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TECHNICAL REPORT

Strengthening Ethiopia's Compost Sector: Enabling a Circular Bioeconomy for Peri-Urban Agriculture

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Back cover photo: Compost production site in Addis Ababa, Ethiopia (photo by Habtamu Mulat/IWMI).

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Contents

List of Tables……..3
List of Figures……..3

Acronyms and Abbreviations……..4

Summary 5

1. Background and Rationale 6

2. Objective and Methodology 7

3. Stakeholder Landscape 8

4. Assessment of the Enabling Environment 10
   4.1 Policy and Institutional Coherence 10
   4.2 Infrastructure and Technology 12
   4.3 Human and Tnstitutional Capacity 10
   4.4 Financial and Economic Mechanisms 11
   4.5 Social and Behavioral Acceptance 13

5. Recommendations: A Pathway for Creating Enablers 15

6. Outlook 22

References 23

List of Figures

Figure 1. Institutional models for solid waste management: centralized, decentralized, and mixed 10
Figure 2. From organic waste to soil: priority actions along the compost value chain in Ethiopia 21

List of Tables

Table 1. Stakeholders in Ethiopia's compost sector and their current role.....8
Table 2. Challenges and opportunities: policy and institutional coherence.....11
Table 3. Challenges and opportunities: infrastructure and technology 13
Table 4. Challenges and opportunities: human and institutional capacity.....11
Table 5. Challenges and opportunities: financial and economic mechanisms 13
Table 6. Challenges and opportunities: social and behavioral acceptance..... 14
Table 7. Recommendations by dimension, with lead actors 15

Acronyms and Abbreviations

AACMA	Addis Ababa Cleansing Management Agency
AAWSA	Addis Ababa Water and Sewerage Authority
ACEA	African Circular Economy Alliance
AfDB	African Development Bank
AI	artificial intelligence
BETin	Bio and Emerging Technology Institute
CBE	circular bioeconomy
EPA	Environmental Protection Authority
ETB	Ethiopian birr
EU	European Union
FDRE	Federal Democratic Republic of Ethiopia
GGGI	Global Green Growth Institute
GIZ	Deutsche Gesellschaft für Internationale Zusammenarbeit
IWMI	International Water Management Institute
JICA	Japan International Cooperation Agency
LT-LEDS	Long-Term Low Emission and Climate Resilient Development Strategy
MInT	Ministry of Innovation and Technology
MoA	Ministry of Agriculture
MoF	Ministry of Finance
MoUI	Ministry of Urban and Infrastructure
MSW	municipal solid waste
NatuReS	Natural Resources Stewardship Programme (GIZ)
NAWACOM	Nakuru Waste Collectors and Recyclers Management
NDC	Nationally Determined Contribution
NGO	Nongovernmental organization
PPP	Public–private partnership
SMEs	Small and medium enterprises
TVET	Technical and vocational education and training
UN-Habitat	United Nations Human Settlements Programme
USD	United States dollar
WWTP	Wastewater treatment plant

Summary

Ethiopia's cities generate large and growing volumes of organic waste, while the farms around them face declining soil fertility. Composting links the two problems: it diverts organic material from open dumps and returns nutrients and organic matter to the soil. This study assesses enablers of transforming Addis Ababa's small and fragmented compost activity into a functioning, standardized system that supports peri-urban agriculture. The assessment combined a desk review of the investment climate for circular bioeconomy businesses, key informant interviews with 20 institutions in Addis Ababa, and a validation workshop with 27 stakeholders, which was structured around five dimensions of the enabling environment.

The assessment identifies key opportunities and constraints across five interconnected dimensions of Addis Ababa's composting system. From a policy and institutional perspective, support for composting has strengthened considerably since 2024, with the draft National Circular Economy Roadmap proposing a national composting strategy and quality standards, and the Long-Term Low Emission and Climate Resilient Development Strategy targeting the processing of 20% of municipal organic waste by 2030. However, fragmented institutional mandates, the absence of national compost quality standards, and weak enforcement of household waste segregation regulations introduced in 2007 continue to hinder sector development. In terms of infrastructure and technology, composting remains predominantly small-scale and operated by small and medium enterprises (SMEs), while the underperformance of large municipal composting facilities, inadequate waste segregation infrastructure, limited operational space, and insufficient facilities for the safe treatment and reuse of sewage sludge constrain opportunities for scaling. Limited technical expertise compounds these challenges among compost producers, dependence on short-term NGO- and donor-supported training programmes, and shortages of skilled personnel and financial resources within municipal institutions. Financial viability remains a major barrier despite the existing municipal subsidy of ETB 3 per kilogram of compost, as high production costs relative to farmers' purchasing capacity, competition from heavily subsidized chemical fertilizers, stringent collateral requirements, and limited access to sustained financial incentives undermine commercial competitiveness. Furthermore, low awareness of compost benefits, concerns regarding the safety and quality of recycled organic products, and limited household participation in waste segregation restrict both production and market demand. Unequal access to resources and market opportunities also risks concentrating on the benefits among relatively better-off farmers and businesses, limiting the inclusiveness of the sector. Overall, the findings reveal a substantial gap between growing policy ambition and the institutional, technological, financial, and behavioral conditions necessary to transform Addis Ababa's fragmented composting activities into a coordinated, standardized, commercially viable, and inclusive system that sustainably supports peri-urban agriculture.

The study suggests recommendations for each dimension, with lead actors identified and arranged along the compost value chain. Clean organic feedstock requires enforced source separation, household incentives, a diversion fee paid to composters for separated organic waste, and, once capacity exists, restrictions on landfilling organic waste. Production needs work areas, equipment, vocational training, and a safe value chain for sewage and fecal sludge. Quality and markets depend on a national compost standard with certification, a review of the subsidy, a pilot that includes compost in the national fertilizer subsidy system, and a national compost market platform. Usage by farmers can grow through extension, demonstration plots, and marketing compost as a biofertilizer. Across the chain, a national coordination platform and the effective implementation of the Roadmap and the Bioeconomy Strategy are the main enablers. Most of these actions build on instruments Ethiopia has already adopted or drafted.. The main task is therefore to implement, coordinate, and finance them, rather than to design new policies.

1. Background and Rationale

Rapid urbanization is intensifying pressure on Ethiopia's urban sanitation systems and on the agricultural land around its cities. Organic material makes up most of the country's municipal solid waste (MSW): a government study of 55 towns estimated its composition at 73% organic and 22% recyclable, with collection and disposal services reaching only about 40% of waste nationwide and formal recycling as low as 2% (FDRE 2023). In Addis Ababa, a waste characterization study puts the biodegradable share at 74% (Hagos et al. 2024). Left in open dumps, this material decomposes and releases methane; composted, it can restore degraded soils.

That soil problem is real and growing. Ethiopia's agricultural growth is increasingly undermined by soil degradation, nutrient depletion, and inefficient fertilizer use, and soil acidity now affects nearly half of the country's highland agricultural soils (MoA 2025). At the same time, combustible renewables and waste still supply 74.4% of the country's total energy (Taron et al. 2024), so much of the organic matter that could return to the soil is burned as fuel instead. Compost is one of the few inputs that can be produced domestically from local waste and that returns organic matter, not only nutrients, to depleted soils.

Demand for compost is potentially large. A Ministry of Agriculture feasibility study projects potential demand in and around Addis Ababa to rise from 126,000 tons in 2024 to 438,297 tons by 2035, assuming that compost could replace 10% of fertilizer demand (MoA 2024). The same study notes that compost is not readily available on the market, and that public greening programs, such as the city's ETB 1.5 billion budget for urban greenery and river basin development in 2023/24, create an additional outlet beyond farming (MoA 2024). As discussed under Financial and economic mechanisms, effective demand is much lower than this potential because of price.

There are also early signs that composting can work at scale. The Addis Ababa Cleansing Management Agency (AACMA) has organized 50 SMEs with 325 members, 60% of them women, and one compost SME alone has created ten temporary jobs . Outside the capital, an open windrow composting project in six cities (Adama, Bahir Dar, Bishoftu, Dire Dawa, Hawassa, and Mekelle) reached 29,000 tons in 2020 (FDRE 2023). The central challenge is therefore less about proving the concept than about scaling it.

Here, the circular economy refers to keeping materials and products in productive use through reduction, reuse, recycling, and recovery. The circular bioeconomy (CBE) applies these principles to biological resources, such as organic waste, wastewater, and agricultural residues, recovering nutrients, energy, and water for productive use. Composting is one of the simplest CBE practices. Ethiopia launched its first National Bioeconomy Strategy in December 2024 (Metaferiya 2024; BETin 2024) and has drafted a National Circular Economy Roadmap (EPA and AfDB 2025), which together provide the policy frame for this assessment.

The objective of this study was to assess the enabling environment for Ethiopia's compost sector across five dimensions (policy and institutional coherence; infrastructure and technology; human and institutional capacity; financial and economic mechanisms; and social and behavioral acceptance) and to identify the actions needed to scale organic waste recovery into a functioning, standardized system that supports peri-urban agriculture.

2. Methodology

The study included three different strategies. First, a non-systematic desk review was used to identify sources in four ways - (i) the indicator framework and sources of the 15-country investment climate assessment (Taron et al. 2024); (ii) keyword searches using AI tools and references which were provided were validated using Google Scholar; in cases, other references were obtained from Google Scholar, those were considered based on their relevance; (iii) websites of the relevant ministries, agencies and development partners; and (iv) documents recommended by key informants and workshop participants. The keyword searches included combinations of “compost”, “organic waste”, “solid waste”, “sludge”, “circular economy” and “bioeconomy” with “Ethiopia” and “Addis Ababa”; Sources were included if they (a) concerned Ethiopia, preferably Addis Ababa, or, for Box 2, a comparable low- or middle-income country; (b) contained information on at least one of the five assessment dimensions; and (c) were published between 2015-2026, except for legal instruments still in force. Sources were used if they provided specific evidence (data, targets, prices, mandates or documented experience) rather than general statements. Where sources disagreed, the most recent official document was preferred and where information could be triangulated with other sources. Information from news media was used only for recent prices and budget figures not yet in official publications.

Second, between December 2024 and March 2025, semi-structured key informant interviews were conducted with representatives of 20 institutions in Addis Ababa: two federal bodies, five city agencies, the wastewater utility, the Reppie waste-to-energy plant, one private compost intermediary, three composting SMEs, four NGOs and development partners, and three universities. Three farmers using compost or biogas in Akaki sub-city were also interviewed .

Third, the findings were discussed and validated at a multi-stakeholder workshop convened by IWMI in Addis Ababa on 2 April 2025. The 27 participants represented government and city authorities (10), private-sector composting enterprises (6), development partners and NGOs (5), academia (4), and civil society (2) (Bodach and Gamage 2025). Participants also described a shared vision of a thriving CBE by 2030 and identified priorities for the next three years, which informed the recommendations.

The interview report and the workshop report are unpublished outputs of this study; the investment climate country report and the scoping study are unpublished IWMI working documents. The study was conducted under the institutional review board (IRB) approvals of the projects that funded it. No individual respondents are identified in this report.

Generative AI tools were used to help identify relevant literature, extract data from key documents, and support restructuring and language editing during revision. All content was checked against the original sources, and the authors take full responsibility for the report.

3. Stakeholder Landscape

Ethiopia's compost sector involves federal ministries and agencies, city authorities, private enterprises, development partners, research institutions, and farmers and households. Table 1 summarizes the mandate of the main actors and what they currently contribute to compost and organic waste recovery. The challenges they face are discussed in the five assessment dimensions that follow, and the lead actors for each recommendation are named in Table 7.

Table 1. Stakeholders in Ethiopia's compost sector and their current role

Stakeholder	Mandate or role	Current contribution to compost and organic waste recovery
Federal level		
Environmental Protection Authority (EPA)	Federal body for environmental regulation and waste management directives	Leads the draft National Circular Economy Roadmap; extended producer responsibility policy; Circular Value Chain Partnership
Ministry of Urban and Infrastructure (MoUI)	Federal mandate for urban solid waste management	Designated lead for the Roadmap's composting strategy, training, and national composting standard
Ministry of Water and Energy; Addis Ababa Water and Sewerage Authority (AAWSA)	Wastewater and sludge management	Operates wastewater treatment, including the Kality plant; sludge reuse not yet regulated
Ministry of Agriculture (MoA)	Soil fertility and agricultural extension	Fertilizer and Soil Health Roadmap names composting and supports SME-led organic fertilizer production
Ministry of Innovation and Technology (MInT); Bio and Emerging Technology Institute (BETin)	Bioeconomy policy	Ethiopian Bioeconomy Strategy, including support for biobased agricultural inputs
Ministry of Finance	Public finance	Proposed by workshop participants to lead the integration of the CBE into national indicators
City level (Addis Ababa)		
Addis Ababa Cleansing Management Agency (AACMA)	Leading city body for waste reduction, reuse, and recycling	Awareness campaigns, training, project support; organized 50 SMEs with 325 members
City bureaus (Farmers and Urban Agriculture; Environmental Protection; Health; Labor and Skills)	Urban agriculture, environmental and health oversight, skills development	Mandates relevant to compost use, safety, and skills; no compost-specific programs documented
Reppie waste-to-energy plant	Incineration of mixed municipal waste (designed for 1,400 tons per day)	Operates below design capacity; burns organic waste that could be composted
Private sector		
Composting SMEs	Compost production from household, supermarket, and market waste	Small enterprises of 5–10 workers each, organized and supported by AACMA
Soil and More Ethiopia	Social enterprise and intermediary	Transfers municipal biowaste to SMEs; composting method aligned with EU standards; inputs, mentoring, machinery loans, market linkages
Development partners and NGOs		

Stakeholder	Mandate or role	Current contribution to compost and organic waste recovery
GIZ (NatuReS, Partnership for Circular Value Chains)	Development cooperation	Equipment such as baling machines, market linkages, support to waste collectors, especially women
Other NGOs and partners (Reach for Change, Eco-Justice Ethiopia, PETCO, TechnoServe, SNV, UN-Habitat, JICA, C40)	Incubation, advocacy, recycling, development support	Mostly focused on recycling and plastics; Reach for Change offers grants of up to USD 10,000 to circular economy start-ups
Research		
Universities (Addis Ababa University and its Institute of Technology, Kotebe University)	Research and training	Waste generation and composition studies, training, policy research
Users and generators		
Peri-urban farmers	Compost users	Compost use is limited; farmers who use it report better soils and yields
Households	Waste generators	Little source separation; the current fee system gives no incentive to separate

Source: Authors' compilation based on Hagos et al. (2024), EPA and AfDB (2025), MoA (2025), and BETin (2024).

4. Assessment of the Enabling Environment

This chapter assesses the five dimensions in turn. Each section first describes the current status, then sets out the main challenges, and closes with a table that pairs each challenge with the opportunity already visible in the sources.

4.1 Policy and Institutional Coherence

Current status

Ethiopia has built a substantial legal and policy foundation for waste management over the past three decades, although it was designed for general waste collection, disposal, and environmental protection rather than for organic waste recovery. The 1995 Constitution establishes a duty to protect a clean environment, operationalized through a sequence of instruments: the Environmental Pollution Control Proclamation (No. 300/2002), the Environmental Impact Assessment Proclamation (No. 299/2002), the Solid Waste Management Proclamation (No. 513/2007), the Integrated Urban Sanitation and Hygiene Strategy (2015), the Urban Wastewater Management Strategy (2017), the Hazardous Waste Management and Disposal Control Proclamation (No. 1090/2018), and Addis Ababa's Integrated Solid Waste Management Regulation (No. 100/2018) (Hagos et al. 2024). The Solid Waste Management Proclamation is the most directly relevant to composting: it makes urban administrations responsible for collection, transport, treatment, and disposal, and it obliges households to separate their waste (Article 11) (FDRE 2007; Hagos et al. 2024). The Urban Wastewater Management Strategy names the reuse of sludge as fertilizer and soil conditioner as a strategic aim (Hagos et al. 2024).

Institutional responsibility is split across levels of government. At federal level, the Ministry of Urban and Infrastructure (MoUI), the Environmental Protection Authority (EPA), and the Ministry of Health share oversight of MSW management; the Ministry of Water and Energy and the Addis Ababa Water and Sewerage Authority (AAWSA) govern wastewater and sludge; and the Ministry of Agriculture (MoA) and the city's urban agriculture bureau are responsible for agricultural extension. No urban agriculture policy has been published, and no extension or marketing guideline connects compost producers to farmers (Hagos et al. 2024). At city level, AACMA, established in 2018, combines regulatory, policymaking, and service functions and coordinates through sub-city and woreda offices (Hagos et al. 2024).

Two national strategies adopted since 2024, and a third in draft stages, give organic waste recovery a much stronger policy anchor. The Ethiopian Bioeconomy Strategy, prepared by the Bio and Emerging Technology Institute (BETin) under the Ministry of Innovation and Technology (MInT), supports the production and use of biobased agricultural inputs, including biofertilizer, through financing, research, investment incentives, and market linkages; it aims to raise the share of standardized biofertilizer in use from 20% to 50% (BETin 2024). The Fertilizer and Soil Health Roadmap names composting among its soil fertility strategies and includes funded actions to upgrade organic fertilizer production and marketing led by smallholder farmers and SMEs (MoA 2025). The draft National Circular Economy Roadmap, prepared under EPA leadership with support from the African Development Bank (AfDB) and the African Circular Economy Alliance (ACEA), commits in the short term to a national composting strategy with composting targets, training and technical assistance for compost producers, and a national composting standard with defined quality parameters, led by MoUI together with the private sector and NGOs (EPA and AfDB 2025). Its monitoring framework adds targets to divert 50% of organic waste to composting and biogas and to certify composting facilities (EPA and AfDB 2025).

The Roadmap also documents that Addis Ababa has introduced compost-specific incentives, including subsidies for compost-producing associations and plans for composting centers in its sub-cities, and that secondary cities have begun to replicate them, although progress is slow (EPA and AfDB 2025). The subsidy is specific: the city subsidizes compost at ETB 3 per kilogram, giving a total price of ETB 7 per kilogram, which SMEs consider insufficient for long-term financial viability .

Ethiopia's climate policies provide a further rationale. Ethiopia's Long-Term Low Emission and Climate Resilient Development Strategy (LT-LEDS) sets targets for processing organic municipal waste of 20% by 2030, 40% by 2040, and 50% by 2050, together with targets for landfill gas reduction, waste collection, and fecal sludge treatment (FDRE 2023). Ethiopia's Nationally Determined Contribution

(NDC) 3.0 identifies waste as a mitigation sector but does not specify actions for source separation or composting (FDRE 2025). These instruments provide a climate rationale for composting, but clear mandates, financing, and quality and safety standards are still needed to turn it into a coordinated national program. Workshop participants confirmed that government interest is evident, but that more active enforcement, investment, and coordination are needed .

Challenges and opportunities

The challenges in this dimension cluster into three themes: standards and enforcement, institutional coordination and links to agriculture, and policy ambition that runs ahead of delivery. Table 2 pairs each challenge with the corresponding opportunity.

- **Fragmented mandates and no compost standard.** Responsibility for organic waste is split across MoUI, EPA, the water sector, and MoA, and no institution is accountable for organic waste recovery from end to end. Government stakeholders describe overlapping mandates that impede coordination and identify the lack of national compost and sludge standards as a barrier to market uptake . The Roadmap confirms that the standard does not yet exist (EPA and AfDB 2025).
- **Regulations not designed for the circular bioeconomy.** Existing regulations are general waste and environmental laws that are not yet aligned with CBE principles, and incentives for waste reduction and recycling are lacking .
- **Weak enforcement of source separation.** The household separation obligation has been in force since 2007, yet weak enforcement remains a current challenge .
- **No pathway from compost to agriculture.** Urban agriculture has no published policy, and no extension or marketing guideline connects compost producers with urban and peri-urban farmers (Hagos et al. 2024).
- **Public–private partnership proclamation under-implemented.** Government stakeholders recommend strengthening its implementation and building links with the private sector and academia .
- **Policy instability.** Frequently changing policies and unbalanced regulation at local level have caused waste-collecting micro-enterprises to lose confidence in the sector (Hagos et al. 2024).
- **Targets ahead of delivery.** The Bioeconomy Strategy's own results framework shows a wide gap between ambition and performance: standardized biofertilizer use stands at 20% against a target of 50% (BETin 2024).
- **Climate targets without an operating mandate.** The LT-LEDS sets quantified targets for organic waste processing and fecal sludge treatment, but no institutional mandate, financing arrangement, or standard yet translates them into a national composting program (FDRE 2023).

Table 2. Challenges and opportunities: policy and institutional coherence

Challenge	Opportunity
Fragmented mandates; no compost quality standard	The draft Roadmap commits, in the short term, to a national composting strategy and standard led by MoUI with the private sector and NGOs (EPA and AfDB 2025)
Regulations not designed for the circular bioeconomy	The Roadmap and the Bioeconomy Strategy provide a CBE-specific frame that existing waste regulations can be aligned with (EPA and AfDB 2025; BETin 2024)
Weak enforcement of source separation	The Roadmap pairs standard setting with training and technical assistance for operators, a vehicle for building enforcement capacity (EPA and AfDB 2025)
No pathway from compost to agriculture	The Fertilizer and Soil Health Roadmap funds SME-led organic fertilizer production and marketing that a compost extension pathway could build on (MoA 2025)
Public–private partnership proclamation under-implemented	Government stakeholders and the Roadmap both name stronger implementation and public–private composting models as near-term priorities (EPA and AfDB 2025)

Challenge	Opportunity
Policy instability	The Roadmap assigns clear institutional ownership and short timelines to its composting actions; consistent follow-through would address this
Bioeconomy Strategy targets ahead of delivery	The financing, incentive, and market-linkage mechanisms needed are already designed into the Strategy; the gap is implementation (BETin 2024)
Climate targets without an operating mandate	The LT-LEDS targets can anchor a national composting program once mandates, financing, and standards are in place (FDRE 2023)

Source: Authors' compilation.

4.2 Infrastructure and Technology

Current status

Addis Ababa's largest waste facility is not a composting facility. The Reppie waste-to-energy plant is designed to incinerate up to 1,400 tons of mixed MSW per day, generating about 50 megawatts of electricity (FDRE 2023). Reppie consistently operates below its design capacity, which leads to gaps in electricity supply and obliges the city administration to pay compensation; equipment failures, limited local capacity, inadequate waste management practices, financial limitations, and institutional weaknesses all contribute . Because Reppie incinerates rather than composts, and a large share of its feedstock is organic material with a high moisture content, it does not function as organic waste recovery infrastructure. The Sendafa sanitary landfill northeast of the city opened in 2016 but operated for only a few months before protests by local farmers, who demanded more compensation for their land, forced it to stop (Fikade 2018;). Plans to revive the site followed in 2018 (Fikade 2018), but the city closed the facility in 2019 because of opposition from the local community (Xie and Mito 2021).

Composting itself remains small-scale and decentralized. The city lacks sufficient recycling plants and composting infrastructure, and stakeholders describe scaling up composting centers as essential to divert organic waste from landfill . Composting is more widely adopted than recycling because of its lower technological requirements, but it is constrained by inadequate working space and funding (EPA and AfDB 2025). Composting SMEs report difficulties in acquiring land, labor-intensive technologies, and weak separation of the waste they receive . Some equipment support exists: GIZ's NatuReS program provides balers and other equipment to the SMEs and recyclers it supports .

Sewage and fecal sludge are a second, largely untapped stream of organic material. Sewers reach only about 23% of houses in Addis Ababa, so most households depend on on-site sanitation emptied by vacuum trucks (Haileselassie et al. 2025). AAWSA operates 36 wastewater treatment plants (WWTPs) with a combined design capacity of 163,080 cubic meters (m^3) per day, which receive about 112,039 m^3 per day (Haileselassie et al. 2025). Fecal sludge is received at the Kality and Kotebe plants, whose capacity is inadequate for the city's volumes; dried sludge considered safe is set aside for agricultural use, and unsafe sludge is incinerated (Sauer et al. 2020). At Kality, the largest plant, expanded in 2018, the stabilized excess sludge from the anaerobic reactors, about 360 m^3 per day, is dried on beds on site; heavy metals accumulate in the sludge, although levels in the dried sludge were below the standards for agricultural application (Shuralla et al. 2024).

The newer treatment plant at Kality uses anaerobic reactors that produce biogas (Gebrekidan 2025), and IWMI's engagement with the water utility showed interest in using these by-products. At the stakeholder workshop the utility invited composting enterprises to use its dried sludge. Research has shown that Kality sludge can be vermicomposted into a nutrient-rich product (Banda et al. 2023). Recovery nevertheless remains at pilot stage, and stakeholders name the absence of national standards for compost and sludge, together with health risks such as helminth eggs in fecal sludge, as key barriers . The LT-LEDS targets the treatment of 4% of fecal sludge by 2030, 15% by 2040, and 30% by 2050 (FDRE 2023).

Challenges and opportunities

The challenges in this dimension cluster into three themes: the execution risk of large, centralized facilities; undersized and poorly equipped composting infrastructure; and the lack of a safe pathway for sludge. Table 3 pairs each challenge with the corresponding opportunity.

- **Insufficient separation infrastructure.** Infrastructure for effective source separation is insufficient, so organic waste reaches composters mixed with other waste . This links to the enforcement gap discussed under policy and institutional coherence and to household willingness, discussed under social and behavioral acceptance.
- **Execution risk in large facilities.** Reppie's chronic underperformance and Sendafa's early closure show the risks of large, centrally engineered facilities .
- **Composting capacity below the available volume.** Composting and recycling infrastructure is insufficient for the city's organic waste .
- **No land or work space for composting SMEs.** SMEs lack land and adequate working space, and their technologies remain labor-intensive (EPA and AfDB 2025).
- **No safe value chain for sludge.** Fecal sludge treatment capacity is inadequate, sludge reuse is informal, and no standards exist for sludge-derived products, so biogas and nutrients in sewage and fecal sludge remain largely unused (Sauer et al. 2020;).

Table 3. Challenges and opportunities: infrastructure and technology

Challenge	Opportunity
Insufficient separation infrastructure	The Roadmap targets separated waste collection in 50% of urban areas (EPA and AfDB 2025)
Execution risk in large, centralized facilities	Decentralized, SME-scale composting already produces most of the compost in Addis Ababa and avoids the single-point failures seen at Reppie and Sendafa; SMEs need support in skills, equipment and procedures to take on a larger role(Box 1)
Composting capacity below the available volume	The city's planned composting centers in sub-cities and the Roadmap's composting strategy provide a framework for expansion (EPA and AfDB 2025)
No land or work space for composting SMEs	Allocating dedicated work areas was a top priority of government participants at the workshop
No safe value chain for sludge	Newer treatment plants already produce biogas and dried sludge, research shows that local sludge can be composted into a nutrient-rich product, and the LT-LEDS sets fecal sludge treatment targets (Banda et al. 2023; FDRE 2023)

Source: Authors' compilation.

Box 1. Centralized versus decentralized institutional models for solid waste management

A centralized model requires municipalities to collect all urban waste and dispose of it at a fixed location, or to run large composting programs directly. It needs high administrative capacity, public resources, and investment in collection and transport. Ethiopia's experience before 2003 shows the risks: sole municipal responsibility for collection was burdened by financial and management problems, and collection routes, schedules, and trucks could not keep pace with urban growth (Desta 2022).

A decentralized model lets communities and SMEs manage waste locally. It requires less municipal financing but relies more on citizens' awareness of, and compliance with, separation rules. It suits organic waste recovery well: neighborhood composting hubs and SMEs can reach households more flexibly than centralized truck fleets, although schedules are less reliable. Addis Ababa decentralized waste management to sub-cities from 2003, and since 2011 the cleansing agency has coordinated a system of 11 sub-cities and about 120 woredas, keeping regulatory and coordinating functions while SMEs deliver services (Desta 2022).

Reviews favor a mixed, largely decentralized model (Desta 2022; Rao and Parsai 2023), shown in Figure 1. Because SME operations are small and modular, the failure of one does not halt the system, which lowers execution risk compared with large facilities. SMEs, however, are not yet

equipped to carry this role on their own: they lack technical skills, vehicles, and standard operating procedures (Desta 2022). Elements of the centralized model, such as supportive policies and adequate infrastructure, therefore remain necessary. The priority is to invest in the actors already operating at this scale, including SMEs, waste collectors, and recyclers, through funding, training, and incentives.



Figure 1. Institutional models for solid waste management: centralized, decentralized, and mixed
Source: Authors' illustration based on Desta (2022) and Rao and Parsai (2023).

4.3 Human and Institutional Capacity

Current status

Stakeholders describe a clear skills gap: entrepreneurs and farmers generally lack the technical expertise needed to turn waste into high-quality compost and related products, which leads to inefficiencies, lower product quality, and lower consumer confidence, and in turn affects sales . The country also lacks trained professionals in CBE fields .

A capacity-building system exists but is fragmented and depends on donors and NGOs. Addis Ababa University, its Institute of Technology, and Kotebe University conduct research and offer training for government agencies and private actors (Mulat et al. 2025). Around them, NGOs fill gaps: PETCO provides technical training to recycling workers, particularly women; GIZ's NatuReS program provides technology transfer and training for community members and government staff; and the Reach for Change Green Business Incubator offers training, mentorship, and grants of up to USD 10,000 (.

Capacity constraints also extend to the public bodies that deliver and oversee waste services. City administrations face shortages of staff and budget that limit their ability to manage composting operations (Debele and Fereja 2024; Desta 2022), and stakeholders attribute Reppie's underperformance partly to institutional weaknesses and limited local capacity .

At policy level, both the Bioeconomy Strategy and the Roadmap treat skills as an explicit lever. The Roadmap commits to integrating circular economy and waste management content into university and technical and vocational education and training (TVET) curricula and to training individuals and communities in composting techniques (EPA and AfDB 2025). Workshop participants proposed vocational training that leads to consistent, certified compost products, and research on compost nutrient content and health risks .

Challenges and opportunities

The challenges in this dimension cluster into three themes: a skills gap among producers, capacity building that is project-based rather than institutionalized, and limited capacity within public agencies. Table 4 pairs each challenge with the corresponding opportunity.

- **Skills gap among producers.** Entrepreneurs and farmers lack the skills to produce high-quality compost, with knock-on effects on quality and market confidence .
- **Capacity building depends on projects.** Training by PETCO, NatuReS, and Reach for Change is valuable but project-based and externally funded rather than a standing national system .

- **No certification and little curriculum content.** University and TVET curricula do not yet cover composting at scale, and no system certifies compost producers or facilities; the Roadmap treats both as actions still to be delivered (EPA and AfDB 2025).
- **Limited institutional capacity in public agencies.** City administrations lack staff and budget to manage composting operations (Debele and Fereja 2024; Desta 2022), and institutional weaknesses contribute to Reppie's underperformance .

Table 4. Challenges and opportunities: human and institutional capacity

Challenge	Opportunity
Skills gap among producers	NGO training models (PETCO, NatuReS) show that skills transfer works at SME scale; the gap is coverage
Capacity building depends on projects	The Reach for Change model of training, mentorship, and seed grants is a template a national program could adopt
No certification and little curriculum content	The Roadmap commits to curriculum integration, composting training, and certification of composting facilities (EPA and AfDB 2025)
Limited institutional capacity in public agencies	Technical audits of existing composting operations, paired with operator training, can show whether problems stem from staffing, design, or maintenance

Source: Authors' compilation.

4.4 Financial and Economic Mechanisms

Current status

Compost production is not yet financially viable without support. SMEs report that costs outweigh returns and that they have difficulty selling compost to customers and government institutions . The city's subsidy of ETB 3 per kilogram raises the total price to ETB 7 per kilogram, which SMEs consider insufficient (). At ETB 700 per quintal, this is above the break-even price of ETB 446–500 per quintal estimated in the Ministry of Agriculture's feasibility study (MoA 2024). The difference has several causes. The feasibility study models a single planned facility in Nefas Silk Lafto, whereas existing SMEs operate at small scale with labor-intensive methods and bear the cost of sorting poorly separated waste and transporting it. The ETB 4 per kilogram that SMEs must recover from buyers is also about twice what farmers say they can pay, so sales volumes stay low.On the demand side, the Ministry of Agriculture's feasibility study estimates a break-even price of ETB 446–500 per quintal (100 kilograms), whereas peri-urban grain farmers say that a price of ETB 140–200 per quintal would fit their fertilizer budget (MoA 2024). Compost also competes with subsidized chemical fertilizer as revealed by the stakeholders during the workshop. This gap between production cost and willingness to pay explains why effective demand remains far below the potential demand cited in the background.

Compost also competes with a heavily subsidized product. Chemical fertilizer is imported almost entirely by the Ethiopian Agricultural Businesses Corporation and supplied to farmers through cooperative unions at a government-set price (Mulugeta 2025). The national fertilizer subsidy rose from ETB 21 billion in the 2023 season (Ethiopian News Agency 2023) to about ETB 84 billion in 2024/25, the largest subsidy line in the federal budget (Yoseph 2025). In early 2025, the government covered about ETB 3,700 per quintal, while urea sold to farmers for ETB 5,000–6,700 per quintal (Italo 2025). Per quintal, compost appears far cheaper than urea, but the two are not substitutes on a weight basis. Compost contains about [1–2]% nitrogen, compared with 46% in urea, and is applied at several tons per hectare rather than about 100 kilograms [source for application rates]. At an application rate of 5 tons per hectare and the break-even price, compost would cost about ETB 22,000–25,000 per hectare, compared with ETB 5,000–6,700 for a 100-kilogram dose of urea at the subsidized price. Even at the price that farmers say they can afford, the same dose of compost would cost ETB 7,000–10,000 per hectare, before the cost of transporting and spreading a bulky product. The value of compost lies mainly in the organic matter and soil structure it restores, which is why it complements rather than replaces mineral fertilizer. National strategies have begun to address this imbalance. The Fertilizer and Soil Health Roadmap identifies limited incentives for organic inputs as a weakness and plans innovative investment schemes such as subsidies and incentives (MoA 2025). The draft Circular Economy Roadmap foresees, in the short term, a review of current agricultural subsidies and the

testing of financial incentives for farmers who adopt circular practices and, in the long term, a gradual shift of subsidies from chemical to organic fertilizer (EPA and AfDB 2025). At the same time, mineral fertilizer remains essential for Ethiopia's food production, and the subsidy is now capped under the government's fiscal program (Kana Television 2026). Support for compost is therefore best framed as part of integrated soil fertility management, which combines organic and mineral inputs and helps farmers use mineral fertilizer more efficiently.

The way waste services are paid for also works against composting. Solid waste services are financed from the city budget and a surcharge on water bills (Desta 2022; Xie and Mito 2021). According to AACMA, households pay 20% of their water bill for solid waste management, while businesses pay 42.5% (Wadehra and Nie 2024). Woreda offices contract collection associations, which AACMA pays according to the quantity of waste collected, and sub-city or contracted trucks haul the waste to the Reppie landfill, operated by AACMA, or to the adjacent waste-to-energy plant owned by Ethiopian Electric Power (Xie and Mito 2021). No per-ton tipping fee is paid at these facilities, composting enterprises receive no payment for the waste they accept, and the payment system gives collectors no incentive to separate waste (Xie and Mito 2021;).

Access to finance is a general constraint for CBE enterprises. In Ethiopia, the average collateral requirement is 234% of the loan amount, SME lending rates range from 11.2% to 14.5%, and 76% of companies that did not seek external equity were unaware that such funding existed (Taron et al. 2024). Starting a business requires 11 procedures and 32 days at a cost of 45.4% of income per capita, and getting an electricity connection takes 95 days and costs 768.5% of income per capita (World Bank 2019), a substantial barrier for compost enterprises that need machinery. Complex and lengthy permit procedures discourage private investment .

Some support mechanisms exist. Investment incentives include income tax exemptions of up to 6 years for manufacturing and agro-processing and up to 9 years for agricultural investment, but there are no sustainability incentives or environmental taxes (Taron et al. 2024). The Reach for Change incubator offers grants of up to USD 10,000 , and the Global Environment Facility's Small Grants Programme offers up to USD 50,000 to NGOs and community organizations (Taron et al. 2024). The Bioeconomy Strategy sets a target of USD 2 million in financial support for biobased-input start-ups (BETin 2024). Workshop participants called for seed funding, tax exemptions for composting equipment, market linkages, green financing, and bankable project plans to access climate finance .

Challenges and opportunities

The challenges in this dimension cluster into three themes: the economics of compost production and use, access to finance and the cost of doing business, and a financing system that is small and project-based. Table 5 pairs each challenge with the corresponding opportunity.

- **Production costs above what farmers can pay.** The break-even price is more than twice what farmers say they can afford, and compost competes with chemical fertilizer subsidized by about ETB 3,700 per quintal (MoA 2024; Italo 2025).
- **Insufficient subsidy and no payment for diverted waste.** The city subsidy is judged insufficient, SMEs bear sorting and transport costs that often exceed their returns, and collectors are paid by volume, whether or not the waste is separated (Xie and Mito 2021).
- **Weak market access.** SMEs struggle to sell to customers and public institutions, and no platform links producers with buyers.
- **Limited access to finance.** High collateral requirements and interest rates and low awareness of equity funding limit investment (Taron et al. 2024).
- **Costly procedures.** Complex and lengthy permits and the high cost of electricity connections deter investment (World Bank 2019).
- **Uncertainty from missing standards.** The lack of standards for compost and sludge-based products reduces investor confidence.
- **Small, project-based support.** Subsidies, grants, and tax exemptions exist, but they are not compost-specific and do not add up to a dedicated financing window (Taron et al. 2024).

Table 5. Challenges and opportunities: financial and economic mechanisms

Challenge	Opportunity
Production costs above what farmers can pay	Public greening programs offer buyers that can pay more than smallholders, and national roadmaps foresee incentives for organic fertilizer (MoA 2024; MoA 2025; EPA and AfDB 2025)
Insufficient subsidy and no payment for diverted waste	The existing city subsidy and the city's volume-based payments to collectors can be adjusted to reward the diversion of separated organic waste (; Xie and Mito 2021)
Weak market access	The Bioeconomy Strategy targets market-linkage platforms for biobased inputs (BETin 2024)
Limited access to finance	The Bioeconomy Strategy's USD 2 million target for start-up support gives a quantified channel for new financing (BETin 2024)
Costly procedures	Simplifying permits is cheaper than new financing and fits the PPP priority named by government stakeholders
Uncertainty from missing standards	The Roadmap's composting standard would remove a key source of uncertainty (EPA and AfDB 2025)
Small, project-based support	Existing incentives can be consolidated into a compost-specific financing window linked to climate finance (FDRE 2023;)

Source: Authors' compilation.

4.5 Social and Behavioral Acceptance

Current status

Public awareness of compost and other recycled products is low, which keeps demand for compost, organic fertilizer, and biogas below potential supply (). Beyond awareness, farmers may prefer traditional methods and be skeptical about the safety or effectiveness of recycled products (), and recycled products are often perceived as unsafe or of low quality (; EPA and AfDB 2025).

Household waste separation is a related but distinct hurdle. The Solid Waste Management Proclamation depends on households separating organic and recyclable material, yet participation is minimal, and the current waste fee system gives households no incentive to separate (). Separation therefore depends on enforcement (policy), on bins and collection systems (infrastructure), and, as discussed here, on households' willingness to comply.

Where compost reaches users, attitudes are more positive. The farmer interviewed in Akaki sub-city who uses compost reported better soil fertility and structure, less need for chemical fertilizer, and higher crop and vegetable yields . On equity, 60% of the members of the SMEs organized by AACMA are women , but wealthier farmers and businesses, with better access to capital and technology, are better placed to benefit from the CBE than poorer communities .

Challenges and opportunities

The challenges in this dimension cluster into two themes: awareness and trust, and equity of access. Table 6 pairs each challenge with the corresponding opportunity.

- **Low awareness limits demand.** Low public awareness keeps demand for compost and organic fertilizer below potential supply ().
- **Low willingness to separate waste.** Even where separation is required, participation depends on households choosing to comply, and the fee system does not reward it .
- **Skepticism toward recycled products.** Farmers' preference for traditional methods and doubts about the safety and quality of recycled products are a barrier beyond lack of information .
- **Unequal benefits.** Better-off farmers and businesses are better placed to benefit than poorer communities .

Table 6. Challenges and opportunities: social and behavioral acceptance

Challenge	Opportunity
Low awareness limits demand	The Roadmap commits to integrating circular economy principles into education to raise awareness (EPA and AfDB 2025)
Low willingness to separate waste	Workshop participants proposed household incentives for waste sorting
Skepticism toward recycled products	Farmers who use compost report clear benefits; demonstration and a national quality standard can build trust (EPA and AfDB 2025)
Unequal benefits	The large share of women in compost SMEs shows that targeted inclusion works and can be extended to poorer households

Source: Authors' compilation.

5. Recommendations: A Pathway for Creating Enablers

The five dimensions point to a consistent conclusion: Ethiopia does not primarily need new instruments, but needs the instruments it has adopted since 2024 to be implemented, coordinated, and financed. Table 7 sets out the recommendations for each dimension, the actors best placed to lead them, and the existing instrument each one builds on. Recommendations without an existing instrument require new arrangements.

Table 7. Recommendations by dimension, with lead actors

Recommendation	Lead actors	Builds on
Policy and institutional coherence		
Implement the draft National Circular Economy Roadmap and the Bioeconomy Strategy effectively, with budgets and monitoring for their composting and biofertilizer actions	EPA, MoUI, MInT and BETin	Roadmap; Bioeconomy Strategy
Set up a national coordination platform on organic waste recovery that links waste, agriculture, water, and environment agencies with research and the private sector	EPA, MoUI, MoA, Addis Ababa City Administration	Roadmap
Adopt a national compost quality standard, with safe limits for sludge-derived products, based on local research	MoUI, EPA, national standards body	Roadmap composting standard
Enforce the household source separation required by Proclamation 513/2007	AACMA, sub-city and woreda offices	Proclamation 513/2007
Consider restricting the landfilling of separated organic waste once sufficient composting capacity is available	EPA, MoUI, Addis Ababa City Administration	LT-LEDS waste targets
Link compost to agricultural extension and organic fertilizer programs	MoA, Urban Agriculture Bureau	Fertilizer and Soil Health Roadmap
Infrastructure and technology		
Allocate dedicated work areas and land to composting SMEs	Addis Ababa City Administration	Planned sub-city composting centers
Divert separated organic waste from collection routes to SME composting sites	AACMA, SMEs	(new arrangement)
Ease the import of composting equipment, for example through duty exemptions	Ministry of Finance	Existing investment incentives
Develop a safe value chain for sewage and fecal sludge, from centralized treatment plants and decentralized systems: recover biogas for energy and co-compost stabilized sludge with separated organic waste under quality and safety monitoring	AAWSA, AACMA, EPA, Ministry of Health, private composters	LT-LEDS fecal sludge targets
Human and institutional capacity		
Offer vocational training and certification in compost production	TVET institutions, development partners	Roadmap training and certification targets
Research compost nutrient content and health risks to inform the standard	Universities and research institutes	(new arrangement)
Strengthen staff and technical capacity in municipal waste agencies	Addis Ababa City Administration, development partners	(new arrangement)
Financial and economic mechanisms		
Review the level of the compost subsidy, currently ETB 3 per kilogram	Addis Ababa City Administration, MoA	Existing city subsidy

Recommendation	Lead actors	Builds on
Introduce a diversion fee: pay composting enterprises per weighed ton of separated organic waste they accept, funded from the city's existing volume-based collection payments, and pay collectors at least as much for delivering separated organics to compost sites	AACMA, sub-city and woreda offices, city finance bureau	Existing collection payments (new arrangement)
Pilot a compost window in the national fertilizer subsidy and input-supply system: a per-ton payment for standard-compliant compost, supplied with mineral fertilizer as part of integrated soil fertility management	MoA, MoF , cooperative unions	Circular Economy Roadmap (review of agricultural subsidies); Fertilizer and Soil Health Roadmap (Action 8.2.2.1)
Establish a national compost market platform that links producers with farmers, cities, and public buyers	MoA, AACMA, private sector	Bioeconomy Strategy market-linkage target
Use public greening and urban agriculture programs to create demand for compost	Addis Ababa City Administration, MoA	City greening budget
Improve SME access to finance through seed funding, alternatives to collateral, and tax incentives	Ministry of Finance, banks, development partners	Bioeconomy Strategy start-up support
Strengthen public–private partnership and blended-finance models for composting, and prepare bankable projects for climate finance	Government, AACMA, private sector, development partners	PPP proclamation; LT-LEDS targets
Social and behavioral acceptance		
Run joint public–private awareness campaigns and farmer-to-farmer demonstration plots that show compost results	AACMA, MoA, SMEs	AACMA awareness campaigns
Market compost as a "biofertilizer" to counter negative perceptions of recycled products	MoA, BETin, SMEs	Bioeconomy Strategy
Introduce household incentives for waste separation, for example through the waste fee structure	AACMA	(new arrangement)
Create jobs and skills for women and youth in compost enterprises, including women's groups and cooperatives	Development partners, AACMA	Existing SME base

Source: Authors' compilation based on Tables 2–6.

Figure 2 arranges the same recommendations along the compost value chain, from clean feedstock to use on farms, and shows the enablers that cut across all stages. The figure does not imply a time sequence: the sources do not support a phasing of actions, and several actions, such as the national compost standard, are already planned in the short term. Together, the actions lead toward the vision that stakeholders described for 2030: a thriving CBE in which the Bioeconomy Strategy is fully operational, public–private partnerships are mainstreamed, green financing reaches enterprises, robust national data systems exist, and the CBE is reflected in national indicators . Box 2 summarizes comparable experiences from other countries.

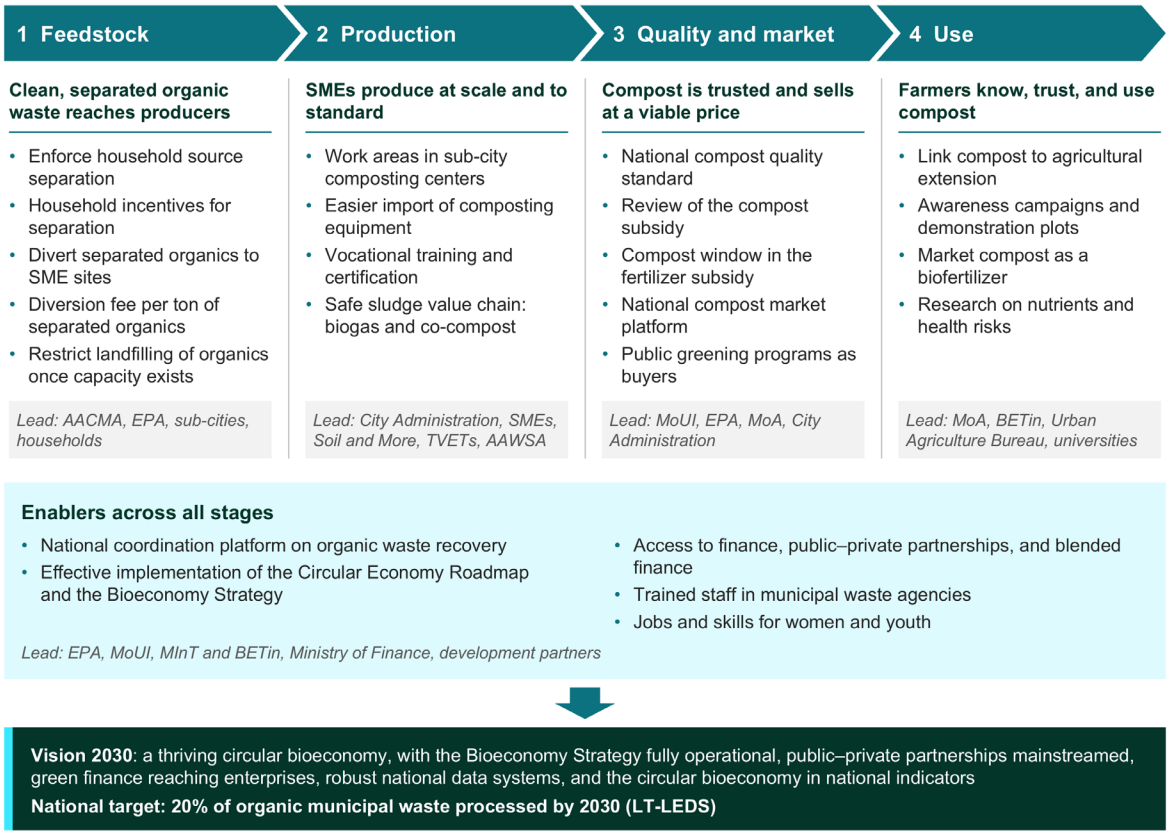

Figure 2. From organic waste to soil: priority actions along the compost value chain in Ethiopia
Source: Authors' illustration based on Table 7

Box 2. International experiences relevant to Ethiopia

In Kigali, Rwanda, the Green Waste Project handed composting infrastructure and equipment over to the government and moved to joint private–municipal management (GGGI 2025). In Mbale, Uganda, a municipal plant set up with government and World Bank funding composted about 60 tons of municipal solid waste per day but did not break even: compost sold at a government-set price of USD 0.04 per kilogram, household waste collection fees remained untapped, and organic fertilizers required national certification (Niwagaba et al. 2018).

In Nakuru, Kenya, the NAWACOM cooperative bought partially composted material from community groups at prices linked to its nitrogen and pathogen content, then finished, fortified, and branded it; without national certification, it could not supply a 500-ton order from a major input supplier (Otoo et al. 2018). In Ghana, Fortifer compost made from fecal sludge and organic waste was produced under long-term contracts between municipal assemblies and a private company in Tema and Somanya; competition for feedstock, a land tenure dispute, and seasonal demand kept the plants below capacity, and the Tema plant failed (Taron et al. 2023).

Bangladesh is debating subsidies and incentives for organic fertilizer to protect soil health (Financial Express Online Desk 2025), and India regulates the quality of biofertilizers through a control order (Yadav et al. 2025).

Together, these cases point to four lessons for Addis Ababa: secure feedstock and land through clear contracts; set and enforce compost standards that also open markets; combine decentralized production with central quality control; and align fiscal incentives so that compost can compete with subsidized chemical fertilizer.

6. Outlook

The coming years offer a policy window for compost in Ethiopia. The draft National Circular Economy Roadmap commits to a national composting strategy and standard in the short term, the LT-LEDS targets processing 20% of organic municipal waste by 2030, and the Bioeconomy Strategy aims to more than double the use of standardized biofertilizer (EPA and AfDB 2025; FDRE 2023; BETin 2024). If these commitments are implemented together, compost can move from a donor-supported niche to a recognized input in Ethiopia's soil fertility and climate policies.

Three evidence gaps remain that this study could not close. First, effective demand and farmers' willingness to pay need to be better understood, given the large gap between production costs and what farmers say they can afford (MoA 2024). Second, data on compost quality and safety, particularly for products made from mixed waste and sludge, are needed to underpin the national standard. Third, this assessment focused on Addis Ababa; experience in secondary cities, such as the six cities of the windrow composting project (FDRE 2023), has not been assessed.

Next steps should focus on coordinated support from academic institutions, development partners, government agencies, and the private sector. Priorities include generating the evidence needed for a national compost quality standard; providing technical know-how, training, and capacity building for compost producers, regulators, and extension services; testing demand-side measures such as public procurement, targeted incentives, and blended financing; and extending assessments and demonstration activities to secondary cities. This support could help translate recent policy commitments into a safe, inclusive, and financially viable compost value chain that serves both cities and farmers.

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