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ReSource

Managing Editor: Kirsten Kelly

kirsten@infrastructurenews.co.za

Editor: Duncan Nortier

duncan@infrastructurenews.co.za

Digital Manager: Chelsea Gillespie

digital@infrastructurenews.co.za

Designer: Beren Bauermeister

Contributors: Brendon Jewaskiewitz,

Etienne de Jager, Logan Moodley,

Marcin Hubert Durski, Mark Williams-Wynn,

Minqobi Mkhize, Ryan Papanicolaou,

Udesh Sewduth

Advertising Sales: Sindi Moni

+27 (0)82 212 4574

sindi@infrastructurenews.co.za

Publisher

Infrastructure News

47 Grove Road, Orange Grove, Johannesburg
Gauteng, 2192

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The 8th wonder of the world

Looking back on humanity, we often marvel at the accomplishments of the ancient and modern world. These monuments to human achievement, ranging from the pyramids of Giza to the Burj Khalifa, provide insight into the culture and engineering of the society that built them.

When we, as humanity, now look back at the ancient world, there is a sense of wonder and bewilderment. How did they do it? Why did they do it? What does this say about them? The pyramids of Giza are the most famous example of this historical conundrum.

A fun activity, something you can do for free, which these days is a big win, is to imagine, "What would a future society think of us?" Or, "What sort of culture produced this?" What would our monument be? The aforementioned Burj Khalifa, or something else, something we often ignore.

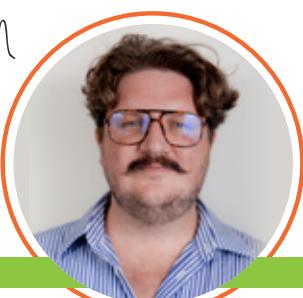
The millions upon millions of tonnes of waste that we have accumulated is as much a human achievement as the great pyramids. It is a monument to overconsumption, global supply chains, hyper-complex logistics, and our inability to genuinely plan ahead.

While the landfills, dumps, and litter are separated by borders and roads, they all form part of one connected object. The great comedian, king of one-liners, Steven Wright, has a quip: "I have the world's largest collection of seashells. I keep it on all the beaches of the world." A silly joke, but a reminder that these disparate objects are all part of one ecosystem, just like our waste.

For a more heady example, ecological philosopher Tim Morton theorises that nature is a hyperobject. A hyperobject is something that has a scale so massive that it dwarves an individual's life, making it difficult to think about. The idea is that nature is an ancient object that works in ways that are often confounding to us; another hyperobject is the sum total of humanity's impact on nature, often named the anthropocene. It is truly difficult to wrap our minds around the waste that was produced hundreds of years ago up until now, but its one long chain in the human story.

This presents us with a unique solution; no one person can solve this crisis, it takes our collective efforts, across time and borders, for us to genuinely tackle waste and the environmental damage associated with it. This can range from large shifts in policy to local clean-up events; nothing is useless if we are all committed to doing our part together. ■

Duncan



COVER OPPORTUNITY

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SOUTH AFRICA ACCELERATES THE ADOPTION OF CLEAN COOKING AS G20 LEGACY PROGRAMME TAKES SHAPE



By adopting a working business model the community benefits from new economic activity

South Africa is moving forward with an ambitious clean cooking initiative developed under its 2025 G20 Presidency, with early implementation already underway in KwaZamokuhle, Mpumalanga.

By Duncan Nortier

The programme, through Outcome 3 of the Energy Transition Working Group (ETWG) led by the Energy and Water Sector Education Training Authority (EWSETA), aims to reduce reliance on coal, paraffin, and biomass by introducing gas-based cooking technologies, last-mile (localised) gas distribution, and community-based enterprise development initiatives.

Although clean cooking has long been articulated in national energy plans, it has seldom moved beyond policy commitments. Under South Africa's G20 Presidency, it has now emerged as a central priority outcome. Teslim Mohammed Yusuf, EWSETA executive for planning, monitoring and evaluation,

emphasises that the current programme "is not a pilot as we have built our programme upon the knowledge and experience of other clean cooking initiatives implemented by G20 members. "Pilots allow room to fail; I don't have that privilege." What we are doing must work," and that is the mindset we had when we successfully launch the G20 Clean Cooking Lagacy Programme in KwaZamokuhle on the 4th of October 2025.

Global context and local relevance

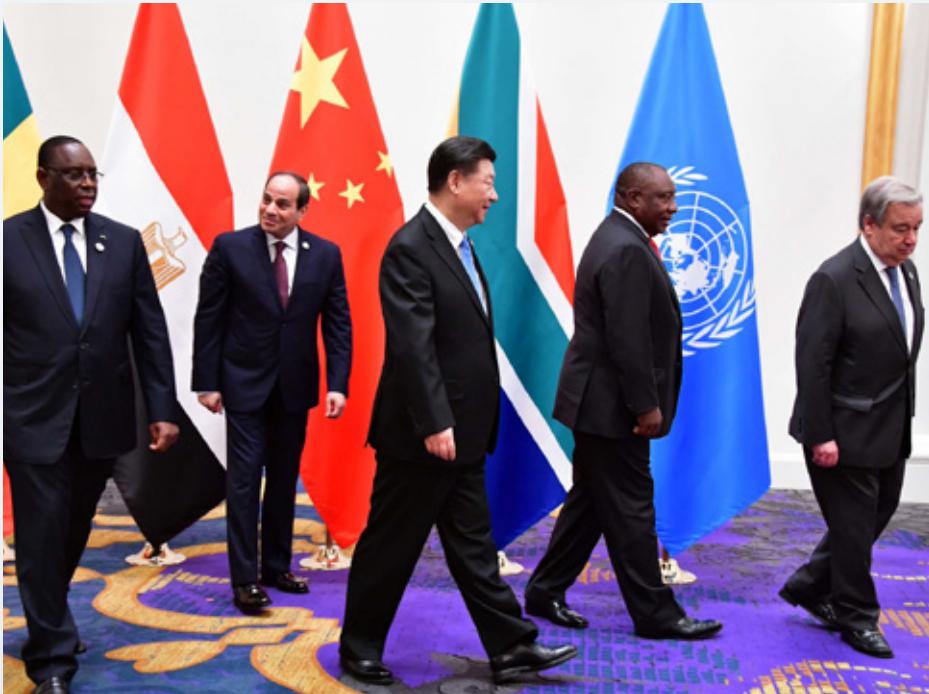
Clean cooking was the only G20 energy priority negotiated outcome led by the Department of Electricity and Energy during the Energy Ministerial in October 2025 that received unanimous support among all member



Teslim Mohammed Yusuf, EWSETA executive for planning, monitoring and evaluation

countries. According to Teslim, this highlights the growing global recognition that energy poverty and health implications of indoor air pollution from harmful cooking fuel types remain "foundational development challenges."

South Africa faces a particularly complex situation due to its heavy coal-energy dependence. "More than 80% of our electricity comes from coal," Teslim notes. "So, before a household even switches on a stove, their baseline outdoor air quality is already poor. Adding coal, wood, or paraffin cooking on top of that multiplies the health risks."



Clean cooking was the only G20 energy priority negotiated outcome led by the Department of Electricity and Energy during the Energy Ministerial in October 2025 that received unanimous support among all member countries. Image credit: Government of South Africa

Government views the clean cooking initiative as an opportunity to improve public health, reduce pressure on overstretched health systems, lower fire-related household risks, and contribute to long-term emissions reduction in-line with South Africa's Nationally Determined Contribution (NDC). Teslim adds that the initiative has indirect economic

significance as well, referencing global carbon border taxes: "If we don't improve our energy profile, our exports will become less competitive internationally."

KwaZamokuhle: The first implementation site

The first rollout took place in five schools and surrounding communities in KwaZamokuhle, Mpumalanga. These schools previously relied on coal stoves for meal preparation, a practice common in many lower-income schools in South Africa.

"These coal stoves are incredibly versatile," Teslim explains. "They can heat a room, keep a kettle warm, cook food, and even be used for

KwaZamokuhle, the first implementation site. Image used under creative commons licensing

ironing. But they also release harmful fumes. We met kitchen staff who were rotating pots and taking turns outside just to breathe."

Through the programme, the schools now use modern high-pressure LPG systems, compliant installations, and improved ventilation. Preliminary feedback from woman cooking in these schools suggests reduced cooking times and safer working conditions.

Teslim stresses that the school kitchens were chosen not only for health reasons but also because "school meals are the first energy transaction many children experience each day. If we can clean that environment, the impact is immediate."

Making LPG accessible: the "box in the community" model

A major barrier to clean cooking adoption is the availability and affordability of clean cooking fuels like LPG in townships and informal settings. Large cylinders are costly upfront, and refilling often requires expensive trips to distant depots.

To address this, the programme deploys a container-based LPG micro-depot or last-mile LPG box, locally known as "the box in the community." These boxes have a hosting capacity of up to 5-tons of LPG. It is positioned within the community as a "clean energy hub"





The Minister of Electricity and Energy for South Africa is Dr. Kgosientsho Ramokgopa alongside community members and EWSETA for the programme launch

and acts as the catalyst point for the broader value chain for entrepreneur-operated LPG distribution cages across KwaZamokuhle.

These cages, operated by five small enterprises, which store limited quantities of gas safely within neighbourhoods are a second tier of even smaller 250-kilogram micro-depots, are being established through spaza shops.

Teslim describes the rationale as simple: "If you do not bring gas closer to the community, people will go back to coal, wood, and paraffin. Easier access is everything."

The programme also promotes micro-transactions, allowing residents to buy small quantities of gas instead of full cylinders. This is a unique "fill what you can afford" solution: making it possible to "top-up" cylinders as opposed to being required to fully fill-up cylinder based on capacity. "If someone only has R10, they can buy enough LPG to cook breakfast. That changes the economics of clean cooking completely," he says.

In addition to household and school interventions, the programme includes capacity building for residential LPG installers, safety officers, and the small distribution of businesses previously mentioned.

"This is not just about technology of fuel type. It is about creating local economies," Teslim says. "We are training youth to become certified installers and safety practitioners. Clean cooking can become an entry point into the wider energy sector."

These training programmes, delivered with industry association called the Liquified Petroleum Gas South Africa LPGSA, aim to

support long-term job creation and formalisation within a sector that has historically been dominated by informal labour.

Governance, coordination, and local politics

The rollout has not been without difficulties. Teslim acknowledges that coordination between entities is crucial to the success of programmes of this nature. The Department of Electricity and Energy are custodian of South Africa's energy security mandate, and it was a privilege to have its Minister Dr. Kgosientsho Ramokgopa launch

the G20 Clean Cooking Legacy Programme in KwaZamokuhle on the 4th of October 2025.

Political complexity at the community level also posed some challenges. KwaZamokuhle spans multiple ward councils, each with its own councillors and administrative systems.

He adds that logistical negotiations, from community engagement facilitated by ward councillors to identifying suitable households in determining how resources should be distributed, often require considerable time and effort. "I drove to KwaZamokuhle twice in one day for a single conversation. That is the

By embedding into the community, the service and product are more accessible, and a safer alternative to burning wood or coal for cooking



Schools that use wood or coal burning stoves for cooking expose cooking staff and student to health problems, which this programme aims to rectify

reality of local implementation,” however, the commitment for change on the ground, keeps you going and sure that success is inevitable.

National implications and alignment with existing programmes

While the current phase is geographically focused, the programme is designed for national and continental “Africa” scalability. Teslim believes that alignment with Eskom’s air-quality-offset programme, which aims to transition more than 90 000 households away from harmful cooking practices, will be essential.

“We must integrate with Eskom’s work. If they are replacing coal stoves in high-pollution areas, and we are building LPG access networks, that is when the system becomes coherent.”

He adds that South Africa cannot view clean cooking as an isolated intervention: “It sits across energy, health, climate, small business, and education. The coordination is as important as the technology or fuel type.”

A model for Africa

Teslim argues that the programme’s impact could extend beyond South Africa’s borders. It is important to remember, the energy Poverty trap, reliance on polluting fuels drains household incomes and exposes families to unsafe environments, diminishing their ability to support themselves in a sustainable manner. Many African countries face similar challenges: limited access to clean fuels, underdeveloped distribution systems, and behavioural barriers to adoption.

“Africa should be our market, not just geographical boundaries of South Africa,” he says. “If our manufacturing and expertise “Africa’s most industrialised economy” can serve a continent of 1.4 billion people, we create economies of scale that make clean cooking accessible, affordable, and available.”

A G20 technical document developed in partnership with the International Energy Agency (IEA), the African Union, and key international organisations, outlines a four-pillar adoption framework covering policy, technology, markets, and capacity building fundamentals. The document will be made accessible to governments, researchers, and industry at larger, guiding a wide audience of actors as a catalyst for positive change.

Although at a G20 Ministerial level, the technical submission is reduced to a Ministerial Communiqué for political circulation, Teslim



The wood and charcoal cookers produce ash as a waste product, while gas does not

emphasises the importance of preserving the scientific detail. “The condensed version is fine, but the full version matters. It gives institutions and individuals the tools to successfully implement their own clean cooking initiatives.”

Reporting and accountability

South Africa accounts for its G20 clean cooking outcome through the Department of Electricity and Energy (DEE), with technical validation from the International Energy Agency. The country’s submission forms part of a growing global evidence base on clean cooking implementation.

Teslim views the accountability function as crucial: “If South Africa is leading such a global initiative, we must lead on data. Our work must be transparent and accurate, and it must be accessible to the world.”

Next steps

The next phase of the programme will expand community-level LPG micro-depots, roll out additional training programmes, and prepare formal monitoring and evaluation systems to assess health impacts, fuel-shift behaviour and economic outcomes.

Government and international agencies are also considering potential fiscal support for clean cooking fuels, including targeted VAT adjustments and expanded carbon credit systems for low-income households.

Teslim is cautious about declaring victory early. “Impact can only be measured after five years of implementation,” he says. “But the

early indications show that if you make clean cooking accessible, affordable, and available, the possibilities for people and communities are unlimited. The behaviour follows the access.”

South Africa’s clean cooking programme is still in its early stages, but it represents a vital combination of technical design, community engagement, and global collaboration. While challenges around governance and coordination remain, the programme has generated unusual momentum in a sector known for slow implementation.

“This work must outlive the people who started it,” Teslim says. “Clean cooking should become part of South Africa’s energy DNA, not a once-off initiative.”

As the country prepares to scale the model, its success may hinge on the same principles that guided its initial phase: accessibility, local ownership, and practical design. If these hold, South Africa could become a continental leader in an area where progress has been historically slow but increasingly urgent. ■



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A year in waste, nothing wasted

Working in the waste management sector can feel isolated. The landfill engineers talk to landfill engineers, the recyclers talk to recyclers, and so on. As the president of the IWMSA I get to see the many faces of the industry, and how it all comes together.

I see that everyone is working towards a common goal, being sustainable, enabling circularity, and reducing waste either through valorising or diversion.

I have also had the privilege of attending many conferences this year, locally and internationally. Getting a boots-on-the-ground view of what is happening both at home and abroad puts the work the sector does into context, and we are often on par with or exceeding our international counterparts.

Seeing partners, collaborators, friends, and professionals heading up and presenting at conferences such as Enlit or seeing the various aspects of the sector share a stage at Ifat, is important as it shows that, as a country, we are making considerable steps in the right direction. There was also a range of IWMSA hosted events such as the Landfill and Waste Treatment Conference held in

Durban this year, which solidifies the value of the organisation, bringing people together under a common goal.

Internationally, I attended the ISWA annual conference in Buenos Aires, Argentina, where the discussions ranged from human rights to the circular economy. Seeing the work that other countries are doing only reiterates the fact that South Africa is heading in the right direction. We often look to the international space for guidance, but really, they can also learn from us, and we must give ourselves credit where it's due.

I was also fortunate to attend the WEEE Forum 2025 event in Edinburgh, Scotland. Seeing innovation and a will to push for real

change from countries all over the world was a good energy boost in the last quarter of a very busy year.

The IWMSA is 50 years old next year, and each year is a testament to the hard work that the sector is doing, and each year we can reflect on how far we have come and learn from that, and plan for the future. With the Ministry of Forestry, Fisheries, and Environment, saying that a single-use plastic ban is on the cards, the sector is ready to go forward and enable the circular economy initiatives that we have all been preparing for. ■

Patricia Schröder, President, IWMSA



IWMSA PATRON MEMBERS



Representing South Africa at The International Solid Waste Association 2025 Conference & Exhibition

The International Solid Waste Association (ISWA) conference is a global gathering of waste and resource management leaders. IWMSA president Patricia Schröder joined a dynamic panel discussion on the newly published ISWA Guiding Principles, contributing valuable insight on how collaboration, innovation, and leadership can shape a sustainable future for waste management.



Site visit to Mpact Plastic Containers

IWMSA, represented by executive officer Nicolle de Bruyn, recently had the privilege of visiting Mpact Plastic Container, a patron member of the IWMSA.

Nicolle's visit offered an inside look at how Mpact Plastic Containers is actively "closing the loop" through advanced recycling and manufacturing processes that turn waste into valuable resources.

The visit began at the company's recycling plant, where key account manager Enough Zwane provided a detailed walkthrough of their operations, from collecting used Mpact products such as crates, pallets, and other post-consumer plastics from clients, to processing and pelletising these materials for reuse.

The tour continued to their production facility, where sales manager Bongani Mabusela and operations manager Donovan



French highlighted how innovation meets sustainability. Nicolle got to see robotic systems transforming recycled pellets into high-quality, durable products, including fully recyclable wheelie bins designed to meet diverse client needs.

The Landfill and Waste

The annual IWMSA's Landfill and Waste Treatment Conference & Exhibition, this year held in KwaZulu-Natal, tackled the provocative topic: "LANDFULL: Where to from here?" The conference brought voices from national and local government, engineers, scientists, and waste management practitioners together for an insightful and productive three days.



IWMSA Eastern Cape ends the year on a high note



Over 69 participants collected over 150 bags of waste

It has been a productive and eventful week for the IWMSA Eastern Cape Branch.

The IWMSA Eastern Cape Branch undertook the removal of alien vegetation and planted indigenous trees along Epsom Road in Stirling to support and enhance the area's biodiversity.

On Thursday, 20 November 2025, the IWMSA Eastern Cape Branch visited two schools, Peter Pan

Pre-Primary and Stirling Primary School, to present educational talks on responsible waste management to young learners:

Following the school visits, the team conducted a clean-up operation in the Stirling area around Nutting Hall.

An estimated 150 bags of waste were collected, with a total of 60 participants contributing to the day's success.

On the ground: IWMSA's Landfill and Waste Treatment Conference

The responses from those in attendance revealed both the vitality of bringing the sector together and the broad conversations that were sparked by the speakers.

Views from the ground



Dr Mark Williams-Wynn from EWaste Africa reports: The WIMSA landfill and waste treatment conference is important for us at EWaste Africa. While we think about recycling, it is important to connect to other spheres of the waste sector, looking at how we can reduce the amount of e-waste that is being sent to landfills to reduce the impact. E-waste is one of the more hazardous types of waste that ends up in landfills, and the question is, how do we make it as easy as possible for people to prevent that e-waste from going to landfills, filling up the landfills, and polluting the environment?



Dr Nthabiseng Motsoane from EnviroServ adds: So, the conference question "land full, where to from here?" Engages us to find more innovative solutions, especially for some of the critical aspects, such as leachate, because we all know the harm that leachate poses to the environment and public health. So, it is extremely crucial for us to produce innovative, sustainable solutions that are adaptable, especially to our African continent. We tend to get advice from Europe, but we need to understand the African and South African context.



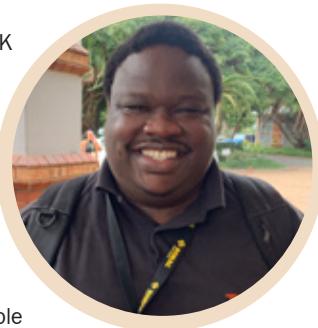
Heather Shard from IWMSA, reflecting as a host, says: It was an excellent conference. We have had some interesting presentations, fantastic networking opportunities, and we have really had some great feedback from the delegates who attended. We are glad to have been able to host this conference in person because we had to hold it virtually. So, it has been a wonderful opportunity to get everyone together and talk about landfills and waste treatment.



Aiden Bowers from the Department of Forestry, Fisheries, and Environment says: Reflecting on this gathering, it is clear that the time is near us to start transitioning away from landfills. We need to start creating the right conditions to enable that. And as the national government, we are pushing baseline enforcement to allow alternatives to become more viable.



Andrew Nyakusinga from SRK Consulting: This conference was quite enlightening. Allowing me to look at the diverse ways in which we can treat our waste. Exploring different ways in which we can make use of the waste and all instead of just dumping it at a landfill site. So, it is really looking at the whole landfill, a landfilling aspect of it. I was more interested in the leachate and how people are treating the leachate, and how people are reusing leachate in various forms, and how. I am quite excited to see how those technologies go forward. There were some interesting case studies offering some unique perspectives. Going forward, I think governments, different stakeholders, consultants, engineers, and the public in general should come together, to get to know how to resolve this big issue called waste.



Ely Bronstring from Circular Energy says, The IWMSA 'Landfull - where from here' event has been insightful for Circular Energy. An amazing networking space with experts in the field discussing the issues and solutions to make landfills more sustainable and circular. The 'human age' called the Anthropocene Age shows how humans have significantly impacted the world we live in. Landfills are our techno fossils and need to be redesigned as a data ecosystem. Landfills will become eco parks in the future, where Circular Energy can and is playing a crucial role in diverting hazardous products to ensure that infinite resources are treated and recycled. It has only been 4 years since the EPR regulations were implemented, and Circular Energy as a PRO has already managed to meet the DFFE diversion targets for identified products in the regulations. Our networking with waste management companies this week has been amazing, and the need to have circularity at landfill sites has been emphasised to work towards these diversion targets. We would like to thank the Institute for bringing expertise and knowledge on waste management together. Collaboration is key to working together to show our future generations that we are all working together for a better sustainable future.

In South Africa and much of Africa, the petrochemical sector is a strategic economic pillar – supporting national energy security, industrial development and export competitiveness

Turning complex petrochemical waste into safer, cleaner solutions

The petrochemical industry produces some of the most complex and hazardous waste streams in the industrial landscape. **Kirsten Kelly** talks to **Hugh Khumalo** – EnviroServ's national haztech and inland southern commercial manager – about petrochemical waste management that is safe, compliant and sustainable.

In South Africa and much of Africa, the petrochemical sector is a strategic economic pillar – supporting national energy security, industrial development and export competitiveness. With this scale and importance comes significant responsibility, and robust waste management is indispensable in the petrochemical sector, where complex, high-risk waste streams demand specialised handling to avoid contamination and operational disruption," explains Khumalo.

EnviroServ has spent more than two decades supporting the petrochemical sector with specialised, compliant and cost-effective waste solutions that prioritise environmental protection and circular-economy value. The company handles the full spectrum of petrochemical waste needs – from recycling and alternative processing to compliant disposal when required – ensuring safe, efficient and responsible outcomes.

Types of waste streams

Petrochemical operations generate a wide range of challenging wastes – from odorous organic and inorganic sludges to liquids, solids, alumina-rich by-products and high-calorific-value materials. These waste streams differ in viscosity, density and chemical behaviour, which determines how they must be pumped, transported and treated.

"The highly odorous and sometimes toxic waste streams are not suited for landfill disposal, especially since many landfills are located near residential communities. They may require odour-control treatment or must be directed to incineration," states Khumalo.

High-calorific waste streams such as coal fines, coal riddlings, crude tar sludge and dusty tar are often reused to fire onsite boilers or fed into clay brick manufacturing processes. Liquid calorific-rich streams are predominantly used as fuel in cement kilns. Some liquids – including tarry or oily wastes – can also be recycled and resold. Alumina-rich fractions are reclaimed for refractory lining, ceramic production and high-temperature insulation.

"EnviroServ has been a leading contributor to South Africa's circular economy, pioneering waste-to-energy solutions long before they became mainstream. In 2017, the company successfully diverted odorous petrochemical waste to cement kilns as a coal replacement

– a project that remains operational today. We continue to blend high-calorific waste streams as kiln feedstock, reducing coal reliance and lowering carbon footprints," notes Khumalo.

Additional circular-economy initiatives include:

- Reusing hydrocarbon sludge in brickmaking
- Using stabilised sewage sludge as lawn-dressing material
- Supplying sludge and high-energy wastes to cement and clay industries as alternative fuel or raw material inputs

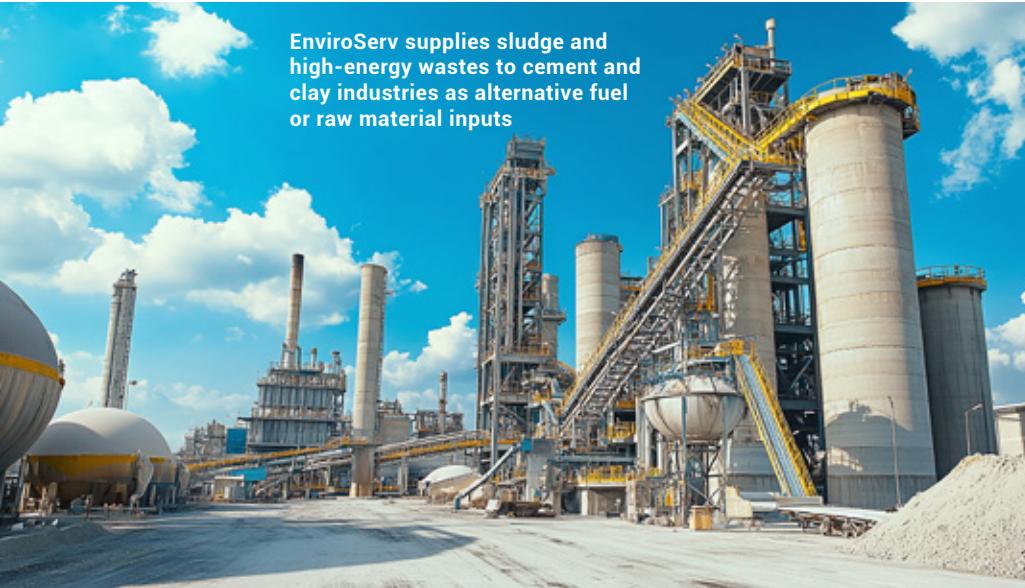
A comprehensive suite of petrochemical waste services

Central to managing complex petrochemical waste is Holfontein, South Africa's largest hazardous waste landfill. Owned by EnviroServ, Holfontein is engineered to safely take Type 1 to Type 4 wastes, and is equipped with treatment processes capable of treating even Type 0 materials before disposal. With legislation tightening and waste streams becoming more chemically complex, this facility provides petrochemical clients with assurance that their most difficult waste is handled safely, legally and transparently.

EnviroServ also provides extensive industrial services, including tank and dam cleaning, desludging, high-pressure washing, vacuum truck operations, soil rehabilitation, asbestos removal and onsite bioremediation. These capabilities allow petrochemical customers to maintain operational continuity while ensuring their environmental responsibilities are met.

"One of EnviroServ's standout innovations is its sludge dewatering technology – developed in partnership with specialised suppliers. The system extracts sludge from dams, separates solids from water, and returns up to 84% of the reclaimed water back to the client's operations. This dramatically reduces disposal volumes, cuts transport emissions, and supports compliance by minimising disposal of liquid waste at landfills," adds Khumalo.

Hugh Khumalo, National Haztech and Inland Southern Commercial Manager, EnviroServ



EnviroServ provides online and offline dam cleaning services, allowing customers to recover capacity from sludge-laden ponds, avoid overflow risks, and reduce the carbon footprint associated with water-laden waste transport. Major petrochemical companies have used this technology to save millions in costs and restore dam functionality.

Ensuring compliance, safety and traceability

Because petrochemical waste carries significant environmental and safety risks, rigorous compliance with waste-management regulations is vital – and forms a cornerstone of EnviroServ's service to the industry.

To ensure the traceability and safe transport of dangerous goods, EnviroServ incorporates advanced systems to track every load in real time, monitor route compliance, link manifests digitally and ensure full transparency from collection to

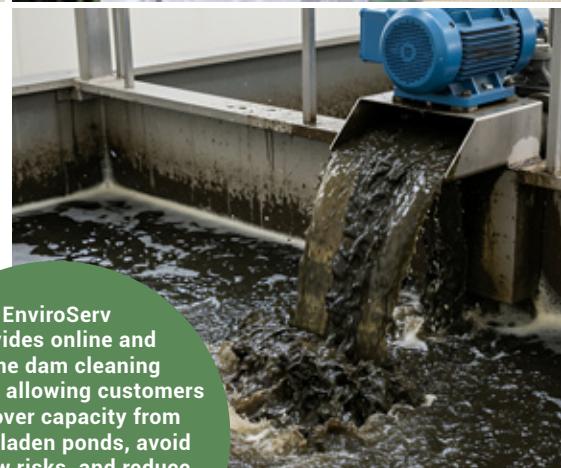
destruction. This integrated approach reduces the risks of spills, misrouting and non-compliance.

Safety is reinforced by EnviroServ's in-house hazmat specialists, technical assessors and an experienced SHEQ team that supports detailed risk assessments, potential deviation analyses and ongoing client audits. This approach is underpinned by certifications including ISO 45001, ISO 14001 and SABS accreditation.

EnviroServ places customers at the centre of its operations. To help customers better understand their waste streams and how these are managed, EnviroServ hosts open-door sessions at Holfontein, allowing clients to see treatment processes first-hand, ask questions and receive practical training – from landfill cell construction to compliance and waste-type disposal. EnviroServ also welcomes technical discussions on alternative solutions and regularly shares industry best practice. Recently, the team introduced a pipe-hoisting system designed to minimise pinch-point injuries; after presenting it to a petrochemical client, it has now been adopted across the entire site as a new safety standard.

To ensure the traceability and safe transport of dangerous goods, EnviroServ incorporates advanced systems to track every load in real time, monitor route compliance, link manifests digitally and ensure full transparency from collection to destruction

EnviroServ provides online and offline dam cleaning services, allowing customers to recover capacity from sludge-laden ponds, avoid overflow risks, and reduce the carbon footprint associated with water-laden waste transport



The future

When asked about the future of petrochemical waste management, Khumalo explains that the industry is shifting away from a disposal mindset toward one that views waste as a resource. "As landfill restrictions tighten, EnviroServ anticipates growth in waste-to-energy infrastructure, alternative fuels, advanced stabilisation technologies, and onsite treatment systems that reduce the need for long-distance transport. The petrochemical sector is also investing more in research and development, sustainability and carbon reduction – and EnviroServ's evolving technologies position it as a key partner in meeting these goals."



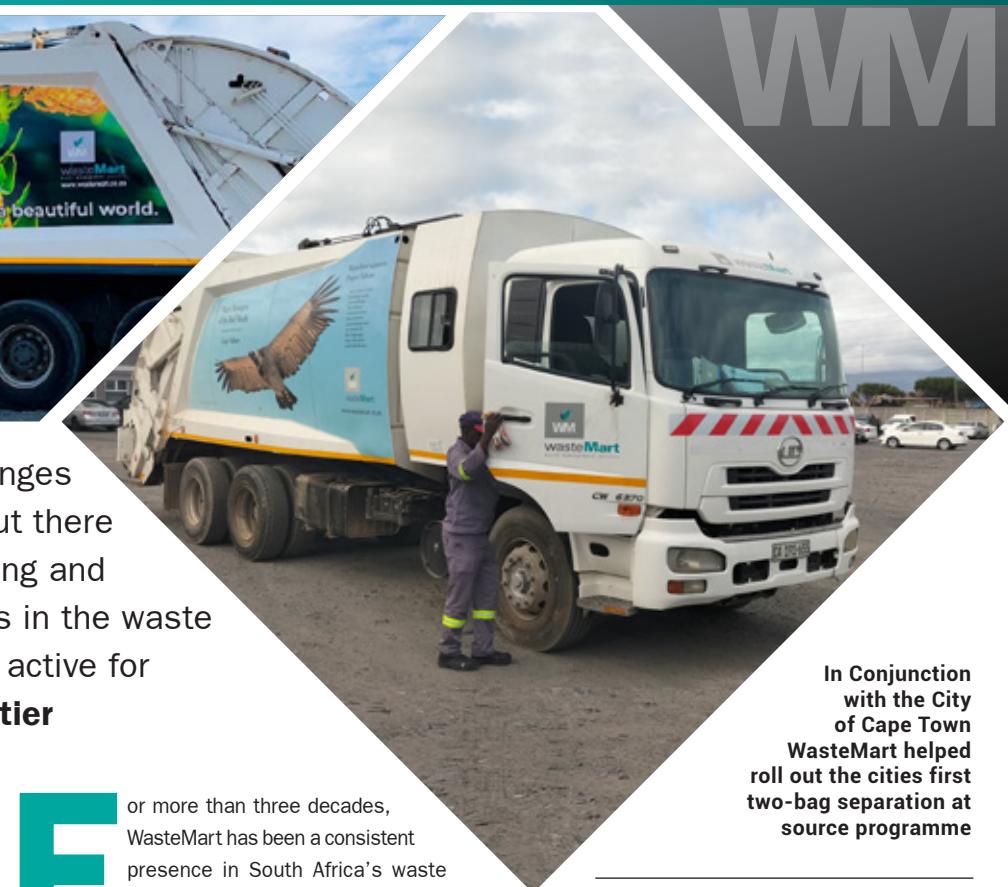

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FORWARD THINKING:

THE DECADES-LONG BATTLE TO GET WASTE MANAGEMENT RIGHT



South Africa's waste challenges can seem overwhelming, but there is a history of forward-looking and highly skilled South Africans in the waste sector, and they have been active for some time. **By Duncan Nortier**



In Conjunction with the City of Cape Town

WasteMart helped roll out the cities first two-bag separation at source programme

For more than three decades, WasteMart has been a consistent presence in South Africa's waste management sector. Established by Nazier Marthinus and his late father, the company evolved from a small family operation into a major service provider. Its development reflects the broader transformation of South Africa's waste management industry towards compliance, efficiency, and sustainability.

According to Marthinus, the company emerged to address an evident gap in reliable waste and recycling services for businesses. "About 35 years ago, no one was offering dependable collections for supermarkets and companies," he recalls. "We decided to do it ourselves, and that's where it all began." Over the years, changing regulatory requirements and a growing emphasis on environmental accountability have reshaped its operations. "Back then, compliance wasn't even a word we worried about," he adds. "Now, you need a licence in every city you operate in. The rules are stricter, but that is a good thing; it keeps people from taking shortcuts."

One of WasteMart's significant contributions to municipal waste systems was the introduction of Cape Town's first two bag recycling programme. The City of

Cape Town put out the tender for a company to assist in this project, and on the strength of WasteMart's methodology proposal, Cape Town chose them to help roll the programme out. The initiative separated household waste into general refuse and recyclables for collection. "We wrote the proposal for the City and rolled it out ourselves," says Marthinus. "Residents used two bags: one for general waste and one for recyclables, which we collected separately. That is still how the city does it today."

Initially piloted in Parklands, Pinelands and Blaauwberg, the system reportedly diverted approximately 160 tonnes of recyclables per area from landfill each month. "It was a major shift in mindset," he notes. "Even Johannesburg wanted to know how we did it."

Investment in biogas and circular technologies

In 2017, WasteMart along with other strategic partners developed a biogas facility to process organic waste, shifting from earlier models that attempted to manage



Nazier Marthinus,
owner of WasteMart



From humble beginnings WasteMart are now a cornerstone of waste management in the Western Cape

mixed municipal waste. "At first, we tried to process municipal waste for organics, but the organic ratios didn't work," Marthinus explains. "We changed the model to focus purely on organic waste, and now it's viable." The project, supported by external funders, laid the foundation for future renewable energy initiatives and is currently run under the Cape Town Biogas banner. "It's part of our long-term plan to run dual-fuel vehicles using gas," he adds, emphasising the company's commitment to innovation within the circular economy.

Marthinus describes WasteMart's approach as guided by practical sustainability, balancing business performance with environmental responsibility. "If your business is sustainability, you have to be sustainable," he states. "We try to practice what we preach, from reducing our own electricity and water use to setting 12-month improvement plans. Clients notice when you are serious about it." This operational consistency has supported long-term relationships with both municipal and private sector clients. "Doing the right thing and doing the hard work keeps clients with you," he adds.

Technological Innovation and efficiency

The company has adopted technological solutions to enhance efficiency in collection and logistics. "As



WasteMart is a leading collector of cullet, or recycled glass

far back as 1994, we had satellite tracking in our vehicles," says Marthinus. "We worked with old SMS-based systems and antennas on computers. Now we have GPS, cameras in every vehicle, and route tracking. It has helped us make operations much more efficient." These technologies enable real-time operational oversight and data-driven decision-making. "Technology has always been part of how we stay competitive," he continues. "We plan to use it even more effectively once our biogas contractor is fully on site and vehicle conversions begin."

Collaboration with the informal recycling sector

WasteMart actively engages with informal waste pickers, purchasing recyclable

One of Nazier's most proud moments was helping set up a biogas facility using organic waste, that facility is now run by Cape Biogas

glass collected through both formal and informal systems. "We buy glass back from waste pickers.

The company is also a leading collector of cullet, or recycled glass, within the Western Cape. Despite limited profitability due to low market prices, WasteMart continues to support this activity as part of its environmental commitment. "The price for glass is too low to make big profits," Marthinus acknowledges, "but it's important work." He notes recent developments that could strengthen the sector: "The Glass Recycling Company now wants to pay the informal sector directly from each transaction, even a few cents extra per kilo. That recognition means a lot to the people doing the hard work."

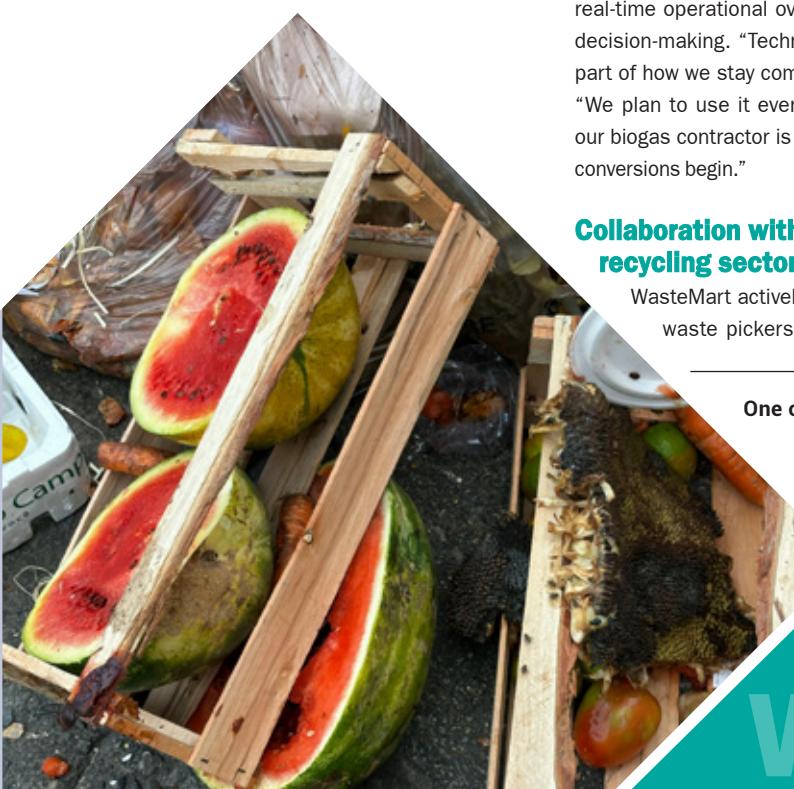
EPR and regulatory alignment

Extended Producer Responsibility (EPR) regulations have introduced a more structured framework for accountability in the waste industry. Marthinus recognises these developments as a positive evolution, noting that the new policies encourage transparency and support industry-wide compliance. "EPR has given the industry more legs to run," he observes. "It has made compliance more transparent and easier to navigate, especially with PROs supporting the process. The bans on liquids and organics make sense; they push everyone towards sustainable waste management."

Outlook and local development

While WasteMart has the capacity for expansion, its current focus remains on strengthening operations within the Western Cape. "We'd like to expand," Marthinus says, "but I believe there is still so much opportunity here. Smaller municipalities and factories in outlying areas need sustainable waste solutions; that is where we are focusing for now." He highlights the importance of source separation at the production level. "If factories separate waste properly from the start, everything improves," he explains. "This reduced double handling, and the transportation costs which results in better pricing, more efficient recycling, less contamination, and the whole value chain benefits."

WasteMart's trajectory reflects the ongoing professionalisation of South Africa's waste management sector. From early recycling initiatives to investments in biogas and digital logistics, the company demonstrates how private operators can align commercial objectives with environmental performance. "It's not easy balancing everything," Marthinus concludes, "but if you keep doing the right thing, the right clients will find you. That is how we have survived for more than 30 years, and that is how we will keep growing."



WM

Electrical leak location: IS IT REALLY A CURE FOR EVERYTHING?

Lined containment facilities are at the heart of modern waste management and pollution control. They serve as the critical barrier between potential contaminants and the surrounding environment, preventing the migration of pollutants into soil and groundwater. Engineered lining systems, incorporating geomembranes, are designed to ensure this containment remains intact. **Adapted from an article by Brendon Jewaskiewitz and Ettienne de Jager, Envitech Solutions (Pty) Ltd**

Yet, the industry's reliance on technology such as electrical leak location (ELL) has, in some cases, led to misplaced confidence that this final testing step can compensate for shortcomings elsewhere in the design or construction process.

Electrical leak location is a proven and powerful quality assurance tool, capable of identifying defects in geomembrane liners with remarkable precision. However, ELL is not a substitute for good design, sound construction practice, and rigorous quality control. Instead, it must be integrated as part of a broader culture of quality that spans every phase of a project, from initial concept through to commissioning.

The role of ELL in modern containment design

Over the last decade, ELL has become widely recognised by regulators and designers as an

essential element of quality assurance in the construction of lined facilities such as landfills, tailings storage facilities, and wastewater ponds. The technology provides a means of locating and repairing breaches in geomembranes, often caused during installation or cover placement, that would otherwise go undetected.

At its core, the dipole method of ELL operates on simple electrical principles. A voltage source is connected between a current injector placed within the covering material and a grounded electrode positioned outside the lined area. The geomembrane acts as an insulator; any current detected flowing through the liner indicates a breach. Using a dipole unit to measure electrical potential across a pre-determined grid, technicians can locate these breaches with high precision and in real time, facilitating repair before the facility is commissioned.

When properly executed, the method can detect punctures as small as a few millimetres, providing an invaluable layer of quality assurance. However, the authors note that its success is not guaranteed simply by conducting the test. For ELL to function effectively, the materials, design, and field conditions must all be compatible with the technology's scientific and practical requirements.

Design compatibility: building for testability

A fundamental principle of effective ELL is that facilities must be designed and constructed with leak testing in mind. Too often, projects treat ELL as an afterthought, something to be applied once construction is complete. This reactive approach undermines the value of the technology.

During design and specification, several technical parameters must be addressed to ensure compatibility with dipole testing. Firstly, the electrical conductivity of both the materials above and below the geomembrane is critical. The system requires sufficient conductivity to allow current to pass through any breach, but excessive conductivity can mask the voltage differentials that indicate a leak. The ideal scenario is a moderately conductive environment with well-controlled moisture content; many specifications reference a minimum of 8% moisture in the cover materials to achieve this.

Equally important is electrical isolation. The materials covering the geomembrane should behave as an isolated 'island', entirely separated from any grounded material outside the lined area. If the current injected into the covering layer can escape through unintended pathways, such as contact between fill material and in-situ soil, grounded pipework, or improperly isolated anchor trenches, the results can be unreliable or misleading.

Designers must also consider cover thickness and homogeneity. Practical experience indicates that the covering material above a geomembrane should not exceed 600 mm in thickness (and certainly no more than 1 000 mm), as deeper or highly variable layers reduce sensitivity and



Etienne de Jager, project manager at Envitech



Brendon Jewaskiewitz, managing director of Envitech



accuracy. Similarly, uniformity in material gradation and moisture content helps maintain consistent readings across the survey grid.

These design principles extend to the treatment of specific structures. Anchor trenches should be configured to maintain electrical isolation between the liner and adjacent ground, while any internal berms, ramps, or drainage structures must be designed to prevent conductive bridging across the containment boundary. For multi-cell facilities, temporary isolation trenches between cells can ensure accurate testing prior to interconnection.

Critically, specifications must be project specific. While ASTM D7007 and ASTM D8265 provide valuable guidance on ELL procedures for covered geomembranes, they are not intended as prescriptive, one-size-fits-all standards. Site-specific factors such as geometry, materials, climate, and liner configuration require thoughtful adaptation of these standards to ensure meaningful results.

Dipole testing in practice

In the field, dipole testing relies on a systematic grid-based approach. The surveyor moves the dipole unit across the surface in measured intervals, recording electrical potential at thousands of data points. The dipole spacing, typically around one metre for cover layers up to 600 mm thick, is critical. Smaller dipole spacing allows for greater resolution and increases the likelihood of detecting small, localised leaks.

- 1 **Geomembranes need to be placed following set standards, and Jewaskiewitz and de Jager argue that landfills should be built to allow for electrical leak location**
- 2 **Punctures break the barrier between the geomembrane and the earth, which puts soil and ground water health at risk**
- 3 **Electrical leak location works by running electricity through the geomembrane, which acts as an insulator, while grounded. If a current is detected it indicates a leak**
- 4 **Placing geomembranes, a vital part of the landfill and one that cannot afford to be compromised through holes**

Some specifications, such as those developed by Leak Location Services Inc., recommend a data density of at least 3 000 points per acre, with dipole spacings between 0.9 and 1.1 metres and survey lines spaced no more than 1.5 metres apart. This density ensures that the smallest possible damage can be located without repeated

re-surveys, saving both time and cost.

Once leaks are identified, they must be uncovered, inspected, and repaired under controlled conditions. It is best practice to re-test the repaired area immediately, as large breaches can mask smaller ones nearby. A systematic approach, locating, repairing, and verifying sequentially, ensures that no defects remain undetected before final sign-off.

Site preparation: the foundation of accuracy

Even the most sophisticated technology will fail without proper site preparation. For ELL to produce reliable and repeatable results, the test area must be well prepared and adequately conditioned.

The area should be fully completed and quality-checked before testing begins, including all relevant CQA inspections, seam testing, and repair work. Electrical isolation must be verified, ensuring that there are no unintended conductive paths between the test area and surrounding ground or structures. Common pitfalls include metal piping, grounded pump bases, concrete structures penetrating the liner, and water-filled risers, all of which can interfere with current flow and distort readings.

Moisture management is equally critical. The materials above and below the geomembrane must be sufficiently hydrated to provide sufficient conductivity, but not saturated to the point of creating isolation breaches. In arid climates, this may require pre-hydration of subgrades or geosynthetic clay liners (GCLs) prior to covering. Conversely, excessive rainfall can flood isolation gaps, creating unwanted conductive bridges.

Proper water application during site preparation often demands logistical planning, adequate



Geosynthetic linings have been used since the 1950's and are just as relevant today

water supply, pumping capacity, and supervision to maintain consistent conditions throughout the survey. Uneven hydration can lead to false readings, delays, and increased costs.

Construction practices: Integrating ELL into the quality process

The success of ELL depends as much on construction discipline as on design or testing. The authors emphasise that a culture of quality must underpin the entire process. This includes careful control of vehicle traffic across liners, strict adherence to CQC procedures during cover placement, and close coordination between contractors and quality assurance teams.

Poor workmanship or inadequate supervision can result in significant damage to geomembranes, particularly during the placement of stone drainage layers or heavy protective fills. Excessive wrinkles, improperly overlapped geotextiles, or heterogeneous materials can all interfere with the electrical continuity required for effective testing.

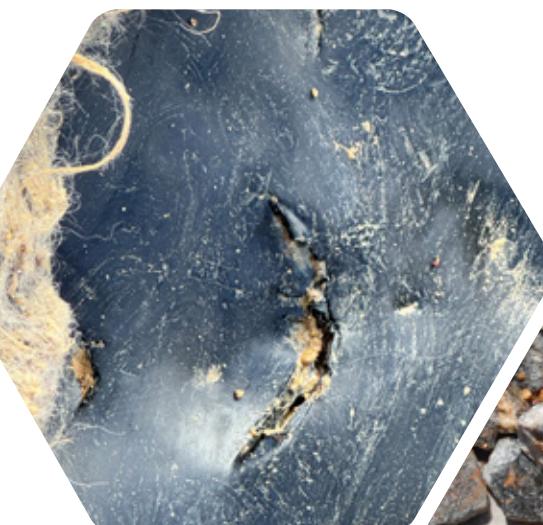
Moreover, the assumption that a post-construction ELL survey will compensate for such issues is misguided. The technology is most effective when it forms part of an integrated quality assurance programme, supplementing, not replacing, good construction practice.

Quality assurance and the limits of detection

While ELL can identify even minute punctures, it is not infallible. Its ability to locate leaks depends on the quality of the installed liner and the integrity of the testing conditions. Poor QC and CQA practices, such as inadequate seaming, contamination beneath the liner, or damage during backfilling, can create numerous breaches that complicate testing.

When many leaks are present, electrical current disperses through multiple pathways, making it difficult to isolate the characteristic signal of individual defects. Larger holes may dominate the readings, masking smaller ones until after repairs. This often necessitates repeat surveys, increasing project timelines and costs.

ELL should therefore be viewed as a verification tool within a broader framework of preventive quality control. Its strength lies in confirming the effectiveness of design and construction, not in compensating for their deficiencies.



Small puncture detected using electrical leak location



Cost, risk, and the value of integration

From a cost perspective, ELL represents a relatively small investment for a potentially large return. Studies indicate that leak location surveys typically account for less than one percent of total project costs, yet they can prevent extensive environmental damage, regulatory penalties, and costly remediation efforts.

However, the return on this investment depends on proper implementation. An inadequately prepared or poorly executed survey provides a false sense of security, arguably more dangerous than no survey at all. Integrating ELL into the design phase, ensuring full compatibility across materials and construction methods, and maintaining rigorous quality assurance throughout are the keys to achieving genuine risk reduction.

The path forward: quality by design

Electrical leak location has earned its place as a cornerstone of modern liner quality assurance. It is the only method capable of detecting construction related damage across 100% of a geomembrane's surface after cover placement. Yet, as Jewaskiewitz and de Jager emphasise, its success is conditional.

To truly harness its potential, the industry must adopt a mindset of quality by design. Every stage, from concept and material selection to installation and final testing, must be informed by an understanding of how ELL works and what it requires. Standards such as ASTM D7007 and D8265 provide a foundation, but their effective application relies on experience, judgement, and attention to site-specific detail.

ELL is not a cure for all ills; it is a diagnostic tool that performs best in a healthy system. When embedded within a rigorous culture of design integrity, construction discipline, and quality assurance, it becomes what it was always meant to be: the final confirmation that a containment system will perform its vital protective function for decades to come. ■

Acting as a final quality check for a landfill site, electrical leak location only works if a landfill has designed for it

E-WASTE IN SOUTH AFRICA: FROM STOCKPILES TO SOLUTIONS

By 2030, South Africa will generate an estimated 750,000 tonnes of electronic waste (e-waste) each year, a staggering figure for a country still struggling to divert even a fraction of its refuse from landfill. Adapted from an article by **Dr Mark Williams-Wynn and Marcin Hubert Durski**



Dr Mark Williams-Wynn, chief technical officer of EWaste Africa

Dr Marcin Hubert Durski, research and development manager at EWaste Africa

Despite a national ban on the disposal of e-waste, between 90 and 95% of the material never reaches recycling facilities. Instead, obsolete electronics are stockpiled, or dumped, trapped in the grey zone between ownership and disposal.

This disconnect between policy and practice is the focus of a conference paper by Mark Williams-Wynn and Marcin Durski of EWaste Africa. Their work highlights a sobering truth: South Africa's challenge is no longer technical feasibility; it is about accessibility, motivation, and behaviour. Even with the right laws in place, e-waste continues to slip through the cracks because recycling remains inconvenient, undervalued, and misunderstood.

The invisible hazard in our homes

Unlike typical household waste, e-waste hides in plain sight. Drawers full of retired smartphones, offices stacked with obsolete computers, and storerooms filled with broken printers all represent a latent environmental risk. Many of these devices contain lithium-ion batteries, which degrade over time and can ignite

spontaneously or release toxic gases. Yet the public rarely perceives these hazards, and so the stockpiles grow.

Globally, e-waste is now the fastest-growing waste stream, driven by shorter product lifecycles and rising consumer demand for connected devices. In 2022, South Africa ranked among Africa's top three generators, producing around 527,000 tonnes, and projections suggest this will rise by half by 2030.

While the country's National Environmental Management: Waste Act (2008) and Norms for Landfill Disposal (2013) explicitly prohibit e-waste from being sent to landfill, enforcement remains weak. The reality is that regulations have outpaced implementation, and citizens, businesses, and even some municipalities are still unsure how or where to dispose of electronic items safely.

Why good policy has not changed bad habits

E-waste is unique among waste streams because it straddles the line between resource and liability. Many consumers cling to outdated electronics because they appear valuable, even

when they no longer function. For wealthier households, old devices are often passed down rather than discarded as a gesture of goodwill that, unintentionally, transfers environmental risk to poorer communities lacking access to recycling infrastructure.

In peri-urban and informal settlements, discarded electronics are frequently mixed with general waste or burned for metal recovery. The informal recycling sector plays a vital role in resource recovery but often under unsafe conditions. Some reclaimers go as far as to dismantle circuit boards by hand, burn wires in open air, and use acid baths to extract metals, releasing toxins into soil and water.

The study identifies four interlinked barriers to effective diversion:

1. Inadequate infrastructure, patchy recycling networks, and limited drop-off sites.
2. Weak enforcement and fragmented policy.
3. Behavioural and socio-economic barriers, from apathy to misperceived value.
4. Low public awareness about recycling options and environmental risks.

Each barrier reinforces the others. A lack of infrastructure discourages participation; poor

While e-waste is explicitly banned from landfill sites, enforcement remains weak



data undermines policy design; and limited awareness prevents demand for better systems.

Recycling must be as easy as throwing away

Williams-Wynn and Durski argue that the key to transforming e-waste management lies in accessibility. "We must make e-waste drop-off as convenient and routine as buying bread or petrol," they argue. This insight is grounded in behavioural research showing that convenience is the single biggest predictor of recycling participation.

To that end, collection infrastructure must evolve from sporadic pilot projects to permanent, visible, and user-friendly systems. Examples include:

- Public drop-off points at libraries, police stations, or shopping centres.
- Community collection hubs in townhouse complexes or gated estates.
- Mobile collection days for rural or peri-urban areas, paired with awareness campaigns.

Each intervention reduces the friction of the small inconveniences that deter people from acting sustainably. However, infrastructure alone is not enough. Without trust, information, and incentives, even the best-designed systems will fail to achieve scale.

Integrating the informal economy

South Africa's informal reclaimers are already embedded in the recycling ecosystem. Rather than excluding them, reformers argue for structured integration providing safety training, fair pricing, and formal market access.

Currently, reclaimers often sell e-waste to unscrupulous scrap dealers who pay cash with no environmental oversight. Formal recyclers, by contrast, offer lower payouts but higher compliance standards. Bridging this gap requires innovative incentives, supported by Extended Producer Responsibility (EPR) funds or municipal partnerships, that reward environmentally sound recovery without penalising informal livelihoods.

Such integration can transform e-waste collection from a survival activity into a green micro-enterprise sector, aligning environmental outcomes with economic inclusion.

Policy coherence and producer accountability

Legislation already provides scaffolding for reform. The Extended Producer Responsibility Regulations (2021) require manufacturers and importers to take responsibility for the full lifecycle of their products. Yet enforcement remains uneven, with "free riders" continuing to operate outside compliance systems.

To close these gaps, Williams-Wynn and Durski highlight several proposals that have been made in the available literature including:

- Stronger alignment between the National Waste Management Strategy (NWMS 2020) and municipal delivery plans.
- EPR enforcement through transparent registration and traceability, including labelling requirements for second-hand and refurbished devices.
- Cross-agency collaboration between the DFFE, SARS, customs, and law enforcement to curb illegal imports and unregistered producers.

Such coordination ensures that the financial responsibility for waste management is borne by those who profit from production, not by under-resourced municipalities or consumers.

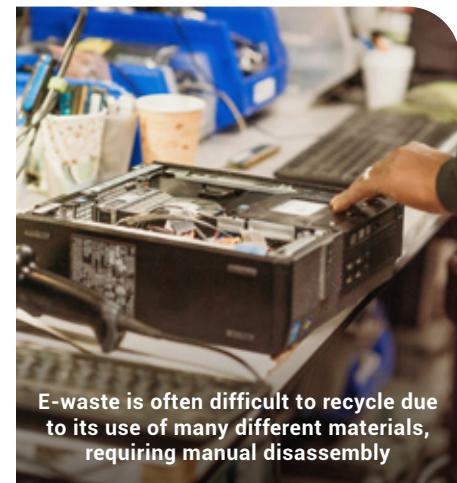
Behavioural insight, recycling is personal

Legislation and infrastructure can only go so far. The final frontier is human behaviour. Research across South Africa shows that many households fail to recycle not because they reject the idea, but because they lack information, motivation, or feedback.

The paper highlights five behavioural interventions to close this gap:

1. Promote civic responsibility, frame e-waste disposal as a moral obligation.
2. Offer small, tangible incentives, from mobile data to product rebates.
3. Recast informal collectors as community recyclers, not nuisances.
4. Challenge fatalism, counter the "my effort doesn't matter" mindset.
5. Celebrate success, publish feedback on diversion rates to build shared pride.

Psychology matters. When people see that their actions produce visible results, they are more



likely to repeat them. This positive feedback loop is essential to turning one-time participation into habitual recycling.

Education and visibility, the missing links

Many South Africans simply do not know where or how to recycle electronics. Awareness campaigns, if they exist, are often short-lived or poorly targeted. A sustainable communication strategy should:

- Provide clear, consistent information on what can be recycled and where.
- Use multiple languages and visual cues to reach diverse audiences.
- Leverage schools as long-term incubators of environmental responsibility.

As Williams-Wynn notes, "Education is not a side issue, it's the infrastructure that underpins participation." Continuous engagement, not sporadic messaging, is what builds durable habits and shifts community norms.

From stockpiles to circularity

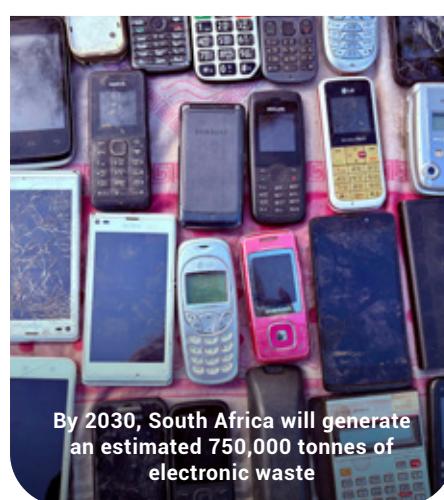
Ultimately, South Africa's e-waste problem is not one of ignorance, but of inertia. The system requires practical pathways that translate regulation into action, pathways that connect the citizen at home to the recycler at the end of the chain.

The way forward is clear:

- Build accessible infrastructure, everywhere, not just in affluent areas.
- Integrate the informal sector, safely and sustainably.
- Enforce EPR compliance, closing loopholes that reward inaction.
- Embed behavioural and educational strategies that make recycling a social norm.

If done well, e-waste diversion could become a flagship of South Africa's circular economy transition, creating jobs, protecting public health, and recovering valuable materials from the waste stream.

Because when technology evolves faster than waste systems, the result is chaos. But when design, policy, and behaviour align, even the smallest device can be part of something regenerative. ■





LANDFULL: WHO'S FOOLING WHO?

South Africa's cities are running out of space, not only in landfills but in their ability to sustain outdated models of waste management. The traditional "collect and dispose" approach has reached its limits. Financial deficits, deteriorating infrastructure, and poor data integrity threaten to overwhelm municipal waste services across the country. **Adapted from an article by Logan Moodley, Ryan Papanicolaou, and Mnqobi Mkhize from eThekini Municipality**

In eThekini, like many other cities in the world has faced challenges in effectively managing waste which ultimately leads to concerns linked to community wellbeing, environmental sustainability, and service reliability. Whilst these issues are interconnected, the city has recognized that these challenges are as complex as they are connected and there are no quick fixes. This has led to a turnaround strategy that has been developed in alignment with National Treasury's Metro Trading Services Reform (MTSR) framework, with the goal of transforming the waste business into a performance-driven, financially viable, and environmentally resilient municipal trading service with a single point of management accountability.

With over 98% of all collected waste still landfilled, the system remains trapped in a linear paradigm, one that consumes land, energy, and capital with diminishing returns.

The question confronting the Waste Management Directorate is no longer whether to change, but how fast transformation can occur. The task is to stabilise a fragile service, recover its financial and operational integrity, and then transform it into a modern, circular, and climate-resilient system.

For decades, South Africa's municipalities have relied on a linear waste management model: collect, transport, dump. This model, while simple to operate, is economically and environmentally obsolete.

Within eThekini, the waste value chain is dominated by collection logistics and landfilling. Collection consumes 53% of total operating costs, followed by transfer and landfilling (26%), and street cleansing (21%). Every additional kilometre travelled by collection trucks, often to distant regional landfills, amplifies costs and emissions.

The city's Operating Cost Coverage Ratio (OCCR) currently stands below the sustainability benchmark of 1.2. This gap reveals deep structural problems: tariffs that do not reflect the true cost of service, escalating maintenance expenditure, and dependence on cross-subsidies from the general rates account.

As landfills near closure and fleets age, the system is increasingly fragile. Temporary fixes such offer short-term relief but accelerate long-term decline.

Landfill security: the tipping point

At the heart of eThekini's waste challenge lies the issue of landfill airspace, the ultimate finite resource in the city's waste economy.

The municipality operates four licensed general waste landfills: Bisasar Road, Mariannhill, Buffelsdraai, and Lovu. Together they handle about 1.2 million tonnes of waste annually,



Logan Moodley, senior engineering manager at eThekini Municipality



Mnqobi Mkhize, principal engineer at eThekini Municipality



Ryan Papanicolaou, project engineer at eThekini Municipality

with a combined 3.9 million cubic metres of remaining airspace. Whilst these figures secure near to mid-term disposal capacity, the cost of the logistics to these end points require attention to transition the business towards circularity.

Bisasar and Mariannhill, both centrally located and logically efficient, are reaching the end of their operational lives. Their closures will shift the burden to the outer Buffelsdraai and Louv sites, dramatically increasing transport distances.

Haulage costs have already risen fivefold in real terms, consuming around 10–12% of CSW's operating budget. Each additional 50-kilometre round trip for collection vehicles inflates fuel usage, accelerates fleet wear, and reduces daily productivity.

To counter this, the city is developing the Shongweni Regional Landfill, a long-awaited project expected to add 75 years of disposal capacity. However, regulatory delays and community opposition postponed its commissioning to 2028. Until then, eThekwin must maintain its "landfill security" through stopgap measures, extending the useful life of existing cells, increasing landfill heights where feasible, and refurbishing transfer stations to optimise waste flows through an integrated system response.

The circular imperative

The underlying issue is not simply landfill scarcity but the absence of circularity. The linear system treats waste as a liability; a circular model treats it as a resource.

eThekwin recognised this nearly two decades ago with the introduction of its Separation at Source (S@S) programme. Residents were encouraged to segregate recyclables, orange bags for paper and plastic, clear bags for bottles and cans, and black bags for organics. While successful in selected suburbs, the programme never achieved universal rollout.

A 2025 waste composition study found that approximately 41% of the municipal waste

stream is potentially recyclable. Yet almost all of it still ends up in landfill. Integration of the informal recycling sector, which already recovers significant volumes of materials, remains fragmented.

Nationally, the Extended Producer Responsibility (EPR) regulations are reshaping the landscape by obligating producers to fund collection and recycling systems. However, without cohesive local implementation, municipalities like eThekwin struggle to leverage EPR funding to build material recovery infrastructure or formal partnerships with recyclers.

The circular transition, therefore, requires more than policy alignment; it demands a viable business model.

A central theme in eThekwin's turnaround is to treat solid waste not as a municipal burden but as a trading service capable of generating value through efficiency and innovation.

Under the National Treasury's Metro Trading Services Reform, the CSW unit is implementing a three-phase strategy: **Stabilise → Recover → Transform**.

- **Stabilise:** Secure the fundamentals, landfill airspace, fleet availability, and compliance. Actions include extending landfill life through lining expansions, refurbishment of transfer stations, and targeted waste diversion projects such as green waste composting and builders' rubble recycling.
- **Recover:** Rebuild data integrity and institutional capacity. Reliable waste characterisation, cost modelling, and scenario planning are essential to guide investment and measure performance.
- **Transform:** Shift towards a circular waste economy. This entails establishing Material Recovery Facilities (MRFs), promoting Mechanical Biological Treatment (MBT) technologies, and expanding composting infrastructure. The long-term vision is a networked system that diverts a minimum of 25% of waste from landfill within a decade, preserving valuable airspace and creating local jobs.

Approximately 69% of new capital investment is directed to fleet replacement, a

prerequisite for stabilising operations, while the remainder targets infrastructure upgrades and circular initiatives.

Financial and institutional realities

Despite ambitious plans, the economics remain tight. The Waste Management Directorate competes with other critical urban services, water, electricity, and housing, for limited municipal funding. Rising unemployment and declining household incomes constrain tariff increases, while inflationary pressures drive up costs.

This dilemma is not unique to eThekwin. Across South Africa, municipalities face similar structural deficits. Waste services are rarely self-sustaining, with revenue gaps often filled through unsustainable cross-subsidies. The National Treasury's 2023 report "Waste Not, Want Not" identified these systemic weaknesses as a key threat to urban fiscal stability.

For cities to escape this trap, waste must be repositioned as an economic enabler. The emerging circular economy presents opportunities for private sector participation, enterprise development, and carbon financing, particularly through waste-to-energy and landfill gas capture projects.

eThekwin's experience with Africa's first landfill gas-to-electricity plants, at Bisasar Road and Mariannhill, provides a precedent. Although these projects are reaching the end of their operational lives, they demonstrate how environmental compliance can generate measurable economic returns.

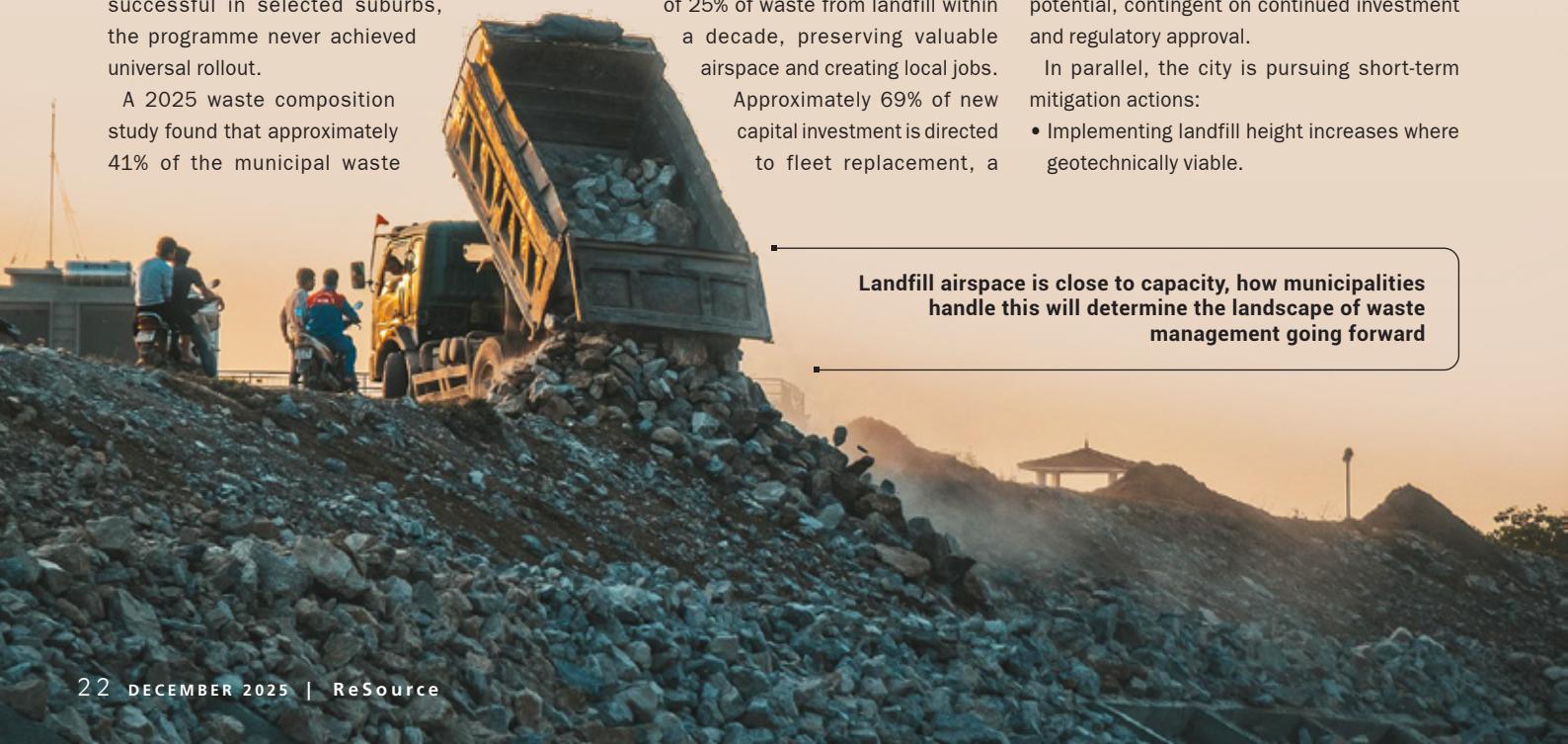
Long-term planning

The city's landfill capacity model projects 4.4 years of remaining lined airspace as of mid-2024, a narrow buffer that underscores the urgency of reform. Fortunately, through planned lining extensions, eThekwin has effectively "banked" 50 years of future expansion potential, contingent on continued investment and regulatory approval.

In parallel, the city is pursuing short-term mitigation actions:

- Implementing landfill height increases where geotechnically viable.

Landfill airspace is close to capacity, how municipalities handle this will determine the landscape of waste management going forward





- Upgrading leachate treatment plants to handle heavier rainfall events linked to climate change.
- Rehabilitating ageing transfer stations to reduce double handling and transport inefficiencies.
- Accelerating small-scale diversion programmes focused on composting and rubble recycling.
- These incremental improvements buy time while the larger circular economy transition gains momentum.

The national mirror

eThekwin's waste trajectory reflects the broader national challenge. All major metros face capacity pressures, constrained budgets, and the imperative to align with South Africa's climate and circular economy commitments.

Landfills across the country are approaching saturation, with limited new sites in the pipeline. The same regulatory, financial, and social barriers that slowed Shongweni's development are playing out elsewhere. Without decisive reform, municipalities risk both environmental non-compliance and service collapse.

However, eThekwin's "Stabilise–Recover–Transform" pathway provides a potential model. By grounding reform in credible data, prioritising financial realism, and embracing partnership-based solutions, the city is charting a pragmatic route out of crisis, one that could inform national policy implementation under the National Waste Management Strategy 2020 and future Treasury reforms.

Ultimately, eThekwin's turnaround strategy is not only about technical efficiency, it is about restoring confidence in public service delivery. Waste management is a barometer of urban

Rising unemployment and declining household incomes alongside historical poverty and inequality contrast with the need for tariffs

governance: when it fails, so does the public's trust in municipal capability.

The principles are clear. First, stabilise core operations to avoid collapse. Second, invest in data-driven decision-making. Third, enable markets for alternative waste management solutions. And finally, embed environmental and social accountability at every stage.

The goal is to evolve the waste directorate from a cost centre into a resilient, service-oriented enterprise, one that treats waste not as a problem to be buried but as a resource to be managed, recovered, and reinvested.

The conclusion to draw is that the data speaks plainly: without systemic reform, Durban's

landfills will reach full capacity, and the cost of inaction will be borne by ratepayers, the environment, and future generations.

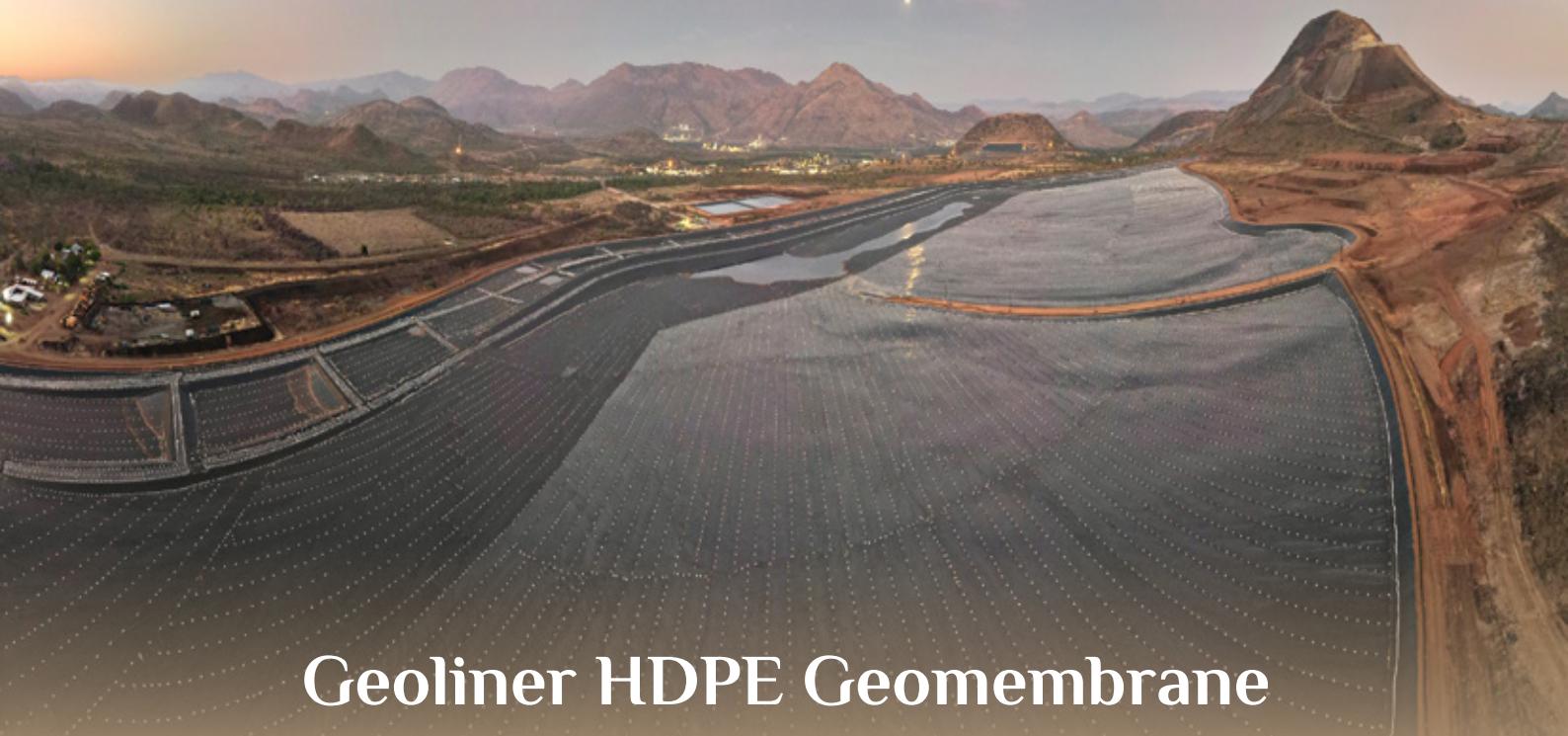
But the city has chosen a different path, one built on pragmatic transition rather than denial. Through strategic planning, investment discipline, and public–private cooperation, eThekwin aims to turn its solid waste crisis into a model of sustainable urban renewal.

There is no illusion in this approach; no attempt to disguise the scale of the challenge. The facts are clear, and the strategy is grounded in them. In waste management, as in governance, credibility begins with data and ends with delivery. ■

Durban harbour



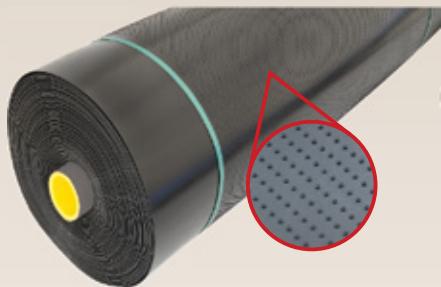
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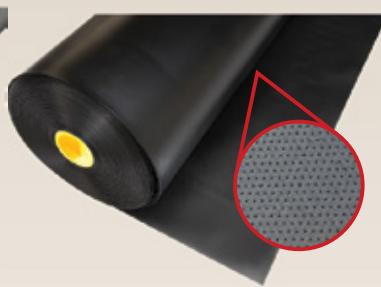
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RESHAPING SOUTH AFRICA'S WASTE SECTOR

South Africa's waste sector stands at a crossroads. Years of analysis have confirmed what practitioners already know: the country's solid waste management system is overburdened, underfunded, and misaligned with its sustainability ambitions, though early reforms to strengthen service delivery and accountability are now underway across the sector. **Adapted from a paper by Aiden Bowers and Masopha Moshoeshoe from the Waste Management Bureau, Department: Forestry, Fisheries and Environment**

Estimates suggest over 90% of municipal solid waste is disposed of rather than recovered, and many licensed landfill sites are nearing capacity.

The underlying causes are complex but consistent across regions: limited enforcement capacity, fragmented governance, financial unsustainability, and limited capacity within municipalities. According to the WMB's national diagnostics, the solid waste sector operates with significant variability in performance and coordination, which affects the delivery of a consistent service.

Municipalities, tasked with the day-to-day responsibility for collection and disposal, struggle to sustain operations amid rising costs and falling revenues



Yet the time for diagnostics has passed. What is needed now is coordinated action and practical interventions that move the system from structural weaknesses toward efficiency, circularity, and economic resilience.

Drawing on national policy reviews, municipal reform studies, and operational data from metros, Aiden Bowers and Masopha Moshoeshoe of

the Waste Management Bureau (WMB) offer a pragmatic blueprint for transformation. Their analysis identifies both the systemic reforms required at the national level and the local interventions needed to restore credibility and performance in city waste services.

A sector under strain

Despite progressive legislation, including the National Environmental Management: Waste Act (59 of 2008) and the National Waste Management Strategy (NWMS) 2020, the majority of South Africa's waste still ends up in landfill.

The diagnostic phase: clarity through data

Over the past five years, a series of collaborative studies, notably the "Waste Not, Want Not" report commissioned by the National Treasury, and complementary assessments by the C40 Cities Network, have exposed the full extent of the problem.

At the core of these diagnostics is a recognition that data quality and institutional coordination are



Aiden Bowers, project manager for the Cape Region at the Waste Management Bureau, Department of Forestry, Fisheries, and Environment



Masopha Moshoeshoe, acting Chief Executive Officer of the Waste Management Bureau, Department of Forestry, Fisheries, and Environment



There are 826 landfills in South Africa, many are non-compliant

as critical as infrastructure. Many municipalities lack credible waste flow data, asset registers, or lifecycle cost models. Without this information, planning for landfill succession, diversion programmes, or circular economy investments becomes guesswork.

The WMB's position is clear: reform must be anchored in evidence-based management. This means consistent national data standards, annual performance benchmarking, and targeted support for local government to collect and use accurate information.

The national diagnostic work has already begun to inform reforms under the National Treasury's Metro Trading Services (MTS) programme, which is designed to help major cities treat waste management as a business, improving cost recovery, transparency, and operational discipline.

From strategy to implementation

While the legislative architecture exists, implementation has lagged. The NWMS 2020 outlines an ambitious shift toward waste minimisation, recycling, and the circular economy, but local delivery mechanisms have been slow to adapt.

The WMB identifies three primary intervention pillars to bridge this gap:

- Financial and business reform – Reposition waste management as a financially sustainable trading service. Municipalities must develop cost-reflective tariffs, modern accounting systems, and asset management plans that reflect the full cost of service delivery.
- Institutional realignment – Establish clear governance frameworks between national departments, provincial regulators, and local

operators. This includes clarifying the roles of the DFFE, WMB, SALGA, and National Treasury in supporting reform through both oversight and funding coordination.

- Infrastructure and circular economy investment
 - Modernise the sector's physical base through targeted investments in Material Recovery Facilities (MRFs), transfer stations, waste treatment infrastructure, and waste-to-energy plants (at scale where feasible), while ensuring that operational capacity keeps pace with capital development.

Each pillar reinforces the others: financial viability enables investment; institutional clarity supports enforcement; and data-driven performance creates the feedback loop needed for policy learning.

Metros as catalysts for change

The most immediate opportunities for reform lie within the country's eight metropolitan municipalities, which collectively manage approximately half of South Africa's municipal waste. The metros' scale and revenue potential make them the natural laboratories for reform.

Johannesburg, eThekweni, Tshwane, and Cape Town are already participating in the Solid Waste Turnaround Strategy under the Metro Trading Services programme. This initiative provides

Illegal dumping remains an issue for South Africa and a priority for the DFFE



technical and financial guidance to stabilise core operations, recover revenue, and transform waste utilities into semi-commercial entities capable of sustaining their own operations.

Using eThekweni as an example, this has meant adopting a “Stabilise → Recover → Transform” model:

- Stabilise core operations by safeguarding landfill airspace and fleet reliability;
- Recover performance through accurate data and cost modelling;
- Transform by building circular infrastructure and expanding recycling partnerships.

Similar strategies are being pursued in Johannesburg and Tshwane, where new landfill succession plans and pilot Extended Producer Responsibility (EPR) collaborations with private recyclers are taking shape.

The principle is clear: when metros function efficiently, they create both the capacity and the precedent for smaller municipalities to follow.

Regulation meets reality

Policy alone will not deliver reform. As Bowers and Moshoeshoe note, enforcement capacity is the weak link. While South Africa has robust environmental law, compliance remains inconsistent, particularly at the landfill level.

Of the country’s 826 licensed landfill sites, fewer than half are currently compliant with environmental management conditions. Chronic underinvestment in environmental monitoring, leachate control, and rehabilitation has led to growing liabilities.

This compliance gap also undermines public confidence. Communities often resist new landfill developments, citing pollution, odour, and health risks even where modern engineering standards are applied. The resulting delays, as seen with eThekweni’s long-delayed Shongweni landfill, create cascading operational and financial impacts.

To address this, the WMB is promoting a risk-based regulatory model, where compliance resources are targeted at the highest-risk sites, and transparent data-sharing builds public trust.

Private sector partnerships and EPR

The private sector has a pivotal role to play in advancing South Africa’s circular economy. The Extended Producer Responsibility Regulations (2021) now compel producers to take responsibility for the full life cycle of their products, including post-consumer waste.

This policy shift opens opportunities for new investment models. Producer Responsibility Organisations (PROs) are emerging across the packaging and electrical sectors, while the tyre sector is now managed directly through government-run EPR. Together, these models offer municipalities potential co-funding and partnerships to support collection and recycling initiatives.



However, successful integration depends on governance clarity. “Municipalities need frameworks to partner confidently with PROs,” the WMB authors note. “Without transparent roles and reliable data, EPR funding risks duplication or inefficiency.”

The circular opportunity

Beyond compliance and cost recovery lies a larger opportunity: to reposition the waste sector as an engine of green growth. The circular economy is not only an environmental imperative but also a developmental strategy capable of creating jobs, stimulating innovation, and reducing municipal liabilities.

Modelling conducted under the DFFE’s Waste Flagship Programme suggests that diverting 20% of waste from landfill could unlock thousands of jobs in recycling, composting, and materials recovery. Such diversion would also slow the rate of landfilling, potentially extending site lifespans and deferring significant capital expenditure on new facilities.

This vision requires coordinated investment in data systems, technology, and human capital. The DFFE advocates for a national Circular Economy Implementation Plan linking waste management reform to industrial policy, infrastructure funding, and climate finance.

From diagnosis to delivery

The authors are unequivocal: the time for analysis is over. “The sector has enough diagnostics,” they argue. “What is needed now is coordinated, funded, and monitored implementation.”

This implementation must be phased, data-driven, and performance-based. Under the Metro Trading Services Reform Programme, a structured pathway for reform is established, centred on measurable milestones:

- Year 1–2: Stabilise municipal operations, standardise data collection, and complete baseline cost recovery assessments.
- Year 3–5: Expand circular pilot projects and enforce compliance improvement across high-risk landfills.

- Year 5–10: Scale successful models nationally, institutionalise EPR collaboration, and integrate waste management within green industrial strategies.

The national government’s role is to provide policy coherence, funding alignment, and regulatory oversight; local governments must deliver operational execution; and the private sector must bring innovation, efficiency, and capital.

Rebuilding trust through performance

At its heart, the WMB’s reform agenda is about restoring credibility and public confidence in waste management as a core urban service. When waste is poorly managed, it undermines not only environmental health but also social trust and investment confidence.

By contrast, a modernised, transparent, and circular waste sector can symbolise a state that delivers one that converts inefficiency into opportunity and environmental pressure into economic resilience.

Conclusion: the next decade

South Africa’s waste sector reform is no longer an environmental nicety; it is an economic necessity. The diagnostic work has provided clarity, and metros have already committed to action through the MTSR programme. What matters now is disciplined execution.

The path forward lies in institutional discipline, credible data, targeted investment, and cross-sector collaboration. With reforms that are structural but not capital-intensive, metros can stabilise operations and set the pace for national change. ■



forestry, fisheries & the environment

Department:
Forestry, Fisheries and the Environment
REPUBLIC OF SOUTH AFRICA

The renewable energy economy is being spurred on by the rapid expansion of solar photovoltaic (PV) and battery energy storage systems. While positive, there are challenges, especially regarding the end-of-life waste management of these solar PV systems.

Best practices for managing end-of-life solar PV waste

The renewable energy economy is being spurred on by the rapid expansion of solar photovoltaic (PV) and battery energy storage systems. While positive, there are challenges, especially regarding the end-of-life waste management of these solar PV systems. In South Africa, there is growing concern regarding unsafe, irresponsible, and often illegal practices that run the risk of jeopardising positive gains in the renewable energy sector.

Decommissioned solar panels stored in preparation for transport

South Africa's accelerating adoption of solar PV due to energy insecurity and cost factors will create a significant waste stream, forecast to be 750,000 to 1 million tonnes of PV waste by 2050, with end-of-life waste volumes expected to rise dramatically after the early 2040s, peaking around 2056. Without circular economy strategies, this waste poses an environmental burden and represents a missed economic opportunity.

Circular Energy, a Producer Responsibility Organisation (PRO) comprising members primarily from the solar PV industry, is working to address the challenges in waste management that threaten to undermine the entire lifecycle of solar and battery products.

The importance of Extended Producer Responsibility (EPR)

South Africa's Extended Producer Responsibility (EPR) legislation, a regulatory framework within the National Environmental Management Waste Act (NEM:WA) of 2008, is in place to hold producers – defined as local manufacturers, brand owners, and importers – accountable for the entire lifecycle of their products, and demands compliance with rigorous legal standards for end-of-life management.

Circular Energy provides the systems, financial assistance, and knowledge-sharing to help companies comply with EPR regulations. The organisation emphasises a lifecycle management approach that prioritises reuse



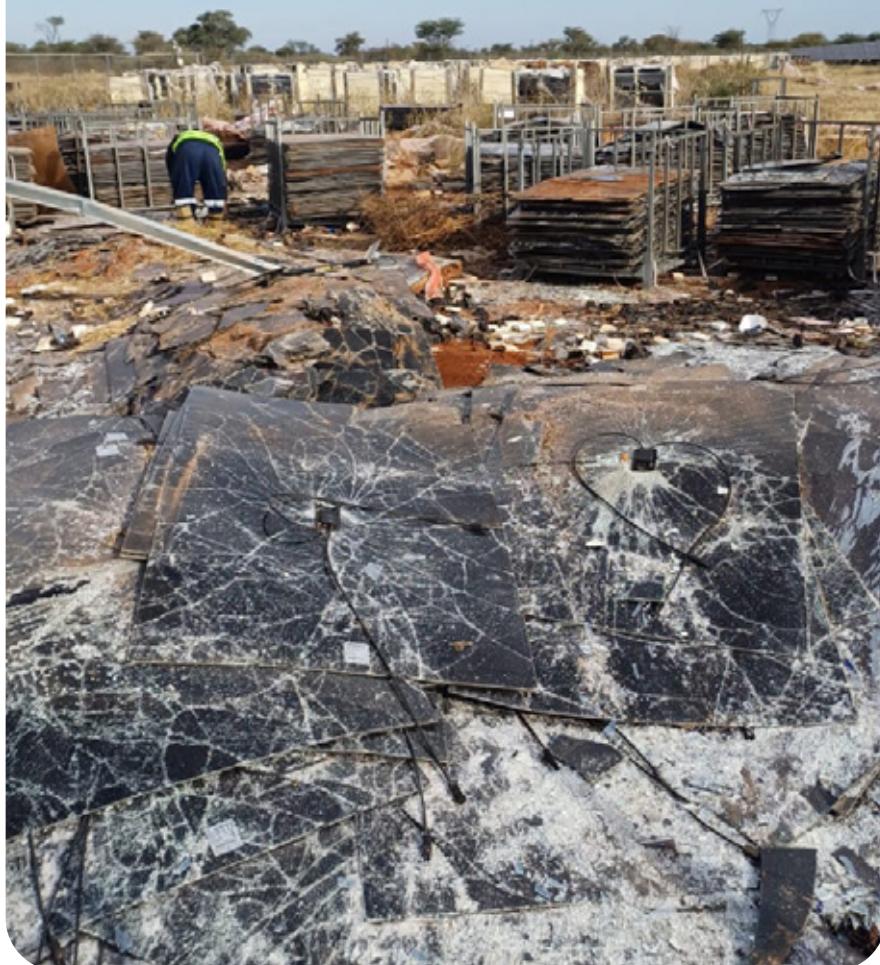


and repair first. Only when a product cannot be safely repurposed should it proceed to destructive treatment for material recovery.

The ISO 59004:2024 standard defines circular economy as “an economic system that uses a systemic approach to maintain a circular flow of resources, by recovering, retaining, or

adding to their value.” For PV modules, circular strategies include repair, reuse, refurbishment, remanufacturing, repurposing, design for disassembly and recycling. Higher-order options (reuse, refurbishment, repurposing) yield greater environmental and socio-economic benefits than recycling.

Improper disposal of solar PV represents a significant hurdle; EPR regulations aim to address this directly



◀ **Solar PV is only sustainable if its end-of-life is managed correctly**

WEEE is restricted to landfills due to its hazardous and toxic potential, and recyclable components



What often causes confusion are the terms ‘recycling’ and ‘waste treatment’. While many use the term recycling rather loosely, the legal distinction under NEM:WA is important: Recycling is the process of reclaiming waste materials to be processed as a product or raw material. Waste treatment is a broader process that legally encompasses recycling and includes methods that change the physical, biological, or chemical characteristics of waste, often to remove hazardous components or reduce toxicity.

The hidden hazards of renewable waste make the requirement for strict regulation essential. This is due to the hazardous nature of solar PV modules and batteries. Unlike simple commodities, these are complex, power-generating products that, when improperly managed, pose serious health, safety, and environmental risks.

South Africa's context: Drivers and Barriers

South Africa's just energy transition must balance decarbonisation (coal accounts for approximately 80% of electricity) with socio-economic upliftment (high unemployment). Energy insecurity, primarily severe loadshedding, acts as a key driver, having accelerated the adoption of embedded solar PV systems (5,791 MWp capacity by 2024). However, the country heavily relies on PV module imports, which increased by 213% in 2023.

The Regulatory Foundation is strong, consisting of the Extended Producer Responsibility (EPR) Regulations (2021), the WEEE landfill



Fires are a real concern when managing battery storage systems

- Scrap harvesting:** Modules are stripped for valuable scrap materials like aluminium and copper. Alarmingly, this often involves burning cables to remove insulation, which releases toxic fumes into the air and results in toxic waste being illegally dumped.
- Illegal down-cycling:** Perhaps the most concerning violation is the practice of crushing entire solar PV modules – toxins and all – into a fine powder and mixing it with concrete to create consumer products such as paving bricks, or mixing it into recycled plastics to make products such as school desks. NEM:WA regulations explicitly require a waste exclusion process, which involves rigorous testing to prove that all toxic elements have been eliminated before any hazardous waste can be repurposed into a consumer product.

Battery Systems – fire, corrosion and critical resources

Battery storage systems, while somewhat more regulated due to their hazardous classification, present other dangers. Lead-acid batteries are corrosive and prone to leaking, while modern lithium-ion batteries, which are used extensively in solar and wind energy storage, do not leak but can violently ignite if compromised.

Circular Energy supports and encourages a meticulous process for battery waste management: once removed, batteries must be de-energised to eliminate electrical risks. Each cell is individually tested – safe cells are repackaged for reuse in accordance with strict electrical standards, while failed cells are sent for destructive recycling to recover critical raw materials.

Safety first and urban mining: The enablers

To combat these challenges, Circular Energy launched the Energy for Hope programme. This initiative focuses on establishing effective interventions, primarily through a rigorous safety protocol, which includes the following key Enablers:

restriction (2021) and the Hazardous Waste Regulations (2008); however, enforcement issues plague the system.

Weak enforcement of EPR (allowing producer free-riding), sectoral uncertainty over PV module classification, and lack of PV-specific targets or standards are significant barriers. Furthermore, economic constraints (declining new module prices) and negative perceptions (consumer distrust of second-hand products) hinder the move toward circularity. The existing informal sector (waste pickers) offers an opportunity for integration into formal systems.

Toxic elements and improper disposal

Research funded by Circular Energy has confirmed that all three main solar technologies in use in South Africa contain toxic elements such as cadmium, lead and arsenic. Without proper handling, transportation, and treatment, these substances are extremely hazardous to human health and the environment. Despite this, poor practices are rampant and include:

- Improper selling:** Entities often sell old modules for a small profit to individuals who don't possess the licences or facilities needed for safe disposal or reuse.

communities in need. This is paired with skills development and training for technicians to ensure proper, compliant installation. This promotes the socio-economic benefits of reuse.

- Urban mining (Infrastructure and recovery):** For products that can't be safely reused or repaired, Circular Energy ensures proper destructive treatment. Advanced technology is used to safely recover valuable materials like aluminium, glass and copper from Solar PV and critical materials like lithium from batteries. This process, often referred to as 'urban mining', is essential for reintroducing finite resources into the circular economy. This is an absolute necessity, especially as South African legislation has, since August 2021, prohibited electronic and electrical products from being disposed of in landfills. To support this, developing take-back and aggregation systems (regional hubs) funded by EPR fees is necessary.

Action required and the way forward

Despite the strong legislative foundation, a successful circular PV module and storage supply chain requires coordinated and proactive action to overcome barriers. Enhanced enforcement and policy clarity are needed to reduce free-riding. Circular Energy members are strategically positioned to lead this transition, ensuring compliance with EPR and contributing to broader national goals like job creation and a just energy transition.

It's important to note that the sale of outdated or unsafe products comes with a hefty price: the original selling company remains legally responsible for any injuries or fatalities that may arise down the line. Compliance with EPR and the Waste Act is not optional; it is a mandatory and fundamental pillar of sustainable energy development. Through rigorous testing, compliance monitoring, and an unwavering commitment to best environmental and safety practices, Circular Energy is safeguarding both the public and the environment. ■



Poor infrastructure, coupled with socio-economic issues and service delivery problems, manifests in excess waste not collected or recycled. This waste adorns streets, the environment and troublingly, water systems like rivers.

By Duncan Nortier



Why we need a “last line of defence” AGAINST LITTER

Rudi Clark, regional manager of the Kwa-Zulu Natal branch of the Litterboom Project, says, “The litter that makes its way into South Africa’s river systems comes down to lack of infrastructure, and lack of education.” Broadly, South Africa’s waste infrastructure caters for suburbs, with the inner city, unplanned, and rural areas suffering from a lack of service delivery. Infrastructure in this case refers not only to the physical and technological aspects of water management but also to the wider logistics of the sector.

This concentration of uncollected waste in both cities and unplanned or rural settlements culminates in a litter problem, exacerbated by illegal dumping. The infrastructure in cities, such as stormwater drains, becomes overwhelmed and sends waste into the river system and, by extension, into the ocean. The lack of infrastructure and formalised waste collection in unplanned settlements and rural areas leads to excess waste being discarded into the rivers.

Clark elaborates, “There are major efforts to find a sustainable and grand solution to litter, waste not properly discarded, but while that is happening, there must be a concerted effort to lessen the harm already done.” The Litterboom Project is an NPO comprising of people passionate about cleaning South Africa’s river and ocean systems, according to their website

act as “a last line of defence.” For Clark, this means that while these larger solutions are being developed, the problem of litter doesn’t stop, “When we are looking for solutions to plastic waste, plastic waste doesn’t stop coming in. The actions to clean up what has already happened only aid the future plans to prevent the litter altogether.”

What is a Litterboom?

A litter boom is a long tube structure that sits atop a flowing river, connected to either side of the bank. This then allows the river to flow unobstructed, without disrupting marine life while catching floating waste. “The design fits the purpose of stopping larger, floating waste like plastic from flowing into the ocean. It does not extend below the surface or use nets because this would disturb marine life, but also because the excess weight of the waste being pushed up against the boom would require a lot more engineering and a more expensive setup,” adds Clark.

Operating in Kwa-Zulu Natal (KZN) and the Western Cape, the Litterboom project aims at setting these booms up in strategic locations to reduce the amount of litter going into the ocean and provide an accessible way to remove litter from the river.

Clark explains, “We identify the major rivers. In KZN, we focus on the rivers around

the Durban CBD, for example, and we move upstream to locate a source of litter, usually an unplanned settlement. From here, the boom is set up, and we employ ‘River Wardens’ from that community whose job is to monitor the site and aid in data collection and

Rudi Clark,
The Litterboom
Project’s KZN
branches regional
manager





reporting. We also move further upstream and boom tributaries."

A river warden is assigned an area, not just one boom, and Clark says that this boom and employment process becomes a bridge into that community. "Community engagement and working with the community are essential to the broader efforts of sustainability. Education and cooperation come with the infrastructure and engagement."

Understanding the roots of litter

While uncollected waste is often associated with informal settlements, Clark cautions against simplifying the issue. "It's not exclusively informal

settlements," he explains. "General littering and waste trickling through stormwater drains are also major contributors. Flooding in Durban, for example, revealed just how much waste had been accumulating in those drains. That's the result of incidental littering, people who just throw things away without thinking. It's widespread."

While the source of the litter is usually found in lower-income areas with little to no access

to basic services, the scope of the issue makes its way into suburban, more affluent areas, too. Clark elaborates, "Higher income areas are usually on board and support what we do, and while they do not experience the same problems

The surface action of the litterboom means that marine life is not disrupted

as lower income areas, they are often not aware of how they can help. They ask where they can send their recycling, an indicator that the recycling system is broken

or too complex. Their waste is usually collected, but things like bags torn open by local wildlife still end up in the environment. And many people remain oblivious to the waste problem, simply because they don't recycle as they should."

Littering, Clark says, is as much a behavioural and social challenge as an infrastructural one. "How do you stop a person from littering? That's not something infrastructure alone can fix. In the past, we had campaigns like Zap it in the Zibi, and Cape Town now has Bin it in the Bingo, which takes a fun, character-driven

The waste collected by a litterboom, while the boom does not go below the surface, the waste collected is still substantial



approach to education. Maybe it's time South Africa revisited something like that on a national level."

Tackling infrastructure and education together

Clark believes that infrastructure must underpin any educational approach. "You can tell people to use a bin, but if there's no bin, or if bins aren't emptied, that education means nothing," he says. "In some under-resourced areas, even if a bin exists, it's not serviced, and waste piles up until it becomes an illegal dump site. Infrastructure is critical to create that sense of order, bins on the roadside, regular collections, trucks that remove waste. Add recycling to that, and it's already a major improvement."

While some argue that communities should take the lead in centralising their own waste, Clark questions whether that's realistic. "It's a good idea in theory, but communities can't be expected to self-organise waste management entirely. It needs collaboration between residents, municipalities and organisations like ours."

Why a "last line of defence" still matters

As a practical, visible intervention, the Litterboom Project bridges the gap between long-term strategy and immediate action. "The waste isn't going to stop while we debate grand solutions," says Clark. "We have to stop

as much as we can now, to prevent further ecological damage, while still supporting systemic change."

Each site is managed by local teams who report daily on the state of the boom. "Our river wardens are from the communities themselves. They send us WhatsApp reports and photos daily, and our operations manager checks in face-to-face weekly," Clark explains. "It's not a turnkey solution. Rivers are dynamic, conditions change constantly, so booms need constant attention."

Effectiveness depends on placement and upkeep, but when installed correctly, Clark says, "They are very, very effective."

What happens to the collected waste?

The waste intercepted by the booms is sorted and processed as far as possible. "We apply zero discretion to what we collect; it all comes out," Clark says. "We then sort it on site. We send PET, HDPE and polypropylene for recycling, while the rest, often too contaminated, is prepared for landfill. In Cape Town and KZN, we work closely with municipalities to manage this."

Revenue from recyclables is reinvested into operations, keeping trucks running, paying drivers and maintaining sites. "It's not profit-driven," Clark notes. "It's about sustaining the work."

The litter caught varies, but patterns have emerged from

years of audits. "We see medium to large pieces, rigid plastics, polystyrene, nappies, flexible plastics," Clark explains. "Smaller fragments tend to wash downstream or appear at beach clean-ups. Cans are rare because they're usually recycled already, and glass sinks. But plastic remains the overwhelming problem."

Beyond clean-ups: building community legacies

Clark is candid about the project's limitations. "Beach clean-ups and litterbooms aren't the full solution," he says, "but they're catalysts. Once we've established a presence in a community, other things start happening, like setting up reclaimer networks, supporting recyclers, and running school education programmes. Those are the land-based solutions we want to build on."

The goal, he adds, is not just cleaner rivers but more connected communities. "If we could leave behind a legacy, it would be that Litterboom helped clean up Durban's and Cape Town's rivers and beaches, but also that it created local jobs and raised environmental awareness."

For South Africa's waste sector, the message is clear: while systemic reform remains essential, the immediate fight against litter continues daily, in every stream, tributary, and community that a litterboom quietly protects. ■

Umgeni River connecting to the Indian Ocean, without intervention river pollution becomes ocean pollution





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The Plastic Reboot Project is a multi-year project that aims to achieve a systems-level shift in the plastics value chain across South Africa

SOUTH AFRICA LAUNCHES PROGRESSIVE PROJECT TO TACKLE PLASTIC POLLUTION

In an effort to reduce plastic pollution from packaging in the food and beverage sector, South Africa is set to launch the Plastic Reboot Project: Circular Solutions for Plastic Pollution in South Africa in Pretoria.

The project will transform how plastic is designed, used, and managed across the entire packaging value chain.

The multi-year project aims to achieve a systems-level shift in the plastics value chain across South Africa.

Its vision is to contribute to South Africa's transition toward a thriving, equitable and inclusive circular economy for plastic packaging and short-lived plastic products in the food and beverage sector, which would create well-being for society and the environment.

The project focuses specifically on upstream and midstream stages of the plastic packaging lifecycle:

- Upstream: Eliminate unnecessary, avoidable, and problematic plastic products and hazardous additives; shift to sustainable alternatives and reuse and refill; and use recycled plastics as feedstock, all of which will displace virgin plastic production.
- Midstream: Support innovation to extend the life of products where plastics are necessary, by creating reusable or recyclable products and by creating circular systems (reuse, refill, repair, resell, repurpose); as well as reducing unnecessary consumption of plastics by consumers and commercial users, especially for short-lived plastic products.
- Downstream: The project will not directly fund downstream activities (among them collection,

segregation, recycling, incineration, landfill, disposal of residues, and clean-ups of legacy plastics in the environment), but its upstream and midstream interventions will synergise and complement existing initiatives and projects in this stage.

The project is funded by the Global Environment Facility (GEF) with the United Nations Industrial Development Organisation (UNIDO) acting as the international implementation agency.

In South Africa, the Department of Forestry, Fisheries and the Environment (DFFE) will be the national focal point, while the national execution agency is WWF South Africa in collaboration with partners, the Council for Scientific and Industrial Research (CSIR) and GreenCape. ■



Plastic waste continues to impact the environment negatively

WHAT IS NET ZERO REALLY?

South Africa is on a path towards net zero, or is it carbon neutral? What about the circular economy? Climate jargon is filling the atmosphere as much as greenhouse gases are, and with a plethora of seemingly interchangeable words, it is important to actually decode what they mean.

While the words themselves can be confusing, they can also be insincere. It is important that the framework is backed by data. Businesses employing climate jargon are communicating to their customers that they care about the environment in some capacity, which can leave us with a warm and fuzzy feeling. If there is no data to back up their claims, then we may just feel fuzzy.

The Circular Economy

The circular economy is an economic system designed to eliminate waste and maximise the continuous use of resources. Instead of the traditional linear model of "take, make, dispose", the circular approach prioritises designing products for durability, reuse, repair and recycling. Materials are kept in circulation for as long as possible, minimising the extraction of virgin resources and reducing environmental impact. In a circular economy, waste becomes a resource, industries collaborate across value chains, and economic growth is decoupled from resource depletion.

Zero Emissions

Zero emissions refers to activities, processes or systems that release no greenhouse gases

into the atmosphere. This means that no carbon dioxide, methane or other climate-warming gases are produced during operation. Zero-emission technologies, such as solar PV, wind turbines or electric vehicles powered by renewable energy, do not add to the global greenhouse gas burden. The term plays a key role in climate policy, indicating the need for sectors to operate without contributing to atmospheric pollution.

Net Zero

Net zero is a state in which the total greenhouse gases emitted by an organisation, country or system are balanced by an equivalent amount of gases removed from the atmosphere. Achieving net zero does not necessarily mean eliminating all emissions; some sectors, such as agriculture or heavy industry, may still produce unavoidable emissions. However, these must be offset through carbon removal measures such as reforestation, carbon capture technology or verified carbon credits. Net zero is the central global target for limiting global warming to 1.5°C.

Carbon Neutral

Carbon neutrality refers to achieving a balance between carbon dioxide emissions produced and carbon dioxide removed or offset. An

organisation, event or product is considered carbon neutral when it measures its carbon footprint, reduces it where possible, and offsets the remainder using credible schemes such as renewable energy certificates or carbon sequestration projects. Unlike net zero, carbon neutrality typically focuses only on CO₂ and does not always require deep, long-term emissions reductions.

Greenwashing

While it would be great to just rely on the words of others, anytime these words come up, they should be backed by data and justified. Some organisations will deliberately obscure the facts in a practice called greenwashing.

Greenwashing is the practice of presenting an organisation, product or policy as more environmentally friendly than it truly is. It involves misleading claims, selective reporting, vague language or exaggerated marketing designed to create the impression of sustainability. Companies may highlight minor environmental initiatives while ignoring significant environmental harm, or use terms like "eco-friendly" without evidence. Greenwashing undermines consumer trust, distorts markets and hampers genuine sustainability efforts by creating confusion and misinformation. ■



The days of uncontrolled emissions and endless resource use are ending



WILL THIS BE THE FIRST MUNICIPALITY IN SOUTH AFRICA TO BAN SINGLE-USE PLASTIC?

In an effort to keep the beauty of the Cape winelands pristine, the Drakenstein Municipality is proposing a bylaw that will ban single-use plastic.

This new Integrated Waste Management bylaw could make Drakenstein the first municipality in South Africa to enforce a ban on single-use plastic, which will set a benchmark for others to follow.

The proposed bylaw is strengthened by the recent comments from the Ministry of the Department of Forestry, Fisheries, and Environment. The former minister, in an open letter in the Daily Maverick, suggested a plan to ban single-use plastics nationwide.

Drakenstein Municipality's draft bylaw is open for public comment until 30 November 2025, allowing residents, organisations and businesses to give their input and share their thoughts. Once all comments have been carefully reviewed and considered, the final version will go to Council for approval and will be tabled in February 2026.

Councillor Stephen Korabie, Executive Mayor of the Municipality, says, "Drakenstein Municipality is taking a bold step towards a more sustainable future for everyone who calls this valley home. By reducing our reliance on single-use plastics such as straws, polystyrene items and plastic stirrers, we are protecting our environment and securing a cleaner future for future generations."

The pristine natural environment of the Drakenstein municipality will be preserved if this bylaw is passed. Photo credit: Frode Inge Helland

Meeting national goals

Across the country, local governments are stepping up to reduce plastic waste. While national regulations are still being developed, many municipalities have launched awareness drives, pilot programmes and plastic-free zones.

Drakenstein Municipality's proposed new bylaw aligns with the National Environmental Management: Waste Act (Act 58 of 2009), which promotes waste reduction, recycling and environmental protection. By leading the charge against single-use plastics, the Municipality will assist the country in moving toward a circular economy where resources are reused and waste is minimised.

"We want to encourage our residents and businesses to embrace a re-use (multi-use) or re-purpose lifestyle and culture, moving away from the current 'buy-and-throw-away' mindset. We want to build a community that values sustainability and shared responsibility," says Councillor Korabie.

The benefits go far beyond cleaner streets. Environmentally, it protects wildlife and reduces pollution. Socially, it encourages sustainable habits. Economically, it can spark new opportunities for



A proposed ban on single use plastic is a huge step forward for South Africa's circular economy

reusable and eco-friendly products. Together, these changes build stronger, more responsible communities.

Stakeholder engagement

Officials of the Drakenstein Municipality briefed councillors and members of the Drakenstein Business Chamber during two separate workshops to discuss the main objectives and intended outcomes of the proposed new bylaw. Most of those in attendance strongly supported the initiative.

Beyond plastics

In addition, Drakenstein Municipality is already promoting waste minimisation through projects such as:

- Diversion of organic food waste from the waste stream: Phase 1, which enables the Drakenstein Municipality to divert organic food waste and recyclable material from wheelie bins at Paarl Transfer Station (RTS), has been completed at an estimated cost of R8 million. Phase 2 entails the upgrade of Paarl RTS to accommodate refuse trucks to dispose of collected waste from residential and business properties in Paarl. Subject to the availability of finance, Phase II will include an organic biological treatment machine, known as the Food 2050 machine, which will



Community clean ups are necessary when dealing with plastic litter

Rationale

While the reasons for banning single-use plastics may seem obvious from an environmental perspective, it is no small task, and will require serious effort on the part of the municipality.

In a statement addressed to ReSource, Louis Pienaar, executive director, Engineering Services, Drakenstein Municipality, says:

“Illegal dumping plaguing Drakenstein Municipality consists mostly of single-use plastic products (i.e. plastic shopping bags, polystyrene material, plastic straws and stirrers), which hurt the cleanliness of our area.

The Municipality’s vision is to protect our environment and secure a cleaner future for future generations. One of our aims is to reduce plastic waste and move toward a circular economy where resources are reused and waste is minimised.

We support the shift from a culture of constantly buying new products to embracing a lifestyle of reuse. One of the objectives of Drakenstein Municipality’s proposed new Integrated Waste Management Bylaw is to facilitate such a change in culture by prohibiting single-use shopping bags, plastic straws, stirrers, and polystyrene products.

The Municipality may also, in the future, request households and businesses (such as restaurants) to divert organic food waste from the municipal waste stream.

The proposed bylaw will require all businesses and households to divert recyclable waste from their waste stream and may not dispose of it into the 240L wheelie bins.

Single-use items already in use in the area include plastic shopping bags, straws, stirrers, polystyrene cups and food holders.

Grocery stores that still sell single-use plastic bags to customers will have to replace such

bags with either multi-use plastic bags that are thicker than 30 microns or a biodegradable product.

Restaurants will have to replace plastic straws with biodegradable, glass or stainless-steel straws.

The Drakenstein community is free to object to the proposed bylaw, but so far, feedback received during the Municipality’s stakeholder engagement sessions has been positive. The Municipality will review all comments on the proposed bylaw after the comments submission deadline of 30 November 2025.”

Have your say

Members of the public can help shape the future of Drakenstein by reviewing the draft Integrated Waste Management Bylaw and sending their comments to the Municipality by 30 November 2025.

When you share your views, consider:
What do you support in the current draft bylaw?
What should be added to the draft bylaw?
What should be removed or reconsidered?

The proposed bylaw can be viewed online or at the following locations:

- Paarl Civic Centre
- Wellington Civic Centre
- Paarl East Engineering Services Office
- Gouda Municipal Office
- Saron Municipal Office
- Any Drakenstein library

Written comments can be submitted to wastebylaw@drakenstein.gov.za or hand-delivered to one of the offices or libraries listed above.

Residents who are unable to read or write can give their comments verbally at Paarl Library, 1 Market Street, Paarl, where staff will assist. ■



Single use plastic exacerbates illegal dumping

enable Drakenstein Municipality to extract organic food waste from the waste stream and convert food waste into a dry, odourless soil enhancer product within a 24-hour cycle. The soil enhancer product could be added to composting projects to complete the composting process.

- **Recycling:** Residents are encouraged to place recyclables on the pavement on municipal refuse collection days for collection by the Municipality. The Municipality channels a large quantity of the recyclable waste to informal waste collectors (or “wastepreneurs”) at the Paarl Refuse Transfer Station, who sort, process and sell it for income.

A phased approach

Rather than immediately enforcing penalties, Drakenstein Municipality is taking a collaborative, phased approach with this bylaw. The focus will be on education, partnership and shared responsibility.

The Municipality’s approach aims to increase stakeholder buy-in rather than impose immediate enforcement once the bylaw is gazetted. However, punitive measures will be applied should stakeholders fail to comply.

To ensure the effective enforcement of the bylaw once implemented, the Municipality is currently appointing dedicated Bylaw Enforcement Officers.

DESIGNING WITH PURPOSE:

How a South African fashion brand promotes circularity in the local context

At a time when global fashion and retail industries are under scrutiny for their environmental impact, South African lifestyle brand Sealand continues to prove that sustainability can be both authentic and aspirational. **By Duncan Nortier**

Speaking to **ReSource**, Tim Coles, Sealand's Head of Sustainability, explains how the Cape Town-based company embeds environmental and social consciousness into every aspect of its operations, from material sourcing to circular design and consumer engagement.

"We don't view sustainability as a marketing gimmick or an add-on," Coles says. "It's about taking care of the environment so that it can continue to take care of us. That's a principle that runs through our brand, our design process, and our culture."

Sustainability as a South African value

Coles believes that South Africa's sustainability journey is deeply shaped by context and necessity. "It's not a luxury here," he says. "In South Africa, sustainability has always been about resourcefulness, looking around, asking what's already available, and finding ways to reuse or repurpose it."

He points to the country's informal economy as a long-standing example of circularity in action. "At any traffic light, you'll see someone making something beautiful out of reclaimed wire or fabric. They're not doing it for sustainability points; they're not calling it innovation; they're doing it because it makes sense. Out of necessity, we've built a culture of revaluing waste."

That culture, Coles adds, aligns closely with Sealand's founding philosophy: to assign value to materials others consider disposable. "When we take old advertising banners or waste fabrics and

turn them into durable bags, it benefits everyone — businesses save on landfill costs, and we get access to robust materials that tell a story."

Cape Town's natural setting reinforces that mindset. "Driving through a national park on your way to work, you're constantly reminded of the beauty and fragility of the environment," he says. "That proximity to nature influences how we design and what we stand for. It has also reinforced the need for on the ground intervention in these spaces - as demonstrated by our Protect Our Paths Foundation and partnerships for beach and trail cleans."

Material innovation and localisation

For Sealand, a certified B Corp, material choice is where sustainability becomes tangible. "We always optimise across as many metrics as we can - low carbon, recycled content, non-toxic coatings, and durability," Coles explains. "It can become a real balancing act, as few materials will meet every requirement, but one of the most sustainable things you can do is make something that really lasts."

A major development for the company is the upcoming launch of MajiTex, a 100% recycled polyester fabric woven in South Africa. The name derives from "maji", the Swahili word for water. "It felt right," Coles says. "Water connects all of us, and in Cape Town, it's always front of mind."

Developed with local weaving partners, the yarn for the new fabric is certified to the Global Recycling Standard (GRS) and fully traceable. "This is our solution to replace what virgin canvas exists across our



Tim Coles, head of sustainability for Sealand

range," he says. "It's made entirely from recycled plastic and allows us to keep production local, with a lower carbon footprint."

The next step, Coles explains, is to localise the entire value chain. "At the moment, the yarn is imported because certification is prohibitively expensive for smaller recyclers here. But we're in talks with local manufacturers to connect the dots, from collection and depolymerisation to extrusion and weaving. The capability exists in South Africa; it just needs alignment and time."

Coles notes that the initiative has an eye on global trends. "Even if our local regulations are still catching up, global markets are tightening. If South African brands want access to those markets, they'll need to meet strict environmental standards. By designing



Sustainability is at the core of the brand's identity rather than an 'add-on'



▲ The new Sealand range now using MajiTex, a 100% recycled polyester fabric woven in South Africa

◀ The growing problem of textile waste must be addressed through sustainable design as well as end-of-life management

with those benchmarks now, we're preparing the industry for the future."

Circular design and end-of-life solutions

Sealand's approach to circularity extends well beyond manufacturing. In 2024, the company launched Second Wave, a take-back and resale programme designed to keep its products in use for as long as possible.

"We've had our Evergreen Guarantee for years, giving every customer ten years of free repairs," Coles explains. "But we wanted to go further. Second Wave lets customers bring back products they no longer use in exchange for a 25% discount on their next purchase. We refurbish, wash, and resell them with a small tag that identifies them as renewed."

Ten percent of the proceeds from Second Wave sales are donated to the World Wide Fund for Nature (WWF), supporting local conservation initiatives. "It's circularity with an added social impact," says Coles. "Customers aren't just buying something sustainable, they're contributing to something larger."

Products beyond repair are stripped for reusable components, with leftover fabrics donated to Taking Care of Business (TCB), a Cape Town social enterprise that creates new items from textile waste. "That partnership keeps materials in circulation and supports livelihoods," he notes.

Sealand is also playing an active role in shaping the Extended Producer Responsibility (EPR) framework for textiles in South Africa, working with GreenCape and WISP to develop the country's first national scheme. "It's still early days," Coles says, "but we're helping define how textile EPR could work, from fees per garment to funding proper recycling facilities."

Durability as sustainability

Beyond recycling and innovation, Coles argues that durability remains the simplest and most effective sustainability principle.

"You can make something from the most extractive industries imaginable, but if it lasts for 100 years, it's still more sustainable than something disposable," he says. "Our philosophy has always been: buy once, buy well."

That ethos has earned Sealand a loyal following. Many customers still use the same products they bought nearly a decade ago, a fact Coles attributes to thoughtful design and quality materials. "Every decision, from hardware to stitching, balances sustainability with function and longevity," he says. "It's about responsible optimisation."

Engaging consumers in carbon literacy

Looking ahead, Sealand plans to introduce a personal carbon offset programme to help customers understand their individual impact.

"We're developing an initiative that encourages people to think about their personal carbon budgets in a fun, accessible way," Coles explains. "It's about awareness, not guilt. Our consumers are often in the premium market segment, which means their embodied emissions are higher, so this is the group that can make the biggest difference."

The programme will support verified local carbon removal projects that also create jobs and alleviate poverty. "We see it as another way to align environmental and social outcomes," he adds. "Offsets aren't the final solution, real reductions are, but they're one important tool in the journey to net zero."

Coles believes that what sets Sealand apart is authenticity.

"The bigger the gap between your values and your actions, the more cautious you have to be," he says. "When your actions match your message, you can speak freely without fear of misrepresentation. That's what we aim for: transparency and accountability."

With ten years behind it, Sealand continues to position itself not just as a brand, but as a platform for responsible innovation within South Africa's growing circular economy.

"We've never tried to claim perfection," Coles concludes. "But we've built a business that proves sustainability and quality can coexist, and that's something worth scaling." ■





The Electronic Cemetery team

From one bakkie to a thriving company

As E-waste grows, so does the effort to combat its harmful impact. Electronic Cemetery, an e-waste recycling company, reflects this as it grew from an essentially informal small-scale operation into a structured and compliant company. **By Duncan Nortier**

Founded by Jami Nash, Electronic Cemetery started out as a one-person venture with a bakkie and a handful of clients. Nash explains, "In the early days, it was ad hoc. I was doing everything myself: collections, dismantling, sales, and eventually, I burnt out. Registering the company brought structure and delegation. That's when things really started moving. The operations were also greatly improved in 2021,

when the Extended Producer Responsibility (EPR) regulations came into effect.

Despite this operational expansion, Nash attributes the company's resilience to its community-based approach. "We've always been community-focused," he says. "Most of our staff come from people we know and trust. We pay above minimum wage where possible and invest in training. That's what builds a loyal, skilled team."

Training is facilitated through Refurb SA, Electronic Cemetery's sister company, responsible for refurbishment, repairs, and learnership placements. "Some of the learners who started with us are now full-time employees," Nash notes. "It's about capacity building, giving people the chance to learn, grow, and stay in the sector."

the Green Fund, which meant we could finally buy essential equipment, including a forklift. I honestly don't know how we operated without one before."

The project was made possible through EPR partnerships, particularly with eWASA. "At first, we didn't fully understand EPR," Nash admits. "But once someone explained it properly, we realised it could help us reinvest in staff, capacity, and better systems. It's not about profit, it's about breathing room and sustainability." The solar and build of the R9 million facility was funded by eWASA, showcasing the real strength of the EPR regulations, and the Producer Responsibility Organisations that enable them.

Electronic Cemetery adheres to strict legal and environmental compliance. Each item undergoes a mandatory one-week holding period under the Second-Hand Goods Act. "It serves a dual purpose," Nash explains. "It allows law enforcement to check for stolen goods, and it gives customers a chance to recover items they may have accidentally given us."

The dismantling process is largely manual, using simple tools to separate components by hand. "It's slower, but it ensures we separate every fraction properly," he says. Reusable



Jami Nash, founder of
Electronic Cemetery

Infrastructure development in Hammersdale

A major milestone for the company was the development of its Hammersdale facility, a R9-million project supported by eWASA, the non-profit Use-It and the Nedbank Green Fund. The new site, equipped with solar power and modern machinery, significantly increases processing capacity. "Use-It's support was massive; they gave us free rental for a year post-build," says Nash. "We also received capex funding via

devices are refurbished through Refurb SA, while non-functional materials are classified into copper, aluminium, circuit boards, plastics, and steel before being sent to approved local recyclers. "It used to bother me that we had to ship circuit boards overseas," Nash notes. "Now we've partnered with a local processor, which means the material stays in South Africa and our carbon footprint is smaller."

Managing hazards and ensuring data security

E-waste management involves specific safety and data protection measures. Nash emphasises that only a small fraction of materials handled are hazardous. "In its original form, it's not dangerous, unless it's dumped and exposed to the elements. Less than one percent of what we handle is truly hazardous." Materials such as leaded glass and lithium batteries are processed through licensed partners like EnviroServ, while the facility maintains impermeable flooring and high health-and-safety standards. "Honestly, the biggest risk in this job is dropping something heavy on your foot," he jokes.

As the company's registered POPIA officer, Nash oversees all data destruction processes. "If a hard drive passes testing, it's wiped with KillDisk using Department of Defence standards. If not, it's manually dismantled or shredded," he explains. "We can process around ten drives a day and issue certificates of sanitisation. Once a drive has been ground into fragments, recovery is impossible."

Electronic Cemetery processes between 15 and 20 tonnes of e-waste per month, with general waste averaging 600–800 kilograms. "We try not to send plastics to landfill," Nash says. "We're working with Use-It to turn brominated plastics into asphalt or structural material – it's about finding real circular solutions."

The company uses an internally developed digital management system to track operations. "It records daily inputs,

The facility in Hammersdale was made possible by understanding EPR and how Electronic Cemetery's PRO, eWASA, could help them grow



What started out as one 'bakkie' operation has turned into a multi-vehicle thriving business

collections, drop-offs, and fractions, and helps us report to eWASA accurately," Nash explains. "It keeps us transparent and data-driven."

Education and sectoral collaboration

Public education is central to Electronic Cemetery's operations. The company uses social media platforms to promote responsible disposal practices and conducts talks at schools, industry seminars, and community events. "There's huge value in getting people to think differently about their old tech," says Nash. "A lot of people don't realise how much recoverable material there is in what they throw away."

Looking ahead, Nash views collaboration, not competition, as key to the sector's

future. "I don't believe in infinite growth," he states. "We're happy being a strong KZN operator. Nationally, logistics become complicated, and collaboration is the future." He also stresses the importance of the right-to-repair movement in addressing e-waste at its source. "If devices were built to last, there'd hardly be an e-waste problem. You can still find fridges from the 1960s that work perfectly, that's what good design looks like."

Towards a circular future

From a small informal operation to a solar-powered facility handling tonnes of material each month, Electronic Cemetery exemplifies the shift from a linear to a circular model in South Africa's waste economy. "E-waste is still a young industry," Nash reflects. "We've had floods, riots, and Covid to deal with, but we've kept growing. The most important thing is collaboration; no single company can fix the e-waste problem alone. But together, we can make a real difference."





TAILINGS STANDARD HIGHLIGHTS VALUE OF PLANNING FOR MINE CLOSURE

The holistic approach of the Global Industry Standard on Tailings Management (GISTM) considers risks throughout the life cycle of a tailings storage facility (TSF) – including the decades following closure and, in some cases, even longer where stability or environmental concerns persist.

This has re-emphasised the importance of closure planning for mines, and the need to build these considerations into the initial mine design phase. James Lake, partner and principal environmental scientist at SRK Consulting South Africa (SA), says that closure is a theme that runs through the GISTM principles.

“The standard is explicit about the owners’ responsibility to plan, build and operate TSFs

to responsibly manage risk at all phases of the lifecycle – including closure and post-closure,” says Lake. “This applies as much to the rights of project-affected people as it does to the maintenance of an interdisciplinary knowledge base and the operation of monitoring systems.”

Robust designs

Recent years have seen considerable activity in the mining sector to bring TSFs into compliance with

James Lake, partner and principal environmental scientist at SRK Consulting South Africa (SA)



SRK Consulting South Africa (SA)
principal environmental engineer
Roanne Sutcliffe



The GISTM has re-emphasised the importance of closure planning for mines, and the need to build these considerations into the initial mine design phase

the GISTM, and Lake notes that TSF designs are becoming more robust. Among the considerations is the likely impact of climate change, for instance, which will require tailings dams to remain stable in conditions of higher or more intense rainfall.

According to Roanne Sutcliffe, principal environmental engineer at SRK Consulting SA, the GISTM reiterates the principle that effective closure planning begins when mines are being conceptualised and designed.

“The operational life of a mine and its TSF is typically measured in decades,” says Sutcliffe. “In contrast, when considering the post-closure aspects of a tailings facility, the design life will need to be much longer in most instances and may need to be considered in terms of centuries.”

In terms of the GISTM, mines need to be able to demonstrate that – from a chemical and physical stability perspective – TSFs will remain stable throughout the operational phase and for centuries to come after mine closure. She notes that an ‘active closure’ period typically follows for 10-20 years after a mine ceases operations, where the TSF requires a maintenance and monitoring team almost commensurate with the team required for operations. After that, a more ‘passive closure’ regime may be sufficient, where the teams involved slowly reduce but would last for many more decades if not centuries.

Planning too late

The GISTM emphasises the risks TSF failures pose to human life and the environment, emphasising the need for early design adaptations. For instance, ensuring long-term stability may require gentler slope designs, which in turn increases the TSF’s footprint. Where space is constrained, this closure consideration could limit both the deposition capacity of the TSF and the production capability of

Ivan Doku, principal resource geologist, partner and country manager of SRK Consulting Ghana



The Global Industry Standard on Tailings Management reiterates the principle that effective closure planning begins when mines are being conceptualised and designed

the mine – even impacting the operation's planned return on investment.

In this sense, the focus on mine closure has been strengthened by the mining industry's compliance with GISTM, says Ivan Doku, principal resource geologist, partner and country manager of SRK Consulting Ghana.

"Planning fully for mine closure has always been challenging, but the GISTM has given positive momentum to this imperative," says Doku. "In West Africa, there is certainly increased interest in closure planning, as mines look for ways to close the knowledge gap between current operational requirements and post-closure needs."

Re-processing valuable tailings

Given the long mining history of countries like Ghana, he pointed out that there could be interesting opportunities in post-closure land use as it relates to TSFs. With advancements in mineral processing technology, many old TSFs could be re-treated to extract additional value – before the remaining tailings are used for other purposes such as backfilling.

"The ability to treat material without incurring mining costs is an attractive prospect, with the revenue helping to boost the financial provisioning for closure," he says. "Where older facilities may not have been designed in optimal areas, re-treating the tailings also presents the possibility of depositing it in a different location – one that better suits the available post-closure options and can further reduce the mine's financial provisioning for closure."

Among the main reasons why effective closure is often so difficult is because tailings is viewed as a waste product with little or no current value, and many operations begin closure planning too late – when cashflow is limited, according to Sutcliffe.

"This means that money has had to be spent when it is least available, and for purposes that generate no return," she explains. "However, if it can be shown to be economically feasible to re-process a TSF, this allows for both additional revenue generation and integration into the updated mine-wide closure thinking, rather than retrospective management of old facilities not designed with closure in mind."

Risk management and mitigation

Sutcliffe highlighted the economic benefits of planning TSFs with closure in mind, pointing out the high cost required to bring many older facilities in line with the current standard's closure requirements.

"Early in the design stage, it is important to understand and best mitigate the potential



risks that the TSF will present after closure," she explains. "Today, we see many facilities approaching the decommissioning phase, where risk mitigation could require significant expenditure or extended timeframes, or even both. It is generally far more cost-efficient to invest in the solutions earlier – in design or even at operational stage – so that post-closure risk can be minimised."

The presence of artisanal miners in many parts of Africa is also a risk element in the management of tailings dams. Doku notes that artisanal mining often occurs close to an operating mine, even to access the same deposit. The same TSF risks that face nearby communities could then apply to these miners.

Lake explained that TSFs, as part of a mine's lease area, are usually well protected by security infrastructure and services during the mine's operational years. However, the risks related to unauthorised access tend to escalate post-closure.

"In Tanzania, for instance, we have witnessed artisanal miners on a TSF, where the tailings were also being removed for use as construction material," he says. In SRK's experience, mines often create 'attractive nuisances' after they close, such as pit gathering water that attracts wild animals. Similarly, a TSF still containing known minerals would attract illegal miners, who could put themselves at risk and perhaps endanger the structure.

Illegal mining remains key closure risk

The mining of tailings storage facilities (TSFs) and rock dumps by illegal artisanal miners is a significant risk that needs attention in terms of the Global Industry Standard on Tailings Management (GISTM).

Based on her work in the Democratic Republic of Congo (DRC), SRK Consulting South Africa

(SA) principal environmental engineer Roanne Sutcliffe explains some of the risks associated with managing TSFs after mine closure.

"In one site, it was clear that artisanal miners were walking over a tailings dam each day to reach discards which were still considered to have some mineral value," says Sutcliffe. "They would then wash the ore in the supernatant pond on the TSF; this sort of activity could have health and safety implications, and could impact on the stability of the TSF."

In another case, there was evidence of artisanal mining on a mineral seam which was not only adjacent to a TSF but which also ran under the TSF's foundation. Post-closure activity close to a tailings dam was itself a potential risk, while any mining underneath the structure would compromise its stability and pose life-threatening risks.

"The GISTM highlights that mitigating TSF risks is a responsibility that extends for tens or even hundreds of years after mines cease operations," she says. "This means finding sustainable solutions and post-closure uses that address the considerable risks posed by ongoing artisanal mining."



The presence of artisanal miners in many parts of Africa is also a risk element in the management of tailings dams. Image used under Creative Commons

In an era defined by urgent energy transitions and environmental accountability, South African company Stratek Global is reshaping how nuclear energy infrastructure is conceived, built, and experienced. **By Duncan Nortier**

A practical case of small modular nuclear reactors in South Africa

The firm's High-Temperature Modular Reactor (HTMR-100) is emerging as a technical benchmark in next-generation nuclear systems, one that fuses engineering innovation with architectural sensitivity to its natural surroundings.

"We are proving that nuclear power can be both clean and visually harmonious," says Dr Kelvin Kemm, Chairman of Stratek Global. "The HTMR-100 is not simply a power plant; it's an energy system that integrates with the environment rather than dominates it."

South Africa's engineering past meant that the country once led the way in terms of small modular nuclear reactors (SMRs), a project now abandoned, which has its DNA in the current global interest in SMRs.

At the core of Stratek Global's strategy for proving SMRs are both safe and useful lies the HTMR-100, a 100-megawatt thermal (35-40 MWe electrical) small modular reactor that utilises high-temperature gas-cooled

reactor (HTGR) technology. It operates with TRISO-coated uranium fuel, renowned for its robust containment integrity, and uses helium gas as a coolant, ensuring both operational safety and high thermal efficiency.

"The HTMR-100 is inherently safe," explains Kemm. "Its design ensures that even in the absence of operator intervention, cooling is maintained through passive systems. The reactor cannot melt down in the conventional sense."

The system's graphite-moderated core operates at high temperatures (around 750°C), allowing for both electricity generation and potential industrial heat applications, such as hydrogen production, desalination, and process steam for mining operations. This adaptability positions the HTMR-100 as a flexible energy solution capable of serving both grid and off-grid clients.

Crucially, the HTMR-100 requires no large external water source, unlike traditional pressurised-water reactors. "We can place this reactor anywhere, coastal, inland, or



Dr Kelvin Kemm, Chairman of Stratek Global

remote locations, because the helium cooling system is closed-loop," Kemm notes. "That flexibility is vital for countries with limited water infrastructure."

Stratek Global is pioneering small modular reactors for residential use



A central advantage of the HTMR-100 lies in its modularity and compact physical footprint. The entire plant occupies an area comparable to a football field, significantly smaller than both fossil-fuel facilities and large renewable installations.

The reactor's modular configuration allows for factory fabrication and rapid assembly on site, drastically shortening construction timelines and improving cost control. It also allows for scalable deployment: multiple modules can be added incrementally to match regional energy demand.

"Instead of ten years of civil works, you can deploy reliable nuclear power within three to five years," says Kemm. "This scalability changes the economic equation for developing nations."

Sustainable architecture and regional adaptability

To complement its technical achievements, Stratek Global commissioned JKDA Architects to develop a suite of architectural designs that integrate each installation into its surrounding ecosystem. The Kudu and Oryx designs, in particular, demonstrate how architectural identity and local materials can coexist with advanced engineering.

The Kudu design, intended for African savannah environments, draws inspiration from the vertical lines of natural camouflage found on species such as the kudu and zebra. The reactor's form echoes the African drum, symbolising energy as the "heartbeat of the community." Columns and trusses use raw, locally sourced materials that weather naturally, reducing heat absorption and maintenance requirements.

"The Kudu embodies both strength and grace," Kemm says. "It represents the elegance of African engineering, powerful, sustainable, and inherently local."

The Oryx design, optimised for arid desert regions, incorporates raw tinted concrete, natural stone, and Corten steel, all of which weather organically without the need for external maintenance. The structures are shaped to mirror the undulating forms of desert dunes, while native plants and rock formations are used to promote biodiversity and ecological continuity.

"These designs are more than cosmetic," Kemm explains. "They're functional embodiments of environmental adaptation. They cool naturally, use less energy for climate control, and involve local contractors in construction."

Future design variations, including the Sable, will address Arctic conditions and high-latitude



These small modular reactors are being implemented in key locations to show the potential for this technology

climates, while urban designs are being developed for metropolitan settings, emphasising public engagement and aesthetic integration.

Environmental and operational sustainability

The HTMR-100 has been engineered to achieve a minimal environmental footprint across its lifecycle. The reactor produces zero greenhouse gas emissions during operation, aligning with global decarbonisation goals.

Its advanced fuel cycle enables the safe, long-term management of nuclear waste. Each facility can store up to 40 years' worth of spent fuel on site within reinforced bunkers, ready for transfer to a permanent repository in accordance with national regulations. "This is about responsibility from start to finish," says Kemm. "Every aspect of our design, from construction materials to waste handling, is driven by sustainability."

The compact footprint also helps preserve open land, supporting ecological inclusion and reducing the strain on existing infrastructure. Native landscaping elements are incorporated directly into site design to maintain biodiversity.

Strategic partnerships and global ambitions

Stratek Global's ambitions extend beyond South Africa. The company has entered into a strategic partnership with France's Groupe Albatros, aimed at facilitating SMR deployment across Africa and the Middle East. The collaboration combines Stratek's reactor expertise with Albatros's engineering and project-management capacity to accelerate regional energy independence.



The tower housing the on-site reactor, which will power the estate

Interest in the HTMR-100 has already come from municipalities, provincial governments, mining companies, and agricultural producers seeking stable, low-carbon power. "Energy resilience is no longer optional," Kemm asserts. "Our technology gives industries and communities the ability to control their energy future safely and sustainably."

For Stratek Global, the HTMR-100 is both an engineering milestone and a cultural statement, an effort to redefine nuclear power as a positive, community-enhancing force. Its blend of technical reliability, environmental integrity, and architectural sophistication signals a turning point for nuclear acceptance in Africa and beyond.

"We're ushering in a new era where nuclear power is not hidden away behind concrete walls," concludes Kemm. "It's something that communities can see, understand, and take pride in. Clean, compact, and beautiful, this is the future of nuclear energy." ■



Size of the fuel ball needed for the Kudu reactor

Construction debris should be handled separately from other waste streams

Recycling in construction

The construction industry is a cornerstone of global economic growth and a pivotal sector within South Africa. It is also one of the largest producers of waste. However, there has been a shift and companies like Calgro M3 are reshaping this narrative by integrating recycling into their core operations. **By Udesh Sewduth, environmental manager at Calgro M3**

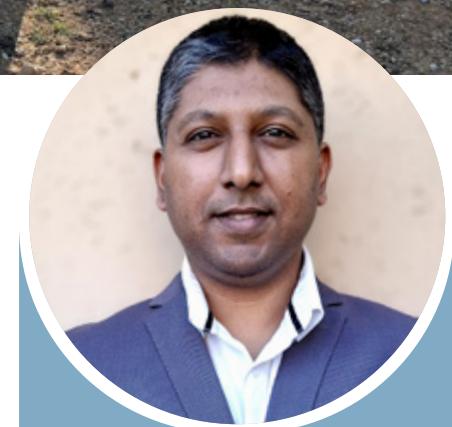
Construction waste is diverse and complex, encompassing materials such as concrete, metals, plastics, glass, wood, e-waste, used oils, and hazardous fluorescent tubes.

When mismanaged, these materials contribute to overflowing landfills, environmental contamination, and greenhouse gas emissions. In South Africa, where landfill space is increasingly scarce and environmental regulations are tightening, the need for effective waste management has never been more urgent. Yet, implementing recycling programs on construction sites faces significant hurdles, including limited awareness among workers, inadequate access to recycling services, space constraints for waste segregation, perceived cost increases, and challenges in tracking waste diversion. Despite these obstacles, Calgro M3's award-nominated recycling initiative proves that

they can be overcome. Being a finalist for the Environmental Excellence Award has elevated Calgro's profile, signalling to employees, investors, and the public that sustainability is integral to its operations, not merely a compliance exercise

South African legislation and climate change context

South Africa's legislative framework, primarily the National Environmental Management: Waste Act, 2008 (Act No. 59 of 2008), as amended in 2014, governs waste management, including construction waste. This Act promotes a waste management hierarchy prioritising avoidance, reduction, reuse, recycling, recovery, treatment, and safe disposal as a last resort. The National Waste Management Strategy (NWMS) 2020 builds on this, aiming to divert 40% of waste from landfills within five years through reuse,

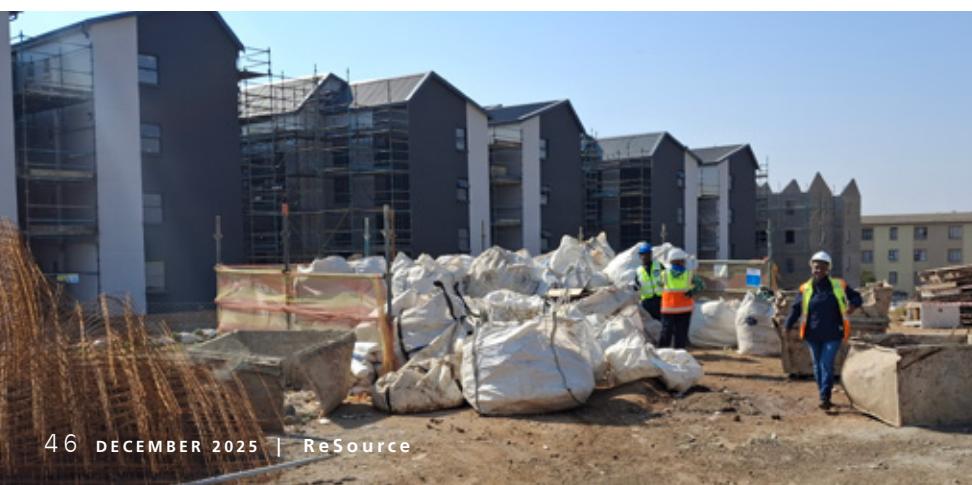


Udesh Sewduth, environmental manager at Calgro M3

recycling, and recovery, while fostering a circular economy to drive sustainable economic growth. It emphasises waste minimisation, effective waste services, and compliance to reduce pollution and illegal dumping. Additionally, the Waste Classification and Management Regulations (GN634) and National Norms and Standards for Disposal of Waste to Landfill (GN636) set stringent requirements for waste handling, storage, and disposal, ensuring environmentally sound practices.

The Climate Change Act, No. 22 of 2024, passed on July 23, 2024, aligns policies to support South Africa's transition to a low-carbon, climate-resilient economy. It mandates carbon budgets for high-emission activities, including construction, encouraging companies to adopt sustainable practices like recycling to reduce greenhouse gas emissions. While the Act does not directly regulate recycling, its focus on emissions reduction complements waste management efforts, as recycling reduces the need for raw material extraction and energy-intensive manufacturing, both significant contributors to carbon emissions.

These laws create a robust framework for construction companies to integrate recycling, aligning with national climate goals to reduce environmental impact and promote a green economy.



Calgro M3's recycling model

When Udesh Sewduth joined Calgro M3 in 2020, the company's recycling efforts were minimal, confined to basic practices at its head office. Recognising the environmental and financial costs of this approach, Udesh has spearheaded a company-wide transformation to turn construction waste into a valuable resource. What began as an ambitious goal to recycle 55% of construction waste quickly surpassed expectations, with Calgro achieving a 62% recycling rate across all active sites. This success earned the company a finalist spot for the Environmental Excellence Award, marking its first formal recognition for environmental leadership.

In recent months, Calgro M3 has diverted around 30 tons of waste from landfills, saving approximately R70 000 in disposal costs, and generated R13 000 in revenue from recyclable materials. Over the past few years, the company has recycled around 46 tons of metals, 3 000 kg of plastic, 10 tons of paper and cardboard, 1 032 kg of glass, 2 400 litres of used oil, 1 288 kg of e-waste, and 417 kg of fluorescent tubes. These figures represent more than just statistics; they signify a fundamental shift in how the construction industry can view and manage waste.

Calgro M3's recycling success stems from a combination of strategic approaches. First, visionary leadership has driven the program, aligning it with long-term environmental and business goals, making sustainability a core operational value. Second, the persistence of HSE team members like Monicca Madzivhe and Linky Mashimbye has been instrumental. Their tireless efforts to engage contractors and staff ensure that recycling practices, such as waste segregation and proper bin usage, remain a priority across all sites. Third, Calgro's holistic waste mapping system tailors recycling

processes to specific materials, collaborating with specialised service providers to handle metals, e-waste, oils, and more efficiently. Finally, by embracing circular economy principles, Calgro transforms waste into a commodity, generating income from recycled metals and plastics while responsibly managing hazardous materials like used oil and fluorescent tubes to meet environmental standards.

Lessons for the construction industry

Calgro M3's model offers a replicable blueprint for the broader construction sector. Companies looking to adopt similar practices can start with small pilot programs to build confidence, set ambitious yet achievable recycling targets to maintain momentum, and invest in continuous staff training to drive behavioural change. Forming partnerships with local recyclers can reduce costs and support local economies, while quantifying results through measurable outcomes helps justify investment and garners recognition. Calgro's experience shows that recycling is not just an environmental necessity but a practical and profitable strategy.

Practical tips for recycling in construction

Calgro M3's model offers actionable strategies for construction companies aiming to implement effective recycling programs. Here are key practices to adopt:

- Develop a clear Waste Management Plan: Create a detailed plan specifying which materials, such as cardboard, plastics, bricks, and metals that will be recycled. Avoid vague or overly broad recycling goals; focus on materials that can be realistically collected and processed to ensure efficiency and clarity for all involved.
- Partner with Local Recycling Companies:

At the start of a project, connect with local recyclers who can collect materials, often at no cost, and sometimes provide small revenue streams for high-value recyclables like metals. These partnerships streamline waste removal and support local economies.

- Provide ongoing Staff Training: Due to high staff turnover in construction, continuous training on waste segregation is essential. Educate workers on identifying and sorting recyclables, and assign dedicated staff to monitor recycling areas, conducting regular inspections to ensure compliance.
- Use Clear Signage: Simplify recycling by placing clear, visible signs on bins to guide workers on proper waste segregation. Well-designed signage reduces confusion and encourages adherence to recycling protocols.
- Enforce Accountability: Issue warnings or corrective measures for workers or contractors who fail to separate waste correctly. This reinforces the importance of recycling and maintains program integrity.
- Start Small and Scale Up: Begin with pilot programs at a single site to build confidence and refine processes before expanding company-wide.

The road ahead

As landfill costs rise and regulations like the Waste Act and Climate Change Act tighten, the construction industry must adapt. Recycling is a critical entry point, reducing environmental impact and supporting South Africa's climate commitments. Calgro M3's journey proves that with visionary leadership, persistent education, and adherence to circular economy principles, construction waste can become a resource. By recycling one brick, diverting one ton, and engaging one contractor at a time, the industry can build a sustainable future aligned with national environmental and climate goals. ■

Calgro M3's recycling success stems from strategy, planning is essential to getting recycling right and without a strategy there is no path forward



SOMETIMES SIMPLE IS BEST



Troughs made from recycled plastic



Recycled plastic tables replaced broken wooden tables offering a long-term solution to repairing tables

South Africa's waste problems can seem overwhelming. While efforts to recycle en masse are being pursued and significant investments in mechanical recycling are being made, simple solutions are still effective and can't be overlooked.



refile Mmope, owner of IC Agri-Plastics, says, "Living in Rustenburg, I saw a need. Farmers are looking to save money, and there is also a lot of waste in the area. I thought that if we could offer feeds made with recycled and reclaimed material, I could offer the farmers a product that suits their needs and addresses waste in the community."

IC Agri-Plastics started out making tables from recycled plastic bought from Extrupet. The company then built a boma for a hotel using recycled plastic and then went on to produce troughs for farmers.

Reuse

While South Africa is focusing on reducing waste creation, and the recycling industry is growing, focusing on reuse is also a viable alternative to landfilling. "We use old tyres and repurpose them

into animal feeders. It's quite simple, but it's fit for purpose," says Mmope.

Along with the tyre feeders, Agri-Plastics also make feeding troughs from recycled plastics. "There are a lot of farmers in the area, and I didn't want to start something without speaking to them. I met with and heard their concerns and found that a considerable amount of money was going towards products that could be made cheaper, locally, and sustainably," says Mmope. The troughs that Agri-Plastics are designed to withstand the harsh conditions on a farm, and recycled plastic is more durable than wooden troughs.

Collaboration

"While we are currently buying recycled plastic from Extrupet, we are working on getting waste from the community in a sustainable manner. We recognised

the need to collaborate early on, as there are many nodes along the chain. We work with Letlotlo Waste, a Rustenburg-based company that supplies waste as a raw material. Agri-Plastics and Letlotlo also partner for community focused campaigns such as raising awareness around sustainability and working in schools to educate the youth. Focusing on community and local solutions, Mmope adds, "We want to start buying from local buy-back centres."

Mmope says that Rustenburg as a community has shaped the business, and working with the community and community-led organisations has earned him trust within this growing sector. Mmope adds, "We have grown to having three full-time employees, and pay for additional labour where we need it. This has allowed Agri-Plastics to contribute to the local economy and prove that sustainability is a viable option, even outside major cities."

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