In partnership with Canada

Ghana Circular Economy Centre

UNITED NATIONS INDUSTRIAL DEVELOPMENT ORGANIZATION

Republic of Ghana

A Data-Driven Circular Economy Roadmap for PET Plastics in Ghana (2025–2028)

A Data-Driven Circular Economy Roadmap for PET Plastics in Ghana

(2025–2028)

SEPTEMBER, 2025

Authors

This publication was prepared under the coordination of UNIDO, within the framework of the Ghana Circular Economy Centre (GCEC) project, implemented in collaboration with the Ministry of Environment, Science and Technology (MEST), with funding support from Global Affairs Canada.

The technical analysis and preparation of this report were carried out by Daniel Agyapong (Lead Author), Daniel Ofori Alex Boadi Dankyi Samuel Tulashie, Peterson Owusu Junior of University of Cape Coast (UCC), Kwame Anane-Fenin of Cape Coast Technical University, Vivian Ahiayibor and Jurgen Meinel of City Waste Recycling Limited with contributions from Halid Abu-Bakr of University of Exeter (UNIDO Circular Economy Expert). Inputs were also provided by national stakeholders, value chain actors, and field teams through data collection, consultations, and validation activities.

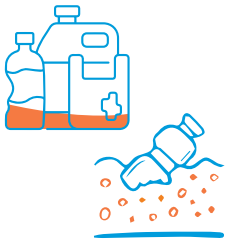
UNIDO gratefully acknowledges the cooperation and support of all partners and stakeholders whose engagement made this work possible.

About This Report

This report outlines a circular economy roadmap for the PET plastics value chain, aimed at strengthening collection, recycling, and end-market development. The sections progress from system overview and baseline analysis to prioritised interventions, implementation planning, and monitoring considerations.

Executive Summary

Ghana's plastics economy is characterised by high consumption, low recovery, and significant material leakage. Over 1.1 million tonnes of plastic enter the market annually, predominantly for short-lived applications such as packaging. Most of this material ends up in landfills, informal dumpsites, or open environments. Current estimates indicate that only 19% of plastic waste is recovered in any form, with the remainder either unmanaged or lost to the environment. As a result, urban centres face frequent drainage blockages, flood risks, and pollution, while the economic value embedded in post-consumer plastic is left unutilised.



Current estimates indicate that only **19%** of **plastic waste** is recovered in any form, with the remainder either **unmanaged or lost** to the environment.

As a result, **urban centres** face **frequent drainage blockages, flood risks, and pollution**

The national Plastics Circular Economy Opportunity Mapping (CEOM) exercise identified six critical systemic inefficiencies within the plastics value chain. These include: (1) limited collection and sorting infrastructure, (2) low recycling rates and dependence on virgin imports, (3) weak market incentives for secondary materials, (4) exclusion of informal actors from high-value recovery activities, (5) inadequate data systems for tracking flows, and (6) fragmented coordination across policy and operations. These inefficiencies result in both environmental degradation and missed economic opportunities.

Among the different plastic types analysed, polyethylene terephthalate (PET) was identified as a high-visibility material with untapped circular value. Although PET accounts for a relatively modest share of overall plastic imports by weight, it dominates the composition of discarded beverage bottles and transparent packaging, items commonly found in urban drains, roadside waste piles, and informal dumping zones. PET's pervasiveness in consumer use and visibility in waste streams makes it one of the most recognisable components of Ghana's plastic problem. At present, PET collection rates are below 30%, and less than 2% of PET-based products contain recycled content. Most PET bottles are used once and discarded, with minimal segregation at source and limited aggregation capacity. Existing recycling infrastructure is underutilised, and very few facilities are dedicated exclusively to PET sorting or flake production. The lack of local processing capacity leads to downstream bottlenecks, with collected PET often baled and exported without domestic value addition.

Furthermore, PET recovery is heavily reliant on informal sector labour, primarily women and youth operating under unsafe conditions with limited income security or access to markets. While these groups are central to PET collection in cities like Accra, Kumasi, and Tamale, they are rarely integrated into formal enterprise development or processing chains.

The PET Circular Economy Roadmap addresses these challenges with targeted interventions aligned to national development goals, climate commitments, and sector priorities. It proposes a series of short, medium, and long-term actions to increase PET recovery, enhance domestic recycling, and integrate informal actors into formal value-creating enterprises. These include:

a. Expansion of PET-specific aggregation and sorting hubs in high-leakage zones.

b. Establishment of pilot-scale flake production and product remanufacturing facilities.

c. Development of PET product eco-design guidelines to encourage recyclability and market uptake.

d. Launch of community-led PET recovery campaigns and buy-back mechanisms.

e. Institutionalisation of gender-responsive training and business support for PET collectors and processors.

The roadmap is structured to improve traceability, reduce leakage, and increase PET's contribution to the circular economy. Through a focus on measurable outcomes, such as increases in recycled content, reduction in PET-related drainage obstructions, and income improvements for collectors, it provides a practical, implementation-ready pathway. If effectively delivered, the PET roadmap will not only improve environmental management but also unlock economic value, particularly for low-income and underserved groups currently excluded from higher stages of the value chain.

Contents

Executive Summary	**1**
Tables of Contents	**3**
List of Tables	3
1: Background	4
1.1 Vision	5
1.2 Strategic Goals	**6**
1.3 Alignment with Policy and Global Frameworks	7
2: Baseline and Opportunity Mapping - PET Value Chain	7
2.1 Material Flow and Loss Patterns (MFA Insights)	8
2.2 Life Cycle Emissions and Environmental Burdens (LCA Insights)	8
2.3 Social Baseline and Inclusion Gaps	8
2.4 Current Circular Practices and Systemic Gaps	**9**
2.5 Circular Hotspots Identified	10
3: Prioritisation and Scope Definition	11
3.1 Geographic Scope	12
3.2 Value Chain Focus	12
3.3 Prioritised Opportunities	**13**
4: Stakeholder Mapping and Engagement Design	13
4.1 Key Stakeholders and Institutional Roles	14
4.2 Stakeholder Engagement Platforms	**15**
5: Pillars, Levers and Enablers	15
5.1 Strategic Pillars	16
5.2 Policy Levers and Institutional Tools	16
6: Pilot Design and Execution	**17**
6.1 Pilot 1: Decentralised PET Buy-Back and Sorting Hubs - Techiman and Ashaiman	17
6.2 Pilot 2: Eco-Design Demonstration and PET Product Standardisation-Accra Metro	18
6.3 Pilot 3: PET Integration in Local Manufacturing - Kumasi and Tema	18
7: Action Plan and Implementation Pathways	

Contents

8: Monitoring, Reporting, and Verification (MRV) 13

8.1 Environmental KPIs 13

8.2 Economic KPIs 14

8.3 Social KPIs 15

8.4 Data Collection Tools 16

9: Financing Strategy and Investment Mobilisation 16

9.1 Funding Sources 17

9.2 De-Risking Mechanisms 17

9.3 Investment Instruments 18

10: Capacity Development and Institutional Strengthening 18

10.1 Modular CE Training Curriculum 19

10.2 Extension Officer Upskilling 20

10.3 Vocational Partnerships 21

10.4 Institutional Integration 21

11: Governance and Integration Framework 21

11.1 Multi-Level Governance Structure 22

11.2 Integration into National Planning and Policy Systems 22

11.3 Institutionalisation and Oversight 23

12: Communications, Behavioural Change and Cultural Shifts 24

12.1 Storytelling and Recognition 24

12.2 Local Language and Low-Literacy Messaging 25

12.3 Community-Led Channels 25

13: Circular Business Model Incubation and Scaling 26

13.1 Incubation Support Mechanisms 26

13.2 Scaling Path 27

14: Alignment with the Project M&E Strategy 27

15: Risks and Mitigation Measures 28

16: Conclusion 28

17: Appendix: Roadmap KPI Matrix 29

List of Tables

Table 1. Alignment with Policy and Global Framework 2

Table 2. Key inflow-outflow-loss pathways 3

Table 3. Current Circular Practices and Systemic Gaps 5

Table 4. Circular Hotspots Identified 5

Table 5. Summary Table 6

Table 6. Feasibility and Impact Assessment 8

Table 7. Summary Table 8

Table 8. Stakeholders' Role and Mandate 10

Table 9. Pillars and PET-Specific Insight 14

Table 10. Pilot Titles, Locations, Objectives and Success Indicators 17

Table 11. Phased Summary 20

Table 12. Environmental KPIs 20

Table 13. Economic KPIs 21

Table 14. Social KPIs 22

Table 15. PET MRV Framework 23

Table 16. Cost Estimates for Priority Interventions 23

Table 17. Financing Strategy Overview 26

Table 18. PET Capacity Development Priorities 28

Table 19. PET Governance and Integration 31

Table 20. PET Communications and Cultural Change Channels 33

Table 21. Business Models Identified 34

Table 22. Projected Returns by Model 35

Table 23. Readiness Pillars and Support Needs 35

Table 24. Scaling Path 36

Table 25. PET Circular Business Models and Returns 37

1. Background

1.1. Vision:

The long-term vision for Ghana's PET value chain is to establish a circular, regenerative, and inclusive system where over 80% of PET packaging is recovered, recycled, or reused, minimising environmental leakage and reducing dependence on virgin plastic. By 2030, PET is envisioned to be a leading model of circularity in Ghana's plastics sector, where discarded bottles are not seen as waste, but as valuable feedstock circulating in a resource-efficient loop. This transition aims to drive job creation, particularly for youth and women, reduce the carbon and material footprint of beverage packaging, and align with Ghana's national sustainability and climate ambitions.

The urgency of this transition is underscored by the fact that nearly 1 in 2 plastic bottles placed on the Ghanaian market end up uncollected and often discarded into open environments. With an estimated 104,000 tonnes of PET entering the market each year, equivalent to filling approximately 400 articulated lorries, the existing linear trajectory is no longer tenable. Most PET waste remains uncollected, with only 35% retrieved and just 14% actually recycled, underscoring both the scale of material loss and the untapped economic value of PET in Ghana's waste ecosystem.

Most **PET waste** remains uncollected, with only **35%** retrieved and just **14%** actually recycled

1.2. Strategic Goals:

1.2.1. Goal 1: Increase PET Collection Rate to 75% by 2030

Justification: Currently, only around 1 in 3 PET bottles is collected. Raising this to 3 in 4 would redirect an estimated additional 41,600 tonnes annually into circular pathways, reducing environmental leakage and boosting feedstock availability for recyclers.

1.2.2. Goal 2: Raise PET Recycling Rate to 40% by 2030

Justification: With only 14% of PET currently recycled, this target would nearly triple recovery performance. At 40%, approximately 41,600 tonnes of PET could be converted into secondary raw materials, reducing pressure on virgin imports.

1.2.3. Goal 3: Ensure Recycled Content Constitutes at Least 25% of Locally Manufactured PET Bottles by 2028

Justification: Local PET bottling remains heavily reliant on virgin inputs. A 25% rPET threshold, comparable to EU standards, would cut material imports by roughly 26,000 tonnes annually and incentivise quality recycling infrastructure.

1.2.4. Goal 4: Eliminate Open Dumping and Burning of PET by 2027 in Target Districts

Justification: Open dumping and informal burning remain widespread disposal pathways, especially in peri-urban and rural zones. Eliminating these practices in key hotspots would avert significant air and soil pollution and protect public health, particularly in densely populated municipalities.

1.3. Alignment with Policy and Global Frameworks:

The roadmap for PET circularity is anchored in a shared vision of a regenerative and inclusive value chain that leaves no actor behind. These ambitions are not formulated in isolation they align directly with Ghana's national planning frameworks, such as the MTNDPF and NPMP, while also contributing meaningfully to key global targets like the Sustainable Development Goals and climate action agendas.

1.3.1. National Development Plans:

The roadmap aligns with Ghana's Medium-Term National Development Policy Framework (MTNDPF) which advocates for sustainable industrialisation, waste recovery, and pollution prevention.

1.3.2. Relevant Sectoral Policies:

This vision supports the National Plastics Management Policy (NPMP), especially its pillars on sustainable material management and inclusive value chain participation.

1.3.3. Sustainable Development Goals (SDGs):

a. SDG 12 (Responsible Consumption and Production): Reducing PET waste and promoting recycling.

b. SDG 13 (Climate Action): Lowering emissions through reduced virgin resin use.

c. SDG 8 (Decent Work and Economic Growth): Creating jobs across the collection, sorting, and recycling stages.

d. SDG 6 (Clean Water and Sanitation): Reducing PET leakage into waterways.

1.3.4. Just Transition Principles:

Prioritises equitable access to circular PET markets by the informal sector, women, and youth, ensuring livelihoods are protected and enhanced in the shift away from linear systems.

Table 1 presents the high-level alignment between the roadmap's vision, specific goals, and relevant policy frameworks.

Table 1. Alignment with Policy and Global Framework

Component	Detail
Vision	Regenerative, inclusive PET value chain with over 80% circularity by 2030
Goal 1	75% PET collection rate by 2030
Goal 2	40% PET recycling rate by 2030
Goal 3	25% rPET content in locally manufactured bottles by 2028
Goal 4	Eliminate open dumping/burning of PET in target districts by 2027
Policy Alignment	MTNDPF, NPMP
SDG Alignment	SDGs 6, 8, 12, 13
Just Transition Alignment	Targets informal actors, youth, and women for inclusion

2: Baseline and Opportunity Mapping - PET Value Chain

2.1. Material Flow and Loss Patterns (MFA Insights)

Ghana's PET material flow is marked by significant leakages and underutilisation of post-consumer waste. An estimated 177,000 tonnes of PE resin enter the Ghanaian market annually, equivalent to over 400 articulated lorries fully loaded with plastic bottles (Ghana Plastics Manufacturers Assoc., 2025). The primary use is for bottled water, carbonated soft drinks, and edible oil packaging. Estimated PET leakage in Ghana: 20,000–25,000 tonnes/year, representing approximately 70% of post-consumer PET use.

Only 35% of this material, around 1 in every 3 bottles, is collected after use, representing approximately 36,400 tonnes. Of this, just 14% of the total PET placed on the market, or approximately 14,500 tonnes, is effectively recycled. This means that roughly 2 out of every 3 PET bottles are uncollected or improperly disposed, often leaking into the environment or burnt in open-air sites. These losses are most acute in low-income urban and peri-urban communities, where waste infrastructure is limited and informal collection dominates. Current PET recycling efficiency: 15–20%, with energy intensity ~1.5 MWh/tonne for hot-wash mechanical lines.

Table 2 summarises the estimated volumes of PET inflows, outflows, and leakages, offering a diagnostic snapshot of the critical pressure points that undermine circularity in Ghana's PET value chain.

Table 2. Key inflow-outflow-loss pathways

Flow Stage	Volume Estimate (Tonnes)	Comment
PET Import and Production	~177,000	Mostly virgin PET for beverage bottles
Post-Consumer Collection	~36,400	Represents only 35% of market input
Effective Recycling	~14,500	Around 14% of total; remainder stockpiled, discarded or exported
Leakage/Loss	~67,600	Ends up in open dumping, drainage, or informal incineration

2.2. Life Cycle Emissions and Environmental Burdens (LCA Insights)

The PET value chain carries a considerable environmental burden, particularly due to its reliance on virgin plastic and inefficient end-of-life treatment.

a. **Energy Use:** Virgin PET production and transport consume approximately 26-30 MJ per kg, compared to 12-16 MJ per kg for recycled PET (rPET). Shifting to rPET can halve energy demand.

b. **Greenhouse Gas Emissions:** Virgin PET generates 2.8-3.2 kg CO_2e per kg produced. This is over twice that of rPET, which emits 1.2-1.4 kg CO_2e per kg.

c. **Water Consumption:** PET bottle production requires about 4-6 litres of water per bottle, including direct manufacturing and upstream processes.

d. **Toxicity and Pollution:** Inadequate collection leads to frequent open burning of PET, especially in informal sites. This releases dioxins and furans, known carcinogens, into the air, impacting both public health and local biodiversity.

The cumulative **carbon footprint** of uncollected **PET waste** in **Ghana** is conservatively estimated at over **190,000 tonnes CO_2e annually,** equivalent to the yearly emissions of more than **40,000 passenger cars.**

2.3. Social Baseline and Inclusion Gaps

The PET value chain is supported by a large informal workforce. However, inclusion across key demographics remains limited.

a. **Gender:** Women are underrepresented in upstream collection but dominate sorting activities in aggregation centres and recycling yards. Many face inconsistent earnings, lack of protective equipment, and absence of formal contracts.

b. **Youth:** Young people (under 35) make up an estimated 60-70% of informal collectors, especially in urban areas such as Accra and Kumasi.

c. **Education:** A significant proportion of workers involved in PET collection have primary-level education or no formal schooling, which limits access to more technical roles in recycling enterprises.

d. **Cooperative Membership:** Less than 20% of informal PET collectors are organised into cooperatives or associations. This restricts bargaining power and access to municipal contracts or extended producer responsibility (EPR) schemes.

2.4. Current Circular Practices and Systemic Gaps

While Ghana has made incremental progress toward PET circularity, many practices remain fragmented or underdeveloped. Existing initiatives show promise but fall short of delivering system-wide impact, often constrained by scale, infrastructure, or policy alignment. Table 3 presents a snapshot of current PET circular practices and the systemic gaps.

Table 3. Current Circular Practices and Systemic Gaps

Practice	Status	Observations
Community-Based PET Collection	Emerging	Pilots exist in Accra and Takoradi, often supported by NGOs, but scale remains limited.
Bottle-to-Bottle Recycling	Nascent	Ghana lacks food-grade PET reprocessing facilities; most PET is downcycled or exported.
Manufacturer Take-Back Schemes	Inactive	No significant take-back system led by beverage producers; reliance on informal sector persists.
Local rPET Use in Manufacturing	Minimal	Less than 5% rPET is used in local PET manufacturing, mainly due to cost, quality, and certification constraints.

2.5. Circular Hotspots Identified

Challenges, such as low collection rates in vulnerable communities and the dominance of virgin PET, signal priority areas for policy and investment. Table 4 outlines four key circular hotspots in Ghana's PET value chain, paired with targeted opportunities that can unlock both environmental and socio-economic returns.

Table 4. Circular Hotspots Identified

Hotspot	Description	Opportunity
Hotspot 1: Collection Gaps	Collection coverage in low-income areas is under 25%.	Introduce community-based sorting incentives and mobile buyback schemes.
Hotspot 2: Virgin PET Use	Bottling firms almost entirely depend on virgin PET.	Ghana lacks food-grade PET reprocessing facilities; most PET is downcycled or exported.
Manufacturer Take-Back Schemes	Inactive	Mandate rPET content in beverage packaging through policy or tax incentives.
Hotspot 3: Unmanaged Waste	PET is among the most visible forms of litter in drains and coastal zones.	Deploy high-volume PET aggregation hubs near hotspots and market centres.
Hotspot 4: Quality Loss	Mixed colours, caps, and labels degrade PET recycling value.	Enforce eco-design guidelines (e.g. uniform bottle colour, detachable labels).

2: Baseline and Opportunity Mapping - PET Value Chain

Table 5. Summary Table

Section	Key Insight
Material Flows	104,000 tonnes annually; only 1 in 3 PET bottles collected; 2 in 3 uncollected or leaked
Environmental Burdens	PET emits 2.8-3.2 kg CO_2e per kg; open burning and water use present major sustainability issues
Social Inclusion Gaps	Women and youth dominate collection but lack protection, training, and cooperative access
Systemic Circularity Gaps	Minimal rPET usage, lack of food-grade recycling, no take-back schemes
Circular Hotspots and Opportunities	Four clear hotspots mapped with actionable, targeted interventions

3. Prioritisation and Scope Definition

3.1. Geographic Scope

The geographic focus of this PET circular economy roadmap prioritises Greater Accra, Ashanti, Western, and Bono East regions. These zones collectively account for the highest volume of PET consumption, disposal, and visible leakage in Ghana.

a. Greater Accra alone generates nearly 30% of the country's PET waste, driven by dense urban consumption patterns, especially in bottled water and soft drinks.

b. Ashanti Region, anchored by Kumasi, is a key aggregation and redistribution hub for beverages, with large informal collection networks but limited formal recycling capacity.

c. Western Region, especially in Takoradi, demonstrates strong NGO engagement and pilot PET recovery schemes.

d. Bono East, particularly Techiman, exhibits high PET presence in open markets and along transport corridors but lacks basic collection infrastructure, making it ideal for intervention testing.

These areas combine high PET density, observable leakage, informal sector activity, and the presence (or lack) of enabling infrastructure, making them strategic for piloting and scaling interventions.

3.2. Value Chain Focus

The PET roadmap focuses specifically on single-use beverage containers, which represent the overwhelming majority of PET consumption in Ghana. This includes:

a. Bottled water (estimated to account for 60-65% of PET usage)

b. Carbonated soft drinks

c. Energy and sports drinks

d. Cooking oil bottles (minor segment)

Secondary attention is given to caps and labels, which, though not made of PET, contribute to recycling inefficiencies and material contamination.

3.3. Prioritised Opportunities

To prioritise interventions that deliver the greatest value, it is essential to balance feasibility with potential impact. While some opportunities are readily deployable using existing systems, others require regulatory and technical upgrades to unlock transformative results. Table 5 evaluates selected circular economy interventions for PET based on their practical feasibility and expected impact

a. Opportunity 1: Decentralised PET Aggregation Hubs: Establish semi-formal PET buy-back centres in underserved areas, linked to major markets and transit routes.

b. Opportunity 2: Local rPET Integration in Manufacturing: Support domestic bottle manufacturers to incorporate recycled PET into new bottles, reducing virgin dependency.

c. Opportunity 3: Eco-Design and Take-Back Schemes: Promote uniform bottle colours, detachable caps, and extended producer responsibility (EPR) partnerships to enable high-quality recycling and producer accountability.

3. Prioritisation and Scope Definition

Table 6. Feasibility and Impact Assessment

Opportunity	Feasibility	Impact	Justification
Decentralised PET Aggregation Hubs	High	High	Requires low capital; builds on informal networks and rapidly diverts PET from streets and drains.
Local rPET Integration in Manufacturing	Moderate	Very High	Needs technical investment and certification frameworks but reduces virgin imports substantially.
Eco-Design and Take-Back Schemes	Moderate to High	High	Aligns with global best practice; success depends on regulatory will and industry collaboration.

Table 7. Summary Table

Component	Detail
Geographic Scope	Greater Accra, Ashanti, Western, Bono East
Value Chain Focus	Greater Accra, Ashanti, Western, Bono East
Priority Opportunity 1	Decentralised PET Aggregation Hubs
Priority Opportunity 2	Local rPET Integration in Manufacturing
Priority Opportunity 3	Eco-Design and Take-Back Schemes
Highest Feasibility	Aggregation hubs - scalable, informal sector-led
Highest Impact Potential	rPET integration - large material savings and emission reductions

4. Stakeholder Mapping and Engagement Design

4.1. Key Stakeholders and Institutional Roles

The successful transition to a circular PET system in Ghana hinges on coordinated action across a diverse ecosystem of stakeholders, each with distinct mandates and capacities. The roles outlined below are drawn directly from PET-specific insights in the shared source documents.

a. Ministry of Environment, Science, Technology and Innovation (MESTI)

Leads national plastics policy development and oversees implementation of the National Plastics Management Policy (NPMP). Acts as the primary policy anchor and convener of national coordination platforms.

b. Environmental Protection Agency (EPA)

Regulates waste management standards and monitoring, including permitting and oversight for PET recycling facilities. Plays a key role in ensuring compliance with eco-design standards and emissions control, particularly concerning open burning of PET.

c. Ministry of Sanitation and Water Resources (MSWR)

Oversees urban sanitation infrastructure and municipal solid waste management. Directly responsible for integrating PET collection into local service delivery, particularly through Metropolitan, Municipal and District Assemblies (MMDAs).

d. Metropolitan, Municipal and District Assemblies (MMDAs)

Key local authorities mandated to operationalise waste collection and management. Responsible for including PET targets within District Waste Management Plans and for establishing task forces that engage with informal collectors.

e. Ghana Standards Authority (GSA)

Oversees the development and enforcement of technical standards, including specifications for food-grade rPET and bottle-to-bottle recycling. Their certification function is critical for enabling rPET integration into local manufacturing.

f. Private Sector (Beverage Producers, Bottlers, and Retail Chains)

Major generators of PET packaging waste. Key actors include bottling companies such as Coca-Cola and Voltic. Expected to lead or co-finance take-back schemes, shift towards eco-design, and incorporate rPET under EPR obligations.

g. Recycling Enterprises and Aggregators

Includes both formal processors and informal aggregators. Over 64% of recycling firms in Ghana handle PET, though most operate below capacity. Their role includes sorting, baling, flaking, and exporting PET waste, with growing potential for local rPET applications.

h. Informal Sector Collectors

The backbone of PET recovery in Ghana. Youth and women constitute the majority of PET collectors, especially in urban and peri-urban zones. Their earnings are vulnerable to price fluctuations and they often lack access to protective gear, health cover, or contract security.

i. Development Partners (e.g. GIZ, UNIDO)

Provide technical support, pilot funding, and capacity building.

j. Academic and Research Institutions (e.g. KNUST, UCC)

Deliver PET-specific training modules, conduct LCA and MFA assessments, and offer analytical support for CE pilot evaluation. These institutions are also involved in curriculum integration to mainstream CE knowledge.

4.2. Stakeholder Engagement Platforms

A robust circular PET ecosystem depends on well-aligned mandates, active collaboration, and accountability across institutional layers. From national regulators to local actors and informal workers, each stakeholder brings unique capabilities that must be leveraged through structured engagement and shared ownership. To ensure cross-sectoral dialogue, knowledge exchange, and solution co-creation, the roadmap adopts the following structured engagement platforms:

a. Regional Design Labs

Multi-stakeholder labs hosted in target regions (e.g. Accra, Kumasi, Takoradi, Techiman) to co-develop PET collection models, eco-design prototypes, and recovery interventions. These labs draw together local governments, waste actors, academia, and recyclers.

b. Value Chain Forums

Sector-specific roundtables are convened quarterly to discuss challenges in PET sorting, flaking, and domestic reprocessing. Forums serve to align regulatory incentives with real-time business constraints, particularly on pricing, feedstock, and certification.

c. Listening Sessions and Demonstrations

Community-based events to engage PET collectors, households, traders, and youth. These sessions inform inclusive design, test pilot models (e.g. colour-sorting incentives), and build grassroots ownership of the roadmap's goals. Pilot demonstrations allow for field validation and stakeholder feedback loops.

Table 8 outlines the institutional landscape and the specific roles different stakeholders and platforms play in supporting PET circularity.

Table 8. Stakeholders' Role and Mandate

Stakeholder/Platform	Role and Mandate
MESTI	National policy coordination on plastics and CE
EPA	Regulation and enforcement of environmental standards, especially for recyclers
MSWR	Integration of PET into sanitation services
MMDAs	Local PET collection, integration into waste management plans
GSA	Certification of food-grade rPET and eco-design standards
Beverage Companies and Bottlers	Primary PET generators; potential EPR leaders and rPET users
Recycling Firms and Aggregators	PET sorting, baling, flaking; export or local resale of recycled PET

4. Stakeholder Mapping and Engagement Design

Stakeholder/Platform	Role and Mandate
Informal Sector	Largest PET recovery workforce; critical for primary collection coverage
Development Partners (e.g. UNIDO)	Funding, technical assistance, informal sector engagement
Universities (e.g. KNUST, UCC)	Training, research, CE metrics, policy design support
Regional Design Labs	Collaborative co-design of regional interventions
Value Chain Forums	Continuous dialogue between regulators and PET market actors
Listening Sessions/ Demonstrations	Grassroots validation and feedback from collectors, consumers, and traders

5. Pillars, Levers and Enablers

Achieving circularity at scale requires more than isolated interventions; it demands a strategic foundation built on strong pillars, catalytic levers, and enabling conditions. Pillars define the structural focus areas (such as infrastructure or governance); levers represent the high-impact interventions that can accelerate change; and enablers are the policies, incentives, and capacities that ensure these solutions are sustainable and inclusive. This section outlines the interconnected elements that must align to transform intent into lasting impact across the LDPE and PET value chains

5.1. Strategic Pillars

5.1.1. Establishing Reliable PET Collection Infrastructure

The fragmented and inconsistent collection of PET, especially in low-income communities and informal markets, remains the most significant bottleneck. PET collection rates hover around 35% nationally, with over 65,000 tonnes of PET leaking into the environment annually. Strategic investment in decentralised PET aggregation points, particularly in areas with no existing municipal coverage, forms the backbone of system transformation.

PET collection rates hover around **35%** nationally, with over **65,000 tonnes** of PET leaking into the environment annually.

5.1.1.1. Materials Recovery Facilities (MRFs) and community collection hubs will be equipped with:

a. Optical Sorters (NIR-based) to segregate PET by colour and polymer type;

b. Vertical or horizontal balers for compacting sorted PET bottles (5–10 tonnes/day);

c. Granulators with output particle size of 6–10 mm for further processing;

d. Segregated collection bins at community hubs colour-coded for clear, green, and amber PET bottles.

5.1.2. Creating End-Markets for Recycled PET (rPET)

Less than 2% of PET collected in Ghana is reprocessed into products for the domestic market, with most of the collected PET exported in baled form. This suppresses value retention and limits incentive for improved sorting. Enabling end-markets, particularly for fibre, construction materials, and food-grade rPET, can unlock demand for higher-quality recyclate and attract private sector participation.

5.1.3. Formalising and Strengthening Informal Sector Actors

The vast majority of PET is collected by informal workers, many of whom earn below a subsistence wage. Formalisation through registration, safety equipment provision, stable pricing agreements, and cooperative formation is crucial for improving livelihoods and ensuring consistent feedstock flow to recyclers. Pilots suggest formalised groups achieve up to 30% higher PET recovery rates than unaffiliated collectors.

Less than **2% of PET** collected in **Ghana** is reprocessed into **products** for the **domestic market,** with most of the collected **PET exported in baled form.**

5.1.4. Standardising Product Design and Quality of Recyclables

Material contamination from mixed polymers, coloured bottles, non-detachable labels and caps drastically reduces PET's recyclability. In particular, labels and adhesives interfere with the flaking and washing process, leading to quality degradation. Eco-design protocols, such as standardised bottle colours and detachable components, are essential for improving material recovery rates and enabling higher-end applications.

5.1.5. Institutional Coordination and Regulatory Alignment

The lack of coherent enforcement across MESTI, EPA, MMDAs and Standards Authority has led to policy fragmentation. Clear institutional roles, embedded PET roadmaps in municipal waste plans, and operational PET sub-committees at national and district levels are necessary for vertical integration. Coordination platforms must also align with Ghana's Extended Producer Responsibility (EPR) framework under development.

5.2. Policy Levers and Institutional Tools

a. Municipal By-laws for PET Recovery Targets

MMDAs should legislate minimum PET recovery thresholds and assign operating permits to aggregation centres that meet safety and environmental standards.

b. Eco-Labelling and Product Certification

GSA and FDA must co-develop a national standard for food-grade rPET. Labels indicating rPET content would guide consumer choice and improve brand accountability.

c. Material Recovery Subsidies and Price Guarantees

Informal collectors face high volatility in PET prices. Establishing minimum floor prices or providing volume-based subsidies, especially in low-density PET regions, would improve recovery consistency and expand geographic reach.

d. Data Reporting Obligations for Large Producers

Bottling firms and packaging importers should be required to disclose PET use, recovery support measures, and recycled content annually. This data should feed into national PET flow tracking dashboards.

5.3. System Enablers

a. Regional Demonstration Pilots in High-Leakage Zones

Regions such as Techiman and peri-urban Accra experience extreme PET leakage into drains and public spaces. Demonstration zones involving buy-back schemes, community sort-and-drop stations, and youth-led mobile collection models will offer replicable blueprints.

b. PET Aggregator Registration and Digital Tracability

Currently, PET aggregators operate without traceability or quality documentation. A basic registration and digital tracking system, via QR-tagged sacks or mobile uploads, can standardise volumes, support payments, and prevent fraud in subsidy schemes.

c. Academic and Vocational Training Partnerships

PET-specific LCA and recycling modules are already being piloted at institutions such as UCC and KNUST. Scaling these into national vocational curricula (NVTI, TVET) and community training centres will ensure a pipeline of qualified recyclers and maintenance technicians.

To effectively transition Ghana's PET value chain toward circularity, it is critical to identify the structural pillars, catalytic levers, and enabling systems that will unlock sustained impact. The insights in Table 8 highlight PET-specific opportunities across infrastructure, policy, technology, and skills each of which must be strategically mobilised to drive change at scale.

Table 9. Pillars and PET-Specific Insight

Pillar / Lever / Enabler	PET-Specific Insight
Collection Infrastructure	Less than 1 in 3 PET bottles are collected; decentralised hubs needed in underserved zones
End-Market Development	Ghana lacks food-grade rPET capacity; fibre and composite markets are untapped
Informal Sector Formalisation	Over 60% of PET recovery is informal; formalised groups recover more and earn better
Eco-Design Standardisation	Mixed materials reduce recycling yield; need for colour and cap design alignment
Municipal By-laws	Local PET recovery targets and licencing for aggregation points to be mandated
Subsidies / Price Guarantees	Minimum PET prices can stabilise informal collector earnings and expand collection
National rPET Certification	Required to unlock domestic bottle-to-bottle production
Regional Pilot Demonstrations	Techiman and Accra hotspots to model full PET recovery loops
Digital Traceability Tools	QR-coded sacks and mobile uploads for transparent aggregator payments and monitoring
Training Partnerships	UCC and KNUST piloting PET curricula; scale to vocational training networks

6. Pilot Design and Execution

Three pilot projects are proposed to test and refine scalable circular interventions for PET plastics in Ghana. These are designed around real-world hotspots and opportunity areas directly cited in the shared data. Recycled PET will comply with EU Regulation (EC) No 282/2008 for food-grade plastics and Ghana Standards Authority (GSA) plastic recyclate standards.

6.1. Pilot 1: Decentralised PET Buy-Back and Sorting Hubs - Techiman and Ashaiman

6.1.1. Context and Rationale

PET leakage into the environment remains high in densely populated market towns such as Techiman and urban areas like Ashaiman, which serve as PET distribution and consumption hubs. Collection coverage in these locations is fragmented, and informal aggregators often lack safe, centralised workspaces. Currently, PET recovery in such areas is predominantly manual, unregulated, and dependent on fluctuating material prices. This pilot targets recovery from informal hotspots and aims to stabilise income for waste pickers while improving feedstock quality. Also, Pilot 1 will focus on bottle-to-bottle mechanical recycling of clear PET for food-grade applications, incorporating hot wash lines and multi-stage filtration extrusion.

6.1.2. Key Activities

a. Establish two semi-permanent PET buy-back hubs with baling and storage capability.

b. Train and register informal collectors, providing protective equipment and ID cards.

c. Introduce QR-coded sacks to track collector volumes and enable transparent payments.

d. Implement weekly mobile pickups to link hubs with recyclers in Accra and Kumasi.

6.1.3. Success Criteria

a. At least 30 metric tonnes of PET recovered in first 6 months.

b. Minimum 120 informal collectors registered, with 40% women participation.

c. Documented reduction in PET litter density in pilot areas by 25% (via waste audits).

6.1.4. Stakeholders and Roles

a. MMDAs of Techiman and Ashaiman: site selection, licensing, monitoring.

b. Recycling firms (e.g. Blowplast, Coliba): offtake agreements and logistics support.

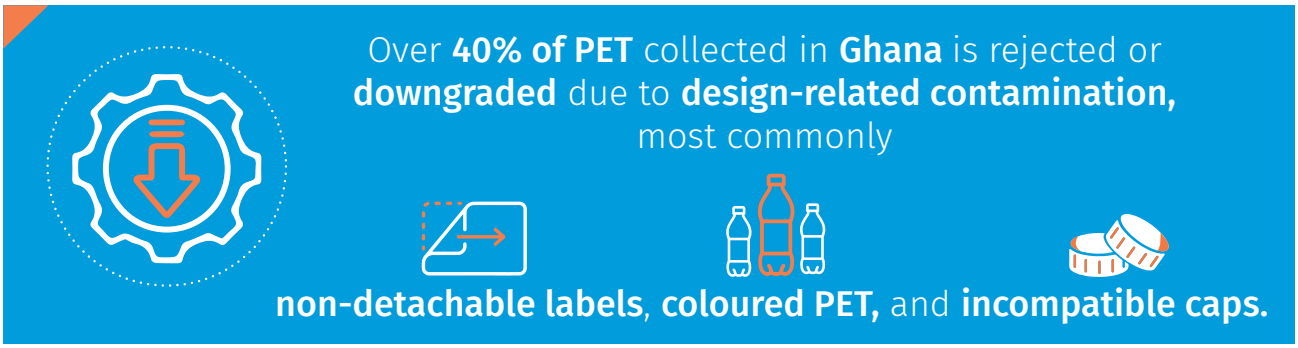
c. The OR Foundation and UNIDO: technical support, training delivery.

d. Informal waste collector cooperatives: primary PET recovery agents.

6.2. Pilot 2: Eco-Design Demonstration and PET Product Standardisation - Accra Metro

6.2.1. Context and Rationale

Over 40% of PET collected in Ghana is rejected or downgraded due to design-related contamination, most commonly non-detachable labels, coloured PET, and incompatible caps.



These issues hinder high-value rPET production and increase processing costs. Despite growing awareness, producers lack incentives and technical guidance to redesign packaging. Pilot 2 explores chemical depolymerisation using glycolysis to produce virgin-equivalent PET monomers, in collaboration with technical universities and private innovators. This pilot provides an industry-facing testbed for voluntary eco-design adoption and standardisation.

6.2.2. Key Activities

a. Partner with three beverage brands to co-develop PET bottles using clear PET, embossed branding, and detachable labels.

b. Conduct side-by-side recyclability trials with existing and redesigned bottles.

c. Produce and distribute a national eco-design guide, with endorsement from GSA.

6.2.3. Success Criteria

a. 3 bottle prototypes tested under real-world collection and recycling conditions.

b. At least 1 partner adopts revised design into commercial production within 12 months.

c. Increased flake yield (by at least 20%) recorded at two participating recyclers.

6.2.4. Stakeholders and Roles

a. Beverage producers and bottlers: design revision and pilot implementation.

b. Ghana Standards Authority: verification and certification of eco-design outputs.

c. Recycling firms: evaluation of flake quality and processing efficiency.

d. Civil society (e.g. The OR Foundation): advocacy and consumer engagement.

6.3. Pilot 3: rPET Integration in Local Manufacturing - Kumasi and Tema

6.3.1. Context and Rationale

Ghana currently imports nearly all its food-grade PET preforms, despite local availability of recycled PET flakes. The gap between recyclers and manufacturers is driven by quality assurance concerns, lack of certification frameworks, and limited technical know-how in extrusion. This pilot aims to close the loop by testing bottle-to-bottle or flake-to-preform production using Ghana-sourced rPET.

6.3.2. Key Activities

a. Provide technical assistance to two local recyclers to meet food-grade standards.

b. Support one bottling plant to retrofit equipment for rPET extrusion or blending.

c. Facilitate third-party testing and certification with GSA and FDA oversight.

6.3.3. Success Criteria

a. At least 1 batch of food-grade rPET successfully extruded and tested.

b. Recycled content of up to 25% integrated into selected beverage bottles.

c. Certification pathway established and documented for domestic rPET producers.

6.3.4. Stakeholders and Roles

a. Recycling firms and bottling plants: core implementers and pilot hosts.

b. FDA and GSA: testing, safety verification, and standard development.

c. UNIDO: funding, technical advisory, and convening of national-level policy support.

d. Academia (e.g. KNUST): conduct LCA and process validation studies.

6. Pilot Design and Execution

Table 10. Pilot Titles, Locations, Objectives and Success Indicators

Pilot Title	Location(s)	Primary Objective	Success Indicator (First 6-12 Months)
Decentralised PET Buy-Back Hubs	Techiman, Ashaiman	Boost PET recovery and formalise informal actors	30+ tonnes recovered; 120 collectors registered; 25% litter drop
Eco-Design Demonstration and Product Standardisation	Accra Metro	Reduce contamination and improve recyclability	3 prototypes tested; 1 adopted; 20% increase in flake yield
rPET Integration in Local Manufacturing	Kumasi, Tema	Enable bottle-to-bottle or flake-to-preform reuse	1 rPET batch certified; 25% recycled content in products

7. Action Plan and Implementation Pathways

The action plan responds directly to the mapped hotspots identified through baseline diagnostics, addressing systemic inefficiencies and value loss in a phased, sequenced manner. The implementation horizon spans four years (2025-2028), structured around three integrated phases: foundation and stabilisation, demonstration and consolidation, and scaling with institutional integration.

7.1. Short-Term Actions (Years 1-2): Foundation and Hotspot Stabilisation

In this first phase, the priority is to target PET's most acute circularity failures, particularly those linked to uncontrolled leakage, unstructured informal collection, and poor product design. The interventions aim to stabilise recovery rates and build basic infrastructure around which more complex systems can evolve.

To address the widespread leakage of PET waste, especially in market centres such as Techiman and Ashaiman, two decentralised PET buy-back and aggregation hubs will be established. These will serve as structured recovery points, equipped with baling machines and basic weighing infrastructure, allowing PET waste to be sorted, tracked, and baled closer to source.

Around these hubs, over 300 informal PET collectors will be formally registered and trained.

Participants will receive protective equipment, collector ID cards, and participate in a digital logbook system that captures volumes collected. Collectors will also benefit from fair, stabilised prices to counteract the market volatility that typically erodes their earnings.

At the design end of the chain, PET packaging producers will be supported to pilot modifications such as detachable labels, standardised clear bottle formats, and compatible caps. Three beverage brands will test and release updated prototypes, with technical guidance to ensure they are compatible with existing recycling processes.

These pilots will be complemented by community-level engagement in five PET leakage hotspots, where campaigns will encourage households and commercial outlets to separate PET from other waste. These campaigns will use local radio, murals in public spaces, and school-based competitions to promote correct disposal behaviour and link it to visible outcomes.

7.2. Medium-Term Actions (Years 2-3): Demonstration and Circular Market Development

With initial systems stabilised, the second phase will demonstrate full recovery loops between collection, sorting, processing, and reuse, particularly targeting underdeveloped end-markets and quality assurance gaps. It focuses on horizontal consolidation of the PET recovery model and strengthening its commercial case. Building on early success, the PET hub model will be expanded to five additional cities, including Kumasi, Ho, Cape Coast, Tamale, and Koforidua, bringing structured PET recovery infrastructure to areas currently lacking safe aggregation spaces. Each new hub will aim to process at least 100 tonnes of PET per quarter, broadening geographic coverage.To improve traceability and quality control in the informal aggregation chain, a QR-coded sack system will be introduced. This will allow collectors and aggregators to record the origin, volume, and quality of materials collected, reducing instances of fraud and contamination.

7. Action Plan and Implementation Pathways

To demonstrate **local value addition** from **PET, small and medium enterprises** will be supported to develop products such as

PET-based textiles, fibre-fill, and interlocking bricks.

To demonstrate local value addition from PET, small and medium enterprises will be supported to develop products such as PET-based textiles, fibre-fill, and interlocking bricks. These demonstrations will use PET sourced from the pilot hubs and showcase their suitability for local applications with higher value retention. To ensure quality consistency, two PET recyclers will receive technical assistance to attain certification for food-grade or construction-grade rPET output. This will lay the foundation for higher-end reuse and improve investor confidence in local rPET supply chains.

In parallel, five Municipal and District Assemblies will be supported to revise their District Waste Plans to include PET-specific recovery targets and integration into broader waste services. These plans will align with national PET circularity goals and guide local enforcement and monitoring.

7.3. Long-Term Actions (Years 3-4): Scaling, Policy Integration, and Replication

The final phase scales successful interventions nationally and embeds PET circularity into policy and planning systems. It focuses on building lasting structures that secure PET circularity as a norm, not an exception.

All 261 MMDAs will be supported to integrate PET roadmap elements into their medium-term development frameworks and waste planning instruments. This will ensure consistent nationwide standards for PET recovery, aggregation, and circular use, and provide a policy base for enforcement. A national PET Recovery and Innovation Fund will be launched to address financial bottlenecks in transport and aggregation, particularly in low-density and rural areas. The Fund will offer matching grants, equipment support, and price guarantees where needed, backed by public and producer contributions. To close the loop, one local bottling plant will be supported to operationalise a bottle-to-bottle production line using food-grade rPET. This will demonstrate that safe, circular reuse of PET within Ghana's beverage sector is technically feasible and economically attractive.

Recycled content thresholds will be institutionalised through national labelling standards. Products containing ≥15% rPET will display a certification mark, developed in partnership with GSA, to support consumer trust and industry compliance. Finally, an EPR-backed incentive scheme will be implemented to reward brands that achieve and sustain high levels of rPET integration in their packaging. This will encourage innovation, drive demand for locally recycled material, and strengthen the viability of PET circularity across the country. To ensure a coherent and scalable transition, PET circularity interventions have been structured into short-, medium-, and long-term phases. Each phase targets specific hotspots, mobilises key actors, and delivers measurable outputs to progressively embed circular practices into national systems. Table 11 presents the summary.

7. Action Plan and Implementation Pathways

Table 11. Phased Summary

Phase	Timeline	Linked Hotspots	Key Outputs
Short-Term	2025-2026	Hotspots 1, 2, 4	Two PET hubs operational; 300 collectors formalised; eco-design pilots launched; waste separation campaigns in five districts
Medium-Term	2026-2027	Hotspots 3, 5	PET hubs in five new cities; rPET product demos; certification for two recyclers; PET integrated into five district plans
Long-Term	2027-2028	Hotspots 6, 7	PET embedded in 261 MMDAs; national Recovery Fund operational; rPET-certified bottle-to-bottle line in use; national rPET labelling and brand incentives rolled out

8. Monitoring, Reporting, and Verification (MRV)

A robust MRV framework is essential to track progress, maintain transparency, and course-correct the PET roadmap over time. The indicators selected span environmental, economic, and social outcomes, each aligned to key interventions and circular economy objectives. The framework is underpinned by accessible, low-cost digital tools, field audits, and participatory feedback loops.

8.1. Environmental KPIs

These indicators measure reductions in PET-related environmental burdens across Ghana. They focus on collection performance, recycling efficiency, and design improvements that reduce leakage and resource demand.

Table 12. Environmental KPIs

Indicator	Baseline (2024)	Target (2028)	Source/Method
PET Collection Rate (%)	~40%	≥75%	Aggregator records; Municipal waste audits
PET Recycling Rate (%)	~9%	≥30%	Recycler throughput logs; verified third-party audits
PET Leakage to Environment (%)	~36%	≤10%	Drain mapping; open dumping site sampling
Recycled PET Content in Bottles (%)	<3%	≥25%	Bottler reports; EPR compliance filings
Volume of Unsorted PET (tonnes/yr)	>90,000	<25,000	Sorting hub logs; bin composition audits

PET leakage, particularly from uncollected or poorly sorted waste, remains a key concern. As of 2024, roughly 1 in 3 PET bottles end up outside managed systems, equivalent to 10 Olympic swimming pools of plastic dumped annually. The 2028 target is to reduce this uncontrolled leakage by over two-thirds while tripling the national recycling rate.

8.2. Economic KPIs

These metrics capture the financial and material flows within the circular PET system, assessing both value recovery and investment mobilisation.

8. Monitoring, Reporting, and Verification (MRV)

Table 13. Economic KPIs

Indicator	Baseline (2024)	Target (2028)	Source/Method
Informal Collector Average Daily Income	~GHS 22 (£1.40)	≥GHS 40 (£2.55)	Collector surveys; aggregator payment logs
Volume of PET Processed Domestically	~14,000 tonnes/ year	≥40,000 tonnes/year	Recycler input records; hub bale logs
Private Sector Co-Investment Mobilised	<GHS 2 million	≥GHS 10 million	Business registry filings; investor pledges
rPET Market Penetration Rate (%)	<5%	≥20%	Industry reporting; GSA certification volumes
Unit Cost of Aggregated PET (GHS/ kg)	GHS 1.8	≤GHS 1.2	Aggregator financial statements; cost-benchmarking studies

Raising the daily income of PET collectors by 80% is a central equity goal of the roadmap. With increased efficiency, volume and price transparency, PET waste could move from a low-value nuisance to a stable income source. Expanding domestic rPET use fourfold will also reduce import dependence and improve Ghana's trade balance in packaging materials.

Raising the **daily income** of PET collectors by **80%** is a central **equity goal** of the roadmap. With increased efficiency, volume and price transparency, **PET waste** could move from a low-value nuisance to a stable income source.

8.3. Social KPIs

Social indicators measure inclusivity, empowerment, and transparency in the PET value chain. They are especially focused on vulnerable and underserved groups.

Table 14. Social KPIs

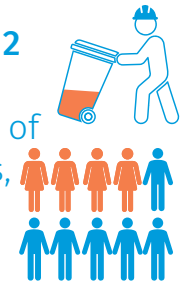
Indicator	Baseline (2024)	Target (2028)	Source/Method
% of Female Collectors Formalised	<15%	≥40%	Collector registry data; verification via audit teams
Youth Participation in PET Enterprises (%)	<10%	≥30%	Innovation challenge applicants; cooperative records

8. Monitoring, Reporting, and Verification (MRV)

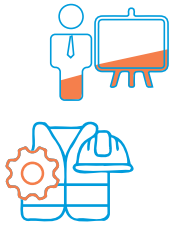
Indicator	Baseline (2024)	Target (2028)	Source/Method
PET Literacy and Awareness Score (1-5 scale)	~2.1	≥4.0	Pre/post campaign surveys; knowledge quizzes
Co-operative Membership Among Collectors (%)	~8%	≥50%	MMDA reports; cooperative membership logs
Reported Injuries/1000 Collectors (per year)	~52	<15	Health centre logs; field observation reports

PET recovery in Ghana is highly gendered and fragmented. By 2028, nearly 1 in 2 PET collectors are expected to be part of formal cooperatives, with at least 4 in 10 being women. Training, recognition, and safety equipment are key to reducing injury rates and strengthening dignity in PET work.

By **2028**, nearly **1 in 2 PET collectors** are expected to be part of formal cooperatives, with at least **4 in 10 being women**.



Training, recognition, and **safety equipment** are key to reducing **injury rates and strengthening** dignity in **PET work.**



8.4. Data Collection Tools

To support these KPIs, the roadmap adopts a hybrid monitoring approach using digital tools and in-person validation. All tools are designed to work in low-bandwidth and low-literacy environments.

a. **Mobile Logs:** QR-coded sacks, collector apps, and SMS-based data capture for PET volumes and locations.

b. **Periodic Audits:** Waste composition studies, facility visits, and unannounced field inspections in target zones.

c. **Household Surveys:** Awareness and behaviour tracking via community enumerators using local languages.

d. **Recycling Hub Dashboards:** Web-linked monitoring of bales processed, sorted material volumes, and contamination rates.

e. **Visual ID Systems:** For verifying collector participation, PPE usage, and cooperative registration in real-time.

8. Monitoring, Reporting, and Verification (MRV)

Table 15. PET MRV Framework

KPI Area	No. of Indicators	Tools Used	Review Frequency
Environmental	5	Waste audits, flow tracking logs	Quarterly and annual
Economic	5	Aggregator logs, investor declarations	Bi-annual
Social	5	Surveys, registry data, health logs	Annual and midterm
Verification	-	Mobile logs, field audits, dashboards	Ongoing + Spot checks

9. Financing Strategy and Investment Mobilisation

Financing PET circularity in Ghana demands a blended strategy that can unlock early-stage infrastructure, de-risk private capital, and sustain operational efficiency. The roadmap prioritises scalable, locally anchored interventions that require moderate capital investments but offer high environmental and social returns. The total investment envelope has been framed around the critical interventions identified in the opportunity mapping, including infrastructure, systems integration, and incentives. Table 16 presents the cost estimates.

Table 16. Cost Estimates for Priority Interventions

Intervention	Estimated Cost (USD)	Notes
Pilot PET Hubs in Ashaiman and Techiman	$160,000	Covers site rental, balers, weighing scales, PPE, and basic ICT tools
Expansion to Five Additional PET Hubs	$450,000	Includes training, logistics and digital systems for scale-up cities
PET Design Innovation and Manufacturer Support	$90,000	Supports three brands in prototyping recyclable PET formats
Digital Tracking and QR-Based Monitoring	$80,000	Development of mobile tracking tools for collectors and aggregators
PET Recovery and Innovation Fund (Initial Pool)	$850,000	Grant + matching fund to support transport, tech pilots, and start-ups
Capacity-Building and Awareness Campaigns	$120,000	Local radio, murals, workshops, and PET school programmes
Food-Grade rPET Certification for 2 Recyclers	$200,000	Includes audits, technical assistance and testing infrastructure
National rPET Labelling and Compliance System	$95,000	GSA development, consumer testing, brand onboarding
Bottle-to-Bottle Demonstration Line	$1.4 million	Covers retrofitting a bottling line to integrate certified rPET

Total indicative cost across three years: ~$3.45 million USD

9. Financing Strategy and Investment Mobilisation

9.1. Funding Sources

A diversified financing approach will be essential, mobilising public, philanthropic, and commercial actors.

a. Public Funding

Government support through the Ministry of Environment and MMDAs will be necessary to anchor buy-back pricing schemes, campaign logistics, and local PET planning integration.

b. Donor Agencies

Development partners such as the UN system, European Union, and UK FCDO are expected to contribute to innovation pilots, food-grade certification, and early training interventions, especially those with climate and inclusion co-benefits.

c. Private Sector Co-Investment

PET bottlers and recyclers will be required to co-invest in design upgrades, traceability systems, and collection infrastructure. This may include performance-based contributions linked to EPR benchmarks or product stewardship schemes.

9.2. De-Risking Mechanisms

To encourage private investment and mitigate exposure to price fluctuations and collection inefficiencies, a suite of de-risking tools will be deployed:

a. Guarantee Funds

Price floor guarantees for PET collected in rural and low-density areas to ensure investor confidence in demand.

b. Innovation Prizes

Competitive grants awarded to PET SMEs and tech innovators solving challenges in PET reuse, sorting, or reprocessing at scale.

c. Transport Subsidy Vouchers

Issued to PET aggregators serving peri-urban or rural zones to offset rising fuel and logistics costs which otherwise erode profitability.

d. Performance-Based Co-Financing

Risk-sharing agreements where brands or recyclers receive match-funding only after meeting verified recovery or design milestones.

9.3. Investment Instruments

a. PET Investment Prospectus

A detailed investment case document showcasing costs, returns, and environmental outcomes, to be used for donor and investor outreach.

b. Producer Responsibility Credits Tradable

Recovery performance credits under a future EPR mechanism, rewarding over-performance and allowing brands to offset gaps.

c. Revolving Community Finance Window

Micro-loans for PET cooperative members to buy collection gear, tricycles or open storage bays, backed by recycled revenue from PET bales.

Beyond conventional funding, mechanisms such as Producer Responsibility Credits, a PET Investment Prospectus, and community-level revolving finance windows offer innovative pathways to crowdfunding in both private and public capital. Table 17 highlights the key instruments and actors essential to financing the PET circular transition.

9. Financing Strategy and Investment Mobilisation

Table 17. Financing Strategy Overview

Instrument/Mechanism	Purpose	Lead Actor(s)
PET Hubs and Infrastructure	Build PET collection and baling infrastructure	Aggregators, MMDAs
Recovery and Innovation Fund	Scale local PET solutions and SMEs	Donors, recyclers, start-ups
Innovation Prizes + Transport Vouchers	Reduce innovation and logistics risks	MESTI, MMDAs, private sector
rPET Labelling and Certification	Create trust in recycled content	GSA, FDA, recyclers, brands
Bottle-to-Bottle Investment	Demonstrate closed-loop PET reuse	Bottlers, industrial recyclers

10. Capacity Development and Institutional Strengthening

The successful transition to a circular PET economy in Ghana hinges on a deep and sustained investment in human capacity and institutional coherence. Given the widespread informal participation and the systemic knowledge gaps identified during the opportunity mapping phase, capacity-building interventions must span collectors, processors, regulators, educators, and local government actors. Each module and initiative is rooted in specific gaps and opportunities observed across the PET value chain.

10.1. Modular CE Training Curriculum

A multi-actor training ecosystem is required to support PET circularity. Training will be modular, language-accessible, and tailored to the different functions across the chain.

a. Plastic Recovery Collectors' Cooperatives and Groups

To formalise practices, improve safety, and introduce sorting protocols. Modules will include PET grade identification, use of protective equipment, and safe handling.

b. Municipal Environmental Health Officers (MMDAs)

To support the integration of PET management into local waste plans and enforce sorting and disposal standards.

c. Small Aggregators and Middlemen

To professionalise bale handling, grading of materials, and participation in digital traceability systems.

d. Recyclers and Reprocessors

To improve knowledge on international rPET standards, food-grade certification requirements, and contamination reduction.

e. Packaging Manufacturers and Brand Designers

Focused on eco-design principles such as material reduction, bottle standardisation, and recyclability features (e.g. detachable labels, transparent PET).

f. Technical Training Institutes and Polytechnics

To introduce PET recovery and recycling modules into existing vocational education frameworks.

g. University of Cape Coast (UCC) and KNUST

Leading academic integration, including curriculum development in sustainability and circular economy tailored to plastics.

h. Ghana Standards Authority (GSA)

Responsible for training and certifying rPET packaging and ensuring labelling schemes are aligned with international best practice.

i. FDA (Food and Drugs Authority)

For training on health and safety considerations tied to food-contact PET and recycled material usage.

j. National Service Secretariat and Youth Employment Agency

To deploy trained youth as CE ambassadors in PET hotspots and aggregation hubs.

k. Training modules for informal sector actors and recycling operators will include:

- *PET resin type and colour identification;*
- *Safe use and maintenance of balers and sorters;*
- *Contamination recognition and prevention;*
- *Food-grade compliance requirements;*
- *Safe handling and PPE use during sorting and granulation*

10. Capacity Development and Institutional Strengthening

10.2. Extension Officer Upskilling

Many MMDAs and district authorities lack PET-specific technical support. The roadmap proposes upskilling at least 100 municipal extension officers across target regions within the first 18 months. These officers will be trained to:

a. Monitor PET leakage and unsorted waste flows.

b. Support community-led PET segregation and drop-off schemes.

c. Enforce compliance on non-recyclable PET packaging bans.

d. Act as PET focal points in regional circular economy forums.

The intention is for each officer to function as both a technical enabler and a behavioural change agent at the local level.

10.3. Vocational Partnerships

Strong partnerships with vocational institutions will provide an entry route for youth and women into the PET value chain. Interventions include:

a. Collaborations with NVTI (National Vocational Training Institute) to offer accredited modules on PET collection, baling and processing.

b. Equipment donations (weighing scales, baling kits) to pilot schools in Ashaiman and Techiman for practical training.

c. Job-matching programmes linking graduates with recyclers, cooperatives and sorting hubs.

At least 5 vocational institutions are expected to deliver PET-specific courses by Year 3.

10.4. Institutional Integration

To ensure long-term sustainability, PET capacity-building must be embedded within broader planning and regulatory systems:

a. a. Management Plans

PET-specific action points to be reflected in medium-term development frameworks at MMDA level.

b. Inclusion in CE Curricula at Tertiary Institutions

Both UCC and KNUST are expected to lead on embedding circularity themes within their engineering, planning and business programmes.

c. Institutionalised CE Units within Selected MMDAs

PET governance to be overseen by dedicated circular economy focal persons housed in district assemblies.

d. National Circular Economy Council (NCEC) Oversight

PET performance and capacity development reports to be reviewed bi-annually as part of broader CE governance.

10. Capacity Development and Institutional Strengthening

Table 18. PET Capacity Development Priorities

Component	Lead Actors	Target Outcome by 2028
Collector and Aggregator Training	Cooperatives, NGOs, MMDA units	≥2,000 trained; ≥60% formalised
Vocational Curriculum Integration	NVTI, Technical Institutes	PET courses in ≥5 institutions
Academic and Policy Curriculum	UCC, KNUST, GSA	PET modules in ≥3 degree programmes
Regulatory Capacity (rPET, FDA)	FDA, GSA, MoTI	2 certified recyclers; national rPET label in use
District-Level PET Planning	MMDAs, NDPC	PET included in ≥20 district waste plans
Youth Mobilisation & Placement	NSS, YEA, Recycling Firms	500 CE-trained youth engaged in PET roles

11. Governance and Integration Framework

Effective governance is critical to ensure that PET-related circular economy interventions are coherent, coordinated, and embedded across national, regional, and district levels. The governance structure builds on existing institutions, policy mandates, and ongoing decentralisation mechanisms in Ghana, ensuring clear roles, accountability, and alignment with broader environmental and economic goals.

11.1. Multi-Level Governance Structure

a. National Level

The National Plastic Action Partnership (NPAP), anchored by the Ministry of Environment, Science, Technology and Innovation (MESTI), will serve as the overarching platform for PET circularity governance. Under this, a dedicated PET Sub-Committee is proposed to coordinate technical planning, standards development, and national stakeholder alignment. Supporting actors include the Ghana Standards Authority (GSA), Food and Drugs Authority (FDA), Environmental Protection Agency (EPA), and the Ghana Recycling Initiative by Private Enterprises (GRIPE). Their responsibilities span regulation, certification, and private sector mobilisation.

b. Regional Level

At the regional tier, coordination will be led by the Regional Coordinating Councils (RCCs), which will oversee the adaptation of national PET strategies to reflect zone-specific dynamics. PET focal persons within each RCC will be responsible for harmonising activities between municipal and national stakeholders, tracking implementation progress, and supporting peer learning across districts.

c. District Level

District Assemblies and their Waste Management Departments will be central to on-the-ground delivery. CE focal persons will be appointed in each MMDA, tasked with local stakeholder engagement, PET hotspot monitoring, and integrating PET-related actions into local development plans. Local task forces, including informal sector representatives, youth groups, and women's cooperatives, will support campaign delivery and feedback loops.

11.2. Integration into National Planning and Policy Systems

To ensure systemic coherence and budgetary alignment, PET-related interventions will be formally integrated into the following mechanisms:

a. Medium-Term National Development Policy Framework (MTNDPF)

PET-specific goals and targets will be embedded in the MTNDPF, ensuring alignment with Ghana's broader economic, social, and environmental development agenda.

b. District Medium-Term Development Plans (DMTDPs)

Each target district will include PET collection, recovery, and awareness targets in their development plans, complete with performance indicators and budget allocations.

c. National Circular Economy Strategy

The PET Roadmap will serve as a model for sector-specific circularity planning within Ghana's upcoming CE Strategy, with lessons feeding into broader plastics governance.

d. Extended Producer Responsibility (EPR) Regulations

As PET is a primary packaging material, it will feature prominently in Ghana's EPR framework, with recovery obligations, reporting requirements, and offsetting mechanisms monitored centrally.

11.3. Institutionalisation and Oversight

Oversight and institutional memory are critical to sustaining momentum and ensuring accountability. Key mechanisms include:

a. Annual PET Circularity Review Forum

A national multi-stakeholder forum will be held to review performance, showcase innovations, and refresh policy commitments. Participation will include government, private sector, academia, and informal sector representatives.

b. PET Performance Scorecard

A publicly available dashboard will track PET collection, recycling, eco-design compliance, and leakage reduction. Data will feed into national CE monitoring tools.

c. Integration with NDPC Results Framework

PET indicators (e.g. collection rates, rPET uptake) will be tracked through the National Development Planning Commission's (NDPC) results framework, ensuring consistency in performance monitoring across sectors.

d. CE Governance Units in MMDAs

Select high-volume PET districts will host Circular Economy Units within their administrative structures, responsible for local oversight, reporting, and stakeholder coordination.

Table 19. PET Governance and Integration

Level	Key Institutions	Function
National	MESTI, EPA, GSA, FDA, GRIPE, NPAP	Strategy development, standardisation, private sector alignment
Regional	RCCs, PET focal persons	Coordination, monitoring, regional adaptation
District	MMDAs, CE focal persons, Waste Management, Departments, Environmental Health	Implementation, planning integration, local engagement
Policy Systems	NDPC, MTNDPF, DMTDPs, EPR Framework	Budgeting, legal enforcement, and mainstreaming
Oversight Tools	PET Sub-Committee, Scorecards, Annual Forum	Transparency, accountability, learning

12. Communications, Behavioural Change and Cultural Shifts

The success of the PET circular economy strategy in Ghana relies not only on infrastructure and policy, but also on the widespread adoption of new behaviours, attitudes, and cultural norms regarding plastic waste. Communication strategies must speak to diverse audiences, particularly informal workers, households, and youth, and must bridge gaps in literacy, language, and media access. Interventions should blend storytelling, visual communication, peer engagement, and recognition schemes, rooted in the lived experiences of affected communities.

12.1. Storytelling and Recognition

a. Community Videos and Micro-Documentaries

Short, locally produced video stories will highlight PET recyclers, women aggregators, and innovative youth-led recovery groups. These stories will focus on impact, pride, and personal agency in changing the plastic narrative. Videos will be subtitled in major Ghanaian languages for accessibility.

b. Annual Recognition Awards for PET Champions

Local assemblies, private firms, and NGOs will co-host an annual awards ceremony to honour outstanding individuals and cooperatives working in PET recovery and recycling. Categories will include "Youth PET Champion," "Women in PET Circularity," and "Eco-Design Innovation of the Year."

c. PET Role Model Ambassadors Programme

Influential figures, including community leaders, local celebrities, and student union leaders, will be trained and profiled as PET Circularity Ambassadors to model sustainable behaviours and influence public sentiment.

d. Neighbourhood 'PET Hero' Spotlights

Posters and short write-ups will be displayed in public areas to showcase informal PET workers making a difference in their communities.

e. A national recognition and awards scheme:

Recognition and awards scheme for MMDAs will be introduced to highlight MMDAs that demonstrate excellence in plastic waste management. The initiative will promote visibility and accountability by rewarding local governments that implement effective collection systems, support public education on segregation and recycling, engage informal sector actors, and reduce plastic leakage.

12.2. Local Language and Low-Literacy Messaging

a. Local Radio Jingle Series: "PET Back to Value"

A set of catchy jingles and skits will be aired in Akan, Ewe, Ga, and Dagbani across community radio stations to reinforce the economic and environmental benefits of PET segregation and return.

b. Wall Murals and PET Messaging Visuals in Public Spaces

Colourful murals will be painted in PET hotspot areas such as Ashaiman and Techiman. These will use imagery to show the lifecycle of a PET bottle, from consumption to recycling and rebirth as a new product.

c. Information Leaflets with Visual Infographics

Leaflets will avoid heavy text and instead feature step-by-step pictorial guides on how to sort, clean, and deposit PET.

d. Drama Sketches and Community Theatre

Mobile theatre groups will perform short plays at markets and festivals, illustrating the social and economic harm of plastic leakage and the benefits of community-led collection efforts.

12.3. Community-Led Channels

a. School-Based PET Clubs and Competitions

Primary and secondary schools will host PET-themed essay and art competitions, and clubs will be established to promote ongoing learning and stewardship among students.

b. Faith-Based Outreach Platforms

PET circularity messages will be incorporated into sermons, mosque announcements, and church youth group meetings in areas where religious institutions are highly influential.

c. Market Associations and Traders' Committees

Engagement with market queens and trader unions will facilitate distribution of PET sorting bins and ongoing education among sellers and transporters.

d. Mobile PET Exhibition Unit

A PET-focused mobile unit will visit universities, town squares, and bus terminals, displaying recycled products and offering interactive demonstrations.

Table 20. PET Communications and Cultural Change Channels

Intervention Type	Examples/Tools	Target Audience
Storytelling & Recognition	Videos, PET Champions Awards, Role Model Ambassadors	General public, youth, informal sector
Low-Literacy Messaging	Jingles, murals, leaflets, visual guides, community theatre	Low-literate audiences, households
Community-Led Engagement	PET school clubs, faith outreach, market sensitisation	Students, worshippers, traders
Mobile & Rotational Tools	PET exhibitions, live demos, town hall events	Urban residents, youth, commuters

13. Circular Business Model Incubation and Scaling

To translate circular economy strategies into locally rooted impact, three PET-specific business models have been selected for incubation. These models are anchored in verified opportunity mapping data, prioritised hotspots, and pilot activities. They address distinct leakage points in Ghana's PET value chain, spanning upstream design, midstream collection, and downstream reuse. Each model reflects a core circular economy archetype—resource recovery, design for circularity, and circular input replacement—and has been tailored for feasibility in the Ghanaian context while delivering measurable environmental, economic, and social outcomes.

Table 21 outlines these business models: a Mobile PET Recovery and Sorting Enterprise targeting low collection rates, an Eco-Design and Lightweighting Packaging Hub to enhance recyclability, and a Local rPET Manufacturing Cooperative focused on downstream value creation. Their projected outcomes are detailed in Table 22, showing promising revenue generation (ranging from $80k to $250k annually per model), substantial waste diversion (up to 150 tonnes/year per enterprise), and inclusive social benefits such as youth employment, women's economic empowerment, and SME capacity building.

To ensure successful implementation and scale-up, Table 23 highlights the readiness pillars and support needs for each model, including access to appropriate technology, flexible financing instruments, enabling regulatory frameworks, and reliable market linkages. Together, these business models and their enabling mechanisms offer a scalable path for advancing PET circularity and inclusive green entrepreneurship in Ghana.

Table 21. Business Models Identified

Business Model	Typology	Problem Addressed	Core Opportunity
Mobile PET Recovery and Sorting Enterprise	Resource Recovery	Over 1 in 2 PET bottles remain uncollected, especially in peri-urban and informal areas	Improve recovery rates by embedding digital traceability and incentivised sorting
Eco-Design and Lightweighting Packaging Hub	Design for Circularity	Low recyclability due to multilayer bottles, coloured PET, and heavy-weight formats	Support manufacturers in redesigning packaging to increase rPET compatibility
Local rPET Product Manufacturing Cooperative	Circular Input	Less than 10% of collected PET is repurposed locally; most rPET lacks end-use market in Ghana	Stimulate demand through local manufacture of useful, high-uptake rPET-based products

13. Circular Business Model Incubation and Scaling

Table 22. Projected Returns by Model

Model	Economic Return (3-year)	Environmental Return	Social Return
Mobile PET Recovery and Sorting Enterprise	$120k-$150k annual revenue per unit; ~12 full-time jobs/unit	150 tonnes/year diverted from open dumps per unit - equal to 10 Olympic pools of PET bottles	Direct youth employment; financial inclusion through mobile payments; reduction of informal exploitation
Eco-Design and Lightweighting Hub	$250k revenue/ year from redesign services, lab testing, and licencing	~20% reduction in virgin PET demand per client brand; GHG reductions of up to 12% per lightweighted bottle	SME capacity-building in eco-design; supports local innovation and EPR readiness
rPET Manufacturing Cooperative	$80k-$100k revenue/year; 60% community reinvestment	Creates demand for 80-100 tonnes of rPET/year; prevents re-export and landfilling	Empowers women in production; cooperative-led social enterprise; product diversification for rural areas

Table 23. Readiness Pillars and Support Needs

Readiness Pillar	Support Needs by Model
Technical Readiness	Sorting tech, baling and weighing tools, packaging redesign labs, product moulds for Rpet
Financial Viability	Seed grants ($15k-$40k), matched donor-private co-investment, subsidised loan schemes
Policy & Regulatory Fit	PET drop-off site permits, labelling standards for eco-design, cooperative registration, EPR-linked incentives
Market Development	Offtake agreements with recyclers and FMCGs, inclusion in public procurement, access to design challenges or fairs

13.1. Incubation Support Mechanisms

To ensure the success and sustainability of emerging PET circular ventures, tailored incubation support is essential. A suite of mechanisms has been designed to strengthen entrepreneurial capacity, facilitate investment readiness, and enable policy engagement. These include Demo Days to spotlight innovations, Roundtables to address systemic constraints, and technical and business training co-led by leading universities. In-kind support through shared infrastructure and maker spaces further lowers entry barriers for start-ups working in resource recovery and circular manufacturing:

13. Circular Business Model Incubation and Scaling

a. Demo Days

Quarterly showcases hosted by the PET Sub-Committee, featuring live product demos and investor pitches.

b. Innovation Roundtables

Thematic policy-entrepreneur dialogues to unlock bottlenecks, e.g., EPR integration, import duties on rPET machinery.

c. Pre-incubation Training

UCC and KNUST will co-deliver modular CE entrepreneurship training with a focus on business modelling, impact accounting, and product-market fit.

d. Access to Makerspaces and Shared Tooling

Entrepreneurs will receive in-kind support including access to injection moulders, PET shredders, and basic analytics labs in Kumasi and Tema.

13.2. Scaling Path

As Ghana seeks to unlock scalable solutions for PET circularity, targeted business models offer promising avenues for environmental and economic transformation. Table 24 outlines a phased scaling pathway, moving from proof-of-concept ventures to regional replication, supported by institutional partnerships and enabling policy tools. Complementing this, Table 25 highlights three circular business models with strong potential to drive inclusive green growth, each demonstrating clear revenue potential, measurable environmental benefits, and social impact across diverse communities.

Table 24. Scaling Path

Phase	Timeline	Key Outputs
Proof-of-Concept	Year 1-2	6 ventures launched (2 per model); access to seed funding, technical support, and local pilots
Institutional Partnerships	Year 2-3	Linkage to EPR funds, public-private offtake agreements, participation in CE product certification schemes
Regional Replication	Year 3-4	At least 2 additional districts engaged per model; formation of multi-district cooperatives; policy recognition

13. Circular Business Model Incubation and Scaling

Table 25. PET Circular Business Models and Returns

Model	Typology	Revenue (3-year)	Environmental Impact	Social Impact
Mobile PET Recovery & Sorting Enterprise	Resource Recovery	$120k-$150k per year/unit	150 tonnes/ year diverted; 10 Olympic pools saved	Youth employment; mobile financial inclusion
Eco-Design Packaging Hub	Design for Circularity	$250k per year	20% virgin PET reduction; 12% GHG saving	SME eco-design capacity and compliance pathways
rPET Manufacturing Cooperative	Circular Input	$80k-$100k per year	100 tonnes/year rPET demand; landfill diversion	Women-led employment; rural product innovation

14. Alignment with the Project M&E Strategy

The PET Circular Economy Roadmap is not an isolated planning tool; it is designed to integrate fully with the overarching M&E framework of the national plastics programme. This alignment ensures that interventions translate into verifiable, high-quality results across environmental, economic, and social domains.

14.1. Environmental Performance and Circularity Gains

The roadmap's environmental ambitions are rooted in the material footprint, leakage points, and processing inefficiencies highlighted in both the baseline diagnostics and the M&E reporting sheets. By targeting PET, which accounts for a disproportionately high share of litter in waterways and urban drains, the roadmap contributes to measurable reductions in waste volumes in public spaces.

For example, the roadmap supports the indicator on "tonnage of plastic waste diverted from unmanaged disposal," with PET-specific pilots designed to divert approximately 98,000 tonnes annually by 2028, a significant increase from current levels (just over 30% of total PET waste collected). This is directly linked to the expansion of recovery infrastructure and urban aggregation systems, which the M&E reports have flagged as a persistent bottleneck.

Additionally, PET pilots focus on increasing the share of recycled content in locally manufactured products, one of the environmental impact indicators already tracked. Moving from <2% recycled PET content in 2023 to a projected 20% by 2028 will reduce demand for virgin resin and cut associated carbon emissions, aligning with national climate commitments reported in the M&E framework.

14.2. Economic Empowerment and Enterprise-Level Indicators

The M&E system places strong emphasis on local enterprise development, cooperative formation, and income generation, all of which are core outcomes of the PET roadmap.

Pilot interventions for PET sorting, flake production, and end-product innovation are structured to strengthen informal-to-formal transitions. The roadmap aligns with indicators such as "number of functional micro-enterprises supported" and "increase in average monthly income among target waste workers." For instance, by enabling price transparency and building direct linkages between aggregators and recyclers, the roadmap aims to lift collector incomes by 30–50%, a figure drawn from price recovery gaps recorded in the project's market diagnostics and M&E performance reports.

The PET Incubation Hub, described in Step 13 of the roadmap, further supports outcome-level targets related to enterprise incubation and job creation, especially for youth and women. The roadmap's business model support framework aligns tightly with the M&E indicator tracking the "number of circular business models prototyped and tested," with three PET-specific models already in pilot planning or early execution.

14.3. Social Inclusion and Cultural Transition

The PET roadmap has strong social alignment with the M&E system's focus on inclusive participation, gender equity, and behavioural change.

Indicators such as "number of women trained in CE-related skills," "community awareness levels on plastic recovery," and "household-level segregation adoption" are all supported directly by the roadmap's community campaigns and modular training packages. The roadmap's target to ensure at least 40% female participation in training programmes reflects both a realistic stretch and a direct M&E reporting requirement.

Moreover, behavioural change metrics, previously tracked through household surveys, are now

14. Alignment with the Project M&E Strategy

embedded in roadmap implementation through initiatives like PET buy-back campaigns and school-led PET art contests. These initiatives serve both cultural and environmental functions, helping shift PET from 'waste' to 'value' in the public imagination, a key dimension of sustainable systems change flagged in the M&E reviews.

a. Tools, Tracking, and Evidence Architecture

The PET roadmap reinforces and operationalises many of the M&E tools described in the monitoring framework. This includes:

- Mobile tracking logs to monitor PET collection and sorting volumes by cooperative.
- Periodic audits of pilot hubs and recovery stations to verify performance against baseline benchmarks.
- Community and household surveys to evaluate shifts in attitudes, practices, and participation levels.

By incorporating these into its MRV system (Step 8), the roadmap ensures real-time data availability for quarterly and annual reporting.

b. Institutional Learning and Adaptive Response

Finally, the roadmap institutionalises feedback loops in line with M&E recommendations for adaptive implementation. These include:

- Quarterly regional review labs involving PET pilot teams and local government focal points to review performance, troubleshoot delays, and adapt methods.
- Annual CE Learning Summits to gather insights across material types and share them with national decision-makers, ensuring that PET learnings inform broader policy refinements.
- Mid-term evaluation triggers based on pilot KPIs, such as flake purity levels, aggregation volumes, or training completion rates, to determine continuation or pivoting of initiatives.

15. Risks and Mitigation Measures

The successful implementation of the PET Circular Economy Roadmap in Ghana hinges on navigating a set of technical, operational, and social risks. These risks, if not proactively mitigated, could compromise material recovery rates, product quality, and equitable participation across the value chain. Implementation of the PET roadmap may face technical and operational risks which include:

15.1. Contamination from Mixed Plastics and Food Residue

PET waste often enters the recycling stream contaminated with organic matter or co-mingled with other polymers such as PP or PVC. This undermines the quality of recyclate and limits applications in food-grade or high-value products.

Mitigation Strategy:

a. Deploy segregated bins at community collection points, differentiated by PET colour and polymer type.

b. Conduct routine sensitization campaigns targeting households, schools, and informal aggregators to promote source separation.

c. Introduce basic rinsing and sorting protocols for informal collectors and at aggregation centres.

15.2. Inconsistent Feedstock Supply for Chemical Recycling

Chemical depolymerization of PET requires a stable and predictable volume of clean, high-quality feedstock to be economically viable. Supply variability from informal sources may threaten process continuity.

Mitigation Strategy:

a. Establish structured aggregation contracts with major collection points and waste cooperatives.

b. Introduce incentive-based reverse logistics programs with retailers and bottled water producers.

c. Develop buffer storage systems at pilot facilities to accommodate supply fluctuations.

15.3. Equipment Failure or Maintenance Gaps

Mechanical and chemical PET recycling facilities requires consistent machine uptime. Inadequate maintenance or limited access to trained technicians can result in operational delays and revenue loss.

Mitigation Strategy:

a. Implement preventive maintenance schedules aligned with OEM guidelines.

b. Partner with TVET institutions and equipment suppliers to train local operators and technicians on machine care and troubleshooting.

c. Include renewable energy components (e.g., solar back-up systems) to reduce dependency on erratic grid supply.

15.4. Difficulty Achieving Food-Grade Quality Standards

Achieving food-grade rPET, particularly for bottle-to-bottle recycling, demands stringent quality assurance protocols and compliance with international standards. Variation in flake purity and processing conditions can hinder product certification.

Mitigation Strategy:

a. Establish quality checkpoints across the recycling chain, including hot-wash processes, IV (Intrinsic Viscosity) testing, and NIR spectroscopic scanning.

b. Adopt and align processes with relevant EU food-grade rPET regulations (e.g., EC No. 282/2008) and Ghana's FDA requirements.

c. Foster partnerships with brands and regulatory agencies for quality co-validation and pilot product testing.

15.5. Exclusion of Informal Sector and Vulnerable Groups

Formalization of the recycling value chain could unintentionally displace or marginalize informal waste pickers, many of whom are women and youth reliant on PET for income.

Mitigation Strategy:

a. Integrate informal workers through cooperatives and performance-based contracting.

b. Design inclusive training programs that offer both technical skills (e.g., PET sorting, baler use) and business literacy (e.g., pricing, safety, and entrepreneurship).

c. Set social inclusion targets in project implementation, ensuring that at least 30–40% of direct beneficiaries are drawn from informal, youth, or women-led groups.

16. Conclusion

The PET Circular Economy Roadmap sets out a targeted, measurable, and implementable pathway for addressing one of Ghana's most visible and persistent plastic waste challenges. By focusing on polyethylene terephthalate (PET), a material that is widely used, technically recyclable, but under-recovered, the roadmap offers a practical approach to transform linear consumption patterns into regenerative loops.

Drawing on robust data from the national Circular Economy Opportunity Mapping and value chain analysis, the roadmap links material flow bottlenecks and leakage points with concrete interventions. These include improved collection systems, decentralised sorting infrastructure, closed-loop recycling pilots, and inclusive business models that uplift informal actors. It also embeds alignment with the national Monitoring & Evaluation framework, ensuring that interventions can be tracked for environmental, economic, and social performance over time.

With recovery rates currently below 30% and recycled content in PET products under 2%, Ghana stands to gain significantly from even modest improvements in PET circularity. The roadmap targets a 75% PET collection rate and a substantial increase in domestic flake production and local reintegration of recycled content. These outcomes are achievable through coordinated stakeholder action, strategic investment, and the mobilisation of public-private partnerships.

Most importantly, the roadmap is designed not only to reduce pollution and import dependency but also to unlock new forms of employment, enterprise, and innovation. By elevating PET from a waste problem to a strategic resource, Ghana can strengthen its urban resilience, support climate targets, and foster a more inclusive circular economy. The roadmap is not an end point, but a structured beginning, a tool for enabling change that is systemic, measurable, and long overdue.

Most importantly, the roadmap is designed not only to reduce pollution and import dependency but also to unlock new forms of employment, enterprise, and innovation. By elevating PET from a waste problem to a strategic resource, Ghana can strengthen its urban resilience, support climate targets, and foster a more inclusive circular economy. The roadmap is not an end point, but a structured beginning, a tool for enabling change that is systemic, measurable, and long overdue.

17. Appendix: Roadmap KPI Matrix

The table below presents all identifiable KPIs categorised as either vertical (function-specific) or horizontal (cross-cutting). Each entry includes:

a. Baseline metric: Value or condition at roadmap start.

b. KPI: The measurable target or output to be achieved.

c. Action required: The intervention/activity that drives change.

d. Broader CE indicator: Overarching theme the KPI contributes to.

e. KPI Category: Vertical or horizontal.

f. TBL Score: Triple Bottom Line impact (Economy, Environment, Social), each rated out of 5.

Table 26. Roadmap KPI Matrix

Baseline Metric	KPI	Action Required	Broader CE Indicator	Category	TBL Score (Econ.Env. Soc)
~30% PET collection rate	Raise to ≥75% by 2028	PET drop-boxes, municipal pilots	Resource efficiency	Horizontal	5.5.4
<2% recycled PET content in products	Reach ≥15% by 2028	Enforce recycled content quotas, industry incentives	Material substitution	Horizontal	5.4.4
1 PET sorting hub (Accra	≥4 PET sorting hubs operational	Construct zonal hubs via co-investment	Infrastructure access	Vertical	4.5.3
64% recyclers accept PET	Raise to ≥80% by 2027	Strengthen PET flake supply, recycling incentives	Processing readiness	Vertical	4.3.4
PET widely burnt/ discarded	20% reduction in PET litter in open areas	Awareness + enforcement + collection	Leakage prevention	Horizontal	3.5.4
10–20% PET recovered by informal sector	Formalise PET recovery system	Cooperative model, PPE support	Inclusion and safety	Horizontal	3.2.5
0 pilots implemented	3 PET pilots launched	Launch collection, flake production, and reuse schemes	Innovation testbed	Horizontal	4.4.4
GHS 0 revenue baseline for PET workers	Income uplift of ≥20%	Pilot-based job tracking	Livelihood enhancement	Horizontal	5.2.5

17. Appendix: Roadmap KPI Matrix

Baseline Metric	KPI	Action Required	Broader CE Indicator	Category	TBL Score (Econ.Env. Soc)
No CE-trained PET stakeholders	≥300 actors trained	Modular CE curriculum rollout	Skills development	Vertical	4.1.5
PET among top 3 in ocean leakage	Leakage tracked in 6 hotspots	Deploy mobile tools and community mapping	Pollution control	Horizontal	4.5.3
0 PET drop-off partnerships	≥50 retail/ market PET drop-off points	Engage retail, churches, markets	Collection expansion	Vertical	4.4.4
0 EPR scheme targeting PET reuse	EPR scheme implemented with PET targets	Regulator engagement, pilot compliance scheme	Policy enforcement	Horizontal	3.3.4
0 PET-specific media campaigns	6-month rotating campaign across 3 regions	Billboard, radio, influencer strategy	Public awareness	Horizontal	3.1.4
0 community reuse showcases	Annual PET Demo Day	Select pilot town and demonstrate end-uses	Community buy-in	Horizontal	4.1.4
0 PET art/ social campaigns	≥3 PET reuse/ repurpose events per year	Partner with schools, art centres	Culture shift	Horizontal	2.2.5
0 PET tracer study	Pilot PET flow tracking by 2026	QR code labels, mobile logging	Traceability	Vertical	3.4.3
0 PET data from households	Household PET audit repeated yearly	Baseline then annual sample (urban/rural)	Evidence for scale	Horizontal	2.4.3
0 PET mobile app adoption	Mobile reporting tool used by 3 MMDAs	Co-develop with digital partner	Digital MRV	Vertical	2.2.4

17. Appendix: Roadmap KPI Matrix

Baseline Metric	KPI	Action Required	Broader CE Indicator	Category	TBL Score (Econ.Env. Soc)
0 gender-specific PET roles documented	Roles mapped and published	Gender audit in PET collection and sorting	Gender equity	Horizontal	1.3.5
<5% PET pickers with PPE	≥60% equipped with PPE	NGO + MMDA + donor initiative	Safety standards	Horizontal	3.3.5
0 PET livelihood cooperatives	≥10 cooperatives formalised	Register and mentor PET cooperatives	Institutional inclusion	Horizontal	3.2.5
0 PET curricula	PET-focused modules integrated into CE course	Add to hub and extension training	Sector-specific training	Vertical	3.1.4
No integration with MMDAs	PET CE KPIs in 4 district plans	Work with NDPC and MMDAs	Policy main-streaming	Horizontal	3.2.3
0 PET reuse enterprises	≥3 PET upcycling enterprises incubated	Link to pilot results	Enterprise innovation	Horizontal	4.4.4
PET flake production <20 t/month	≥60 t/month local flake capacity by 2028	Set up 2 semi-mechanised units	Input security	Vertical	4.5.3
0 PET bin colour standard	PET standardised bin colour in 3 regions	Harmonise bins in drop zones	Visual literacy	Vertical	2.1.3
No PET-focused CE monitoring	KPIs embedded in national CE MRV	Liaise with EPA and MoF	National alignment	Horizontal	2.2.3
0 PET-to-flake quality standards	PET flake standard developed	GSA/EPA technical committee	Quality assurance	Vertical	3.4.3
0 PET audit benchmarks	PET audit framework validated	Use in 3 district pilots	Measurement consistency	Horizontal	3.2.4

17. Appendix: Roadmap KPI Matrix

Baseline Metric	KPI	Action Required	Broader CE Indicator	Category	TBL Score (Econ.Env. Soc)
No baseline PET reuse rate	Reuse rate recorded (target: 10% by 2027)	Partner with reuse start-ups	Market innovation	Horizontal	4.3.3
0 mobile PET densifiers	2 mobile densifiers deployed	Pilot in high-volume low-infra zones	Logistical adaptation	Vertical	3.5.3
0 circular hubs for PET	3 PET nodes integrated into CE hubs	Retrofit or adapt existing sites	Ecosystem strengthening	Horizontal	4.4.3
0 PET school challenges	Annual PET school challenge in 5 schools	Engage via GES	Youth engagement	Horizontal	2.2.4
0 PET informal recycling baseline	Informal sector PET metrics tracked	Use GPS + income survey + flow estimates	Informal data inclusion	Horizontal	3.2.4
<10 PET reuse product types	≥25 market-viable PET reuse products	Business incubation support	Product diversification	Horizontal	4.2.4
0 PET jobs benchmarked	PET value chain jobs mapped	Labour force survey and tracking	Job creation monitoring	Horizontal	3.2.4
No PET startup support	6 startups accelerated	Select through challenge fund	Entrepreneur-ial growth	Horizontal	4.3.4
No PET leakage projection tools	PET leakage tool piloted	Predictive modelling + field testing	Forecasting capacity	Vertical	3.5.3
0 national PET policy references	PET roadmap cited in national circular policy	NDPC & EPA advocacy	Policy visibility	Horizontal	2.3.3
0 PET impact scorecard	PET TBL scorecard adopted	Create visual dashboard for policy actors	Multi-dimensional evaluation	Horizontal	4.4.4
No PET livelihood index	Index piloted in 2 districts	Co-create with recyclers	Welfare tracking	Horizontal	3.2.5

17. Appendix: Roadmap KPI Matrix

Baseline Metric	KPI	Action Required	Broader CE Indicator	Category	TBL Score (Econ.Env. Soc)
No PET baseline video campaign	Launch of 'PET Back to Value' media series	Radio jingles + social reels	Perception shift	Horizontal	3.1.5
0 PET closed-loop pilots	2 closed-loop systems piloted	PET-to-product partnerships	Circular business models	Horizontal	4.4.4
0 PET leakage quantified	Leakage reduced by 40% from baseline	Source-segregation, public campaigns	Environmental outcome	Horizontal	4.5.4

Notes:

a. TBL Scoring uses a 5-point scale per dimension, highlighting relative strength across Economic (E), Environmental (Env), and Social (Soc) contributions.

b. Vertical KPIs are specific to functions like farming, processing, or cooperative operations.

c. Horizontal KPIs cut across multiple actors or systems, influencing the ecosystem more broadly.

d. Many KPIs overlap across steps in the roadmap, especially those associated with pilots and implementation phases.

e. Data Sources include processor logs, field surveys, cooperative records, and institutional reports.

In partnership with Canada

Ghana Circular Economy Centre

UNITED NATIONS INDUSTRIAL DEVELOPMENT ORGANIZATION

Republic of Ghana

About Ghana Circular Economy Centre

The Ghana Circular Economy Centre (GCEC) project supports Ghana's transition to a resource-efficient and inclusive circular economy by promoting innovation, strengthening policy and institutional frameworks, and building capacity across key value chains, including plastics, agriculture and agro-processing (cassava, mango, pineapple and tilapia), and textiles.

The project is implemented by the United Nations Industrial Development Organization (UNIDO) in partnership with the Ministry of Environment, Science and Technology (MEST), with funding support from Global Affairs Canada.

The GCEC serves as a national hub for knowledge generation, stakeholder engagement, and the piloting of circular solutions to advance sustainable industrial development, improve resource efficiency, and create decent jobs.

Host Institution

HO TECHNICAL UNIVERSITY

Value Chain Leads

KNUST KWAME NKRUMAH UNIVERSITY OF SCIENCE AND TECHNOLOGY

UNIVERSITY OF CAPE COAST

The Or Foundation

CAPE COAST TECHNICAL UNIVERSITY

CITY WASTE RECYCLING LTD. *Friends of the Environment*

UNIDO Division of Circular Economy and Green Industry
Vienna International Centre, P. O. Box 300, 1400, Vienna Austria.

Ghana Circular Economy Centre
Ho Technical University, 1st Floor, Agric Engineering Block
Email: info@gcec.org.gh
Tel: 0362295799

www.gcec.org.gh

Ghana Circular Eonomy Centre