UK and South Africa Collaborative Water & Waste Insights

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In this perspectives piece, Nicola Redelinghuys, Knowledge Transfer Manager – Global Alliance Africa and manager of the UK-South Africa Water Security and Waste Circularity Global Innovation Network shares the key opportunities within the water and waste industries for innovators in the UK and South Africa.

For readers seeking deeper context and detailed analysis, this insights document provides further background on system pressures, policy dynamics, and delivery considerations across South Africa's water and waste sectors. What follows distils the main priorities and implications for collaboration, particularly from a UK perspective.

South Africa is at an important point in how it manages these two essential systems. In both sectors, the challenges are well documented, including scarcity, aging infrastructure, uneven service delivery, limited municipal capacity, and growing climate and environmental pressure. These same pressures also create space for practical improvement, particularly where planning, partnerships, and investment are aligned.

The discussion brought together here reflects two closely linked areas of focus. The first considers the water sector, moving from system pressures toward responses that are feasible and investable. The second looks at the waste sector's gradual shift away from landfill dependence toward approaches centred on recovery and value creation. Together, these insights are intended to support shared understanding and practical collaboration between UK and South African stakeholders.

Opportunities for UK partners in the water sector

Focus first on reducing losses and improving performance of existing systems
Reducing non-revenue water, improving network maintenance, and strengthening operational performance are consistently identified as priority entry points. For UK organisations, this points to opportunities in leakage management, pressure control, monitoring systems, and performance-based operating models rather than large new supply infrastructure.

Support municipal capability alongside technical solutions
Technical interventions tend to perform best when paired with improvements in financial controls, asset management, and operational governance. UK partners are encouraged to consider blended approaches that combine engineering or digital solutions with institutional and capacity support.

Position water reuse as a practical, non-controversial supply option
Industrial and non-potable reuse are areas with clear demand and relatively low regulatory risk. UK companies with experience in advanced treatment, reuse system design, or operational management are well placed to engage in these segments.

Deploy digital tools with clearly defined operational use cases
Technology delivers the most value when linked to specific operational needs. For UK digital and data firms, this suggests a focus on solutions that directly support billing accuracy, leak detection, compliance monitoring, or day-to-day decision-making.

Integrate nature-based approaches into engineered solutions
Catchment restoration and ecosystem-based interventions are increasingly seen as complementary to traditional infrastructure. UK organisations with experience in environmental services, monitoring, or blended infrastructure models may find alignment here.

Target well-prepared, repeatable projects rather than one-off schemes
Smaller, replicable projects are often easier to implement and finance. UK partners are encouraged to look for scalable models that can be applied across multiple municipalities rather than single bespoke projects.

Opportunities for UK partners in the waste sector

Engage in diversion and recovery, not landfill expansion
Future investment is expected to focus on diversion pathways rather than new disposal capacity. UK organisations with experience in organics processing, recycling systems,

materials recovery facilities, and waste-to-energy may find stronger alignment than those focused on landfill infrastructure.

Work with, not around, the informal recycling economy
Informal reclaimers play a central role in material recovery. UK partners are encouraged to design solutions that accommodate informal collection, aggregation, and sorting, rather than attempting to replace these systems.

Plan for stable feedstock and long-term contracts
Feedstock risk remains a key barrier to investment. For UK technology providers and investors, this highlights the importance of regional aggregation, off-take agreements, and longer-term operating contracts when entering the South African market.

Align with extended producer responsibility frameworks
Extended producer responsibility is shaping investment decisions in plastics and packaging. UK organisations are advised to understand how these frameworks operate locally and to align technology choices, processing capacity, and business models accordingly.

Scale proven technologies before introducing complexity
Simpler, established recovery technologies are generally more appropriate entry points than highly complex systems. UK firms are encouraged to phase investment and scale in line with local data, skills, and operational maturity.

Shared guidance for UK engagement across both sectors

Across water and waste, experience points to more effective engagement when:

- Technical solutions are closely linked to operational and financial realities
- Projects are prepared and structured before technology is introduced
- Delivery models are repeatable and adaptable across locations
- Skills transfer and local partnerships are built into project design
- Data and performance metrics are agreed upfront
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How UK organisations can engage through existing platforms

These priorities align closely with the objectives of Innovate UK and its international collaboration programmes. Through Innovate UK supported platforms focused on water security and waste circularity, UK organisations can:

- Explore partnerships with South African municipalities, utilities, and private operators
- Participate in pilot projects that test solutions under real operating conditions

- Access structured pathways for market entry and scaling
- Contribute to joint innovation, learning, and skills exchange
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For readers who would like deeper analysis, sector context, and examples, the full set of articles provides additional detail and supporting evidence. UK organisations interested in applying their expertise in South Africa's water and waste sectors are encouraged to use both this summary and the articles as a practical reference when engaging through Innovate UK programmes, calls, and collaborative initiatives.

UK and South Africa collaborative water insights

A watershed moment for South Africa: Charting a course for a water secure future

South Africa's water story is changing. Scarcity is a constant, but variability, aging assets, and uneven service delivery now make reliability the central challenge. In this series, we set out

to connect the dots: the physical realities, the institutional foundations, the technology that already works, and the partnership models that can convert potential into delivery.

What stands out is the power of preparation. When municipalities stabilise finances, improve data, and plan proactively, projects move faster and at lower risk. When we match that with proven solutions—reuse, smart networks, advanced treatment, and nature-based investments—the numbers begin to work for both public and private partners. The result is not a single mega project, but a steady pipeline of credible, right sized interventions.

There is real space for UK South Africa collaboration here. UK firms bring strong track records in digital water, complex treatment, and project delivery. South African partners bring deep local knowledge and the ability to adapt solutions to context. Together, we can focus on what matters: bankable reuse schemes, non-revenue water reduction at scale, resilient catchments, and performance-based contracts that reward outcomes people can feel at the tap.

Our objective is simple: help decision makers and investors see a coordinated path to resilience—practical, inclusive, and measurable. If this aligns with your work, let us talk about where we can add momentum.

Focus areas for joint action

- Reuse and reclamation that free potable supply
- Digital loss reduction with clear payback
- Advanced treatment for complex industrial needs
- Catchment restoration with jobs and measurable yield
- Standardised PPP models with transparent performance data

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South Africa's water crossroads: Understanding the pressures on a vital resource

South Africa stands at a water crossroads. As one of the world's 30 driest countries, its relationship with this vital resource has long been defined by careful management and engineering ingenuity (Department of Science, Technology and Innovation, n.d.; GCIS, 2024). However, the nation is now experiencing a convergence of pressures that are testing the resilience of its water systems. A combination of natural scarcity, the increasing impacts of climate change, and significant infrastructural constraints has created a situation of national importance, calling for a clear and measured assessment of the landscape to chart a sustainable path forward.

The country's natural context sets a challenging baseline. With an average annual rainfall of approximately 500 mm; well below the global average of 860 mm; South Africa is recognised as a water-scarce nation (GCIS, 2024; Frontiers, 2025). Historically, this has been managed through extensive infrastructure development, but with 98% of available water resources already allocated, the capacity to meet rising demand through conventional means is limited (Denmark in South Africa, n.d.). This inherent vulnerability is being intensified by climate change. The 2024 National State of Water Report noted that the country recently experienced its hottest year on record, accompanied by below-average rainfall across most regions (DWS, 2024). Projections indicate a future marked by greater rainfall variability and a higher frequency of extreme weather events, from prolonged droughts to intense floods (WRI, 2025; Frontiers, 2025). These are not distant risks, but current realities that are reflected in national dam levels that have declined from the highs of previous years (DWS, 2024). This trend is particularly evident in major systems like the

Vaal Dam, a key water source for the country's economic heartland, where levels have reached concerning lows in recent years (NuWater, 2025). Additionally, rising sea levels are leading to saltwater intrusion in the freshwater systems of coastal cities, affecting groundwater quality and suitability for consumption. The acute water shortages that nearly interrupted municipal supply in metropolitan areas such as Cape Town during the 2017 to 2018 Day Zero period, and in Gqeberha during the prolonged drought between 2021 and 2022, highlighted the potential for significant social and economic disruption if resilience is not strengthened.

Within this context, the condition of the country's water infrastructure remains a key concern. Much of the system is aging and has been impacted by years of underinvestment and deferred maintenance, leading to a largely reactive cycle of emergency repairs rather than proactive upkeep (Cliffe Dekker Hofmeyr, 2025; WRC, 2017). This shift from planned maintenance to more expensive and less efficient "emergency maintenance" has shortened the useful life of assets and increased future costs (DWS, 2024). The South African Institution of Civil Engineering (SAICE) highlighted this challenge in its infrastructure report card, awarding the country's public infrastructure an overall grade of 'D+' and noting that the water sector faces similar pressures to those experienced by the electricity sector a decade ago. The most visible outcome of this under-maintenance is the level of Non-Revenue Water (NRW), which represents treated water lost before reaching consumers. The 2023 No Drop Report found that around 40% of municipal water is lost through physical leakages, illegal connections, and other inefficiencies (Merchantec Capital, 2025). This figure, which has since risen to a national average of 47.4%, indicates a significant waste of a scarce resource and a notable strain on municipal finances (DWS, 2024).

Parallel to the challenges in water supply, South African sanitation systems are also under strain. The latest Green Drop assessment (2022) found that more than 60 percent of municipal wastewater treatment works are in poor or critical condition, with 39 percent classified as critical risk, reflecting a continued deterioration from earlier years (DWS, 2022). This results in the discharge of untreated or insufficiently treated effluent into rivers and streams, a trend confirmed by the 2022 Green Drop assessment, which found widespread non-compliance and poor effluent quality across most systems, posing risks to public health and aquatic ecosystems (DWS, 2022). Such conditions contribute to the spread of waterborne diseases like cholera, typhoid, and dysentery, particularly in communities that rely on surface water for domestic use (Frontiers, 2025). The latest Green Drop assessment, which evaluates the performance and compliance of municipal wastewater treatment systems across the country, indicates that nearly two thirds of these systems are in a poor or critical state, reflecting a decline from previous years (SALGA, 2022). This widespread underperformance not only affects environmental quality but also raises the cost of providing safe drinking water downstream, creating an economic feedback loop (GreenCape, 2023). The challenge is further compounded by the legacy of Acid Mine

Drainage (AMD), particularly from derelict and ownerless mines, which pollutes rivers and groundwater with highly acidic, metal-laden water, posing one of the most persistent long-term risks to national water resources.

The economic and social reasons for addressing these issues are clear. The South African Constitution guarantees the right to sufficient water, a cornerstone of the country's development goals (DWS, 2018). Yet the human impact of these cumulative pressures demonstrates a persistent gap between policy aspirations and practical delivery, particularly in rural and informal areas. It is estimated that around 42% of rural households in South Africa do not have consistent access to clean water, relying instead on unsafe sources such as rivers and unprotected wells (Frontiers, 2025). This reality highlights ongoing inequities in service delivery. While national statistics show gradual improvement in overall access, they mask localised declines in certain provinces, such as Limpopo, where access to piped water has decreased over the past two decades (GCIS, 2024). From an economic perspective, agriculture remains the largest water user, accounting for 61% of consumption, making food systems particularly sensitive to water availability (GCIS, 2024). Other critical sectors, including mining and power generation, are also heavily reliant on stable water supplies—with water for power generation classified as strategically significant and maintained at a 99.5% assurance level (GCIS, 2024). Limited water security is therefore not only an environmental concern but also a constraint on South Africa's broader growth and social well-being.

Understanding this complex web of pressures is the first step. The challenges are substantial, but they can be addressed through coordinated, forward-looking approaches. As this series will highlight, the narrative of strain is only chapter of the story. The rest boasts opportunity, where the urgency of action is driving innovation, new investment models, and partnerships that can strengthen the resilience of South Africa's water systems. Our next article will examine the governance and financial dimensions that underpin these challenges, exploring how improved municipal performance and institutional reform can help build a more secure water future.

For businesses, innovators, and researchers seeking to contribute to this effort, there are clear opportunities for collaboration. To connect with partners and explore joint initiatives, we invite you to join the UK–South Africa Water Security and Waste Circularity Global Innovation Network.

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Strengthening the foundation: The key role of municipal governance in water security

While aging infrastructure and climate change are significant external pressures on South Africa's water sector, a deeper analysis indicates that many of the underlying issues stem from the institutional and financial foundations of service delivery. The physical decline of pipes and treatment plants largely reflects broader systemic challenges at the municipal level, where the constitutional responsibility for providing water and sanitation services resides (SALGA, 2022). To understand the path to water security, it is essential to first explore this landscape of governance, where financial instability and limited technical capacity have created notable hurdles to sustainable water management.

Reports from the Auditor General of South Africa (AGSA) consistently highlight the constrained financial health of the local water sector (AGSA, 2024). A central issue is a persistent cycle of debt that affects the entire value chain. Many municipalities experience difficulty with revenue collection, which in turn reduces their ability to pay bulk water bills to the state-owned Water Boards (AGSA, 2024). This non-payment affects the financial stability of the Water Boards and limits their operational capacity, reducing their ability to pay suppliers or invest in the maintenance and refurbishment of the bulk infrastructure they manage (AGSA, 2024; Parliament of South Africa, 2024). This creates a reinforcing cycle in which municipal financial constraints contribute to the gradual deterioration of assets essential for service delivery. The AGSA has emphasised that a coordinated effort across all three spheres of government is needed to address the local government financial challenges that influence the sustainability of the entire water value chain (AGSA, 2024).

This financial pressure is compounded by what the AGSA identifies as ongoing weaknesses in accountability and financial controls. Audits regularly note high levels of irregular, fruitless, and wasteful expenditure, pointing to challenges in procurement and consequence management (AGSA, 2024). In the 2023-24 reporting cycle, material misstatements were found in the performance reports of seven out of eight audited water boards, and material findings on non-compliance with legislation were raised at all entities (AGSA, 2024). This suggests that the data used to measure progress is sometimes unreliable, which complicates effective oversight and accountability. Such conditions make it difficult to mobilise the capital required for long-term infrastructure maintenance and upgrades. The Development Bank of Southern Africa (DBSA) and the World Bank have noted that a significant portion of the gap in achieving water security goals arises not from a shortage of new infrastructure, but from challenges with quality and reliability in existing systems (DBSA, 2022). For water, 48% of the gap to achieving SDG 6.1; which aims for universal access to safe and affordable drinking water by 2030; is due to quality and reliability issues, underscoring that improving the management of existing systems is an important area for intervention (DBSA, 2022).

A critical factor influencing these outcomes is the limited availability of technical and engineering skills within many municipalities (Administratio Publica, 2022; TD, 2018). The operation and maintenance of complex water and wastewater systems require qualified professionals; from engineers and project managers to process controllers and artisans; responsible for the daily operation of treatment facilities. The shortage of such capacity leads to gaps in project planning, contractor oversight, and asset management (AGSA, 2024). In the 2023–24 financial year, for example, 45% of major infrastructure projects were significantly delayed due to issues such as slow procurement and limited project management (AGSA, 2024). These delays not only postpone the delivery of essential services but also lead to cost escalations, placing further strain on limited budgets. The Water Trading Entity, for instance, did not meet its maintenance targets for three consecutive years, achieving only 39% of planned projects in 2023-24, contributing to the continued deterioration of infrastructure (AGSA, 2024).

The challenges are particularly pronounced in smaller and district municipalities, which often have a limited revenue base and face greater difficulties in attracting and retaining skilled personnel (APSDPR, 2023). The result is a service delivery landscape characterised by intermittent supply, frequent breakdowns, and a reactive approach to maintenance that is both more expensive and less effective. This institutional fragility has been acknowledged at the highest levels. The South African Local Government Association (SALGA) has observed that despite national government providing billions of rand in grants to support municipalities, the outcome has not consistently translated into service improvements (SALGA, 2022). This points to a systemic absorption issue, where financial injections may not lead to better results due to underlying governance and capacity constraints. This shortfall has a direct human impact, with millions of people, particularly in rural areas, still waiting

for reliable access to safe water and sanitation services; a reality that highlights the gap between policy ambition and on-the-ground delivery.

Recognising these foundational challenges is crucial because it reframes the issue. South Africa's water situation is not simply an engineering problem to be solved with more infrastructure; it is also a governance matter that requires institutional strengthening, financial restructuring, and sustained investment in human capacity. In response, the government is advancing significant institutional reforms, including the establishment of a new National Water Resource Infrastructure Agency (NWRIA) and new Catchment Management Agencies (CMAs), aimed at professionalising the management of bulk water assets (PMG, 2024). This approach is shaping a more coordinated and stable environment for future investment. As the next article in our series will explore, it is precisely within these systemic challenges that meaningful opportunities for innovation in technology, finance, and service delivery models are beginning to emerge.

For businesses, innovators, and researchers looking to be part of the solution, the opportunity for collaboration remains strong. To connect with partners and explore joint initiatives, we invite you to join the UK–South Africa Water Security and Waste Circularity Global Innovation Network.

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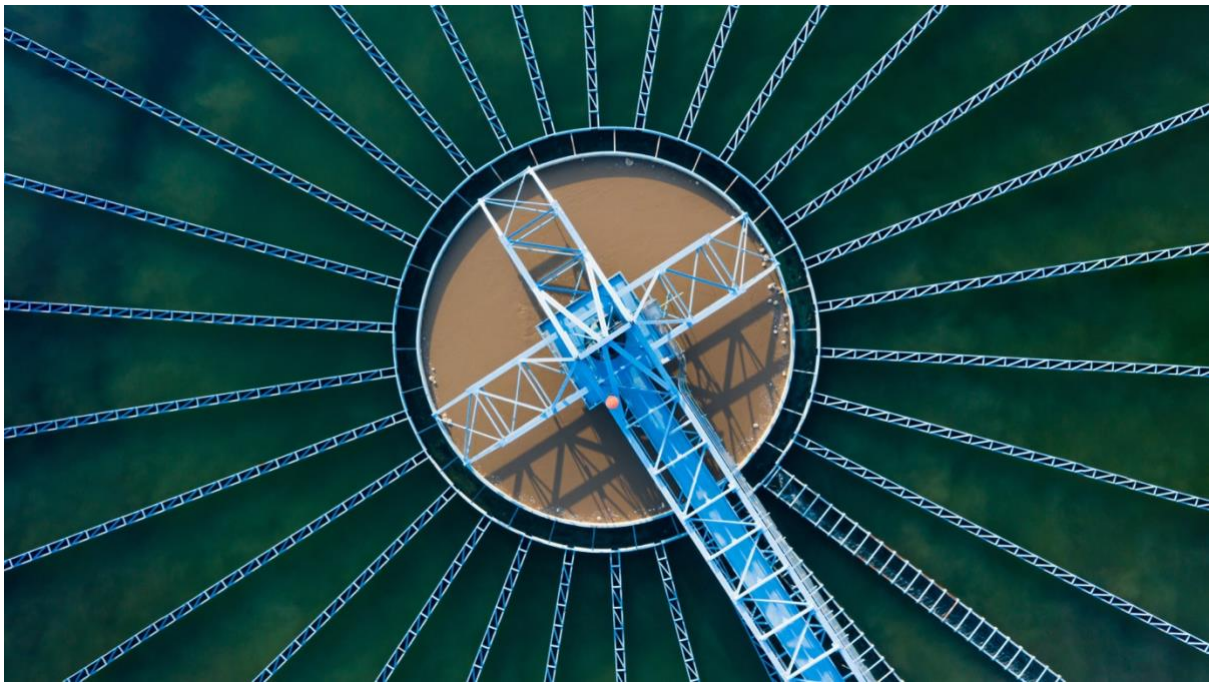

An innovation led future: Technology driven pathways to water resilience

The growing pressures on South Africa's water sector are becoming a catalyst for change. The limitations of the traditional, linear model of water management are becoming increasingly evident, encouraging a shift towards greater efficiency, resilience, and sustainability. This transition is helping to create an environment that supports innovation and presents a significant opportunity for investment across technology, infrastructure, and new service models. Central to this transformation is the adoption of a circular economy framework, which redefines wastewater and other byproducts as potential resources rather than liabilities (CSIR, n.d.).

A key area of opportunity lies in wastewater beneficiation and sludge treatment. With regulations such as the national ban on liquid waste to landfill now in effect, there is a growing incentive for technologies that can treat and derive value from wastewater sludge (GreenCape, 2023). This creates space for solutions in sludge dewatering, anaerobic digestion for biogas production, and the recovery of valuable nutrients like phosphates (in the form of struvite) for use in fertiliser (CSIR, n.d.). This approach helps transform a costly waste management challenge into a potential revenue stream, presenting a strong business case for investment in modern treatment technologies at both municipal and industrial levels. There is also potential to evolve existing wastewater treatment facilities into future "waste resource recovery centres," which not only treat effluent for compliance but also

promote innovation and create mutually beneficial partnerships with local communities (DSTI, n.d.).

Closely related is the increasing importance of water reuse and reclamation. With conventional water resources almost fully allocated, reusing treated wastewater for industrial processes, agricultural irrigation, and even augmenting potable supplies is shifting from a niche practice to a practical necessity (DBSA, n.d.). While public perception can present a challenge for direct potable reuse, several successful projects have demonstrated the potential of this approach. A prominent example is the Durban Water Recycling Project, which treats domestic sewage to a near potable standard for industrial use. This project freed up enough potable water to supply an additional 400,000 people and provided industrial users like SAPPI and MONDI with a more reliable and cost-effective water source, demonstrating a working model of the circular economy in action (DSTI, n.d.). Recognising this potential, the Development Bank of Southern Africa (DBSA) is actively supporting this transition through its National Water Reuse Programme, which helps municipalities develop bankable reuse projects and establish a new asset class for infrastructure investment (DBSA, n.d.).

Technology continues to play a key role in enabling this transition. One of the most immediate and promising areas of growth is smart water management, which involves using digital tools such as real time monitoring, automated controls, and data driven decision making to improve how water systems are operated and maintained. The deployment of sensor-based networks and data analytics directly addresses the sector's ongoing challenges of water loss and inefficient revenue management. Case studies from municipalities in the Western Cape have demonstrated a strong return on investment. For example, Saldanha Bay Municipality implemented smart pressure management that reduced pipe bursts from over 50 per month to just over 7, resulting in annual savings of R6.3 million (GreenCape, 2022). Similarly, Cape Agulhas Municipality’s smart groundwater management system is expected to deliver annual savings of R1.4 million with a payback period of just 24 months (GreenCape, 2022). These systems, incorporating ultrasonic smart meters, advanced LoRaWAN communication networks, and real time quality monitoring tools, provide a comprehensive view of the water network. This supports faster; more informed decision making, improves billing accuracy, and enables proactive maintenance rather than reactive repairs. However, successful implementation requires careful planning; early pilot projects show that community engagement and ensuring the long-term economic sustainability of a chosen technology is key to achieving lasting impact (WRC, 2018).

The need to treat increasingly complex and polluted water sources is also stimulating demand for advanced purification technologies. This includes systems such as Membrane Bioreactors (MBR) for efficient wastewater treatment, reverse osmosis for desalination and industrial effluent treatment, and Zero Liquid Discharge (ZLD) systems that recover nearly all water from a waste stream, leaving only solid residue (NuWater, 2025). These technologies

are essential for addressing challenges such as Acid Mine Drainage and for supplying ultra-pure water required by industries like power generation. South African research institutions such as the Council for Scientific and Industrial Research (CSIR) are developing and testing this fit for purpose technologies, creating opportunities for collaboration in commercialisation and scaling these innovations into local industries and global markets. (CSIR, n.d.). The next generation of this field is being shaped by emerging technologies such as nanotechnology for highly selective molecular filtration and artificial intelligence for real time monitoring and predictive maintenance of filtration systems (NuWater, 2025).

Alongside advanced technologies, there is growing recognition of the importance of nature-based solutions. Investing in ecological infrastructure, such as restoring wetlands and clearing invasive alien plants from key water catchments, is proving to be a highly cost-effective way to enhance water security (WRI, 2025). These initiatives not only increase the volume and quality of available water but also create important employment opportunities in rural areas. Studies show that actively clearing invasive plants could reduce future investment needs by 9% by 2050, representing a total potential cost saving of 22% compared to inaction (WRI, 2025). This approach, which works with nature rather than against it, is becoming an integral part of a holistic water resilience strategy.

These pathways to resilience illustrate how the response to South Africa's water challenges is increasingly being driven by innovation. The shift towards a more circular, efficient, and technologically advanced water sector is no longer a distant vision but an active and investable progression. The final article in this series will focus on how these opportunities are being structured to attract private and international capital, with particular attention to the collaborative platforms being developed to connect UK expertise with South African priorities.

For businesses, innovators, and researchers interested in contributing to these efforts, the scope for collaboration is substantial. To connect with partners and explore joint initiatives, we invite you to join the UK South Africa Water Security and Waste Circularity Global Innovation Network.

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Unlocking the flow: Structuring UK-South Africa partnerships for investment and impact

The scale of South Africa's water sector challenges is matched only by the scale of investment required to address them. The National Planning Commission estimates that an additional R75 billion to R91 billion is needed annually to achieve a sustainable water future

(National Planning Commission, 2025). This figure exceeds the capacity of the public fiscus alone, highlighting the need for greater private sector participation and international collaboration. This is not only about mobilising capital but also about drawing on the efficiency, innovation, and specialised expertise that private partners can contribute. By engaging private financing and knowledge, municipalities can access the resources necessary to build and maintain essential infrastructure, supporting the constitutional mandate to ensure all South Africans have access to sufficient water (Sabinet, 2024). In response, South Africa is developing new institutional and financial models intended to reduce project risk and encourage investment. For UK businesses and investors, several bilateral programmes are creating structured pathways to engage with these opportunities.

A key constraint to private investment has traditionally been the financial and institutional instability at the municipal level, which can create uncertainty for potential partners (Sabinet, 2024). To address this, the Department of Water and Sanitation (DWS), in collaboration with the South African Local Government Association (SALGA) and the DBSA, has established a Water Partnerships Office (WPO) (DWS, 2024). This dedicated unit is responsible for developing standardised public private partnership (PPP) models and supporting municipalities in preparing bankable projects. The WPO's role is to make it easier and more cost effective for the private sector to participate, reducing the administrative and financial complexity that has often delayed such partnerships in the past. This represents an important step in building a consistent pipeline of viable projects for private investment.

This approach builds on decades of experience with PPPs in the South African water sector. Long term concessions in areas such as Dolphin Coast in KwaZulu Natal and Nelspruit in Mpumalanga have provided valuable lessons. In Nelspruit, a 30-year concession with a private operator resulted in a notable reduction in non-revenue water, even as the number of customers supplied increased by over 30 percent (Wikipedia, 2025). Similarly, the Dolphin Coast concession, following an initial renegotiation, led to a 68 percent increase in revenues through improved billing and collection (Wikipedia, 2025). These examples illustrate the potential for well-designed partnerships to enhance operational performance and service delivery. However, not all experiences have been positive; a management contract in Johannesburg with Suez was not renewed after its completion in 2006 due to a combination of limited authority under the contract model, misaligned incentives, labour and public concerns, and a policy decision by the City to strengthen in house capacity. This highlighted the importance of contract design and alignment of interests. The WPO aims to draw from these experiences to create standardised models that balance public benefit with a clear and attractive framework for private participation.

This gradual move towards structured partnerships is helping to create a more stable and inviting environment for international expertise and finance. For UK based entities, a set of targeted programmes offers entry points into the South African water sector, reflecting a collaborative approach based on mutual learning and co creation (GOV.UK, 2025).

One of the main platforms, delivered by Innovate UK Global Alliance Africa, is the UK South Africa Water Security and Waste Circularity Global Innovation Network. This network acts as a connector, bringing together innovators, businesses, and researchers from both countries to promote collaboration, share knowledge, and explore joint solutions to shared challenges (Innovate UK, n.d.). This initiative goes beyond discussion and includes direct financial support.

The UK SA Water Innovation Lead Customer Programme, for instance, provides grant funding for collaborative innovation projects. It offers a combined pool of up to £500,000 and ZAR 5 million, with the ZAR 5 million contributed by the Technology Innovation Agency (TIA), for joint UK and South African business partnerships that are developing and demonstrating new technologies in areas such as wastewater management and digital water solutions (Innovate UK, n.d.). This serves as a useful mechanism to reduce financial risk for small and medium enterprises seeking to test and expand their innovations in a new market.

Further assistance is available through the UK Government's Climate Finance Accelerator (CFA) programme. The CFA offers technical support to help promising South African green projects, including those in the water and sanitation sector, become investment ready and links them with potential financiers (GOV.UK, 2024). This contributes to a growing portfolio of vetted, bankable projects for UK investors seeking impactful green investments, with past participants including companies focused on innovative sanitation technologies.

Most recently, a new Government to Government (G2G) Infrastructure Partnership was launched to deploy British expertise in engineering, project management, and professional services to help unlock delayed infrastructure projects in South Africa (CLGF, 2025). This high-level partnership aims to establish a direct pipeline of work for UK firms, drawing on their experience to support project implementation and improve the management of public assets. This provides opportunities for UK consultants, contractors, and technology providers to contribute their expertise to one of South Africa's most important sectors.

Together, these initiatives demonstrate a strong and coordinated interest in international collaboration. They provide practical mechanisms for UK businesses with expertise in water technology, project finance, and engineering to engage with one of South Africa's most important and opportunity rich sectors. These partnerships are aligned with the strategic priorities of South Africa's National Water Resource Strategy (NWRS 3), which calls for sound governance, improved management, and a diversified water mix to support a sustainable balance. By connecting public and private partners from both countries, these initiatives present a valuable opportunity to help build a more sustainable and water secure future for South Africa.

For businesses, innovators, and researchers seeking to engage in this effort, the opportunity for collaboration remains strong. To connect with partners and explore joint initiatives, we invite you to join the UK South Africa Water Security and Waste Circularity Global Innovation Network.

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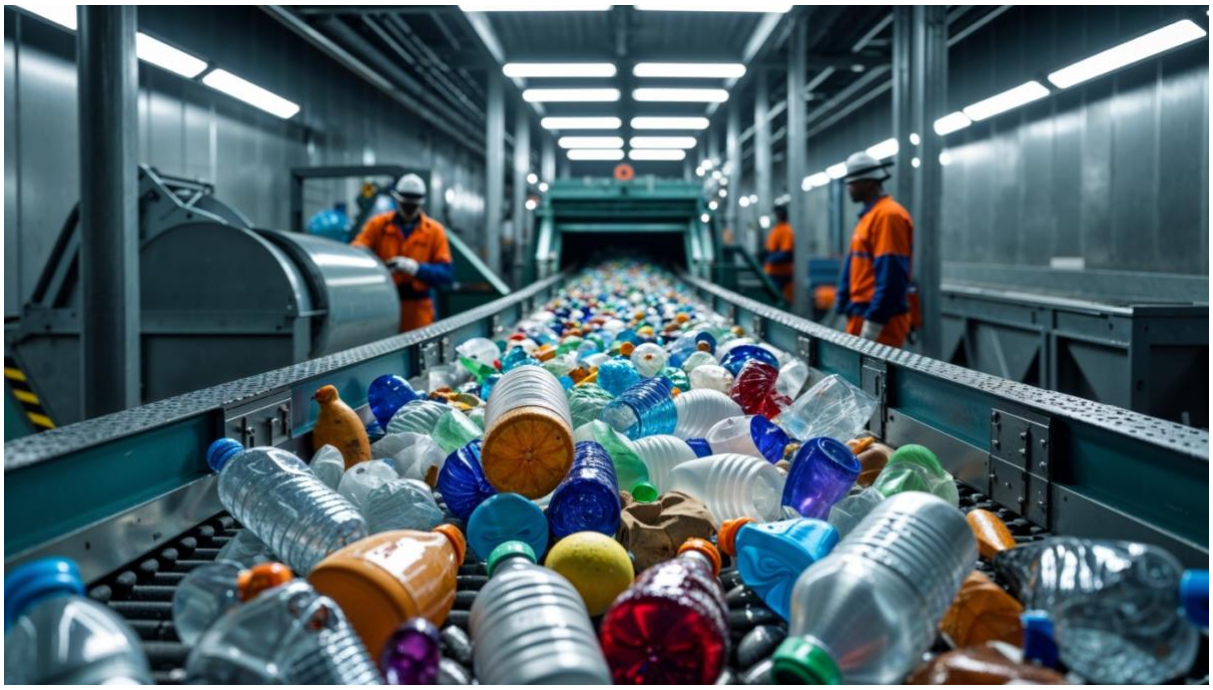
UK and South Africa collaborative waste insights



From waste to wealth: Building South Africa's circular economy

Landfill constraints are forcing a system change in South Africa’s waste sector. That pressure can be a positive force if we translate it into stable feedstock, safe jobs, and bankable assets. Across this series, we explored the context, the human infrastructure of informal reclaimers, the investable hotspots, and the partnership models that can bring it all together.

Three lessons are consistent. First, inclusion is strategy. Recognising reclaimers as partners stabilises supply and improves safety, which is essential for advanced facilities and long-term investment. Second, pricing signals matter. When disposal reflects true costs, composting, digestion, plastics recovery, and waste to energy can compete on merit. Third, preparation wins. Regional systems, standard contracts, and reliable data reduce risk and shorten timelines.

UK partners can add real value in process design, facility operations, producer responsibility systems, and project finance. South African players bring market knowledge, entrepreneurial energy, and the ability to deliver in complex settings. Together, we can build a circular economy that works for people and balance sheets.

Our aim is to invite practical collaboration. If you are developing sorting, organics, e-waste, construction materials, or waste to energy projects, there is room to pool capability and move faster.

Focus areas for joint action

- Integrate reclaimers and stabilise feedstock
- Scale organics diversion and biogas
- Improve design standards under producer responsibility
- Build regional waste parks with bankable pipelines
- Structure PPPs with transparent, performance-based contracts

The tipping point for landfills: South Africa's shift to a circular economy

South Africa is at an important juncture in how it manages waste. For decades, the dominant approach has followed a largely linear model: take, make, and dispose. However, this system is reaching its practical and environmental limits. The country produces an immense volume of waste each year, estimated between 54 million and 122 million tonnes, and existing infrastructure is under growing pressure (Interwaste, 2024; AWARD, 2019). A

substantial share of this waste still ends up in landfills and dumpsites, some estimates suggest up to 90%, resulting in an ongoing shortage of disposal space and prompting a broader reassessment of waste as a potential resource (DFFE, n.d.; WasteAid, n.d.). This shift is motivated not only by environmental concerns but also by economic opportunity, as materials currently sent to landfill could add measurable value to the economy if recovered and processed (DFFE, n.d.). The issue extends beyond general waste: about 94% of the 48 million tonnes of hazardous waste generated in 2017 was also landfilled, adding to environmental risks (AWARD, 2019).

The most pressing concern is the limited remaining landfill capacity. A 2024 report on solid waste management found that over 80% of municipal landfill sites do not meet minimum operational standards, and many are nearing capacity (GlobeNewswire, 2024). This aligns with government findings that 60% of landfill sites were noncompliant in the 2023/2024 financial year (DFA, 2025). The implications are particularly significant for major urban areas. In Johannesburg, the country's economic centre, all four landfill sites are projected to reach full capacity by the end of 2026 (GroundUp, 2025). Observers have cautioned that this situation could disrupt waste collection services and increase risks to public health and water quality if unaddressed (GroundUp, 2025). The challenge is further complicated by limited forward planning: no new landfill sites have been licensed by metropolitan municipalities in Gauteng for more than two decades, leading to growing strain on existing facilities (AWARD, 2019). These dynamics highlight the limitations of a disposal dependent model.

This dependence is linked to historically low levels of waste diversion and recycling, representing a considerable missed opportunity to recover the economic and environmental value embedded in various waste streams. Some of these streams are particularly challenging but also present substantial potential for recovery and reuse.

Plastic waste remains a major area of concern, with South Africa identified as a notable contributor to marine plastic pollution (EWASA, 2022). The problem is systemic, often linked to packaging that is difficult to recycle and labelling that can confuse consumers (WWF, n.d.). The issue is also influenced by international trade flows, with parts of Africa receiving plastic waste from the Global North, sometimes in the form of "recycled" textiles (MDPI, 2024). In response, the Global Environment Facility (GEF), in partnership with UNIDO and WWF, has launched a five-year initiative to redesign the plastic packaging value chain, focusing on upstream changes in product design and manufacturing (EWASA, 2022). The initiative promotes eco-friendly alternatives to single use plastics, the phasing out of hazardous chemical additives, and the adoption of reusable packaging systems. According to CSIR analysis, such systemic change could reduce plastic pollution by 63%, lower related greenhouse gas emissions by 37%, and increase employment by 3% by 2040 (EWASA, 2022).

Electronic waste (e waste) is the fastest growing waste stream in South Africa, expanding at roughly three times the rate of other municipal solid waste (WEEE are SA, n.d.). The country generates about 360 000 tonnes of e-waste annually, yet only 7 to 12% is formally recycled (WEEE are SA, n.d.; WEEE Forum, n.d.). Despite a national ban on landfilling e-waste, most is still disposed of informally, posing environmental and health risks. e-waste contains hazardous substances including lead, mercury, arsenic, cadmium, and brominated flame retardants that can contaminate soil, groundwater, and air through unsafe disposal practices (WEEE are SA, n.d.; MDPI, 2023). The World Health Organization has raised concerns about exposure among vulnerable groups, estimating that 12.9 million women working in the informal waste sector face occupational risks affecting maternal and child health, while around 18 million children and adolescents may experience developmental or respiratory effects from direct or indirect exposure (WEEE are SA, n.d.).

Organic waste also makes up a large share of municipal waste, around 35% (RVO, 2023). When landfilled, this waste decomposes anaerobically, releasing methane, a potent greenhouse gas, and producing leachate that can pollute groundwater and soil (DFFE, n.d.). As a result, diverting organic waste from landfill has become a government priority. Provinces such as the Western Cape are leading with phased restrictions, aiming for a complete ban on the disposal of organic waste to landfill by 2027 (Interwaste, 2024).

Together, these challenges—limited landfill capacity, valuable materials being lost, and mounting environmental and health pressures—are creating momentum for change. As landfilling becomes increasingly constrained and costly, the economic rationale for investment in alternative waste treatment, recycling, and resource recovery technologies is becoming stronger. These trends are gradually creating the conditions for a transition toward a more circular economy. The next article in this series will examine the structural and systemic barriers to that transition, with particular attention to the complex and essential role of the informal sector in South Africa's recycling landscape.

For businesses, innovators, and researchers seeking to engage in this space, there is significant scope for collaboration. To explore partnerships and joint initiatives, consider connecting with the UK South Africa Water Security and Waste Circularity Global Innovation Network.

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Beyond the pavement: The informal reclaimers at the heart of the recycling economy

While the diminishing capacity of landfills provides commercial motivation for South Africa's transition toward a circular economy, progress is shaped by deep seated systemic and structural factors. As in the water sector, the frontline of waste management lies at the municipal level, where many of the most significant challenges emerge. These include gaps in service delivery and an infrastructure deficit, but the most defining characteristic of South Africa's waste landscape is its strong dependence on a large and vital informal sector.

A significant portion of the population, estimated at more than 5 million households, does not have access to a regular formal waste collection service (WasteAid, n.d.). This service gap, which results in approximately 3.67 million tonnes of waste remaining uncollected each year, is most pronounced in rural areas and informal settlements (UNEP, 2021). It often leads to practices such as illegal dumping and open burning of waste, which have serious public health and environmental implications (UNEP, 2021; NWU, n.d.). People living near unregulated dumpsites face higher risks of respiratory illnesses and skin infections, while leachate from these sites can pollute groundwater and enter the food chain (NWU, n.d.). Even where collection services are provided, the system remains largely focused on disposal rather than recovery. There is a notable lack of essential waste diversion infrastructure, including materials recovery facilities for sorting recyclables and accessible buy back centres for the public (GlobeNewswire, 2024). The absence of widespread systems for separating waste at source remains a primary barrier to increasing recycling rates and adopting circular practices. These municipal level challenges stem from a complex mix of issues, including

limited budgets, a shortage of technical expertise, inconsistent enforcement of by-laws, and the generally low prioritisation of waste management in funding decisions (GlobeNewswire, 2024; Journals, 2021).

Filling this structural gap is a dynamic informal economy. An estimated 60 000 to 90 000 waste reclaimers form the foundation of South Africa's recycling industry (RVO, 2023). These individuals perform an important economic and environmental service, diverting a large share of recyclable materials from landfills at no cost to the state. Their collective work is estimated to save municipalities around R750 million per year in landfill space and related costs (GroundUp, 2025). They effectively provide the base layer of the recycling value chain, supplying essential raw materials to formal industry (Engineering News, 2025). Their contribution is fundamental; without their efforts, the flow of recyclable materials to formal processors would decline sharply, weakening the overall circular economy system.

However, this dependence on the informal sector also presents a major structural challenge. Reclaimers often work in unsafe and precarious conditions and are not formally integrated into municipal waste management systems (GlobeNewswire, 2024). They are particularly exposed to market fluctuations in the prices of recyclable materials, which directly affect their income and, in turn, the stability of supply to the formal recycling industry (WWF, n.d.). This variability in material supply creates uncertainty that can limit the large-scale private investment required for advanced recycling and beneficiation facilities, which depend on consistent and high-volume inputs. The working environment itself also presents significant health and safety risks, especially for those operating on or near unmanaged landfill sites where exposure to hazardous materials and unsanitary conditions is common (GlobeNewswire, 2024; SAWIS, n.d.).

For these reasons, the formalisation, support, and integration of the informal sector is not only a social consideration but also an economic priority for enabling the full potential of the circular economy. The expected closure of many landfills, which currently serve as the primary source of materials for reclaimers, makes this integration increasingly urgent (GroundUp, 2025). Recognising and strengthening this sector is an important step toward building a more reliable and efficient recycling supply chain. There is growing acknowledgement of this need, reflected in emerging initiatives focused on improving conditions for informal waste reclaimers and strengthening their role in the value chain (GlobeNewswire, 2024). Programmes that provide training, financial literacy, and small business support can help reclaimers increase their income and operate more safely and productively (WasteAid, n.d.). A successful example is WasteAid’s e-waste Repair and Reuse Programme in Diepsloot, which offered training in appliance repair, business management, and tool use, helping small enterprises improve their services and intercept e-waste before it reaches landfills (WasteAid, 2023). Such initiatives help bridge the divide between the informal and formal economies, fostering a more inclusive and resilient system.

The combination of these factors — gaps in municipal service delivery, insufficient infrastructure, and reliance on a vulnerable informal workforce — presents a complex but clear picture. Building a resilient circular economy will require a holistic approach that invests not only in physical infrastructure but also in the human capacity that underpins the recycling ecosystem. This involves developing policies that recognise the value of reclaimers, supporting their skills and wellbeing, and creating systems that enable, rather than constrain, their vital work. By doing so, South Africa can move toward a more equitable and effective waste management system that benefits all participants, from individual reclaimers to large industrial recyclers.

The next article in this series will examine the investment opportunities emerging from this evolving landscape, including areas such as waste to energy and high value e-waste recovery.

For businesses, innovators, and researchers interested in contributing to these solutions, there are clear opportunities for collaboration. To explore partnerships and joint initiatives, you are invited to engage with the UK South Africa Water Security and Waste Circularity Global Innovation Network.

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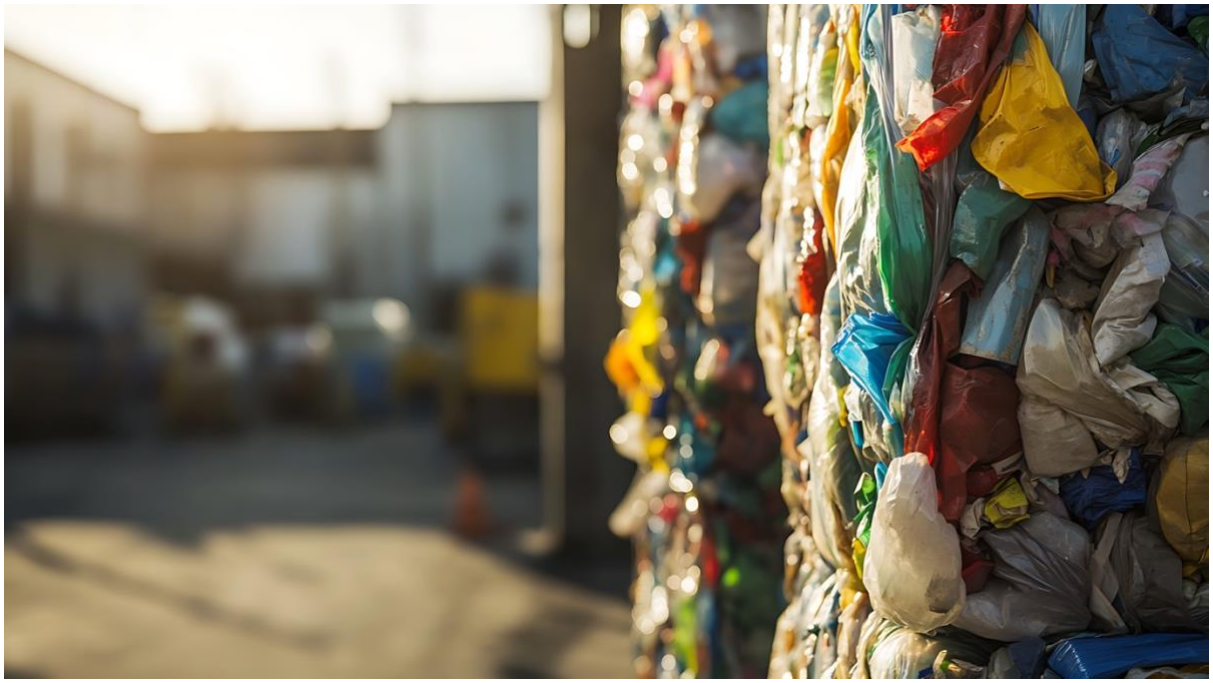

The circular opportunity: Unlocking value and investment in South Africa's secondary resources

South Africa’s transition toward a circular economy is moving from policy ambition to practical implementation. Driven by the need to reduce pressure on overburdened landfills, the country's National Waste Management Strategy emphasises the development of a “secondary resources economy” focused on deriving value from waste (WasteAid, n.d.). This policy direction, together with a waste management market expected to reach 28.3 billion US dollars by 2033, reflects a growing and dynamic space for investment (Grand View

Research, 2024). The main opportunity lies in transforming materials once viewed as waste into higher value products, with several key sub sectors offering promising potential.

Waste to Energy (WtE) is emerging as a particularly appealing area, offering solutions that address both South Africa's waste management challenges and its well documented energy shortfall (Interwaste, 2024). The opportunities are diverse, ranging from landfill gas to energy projects, such as the one implemented by the City of Johannesburg, to more capital-intensive thermal treatment plants that use technologies including incineration and gasification (Interwaste, 2024; GreenCape, 2021). Traditional incineration provides an effective approach for reducing waste volume and generating energy, while newer thermal technologies such as gasification and pyrolysis are gaining attention. These methods convert waste into syngas or bio-oils that can be used for electricity generation or as feedstocks for the chemical industry, enabling higher levels of resource recovery. Another promising growth area is the production of Refuse Derived Fuel (RDF), which involves converting non-recyclable, high-energy waste into a fuel that can replace coal in industries such as cement manufacturing (Subnational Climate Fund, n.d.). These developments create opportunities for technology providers, engineering firms, and infrastructure investors. However, growth in the sector depends on a more supportive policy framework. At present, low landfill gate fees make disposal the most cost-effective option for many municipalities. A shift toward full cost accounting, where disposal fees reflect the true environmental and social costs of landfilling, would help make WtE projects more competitive and encourage private sector investment (SANEDI, 2024). In addition, the absence of a clear national WtE policy defining plant size, minimum waste volumes, and licensing conditions continues to create uncertainty for developers considering large scale projects (SANEDI, 2024).

The diversion of organic waste from landfills is opening another important market. Provincial governments such as the Western Cape are introducing landfill bans for organic materials, creating growing demand for solutions such as large-scale composting and anaerobic digestion (GreenCape, 2021). Anaerobic digestion transforms organic waste into biogas for energy and nutrient rich digestate that can be used as fertiliser. This process aligns with the country's needs for alternative energy sources and more sustainable agricultural inputs. The digestate provides a valuable bio fertiliser that supports soil health and regenerative farming practices. South Africa also has existing expertise in related technologies, including the use of Black Soldier Fly (BSF) larvae for organic waste processing, which can be scaled commercially (RVO, 2023). BSF technology is particularly promising as it rapidly converts organic waste into high protein animal feed and nutrient rich compost, creating multiple sources of value from a single input. This represents a strong area for investment in a proven local technology with international relevance.

Plastics recycling, although a relatively established sector, still offers considerable room for growth. This is being driven by the introduction of mandatory Extended Producer Responsibility (EPR) regulations, which require producers to take financial and operational

responsibility for managing their products at the end of their life cycle (Cape Chamber of Commerce and Industry, 2025). Organisations such as PETCO have already achieved strong results, with a 76% collection rate for PET bottles and jars in 2024 (Cape Chamber of Commerce and Industry, 2025). Nonetheless, challenges remain. One major issue is the presence of free riders, producers who do not belong to a Producer Responsibility Organisation (PRO) or implement their own collection systems, thereby avoiding their share of recycling costs (Cape Chamber of Commerce and Industry, 2025). Another obstacle is product design that is incompatible with domestic recycling infrastructure, which can contaminate recycling streams and reduce processor efficiency. EPR systems aim to internalise these end-of-life costs, ideally making recycled content more price competitive with virgin materials, although achieving this balance in practice remains difficult. Stronger enforcement and standardised design requirements across the industry could help address these challenges and open new avenues for investment.

High value but underutilised waste streams, such as electronic waste and construction and demolition waste, also present major opportunities. In the case of electronic waste, prospects extend beyond conventional recycling to include refurbishment, repair, component recovery, and advanced extraction of precious metals. For everyone million mobile phones recycled, significant quantities of copper, silver, gold, and palladium can be recovered, turning what would otherwise be a hazardous waste stream into an economic resource (RVO, 2023). The repair and refurbishment segment is particularly promising because it is more labour intensive than basic recycling, aligning well with South Africa's employment and social development objectives. Construction and demolition waste, which is still mostly sent to landfill, can be processed into aggregates for construction and other building materials. Innovative products such as green blocks, made from a mixture of crushed concrete and waste plastic, provide circular solutions that address two major waste streams at once (RVO, 2023).

These emerging investment areas demonstrate that the shift toward a circular economy is both an environmental necessity and a significant economic opportunity. The challenges within the current waste management system are creating demand for innovative and sustainable business models. The final article in this series will explore how these opportunities are being structured to attract private and international investment, with particular attention to the collaborative platforms available to UK partners.

For businesses, innovators, and researchers interested in contributing to this transition, there are clear opportunities for collaboration. To connect with partners and explore joint initiatives, you are invited to engage with the UK South Africa Water Security and Waste Circularity Global Innovation Network.

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Forging green partnerships: How UK expertise can accelerate South Africa's circular transition

The transformation of South Africa's waste sector into a circular economy requires more than innovative technology; it calls for new approaches to investment and collaboration.

The need is not only financial but also operational. At the national level, between 25 and 30% of households still do not receive regular waste collection services, rising to over 60% in certain rural provinces (PMG, 2022; PMG, 2021). This service gap, combined with the fact that 87% of municipalities lack the infrastructure and capacity for effective waste management (WWF, n.d.), results in widespread illegal dumping and environmental degradation. The government itself faces challenges in maintaining compliance, with 52 criminal cases reportedly opened against municipalities for noncompliant landfill sites (DFA, 2025). These operational realities are creating opportunities for private sector participation that extend beyond conventional service contracts toward more collaborative partnerships. For UK investors and businesses, this evolving landscape—supported by several targeted bilateral initiatives—offers structured pathways to apply their expertise and capital.

The scale of investment required to develop new waste infrastructure, from advanced materials recovery facilities to waste to energy plants, often exceeds the financial capacity of individual municipalities. This has opened space for private companies to work alongside government in designing, financing, and operating essential facilities (GlobeNewswire, 2024). Pikitup, Johannesburg's waste utility, recognised this in its 2023/24 annual report, noting that "Mitigating the risk of depleting landfill airspace requires significant investments beyond the government's financial capabilities," and that "Formulation of public private partnerships is vital" (GroundUp, 2025). One emerging approach to address the financial and operational limits of individual municipalities is the development of regional waste systems. The Department of Forestry, Fisheries and the Environment (DFFE) is exploring "waste parks" designed to serve multiple municipalities, enabling them to pool funds and establish centralised facilities for sorting, recycling, and beneficiation (PMG, 2022; PMG, 2021). This regional model provides a clear and scalable opportunity for large scale partnerships between the public and private sectors.

The introduction of Extended Producer Responsibility (EPR) regulations has also created a new and expanding market for specialised waste management services. Private companies and Producer Responsibility Organisations (PROs) are increasingly needed to manage the complex logistics of collection and recycling on behalf of producers, an area where UK firms with experience in Europe's mature EPR systems can offer valuable expertise. This is particularly relevant for managing complex or hazardous waste streams. With an estimated 94% of the country's 48 million tonnes of hazardous waste still directed to landfills, there is a growing demand for specialised private sector knowledge that EPR schemes can help coordinate and finance (AWARD, 2019).

To support this growing engagement, several dedicated UK and South Africa platforms have been created to connect expertise with opportunity. One of the central mechanisms, delivered by Innovate UK Global Alliance Africa, is the UK South Africa Water Security and Waste Circularity Global Innovation Network. This initiative connects innovators, businesses, and researchers from both countries to develop joint solutions and share knowledge in the

waste sector. Such research and development are essential to meet the government's ambitious waste minimisation targets, which aim to divert 45% of waste from landfills within five years and at least 70% within fifteen years (DFA, 2025). The network plays a crucial role in supporting collaborative innovation tailored to South Africa's specific conditions, with a particular emphasis on enabling women entrepreneurs and leaders to access finance, mentorship, and new sector opportunities (Innovate UK, n.d.).

The UK's Climate Finance Accelerator (CFA) programme has also established a solid record of supporting South African waste management projects. By providing technical assistance to help promising local enterprises become investment ready, the CFA contributes to building a pipeline of lower risk opportunities for investors. Examples include support for EWaste Africa, which is expanding its electronic waste management operations, and react, which is developing decentralised recycling facilities in low-income areas. These cases highlight how the programme helps bridge the gap between local innovation and international finance (GOV.UK, 2024).

At a strategic level, the new Government to Government Infrastructure Partnership provides a high-level framework for deploying UK expertise in engineering, project management, and finance (CLGF, 2025). The partnership is intended to accelerate the development of large scale, complex waste infrastructure projects that are essential to South Africa's transition away from landfill dependency. It offers a structured avenue for UK engineering and consulting firms to contribute to major initiatives that support the country's green economy objectives. South Africa's Minister of Public Works and Infrastructure, Dean Macpherson, described the aim of this partnership as turning "South Africa into a construction site which will help grow our economy and create jobs," by channelling technical expertise into projects that have previously struggled to advance (CLGF, 2025).

These programmes, grounded in mutual partnership, provide clear and structured entry points for UK organisations. They reflect an understanding that addressing complex challenges such as waste management requires a combination of local insight, international technology, and innovative financial models. This collaborative approach is supported by a strong and expanding trade relationship; total trade in goods and services between the UK and South Africa reached £11.7 billion in the four quarters ending in the first quarter of 2025, an increase of nearly 10% compared with the previous year (GOV.UK, 2025). For UK investors and businesses, the opportunity is not only to participate in a growing market but to become long term partners in building a more sustainable and resilient secondary resources economy in South Africa. The timing is favourable, the need is evident, and the mechanisms for collaboration are well established.

For businesses, innovators, and researchers interested in contributing to these efforts, there are clear opportunities for collaboration. To connect with partners and explore joint

initiatives, you are invited to engage with the UK South Africa Water Security and Waste Circularity Global Innovation Network.

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