological risk at source (particularly important during the Covid pandemic), huge improvement of the segregation by the medical staff and autonomy of the hospital in waste management (thus respecting the regulations in terms of storage and waste disposal deadlines).

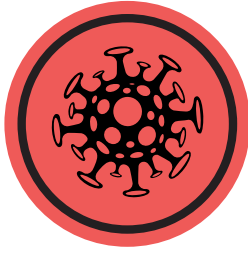
Finally, the shredded and decontaminated HCW has been analysed in order to evaluate the recycling/revalorization possibilities. 96% of the materials contained in the shredded waste are recyclable or have some valorization options (cardboard/paper/natural fibres, PE, PP mainly). Some other options have been explored like energy recovery (shredded HCW has a high heat power which could be useful for waste-to-energy plant or cement kilns) or integrating the shredded waste in other raw material (asphalt, bricks). However recycling/revalorization of medical waste still remains at the experimental level in France.

DISPOSABLE MASKS

A new pollution threat?

In response to government mandates the world's factories produced **52 BILLION** disposable facemasks in 2020. An estimated 1.6 billion ended up in our oceans. Here is how long they take to biodegrade.





logically begins with: "It depends." And then Krisiunas says: "What we have seen in the health care sector has varied around the world. Large volumes of health care waste have been generated in all countries. The variability is in the available treatment and disposal systems for these waste streams. My personal experience in high income countries points to systems in place to manage the tsunami of waste that was created. Yes, there have been large volumes of wastes and we continue to see those volumes in so-called hot zones, but they are managed properly."

The situation is different in some of the low income countries, Krisiunas adds. "Countries that normally generate less than 1 kg per patient per day are now generating waste volumes on a par with high income countries. These countries are providing health care ser-

vices at a level closer to high income country services without the same effort dedicated to waste disposal."

From this perspective, it could be said that how COVID-19 changes the health care waste sector depends on the context.

MODULAR SOLUTIONS

In countries with well-developed waste management, well-established collection systems, and the appropriate infrastructure, dedicated service providers are very often hired to dispose of health care waste from hospitals and other health care facilities, offering an all-around service: from the collection containers to their collection and the recycling of the waste. Until the outbreak of the pandemic, hospitals that opted for such solutions were in a comfortable position: in the best case scenario, they merely needed to renew existing contracts with disposal companies once a year or every few years.

With the pandemic, everything changed. In China, the first country to be massively affected by the coronavirus, capacity limits were quickly reached at the height of the pandemic. In 22 cities, health care waste could no longer be disposed of in a timely manner, and in 28 cities, disposal facilities reached their limits. In an unprecedented effort, a centralized temporary plant with a capacity of 30 tonnes per day was built in Wuhan within two weeks. The plant was built by Gient, the leading Chinese provider of health care waste treatment equipment.

Gient's modular solutions, which have been used in the past in regions with poor waste management infrastructure, proved very useful during the pandemic, even in areas that are basically well served. Housed in containers and transportable by truck, these units have connections for water and power and can be put into operation virtually immediately after transport.

Because they are fully automated, they require only one operator. One unit processes between one and three tonnes of health care waste per day. However, several containers can also be set up next to each other at a single site. The major advantage of the system, apart



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from its scalability and rapid deployment, is the investment cost: A central stationary unit with a capacity of 3 to 5 tonnes costs around two million US dollars to build. Mobile and modular systems cost about a third of that.

In Europe, the disposal situation was not as drastic as in China. But in 2020, at the height of the pandemic, capacity became scarce, even in Europe. In France, the 72-hour period during which waste could be temporarily stored had to be extended to 5 days at times because disposal companies were not keeping up with their work.

ON-SITE SOLUTIONS

"That was the moment when many hospitals also realized the disadvantages of relying on an external service provider," says Miquel Lozano, president of Tesalys, a French company that produces equipment for on-site treatment of health care waste. The smallest units Lozano's company offers are just one square metre, while the largest are five square metres. The most powerful models can process up to 100 kilograms per hour.

"LOW INCOME COUNTRIES ARE FOR THE FIRST TIME GENERATING WASTE VOLUMES ON PAR WITH HIGH INCOME COUNTRIES – WITHOUT THE SAME EFFORT DEDICATED TO WASTE DISPOSAL."



Edward Krisiunas
Health Care Consultant

On-site solutions, however, don't just prevent bottlenecks in disposal, they can also be a way to reduce the carbon footprint of health care waste disposal when thought about more broadly. If they are used, the CO₂ emissions of the journeys between the hospitals and the disposal sites are eliminated, as is the incineration of the waste. To date, no data has been collected on the actual extent of this effect. Tesalys has therefore commissioned the independent sustainable development agency Primum Non Nocere to carry out a study in a hospital in the south of France.

The hospital, which served as the test site, has 250 beds and 16 operating rooms, and the surveys were conducted under real-life conditions. "The environmental impact study took into account all the direct and indirect modifications associated with the deployment of the on-site treatment solution," explains Lozano.

The key message of the study is impressive: using the on-site solution reduced the hospital's CO₂ footprint to one-fifth of its original level. The

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COVER STORY

SOME FIGURES

6 The amount of health care waste increased **by a factor of six** at the peak of the pandemic in Wuhan

10 **Tenfold increase** in the amount of health care waste in Pattaya in August 2021

129,000,000,000

disposable masks produced per month worldwide to combat COVID-19



1/5

Hospital health ware waste could be reduced to one-fifth through on-site treatment.

40%

more disposable personal protective equipment has been used globally since the pandemic outbreak.

65 BILLION

disposable gloves are produced per month worldwide to combat COVID-19

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volume of residual waste left over following on-site treatment was 76 percent less than with incineration. The study also showed that 96 percent of the shredded and decontaminated material from on-site treatment contained materials that could, in principle, be recycled. (See the box for more on the study results.)

If all infectious waste generated in the country - 141,000 metric tons per year before the pandemic, in 2018 - was treated on-site, it would result in a savings of 68,254 metric tons of CO₂ equivalents, or in other words, 1.3 million flights between London and Paris. According to the study results, the global annual savings potential is equivalent to the annual CO₂ emissions of one million cars.

A study conducted in the UK in 2008 has already shown that the

recycling potential in the area of health care waste is huge. The waste in the operating rooms of a hospital was analysed over a period of two weeks. It was found that even in this extremely sensitive environment, 40 percent of the waste was basically recyclable. In most countries, however, recycling health care waste is an option that is rarely used, not least because of legal restrictions.

The pandemic has led to an increase in health care waste, the classification of which as hazardous or non-hazardous, infectious or non-infectious was initially very unclear. In the meantime, these issues have largely been clarified. The major challenge now, experts agree, is to consider how to minimize the ecological impact of materials used in the pandemic response. —

“THE HEIGHT OF THE PANDEMIC WAS THE MOMENT WHEN MANY HOSPITALS REALIZED THE DISADVANTAGES OF RELYING ON AN EXTERNAL SERVICE PROVIDER.”



Miquel Lozano
CEO of Tesalys

OUTLAST THE COMPETITION

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The application of artificial intelligence and cutting-edge sensor technology promises major efficiency gains in the metal scrap industry.

This technological leap comes just in time, as the shortage of raw materials in various industries poses an ever greater challenge. Here are some promising innovations.



NEW TECHNOLOGY IN METAL RECYCLING

In 2011, the Finnish company ZenRobotics introduced the first fully automated robot for waste sorting. By using metal detectors, 3D laser technology and spectroscopic imaging, the precision of sorting parts was significantly improved, paving the way for the entire recycling industry.

In 2014 the "Heavy Picker" was introduced – a dedicated product for metal recycling. Since then the system has been continuously improved and optimized using AI. With the use of three robot arms, the system can now perform up to 6,000 sorting processes per hour. In comparison an experienced manual sorter only manages 200

picks per hour. Another advantage is that the "Heavy Picker" can be seamlessly integrated into existing systems or used as a stand-alone sorting line.

BREAKTHROUGH X-RAY AND LOD TECHNOLOGY

Scandinavia is amongst the leading players in the innovation of new technologies in metal recycling. The Norwegian company TOMRA, for example, has specialized in the recycling of aluminum scrap. The importance of this raw material was emphasized by the Covid pandemic, when aluminium became a scarce resource all over the world. As a result, aluminium producers are becoming increasingly re-



liant on high-quality recycled material. And that's where TOMRA promises to deliver with its X-TRACT series.

The system uses an electrical X-ray source that generates broadband radiation. This radiation penetrates the material and strikes an X-ray camera that uses two independent sensor lines with different spectral sensitivities. In this way, the atomic density of the materials can be identified. This technology contributes to a reduction in the purchase costs of the raw material, since, on the one hand, the materials no longer have to have an overly strict composition and, on the other hand, less material than usual is processed. As a result, scrap can be purchased at a lower price with a lower quality and then cleaned.

In 2018, its German-based subsidiary TOMRA Sorting introduced

a new laser object detection (LOD) system for its "AutoSort" and "Finder" product line, increasing the detection accuracy of existing equipment by an additional four percent. Among other applications LOD has also been designed to separate black rubber, glass and plastic material from nonferrous zorba and zurik products, allowing these commodities to be turned into more valuable revenue streams while reducing the number of manual pickers.

XRF TECHNOLOGY FROM THE HEART OF EUROPE.

The Austrian-based company Redwave has been using XRF technology for years to determine the chemistry of a sample. Initially, the technology was primarily used in glass sorting – with the introduction of

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RECYCLING



ZenRobotics is a pioneering innovator in the field of automated metal recycling.



TOMRA's X-TRACT series uses X-ray technology to cut the cost of purchasing aluminum scrap.



© REDWAVE



© ThermoFisher

The "Niton Apollo" hand-held LIBS analyser increases accuracy and mobility at metal scrap sites.

REDWAVE's sorting technology X-ray Fluorescence (XRF) quantifies a material's elemental composition.

Redwave XRF/C, a standalone solution for metal sorting was developed.

Compared to other technologies, moisture, colouration and surface impurities have no negative influence on the metal detection. The sorting processes, with the aid of advanced software algorithms, produce high-purity metal fractions, which can be sold directly and profitably. This innovative sorting solution has already been successfully implemented in various sorting lines and plants worldwide.

HAND-HELD LIBS ANALYSIS FOR LIGHT ELEMENTS

Since the beginning of the millennium, portable and flexible handheld devices based on XRF technology have been widely used as a flexible and cost-saving solution in metal recycling. Over the years, the technology has improved significantly and is now the leading portable instrument when it comes to stainless,

high temps and red metals. However, since the introduction of handheld LIBS devices in 2015 – they use a fast chemical analysis technique with a short laser pulse – an alternative has been established, especially for the analysis of light metals such as aluminium or magnesium.

Thermo Scientific introduced the "Niton Apollo" in 2019, which is leading the way for individual and flexible applications. Especially recyclers dealing with heavy loads or space constraints are relying on the laser guns to analyse metals on their composition within a few seconds. Another major advantage of this technology is that no sampling is necessary and the measurement can be carried out without contact.

SHORTAGE OF RAW MATERIALS AND CLIMATE CHANGE

According to studies, the demand for metal raw materials will rise rapidly in the coming years. Aluminium on its own

will require an additional 360 million metric tons of raw material over the next 20 years to meet demand from the industry. Above all, key industries of the future, such as the electric automotive sector, are dependent on the supply of light metals.

In the new age of climate change, recycling metals is becoming increasingly important, but it also holds great economic opportunities. For example, recycling rare metals from electronic waste is thirteen times cheaper than extracting them from mines, according to the American Chemical Society. By using new methods as well as artificial intelligence, metal recycling is becoming a key player in the fight against global warming. —

GOOGLE AND APPLE ARE INVESTED IN METAL RECYCLING

Tech giants Google and Apple have recognized the economic and ecological potential of metal recycling.

Google's parent company Alphabet is working on "The Everyday Robot Project," a universally applicable robot system that can be used to sort waste in a precise manner and thus reduce a company's ecological footprint. At Apple, an in-house developed robotic system designed specifically for iPhone recycling has been in use since 2016. As a result, 200 iPhones an hour are taken apart in a fully automated process and sorted into the components that can then be reused. Of particular importance is the recovery of cobalt, which is used to manufacture rechargeable cell packs.



© Apple

Apple's "Daisy" disassembles and recycles around 1.2 million iPhones a year.



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PLASTIC RECYCLING: SEVEN IDEAS FOR AN EVEN BETTER FUTURE

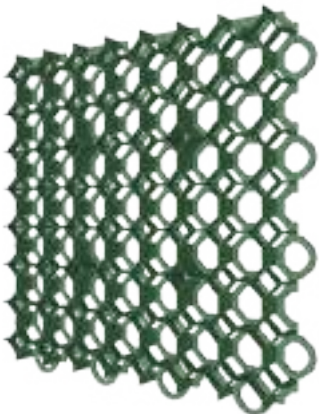
From the production of heavy-duty building materials, to sorting techniques that can be applied directly on the production floor, to regional recycling models: Waste Management World takes a look at the most innovative ideas and technologies for plastic recycling.

The scientific community, as well as international organizations, have been committing serious resources to understanding the sources and flows of plastic litter. Innovations in material and the recycling models and techniques are – be they small or big and disruptive - key to tackling the global plastic crisis. On the occasion of this year's Plastic Recycling Show Europe PRSE 2021, Waste Management World takes a look at seven quite promising ideas.



1

ROBUST PAVEMENT



Category	Building & Construction Products
Challenge	Pavement grids used in the design of traffic areas should be durable, able to withstand high pressure loads and have a low environmental footprint.
Solution	Together with Stella Green, one of the largest suppliers on the market, the Polish company ML has developed a paving grid that is made of 100 percent recycled materials and that is subsequently itself fully recyclable. At the same time, the paving grid achieves excellent technical values and can withstand loads of up to 420 tons per square metre.
Company	ML Sp. z o.o.
Country	Poland
More info	krataml.pl

2

RAPID ANALYSIS OF RECYCLATE

Category	Recycling Machinery Innovation
Challenge	Determining the quality of recycled plastic flakes or regrind from recycled plastic is tedious, but plays a very important role for companies that further process such recyclates.
Solution	Sesotec, based in Schönberg, Germany, has developed FLAKE SCAN, an analysis process that drastically reduces the time required to analyse recyclate. Within minutes, the system delivers data that allows a decision to be made on whether plastic flakes and plastic regrind can be processed profitably and without technical problems.
Company	Sesotec GmbH
Country	Germany
More info	www.sesotec.com

3



REGIONAL RECYCLING BOTTLE

Category	Plastic Packaging Products
Challenge	In plastic recycling, materials are often transported over very long distances. The awareness that circular economy should ideally also be regional is still relatively weak. There is also a lack of showcase projects.
Solution	In Hamburg, the city of Hamburg, the waste management company Veolia, the cosmetics manufacturer Unilever, the cosmetics specialist chain BUDNI and the Technical University of Hamburg have joined forces in an initiative that shows that regional circular economy works. The detergent "Seven Generations," which is sold by BUDNI, is filled in a recycled bottle made from 100 percent used packaging collected exclusively in Hamburg.
Organization	Hamburgs Wertstoff Initiative
Country	Germany
More info	hamburgs-wertstoff-innovative.de

4



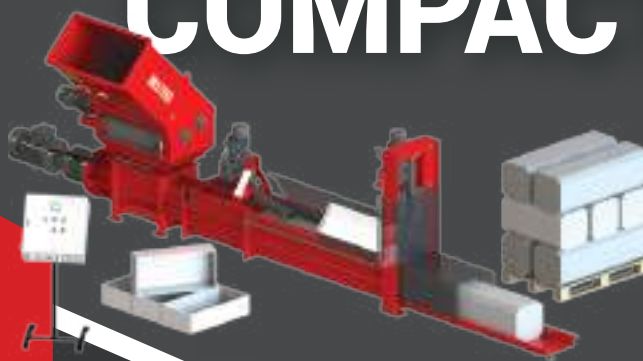
EVEN BETTER PET RECYCLING

Category	Product Technology Innovation
Challenge	Producing bottles from recycled PET can negatively affect their appearance, thermal stability and even lightfastness. Processing the recycle is also relatively energy-intensive.
Solution	ColorMatrix SmartHeat RHC, a dispersion aid developed by Avient, makes it possible to increase the recycled PET content of bottles and reduce CO ₂ emissions. Its addition can also reduce the amount of energy used in production, make bottles less sensitive to temperature differences and also make them lighter in design.
Company	Avient Corporation
Country	Luxembourg (European headquarters)
More info	www.avient.com

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RECYCLING



5

CO₂-NEUTRAL SIM CARD

Category	Household & Leisure Products
Challenge	Around 4.5 billion new SIM cards are sold worldwide every year. Plastic is required for their production, which has a negative impact on the CO ₂ balance. The production of the chips also has a negative impact on the carbon footprint.
Solution	The technology specialist Thales and the energy and waste disposal service provider Veolia have jointly developed an Eco-SIM card whose plastic components are made of recycled material. The SIM card has a neutral carbon footprint, as carbon dioxide emissions from the manufacturing process and non-recyclable electronic components are fully offset by Thales' carbon offset programme.
Companies	Thales Group, Veolia
Country	France
Read more	www.thalesgroup.com www.veolia.com

6

CIRCULAR ECONOMY ON SITE

Category	Recycling Machinery Innovation
Challenge	When residues of different types of plastics are generated during production, their recycling can only take place after sorting. This makes it difficult to recycle production waste directly at the point of origin.
Solution	Trebo's novel fluid-mechanical sorting technology allows sorting of complex plastic mixtures directly at the production site. The technology takes advantage of the fluid-mechanical differences of the various types of plastics. Different shapes or degrees of contamination of the waste mixture do not affect the sorting result. By recycling on-site, users can not only reduce their carbon footprint, but also reduce the cost of procuring new raw material.
Company	Trebo ApS
Country	Denmark
More info	www.trebo.dk



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Julio JR Compagnon
CEO of Comberplast &
co-founder of
Atando Cabos
Chile

The Atando Cabos project was created to preserve the beauty of Patagonia: the Chilean plastics recycler and circular economy pioneer Comberplast took on the problem of fishing nets and lines carelessly discarded on the coasts. Today the company processes over 3,000 tons of these materials annually into new products with the help of the Lindner Micromat 1500 shredder. More information www.lindner.com/comberplast

LINDNER



7

BATTERY BOXES WITH A SMALL FOOTPRINT

Category	Automotive, Electrical or Electronic Products
Challenge	Containers for car batteries are made of plastic. Due to the size and technical requirements, the amount of raw material needed for this is quite large.
Solution	Turkish automaker Ford Otosan makes the boxes for car batteries installed in its light commercial vehicles from 50 percent recycled material. Per battery box, the company thus reduces its carbon footprint by one kilogram. But using recycled material also has the advantage that the base material has to be sourced domestically rather than imported, which saves on both transportation costs and emissions.
Company	Ford Otosan
Country	Turkey
Read more	www.fordotosan.com.tr



**PRSE 2021
SAVE THE DATE**

Plastic Recycling Show Europe
PRSE 2021, the industry's key annual event, will this year once again feature an on-site exhibition, conference and the Plastics Recycling Awards Europe ceremony. However, a number of virtual elements will also allow those who cannot attend in person to participate.

When: November 4-5, 2021

Where: RAI, Amsterdam

More info: www.prseventeurope.com

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PRODUCT NEWS

LINDNERS TWIN-SHAFT SHREDDER ARMADA KEEPS EUROPE'S NORTH TIDY

The largest waste management company in Scandinavia, RGS Nordic, is managing almost a football team of Lindner shredders.

The Nordic countries are pioneers in environmental protection, and that entails a lot of work. As is the case for the region's largest waste management company, RGS Nordic, based in Denmark. The company recovers more than 4.8 million tonnes of waste and soil annually at over 28 sites in Denmark and

Sweden. To manage the different materials efficiently and flexibly, the company in the far north relies on solid but versatile shredders from Austria's south since 2015. As many as 10 Lindner Urracos, six of the 95 DK type and four compact Urraco 75D ones, one of which has a purely electric drive, do their job under tough conditions. If you ask Jan Glerup, Managing Director at RGS Nordic, why, the answer is clear: "We looked at several machines from different manufacturers.

But the flexibility without major retooling and the fact that the machines can handle even tough materials without any issues are key, especially during peak times. But it is at least equally important for us to have easy access to rapid service support and Lindner's after-sales team and our regional contact, Komi Contractor Supply (KCS), has an impressive client-centred approach. We recently commissioned the ninth and tenth Lindner Urraco. I think that says it all"



Lindner Shredders at work in Europe's far north: At serve even under the toughest of conditions.



Tiger depack unit: The company offers worldwide assistance for warranties, spare parts and for rapid response to customer's needs.

TIGER DEPACK AN EVER MORE IMPORTANT CHALLENGE

The organic fraction of waste is usually the most complex part of waste coming from municipal or industrial collection or from waste generated in production processes to process.

And it's the predominant part coming from municipal or industrial collection. The great challenge is to separate the organic from the inorganic obtaining homogeneous organic material, ready for anaerobic digestion or composting, and clean packaging suitable for subsequent recycling or reuse in production. Tiger Depack separates the materials (wet or dry) into two clean

matrices. Water content (water or process liquids) can be easily adjusted to achieve the desired density in the organic and the right cleanliness and weight in the inorganic. Cesaro Mac Import SRL, the Italian leader in the waste treatment plant sector, developed a targeted technological solution for the treatment of this complex material, for the separation of the packaging from the organic with an overall recovery approaching 100% both in diversity and quantity. Tiger Depack solutions have been engineered specifically to process a wide range of materials otherwise intended for disposal, to handle material depackaging and organic separation. There are three models: Tiger HS 20, Tiger HS 10 and Tiger HS 5 corresponding to different treatment capacities.

ROSTER RELIES ON PANIZZOLO FOR RECYCLING

Near Burgas the new Panizzolo recycling plant was recently started up, treating scrap, mixed metals and armoured cables.

Roster Ltd has been operating throughout Europe in the field of demolitions for over thirty years, also actively participating in the recycling of scrap resulting from these works. Precisely with this in mind, Rosen Terziev, owner and founder of the Bulgarian company, decided to close the recovery cycle internally, making the most of the metals and choosing Panizzolo technologies for an End-of-Waste treatment. The installed system guarantees Roster a flexible End-of-Waste treatment. If, on the one hand, waste such as mixed metals, electric motors, WEEE and mixed armoured cables enters, on the other hand a granular product comes out and can be classified as a secondary raw material. Starting with a volumetric reduction thanks to the shredding PZ 2H 1500 R (2x132kW), a grinding using the Flex 1000 hammer mill (250 kW - up to 11 ton / h) and then continuing with appropriate systems for separating the output material. An independent treatment line is dedicated to the Panizzolo refining plant.

CFC-containing heating pipes: ELDAN A/S and Stena A/S are working on innovative recycling solutions.



RECYCLING CLIMATE-DAMAGING HEATING PIPES WITH CFCs

A consortium of companies in the recycling industry is developing a concept for handling large amounts of CFC-containing district heating pipes in Denmark.

Two of the Denmark's leading companies in waste management and recycling technologies, ELDAN Recycling A/S and Stena Recycling A/S, are developing a concept for handling and recycling of pipes from refrigerators, freezers, and district heating, which were phased out due to containing CFC. They aim at developing a treatment concept that enables the district heating pipes to be identified, shredded, sorted, and processed

for recycling. The treatment concept for district heating pipes must build on technology that ELDAN already uses to break down refrigerators and similar appliances containing metal, plastic, and PUR foam. The goal is to ensure that 99 % of CFC gases from all processes are collected and that more than 95 % of materials are recycled. "Today, only the steel is recycled, and we need to do something about that," says Jan Kjær, product manager at ELDAN. "ELDAN already knows a lot about how to handle CFC-containing refrigerators safely and sustainably. We can draw on that experience here."

FORREC SOLUTIONS FOR TYRE TREATMENT

Forrec's single machines and complete plants allow a rubber granule to be obtained with a size between 0.8 and 4 mm.

With this recycled rubber from ELTs (end of life tyres), innovative eco-sustainable products are made, which find application in very different sectors. Various treatment lines of this type have been installed by Forrec in different areas of the world and are currently operational. Over time, however, it has been noticed that the supply of granules of this size is much higher than the demand and sometimes the market value does not justify the investment. The energy recovery of ELTs represents, in fact, a fundamental component to ensure 100% of the virtuous cycle of ELT recovery. Moreover, the use of this process allows combustion residues, ashes and steel to be recovered as materials which are incorporated into the finished product, thus avoiding the use of further virgin raw materials, with environmental and economic benefits for companies and the community. The most delicate phase is that of primary shredding for the production of TDF (tyre-derived

fuel). This treatment requires, in fact, that the output product be of well-defined dimensions and with the characteristic of a clean cut and not frayed.



Tyre treatment: Forrec has developed the TX1600 shredder without neglecting productivity and keeping an eye on the relationship with production costs.



Running on Runi: Runi compacting machines in the Vartdal Plast plant in Norway.

VARTDAL PLAST TAKES THE LEAD ROLE IN NORWAY

Vartdal Plast is one of the biggest EPS converters in the Nordic region of Europe choosing Runi as a partner.

The company was founded in 1962 and was, actually, the first company to produce fish boxes from EPS (Expandable Polystyrene). In May 2020 Vartdal Plast finished the installation of their recycling facility at Liadal close to the Vartdal Plast headquarters in Vartdal, Norway. In this facility Vartdal Plast aims to be compacting all EPS waste from Trondheim to Bergen. With a fleet of 75 trucks, Vartdal Plast collects EPS as return freight from several waste collecting companies within the region. When planning the recycling facility Vartdal Plast chose Alles Miljø AS as their partner for the compacting machinery, because they are the reseller of Runi compacting machines in Norway. "We have known Runi compacting machines ever since they came to the market. When buying Runi we know what we get, and we know that the quality is good and that the operations are reliable. In addition, we have received a lot of good input from Alles Miljø/Runi when planning our recycling facility," says Jan Endre Vartdal, CEO of the Vartdal Plast group. The facility at Liadal has been running since May 2020 and Vartdal Plast could even be planning for similar facilities in the near future.

PRODUCT NEWS



Collaboration at Indorama Ventures Tomra material on belt

TOMRA RECYCLING & INDORAMA VENTURES COLLABORATE

Both companies seek to promote the future of plastics recycling in Mexico by producing recycled plastic of the highest quality.

Indorama Ventures entered the recycling business in 2011 and operates production facilities that transform post-consumer PET bottles into flakes, rPET resins and recycled polyester yarns. In 2014, Indorama started the production of FuTuRePET bottle grade resin, which consists of the flakes produced from post-consumer PET bottles at their facility and installed a second PET bottle post-consumer recycling production line processing 30,000 tonnes of PET flakes a year in 2019. This line features TOMRA's sorting units. TOMRA units presort incom-

ing PET bottles obtained from landfills and collection centres primarily from central and western Mexico. The presorted materials are then washed and shredded before the respective PET flakes are purified by two AUTOSORT® FLAKE units. The flakes produced are further recycled and made available as food-grade PET resin to plastics converters. Indorama highly appreciates TOMRA's service: "The services provided have been personalized, either in person or virtually, always responding in a timely manner to our requirements bringing our production to the next level. We produce high quality products and profit from substantial savings," says Shankar Srinivasan, CEO of Indorama's Recycling Vertical.



UNTHA ZR two: a whole new world of shredding possibilities

UNTHA UNVEILS NEW ZR TWO SHAFT SHREDDER

The dual shaft machine now promises the lowest lifecycle costing (LCC) for waste, wood and metal shredding in its class.

The high-performance ZR has been purposefully engineered for multi-shift, continuous pre-shredding. The machine's low speed, high torque drive means it can process severe duty applications with ease, for a high level of plant availability. And the modular, quick-change cutting table design presents versatility at the core. The ZR2400H, for example, has been engineered for the high throughput, rough shredding of bulky waste, C&I waste, waste wood, MSW, mattresses, carpets, railway sleepers, bales and rolled goods. The ZR2400W is the perfect metal scrap shredder, and also excels in the processing of WEEE and large domestic appliances. The goal is to achieve a rough material breakdown (90% <300mm) for downstream sorting, making this the ideal machine for metal processors, recyclers, and aluminium and metal manufacturers. Both pre-shredders are also supplied with the UNTHA Eco Power Drive with water-cooled synchronous motors – an energy-efficient concept which has become globally renowned for its ability to reduce energy consumption by up to 75%.

HSM CELEBRATES ITS 50TH ANNIVERSARY

When Hermann Schwelling set up his own business for manufacturing industrial components in 1971, he had a clear vision in addition to his business idea.

50 years later, this vision is more alive than ever. Whether Hermann Schwelling expected to become a market-leading global player in environmental and office technology when he first founded his business partnership remains his secret. The path

was mapped out early on: Ever since he presented his first baling press at the Hanover Trade Fair in 1973 and hit the bull's eye, HSM GmbH + Co KG has been on an expansion course. Today, nearly 900 employees and more than 100 sales and service points support the company's growth worldwide. Today HSM processes around 10,000 tonnes of steel and over 500 tonnes of plastic granules annually at its plants in Salem, Reichenbach

and Frickingen: an immense amount of material that corresponds to the production of about 5,000 cars per year. From here, the products are exported all over the world. The HSM values have always been applied in the day-to-day working practices by the members of the family, the management board and the company's employees. Or as HSM itself puts it so succinctly: Great Products, Great People.



WHICH SORTING TECHNOLOGY IS RIGHT FOR YOU

Each material has different sorting requirements; making use of the right technology ensures efficient recovery and outstanding results. Redwave can help.

GLASS?

The prerequisite for effective reuse of glass is to sort it as purely as possible to achieve the right quality, i.e., free of contaminants such as ceramics, stone and porcelain.

Our recommendation:

REDWAVE CX – High-performance removal of impurities and colour sorting with optimised sorting technology to recognise dark glass

PLASTICS?

The main challenge is recovering the maximum amount of pure material while effectively removing impurities to achieve excellent product quality.

Our recommendation:

With REDWAVE 2i, hollow bodies (PET, HDPE, PP, etc.), foils (LDPE, PP, etc.) and biodegradable plastics can be efficiently recovered; chlorine-containing compounds (PVC), plastics with flame retardants, paper, wood and metals can be effectively eliminated.

PAPER?

The decisive factor is the type of paper to be produced, and above all, the type purity of the wastepaper used. The purer the wastepaper is, the higher the possible proportion of it in recycled paper.

Our recommendation:

REDWAVE 2i offers the necessary prerequisites for future developments in the area of Industry 4.0 and thus becomes a future-oriented solution for the upcoming requirements and needs of the paper industry.

METAL?

Advanced metal sorting refers to the efficient recovery of the material regardless of surface contamination, always achieving the highest purity at the highest capacity.

Our recommendation:

REDWAVE XRF recovers up to 10% more aluminium compared to XRT and sorts heavy metals up to 25% quicker.

WIMAO PLANT IS OPERATIONAL IN RIIHIMÄKI

Since 2021 Wimao Ltd has been installing and further developing its innovative recycling technology in Finland.



The new facilities can easily be integrated with local waste management. The Wimao Recycling Process Technology may be assembled in the proximity of any waste area. The plant's recycling capacity can be adjusted according to need, starting from ca. 4.000 tonnes of various types of plastic waste annually. In addition to plastic waste, a portion of the raw material can be wood, paper and board fibres as well as various mineral, textile, glass and carbon fibres and different polymers. The main advantage of the technology is that it allows content variations and impurities in the raw material, which makes sorting and pre-treatment easier. It also enables the recycling of materials that are hard or impossible to recycle using other technologies. For every tonne of waste processed, one tonne of ecological plastic or composite products is produced and 1–4 tonnes of CO₂ emissions reduced. The Wimao's innovative technology will help to reduce the amount of CO₂ emissions traditionally caused by incineration, which is the standard process used to deal with materials that are normally considered waste. By extending the life cycle of these materials, Wimao Recycling Process Technology is directly contributing to a reduction in CO₂ emissions. In addition, this technology can recycle the currently unrecyclable waste streams, it can be used around the world, and it has the potential to change global industries.

“MOVE TO THE CLOUD OR MISS OUT”



The waste industry seems somewhat reluctant to fully embrace digitization.

Even though digital solutions help make work more efficient and less cost-intensive, as Mark Abbas, CMO of software expert AMCS, explains.

Some 25 years ago Mark Abbas was working in a small Dutch IT company mainly developing CRM systems, when the company was approached to develop software solutions for the waste industry. An industry that was way behind in the digital sector and so offered huge opportunities. “I quickly get bored and am always looking for new exciting projects, so of course I said yes,” Abbas remembers. At the beginning it was primarily back end programmes such as billing systems. But Abbas was intrigued. On the one hand it was the industry’s slowness to accept and adapt new tech-

nology. He saw that there was big potential to change the world, as he puts it.

On the other hand it was the focus on sustainability, which slowly emerged at that time, that made working in the waste industry so exciting. “Especially as I was starting having kids, that became more and more important for me. I really do want to leave a better world for my children.” Soon the IT company collaborated with some larger US companies such as Browning Ferries Industries (BFI). It was the early 2000s and recycling became more and more “a thing” and this development of a circular economy naturally sparked new technical requirements. The

ABOUT

Mark Abbas has been CMO and director of business development at AMCS for five years. He has worked as an IT executive in the waste and recycling industry for over 25 years, developing innovative digital solutions specifically designed for the waste & recycling industry. Before completing a management buyout of GMT, a leader in the Dutch market for industry-specific waste solutions, Mark led various IT projects in a project director role for companies like Suez (France, UK, Middle-East), Renewi (The Netherlands) and Ferrovial (Spain). In 2010 he founded Wastehub, a cloud platform that offers ICT broker services for the waste industry. As the CEO of GMT Europe, a company that was acquired by AMCS in 2016, he completed a number of acquisitions in Europe and Australia and led the company to international growth.

company grew slowly but steadily and now had about 60 people working there. Abbas was then asked if he was interested in running the company and with the help of an investor he led a management buyout. Subsequently they expanded and bought companies worldwide.

CLOUD PLATFORMS CAN SIMPLIFY THE WORKFLOW

By that time he had garnered a lot of experience in the waste industry and thought the time for the next step had come. So in 2010 he founded Wastehub in the Netherlands, a cloud platform that provides ICT (information and communications technology) broker services for the waste industry. On it waste collection, recycling or treatment sites can exchange operational data in real time. Looking back he thinks he might

have been too early with this project.

When a couple of years later he met Jimmy Martin, co-founder and CEO of the AMCS group, he found a kindred spirit. Both have a vision of a global technology company with a mission to change the world through technology in terms of sustainability, efficiency and customer intimacy. For five years now Mark Abbas has been the CMO and director of business development of AMCS, a software company with 600 employees worldwide that offers a single digital platform that combines industry-specific waste solutions for the various areas of the business from ERP (enterprise resource planning) software and mobile technology to route optimization and analytics. "Our cloud based platform provides end to end technology. But of course customers can take from it what they need," says Abbas,



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End-of-Waste recycling plant for the recovery of mixed metal scrap



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RECYCLING

More efficiency in the waste management industry: Digital solutions for billing and pricing services and on board/tablet solutions for the mobile workforce and route optimization and on board weighing, material grading and analytics.



whose Wastehub now is integrated in the AMCS platform. Different systems can be combined with the AMCS technology. The ERP software and route optimization software are the most popular.

NEW TECHNOLOGY IS NOT THE ENEMY

Generally speaking, waste management software is designed to help businesses be more efficient in terms of the collection and disposal of waste. This includes not only billing and pricing services and on board/tablet solutions for the mobile workforce but also route optimization and on board weighing, material grading and analytics. The technology is designed to streamline the workflow, reduce costs and make work more (cost) efficient. The industry has changed, the work is much more complex and needs a lot of planning. It is no longer just collecting waste and dumping it in the ground. The competition is fierce so you have to be more effective and react to change.

SOLUTIONS FOR A COMPLEX INDUSTRY

In creating the best technology and software you have to understand the challenges and requirements the waste industry faces. It's a logistically and legally complex area, especially when working internationally. "I have everyone sit in the back of a waste truck for at least a couple of days before they

"CLOUD BASED PLATFORMS PROVIDE END TO END TECHNOLOGY. BUT OF COURSE CUSTOMERS CAN TAKE FROM IT WHAT THEY NEED."

Mark Abbas
CMO of AMCS

work here to know what it's like, see the logistics themselves so that we can offer the best technology," Abbas says.

AMCS strives to make its platform as accessible as possible. Abbas sees the reluctance of some companies to trust in digital solutions also in the mistakes the tech industry made at the beginning. "In the early stages it all seemed very complicated, there also were a lot of delays and failures," Abbas explains. Companies got scared and were asking themselves if they were risking too much. So nowadays easy and effective solutions are key. "We want our customers to be successful and we won't leave them until they get there."

BASIC TECHNOLOGY TO STAY COMPETITIVE

According to Abbas the industry still has a lot of catching up to do. "We asked companies if they would rather buy a new truck or the technology that would save them from buying that new truck. The majority said: 'Buy the new truck!'" says Abbas. The truck is something more tangible whereas a software program, well, it's a screen you can look at. Some companies still need to be convinced that software solutions can improve their business. But the IT specialist is convinced that it is necessary for all companies to jump on the digital train. "You have to move to the cloud

or you're going to miss out," Abbas is convinced. "I'm not saying you're not going to survive but you will miss out on the opportunity of rapidly adopting new technologies." There is just so much potential to save money in the long run.

According to Abbas there are some basic digital solutions each and every company should use:

A digitized route sheet, that is to say a completely digitized order flow. There should be no paper in and out of the truck. Because of the pandemic that already changed a lot in a short amount of time. Many companies that relied on paper route sheets handed out to the drivers in the office had to reorganize the process because offices were closed.

It's also not feasible to have the job and billing system separated.

For recycling companies a material grading system is essential. A lot

"GET YOUR BASIC PROCESSES UP AND RUNNING IN A DIGITIZED WAY, CLEAN UP YOUR DATA BEFORE YOU LOOK AT THE FANCY STUFF"

Mark Abbas
CMO of AMCS

of money is lost because of wrongly graded material. "Get your basic processes up and running in a digitized way, clean up your data before you look at the fancy stuff," Abbas recommends. If a route optimization system fails, it's usually because of the lacking data.

THE FUTURE IS SMART

But what does the future hold? As things get smarter – our phones, cars and even our homes can be smart nowadays – new investments are necessary. Machine learning and algorithms are the project of the future. AMCS has some pilot projects in the works from ERP software that can predict when customers will pay their invoice to autonomous driving and contamination detection. What now may sound like something out of a sci-fi novel might in the not-so-distant future be the gold standard. —



EUROPEAN TOUR!

Max-AI® AQ-C: The Industry's first Collaborative Robot

A demo loop featuring the Max-AI® CoBot will be on display at several trade shows this fall including:

Pollutec: October 12-15

Ecomondo: October 26-29

PRSE: November 4-5

Come see how Max is automating recycling operations throughout the world at record pace, from CoBots to larger robotic sorters to optical sorters. These intelligent solutions provide reliable performance all day, decrease operations costs, improve recovery and boost safety. What can Max do for your system? max-ai.com.



THE MAX-AI® PRODUCT LINE



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PRODUCT NEWS



**ZenRobotics
Fast Picker:**
AI powered
for efficiency.

AI POWERED SORTING ROBOTS FOR SMARTER, FASTER & SAFER WASTE MANAGEMENT

Half of the total waste produced in the European region is recycled or recovered, but a hefty amount still ends up in landfills - that's over 900 million tonnes annually. Operators are looking to new technologies to gain more value out of waste. What's in the way of Europe reaching more efficient and sustainable results on the waste management front?

First, local Materials Recovery Facilities (MRF) are faced with the high volumes of waste, coupled with a decline in manual labour. Second, the technologies widely used today aren't able to achieve the high purity in materials expected by demanding European customers. Finally, building and upgrading MRFs to meet modern demands can be costly. In short, the industry needs solutions that can sort waste incredibly fast and efficiently, fit into existing facilities easily without huge investments and adapt to changes in waste as autonomously as possible. This is where ZenRobotics' intelligent robots come into the picture.

ZenRobotics Heavy Picker is an AI powered robot in the market equipped to deal with heavy waste, such as bulky industrial discards, that comes from construction sites. With 1-3 heavy-duty robot arms and a mechanical gripper, the robot can lift objects up to 30kg and make over 6000 picks per hour. The robots sort multiple fractions from C&D and C&I waste, e.g. wood, metal, concrete or plastic on the same go. They can even prioritize the most valuable objects using a smart,

unmanned process. This robot has an extra smooth installation, too. It can be integrated into existing facilities or installed as a standalone solution that requires no more than space on the site. The result: a waste sorting system that's more accurate and profitable, and much safer for the people involved.

For lightweight packaging waste made from plastic, fibre and/or metal, ZenRobotics Fast Picker is an option. It sorts plastics in different colours and quantities including HDPE, LDPE, PET or PETE, PP and PS, as well as grey and brown fibres including beverage cartons and metals such as UBC. The Fast Picker can be easily retrofitted for different conveyor widths and multi-lane conveyors. This is an optimal solution for keeping up with the evolving demands of waste management, while maximizing profit along the way. Each MRF has unique sorting needs. ZenRobotics will work together with operators to find the most suitable solution to get more value out of waste. ZenRobotics has installations across some 20 countries and 4 continents.





VECOPLAN AT ECOMONDO: THE PROBLEM SOLVERS

Vecoplan will be demonstrating its professional expertise at Ecomondo with the Vecoplan Smart Center (VSC).

Vecoplan AG will be there as a leading specialist for efficient recycling technologies and as a solution provider for mechanical material processing. Vecoplan will be demonstrating the Vecoplan Smart Center (VSC) and other innovative products at Ecomondo. The VSC, a new and powerful digitalization concept, offers a modern communication interface between Vecoplan and the customer's plant – the VSC.connect system. The user can access services such as document management and remote service. The integrated, intuitive VSC.control operating panel serves as a communication medium

for the machine's control system and as a live link to the Vecoplan technicians. This enables the solution provider to see everything that's happening on the customer's Vecoplan machines. The VEZ 2500 TT, which Vecoplan will be showing in Rimini, is also equipped with this operating panel. This high-performance post-shredder is used for producing refuse-derived fuels (RDF) from production and sorting waste, packaging materials and the high-calorific fraction of domestic and commercial waste. The resulting fuels can then be used as an energy source in cement works and power plants.



The system that sees it all:
Vecoplan technicians can access the control system, enabling them to detect, analyse and correct errors in real time.

MAX-AI IS DRAMATICALLY CHANGING THE WASTE & RECYCLING INDUSTRY

Artificial Intelligence is driving improvements in facility design, operational efficiency, safety, recovery, system optimization, maintenance and more.

To keep ahead of competitors, operators need to integrate the latest sorting and reporting technology into their recovery facility. It starts with the Max-AI® VIS (Visual Identification System), encompassing both a vision system and multi-layered neural network to see and identify objects, and is able to provide material characterization in real time. VIS can be used as a standalone product or paired with robotic sorters: Max-AI AQC (Autonomous Quality Control), Max-AI AQC-C; or with optical sorters: NRT SpyDIR® with Max-AI, NRT ColorPlus™ with Max-AI. The Max-AI® AQC-C, consisting of a vision system (VIS) and at least one cobot, is quickly and easily programmed and installed in existing recycling facilities. These cobots work safely alongside people, unlike larger Max-AI AQC robotic sorters which are

positioned above the conveyor and require structure to support the robot and guard employees. The AQC-C is positioned next to the belt, between chutes – the same way a person is positioned – and can be installed in sort cabins, on narrow walkways and in other tight locations. The cobot is also a scalable solution – up to four robotic sorters can be installed (or added later) with one Max-AI VIS. Each sorter can sort up to 40 picks per minute and up to four different material types for a total of 160 picks per minute with four cobots! In addition, the neural networks can be retrained to identify new materials as waste streams change or if a customer relocates them inside their plant. Have a look at the demo loop with the Max-AI® AQC-C at Pollutec on October 12-15; Ecomondo: October 26-29; and at PRSE November 4-5!



The Max-AI demo loop:
Take a closer look at the solution at Pollutec, Ecomondo and at the PRSE.

ECOMONDO
THE GREEN TECHNOLOGY EXPO



THE GREEN TECH WORLD FAIR

On October 26, Ecomondo, the global benchmark event for technological and industrial innovation for circular economy, will open its doors. What to expect, hear and see in Rimini this fall.

From October 26 to 29 the international event with the innovative format will for the first time after the most impactful times of the pandemic bring together all sectors of the circular economy in a single platform in Rimini, Italy: from material and energy recovery to sustainable development.

Italy is among the leading countries in Europe in the green and circular economy, in particular in energy efficiency, waste recycling and resource productivity.

For this reason, Ecomondo is a reference point in the international panorama, where all the leading companies of the sector can meet and discover the trends, innovations and new technologies and exchange views with sector professionals.

ISWA and Waste Management World will join Ecomondo with a booth together with ATIA-ISWA Italia, our national member in Italy. Come have a chat with us in Italy and catch up. With the support of the Ecomondo Scientific Technical Committee, ISWA will





Ecomondo 2021: Four days of exchange with top experts from the European Commission, innovators, international and national authorities, scientists, decision makers and investors.



organize an international session: A roadmap towards sustainable waste management worldwide, on 28 October from 4 pm.

WHAT TO SEE, HEAR AND EXPECT FROM ECOMONDO 2021?

This year's Business Platform will be a driving force for environmental business and an ecological transition accelerator: four days of business and know-how exchange with top experts from the European Commission, in-

novators, international and national authorities, the world of science and university, decision makers and investors. All gathered from 26th to 29th October, at Rimini Expo Centre in Italy, for Ecomondo (24th edition) and Key Energy (14th edition). "These two shows of ours," explained Corrado Peraboni, CEO of IEG - Italian Exhibition Group, "are green economy and renewable energy leaders in the Euro Mediterranean basin. They present products and compare

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ECOMONDO SPECIAL

projects for the global green challenges that every country has been called upon to resolve, particularly those on the African and European continent.”

As IEG’s Green&Technology group exhibition manager, Alessandra Astolfi, adds: “The African embassies of Algeria, Egypt, Morocco, Tunisia, Rwanda and Kenya, to name but a few, will be represented at the trade shows, as well as companies, associations and delegates from the aforementioned countries and from Europe, to further their know-how, develop networking and finalize business agreements.”

The 2021 edition of Ecomondo and Key Energy will ignite an authentic debate and business platform, further enriched by one-to-one meetings that operators and companies will be able

ALL EVENTS ON A GLANCE



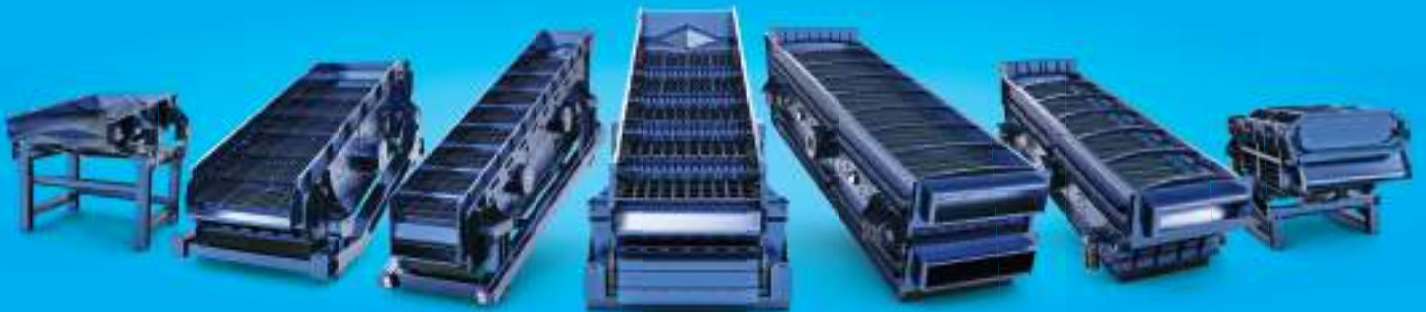
en.ecomondo.com/events/program/events-schedule

en.keyenergy.it/events/program/preview-of-events-21

to organize even prior to the event. Besides the exhibition area, which will occupy all the Expo Centre and is the core of Ecomondo and Key Energy, the two shows will also feature 150 seminars and conferences – many international and in English – officiated by professor Fabio Fava and Gianni Silvestrini as heads of their respective Scientific and Technical Committees. The main theme, the Mediterranean basin: as part of the BlueMed Pilot initiative and with the participation of the European Commission, the event will illustrate the production and plastic recycling strategies for a clean sea and for recovering degenerated ecosystems and habitats. Other events will deal with the topic of circular bio-economy proposed by the Mission Soil Health and Food Mission

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Board to ensure that 75% of soils are healthy by 2030, while workshops on plastic waste transformation will highlight the opportunities of pyrolysis systems as well as the legal obstacles that are still blocking these types of technologies.

AFRICAN GREEN GROWTH.

Within the context of Key Energy, the opening conference will offer the chance to shed light on the opportunities for Italy linked to the PNRR (National Recovery and Resilience Plan), on incentive policies for energy transition and the assessment of their impact on the Nation System, while the Africa Green Growth event, in collaboration with ITA, Italian Trade Agency, will directly involve institutional representatives and African associations from Kenya and

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en.ecomondo.com
en.keyenergy.it

Rwanda as well as Italian companies in Sub-Saharan Africa and will highlight the future role of wind energy in the African continent's energy mix. And, in line with the events, the electricity sector at the centre of European actions to re-launch the economy: institutions and European associations will meet with Italian interlocutors to define the best strategy to fulfil the Green Deal.

This year, running alongside Ecomondo and Key Energy, will be SAL. VE, the biennial Environmental Motor Show, organized by IEG in partnership with ANFIA (Italy's automotive industry association), which will be exhibiting the entire range of vehicles and fittings for urban hygiene, street cleaning and solid and liquid waste collection and transportation. —

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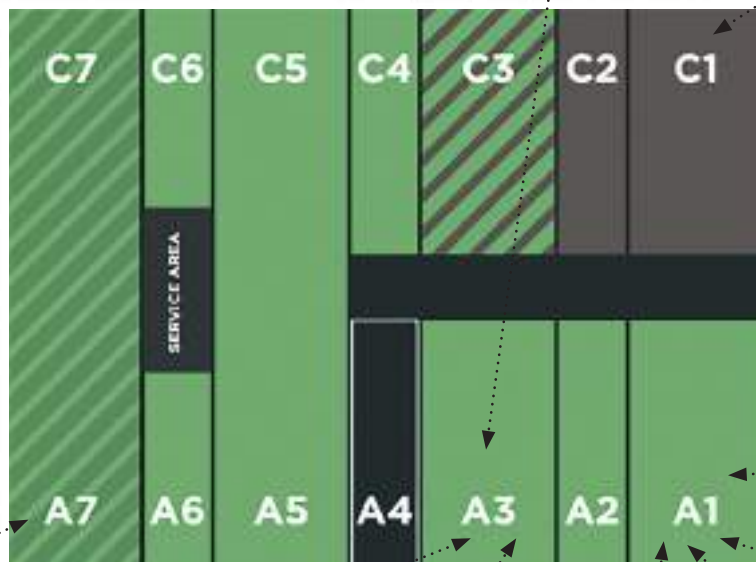
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With over 80,930 exhibitors at this year's Ecomondo, don't walk round in ever decreasing circles – plan your route and head straight for the treasure.

Molinari offers a complete range of granulators and shredders capable of facing any shredding challenge, with machines designed to treat rubber and PFU, waste, plastic, wood, and much more.
Hall A3, Stand 036
www.molinari-recycling.com



MORO KAISER is part of the KAISER Group and an internationally leading manufacturer of combination vehicles for sewer and industrial cleaning for liquid and dry waste, as well as pumps and components.
Hall A7, Stand 005
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ELDAN Recycling is your supplier of high-quality plants and machinery for establishing or expanding a profitable business for recycling of tyres, cables, e-waste, aluminium, and many other materials! ELDAN takes care of everything from drawings and planning to electrical control and supervision of installation – making your life easier.
Hall A3, Stand 197
www.eldan-recycling.com



Panizzolo's recycling solutions include machinery such as industrial shredders, hammer mills and separation systems designed by the company and deriving from 30 years of direct experience. The equipment produced is characterised by strong modularity and flexibility, allowing end-of-waste treatments of the metal scrap.
Hall A3, Stand 78
www.panizzolo.it



Forrec srl designs, manufactures and installs single machines and complete lines for the treatment of any kind of municipal and industrial waste
Hall A1, Stand 050
www.forrec.eu

The Environment Division of Baioni Crushing Plants is dedicated to the design and production of sludge sewage treatment plants, horizontal centrifuge for sludge dehydration and provide an integrated project specific approach for environmental remediation of contaminated site with soil washing technologies and stabilization/solidification technique.

Hall C1, Stand 083
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Based in Jesi, in Italy, Pieralisi is world-leading experts in extraction and centrifugal separation. We design and manufacture solid-liquid and solid-liquid-liquid separation solutions for multiple applications. Pieralisi is an unrivalled, reliable and long-lasting partner.

Hall D3, Stand 002
www.pieralisi.com



Venza designs processes for water treatment applying chemical, physical and biological technologies. The group is able to identify technical and economic solutions that can benefit of tax advantages and incentives, lowering investment and management costs: in particular, can provide high energy efficiency evaporation systems.

Hall D3, Stand 186
www.venza.eu



SGM Magnetics is leader in different in-house separation technologies such as inductive based sensor separators, X-ray separators, color sorters, gravimetric separation and full process definition. Since 1954 SGM is the reliable partner of the global leading companies in the steel and metal recycling industry. Our business model is based on providing technological expertise in order to maximize our customers profits and yields and to being close to them through a network of SGM Magnetics corporations located worldwide.

Hall A1, Stand 165
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Tiger Depack by Cesaro Mac Import, is a targeted technological solution for the treatment of organics waste material, for the separation of the packaging from the organic with an overall recovery approaching 100% both in diversity and quantity.

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ISWA INFORMATION

Visit www.iswa.org for more information



CLOSING THE LOOP FOR MATERIALS DIFFICULT TO RECYCLE

Novel innovations in the European Union
to increase recovery and re-use.



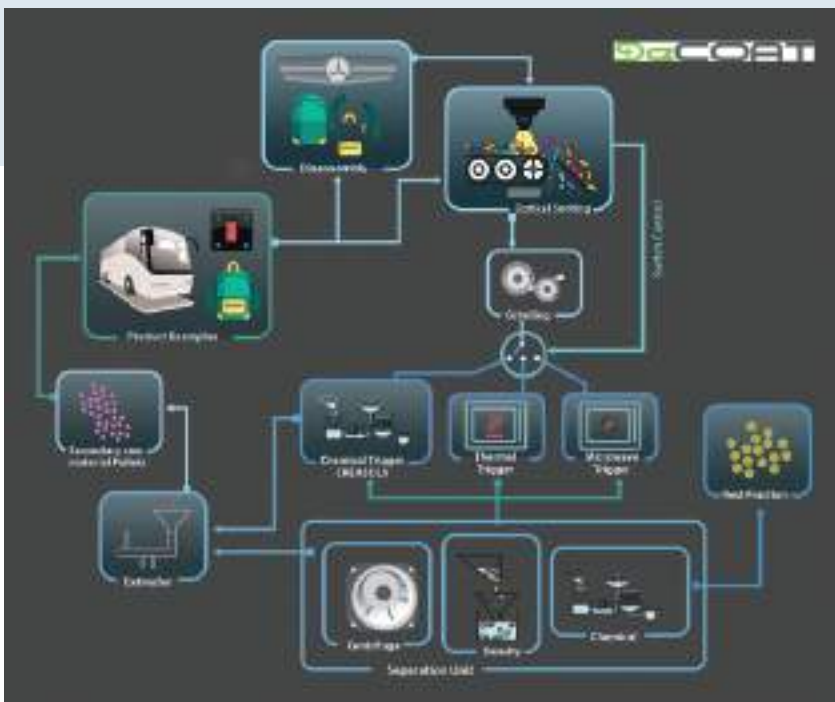
With a growing need to reduce greenhouse gas (GHG) emissions, recycling and circular thinking can impact the reduction of GHG emissions significantly. By producers reducing the production of new products, thereby decreasing the demand for virgin materials, this crucial step avoids GHG emissions from the extraction and processing of virgin materials. New innovations supported by the European Union are making strides to increase the circularity of materials deemed 'difficult to recycle.' These projects are supported by the EU H2020 programme, the EU's largest research and innovation funding programme. To facilitate circularity, these projects focus on

key innovations in eco-design, end-of-life, new innovations in design, and developing novel monitoring systems to optimize sorting and facilitate repair and re-use.

Launched between 2018 and 2021, ISWA partners in three EU projects: ALMA, DECOAT and MultiCycle which focus on innovation in the recycling sector. Each project brings unique developments focusing on circularity, eco-design, end-of-life and monitoring systems. The ALMA project will develop a novel battery electric vehicle structure for a passenger car with 45% weight reduction potential compared to current baseline at affordable costs. DECOAT focuses on enabling the circular use of textiles and plastic parts with (multi-layer) 'coatings', which are typically not

FOR MORE INFORMATION

This is part of a larger, feature-length article, which will feature on the Waste Management World website. Visit www.wmw.news to read the article in full.



recyclable yet. MultiCycle is demonstrating advanced and sustainable recycling processes and value chains for plastic-based multi-layer packaging and fibre reinforced automotive components.

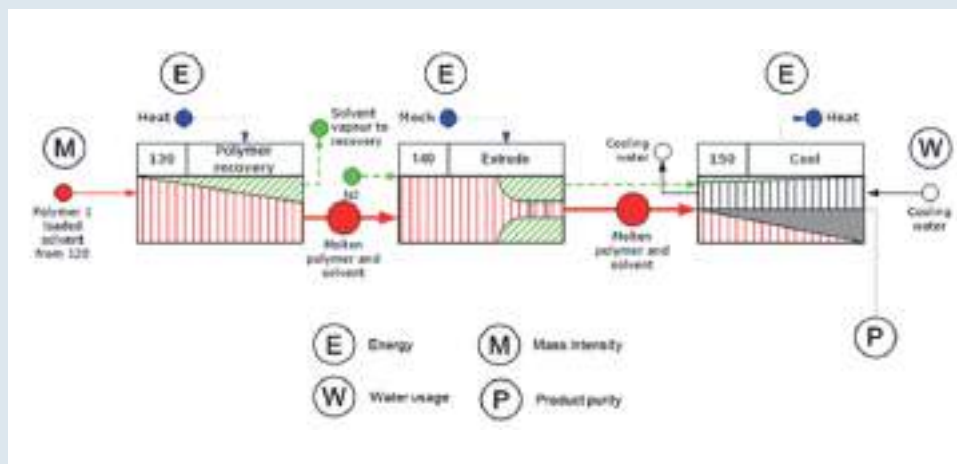
HOW IS EACH PROJECT WORKING ON ECO-DESIGN FOR THE FUTURE AND IS END-OF-LIFE TAKEN INTO CONSIDERATION?

ALMA focuses on the development of a novel electric vehicle structure for cars with reduced weight and en-

vironmental impact thanks to the adoption of an integrated circular approach across the entire life cycle, supported by LCA and LCC tools.

ALMA will contribute to reducing the environmental impact of the production and the end-of-life phase, promoting the remanufacturing and recycling of the vehicle structure. The use of remanufactured parts and components can conserve up to 88% material and 56% energy use compared to new parts. In addition, ALMA's circular-economy approach is tapping into the sustainable development policies and regulations of the EU since ALMA solutions are estimated to contribute to the reduction in greenhouse gas emissions (GHG) and the potential reduction of 40-45% waste to be landfilled or burnt.

For the DECOAT project, in view of a circular and sustainable economy, eco-design is important as 80% of the environmental impact of a product is determined during the design phase. Multiple aspects can be taken into account to lower the footprint, like design for repair, design for recycling, design for (dis)assembly, design for composting, design for longevity etc. Some of these



Simple sustainability driver prompts can act as an early pointer for areas of focus in subsequent detailed Life Cycle Analysis; in this example energy is involved at each step

design principles go hand in hand, while others are more difficult to reconcile (e.g. compostability and longevity).

Within DECOAT, the main focus is on 'design for recycling'. Multi-layered textiles and plastics are currently being incinerated or landfilled as the presence of a coating or paint hampers the recycling process at end-of-life. By removing the coatings or paints, the bulk material can be recycled, enabling circularity.

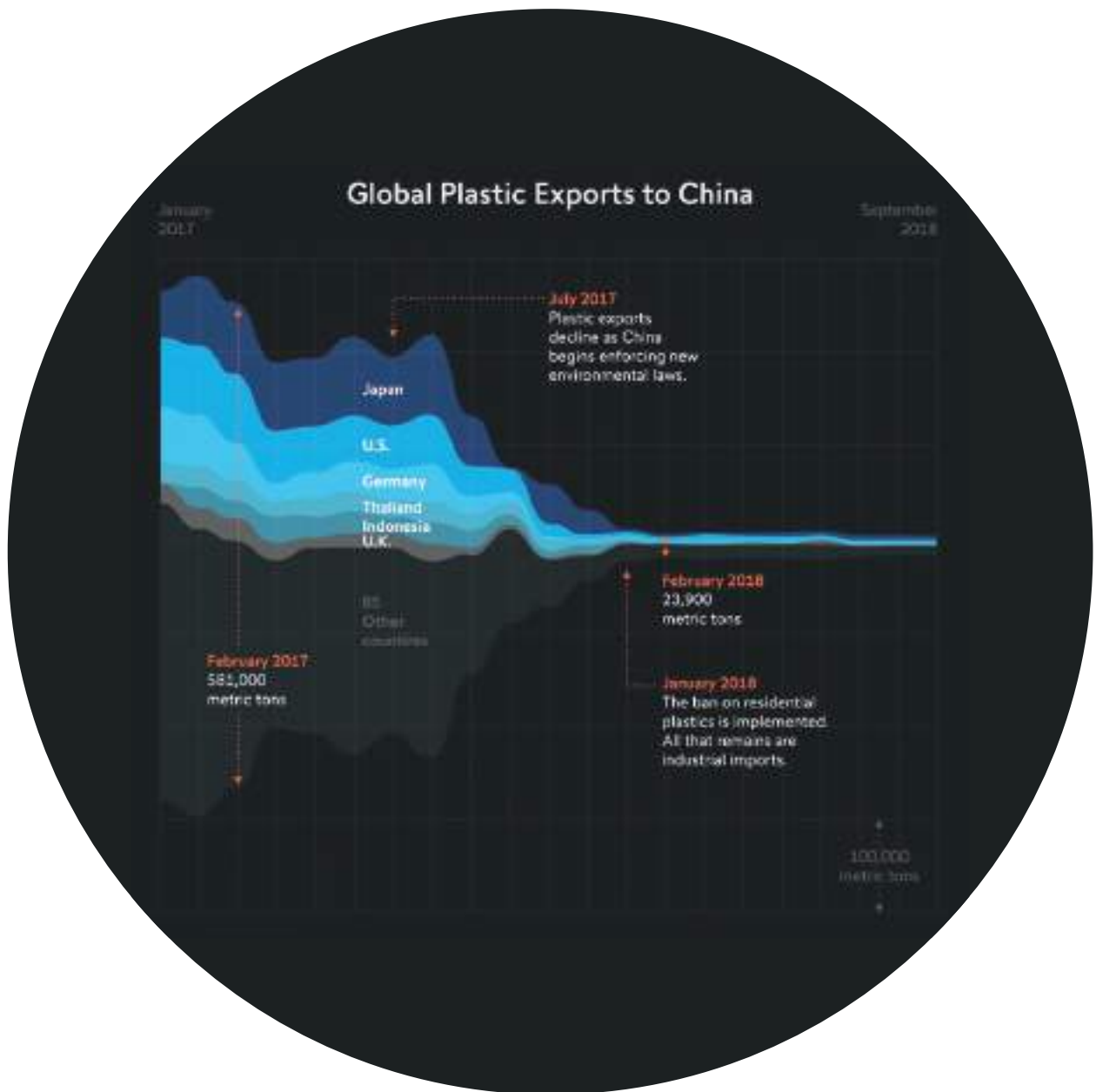
The project focusses on implementing triggerable additives into the adhesive layer during the production phase (eco-design). At end-of-life, these additives will be activated by a specific trigger (like heat, microwave, steam), leading to separation of the coatings/paints and the bulk material. This trigger-based technology developed within DECOAT could also serve for 'design for disassembly' purposes. A second approach which is being investigated is the use of a dissolution process (Creasolv®). This process, based on green solvents, allows coating/paint layers to be dissolved or delaminated. This debonding process can be applied to conventional products. By choosing a more easily dissolvable coating layer during the

design phase, the debonding process at end-of-life can be facilitated.

From the perspective of MultiCycle, sustainable process and product design thinking needs to take a whole life perspective. It's no use, for example, replacing the environmental harm of plastic waste with emissions from inefficient energy recovery options, or losing value by downcycling plastics to lower grade applications which ultimately fail to prevent further consumption of primary materials. That's why MultiCycle is targeting closed loop recovery of near virgin-quality recyclates from multimaterial plastics: materials whose necessarily complex design (needed for functionality) makes them particularly challenging to recover materials from both technically and economically using existing recycling routes. Designing an industry-ready process to meet this challenge involves combining innovative process chemistry and advanced control systems. To help keep process designers' "eyes on the prize" MultiCycle partner Britest champions the use of visible sustainability driver prompts when building conceptual whole process representations used early in the MultiCycle design thinking. —

These EU projects have received funding from the European Union's Horizon 2020 Research and Innovation Programme under the following Grant Agreement No: ALMA: 101006675, DECOAT: 814505, MultiCycle: 820695.

FLASHBACK: HOW CHINA'S PLASTICS BAN THREW GLOBAL RECYCLING INTO DISARRAY



Source: National Geographic/Visual Capitalist

The world's reliance on China for waste management was never a sustainable solution. At the beginning of 2018, China's National Sword Policy banned the import of foreign recyclables – and the imports plummeted by 96% in one single year.

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