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Artscape GIVING SHAPE TO SUSTAINABILITY

OF INDIAN RECYCLING INDUSTRY

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EDITORIAL

aste. Recycling. Resource. These are the three magic worlds that our life revolves around. That is why Global Waste Management Outlook, the scientific global assessment of the state of waste management by the International Resource Panel of the United Nations Environment Programme assumes a lot of importance.

The flagship publication presents a stark picture of global inequality with the growth story of global production and consumption of material resources illustrated as the main driver of the triple planetary crisis. The extract from the current edition of the report is a sample and it should potentially guide you to the bible on resourcefulness of waste. Fetch it. Talking about waste, and a waste that we seldom recognise but which is all around, thanks to the galloping population, is the hospital waste. It is increasingly contributing to the large pile of waste that is hazardous and has the potential of nothing less than an epidemic. Our efforts will help to sensitivize everybody to the hidden dangers, if the waste is not addressed seriously and on an urgent basis.

Vishwanath Mallabadi Davangere is a Bangalore-based artist who is using his ingenuity to turn even characterless mobile phones to an art form. His beautiful installations across the city help to give out messages to the society at large about the perils of mindless consumption and over use.

The second edition of MRAI's International Business Summit at Bangkok is getting ready to equip you for the next phase of growth. Are you ready?

See you

Ayyappan V



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JUNE 2024



PET RECYCLING

On with the Learning Curve

Packaging and Recycling Consultant, Rajesh Kumar Gera gives an overview of Plastic industry, its various trends, challenges and opportunities.

ARTSCAPE

Giving Shape to Sustainability

An eco-artist based in Bangalore, Vishwanath Mallabadi Davangere transforms e-waste into stirring pieces of art, blending creativity with the environment.

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'Recycling for Sustainable Future'

Gurashish Singh Sahni, COO and Co-Founder of ReCircle shares his work and passion in support of sustainable economy

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Figuratively Speaking

Highlights from the latest World Steel Association release include sectoral structural suggestions

COVER STORY

Medical Waste : A Looming Concern

Biomedical waste management in India is a pressing issue, requiring improved infrastructure and awareness to mitigate environmental and health risks effectively.

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Turning rubbish into a resource

Waste generation should be prevented and MSW management should be safe and cost-effective to achieve the objectives of Global Waste Management Outlook 2024.

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Automobile: The Future is Circular

With its high carbon footprint, the global automobile industry is aiming towards a more sustainable future

EUWASTE RULES 12

Courting Trouble

What is the latest development of the global recycling industry today and how leading associations are looking at it ?



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Ministries of Steel and Mines have got new ministers under the newly formed Modi Government at the Centre

SHRI H. D. KUMARASWAMY ASSUMES CHARGE AS THE UNION MINISTER OF STEEL, ON JUNE 11, 2024

Change of Guards

Prime Minister Narendra Modi has entrusted Haradanahalli Devegowda Kumaraswamy H. D. Kumaraswamy of JDS and Shri Gangapuram Kishan Reddy of BJP with the ministries of Steel and Mines, respectively.

Shri Kumaraswamy will serve as 22nd Minister of Heavy Industries, and 35th Minister of Steel. His tenure as Chief Minister spanned two terms, from 2018 to 2019 and from 2006 to 2007. Speaking to the media Shri Kumaraswamy emphasized his



commitment to strengthening the economy, with an aim to ensure a rise in country's GDP. "For the entire country's prosperous growth, we will work tirelessly," Minister added.

Shri Reddy has been serving as Minister of Tourism, Culture and Development of North Eastern Region of India. A member of the Bharatiya Janata Party since 1980, he is an MP representing Secunderabad.

Interacting with the media after assuming charge of office, Shri Reddy expressed his gratitude to the Prime Minister Shri Narendra Modi for entrusting him with this responsibility to serve as the Union Minister of Coal and Mines and giving the opportunity to serve the people of Bharat.

He stated that both the ministries of Coal and Mines will work with determination, devotion, dedication, honesty and transparency towards making India AtmaNirbhar (self-reliant) in the coal and mining sector.

During a review meeting with the senior Officials of Ministry of Mines, CPSEs and attached offices, the minister was presented an overview of the ministry. Besides looking at the achievements of the ministry and long-term plans, the discussion focused on crucial aspects including automation, innovation, sustainability and deploying advanced technologies to make Bharat self-reliant in the mining sector.

SHRI REDDY ASSUMES CHARGE AS THE UNION MINISTER OF COAL AND MINES, ON JUNE 13, 2024.

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EU WASTE SHIPMENT REGULATION

Courting TROUBLE

The latest development in recycling and how the two leading associations view it

fter the European Parliament gave its final approval of the review of the Waste Shipment Regulation in February, the Council of the European Union ratified it on April 30 and was published in the Official Journal of the EU. The legally binding regulation will apply to all EU member states in May 2026, with some important provisions and further implementing regulations entering into force in May 2027. A transitional period of three years is given before the new regulation's export rules for non-OECD countries replaces the 2006 Waste Shipments Regulation.

The main features of this regulations are:

1. Shipment of waste in the EU: Setup of control procedures for the shipments of waste, improve traceability of waste movement and encourage shipments for recycling.

2. Outside the EU: guarantees that the non-hazardous waste is only shipped outside the EU, if managed in an environmentally sound manner and by ensuring that independent audits are carried out in

the facilities to which they ship waste, in the destination countries.

3. Tackle of illegal shipments: Enhance cooperation and coordination on enforcement.

In the case of export prohibitions of non-hazardous waste to non-OECD countries, will be allowed only when such non-OECD country notifies its willingness to import and demonstrates its abilities to manage the waste in an environmentally sound

manner and by ensuring that independent audits are carried out in the facilities to which they ship waste, in the destination countries.

In the case of India, the per capita consumption of steel has historically been low and will continue to experience a shortage of domestic scrap waste, since its consumption has not yet reached global levels. The importation of steel scrap waste will be a significant resource in the production of steel. Being the second largest importer of steel scrap waste globally, India consumed around 10.98mt in FY23-24 of which nearly 3.63mt of scrap came from Europe.

> Considering the same, the industry has been requesting the Steel Ministry to take note of these regulations and initiate the necessary steps to get India registered as a country willing to import waste from the EU.

> > It is perceived that the European waste regulations, particularly those focused on waste management, re-



'The Rules will create competitive disadvantages for recycling in many parts of the world'

Draft revisions fail to support circular economy goals, it points out

The Institute of Scrap Recycling Industries (ISRI), which is recently rechristened as Recycled Materials Association (ReMA), has applauded the European Commission's emphasis on the protection of environmental and human health in the trade of end-of-life materials. It also supports the needed enhancements outlined in the proposed revised regulation to combat illegal trade in true waste. "Effective implementation, compliance, and enforcement is a shared



responsibility, and we believe that setting clearer criteria for EU Members States to increase oversight will go a long way to addressing the harmful practice of illegally shipping waste to third countries."

"We are also relieved that the proposed Regulation will not be imposing trade restrictions on recycled commodities between the United States and Europe. However, the Regulation fails to provide adequate, clear, and concise definitions and distinctions between valueless discarded waste and specification-grade recyclable commodities that are in high demand by global manufacturers with
global supply chains," said a press release from the Association.

"Imposing burdensome procedures on exporters to judge another country's policies and recycling infrastructure or worse, banning trade of recyclable commodities – especially when no such comparable regulations are being imposed on

carbon-intensive, primary raw materials extracted from the earth – will lead only to greater stress on the environment from mining and manufacturers being challenged to meet sustainability goals. The Regulation will thus create competitive disadvantages for recycling in many parts of the world, including in Europe, potentially leading to less recycling and falling short of sustainable development goals, the circular economy, and the Green New Deal," it added.

'Strict EU waste export rules risk disrupting global recycling markets'

Imposition of increased trade barriers will likely lead to less efficient supply chains, it adds

While supporting the intended improvement of combatting illegal waste shipments by enhancing digital procedures, Bureau of International Recycling (BIR) has said that always it been very vocal about the heavy implications this regulation has for the global trade in recyclables. Strict

EU waste export rules risk disrupting global recycling markets, hindering investment and innovation, creating trade barriers, and ultimately damaging global efforts towards a circular economy. Importantly, this stems from a failure to differentiate between material streams and markets that are paramount for recycling from a regulatory perspective. Additionally, the imposition of increased trade barriers and layers of bureaucracy for both OECD and non-OECD partners will likely lead to less efficient supply chains for the recycling industry.

A statement from the organisation read: 'BIR reiterates that it fully supports regulations that aim at the protection of both human health and the environment, but

also highlights that raw materials from recycling should be allowed to play their important part in an equitable, global move towards a circular economy and decarbonisation. BIR will continue to engage with stakeholders and multilateral forums throughout the remainder of the ratification and enforcement process, as well as through the future implementation of the regulation."

cycling, and environmental protection, can have several implications for India and Southeast Asia.

Overall, while European waste regulations primarily aim to improve environmental standards within the EU, their implications extend globally, influencing waste management practices and policies in regions like India and Southeast Asia. This shift towards sustainable waste management practices can ultimately benefit both the environment and public health in these regions, albeit with initial challenges and adjustments required.



MAISER

IBIS 2024



SAWASDEE BANGKOK

Come July 25, the second edition of MRAI's International Business Summit is all set to splash its spell

angkok, capital of Thailand and home to ultramodern cityscapes next to quiet canal side communities and the iconic temples of Wat Arun in Thailand, is calling you once again to MRAI's International Business Summit. It is the second time that grand event is coming to the city known for tropical beaches, opulent royal palaces, ancient ruins and ornate temples displaying figures of Buddha – the embodiment of knowledge and enlightenment amidst the uplifting and enchanting life in all its splendour.

The Government of Thailand and High Commissioner of India have put in their weight behind the programme, which, past experiences show, will undoubtedly work as an extension of India Government's programmes for furthering its Go East Policy.

The super success of the last year's Business Summit has helped MRAI to bond well with regional authorities and its trade and industry.

No wonder, the glittering inauguration would witness who-of-who of the trade and industry in the region sharing their thoughts and actions. Deliberations are set to see Indo-Thai trade relations



The second edition is bound to benefit from the experience we gained from our maiden event in Bangkok last year – making it another memorable conference. Our team has put in every effort to make the event the best. I would like to thank the Government of Thailand and Indian Consulate for their support and cooperation.

SANJAY MEHTA, President, MRAI



The Bangkok edition is all set to record new heights in terms of exhibitions, delegates and networking opportunities. That is why we are confident of more delegates from the South Asian Regions attending the event. Besides, recyclers and traders from India's neighbouring countries would be present in large numbers.

AMAR SINGH, Secretary General, MRAI





& global practices getting a leg up with speakers underlining the salient features of the growing relationship between the countries of the region. The emerging opportunities that recycling as an industry in the region are going to get a new narrative, where cooperation and collaboration would further promise many new ventures.

Going forward, a series of sessions are planned to take up important trade and industry related topics on to discussions.

For example, the spotlight session on ferrous recycling which will look at the dynamics of ferrous recycling in Asia.

The session on Battery Recycling will focus on global demand & supply of raw materials.

The Spotlight on Stainless Steel will analyse and help underscore the dynamics and the key demand drivers for the Industry.

The Session on Aluminium Recycling would throw more light on Asia's role in fuelling India's growth

The Spotlight on Copper Recycling would be looking at the demand & supply scenario in global energy transition.

For the first time, MRAI would be demonstrate its expertise of bringing and showcasing some of the brightest jewels of global recycling trade and industry in Bangkok.

The purpose of the expo, which will have a sizable foreign participation, is to provide a platform to those who are unable to make it to the MRAI mega yearly international carnival on recycling with their products and services, better known as International Material Recycling Conference and Exposition in India.

If there is MRAI, can networking be far behind? The entire event is conceived and designed to give maximum exposure to participants to interact and exchange that would help further their businesses.

All the days would witness gala dinners and full-blown entertainments that would make the event a really memorable one.

Icing on the cake, if one could say that, would be the plant visits that are scheduled to leading recycling facilities in Bangkok.







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Leading the way

Assessing 48 countries' recycling performance, Global Recycling League highlights global disparities and successes

ustria has been revealed as the world's best country for recycling in a new study by Reloop and Eunomia Research and Consulting. Wales leads the way in the UK, coming in at second. Northern Ireland was ranked ninth, England at eleventh and Scotland at 15th among the 48 countries included in the comparison.

Published on World Environment Day, 'Global Recycling League Table — Phase One Report' examined the recycling performance of 48 countries, including the countries that report the highest recycling rates and many of the world's largest economies. The study also includes lower income countries in Latin America, Asia, and Africa, to highlight global disparities. Tomra,

The Welsh Government, International Aluminium Institute and the Can Manufacturers Institute in collaboration with Reloop funded the research with the aim of ascertaining who was doing what well when it comes to recycling.

The report compares countries' recycling rates on a like-for like basis. The focus is on 'municipal waste' recycling rates, in line with the definition used by the EU. A country's performance was analysed from their officially reported recycling rate (if they have one – wherever possible, using a figure that approximates a "municipal" recycling rate) and endeavours to use underlying waste data and other published sources to adjust the results to present them on a consistent basis.

The report found the world's top recyclers are not exceeding a 60% recycling rate for municipal waste, once differences in reporting practice are accounted for. Eight of the top 10 are to be found within Europe, with seven being in Western Europe, reflecting the longstanding strate-

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gies and policies that have driven investments in collection, logistics, sorting and reprocessing across the continent.

The exceptions are two East Asian nations, Taiwan and South Korea, which also have long-established collection and treatment systems. These results highlight the importance of long-term investment in making recycling convenient and efficient, as well as the role that establishing behavioural norms over many years plays in creating a recycling culture. The countries with the biggest drops in reported recycling rates were Singapore, South Korea, Spain, and Germany. A few countries saw adjustments increase the performance or compensate for the fact that they were not reporting recycling rates - China and South Africa being the biggest beneficiaries.

The work also looked at collection for recycling rates for glass, metal, and plastic beverage containers. Whilst data availability was more limited, we found there were significant differences in the amounts of beverage containers being placed on the market, and little correlation between consumption and recycling performance.

While the countries with the highest municipal waste recycling rates also generally had good beverage container collection rates, the countries with the greatest amounts of beverage containers placed on the market (US for plastics and metal, and Australia for glass) had quite low 'collected for recycling' rates.

The features of countries that had high municipal recycling rates included:



According to the report, 60% of municipal waste is recycled by the world's top recyclers



- A formal waste and recycling strategy, including clear goals regarding targets to be achieved and steps to be taken to improve.
- Widespread separate collection of common recyclables, including organics, to provide households and businesses with a convenient way to recycle.
- Methods to ensure that recycling is

funded on a "polluter pays" basis, such as EPR, to incentivise producers to avoid selling unnecessary packaging and to prevent performance from being restricted by the funds available to public bodies;

- The use of financial and other behavioural incentives to encourage households and businesses to use the recycling system (e.g. to avoid costs).
- The study found that many of the lower income countries from Latin America, Africa and the Middle East have the lowest performance both in terms of recycling and data quality. Moreover, a big part of their waste collection and recycling is undertaken by the informal sector, which had to be excluded from the calculation of recycling performance as it could not be verified that this waste is being managed appropriately.

To all countries, the report recommends:

- Improve municipal waste and recycling reporting including:
 Use of clear and consistent
 - definition of municipal waste
 - •Reporting point of measurement
 - Reporting by key materials
 - Reporting by waste types
 - Reporting by source

•Distinguish as far as possible between estimates of waste generation, collection and recycling.

- Adopt practices that are associated with high performing countries, as referenced in the list above.
- Where the informal recycling sector operates, examine how this could be formalised to protect human health and the environment, raise living standards, and improve recycling and data reporting.

It is intended that a Phase 2 publication covering a larger number of countries will be published before INC-5 in the autumn. A database will be produced and published on the Reloop Global Data Observatory. Countries wishing to provide additional information to improve our estimates of their adjusted performance are welcome to submit this to Eunomia for review.

5



MATERIAL RECYCLING ASSOCIATION OF INDIA Voice of the Indian Recycling Industry

DECARBONISING THE STEEL INDUSTRY

DATE: July 6, 2024 TIME: 5:00 PM - 6:30 PM

EMINENT SPEAKERS

Mr. SANJAY MEHTA

WEBINAR

Director, MTC Group President, MRAI - India

Dr. SARA HORNBY

CEng, FIMMM - USA

Mr. SABARISH ELANGO

Programme Associate, Council on Energy, Environment and Water (CEEW) - India

Ms. NISHTHA SINGH

Assistant Director - Climate at the Asia Society Policy Institute - India

Mr. AMAR SINGH

Secretary General, MRAI - India



ecarbonizing the Steel Industry, which significantly contributes to global CO_2 emissions, is now urgent. Steel production primarily is dominated by the Blast Furnace-Basic Oxygen Furnace (BF-BOF) method (71%), followed by Direct Reduced Iron to electric arc furnace (5%), and secondary steel production using scrap in electric arc furnaces (EAF-scrap) (24%). EAF-scrap is the easiest to decarbonize but is limited by recycled steel availability, while BF-BOF is the hardest.

Material Recycling Association of India (MRAI) is planning to conduct an international webinar featuring experts from Government, Industry, Academia, and NGOs to discuss and plan decarbonization strategies like hydrogen injection, biomass substitution, zero-carbon electricity, and Carbon Capture and Storage. Given the slow growth projections, retrofitting existing plants is seen as the primary decarbonization strategy. This webinar will discuss various technologies, noting that no single solution fits all due to differing regional infrastructures, policies, and economics. Government support and policy interventions are crucial to make this successful.

The Webinar will include Q & A sessions and will provide the participants with a Certificate of Participation issued by MRAI.





Globally, e-waste is a growing problem, but some artists and designers see its potential in upcycling, raising awareness about the environmental impact. Here is a journey into the works of a Bangalore-based Eco-artist to see how he transforms e-Waste to Eco Art!

ave you ever wondered what happens to your mobile phones and laptops after you throw them out to make way for newer models? The United Nations estimates that the world produces more than 50 million tonnes of e-waste every year – most of which ends up in landfill.

According to Global E-Waste Monitor, India is the third top producer of e-waste in the world, generating more than three million tonnes per annum. E-waste in Indian landfill goes on to contaminate soil and groundwater, affecting food supply systems and water sources, according to a study in the Indian Journal of Community Medicine. Thankfully, the country has a new breed of artists who are converting these discarded items – from mobile phones to mother boards, and speakers to old televisions – into

Giving Shape to

22 MATERIAL RECYCLING O JUNE 2024

Innovations in recycling, upcycling, and circular economy models are likely to become more prevalent, reducing waste and promoting resource efficiency. environmental impact of e-waste. Mallabadi acquired extensive knowledge about technology through years of hands-on experience and a deep-rooted curiosity. He reminisced, "My journey began in my childhood when I would collect discarded products from flea markets or *kabaddi* bazaar to understand their inner workings. Being part of the Armature Radio Club in the 1980s further enhanced my understanding of electronics, mechanics, and fabrication. Additionally, having a family background in art, design, and architecture provided me with a unique perspective that blends technology with creativity."

He added, "My extensive research led me to contribute to raising awareness about sustainability and inspiring others to see the potential in what we often consider trash. This passion drove me to explore and innovate, resulting in the creation of captivating installations that not only highlight the importance of sustainability but also showcase the beauty that can emerge from waste."

A growing interest in sustainability in the 2000s further fuelled his passion, leading him to do extensive research and discover the beauty in e-waste. Today,

large murals and artworks.

Bangalore-based Eco-artist, **Vishwanath Mallabadi Davangere** has made e-waste his subject of art. He has been upcycling e-waste into amazing work of art with various themes that refocus the attention on a pressing environmental issue. These artworks help the viewers forge a connection between art, technology, and sustainability to help them realize the error in modern ways.

Eco-Art involves transforming discarded materials, particularly e-waste, into artistic creations. Mallabadi explained, "The technique is not patented, as I believe in sharing knowledge and encouraging others to participate in sustainable practices. The process is highly sustainable, as it repurposes materials that would otherwise contribute to environmental pollution, giving them a new life as art."

ART AS A CATALYST FOR CHANGE

The transition into becoming an Eco Artist was motivated by his desire to raise awareness about sustainability and the

EcoNap-SustainaSleep

It is a modern Sustainable Sculpture; themasterpiece crafted from 20,000 keyboard keys, symbolizes technological relics and raises awareness about sustainable practices. Serving as a symbolic representation of our technological evolution, the sculpture prompts viewers to contemplate on the rapid advancement of technology and its environmental consequences, emphasizing the ever-growing issue of e-waste and the need for responsible disposal methods. It encourages self-reflection on consumption habits, serving as a reminder that today's actions impact the planet's future.

RETIRED ECHOES

is an exceptional art installation crafted using discarded mobile phones, primarily featuring keypad devices, meticulously affixed to a 5-foot spherical structure. The underlying concept seeks to convey that outdated or 'retired' mobile phones possess a latent value and can find a second life. This captivating and thought-provoking artwork carries a profound message about the worldwide repercussions of technology and the staggering volume of electronic waste generated daily.



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It is an extraordinary artistic masterpiece that captivates observers. The sculpture of a cow not only enchants with its aesthetic allure but also signifies a pivotal stride towards a sustainable future. Crafted entirely from recycled materials, this eco-friendly marvel stands as a unique and contemporary art installation.

Adorned with 40,000 used computer keyboard keys, it serves as a striking embodiment of the intersection between art and sustainability.Beyond its visual appeal, this artwork also serves as a symbol of our collective responsibility to safeguard and conserve the environment, serving as a poignant reminder of the imperative to protect our planet for generations to come. It stands as a shining testament to our dedication to minimizing electronic waste and underscores our duty as global citizens to preserve and protect our shared home.

Eco Art is being consumed in various sectors, including galleries, museums, public installations, and corporate offices. It is also gaining popularity in educational institutions.

As an external faculty member at Chanakya University, Mallabadi teach upcycling for sustainable living as a tool for educating students about sustainability and the environment. He explained, "Young generations and art students are increasingly viewing upcycling as a lucrative industry. They recognize the potential for creative expression and the positive environmental impact of transforming waste into art. Many are inspired by the idea of contributing to a sustainable future and are eager to explore innovative ways to upcycle materials. This trend is supported by a growing market for sustainable and eco-friendly products, providing ample opportunities for aspiring Eco Artists."

TRASH TO TREASURE

Through his thought-provoking installations, viewers are invited to contemplate the rapid advancement of technology and its consequences on the environment. The incorporation of discarded electronic components and materials highlights the ever-growing issue of electronic waste and the need for responsible disposal methods. By showcasing these relics of our technological past, Mallabdi's installation encourages viewers to reflect on their own consumption habits and consider more sustainable alternatives. It serves as a reminder that our actions today have a lasting impact on the planet and that we must prioritize sustainable practices to ensure a better future.

KEY MILESTONE

Through his art works and installations, Mallabadi have raised awareness about e-waste and sustainability.

- Successfully creating and showcasing hundreds of artifacts made from e-waste.
- Collaborating with organizations like Zolopik to promote e-waste recycling.
- Receiving recognition and appreciation for my unique creations from various art communities and environmental organizations.
- Inspiring others to consider the potential of upcycling and sustainable practices through workshops and public speaking engagements.

He believes, "the way we consume and the waste we generate will change in the years to come. There is a growing awareness of the environmental impact of our consumption habits, leading to a shift towards more sustainable practices". Public When you put together things that other people have thrown out, you're reallybringing them to life, a spiritual life that surpasses the life they were originally created for.

policies and consumer behavior are also expected to evolve, prioritizing sustainability and environmental responsibility.

ROLE OF COMMUNITY

According to Mallabadi, community engagement and education are key to promoting recycling and sustainable arts. Organizing workshops, exhibitions, and community projects can foster a^{¬¬} culture of sustainability and inspire collective action. Collaborating with schools, local governments, and environmental organizations can amplify the impact of Eco Art and encourage more people to participate in recycling initiatives.

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MEDICAL WASTE

A LOOMING CONCERN

India faces significant challenges when it comes to managing biomedical wastes. As the country's healthcare sector expands rapidly, proper biomedical waste management becomes increasingly crucial in order to maintain public health and environmental integrity.

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iomedical waste, encompassing industrial waste, hospital waste, and waste from other healthcare facilities, poses a heightened risk of infection and injury compared to any other form of waste. A lack of understanding regarding safe medical waste disposal practices can be hazardous to one's health as well as the environment. To manage medical waste effectively, healthcare professionals must be knowledgeable about and have experience with the process.

On an average, high income countries generate 0.5 kg of hazardous waste/bed/ day when compared to 0.2kgs/ bed/ day for low income countries. This is because quite often they are not segregating the hazardous and non hazardous waste appropriately. The result is contamination of the entire waste. According to Ministry of Environment and Forests, almost 28%

of biomedical waste is left untreated and not disposed. Only two-thirds of the total biomedical waste is treated scientifically.

According to World Health Organization (WHO), nearly 85% of all waste generated by hospital is general waste. The remaining 15% is hazardous biomedical waste subdivided as infectious and non-infectious waste. In global healthcare frameworks, effective management of waste from medical establishments, educational institutions, and laboratories is paramount. Proper biomedical waste management (BMWM) is essential to prevent environmental contamination and ensuring safety for both the public and medical personnel.

India faces significant challenges in managing biomedical waste due to its rapid development and expanding healthcare sector. The production of biomedical waste has increased significantly across the country due to the exponential growth of medical facilities, the growing population, and improvements in healthcare technology. As a result, improper waste management techniques are now a source of concern because they pose significant risks to both the environment and human health.

The regulatory framework governing BMWM in India assesses its effectiveness in ensuring compliance and ac-

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Things have improved to a large extent but the importance of biomedical waste management has not been really understood by many hospitals, even those that are accredited. Very often, the last area to get attention is biomedical waste.

countability among healthcare facilities and explores the adoption of advanced technologies and innovative practices in waste treatment and disposal to reduce the environmental impact of biomedical waste. Understanding the advantages and disadvantages of current waste management techniques will lay the foundations for recommending evidence-based interventions and changes in policies that adhere to global best practices.

To address the urgent problem of biomedical waste in India, stakeholders must cooperate and act together. By fostering a culture characterized by accountability and sustainability, the capacity to enhance the safety and well-being of the environment for both current and forthcoming generations is possible.

WASTE SEGREGATION AND HANDLING

Waste segregation and proper handling constitute the fundamental pillars of an effective BMWM system. Smaller facilities often lacked proper waste segregation procedures, while many larger hospitals had clearly defined segregation protocols. Inadequate biomedical waste segregation puts waste handlers and healthcare workers at risk and makes the waste treatment process more difficult. To improve waste management procedures, training, and awareness programmes must strongly emphasize proper waste segregation.

Speaking on how well India is managing its medical waste, Dr Bishnu Panigrahi, Group Head - Medical Strategy & Operations, Fortis Healthcare Ltd.Explained, "With stringent BMW Rules, each state pollution control has designated authorized vendors for collection and treatment of BMW. There is strict control from the Pollution Control Board for the same. The BMW bags have bar-coded labels, which are scanned and the bags weighed by the state pollution control board authorized vendors at the time of collection in the hospital. The information regarding the type of BMW Waste & its weight gets directly uploaded on the state pollution control board website. The vehicles carrying BMW are authorized by the state pollution control board & have GPS tracking. This ensures that the entire waste generated

reaches safely to the designated authorized vendor's treatment plant.

All BMW is not incinerated. Only the infected waste in 'Yellow Category' gets incinerated. The other categories of waste are used in landfill etc."

How much medical waste does an average hospital produce? Dr Panigrahi clarified, "This depends upon the kind of treatment being provided in the hospital. The quantity of waste is more in tertiary care hospitals and those doing more of surgical work. On an average such hospitals generate around 1- 2kg/bed/day". According to him, the most important step in BMW Management is segregation at the site of generation. All healthcare workers must be sensitized regarding the BMW Management."

Dr Abhimanyu Bishnu, Chief Executive Officer, Innovhealth Services & Chief Quality & Excellence Officer, Health City Hospital, Guwahati states the ground reality of biomedical waste management in India. He said, "Two decades ago, the concept of biomedical waste segregation and management did not really exist. The Environmental Protection Act took care of only part of the problem, because biomedical waste is very different from the rest of domestic waste. For example; a hotel or a factory may generate waste that is toxic but not infectious, which is the nature of biomedical waste.

Finally, in 1998, the Bio Medical Waste (Management and Handling) Rules were brought into force, but even today, if you go to a Tier III city or the outskirts of a Tier I city. Even after introducing regulations and many interventions, this problem persists."

Over the years, the rules have been modified, re-tuned and made more streamlined, with certain punitive aspects thrown in.

In a typical assessment, more often than not, we find deficiencies in biomedical waste practices. The importance of implementing the rules is not reflected by hospital managements as well. But if we look at the epidemiology of hospital acquired infections, waste generation, waste segregation and waste disposal is a triad that forms one of the most important pillars of infection control.

REVISED RULES

In 2016, the biomedical waste management rules were revised further. One of the concerns of the hospital staff hanWaste generated within healthcare facilities encompasses a wide range of materials, each carrying varying degrees of risk. Proper waste segregation is essential to categorize waste into distinct streams, such as infectious, hazardous, and general waste.

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dling this waste was that they were not able to understand in which category to dispose of which stream of waste. With 10 different sub-streams, things became confusing. In the revised rules, all these categories were done away with, and four basic categories of biomedical waste were retained. It became easier for the end-user to segregate waste. Additionally, a provision was introduced which stipulated that a common biomedical treatment centre had to be present within 75 kilometers of a healthcare facility. The new rules also provided

SEGREGATION OF BIOMEDICAL WASTE IN HOSPITALS USING COLOR-CODED BINS

Medical Waste Management Market to Reach \$12.2 billion: Research Paper

Medical Waste Management market in terms of revenue was estimated to be worth \$9.2 billion in 2023 and is poised to reach \$12.2 billion by 2028, growing at a CAGR of 5.9% from 2023 to 2028 according to a latest report published by MarketsandMarkets.

The increasing penetration of medical waste management in medical and pharmaceutical industry is driving the market growth.

In recent years, the medical waste management market has witnessed the emergence of novel and innovative technologies that are revolutionizing the hazardous and non-hazardous waste management. The conventional approach for waste management involves landfill. However, novel techniques in are emerging as potential substitutes or complementary strategies in instances where traditional method fails. Additionally, certain innovative methodologies, such as the incineration, have the capability to accurately dispose the waste.

Of the collection, transport and storage services, treatment & disposal services and recycling services, the collection, transport and storage services segment held the largest share of in the market in 2022. There has been a surge in the number of surgeries worldwide which has led to the notable rise in this market share.

In 2022, the highest share of medical waste management market was held by non-hazardous waste, while the remaining falls under the hazardous. The substantial large share of this segment can mainly be linked to the rising patient population and increased emphasis on advancements in healthcare.

With the expansion of healthcare services there is an increase in number of hospitals, clinics, and other healthcare facilities corresponding to the rise in generation of medical waste. These factors accounted for the largest market share.

Of major regions of the global medical waste management market, Asia Pacific market is estimated to have highest growth rate. Asia Pacific region have been experiencing steady growth in healthcare expenditure which has led to increase in generation of healthcare waste. Growth in this market can be attributed to the increasing prevalence of chronic conditions such as diabetes, the growing per capita income, the expansion of healthcare and pharmaceutical research in various APAC countries.

Thiruvananthapuram-based CSIR-NIIST has developed an innovative solution for safe and sustainable management of pathogenic biomedical waste by turning it into soil additives.

The CSIR-National Institute for Interdisciplinary Science and Technology (NIIST) has developed a dual disinfection-solidification system for spontaneous and instantaneous disinfection of both liquid and solid biomedical waste, including urine, saliva and blood, bacterial broths, cotton, tissues, swabs, needles, and syringes.

The innovative system converts degradable waste into soil additives while lab disposables are prepared for direct recycling.

Segregation, transportation and disposal of such disinfected medical waste are easier and safer with significant reduction in cost for a healthcare facility and less expensive than red-bagging, a method currently in practice for containing medical waste. for barcode tagging of biomedical waste, which has only partially been implemented. When we assess hospitals, we usually find that they have not introduced this.

The rules emphasized training and vaccination of biomedical waste handlers, since they are vulnerable to needle-stick injuries and needle-stick infections, which can lead to infectious disease transmission. It laid emphasis on voluntary reporting of adverse events related to biomedical waste management, and submission of annual reports of biomedical waste 'returns' which must be published on the hospital's website. Many hospitals that are pursuing NABH certification are following these.

YELLOW OR GREEN?

A provision was introduced which stipulated that a common biomedical treatment centre had to be present within 75km of a healthcare facility. Dr Anusha Rohit, Head of Department of Microbiology and Sr. Consultant, Chair-Infection Control, Madras Medical Mission, Chennai questioned, "One of the changes that came about with the Biomedical Waste Management Rules 2016 was getting rid of the black covers that used to be used for cytotoxic drugs, disinfectants etc., which later on got added into the yellow bag. One of the problems we face is that according to the rules, empty disinfectant or hand rub bottles, which are just plain plastic, still need to go into yellow bags. An empty plastic bottle is actually not biomedical waste at all...should it go into the green bin instead?"

CONCLUSION

In the face of escalating biomedical waste challenges, there is no time for complacency. It is imperative that regulatory agencies, healthcare facilities, waste management authorities, and stakeholders unite to develop a comprehensive strategy to address India's bio-medical waste issues.

In 2016, the Centre published a set of guidelines for the management of biomedical waste under the Biomedical Waste Management Rules.

According to the guidelines, biomedical waste is subdivided into four subcategories, each with a distinct colour code: Yellow, red, white and blue.

The yellow category of waste contains anatomical, chemical liquid, and clinical laboratory waste. The red category includes waste generated from disposable items. Sharp objects and metals fall under the category of white waste. Except for those containing cytotoxic wastes, wastes in the blue category consist of contaminated glass.

In addition, the Act prescribes six steps for the proper management of biomedical wastes, including separation, collection, pre-treatment, intramural transportation, storage, treatment, and disposal through a Common Biomedical Waste Treatment Facility or a captive facility. The first five steps are the exclusive responsibility of the healthcare facility.

The BWM Rules 2016 outline the guidelines for the proper handling, collection, treatment, and disposal of biomedical waste.

SEGREGATION AND COLLECTION:

Healthcare facilities are required to classify biomedical waste into various categories, including infectious, hazardous, radioactive, and non-hazardous waste. Colour-coded bins and bags are used to differentiate between different types of waste. The waste is collected separately and labeled appropriately to prevent cross-contamination.

TRANSPORTATION:

The waste should be transported in specially designed vehicles that adhere to safety and hygiene standards. These vehicles are equipped with leak-proof containers and are staffed by trained personnel to minimize risks during transit.

TREATMENT TECHNOLOGIES:

In India, several technologies are employed for the treatment of biomedical waste:

- Incineration: It is a widely used method for treating infectious and hazardous biomedical waste. High-temperature incinerators burn the waste at temperatures exceeding 800°C, effectively reducing it to ash and gases. Modern incinerators are equipped with advanced emission control systems to minimize air pollution.
- Autoclaving: It involves subjecting the waste to high-pressure steam to sterilize it. This method is effective for treating infectious waste and sharps, rendering them safe for disposal in landfills.
- Microwave Treatment: This can be used to disinfect biomedical waste. The waste is exposed to microwave radiation, which kills pathogens and reduces the volume of waste. This method is suitable for low-level infectious waste.
- Chemical Treatment: This involves using chemical agents to neutralize pathogens in biomedical waste. The method is often employed for liquid waste, such as blood and body fluids.
- Non-Burn Technologies: Non-burn technologies, such as autoclaving and shredding, are gaining popularity due to their lower environmental impact compared to inciner-

ation. These methods reduce waste volume and make it safer for final disposal.

- Shredding and Compaction: These technologies are used to reduce the volume of waste, making it more manageable for transportation and disposal. The process is often combined with other treatment methods for more efficient waste management.
- Final Disposal: After treatment, the waste is disposed of following specific guidelines. Non-hazardous and treated waste can be sent to municipal landfills, while hazardous waste is sent to designated hazardous waste disposal sites. It's important to ensure that the waste is properly packaged and labeled for final disposal.
- Post collection the waste is transferred to a Common Bio-Medical Waste Treatment Facility (CBWTF) where further processing is done. A CBWTF is a centralized facility designed to treat bio-medical waste generated by various healthcare facilities. CBWTFs provide an efficient and cost-effective solution, preventing the proliferation of treatment technologies within a single locality.

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As a major source of greenhouse gas emissions, the global car industry is driving toward a sustainable future.

longside the push to electric, the sector is shifting away from traditional materials in the construction of car parts, such as petroleum-based plastics – to raw materials that are sourced responsibly, including those that are recycled or made from waste.

RENDS

Car companies are turning not just to scrap metal, but to landfill waste,

and to agricultural by-products, recycling what would otherwise be wasted to develop new plastics.

From ocean plastics to discarded textiles, waste materials are being blended with bio-composites to be used in upholstery, and increasingly other car parts, from headlights to panelling.

In short, manufacturing is being

reimagined, with a focus on reducing waste and improving reusability.

Currently, around 30% of vehicle materials are recycled for new vehicles. Among leading car companies turning trash into treasure: Volvo Group is recycling discarded fishing nets into carpets; BMW is making trim parts from recycled fishing nets and ropes; Audi is constructing seats made with yarn from plastic bottles; Nissan has started recycling textiles to make sound insulation for its electric vehicles; and Renault Group is using seat material made from recycled safety belts, textile scraps and plastic bottles. Ford Motor Company is increasingly tapping agricultural by-products, including coffee bean husks, and now olive tree waste, as it looks to advance its circular economy goals.

Long billed as the number one commercial vehicle brand in the US and Europe, Ford has taken sustainability seriously and is always searching for innovative ways to take the sustainable path.

Aiming for net-zero no later than 2050 and carbon-free electricity in global manufacturing by 2035 – like many manufacturing majors, Ford is moving toward an all-electric future, investing more than US\$50 billion from 2022 through 2026.

After reaching its annual targeted production run rate of 600,000 electric vehicles globally by the end of 2023, the company is "on track to reach 2 million by the end of 2026", Ford CEO Jim Farley said in the company's 2023 Integrated Sustainability and Financial Report.

What is interesting is that beyond the transition to clean energy, Ford is also striving to green its cars in other ways – by expanding the use of sustainable materials focused on plastics, battery recycling, and sustainable sourcing.

Leading the charge in sustainable materials, Ford was the first automaker to use 100% recycled post-consumer plastics to produce car parts.

And since 2000, Ford has used nine industry- and world-first plant-based materials in its production vehicles – researching the possible use of bamboo, soybeans, hemp fibre, coffee husks, captured carbon dioxide, and olive tree fibres as materials.

As early as 2008, Ford was experimenting with plant-based materials, and has now used soybean-based foam in more than 18.5 million vehicles built in the US.

Coffee chaff is another waste product being leveraged by Ford.

Joining forces with McDonald's in 2019, Ford is now taking the husk of the coffee bean that comes off during roasting and is thrown away, heating and mixing this with plastic and other additives, and turning the material into headlamp housings for its cars.

More durable than the standard housings, and 20% lighter, they also deliver on fuel efficiency, saving up to 25% energy during the moulding process.

Armed with a target to achieve 20% recycled and renewable plastics in new vehicle designs by 2025 – Ford continues to explore plant-based material innovation.

In its latest circular push, the US

KEY SUSTAINABILITY GOALS AND PROGRESS

- Energy goal to use 100% carbon-free electricity in all manufacturing by 2035, with 60.6% used in 2022. All purchased electricity for manufacturing in Europe is now renewable and all manufacturing locations in Mexico now powered with 100% carbon-free electricity.
- Water goal to reduce absolute freshwater use by 15% by 2025. More than 186.3 billion gallons of water has been saved since 2000.
- Electrification goal to create a carbon-neutral transportation future and on track to reach an annual targeted production run rate of 600,000 electric vehicles globally by the end of 2023, and 2 million by the end of 2026.
- Waste goal to reach zero-to-waste landfill across operations by 2030 and eliminate single-use plastics. Ford reduced waste to landfill by 35% in 2022, across 84 sites.

(2023 Sustainability Report, Ford)

car manufacturer has turned to olive tree waste – sourcing branches, twigs, and leaves discarded during the olive harvest in groves in Andalusia, Spain, a region with the highest production of olive oil in the world. Every year, pruning olive trees creates 7 million tonnes of waste.

Following simulation testing to assess the usability of olive trees in durability, strength and mouldability, engineers at Ford's European HQ in Germany produced prototypes of footrests and parts of the boot area that were deemed "robust and durable" – potentially paving the way for mass use in EVs.

In using waste from olive trees, the carmaker is not only able to "substitute a significant amount of petroleum-based raw material in the interior parts" but also support cleaner air in the areas the trees are grown by avoiding burning waste, Inga Wehmeyer, Project Lead at Ford was quoted as saying.

Always on the lookout for "ways to become more sustainable", says Wehmeyer, Ford is serious about recycling and waste efforts.

The largest closed-loop aluminium recycling automaker in the world, as per its 2022 Sustainability Report, the automaker uses the system to build its F-series, recovering up to 20 million pounds of high-strength, military-grade aluminium alloy per month. Among other achievements, more than 85% of Ford's vehicle parts are recycled and reused at their end of life.

The company has 84 zero waste to landfill sites globally, with plans to reach true zero-to-waste landfill across operations by 2030.

In a discussion at COP28 in Dubai, Cynthia Williams, Ford's Global Director of Sustainability, Homologation, and Compliance, emphasised the need "to encourage product design that minimises waste and supports a circular economy" – as well as providing subsidies and incentives or green technologies and fostering a 'just transition' that ensures inclusion and equity for all.

High-performance Degassing

Erema Plastic Recycling System has introduced INTAREMA

TVEplus^R, a recycling system with high-performance degassing. The patented extruder system sets new standards in the recycling of materials that are difficult to process such as heavily printed films and/or very moist materials. This is made possible through ultrafine filtration, thorough melt homogenization and high-performance degassing in a single step.

The proven basic principle of TVEplus technology: melt filtration takes place upstream of extruder degassing. Thus, you can produce end-products that are high quality, have outstanding durability, and contain a considerable share of recycled pellets.

AT A GLANCE:

Counter Current technology

- Highest process stability through improved material intake ensures constantly high output over a considerably broader temperature range
- Higher flexibility and operational reliability with a variety of materials.
- Increased throughputs with the same plant size for more productivity

Smart Start

- Remarkably easy to operate thanks to logical, clearly structured and simplified handling and ultramodern, ergonomic touch-screen display
- Fewer buttons, more user-friendliness thanks to high degree of automation including extensive control packages.
- The right recipe for every application saved processing parameters can be loaded easily and conveniently from the recipe management system at the push of a button.

ecoSAVE®

- Lower specific energy requirements thanks to a complete package featuring design and process engineering measures including the new direct drive for the extruder screw
- Lower production costs through optimized control technology and high-quality, energy-efficient components such as high-performance motors
- Additionally, the practical energy display on your operating panel gives you a constant overview of energy consumption at all times, thus enabling you to take specific measures to optimize consumption
- Reduced CO2[®] at a glance: emissions an important contribution to environmental protection.

HOW IT WORKS

- 1. Feeding: is automatic according to customer requirements. The material is cut, mixed, heated, dried, pre-compacted and buffered in the patented.
- 2. Preconditioning Unit: Next, the tangentially connected extruder is filled continuously with hot, pre-compacted material. The innovative Counter Current technology

enables optimized intake action across an extended temperature range.

- 3. The material is plasticized and degassed in reverse in the extruder screw
- At the end of the plasticizing zone the melt is directed out of the extruder, cleaned in the fully automatic, self-cleaning filter and returned to the extruder again.
- The final homogenisation of the melt after the melt filter. The filtered and homogenised material is degassed in the subsequent degassing zone takes place
- Following this, and with the help of the discharge zone, the melt is conveyed to the respective tool (e.g. pelletiser) at extremely low pressure.

TECHNICAL BENEFITS:

- Enhanced material intake, greater flexibility and higher throughput rates thanks to Counter Current technology
- Optimized triple degassing with the patented EREMA Preconditioning Unit, optimum screw design and extruder degassing ensure highly effective degassing of the filtered melt.
- Reduced shearing before the filter improves filteR performance
- Greater homogenization efficiency downstream of filtration and upstream of degassing enhances the subsequent degassing performance and improves the characteristics of the melt.
- Innovative, patented additional technologies for the EREMA Preconditioning Unit – DD system and Air Flush module (optional) widen the scope of application.

ECONOMIC BENEFITS:

- High-quality end product even with materials that are difficult to process such as heavily printed films and/or very moist materials; end products can contain a considerably higher share of recycled pellets.
- Extremely easy operation and maximum user-friendliness with the Smart Start principle ecoSAVE

reduces energy consumption by up to 12 % as well as production costs and CO2 emissions as a result.

- Considerably higher outputs with the same screw diameter compared to conventional degassing extruder.
- Compact, space-saving design.

High-capacity Pre-Shredders

SR-200 HD from **Fornnax**'s HD model of the SR series is a highcapacity and powerful pre-shredder which has highest input capacity model in the SR series of machines.

The SR-200 HD is primarily designed for tyre shredding applications. It can also be utilized for other applications, including high-volume municipal solid waste, wood pallets, industrial and commercial waste, and many more.

As a result of the stringent waste treatment policies in place, there is a growing global demand for competitive pre-shredders. It presents significant opportunities for industries in the Middle East, Australia (due to full-tyre export bans from Australia and steel export bans from the Middle East) and Europe.

TECHNICAL SPECIFICATIONS

- The new shredders come with various proven knives developed to accommodate customers' needs. With the robust cutting chamber design.
- The slow-speed shafts, which produce up to 2,000,00 Nm(newton meter) of torque, allow the SR-200HD to work with the most challenging materials. This, along with quick shafts change system, enables the end user to switch from working in one application to another.
- There are different variants available for different market standards. SR200 with disc classifier provides 60 to 150 mm output sizes to feed downstream equipment. The SR-200 HD with a Trommel screen provides output sizes of 60-80 mm,

called TDF alternate fuel for the cement industry. And SR-200 HD without a screen produces output sizes up to 400 mm, called single pass rough shreds. Due to the design of 750 mm diameter knives and a larger shaft centre, it has more discharge space to process bulky and high-thickness materials such as agricultural tyres, truck tyres and OTR tyres.

ECONOMIC ADVANTAGES:

SR200 HD provides a low cost-per-tonne with high reliability, ease of operation, and more flexibility for various types of tyres, as well as a design optimized especially for sites with a 25-tonne per-hour production requirement.

It is designed to focus on the TDF application (Tyre Derived Fuel). Cement plants usually utilize 3 to 4 lines to maximize production. The SR 200 HD is a single-line system that delivers a high output equivalent to 3-4 smaller lines.

Plastics Waste Shredders

US-based **Vecoplan's** plastic size reduction system converts plastic scrap to a similar size of the virgin processing material. The company has combined both shredder and granulator features to create a line of **plastics shredders** that meet virtually all plastics processing challenges including industrial plastic scrap, with over 300 configurations tailored to excel at specific applications.

Vecoplan plastic waste shredders play an integral recycling role in how to shred plastic in injection molding, extrusion, blow molding, rotational molding, thermoforming, blown film, cast film, and pelletizing factories. They process rejects, runners, sprues, parts, purgings, pipe, profiles, bags, bottles, bales, buckets, tubs, totes, wovens, nonwovens, film, fiber, carpet, containers, drums, IBCs, lids, - in short, anything made of plastic.

The plastic shredder machines can shred ABS, Acetal, Acrylic, HDPE, HMWHDPE, LDPE, LLDPE, Nylon, Nylon 6, Nylon 66, PC, PET, Polyamide, Polyester, PP, PS, PU, PUR, PVC, TPE, TPO, and UHW-PE, as well as composites. The shredder can grind it up & down to the size you need.

THE SHREDDER IS

- Flexible low bulk density or high bulk density, small parts, or big parts, our plastic shredding machines handle them better than any competitor.
- Versatile- easily changed particle size, through quick & inexpensive screen changes. Ease of operation – dump it in, push a button and walk away, or feed it continuously by conveyor.
- Durable
- Ease of maintenance the plastic granulators and plastic recycling products are designed for quick and easy replacement of wear parts.

To introduce your products and services through these pages, write to Ayyappan V. at **editor@mrai.org.in** Or contact **9892909946** SPET RECYCLING

ON WITH THE EARNING CURVE

Packaging & Recycling Consultant, **Rajesh Kumar Gera** takes an overview of the topic while writing about the various trends, challenges and opportunities t is important first to understand the Indian PET industry and how it has grown. The PET resin consumption was 1.10 million TPA in 20-21 and has been growing at an average rate of 10-12% p.a. The Indian PET resin consumption of 1.7 million MTPA (23-24) had bottles: 92%, sheet: 4 %, strapping/monofilaments: 2% and others: 2%. The different applications are as enclosed.

RECYCLING INDUSTRY IN INDIA:

The PET bottle usage was 1.7 MMT plus (23-24) and recycled PET usage was 1.55 MMT (@ 92%). There are 200 plus collection-cum-baling centers in India and growing. There is surely a shift for moving from unorganized informal set-up to organized formal recycling setups. It is primarily 'Mechanical Recycling' of PET packs in India. There is 50+ medium to large scale manufacturing units using washed flakes of 'Recycled PET'.

THE PROCESS:

The PET recycling in India typically starts with a 'waste collector/rag picker' collecting the discarded PET bottles from different sites including dump sides. They in turn get sold to 'Kabadiwallahs' (waste traders), who sort PET from 'other plastics' and bales are made. The baled bottles are transported to 'Recyclers', who do sorting, removal of metals, caps, rings, labels etc. These are shredded, washed, and dried. The dried flakes are sent to textile spinning units and the recycled polyester fiber made is then used to make polyester fabric and other end-uses.

TRENDS IN USAGE OF RECYCLED PET RESIN

The use of recycled PET is allowed for packaging of 'Non-Food Items' in India. The major FMCG producers (non-food) are studying the possibilities to use 'rPET' and initial target is 15% rPET. The awareness is on the rise for 'recyclability and sustainability' initiatives by a brand influence 'Pack choice by customers'. The consistent availability of quality rPET resin is the key. The usage of rPET in secondary packaging like jars is already being done by some brands, driven by the need for 'Greener Packaging'. PET is the first material of choice, due to ease of recyclability and the established recycling systems.

THE CHALLENGES

One of the major challenges is 'Traceability'. One of the key differentiators in times to come in Indian recycling ecosystem will be the assurance of 'Traceability'. The move is thus towards digitalization and blockchain/AI driven SCM of rPET bottles. The brand-owners and regulatory bodies will be paying more attention, which will improve the quality of recycled chips. The other major challenge is the availability of consistent quality rPET material. There are concerns on IV and 'Lab' values. These are being addressed by improvising sorting and washing processes.

BOTTLE TO BOTTLE (B-TO-B) RESIN

There is a limited availability of food grade rPET resin and there is a premium Vs virgin PET resin made by the fossil route. The mechanical recycling process for rPET for non-bottle uses involves 'sorting and washing'. In B-to-B resin, the flakes go through decontamination, SSP and granulation for use in bottles for direct food contact applications. There are presently five manufacturers of 'B-to-B' PET resin on a pan-India basis and there are 10 plus lines getting commissioned to make rPET resin, suitable for direct food contact packaging in India.

ADVANCED RECYCLING

The demand for rPET resin in the long run cannot be met solely by mechanical recycling. There is growing interest in non-mechanical PET recycling, not only in India but also globally. This includes both ch ical recycling and bio-recycling technology for PET recycling. The chemical recycling is done in a small way in the country. The bio-recycling will help to power both PET bottle and textile recycling and circularity. One of the technology suppliers (Carbios) has done successful alliance of polymer science and enzymology. The process enables enzymatic recycling of PET and results in virgin like monomers. It will have high purity and constant rPET quality allowing food contact applications. This technology has matured from demonstration plant stage to industrial scale and commercialization. These chemical and enzymatic recycling processes will thus have higher differentiated CAGR for PET recycling in the future.

APPLICATIONS

The rPET finds applications in 'non-bottle' applications, especially in the fiber industry. The different end-uses in India include "fiber Fil, non-woven, sheets, strap, injection moulding, POY, PSF, bottles for non-food applications, monofilament, masterbatches" among others. The poly-

ester fiber is used as filling material for cushions, pillows and converted to fabrics for use in clothing, upholstery. The other products include T-shirts, caps, jackets, scarfs, carry bags, etc. Just for instance, the Indian cricket team's apparel is made from recycled PET bottles. Some of the other applications in India are for non-woven (for automobiles carpets, boot liner, headliner), synthetic leather, fiber filling (for cushions, pillows, etc.), spun yarn and textiles. It is encouraging to observe that companies like Adidas, Nike make athletic merchandise from recycled polyester in India, and this makes the brands 'Greener' and attract a premium over regular products. In non-bottle area, rPET sheet usages are for blister Packaging of toothbrushes,

66_

The approved guidelines and acceptance criteria for use of recycled post-consumer PET for food contact applications is also being made effective for implementation cells, toiletries, etc. both for domestic and export markets. This was made possible by collaborations between all stakeholders including major Indian PET raw material manufacturers, sheet suppliers, thermoformers/FFS companies along with the brand owners.

THE MACHINERY

As quality of recycled chips depend on all process steps, hence there is sure shift in the mind-set towards high-end machines and recycling tech for new projects in India to get further improved quality of recycled PET. Technical alliances at local and global levels for recycling machinery are in offing and many machines are being made in India with foreign collaboration.

REGULATIONS

In India, Bureau of Indian Standards (BIS) frames standards for different packaging materials and end-uses including recycled resins. For example, IS 14534: 1998 covers guidelines for the recovery and recycling of plastic waste and IS 14535: 1998 is the BIS for using recycled plastics for manufacturing of different products focusing on non-food sectors. The use of rPET in food and beverages was not allowed till now in India by FSSAI and BIS. FSSAI has come out with 'Draft Food Safety and Stan-

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dards Packaging (Amendment) Regulations' for use of recycled plastics in 2022 as food contact materials based on PWM rules 2021. Thus, the approved guidelines and acceptance criteria for use of recycled post-consumer PET for food contact applications is also being made effective for implementation. The draft amendment regulations are in the process of getting approval by the Food Authority.

PROMOTION

There has been quite a spurt in installation of 'Reverse Vending Machines' (RVM) in the last 5-6 years with concerted efforts of machinery suppliers and PET resin manufacturers. Today around 1000 plus RVM machines have been installed all-over India. The objective has been to sensitize both the public and decision makers on the need for recycling and create awareness about the vast recycling ecosystem existing for PET recycling in the country.

CONCLUSION

Although PET is a relatively new packaging material, its versatility, affordability and convenience is contributing to its rapid growth in India. It is thus putting an equally increasing pressure on the re-

THE INDIAN PET RECYCLING INDUSTRY

The PET Recycling industry had a turnover of ~Rs 5 K crore in 20-21, which has increased to Rs 7 K crore plus in 23-24. India is proud to be having one of the highest PET recycling rates @ 92% and competing with the best globally. The Indian Recycling industry is consisting both of unorganized and organized recyclers. There are value-added products made from RPET and the Indian PET recycling industry is projected to grow @ 15-20 % p.a. in the coming years. It is estimated that the Indian PET recycling industry will have a turnover of around Rs 10 K crore plus in the next 2-3 years' time.

cycling infrastructure currently in operations in India. The Indian players like their counterparts globally are on the learning curve with regards to the usages, handling and disposal of PET packaging. However, they are benefiting with better management of PET waste and are also parallelly introducing more rPET items in the system, including for direct food-contact.

The 'Design for Sustainability & Ease of Recycling' are now the key components for any product launch today. With regulatory support being extended by FSSAI and BIS, the scope of rPET in India will further enlarge in the coming years and will open new avenues for all in the value chain. The sustained mantra of 'reduce and reuse' will help to establish a robust 'recycling and sustainability' eco-system in India.

(Packaging and recycling consultant, Mr Gera, is a PET industry veteran. May contact him on 0091-9967033107 and rajeshkgera@gmail.com)

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Turning Rubbish into a RESOURCE

The flagship publication of the International Resource Panel of the United Nations Environment Programme, this year's report sheds light on how resources are essential to the effective implementation of the Agenda 2030 and multilateral environmental agreements to tackle the triple planetary crisis. It also brings together the best available data, modelling and assessments from 180 countries, seven world regions and four income groups, to analyse trends, impacts and distributional effects of resource use.

s well as municipal waste, human activity generates significant amounts of agricultural; construction and demolition: industrial and commercial; and healthcare waste. This waste is produced on farms and building sites and in factories and hospitals. Municipal waste is generated wherever there are human settlements. It is influenced by each person in the world, with every purchasing decision, through daily practices and in the choices made about managing waste in the home. The way people buy, use and discard materials determines the amount of energy and raw materials used and how much waste is generated. Municipal waste is thus intrinsically linked to the triple planetary crisis of climate change, pollution and biodiversity loss.

The first Global Waste Management Outlook (GWMO), published in 2015, provided a pioneering scientific global assessment of the state of waste management. It was also a call to action to the international community to recognize waste and resource management as a significant contributor to sustainable development climate and change mitigation. Since then, despite some concerted efforts, little has changed. If anything, humanity has moved backwards -generating more waste, more pollution and more greenhouse gas (GHG) emissions. Billions of tonnes of municipal waste is still being generated every year, and billions of people still don't have their waste collected.

Uncontrolled waste knows no national borders. It is carried by waterways across and between countries, while emissions from the burning and open dumping of waste are deposited in terrestrial and aquatic ecosystems and in the atmosphere. Pollution from waste is associated with a range of adverse health and environmental effects, many of which will last for generations.

In response to Resolution 2/7, adopted by the second session of the United Nations Environment Assembly and reiterated in Resolution 4/7, adopted by its fourth session (United Nations 2019a), the amount of energy and raw materials used update of the global waste management picture and an analysis of data related to MSW management globally. It assesses three potential scenarios of municipal waste generation and management and their impacts on society, the environment and the global economy. It also provides possible pathways to reducing waste and improving its management—following the waste hierarchy—with the goal that all waste materials are managed as a resource.

The Global Waste Management Outlook 2024 echoes the first GWMO's call to action to scale up efforts to prevent waste generation; to extend adequate safe

The way people buy, use and discard materials determines the amount of energy and raw materials used and how much waste is generated

and affordable MSW management to everyone worldwide; and to ensure that all unavoidable waste is managed safely.

TYPES OF WASTE

The word "waste" means different things to different people. Different local conditions and data collection methods confuse attempts to arrive at clear definitions. Variously referred to as refuse, discards, trash or garbage, waste is essentially the unintended by-product of consumption and production.

Waste is hugely diverse and there are different ways of categorizing it, for example by:

Material, e.g. food waste or plastic waste;

 Product type, e.g. e-waste (electrical and electronic waste) or end-oflife vehicles, which contain multiple materials; Source, e.g. MSW, which contains multiple product types and materials.

This report focuses on MSW, which is the waste generated by householders; retailers and other small businesses; public service providers; and other similar sources.

Managing MSW is generally a local service and is commonly the responsibility of local government. MSW is only a (comparatively small) part of the story, since enormous amounts of non-municipal waste are generated each year, for example:

- Construction and demolition waste
- Industrial waste
- Agricultural waste
- Healthcare waste

Data is severely lacking for these other waste streams. Quantities vary significantly according to whether a country's economy is primarily agricultural or industrial, and its level of urbanisation. Healthcare waste is usually only a fraction of municipal waste but may be more hazardous. These other types of waste may be mixed with MSW, particularly where formal waste management systems are not fully implemented (for example, demolition waste or healthcare waste may be disposed of in a municipal waste landfill or dumpsite).

Because MSW is generated by all residents, regular collection schemes need to reach everyone, everywhere. This requirement contrasts with the management of waste arising from industries, mining or hospitals, for example, which is often concentrated at specific sites.

MSW typically includes food waste; packaging; household items including broken furniture and electronic goods; clothes and shoes; and personal hygiene products. Its composition varies from place to place (and even at the neighborhood level) and may be affected by the time of year, weather conditions and economic recessions or other major events and trends.

Some products or materials found in the MSW stream are of particular concern. This is owing to rapid increases in their amounts or difficulties in collection, treatment, and other aspects of waste management aimed at meeting standards for protecting health and the environment. Examples of these materials are:

- Hazardous chemical waste
- Electrical and electronic waste
- Textiles
- Plastics
- Food waste
- End-of-life vehicles and waste from mechanics' garages

The management of MSW poses unique challenges due to its sheer volume, continual growth, diverse composition, ubiquity in human settlements, variability and influence by cultural change, and the intricate web of social, economic and environmental impacts that arise from its management.

DATA AVAILABILITY, COMPILATION AND ANALYSIS

Across countries and regions there are significant challenges in terms of waste data and availability. One important issue is the lack of standardisation in measurement and reporting; another is the lack of well-developed monitoring systems in many countries, which means adequate estimates do not exist for simple indicators such as total collected waste and the share of collected waste deposited in controlled landfills.

Some countries have no official waste data whatsoever, or this data may be incomplete or inaccurate. The use of different methodologies can also make comparisons challenging. These issues are most pronounced in regions with the largest amounts of uncontrolled waste, underscoring the difficulties involved in providing accurate estimates and analyses of the impacts of uncontrolled waste globally, both now and in the future.

The data used for the analysis in this report is a compilation of existing municipal solid waste (MSW) data reported by countries, population data and projections, and socioeconomic data. As most data points are from before 2020, that is the year used as the baseline.

While gross domestic product (GDP) has been used as the standard measure for this analysis, gross national income per capita in 2022 has been used to group countries according to the most recent World Bank classifications of countries as low income, lower middle-income, upper middle-income and high income (World Bank 2024a), which is standard international practice:

The Global Waste Management Outlook 2024 adopts a similar approach to that of the World Bank's What a Waste 2.0 Available data has been collected and linear regression analysis has been used to obtain estimates for missing data points and to forecast global waste generation to 2050. Both reports focus on the management of municipal solid waste (MSW) globally. The key differences between them are that this report uses updated waste generation figures for most countries does not use logarithmic scales (to avoid visual distortions of the data), and includes weighted observations by population. Instead of establishing the relationship between GDP and waste

Highlights of the report

It presents a stark picture of global inequality, where low-income countries consume six times less materials compared to wealthy countries, despite generating 10 times less climate impacts.

generation in countries and determining

a mean average, the analysis in this report

uses a mean weighted by population.

The estimates have been shown not to be

affected significantly by the method used

(linear or logarithmic GDP, weighting by

population or not), while they provide a

useful comparison with the What a Waste

It is also important to note that data

on waste management practices and

impacts is rarely collected in a gender-

disaggregated form. Since men and

women influence and are impacted by

waste generation and its management

differently, it is vital that gender-

differentiated data be collected in order

to better understand and control waste, its

management and its impacts. The United

Nations Human Settlements Programme

(2023) carried out independent analysis

of waste generation and management for

Global Database.

- Global production and consumption of material resources has grown more than three times over the last 50 years, growing at an average of more than 2.3 per cent a year, despite the increase being the main driver of the triple planetary crisis.
- The consumption and use of resources is largely driven by demand in upper income countries.
- The extraction and processing of material resources including fossil fuels, minerals, non-metallic minerals and biomass – accounts for over 55 per cent of greenhouse gas (GHG) emissions and 40 per cent of particulate matter poisoning the environment.
- The extraction and processing of agricultural crops and forestry products accounts for 90 per cent of land-related biodiversity loss and water stress and a third of GHG emissions.
- The extraction and processing of fossil fuels, metals and non-metallic minerals including sand, gravel and clay account for 35 per cent of global emissions.
- Despite this, resource exploitation could increase by almost 60 per cent from 2020 levels by 2060 – from 100 to 160 billion tonnes.

its SDG 11 synthesis report. It estimated that 2.3 billion tonnes of municipal waste is generated globally, compared to the 2.1 billion tonnes estimated in this report. It also estimated a global average waste collection rate of 84 per cent (compared to 75 per cent in this report), and that 61 per cent of all municipal waste is "controlled" (compared to 62 per cent in this report). The discrepancies highlight the need for improved municipal waste data worldwide.

In 2020, global MSW generation is estimated to have been 2.1 billion tonnes per year. Owing to a combination of economic and population growth, it is projected to increase by 56 per cent to 3.8 billion tonnes by 2050 if urgent action is not taken.

COMPOSITION OF WASTE

Low-income countries have proportionally larger rural populations, which mean more people live close to locations where food is produced. In these countries, less packaging is used to transport food from rural to urban areas. Packaging, therefore, makes up a smaller proportion of MSW. This can be seen in the composition of MSW in Sub-Saharan Africa and South America. These regions have a higher relative proportion of food waste, not because they waste more food than other regions but because there is a smaller share of packaging waste in their MSW stream.

Higher income, more urbanized populations require more packaging to transport food safely from rural to urban areas Moreover, higher-income consumers tend to prioritize convenience, resulting in more single-use products and packaging from home deliveries and takeout food being found in the MSW stream.

CURRENT WASTE MANAGEMENT METHODS

Notwithstanding the need for upstream measures to reduce waste and, ideally, decouple waste generation from economic growth, this section looks at how MSW is currently managed.

WASTE COLLECTION

Access to waste collection services varies

GLOBAL MUNICIPAL SOLID WASTE DESTINATIONS IN 2020: CONTROLLED (LANDFLLING, WASTE-TO-ENERGY RECYCLING) AND UNCONTROLLED.

significantly within and between regions. In higher-income regions almost all MSW is collected, while less than 40 per cent of MSW is collected in lower-income countries. The regions with the lowest collection coverage (Oceania, Central and South Asia, Sub-Saharan Africa) also have the lowest urbanization rates.

According to the analysis undertaken for this report:

- Some 2.7 billion people do not have their waste collected: 2 billion in rural areas and 700,000 in urban areas;
- This amounts to 540 million tonnes of MSW, or around 27 per cent of the global total, not being collected.

WASTE-TO-ENERGY

Thermal waste-to-energy, also known as incineration with energy recovery, is a waste treatment method used in a relatively small number of countries. Many governments are increasingly prioritizing waste reduction, reuse and recycling as more cost-effective and more environmentally sound than the use of waste-to-energy technology (UNEP 2019a).

Waste-to-energy represents linear resource use since materials that are combusted can never be recovered and used again. Although waste-to-energy technologies are widely used in some industrialised countries, questions persist concerning the adoption of these technologies. The issue of whether to adopt waste-to-energy is very controversial, with many people arguing that thermal treatment technologies reduce incentives to decrease waste generation and move towards a zero-waste and low-carbon society (UNEP 2018).

Thermal treatment technologies rely on the energy released from highly calorific waste (greater than 7 mega joules per kg)-namely plastics, cardboard, paper and textiles-to generate electricity. Since these are the materials most likely to be collected by informal waste collectors for recycling, destroying them using thermal treatment threatens already vulnerable livelihoods (UNEP 2019b). For that reason, waste picker associations in Latin America, Africa and Asia have protested against incineration, pointing out that it would be preferable to develop an integrated MSW management plan based on material flow analysis that integrates concepts such as the waste hierarchy, the circular economy and the creation of green jobs.

Other challenges include the limitations of thermal combustion technologies with respect to processing wet food waste, which can dominate municipal waste streams; ineffective waste collection methods; lack of financial support; lack of policies related to energy recovery projects; absence of coordination between governmental bodies; lack of environmental regulation capacity; low energy efficiency (unless coupled with heat recovery into a district heating system or a similar arrangement); and the generation of hazardous waste by pollution abatement systems GHCs and

other airborne pollutants emitted from combustion processes may also hinder countries' abilities to meet obligations related to their Nationally Determined Contributions (NDCs) and emission trading scheme allowances.

Where waste-to-energy facilities are already in use, emissions from these facilities are coming under increasing scrutiny due to the need to reduce sources of anthropogenic atmospheric carbon, with the potential to retrofit carbon capture and storage technology adding to technological uncertainty and costs. In 2023, the European Union (EU) and the United Kingdom of Great Britain and Northern Ireland agreed to expand emissions trading schemes to include waste-to-energy, in recognition of the negative environmental impacts of GHG emissions from even the controlled combustion of waste. This decision represents the most significant regulatory intervention to the waste industry in a generation. It will fundamentally change the economics of the sector and will require further sorting of the municipal waste stream to extract more recyclable materials.

Alternative thermal treatment approaches include co-combustion of low-value plastics in cement kilns. The suitability of this treatment depends upon the availability of cement kilns at an appropriate distance from urban areas. Research and development are also taking place on pyrolysis of plastic waste into diesel, offsetting the need for virgin fossil fuels. However, there are concerns about the safety standards in cottage industry scale pyrolysis, as well as about carbon and other emissions released from the combustion of mixed plastics (and associated additives), which could negatively impact local air quality and public health and contribute to global climate change.

CURRENT COSTS OF WASTE

Unsustainable consumption and production patterns result in increasing quantities of waste to manage, which in turn increase the direct costs to society.

The analysis carried out for this report found that in 2020 MSW management globally cost US\$252.3 billion. Why does MSW management cost so much?

The most expensive step in the waste management chain is usually collection, with crew wages; vehicle fuel and maintenance; insurance; and other indirect costs to be covered. Recycling requires sorting and processing infrastructure, together with funds for ongoing operational costs.

Waste disposal facilities such as engineered landfills and waste-toenergy plants require significant up-front investments in infrastructure. They also have high operational and maintenance costs. Even the open dumping of waste has direct costs, with fires needing to be extinguished and land value being lost.

These direct costs do not include the externalities of MSW and its (mis) management, which are intrinsically linked to the triple planetary crisis of climate change, biodiversity loss and pollution, as well as to human health and environmental and social justice.

Worldwide, the externalities of MSW and its mismanagement are experienced most severely by communities that are already disproportionately affected by poor environmental quality, particularly waste workers and citizens in lower income countries and Small Island Developing States.

The reasons for this vary. They include:

- Limited capacity and technical capability to deal with fast-growing waste streams;
- Prohibitive costs of upgrading infrastructure;
- Inability to hold polluters to account, either through enforcing environmental regulations or through market mechanisms such as Extended Producer Responsibility (EPR);
- Illegal waste trafficking to countries with weaker environmental

regulations and already inadequate waste management systems;

 Limited influence or control over product design, including material choice and design for longevity, reuse or recycling.

Furthermore, within countries, differences due to gender and socioeconomic status can result in unequal access to waste management services as well as unequal exposure to pollution from waste and associated health outcomes

The burden of inadequate waste management practices can be difficult to quantify, yet it is substantial. On the other hand, reducing waste and recycling unavoidable wastes results in positive externalities, including reduced demand for raw material extraction; reduction of waste's environmental and social impacts; less need for waste disposal capacity; reduced GHG emissions; and healthier populations.

External costs, in terms of the negative impacts of waste disposal and positive gains from recycling (for the climate, ecosystems and human health), were calculated for this report using the methodology and parameters described in the Environmental Prices Handbook. Environmental prices are indices that calculate marginal social value (i.e. the satisfaction society experiences associated with a specific good, plus or minus overall environmental and social costs or benefits) of preventing emissions (or other activities such as land-use change). They are expressed in terms of monetary cost per unit of damage. In this sense, environmental prices are often the same as externalities or external costs.

While national contexts vary and there is no one-size-fts-all solution that can be used to move towards zero waste and a circular economy, it is clear that the hidden costs of waste are unaffordable for current and future generations. Recognizing the full cost of these externalities provides governments and other decision-making bodies with the evidence needed in order to prioritize waste reduction and waste management for a sustainable future.

> (Courtesy: United Nations Environment Programme)

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Founded in Mumbai, ReCircle promotes a circular economy and supports sustainable businesses through EPR and PNP services. With the help of his team, ReCircle is making waste management effortless for both global brands and individuals alike, claims **Gurashish Singh Sahni,** COO and Co-Founder

RECYCLING FOR A SUSTAINABLE FUTURE?

What was your main motivation for founding ReCircle?

Eight years ago, my co-founder Rahul Nainani and I participated in Google's Startup Weekend. We ideated an 'Uber for raddiwalas' app and won the challenge that week. This is when we realized that there was a dire need for awareness and action on segregation of waste and resource recovery which led to the founding of ReCircle.

Another huge wakeup call was the massive Deonar fire that took place in 2016 which raged in the largest landfill in Mumbai. The smoke from the landfill fire was visible in NASA images. Days later when we visited the location, we learnt that the life expectancy of people living around the dumpsite was 38 years of age. This was pivotal for getting into waste recovery.

How has ReCircle grown since its inception?

Since inception, we have grown tremendously, both in scope and scale, having diverted over 169,000 MT (equivalent to the weight of over 28,166 elephants) of waste across 270 + cities & towns in India with the help of 45+ processing partners who have a pan-India network of 400 collection partners all while impacting the lives and livelihoods of over 3,100 Safai Saathis (waste workers). We empower consumers and brands to divert waste away from landfills and oceans, back into the economy to be recycled,

reused or repurposed.

We encourage consumers to participate in our on-ground community events such as our monthly waste collection drives. Once the collected materials reach our Material Recovery Facility in Dahisar (Mumbai) it is segregated by ReCircle's Safai Saathis (waste workers) where it is sorted, processed and bailed. This processed waste is then sent out to recyclers who further converting into plastic flakes and granules to use towards creating new products.

At the heart of our traceable and ethical reverse supply chain, lies ClimaOne which offers end-to-end traceability for plastic credits, reporting for compliance, live data tracking, etc. to brand owners who want to go plastic neutral & use recycled plastic in their supply chain. Progressive brands such as HUL, Hindustan Coca-Cola Beverages, etc. choose us for their Extended Producer Responsibility needs, launching plastic neutral initiatives, establishing zero waste workspaces, orchestrating zero waste events & driving impactful sustainability projects.

How sustainable and circular is the process?

Our business model centers on a circular economy approach, leveraging innovation, technology, and a closed-loop system to extend the life cycle of plastic waste. Essentially, we leverage technology to build a traceable reverse supply chain for waste, especially plastics. We are also working towards creating a circular textile waste management vertical, called Project Extra Life, wherein we aim to collect, sort and sell at least 570 MT textile waste over the next 12 months.

Our flagship proprietary tech platform, ClimaOne offers a traceable reverse supply chain for all waste moving from collection facilities to recycling plants, playing a crucial role in bridging the gap between waste collection partners, waste processors & brands. In its current upgrade phase, we envision a future where ClimaOne collects data right from the collection till the reintroduction of collected plastic back into the supply chain of our partner brands in the form of ethically recycled plastic granules. This approach generates a waste-to-product traceability, thereby effectively closing the loop on plastic. For instance, we recently helped leading coffee brand circularity by converting 48,000 plastic bottles from their outlets into 4,000 circular and ethically recycled t-shirts.

We have always kept sustainability, environmental consciousness and circularity front and centre of our operations and decision-making; it is a key part of our business and growth plan, how we continue to expand our ecosystem by collaborating with institutions and consumers who share our alternative vision of the future as well as making bold decisions when it comes to achieving financial growth and benefiting the planet.

What kind of impact have you been able to make? Please share a few key milestones.

Here are some of our most recent milestones from the past few months;

- Overall impact: We have diverted over 169,000 MT (equivalent to the weight of over 28,166 elephants) of waste across 270 + cities & towns in India with the help of 45+ processing partners who have a pan-India network of 400 collection partners all while impacting the lives and livelihoods of over 3,100 Safai Saathis (waste workers).
- Set up Mumbai's first semi-automated Material Recovery Facility (MRF): In a recent upgrade, our facility underwent enhancements, including the installation of a conveyor system. This system facilitates our Safai Saathis in the efficient segregation of up to 4 metric tonnes of materials across more than 20 categories within a single shift. The integration of this conveyor has led to a substantial increase in our processing capacity, elevating it from 5 metric tonnes to an impressive 8 metric tonnes per day. We anticipate that this enhanced capacity will pave the way for new market opportunities for high-quality products.
- Inclusive partner network pan-India: We reach over 270 cities & towns in India with the help of 45+ processing partners who have a pan-India network of 400 collection partners.
- New waste management vertical: We recently launched a new textile waste management vertical — Project Extra Life — to enable businesses to go circular and tackle India's burgeoning textile waste problem.
- Brand on-boarding: We have formed strong business partnerships with 60+ progressive brands such as Hindustan Unilever, Hindustan Coca-Cola Beverages, Mondelez, and Tata

Starbucks which have led to an increase in our revenue and opened new areas of work with these brands.

Developing & launching traceable tech-driven operations with ClimaOne: With support from GSMA & UK Aid, we built ClimaOne, our proprietary clean-tech platform as an attempt to digitize the plastic waste supply chain. It has enabled

seamless connectivity among stakeholders while simultaneously providing a transparent reverse supply chain for plastic waste, and ensuring that collected plastic waste moves towards a circular economy.

 Accelerators and Engagements: Our journey is marked by accolades like the Businessworld Social Impact Leader in Recycling (2022), Fortune India 40under40 (2024), and gaining the privilege of sharing ReCircle's latest projects at prestigious conferences like Mobile World Congress Africa (2022) and the NY Times Climate Conference (2022), Mobile 360 Series in Seoul (2023) and GSMA MWC in Barcelona (2024).

Do you see the way we consume overall waste generated change in the years to come?

Since 2016, we have seen tremendous progress in the waste recycling space, a lot has changed. Back then, brands did not have sustainability teams; circularity did not exist as a term and plastic waste recycling compliances/ programs were few and far between. Programs such as Extended Producer Responsibility (EPR) and Clean India Campaign have added a much needed boost to the sector.

What are your views on EPR? How do you think EPR will help businesses, recyclers and consumers?

EPR is a policy that works on the polluter pay principle. It puts the onus of the collection on the polluter instead of the government. It helps in raising the value gap funding for collection, segregation, transportation and recycling/ co-processing of waste. It has tremendously helped in establishing collection for plastics that was not being collected before especially in the case of category 3 MLP. Furthermore, the policy has acknowledged that currently recycled plastic is only being used in down-scale applications and to counter the same has introduced mandatory use of recycled content in its amendments. This will not only help segregation and collection but will help for better uptakes of the recycled content at a better price thereby increasing the value of recycled content and helping recyclers and waste collectors.

Additionally, EPR helps brands become more environmentally conscious and increase brand sentiment among customers who are more environmentally conscious. As per a study conducted, l out of 3 millennials would prefer a more environmentally conscious product even if it is slightly more expensive. Hence, the policy is well crafted keeping all stakeholders in mind.

In 2023 alone, ReCircle steered India's shift towards a circular

Now, as we stand before a new era of wide-scale social and technological innovation, public and private sectors must collaborate closely to ensure the evolution towards a sustainable nation.

What are key issues regarding plastic waste in India? What could a sustainable plastic waste industry look like in the future?

It is no secret that businesses design waste into our systems. And, once we are done with a product it goes into waste; i.e. landfills and our oceans. The journey of a product starts at the creation phase; so, while we all look at plastic as waste once we are done with the product, we need to start looking at it at the start of its life, when we start designing or manufacturing the product. And, whatever we cannot eliminate we should ensure we reuse, repurpose and recycle the material that comes to our supply chain.

We believe that in order to go from linearity to circularity, we need to look at waste from an entirely new lens — that of being a valuable resource. To give you an example, ReCircle has incentivized and created a robust supply chain for collecting low-value and non-recyclable plastics, optimizing their value. This strategy helps mobilize materials that would otherwise be neglected due to their low economic value and presents a significant financial opportunity. Furthermore, we enhance the material value of recycled plastic and uphold our commitment to ethical business practices by reintroducing ethically collected and recycled plastic granules into the supply chain.

We believe that in order to go from linearity to circularity, we need to look at waste from an entirely new lens – that of being a valuable resource

economy by collaboration with a diverse network of partners to divert over 78,498 MT of waste from landfills. Our waste recovery has surged by 202% and our Extended Producer Responsibility program has expanded by 251% in 2022-2023, signalling a robust growth trajectory.

As a plastic waste recycler, how well-placed are your collection agents in terms of ensuring health and safety?

We have a pan-India network of over 400 collection partners. Throughout our near-decade long journey, we have focused on building the infrastructure of the Indian waste management industry. We address key areas such as livelihood generation,

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Material Recycling Association of India

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Contacts: Mr Ayyappan V +91 9892909946 / Mr Anil Borhade +91 9890290766

partnership building, collaborations for growth, development and formalisation of Standard Operating Procedures (SOPs), guidelines and capacity enhancement, as well as the integration of workers into the formal supply chain. There have also been significant improvements in workplace hygiene, safety standards, and overall operational efficiency, with 74% of Processing Partners surveyed following ReCircle's SOPs.

What was the thought process behind launching a textile recycling vertical?

We are constantly looking at innovative ways to digitize the waste supply chain and having established circularity for plastic waste it was a no brainer for us to look at textiles as another waste stream for us to work with. After plastic and paper, textiles are the third-largest source of waste in many Indian states. That is why we recently launched Project Extra Life to tackle India's textile waste problem and build a more circular future.

What are the challenges in the textile recycling space?

Firstly, the current textile supply chain ecosystem lacks formalization via traceability and accountability. We want to build confidence among consumers and businesses through our transparent technology-driven value chain, all while focusing on capacity building for waste workers and enabling a more circular textile waste value chain.

Secondly, textile reverse logistics is a long-drawn and expensive process. By leveraging data (which adds an advantage by providing better supply chain visibility to businesses), we plan to provide benefits such as cost and waste reduction as well as improved brand sentiment.

We are positive that we can empower various stakeholders to participate in the formalization and mainstreaming of the textile waste value chain and eventually create a closed-loop textile industry.

Tell us more about Project Extra Life.

In India, textiles significantly contribute to industrial water pollution, demanding innovative solutions. That is why ReCircle recently launched Project Extra Life to tackle India's textile waste problem. With Project Extra Life, ReCircle has established a circular textile waste management vertical as an addition to its existing waste management services and aims to collect, sort and sell at least 570 MT textile waste over the next 12 months.

We plan to reach over 1 lakh + institutions and individuals including fashion houses, textile businesses, hospitality giants, educational institutions, brands, offices, factories, households as well as existing clients within its corporate programme to help close the loop on textiles.

How can businesses participate in textile recycling with ReCircle?

ReCircle offers nationwide participation options and custom plans for bulk contributions in cases where businesses have more than 10 tons of textile waste. The waste can be delivered directly to ReCircle's Advanced Material Recovery Facility (MRF) in Mumbai.

ReCircle also proposes enabling institutions in setting up textile waste collection drives. Fashion houses/textile businesses can reach out to ReCircle to manage their production waste and set up 'take-back' programs for customers. Considering the highest value will be captured from post-consumer (wearables) textiles, Project Extra Life will concentrate on this part of the value chain over the next coming months.

In the months to come, we intend to build the value potential of textile waste with Project Extra Life and create a traceable and transparent value chain, leverage technological interventions for waste segregation and sorting, concentrate on post-consumer (wearables) textiles and foster an enabling environment to pave the way for a more sustainable and efficient textile waste value chain. We also aim to integrate micro-entrepreneurship, create 80-100 indirect jobs for waste workers and improve inefficiencies of waste handlers through capacity building.

Where does the collected textile material go?

We plan to collect materials such as cotton, wool, polyester, acrylic, synthetic fibres, nylon, denim, silk, etc. After the textile waste is collected, they are sent to ReCircle's Advanced Material Recovery Facility (MRF) in Dahisar, Mumbai where they are assessed on reusability by ReCircle's Safai Saathis (waste workers).

The collected textile waste, which is beyond repair, is sent to ReCircle's recycling partners in Surat and Panipat where it is shredded and turned into recycled yarn.

Based on this, the garments start their Extra Life journey via one of four channels; including:

5

- Rewear: what can be worn again
- Revamp: what needs a few repairs
- Recycle: what is nearing end of life
- Relife: unusables converted into energy.

STEERING THE **STAINLESS STEEL** POSSIBILITIES

Transforming Waste into Wealth

3rd Edition

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Figuratively speaking

The latest report from the world association provides not only interesting highlights but also recommendations for structural changes

rom time-to-time World Steel Association (worldsteel) brings fascinating snapshot of the dynamics of today's steel industry in figures. Everything from production and production processes, to demand, trade, safety and more, it gives a graphic depiction of the world industry.

In its latest report, it estimates that the gap between global capacity and global demand was 550 million tonnes in 2022, up from 475 million tonnes in 2021. Although this is a significant improvement from the historic high of 793 million tonnes in 2015, plans should be finalised with care.

worldsteel has proposed the following principles to guide discussion on excess capacity and structural adjustment in the steel sector:

 Governments should promote a swift and timely restructuring of the steel industry by advancing policies that ensure market forces play a decisive role in determining the future of the industry.

TOP 10 STEEL-PRODUCING COUNTRIES IN 2022 & 2023						
2023 2022						
R	ank	Tonnage	Rank	Tonnage		
China	1	1 019.1	1	1 019.1		
India	2	140.81	2	125.4		
Japan	3	87	3	89.2		
United States	4	81.4	4	80.5		
Russia	5	76	5	71.7		
South Korea	6	66.7	6	65.8		
Germany	7	35.4	7	36.9		
Türkiye	8	33.7	8	35.1		
Brazil	9	31.8	9	34.1		
Iran	10	31	10	30.6		

TOP 10 STEEL-PRODUCING COMPANIES 2023

1	China Baowu Group	130.77
2	ArcelorMittal	68.52
3	Ansteel Group	55.89
4	Nippon Steel Corporation	43.66
5	HBIS Group	41.34
6	Shagang Group	40.54
7	POSCO Holdings	38.44
8	Jianlong Group	36.99
9	Shougang Group	33.58
10) Tata Steel Group	29.5

APPARENT STEEL USE 2019 TO 2023 (million tonnes, finished steel products)							
	2019 2020 2021 2022 202						
World	1779.31	1790.41	1843.71	1783.01	1763		
China	911.9	1008.7	954.4	926.7	895.7		
India	102.6	89.3	106.2	116.1	133.4		

	APPARENT STEEL USE PER CAPITA 2019 TO 2023 (million tonnes, finished steel products)								
	2019 2020 2021 2022 2023								
World	229.2	228.4	233.2	223.7	219.3				
China	641.3	707.9	669.3	649.9	628.3				
ndia	74.2	64.0	75.5	82.0	93.4				

Steel production and use: geographical distribution, 2013

Rank Total exports

MAJOR IMPORTERS AND EXPORTERS OF STEEL 2023

Rank

(

Steel production and use: geographical distribution, 2023

Total imports

Mt

39.2

264

Past restructuring was only successful when government support and other barriers to orderly market transformation were removed. Industrial competitiveness was maintained and improved as a result of restructuring.

 Market-oriented approaches should ensure survival of the fittest producers. Inefficient producers should not be subsidised to remain in operation.

It is important to always maintain a level playing field between producers. Long-term sustainable producers have to meet environmental, financial and social expectations.

 Barriers to exit that delay restructuring should be removed in an orderly and timely way.

Development of a long-term restructuring plan should identify and remove barriers to exit. As the industry remains one of the least consolidated, barriers which prevent efficient mergers should also be reviewed.

• Develop safety net support that mitigates the consequences of restructuring.

Support should focus on addressing the social and environmental impact of restructuring.

1	China	94.3	1	Eu (27)
2	Japan	32.2	2	United States

Mt

	a a p a l i	0111	-	ennied etailee	
3	South Korea	27	3	Germany	18.7
4	EU (27)	26	4	Italy	18.7
5	Germany	22.5	5	Türkiye	18
6	Italy	16.1	6	Mexico	17.5
7	Belgium	14.6	7	South Korea	15
8	Russia	13.9	8	Viet Nam	14
9	Türkiye	12.7	9	Thailand	13.7
10	Brazil	12.3	10	Indonesia	12.4
11	Iran	11.9	11	France	11.8
12	Netherlands	11.8	12	Belgium	11.6
13	France	9.9	13	Poland	11.6
14	India	9.9	14	China	11
15	Indonesia	9.6	15	Spain	10.2
16	Taiwan, China	9.5	16	India	9.8
17	United States	8.9	17	Netherlands	9
18	Viet Nam	8.6	18	Canada	8.6
19	Spain	7.8	19	Taiwan, China	7.5
20	Malaysia	7.6	20	Malaysia	7.1

PLASTIC RECYCLING

French companies develop PET bottles using enzymatic recycling

rance-based company Carbios has partnered with cosmetics brand L'Occitane en Provence to develop a transparent polyethylene terephthalate (PET) bottle made entirely from enzymatic recycling. In collaboration, the companies say the bottle exemplifies a shared desire to build an efficient European recycling sector to accelerate

According to Carbios, the PET bottle was made via its enzymatic depolymerization process and with a European value chain committed to responsible consumption of sustainable materials. The bottle's production began with the local supply of PET scrap that had already been collected, sorted and prepared and was sent to Carbios' industrial demonstrator in Clermont-Ferrand, France. The material consisted of colored bottles, multilayer trays and mechanical recycling residues.

Carbios says it deconstructed the PET material into its original monomers, PTA and MEG, using its bio-recycling technology. The resulting monomers were then repolymerized into new, fully recycled PET resins. A recent life cycle analysis shows a 57 percent reduction in

CO2 emissions in its process compared to virgin plastic production, and for every ton of recycled PET produced, 1.3 tons of oil are avoided. Compared with conventional recycling, the company says enzymatic recycling is five times more circular, citing calculations based on the Ellen MacArthur Foundation's Material Circularity Indicator.

The company says that because of its highly selective enzyme, which is optimized for efficient PET degradation, its depolymerization technology can handle all types of PET scrap, including colored, multilayer or textile material that cannot be recycled with current technologies. Additionally, the company says its process complements mechanical recycling, and the PTA and MEG monomers it produces make it possible to recreate recycled PET products suitable for food contact and of identical quality to those of petroleum origin.

GREEN STEEL Tata Steel chooses Dutch EAF technology

he Tata Steel Nederland business unit of India-based Tata Steel has selected a lead technology provider to help enact the Green Steel Plan at its IJmuiden integrated steelmaking complex in Velsen-Noord, Netherlands. According to the steel producer, by 2030 it plans to have replaced its largest blast furnace on the site with an electric arc furnace (EAF) production line that will help it reduce its CO2 emissions at the site by about 40 percent. According to Italy-

based technology vendor Tenova SpA, the project involves the installation of a directreduced iron (DRI) plant, it also will result in greater steel recycling volumes.

"From 2030 onwards, we will increase the use of scrap from 17 percent to 30 percent," Tata Steel Nederland says. The project will involve the replacement of the largest blast furnace on the site (BF7) and one of the coke-making plants (KGF2) with DRI and EAF equipment. The overall contract will include engineering, supply, and advisory services for a 3 million tonnes [per year] electric arc furnace. In addition to the DRI and EAF equipment, Tenova lists continuous casting, electromagnetic stirring and secondary metallurgy equipment as part of the Green Steel Plan project. Also included will be innovative technologies aimed at minimizing the environmental impact of the new plant including an innovative fumes treatment plant, a waste energy recovery system and a dry slag granulation unit.

BATTERY RECYCLING

GM arm to recycle battery scrap

Redwood Materials, the battery recycling startup founded by former Tesla co-founder JB Straubel, will be recycling production scrap for batteries going into General Motors electric vehicles. The company announced that it's working with Ultium Cells, the joint battery manufacturing venture between GM and LG Energy Solution, to recycle cathode, anode and cell scrap from both their Warren, Ohio and Spring Hill, Tennessee facilities.

Redwood will recycle Ultium's scrap and process it into high-quality battery materials, which are then supplied back to cell manufacturers as domestically produced anode and cathode components. Processing the materials -- not just recycling them -- is also part of Redwood's long-term strategy, as the price of materials fluctuates regularly.

METALS MARKET

India poised for growth

rdia is poised for a significant increase in metals demand, driven by ambitious infrastructure projects and clean energy initiatives. As the nation invests heavily in building robust infrastructure, the requirement for metals like steel, aluminium, and copper is set to rise sharply. The government's focus on renewable energy, including solar and wind power, further propels this demand, as these sectors rely heavily on metal components. The expansion of India's infrastructure, encompassing roads, bridges, and urban development, necessitates vast quantities of steel and other metals. These projects are

critical for economic growth, enhancing connectivity, and improving the quality of life for millions. Simultaneously, India's commitment to achieving its clean energy targets amplifies the need for metals. Solar panels, wind turbines, and electric vehicles (EVs) are metal-intensive, driving up the consumption of aluminium, copper, and rare earth elements.

India's clean energy plans are particularly noteworthy. The country aims to achieve 450 GW of renewable energy capacity by 2030. This ambitious target involves large-scale deployment of solar and wind energy projects, both of which require substantial metal inputs. Solar energy, for instance, demands significant amounts of aluminium for panel frames and copper for wiring. Wind turbines also require considerable amounts of steel and other metals. Moreover, the push towards electric mobility is another significant factor. The Indian government's initiatives to promote EVs, including subsidies and incentives for manufacturers and consumers, are expected to increase the demand for metals like lithium, nickel, and cobalt, essential for battery production.

This surge in metals demand presents both opportunities and challenges. While it offers a boost to the mining and metals industry, ensuring sustainable

ENERGY TRANSITION Renewable energy to power Swiss Steel Group

wiss Steel Group has announced its participation in a renewable energy consortium, the 'Initiative EE-Industrie'. This initiative, consisting of 19 small and medium-sized enterprises (SMEs) in Germany, aims to build, operate and utilize wind and photovoltaic plants for self-supply with green electricity. Based on initial forecasts, the consortium will require a total output of 220 MW of wind power and 80 MW of photovoltaics. These figures correspond to around 35-40 modern wind turbines and a groundmounted PV system of 960,000 square meters.

The importance of a stable and competitive electricity price from sustainable sources for the steel industry cannot be overemphasized. Especially on the electric arc furnace route, where Swiss Steel Group operates as a leader, the availability of affordable green electricity is of crucial importance for further decarbonization efforts. The initiative firmly believes that a collaborative approach offers the most promising opportunity to secure much-needed quantities of low CO2 energy, leverage bundling effects and optimize the cost of green power generation.

As a first step, the companies involved have commissioned the development of a practicable and legally compliant concept and to determine the economic framework conditions. At the same time, the participants in this pioneering initiative are urging politicians to support competitive green electricity. Koch adds,

"The transformation to CO2neutral processes is crucial for the steel industry and stable energy prices play a central role in this. As a company that is one of the leading European green steel producers, we see it as our responsibility to continue to actively contribute to decarbonization and expand our role as a trendsetter. But to do this, we need a competitive overall price for green electricity. We hope that our joint efforts with the "Initiative EE-Industrie" will not only drive forward our own green transformation, but also set an example and inspire other companies to also embark on this path."

RECOVERED PAPER Exports to follow downward trend

In March, the Washington-based Recycled Materials Association (ReMA) released a report that showed US recovered paper exports were down all of 2023 compared with 2022, the trend has continued into this year. US exports of recovered paper declined 19 percent in the first quarter of 2024 to 2.98 million metric tonnes, based on data from ReMA, the US International Trade Commission and Census Bureau, while the value of those exports declined nearly 17 percent to \$600 million. Figures were down even further when comparing monthly totals, as US recovered paper exports were down about 23 percent this March compared with March 2023, however, ReMA reports March export volume increased 5 percent compared with February export volume.

Thailand was the top importer of US recovered paper in the first quarter, taking in 547,183 metric tonnes, but that number is down almost 27 percent from the first quarter of 2023 when Thailand imported 747,105 metric tonnes. According to ReMA, last year, Thailand was one of only two top-10 countries that bought more U.S. recovered paper than it did the previous year. India was the second-largest buyer in the first quarter, taking in 514,472 metric tonnes—down almost 25 percent from the first quarter of 2023.

The remaining top buyers include:

- Mexico: 460,833 metric tonnes
- Malaysia: 428,830 metric tonnes
- Vietnam: 269,701 metric tonnes
- Canada: 241,520 metric tonnes
- South Korea: 133,246 metric tonnes
- China: 120,841 metric tonnes
- Taiwan: 96,695 metric tonnes
- Indonesia: 56,814 metric tonnes

Of the top 10 importers of US recovered paper, only two countries, Malaysia and Canada, purchased more in the first quarter of 2024 than they did the first quarter of 2023. Malaysian imports were up 62.3 percent in the first quarter while Canadian imports were up 40.5 percent. The steepest decline was in Taiwan, where imports were down 54.6 percent in the first quarter. In total, the top 10 US recovered paper importers decreased purchases by 17.6 percent, while the rest of the world saw a 45 percent decrease, from 205,921 metric tonnes in the first quarter of 2023 to 113,260 metric tonnes in the most recent quarter.

ENERGY TRANSITION EMR opens recycling center for wind turbines

uropean Metal Recycling (EMR) has opened a pilot centre for reprocessing used wind turbines. The Warrington-headquartered firm now accepts all parts of the sustainable power infrastructure assets at its Glasgow South Street site.

Nine-tenths of a typical turbine can be infinitely recycled, according to EMR, allowing the new facility to boost the circular economy. The plant also looks to reuse and refurbish components where possible. Although steel, aluminium and copper from the turbines can be relatively easily recycled, many blades are constructed with a mixture of balsa wood and fiberglass.

The new site has achieved a permit to receive and store these items to trial innovative techniques to handle and downsize them to enable repurposing, recovery and recycling. Research and development projects to boost reclamation of rare earth magnets used within modern wind turbines will also be based at the new processing centre.

STEEL TRADE

Aramco signs Rs 3,670Cr contract with Welspun Corp

WW relation Corp and its associate entity EPIC has signed multiple agreements worth SAR 1.65 billion (about Rs 3,670Cr) with Saudi Arabian Oil Co. (Aramco) for the supply of steel pipes.

The duration of the contracts is 19 months, and the financial impact of the contracts will be reflected from the fourth quarter of the financial year 2024-25 to the last quarter of the financial year 2025-26.

"Our associate company East Pipes Integrated Company for Industry (EPIC) today announced multi contracts sign off with Saudi Arabian Oil Co. (Aramco) with value exceeding (Saudi Riyal) SAR 1.65 billion (approximately Rs 3,670Cr) inclusive of value added tax for manufacturing and supply of steel pipes," it said.

TEXTILE RECYCLING

'Empower Governme\ts to foster circularity'

t the sixth session of the United Nations Environment Assembly (UNEA-6), governments called for the United Nations Environment Programme (UNEP) to facilitate a Global Textiles Policy Dialogue, aiming to create a space to empower governments to foster circularity across the value chain.

The clothing and textiles sector matters for global and local economies, representing millions in jobs and US\$1.5 trillion in revenue. It, however, struggles to address its contribution to climate change, nature loss and pollution.

At an event held alongside, Mustafa Tuzcu, Türkiye's Deputy Minister of Trade, called for UNEP to "bring and convene a wide array of governments in an inclusive policy dialogue to facilitate the transition towards a climate neutral, resource efficient and circular textile sector".

Panelists acknowledged that tackling the negative environmental impacts of the textile value chain requires a systemic change with lifecycle-based and upstream policies, such as products designed with resource efficiency and circularity principles. To succeed, solutions need to be economically viable for industry and attractive enough for consumers. "To bring about policy coherence, we must find sustainable ways to balance consumption and production within a frame of human rights, environmental and sustainability laws," said Ligia Noronha, United Nations Assistant Secretary-General and Head of the UNEP New York Office.

"The growing popularity of ultra-fast fashion, low-quality products and very low prices, is contributing to an explosion in textile waste," said HE Arnaud Suquet,

France's Ambassador to Kenya and UNEP Permanent Representative. "We need to start thinking collectively about the issue of textile waste and France is ready to get involved."

In 2008, France introduced an Extended Producer Responsibility (EPR) scheme which has helped to increase textile waste collection. A draft law on ultra-fast fashion aims to develop a legal definition, discuss financial penalties for such products within the EPR scheme, increase awareness of its negative impacts, and ban its advertising.

NON FERROUS

LME reports rebound in nickel contract activity

ondon Metal Exchange (LME) says the exchange's nickel contract has rebounded from the turmoil it experienced in 2022. BIR 2024 World Recycling Convention guest speaker Alberto Xodo, an LME product specialist for steel and nickel, said liquidity has returned to the contract and that open interest has started rising again.

The first several months of this year have seen activity on the contract rising close to March 2022 levels. Xodo said that, following an earlier disconnect in the wake of the suspension, convergence had been restored between prices on the LME and the Shanghai Futures Exchange (SHFE).

Referring to hedging, Xodo indicated the turnaround reflected "the value companies attach to protecting themselves." He also said measures put in place by the LME to prevent a repeat of the situation in 2022, including the introduction of 15 percent upper and lower daily price limits for all metals, had been helpful. LME had put in considerable work to regain trust, including from recyclers, "and the contract seems to have come back to life."

Vlasov predicted China and Indonesia would be the drivers behind a projected 3.9 percent compound annual growth rate for stainless slab production from 2023 to 2028 while output in Europe and North America would be 'relatively stable'. Stainless scrap demand would continue to come from the latter two continents, however, while China and emerging

markets would rely more on other raw materials, Vlasov said.

Doug Kramer of California-based Spectrum Alloys LLC summarized regional stainless scrap market reports, noting stainless steel scrap demand from mills in Taiwan had weakened further in this year's first quarter. Meanwhile, mills in India were looking to rebuild their low raw material inventories and had resumed booking scrap cargoes in recent weeks, Kramer said.

Europe's crude stainless production had been hit by strikes at more than one mill, so scrap prices there had not gained significant ground despite scarce supply and higher LME nickel values, according to BIR committee members on that continent.

Nonetheless, overall mill demand for stainless scrap in Europe was characterized as robust during the first quarter of this year, with the EU recording a year-on-year increase of more than 50 percent in net imports from beyond its borders in the first two months of this year.

NEW MEMBERS

WE WELCOME OUR NEWLY JOINED MEMBERS DURING THE MONTH OF JUNE 2024

SR. NO.	COMPANY NAME	CITY/TOWN	STATE / COUNTRY	REPRESENTATIVE NAME
	NATIONAL			
1	Kothari Impex	Ahmedabad	Gujarat	Mr. Shreepal Shah, C.E.O
2	Chamunda Industries	Mumbai	Maharashtra	Mr. Maheshkumar Sheth, Proprietor
3	Rs Metals	Jalandhar	Punjab	Mr. Yuvraj Mago, Proprietor
4	Adarsh Stainless Pvt Ltd	Mumbai	Maharashtra	Mr. Bhavya Jain
5	Marangoni South Asia Private Limited	Mumbai	Maharashtra	Mr. Hemant Kaul, Chief Executive Officer
6	Nikko Systems Private Limited	Mumbai	Maharashtra	Mr. Vispi Adajania, Chief Executive Officer
7	VKG Trexim	New Delhi	Delhi	Mr. Deepak Goyal, Proprietor
8	Sri Neelayum Precoated Steel Pvt. Ltd.	Patna	Bihar	Mr. Sankalp Sarraf, Director
9	Atishay Metal	Faridabad	Haryana	Mr. Rishab Jain, Partner
10	Rama Udyog Pvt. Ltd.	Raipur	Chhattisgarh	Mr. Pankaj Somani, CEO
11	Bansal Tradelink	Faridabad	Hayrana	Mr. Sanjeev kumar Bansal, Partner
12	Sihorwala Steel Traders	Navi Mumbai	Maharashtra	Mr. Ibrahim Salim Ganiyani, MD / CEO
13	Falah Global Ventures	Bhavnagar	Gujarat	Mr. Anas Amin Lakhani, Proprietor
14	Maxima Product Solutions	Pune	Maharashtra	Mr. Sameer Kshirsagar, CEO-Propreitor
	INTERNATIONAL			
1	DDT Holdings Pty. Ltd.	Sydney	Australia	Mr. Rajeev Saraff
2	Aspire International General Trading LLC	Dubai	U. A. E.	Mr. Saurabh Puri, Director

RAI is an umbrella organization having under its wings most of the National and Regional Trade Associations and almost all of the international trade associations related and associated

with recycling. Whether it is leading National Associations such as CII and FICCI or International Organizations such as Bureau of International Recycling , BIR and Institute of Scrap Recycling Industries , ISRI, MRAI works shoulder to shoulder in promoting Responsible recycling across industries. MRAI's collective strength comprises over 20,000 small, medium and large enterprises, directly and indirectly employing 25 lakh people.

MRAI offers unparalleled opportunities to develop National and International business contacts. Join MRAI to get access to Members Directory, an essential networking and information tool featuring details about potential organizations that includes suppliers and customers all over the world.

MRAI extensive network has become an influential source of information for public authorities, the media, and other industry sectors. Representing its member's interests, MRAI maintains contact with other national and international bodies FICCI, ASSOCHAM, CII, BIR, BMR, ISRI, advising them on the formulation of appropriate legislation and the promotion of a more competitive Recycling Industry.

MRAI liaison with Ministry of Steel, Ministry of Commerce, Ministry of Finance, Ministry of Mines, Ministry of Environment and Forest, Ministry of Shipping, Customs and took up the problems of its Members at various State Government and Central Government level.

MRAI provides the following services to its members:

- Promoting all types of recycling in India.
- Pursuing with GOI to obtain official industry status for the Recycling industry in India.
- Providing our Members, a proper forum to discuss the various issues faced by the Recycling Community.
- Representing the Government for abolishing the import duties levied on the scrap material.
- Provides Membership Certificates to its Members.
- Distributing a complimentary Magazine to members.

For any queries, please contact: **Membership Dept.** Material Recycling Association of India 105/106, A Wing, Dynasty Business Park, Andheri-Kurla Road, AndheriE, Mumbai 400059 Phone: 7045167403. E-mail: membership@mrai.org.in

MATERIAL RECYCLING ASSOCIATION OF INDIA

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Indian Import of Non-Ferrous Scrap

Quantity in Thousands Values in Rs. Lacs **HS Code** Description APR **APR-APR** APR APR-APR 2024 (F) 2024 (F) 2024 (F) 2024 (F) 740400 COPPER WASTE AND SCRAP 20,094.71 20,094.71 1,01,144.01 1,01,144.01 760200 ALUMINIUM WASTE AND SCRAP 20,094.71 20,094.71 2,12,260.40 2,12,260.40 790200 9,877.99 ZINC WASTE AND SCRAP 5,987.80 5,987.80 9,877.99 LEAD WASTE AND SCRAP 12,956.45 12.956.45 780200 8,828.13 8,828.13 750300 NICKEL WASTE AND SCRAP 352.84 352.84 2,826.07 2,826.07 TOTAL 55,358.19 55,358.19 3,39,064.92 3,39,064.92

Indian Import of Ferrous Scrap

		Quantity in	n Thousands	Values in Rs. Lacs	
HS CODE	DESCRIPTION	APR 2024 (F)	APR-APR 2024 (F)	APR 2024 (F)	APR-APR 2024 (F)
720421	WASTE AND SCRAP OF STAINLESS STEEL	78,185.87	78,185.87	85,976.65	85,976.65
720410	WASTE AND SCRAP OF CAST IRON	14,715.40	14,715.40	5,280.05	5,280.05
720429	WASTE AND SCRAP OF OTHER ALLOY STEEL	12,817.95	12,817.95	6,700.36	6,700.36
720430	WASTE AND SCRAP OF TINNED IRON OR STEEL	-	-	-	-
720449	OTHER WASTE AND SCRAP (HMS,SHREDDED ETC.)	4,15,306.33	4,15,306.33	1,45,708.06	1,45,708.06
720450	REMELTING SCRAP INGOTS	-	-		
	TOTAL	5,21,025.55	5,21,025.55	2,43,665.12	2,43,665.12

Indian Import of Paper Scrap

		Quantity in Thousands		Values in Rs. Lacs	
HS CODE	DESCRIPTION	APR 2024 (F)	APR-APR 2024 (F)	APR 2024 (F)	APR-APR 2024 (F)
47079000	OTHR INCL UNSORTED WASTE AND SCRAP	2,61,821.42	2,61,821.42	38,355.72	38,355.72
47071000	WSTE AND SCRP OF UNBLECHD KRAFT PAPR OR PAPRBORD OR CORGTD PAPR/PAPRBORD	1,67,292.71	1,67,292.71	27,823.87	27,823.87
	TOTAL	4,29,114.13	4,29,114.13	66,179.59	66,179.59

Indian Import of Plastic Scrap

		Quantity in Thousands		Values in Rs. Lacs	
HS CODE	DESCRIPTION	APR 2024 (F)	APR-APR 2024 (F)	APR 2024 (F)	APR-APR 2024 (F)
39011010	LINEAR LOW DENSITY POLYETHYLENE (LLDPE)	20,863.05	20,863.05	16,899.47	16,899.47
39012000	POLYETHYLENE HVNG A SPCFC GRVTY 0.94 /MORE	93,692.24	93,692.24	80,124.65	80,124.65
	TOTAL	1,14,555.29	1,14,555.29	97,024.12	97,024.12

Source: Ministry of Commerce Export Import Data Bank

(Updated on 13/06/2024)

(Updated on 13/06/2024)

(Updated on 13/06/2024)

(Updated on 13/06/2024)

Indian Export of Non-Ferrous Scrap

(Updated on 13/06/2024)

		Quantity in Thousands		Values in Rs. Lacs	
HS CODE	DESCRIPTION	APR 2024 (F)	APR-APR 2024 (F)	APR 2024 (F)	APR-APR 2024 (F)
740400	COPPER WASTE AND SCRAP	936.74	936.74	6,087.50	6,087.50
760200	ALUMINIUM WASTE AND SCRAP	1,168.03	1,168.03	1,839.47	1,839.47
790200	ZINC WASTE AND SCRAP	-	-	-	-
780200	LEAD WASTE AND SCRAP	0.00	0.00	0.06	0.06
750300	NICKEL WASTE AND SCRAP	226.68	226.68	2,384.79	2,384.79
	TOTAL	2,331.45	2,331.45	10,311.82	10,311.82

Indian Export of Ferrous Scrap

(Updated on 13/06/2024)

		Quantity in Thousands		Values in Rs. Lacs	
HS Code	Description	APR 2024 (F)	APR-APR 2024 (F)	APR 2024 (F)	APR-APR 2024 (F)
720421	WASTE AND SCRAP OF STAINLESS STEEL	145.97	145.97	487.49	487.49
720410	WASTE AND SCRAP OF CAST IRON	81.96	81.96	29.59	29.59
720429	WASTE AND SCRAP OF OTHER ALLOY STEEL	49.08	49.08	30.39	30.39
720430	WASTE AND SCRAP OF TINNED IRON OR STEEL	0.02	0.02	0.03	0.03
720449	OTHER WASTE AND SCRAP (HMS, SHREDDED ETC.)	69.61	69.61	112.43	112.43
720450	REMELTING SCRAP INGOTS	-	-	-	-
	TOTAL	346.64	346.64	659.93	659.93

Source: Ministry of Commerce Export Import Data Bank

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Indian Export of Paper Scrap

(Updated on 13/06/2024)

		Quantity in Thousands		Values in Rs. Lacs	
HS CODE	DESCRIPTION	APR 2024 (F)	APR-APR 2024 (F)	APR 2024 (F)	APR-APR 2024 (F)
47079000	OTHR INCL UNSORTED WASTE AND SCRAP	1.23	1.23	1.95	1.95
47071000	WSTE AND SCRP OF UNBLECHD KRAFT PAPR OR PAPRBORD OR CORGTD PAPR/PAPRBORD	26.99	26.99	12.53	12.53
	TOTAL	28.22	28.22	14.48	14.48

Source: Ministry of Commerce Export Import Data Bank

Indian Export of Plastic Scrap

(Updated on 13/06/2024)

		Quantity in Thousands		Values in Rs. Lacs	
HS CODE	DESCRIPTION	APR 2024 (F)	APR-APR 2024 (F)	APR 2024 (F)	APR-APR 2024 (F)
39011010	LINEAR LOW DENSITY POLYETHYLENE (LLDPE)	5,062.09	5,062.09	4,573.96	4,573.96
39012000	POLYETHYLENE HVNG A SPCFC GRVTY 0.94 /MORE	7,877.36	7,877.36	6,711.65	6,711.65
	TOTAL	12,939.45	12,939.45	11,285.61	11,285.61

Source: Ministry of Commerce Export Import Data Bank

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