

THE SHINE MODEL

The sustainable Solid Waste Management Model developed in Rwanda

For public and private experts in
Solid waste management



german
cooperation

DEUTSCHE ZUSAMMENARBEIT

Implemented by

giz Deutsche Gesellschaft
für Internationale
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U RWANDA
RURANAGURA

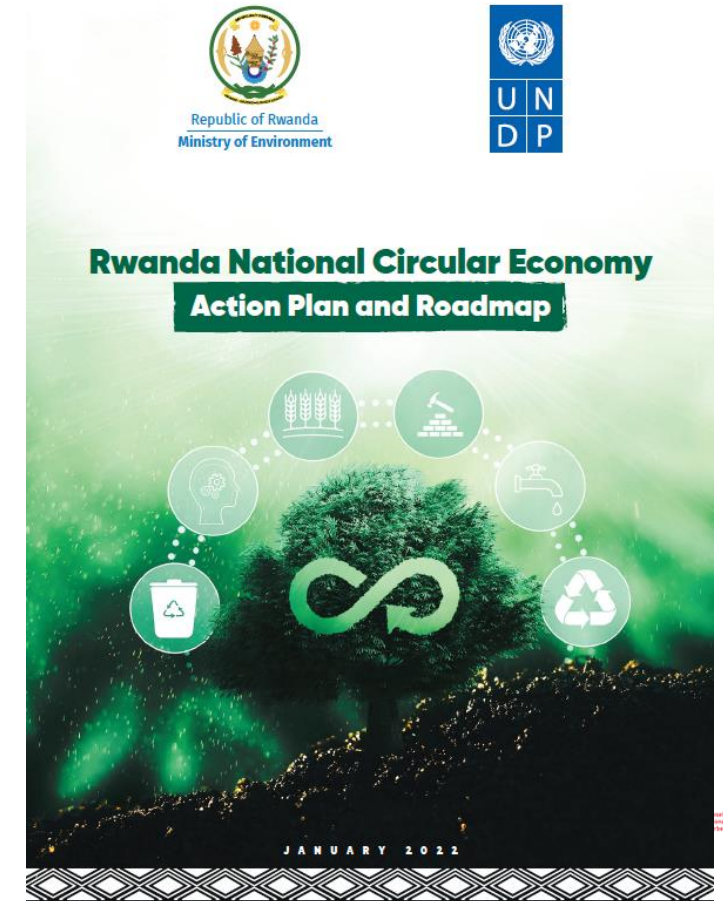
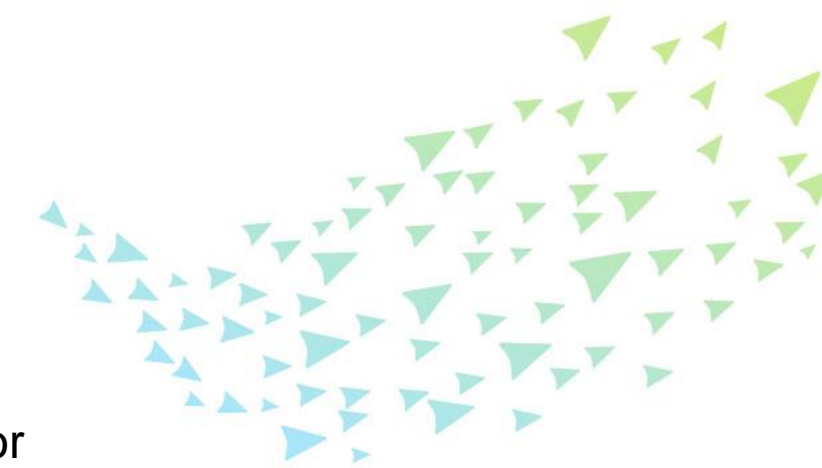
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CONTENT

- Background to the Model
- The components of the Model
- Source Separation
- Communications and Behavior Change
- Quality Composting
- Integrated logistic solutions
- Nature based Bio-Cycles
- Efficiency on Costs

The SHINE Model: Developed in Rwanda

- The SHINE model fully addresses the strategic vision of the waste sector in the National Circular Economy Action Plan and Roadmap.
- It fully aligns with Pillar 1, Pillar 2, and Pillar 4 of the Integrated Solid Waste Management Strategy.



Rwanda's Integrated Solid Waste Management Strategy

- Minimize waste and promote resource recovery through prevention, source separation and targeted management of organic waste.
- Ensure access to waste services by improving collections, logistics and supporting behavior change
- Protect public health and work towards a zero waste, circular economy, through stronger regulations and encouraging private sector innovation and investment.

PILLAR 1 WASTE MINIMIZATION	PILLAR 2 EQUITABLE ACCESS TO SERVICES	PILLAR 3 ENVIRONMENTAL AND PUBLIC HEALTH PROTECTION	PILLAR 4 GROWING THE GREEN ECONOMY
<ul style="list-style-type: none">• Reduce waste generation through prevention and treating waste as a valuable resource• Support behaviour change campaigns and awareness initiatives targeting households, institutions, and businesses• Focus on managing organic waste, the largest waste fraction in Rwanda	<ul style="list-style-type: none">• Expand access to waste collection services, especially in underserved rural areas• Improve logistics and encourage waste separation at the source to enable resource recovery	<ul style="list-style-type: none">• Protect ecosystems and public health by implementing the “polluter pays” principle• Establish a regulatory framework and classification system to manage waste responsibly	<ul style="list-style-type: none">• Leverage the waste sector’s potential to drive green growth, create jobs, and support small businesses• Promote private sector innovation and investment in waste treatment technologies and circular economy practices

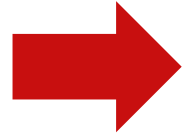
The SHINE Model: Developed for Rwanda

The SHINE Model is a locally developed solution for cost-efficient solid waste management, grounded in life-cycle thinking and full-cost accounting. It was piloted successfully in Rwanda's three satellite cities, with tailored infrastructure and operational approaches.

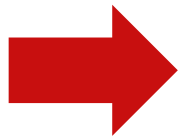
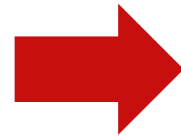
The aim is to scale the model for broader application across the country, led by private sector operators, building on the proven success of the pilot implementations.

- **S**ource Separation at Household
- **H**igh Quality Composting
- **I**ntegrated Logistic
- **N**urturing Bio-cycles
- **E**fficiency on costs





THE PHYSICS: PURE MATERIALS → QUALITY PRODUCTS





THE START: Source Separation at the Households

- Key Approach is the focus on the **separate collection of three household waste streams:**
Organics | **Recyclables** (plastics, paper) | **Residuals**
- This approach is key to implementing the Rwanda Integrated Solid Waste Management Strategy (2022).
- With successful rollout, Rwanda can lead by example, positioning source separation as a flagship model for Africa.

Source Separation – Communicating with Households and Mobilizing Communities

- Sustained household engagement and education is critical for success.
- Use a “carrot and stick” approach: apply differentiated fees for sorters vs. non-sorters.
- Enforce sorting quality through regular monitoring.



Behavior Change Strategy to make Source Separation happen

Ultimate goal:

Citizens manage waste responsibly and sorting and recycling becomes a social norm.

Preconditions:

1. Reliable service provision
2. Easy and inclusive engagement
3. Trust in the system and seeing the benefits for all

HOW TO: Engage – Educate – Motivate – Reinforce

- **Engagement:** Use print, social media, events, branded containers and vehicles, direct one to engagement to effectively reach residents
- **Education:** Provide clear guidance on waste sorting and recycling. Address **common myths**
- **Motivation:** Highlight the environmental, **economic** and social benefits
- **Participation:** Make sorting simple and accessible through clear instructions and tools
- **Reinforcement:** Share success stories, repeat messages and use social norming to build lasting habits

Policy and Administrative Frameworks Enabling Source Separation

- **Political will and local government commitment buy-in** are essential for legitimacy, long term sustainability and community trust.
- **Adequate infrastructure and funding** are needed to support implementation and long-term success of source separation.
- **Clear regulations** create accountability and encourage household compliance with waste separation.





„To separate organic and non-organic wastes requires everyone's participation.“

CYIZA Beatrice

Permanent Secretary, Ministry of Environment

„In line with the Rwanda National Water and Sanitation Policy (2023) we need to collect separated wastes for recycling and treatment.“

„We request the private sector to join efforts with the Government of Rwanda in improving circular waste management.“

MANIRARUTA Gemma

Director General
in Charge of Water and Sanitation, MININFRA

Why Communication Matters



Driving participation through awareness and education

Raising awareness is essential to increase citizen participation in waste separation and collection.

Developing campaigns to target householders, schools and workplaces to support responsible waste management is essential.

Aims

- Encourage proper sorting of waste through the provision of clear instruction and provision of collection containers
- Help citizens understand the value of paying waste collection fees as a meaningful contribution.

Benefits

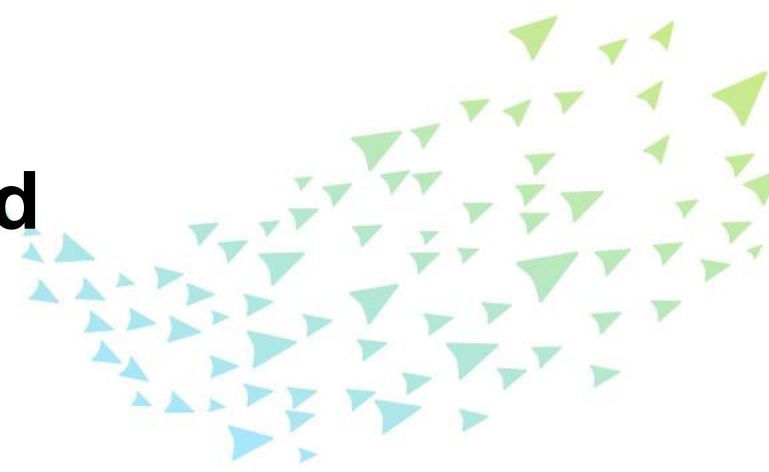
- Reduces litter and improved community cleanliness
- Protecting public health and the environment
- Promotes the circular economy – creates jobs, produces high quality compost for local use and transforms recyclables into new products

High Quality Composting

- Promote **decentralized composting facilities** close to waste generation sources
- Develop sites with basic infrastructure: paved ground, roofing and water supply.
- Ensure quality of source-separated organic waste to produce high-grade compost.



Enabling Quality and cost-effective Composting



- Clean, contamination-free organic waste lowers processing costs, making compost sales a viable way to cover operational expenses.
- Districts or other government institutions should provide land for decentralized composting, rented to operators at a low fee to encourage uptake and sustainability.



Integrated Logistics

Finding the most cost-effective local solutions for separate waste collection:

- Utilize a variety of vehicle types suited to specific waste streams.
- Plan collection routes in detail to achieve the most efficient combination of:
 - Distance between pick-up points
 - Waste streams
 - Vehicle types
 - Transport routes to treatment, accumulation, and disposal sites
- Define clear performance requirements that allow alternatives to costly compactor trucks. For example: “No waste should be lost or blown away; leakage must be prevented.”
- Ensure vehicles are ergonomically designed to allow workers to perform tasks efficiently and comfortably.



Organizing Intermediary Storage Facilities for Recyclables



Incorporating Digital Solutions

Add Plastics Weight

NTAKIRUTIMANA Private

Plastic Type	Weight (kgs)	Price
PET Clear/Blue	0	0
PET Color	0	0
LDPE Nylon	0	0
LDPE Sacks	0	0
HDPE	0	0
Polypropylene (PP)	0	0
PVC	0	0

ADD WEIGHT

ADD WEIGHT

NTAKIRUTIMANA Private
WA-0033

4.3 Stars 1000 Points

Requests Impact Pay

Select Waste Type

PAYMENTS

2497+GM2, Kigali, Rwanda

All Waste Pickers My Waste Pickers

- NTAKIRUTIMANA PRIVATE
Waste Collection Agent
- BARIHUTA DAMASCÈNE
Waste Collection Agent
- NDIKUBWIMANA CLAUDE
Waste Collection Agent
- MUKANIYONGABO GERMAINE
Individual
- ERIC MBARUSHIMANA
Waste Picker
- NGENDAHAYO
Waste Picker

Waste Pickers

Supporting logistics and collection of recyclable materials with digital solutions

Building up the Recycling Value Chain

Identifying, assessing and testing various approaches and ideas to develop practical solutions and identify opportunities for improvement, including:

- Improving the collection process
- Enhancing the overall value chain of recyclable materials



Nurturing Bio-Circles: The MARKET

Supporting the ecosystem for selling compost is a key factor for success.

Key actions include:

- Collaborating with institutions such as RAB, MINAGRI, and others
- Adopting the RSB Standard for Compost from source-separated waste
- Setting up laboratory testing structures for quality control
- Establishing a representative group from composting facilities to support coordination and market development



Nurturing Bio-Circles: Optimizing the use of compost from organic waste



Enhance Soil Health: Compost improves soil structure, enhances nutrient content, and promotes healthy plant growth, contributing to sustainable agriculture.

In Rwanda the value of compost is highly recognized and appreciated by farmers.



Boost Local Food Systems: Using compost in local farms and gardens enabled communities to grow healthier crops while reducing reliance on synthetic fertilizers.

[Ellen Mc Arthur Foundation: How the circular economy tackles biodiversity loss](#)

[Towards a circular economy that begins and ends in nature – IUCN](#)

Supporting Diverse Composting Solutions



Within the SHINE Model, home composting is actively promoted. Households that separate organic waste properly are supported in their composting efforts.

In the context of tariff setting and household regulations, a fair cost-sharing mechanism must be established for residual waste and recycling collection.



Composting of source separated materials such as organic waste from markets can be implemented through various models. For example, the “Farmers' Cooperative Model” tested in Rwamagana showed promising cost-effectiveness, despite some challenges.

Dumpsite Remediation

Effective strategies are being developed to address dumpsite remediation.



A close-up photograph of a person's hand holding a small amount of dark, granular soil. The person is wearing a patterned sleeve. In the background, several other people are visible, some wearing green and white uniforms, suggesting a community or agricultural setting. The word "COST" is overlaid in large white letters.

COST

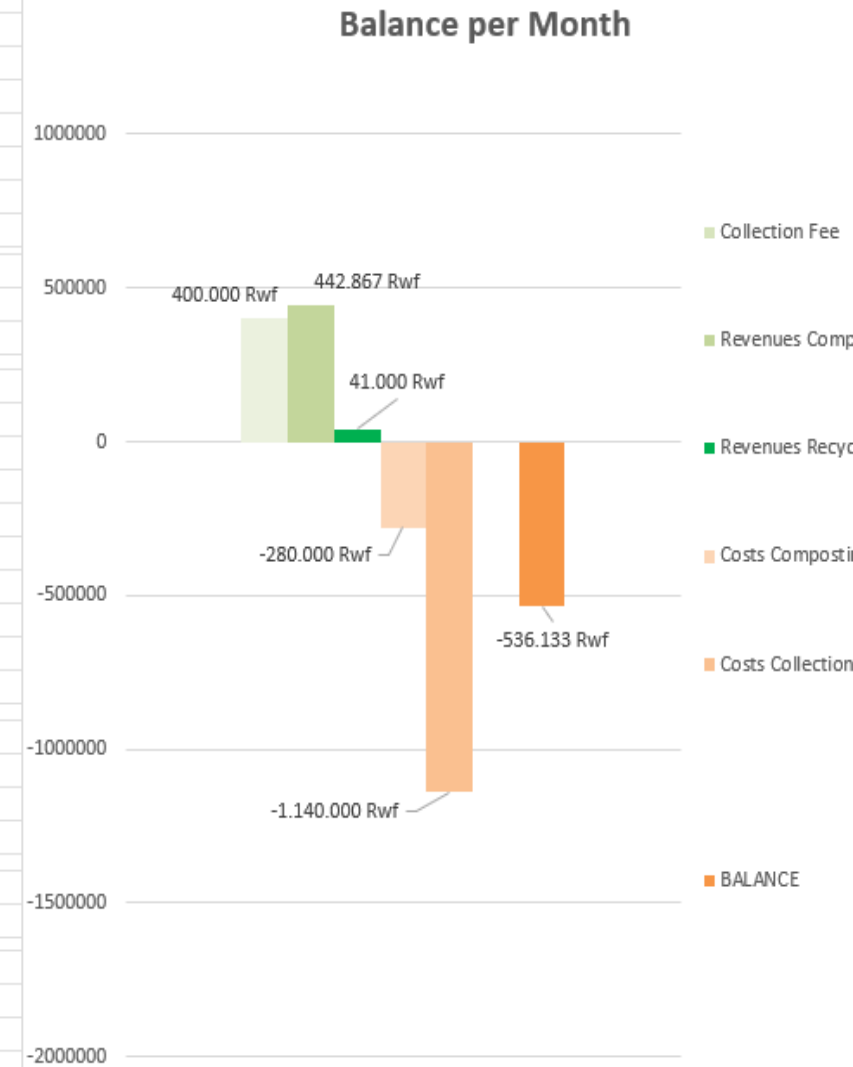
The SHINE Model for Circular Solid Waste Management | In Cooperation with the
Ministry of Environment, Ministry of Infrastructure, REMA, WASAC, RURA and others

Cost Efficiency

- Provide a comprehensive cost overview for the entire structure and value chain of solid waste management.
- Include all relevant costs, such as collection, transport, treatment and disposal.
- Evaluate alternative approaches to identify more cost-effective and sustainable solutions.

		WEEK	MONTH	YEAR
Site HH	t	2,0	8,0	104
Site Market	t	3,0	12,0	156
Sorting Input	t	5,0	20,0	260
Composition	t	2,1	8,4	101
Old	%	39%	39%	39%
Sorting/Compost	%	25%	25%	25%
Product	t	1,6	6,3	75,9
Posting				
	Number	7	7	7
per Person	Rwf	10.000 Rwf	40.000 Rwf	480.000 Rwf
SUM	Rwf	70.000 Rwf	280.000 Rwf	3.360.000 Rwf
Material	Rwf			
Accelerator	Rwf			
	Rwf			
	Rwf	-70.000 Rwf	-280.000 Rwf	-3.360.000 Rwf
Posting				
	Rwf	70	70	70
		110.717 Rwf	442.867 Rwf	5.314.400 Rwf
Person				
Picker	Number	5	5	5
per Person	Rwf	1.000 Rwf	4.000 Rwf	48.000 Rwf
	Number	10	10	10
per Person	Rwf	1.000 Rwf	4.000 Rwf	48.000 Rwf
SUM	Rwf	15.000 Rwf	60.000 Rwf	720.000 Rwf
Truck	Rwf	120.000 Rwf	480.000 Rwf	5.760.000 Rwf
Truck	Rwf	120.000 Rwf	480.000 Rwf	5.760.000 Rwf
Truck	Rwf	30.000 Rwf	120.000 Rwf	1.440.000 Rwf
Collection	Rwf	-285.000 Rwf	-1.140.000 Rwf	-13.680.000 Rwf
Collection Waste Fee				
	Rwf	250	1000	12000
paying		400	400	400
Collection	Rwf	100.000 Rwf	400.000 Rwf	4.800.000 Rwf
Recyclables				
Recyclables	Rwf	10.250 Rwf	41.000 Rwf	492.000 Rwf
SUM				
	Rwf	-355.000 Rwf	-1.420.000 Rwf	-17.040.000 Rwf
	Rwf	220.967 Rwf	883.867 Rwf	10.606.400 Rwf
	Rwf	-134.033 Rwf	-536.133 Rwf	-6.433.600 Rwf

Recyclables from Collection	Rwf/kg	kg/week	Rwf/week	Rwf/month	Rwf/year
Paper/Carton	150	25	3750	15000	180000
Plastic Bottles	100	20	2000	8000	96000
Plastic Foils	100	10	1000	4000	48000
Plastic Containers	250	10	2500	10000	120000
Plastic Bags	100	10	1000	4000	48000
SUM			10.250 Rwf	41.000 Rwf	492.000 Rwf



Reducing Transportation Costs

- Minimize transport time to dumpsites or landfill sites
- Lower maintenance costs by reducing truck damage and breakdowns caused by poor road conditions
- Reduce investment needs by using smaller, more cost-effective vehicles where appropriate
- Implement optimized routing to improve efficiency and reduce fuel and time costs

Saving money by reducing waste disposal costs



Landfill Disposal Costs

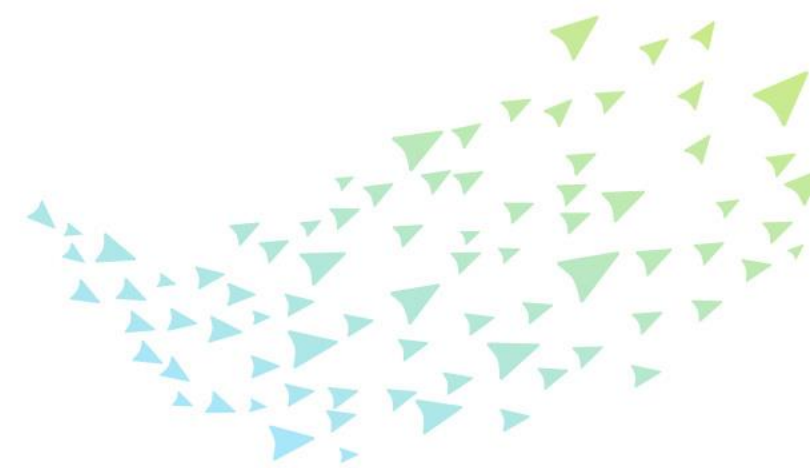


Even with waste diversion, residual waste must be managed.

Typical costs include:

- **Tipping Fees** — to dispose of waste at sanitary landfill — \$10-\$50 per ton (region dependent)
- **Sanitary Landfill Construction — CAPEX:** site acquisition, construction, equipment and financing
 - *Nduba CAPEX estimate: \$15 – \$20 per tonne*
- **Sanitary Landfill Operations and Maintenance — OPEX :** staffing, equipment, environmental monitoring, closure costs (size dependent)
 - *Nduba OPEX estimate: ~\$20 per tonne / \$20K–\$100K annually (site size dependent)*

Cost Savings from Waste Diversion (Avoiding Landfilling)



Estimated sanitary landfill gate fee:

\$40/ton → adds 3,560 RWF/month per household

\$20/ton → adds 1,780 RWF/month per household

Diverting waste from landfill reduces these costs and helps keep household fees lower.

kg/d per HH		kg per year	USD / Year	rwf/month
2	356	0		
		712	28.48	3560

The background image shows a dark, silty landscape at the bottom, with a sky above it filled with numerous small, dark fragments of trash and debris floating in the air. The overall tone is somber and environmental.

Avoiding Environmental Costs



Avoiding Social Costs

Creating Additional Value

Compost Production: Turning organic waste into quality compost reduces landfill costs and creates a marketable product

→ Potential revenue: 30-100 RWF/kg

High Quality Recycling: Improving the quality of collected plastics and paper enables production of high-value recycled goods (e.g. packaging, paper)

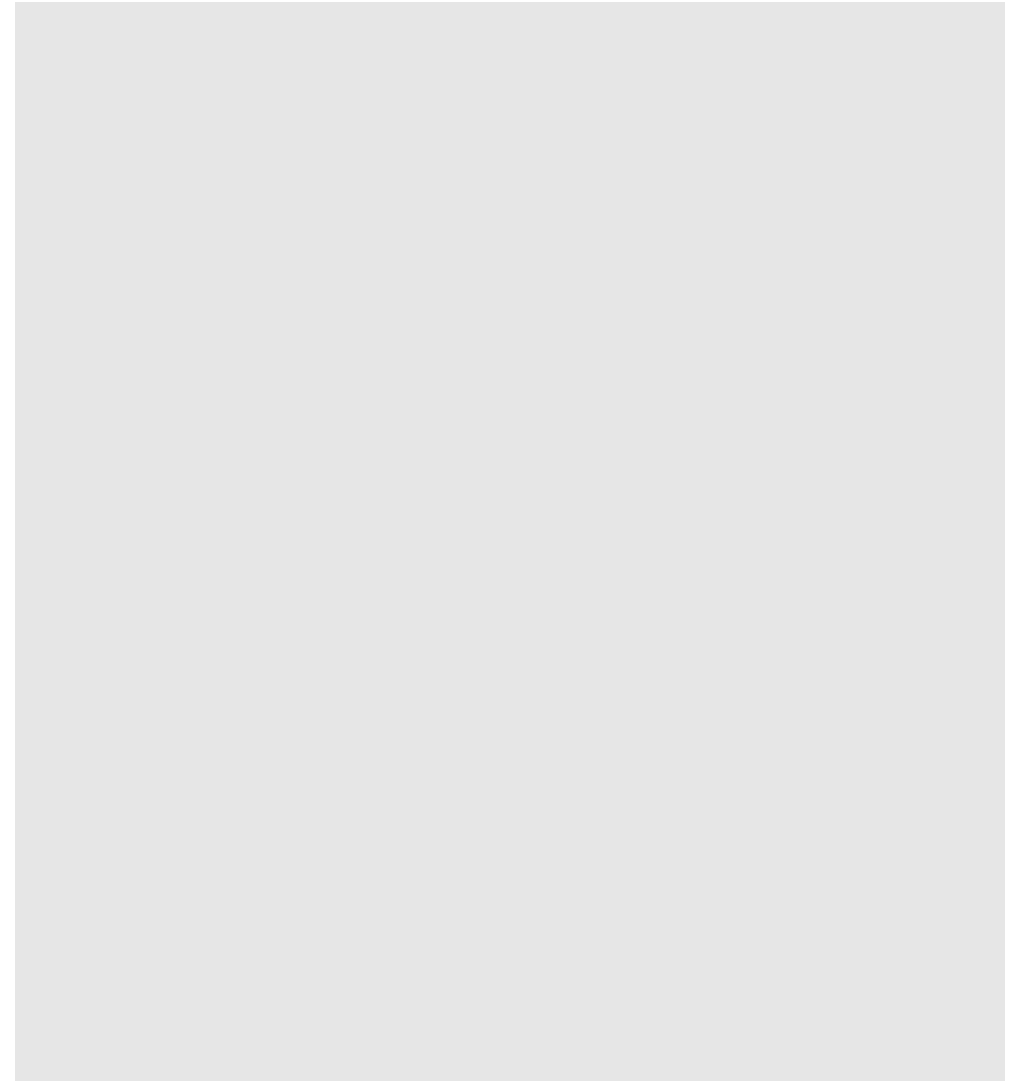
Economic and Environmental Impact: Increasing the currently low recycling rate creates new revenue streams while also reducing the need for foreign exchange to import plastic materials.



Incentives and Support Systems

Political commitment should include incentives for households that actively separate waste at source, such as rewards or fee discounts.

Support systems must be in place, including education, training and easy access to recycling facilities



Future Roadmap

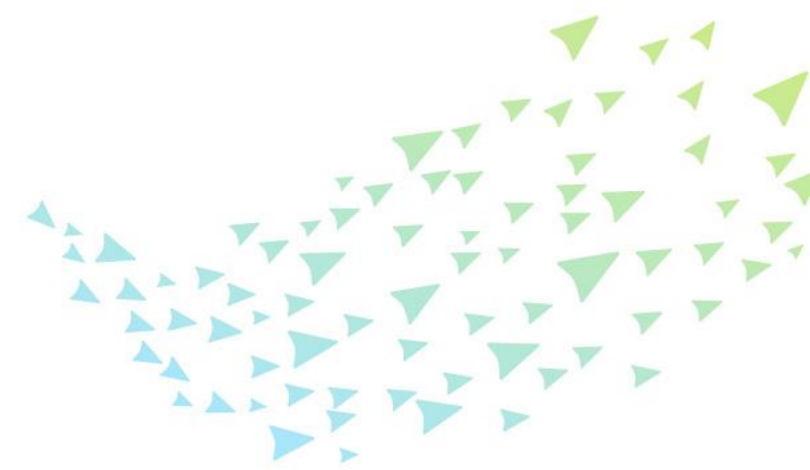


- The SHINE Model delivers the most cost-effective, locally adapted solutions for the current context (2025)
- Supports future development and remains open to technology upgrades
- Creates income opportunities in a well-organized, safe and healthy work environment

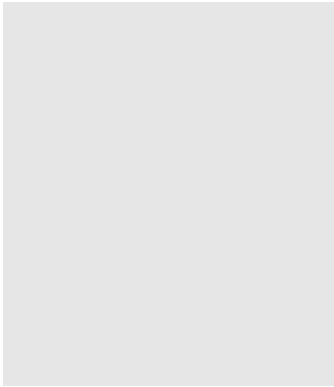


Way Forward

- Designing the structural set up for the District: how to structurally and contractually manage the over all SWM system
- Defining household contribution
- Establishing the financial structure for household fees, government contributions, and external funding
- Developing frameworks for contracting the private sector under the SHINE model
- Signing implementation agreements with private sector partners
- Allocating land for SWM facilities



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