

Overview of RT Technologies in South Africa and their relevance in emergency response

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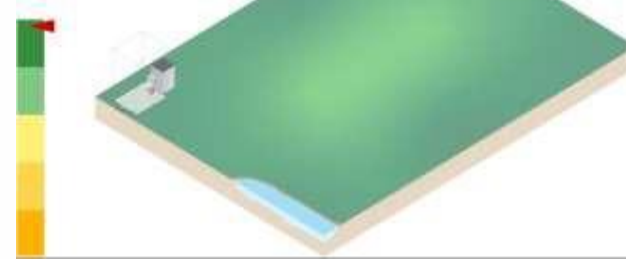
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SASTEP Introduction

- SASTEP is an innovative initiative by the Water Research Commission (WRC) aimed at bridging the gap between R&D and commercialization.
- SASTEP focuses on innovative sanitation by matching commercial entities with late-stage technologies, funding field demonstrations, assisting in localization, commercialization, and industrialization pathways.
- Programme is funded by DSI and BMGF
- Water Efficient Sanitation Systems (RT Technologies)
 - **Appliance design** for households
 - **Modular** systems for household, communal and commercial spaces
 - **Convenience of a flush**
 - **Resource efficient toilets** and toilet systems
 - **Systems designed for circularity** (Full recycle systems (water), and Sludge valorization systems)
 - **Cost** (Understand cradle to grave cost - Lifecycle cost)

Off-Grid Sanitation

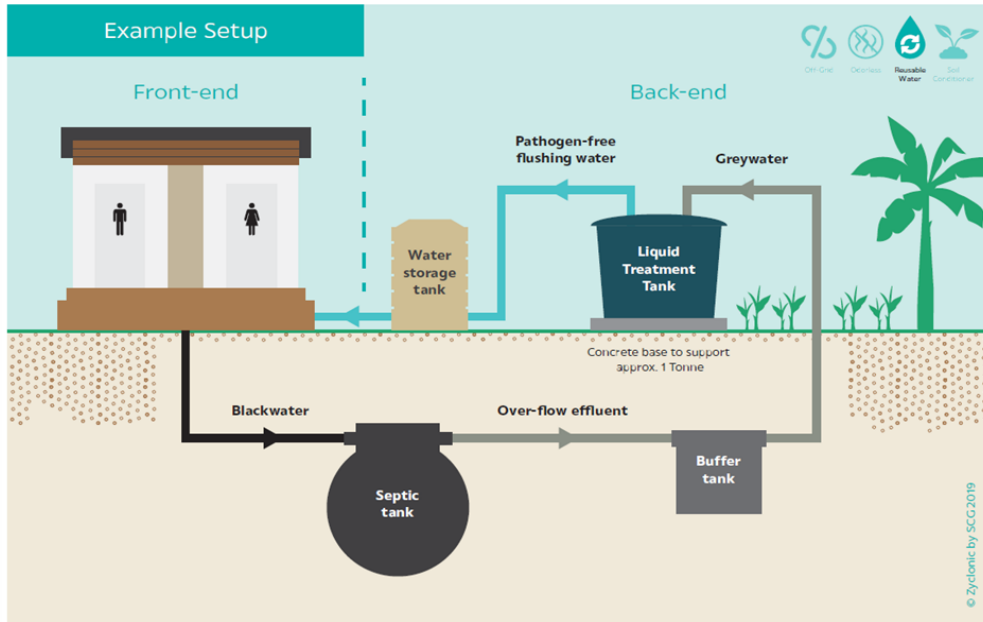


Gold Standard:
Piped Sewer System

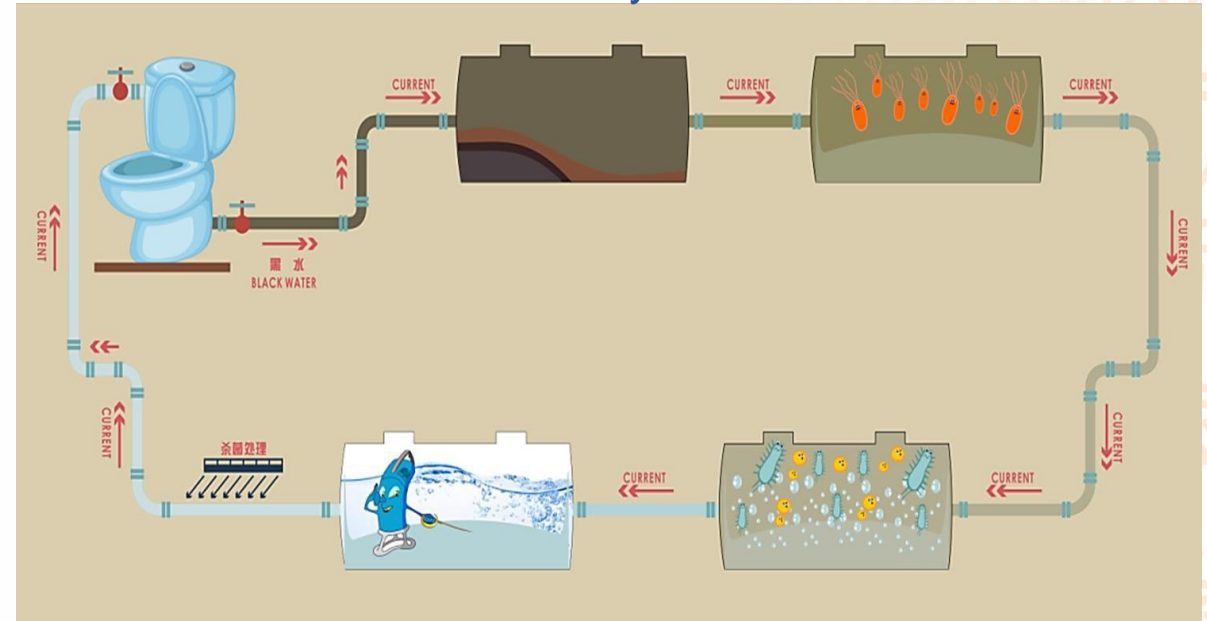


Reinvented Toilets (RTs) – Overview

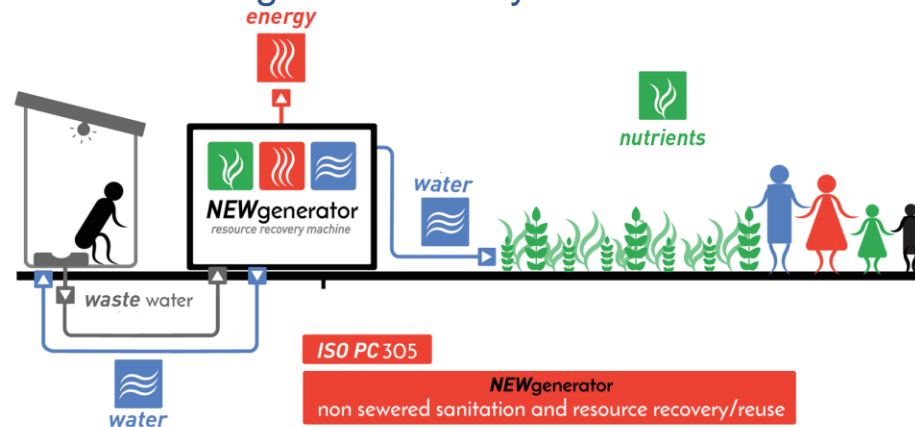
Aquonic recycle toilet



Clear water recycle toilet



NEWgenerator recycle toilet



Designed towards a standards-based approach for quality of product and trust in performance

ISO/SANS 30500

- Recycles water (closed loop systems)
- Provides waterborne sanitation solution
- Can be set up off-grid (No connection to water, sewer and electricity)

Sanitation related challenges in Informal Settlements

Flooding - Unsafe access and contaminated water, washout of sanitation systems

Drought - Limited availability of safe, accessible toilets

Storm surges - Infrastructure at risk of damage; sanitation services disrupted.



Perfect Storm: Durban floods, climate change and coastal resilience



Climate resilience and emergency response sanitation in informal settlements - City of Cape Town and eThekweni

Why COCT & eThekweni?

- **Strategic Relevance** - Both municipalities are hubs of economic activity with extensive informal settlements
- **Challenges** - Frequent floods, drought conditions, and storm surges make these areas prone to sanitation challenges and heightened disease risk

Objective - Evaluate RTTs' adaptability and benefits under extreme conditions, such as:

- Flooding resilience and access challenges
- Drought-impacted water availability
- Impact of storm surges and extreme weather events



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City Prepares to Pilot Innovative Off-Grid And Minimal Water Sanitation Technologies



City set to pilot innovative sanitation solutions in informal settlements

13 September 2023

Phased Emergency Response Approach for Sanitation Solutions

Phase 1 - Immediate Response (0–3Months)

- **Options** - Chemical toilets, container-based toilets
- **Pros** - Rapid deployment, low initial cost.
- **Cons** - Limited capacity, environmental impact if not managed properly. Expensive if used as long term solution



Phased Emergency Response Approach for Sanitation Solutions

Phase 2 - Interim Recovery (3 Months – 5 Years)

- **Options** - Reinvented Toilets (RTTs), modular plug and play systems.
- **Pros** - Medium-term solution, sustainable technology (solar-powered, water-recycling).
- **Cons** - Higher setup cost, requires regular maintenance.



Phased Emergency Response Approach for Sanitation Solutions

Phase 3 - Long-Term Recovery (5+ Years)

Option 1 for the future – Centralised sewer for high density areas

Option 2 for the future – Combination of CRTs and HRTs which is more water efficient, manages human waste safely, adaptable, modular with a new service model which brings more small businesses into standardized O&M services using centralised aggregated service model.



RT Technologies as Interim Solutions in Emergency Response

Why RTs Are Effective - Plug-and-play design, eco-friendly and reliable for medium-term use in various environmental conditions

Key Advantages Over Immediate Response Solutions:

- **Sustainable Waste Management**- Reduces environmental impact.
- **Enhanced Public Health** - Reliable sanitation access limits disease risks



Preliminary climate resilience rating of RTTs

- RT technologies achieved at least **68%**(16/25) climate-resilient design features based on UTS’s climate resilience framework.
- Each RT demonstrated resilience across **all** six design categories, resulting in a high overall resilience rating.
- All systems scored 33% in the "**containing failures**" category, indicating a key area for future optimization by designers and implementers.

Category	Resilience design feature	Clear	NEWgen	Aqounic
A. Avoiding exposure to hazards	1. Raising	Y	Y	Y
	2. Burying	Y	Y	Y
	3. Portability	N	N	N
	4. No/low inputs	Y	Y	Y
B. Withstanding exposure to hazards	5. Armouring and strengthening	Y	Y	Y
	6. Oversizing	Y	Y	Y
	7. Shapes that distribute pressure			
	8. Circumvention	N	N	N
	9. Sealing and Barriers	Y	Y	Y
C. Enabling flexibility	10. Adaptability	Y	Y	Y
	11. Modular design	Y	Y	Y
	12. Platform design	Y	Y	Y
	13. Redundancy and diversity	Y	Y	Y
	14. Signalling	Y	Y	Y
D. Containing failures	15. Frangibility			
	16. Fail-operational			
	17. Decentralisation	Y	Y	Y
E. Limiting consequences of complete failure	18. Safe disposal	Y	Y	Y
	19. Reusable materials	Y	Y	Y
	20. Fail-silence			
	21. Repair speed	Y	Y	Y
	22. Accessibility for rapid flaw detection and repair	Y	Y	Y
F. Providing benefits beyond sanitation technology resilience	23. Reciprocity	Y	Y	Y
	24. Hybridising	N	Y	N
	25. Transformative capacity	N	Y	N
Overall Resilience Rating		High (17/25)	High (19/25)	High (17/25)

Summary and Future Directions

- **Observations** - RTTs offers a viable, adaptive solution for interim recovery in areas vulnerable to climate hazards
- **Next Steps** - Continue pilot project in CoCT and eThekweni to refine RT deployment in emergency contexts
 - Align the pilots to existing National Disaster Management Framework/Policy/Guidelines





Global Recognition

WRC SASTEP won a **bronze** award at the 2024 **IWA** Project Innovation Awards in the Category of Market Changing Technology and Infrastructure at IWA Congress in Toronto

THANK YOU