

City-to-Village Circular Food System

Governance Architecture for Circular Food Economies in the Developing World

Sub-Saharan Africa's cities generate more than half of municipal solid waste as organic material, approximately 57 percent on average with East African urban markets trending higher, and the majority of that material is currently landfilled at enormous methane cost. Rural smallholder farmers simultaneously face rising fertilizer prices and declining soil health from continuous monoculture. A \$546 billion circular economy opportunity is being built across Africa, projected to create 11 million jobs by 2030 according to AfDB and ACEA, and commercial operators are arriving to serve profitable customers. Without governance standards requiring community access provisions, 33 million smallholder farmers across sub-Saharan Africa, who collectively produce up to 90 percent of the region's food supply, face exclusion from a system built from their communities' own waste.

3–7 yrs

GOVERNANCE WINDOW
Before commercial operators write LMIC circular food standards. Open now. Closing.

\$546B

MARKET BEING BUILT
Africa circular economy by 2030, almost entirely ungoverned for community access.

165

COUNTRIES, NO MANDATE
No food waste NDC commitment as of COP30 2025. The governance vacuum is global.

33M

SMALLHOLDER FARMERS
Producing up to 90% of SSA's food supply, at risk of exclusion from circular food economies built from their communities' waste.

THE PROBLEM

The structural misalignment is documented. SSA cities produce the organic waste; rural farmers need the inputs; the technology to convert one into the other is mature and proven. What is missing is the governance architecture ensuring that a circular food system built from community waste actually serves the community that generated it, rather than commercial operators arriving later to serve more profitable markets.

As of COP30, 165 countries had made no NDC commitment to reducing food loss or food waste, according to WRAP's analysis of nationally determined contributions submitted by October 2025. The African Union launched its Continental Circular Economy Action Plan in July 2025, and the AfDB incorporated circularity into its Ten-Year Strategy 2024 through 2033. These institutions are writing standards now, and whether those standards embed smallholder access provisions depends entirely on who shapes them before commercial operators establish market presence.

THE MODEL

A minimum viable anaerobic digestion and composting hub in Nairobi converts institutional organic waste into targeted KEBS-certified organic fertilizer and liquid digestate, distributed to cooperative societies in Central Kenya at cost-plus pricing with buyer-of-last-resort provisions. A hub-spoke-satellite architecture extends reach to far-rural communities at 80 to 150 kilometres, where satellite micro-composting units use hub digestate as a microbial inoculant, enabling county governments to replicate the model through existing extension infrastructure without new capital expenditure.

Black soldier fly protein (Phase 2) and rural biogas distribution (Phase 3) activate only when prior operations are stable and market scoping confirms demand. Technology activation follows demonstrated demand, not supply capability; this prevents the premature capital deployment that causes most LMIC circular hub failures.

The hub is the evidence base. The Open Protocol Library is the legacy: openly published governance standards that AfDB, the AU, and national governments can adopt before commercial operators write their own version.

IMPACT ARCHITECTURE

SCOPE AND BASIS

GOVERNANCE SCALE

3 to 5M people with improved food security across 50+ SSA cities and global LMIC replication over 20 years; **500K+ living-wage jobs**, cooperative-owned, informal sector integrated; **50%+ women** in employment as a constitutional provision; Food loss and waste governance addressing the waste sector's 18 percent share of total global methane mitigation potential under the Global Methane Pledge framework. Food loss and waste generate 8 to 10 percent of global GHG emissions, nearly five times all aviation combined (UNFCCC/UNEP, 2024).

WITHOUT GOVERNANCE

33M smallholder farmers priced out; 11 million jobs become piece-rate commercial labour with no cooperative ownership; 165-country NDC governance gap persists for another decade; gender equity provisions become optional CSR with no enforcement mechanism.

LAYER 1

EVIDENCE BASE

22,500 people direct; 55 to 80 formal jobs; 10+ open protocols; input cost reduction. Nairobi hub, Year 10. This is not the impact claim. It is the proof-of-concept that makes the governance standard defensible to development finance institutions.

WHAT DIFFERENTIATES CTVCFS

Preemptive Open Governance Library

Nine governance standards in Development as public standards before commercial entry, filling the governance vacuum across 165 countries' NDC cycles. No other initiative mandates community access or buyer-of-last-resort provisions in an open standard.

Development-Mandate Lock-in

Cost-plus pricing, 50%+ women employment, and cooperative ownership are enforceable protocol provisions, not optional CSR. Prevents waste picker displacement and treats gender equity as constitutional rather than aspirational.

Satellite Replication Blueprint

Hub to spoke to satellite deploys via county extension officers using hub inoculant, uniquely low-capex for 50+ SSA cities versus hub-only models. No new capital expenditure required for each replication city.

CO-PARTNERSHIP IN DEVELOPMENT

HUMANDREAM is the governance architect, not the operator. Phase 0 co-partnerships span six Kenyan institutional partner types: an organic waste processing operator, a statutory agricultural research institution, a national cooperative federation, a government standards body, a national research university, and a CGIAR research centre. Technical cooperation conversations are active with GIZ Kenya, SWITCH-2-CE, and Sitra for Horizon Europe 2027.