



MICRO-CREDENTIAL

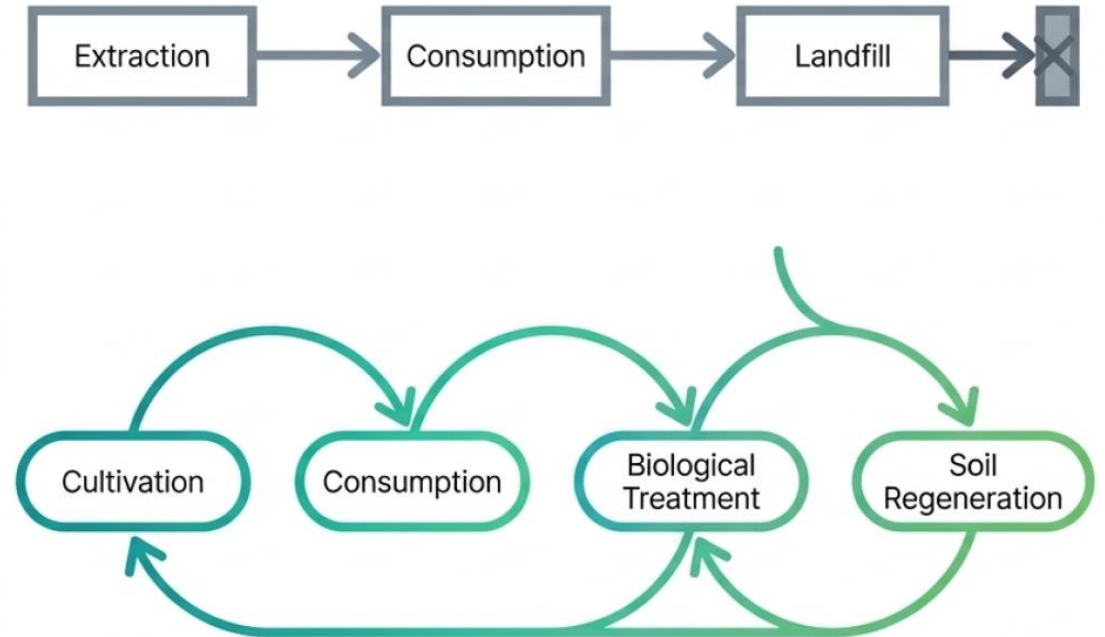
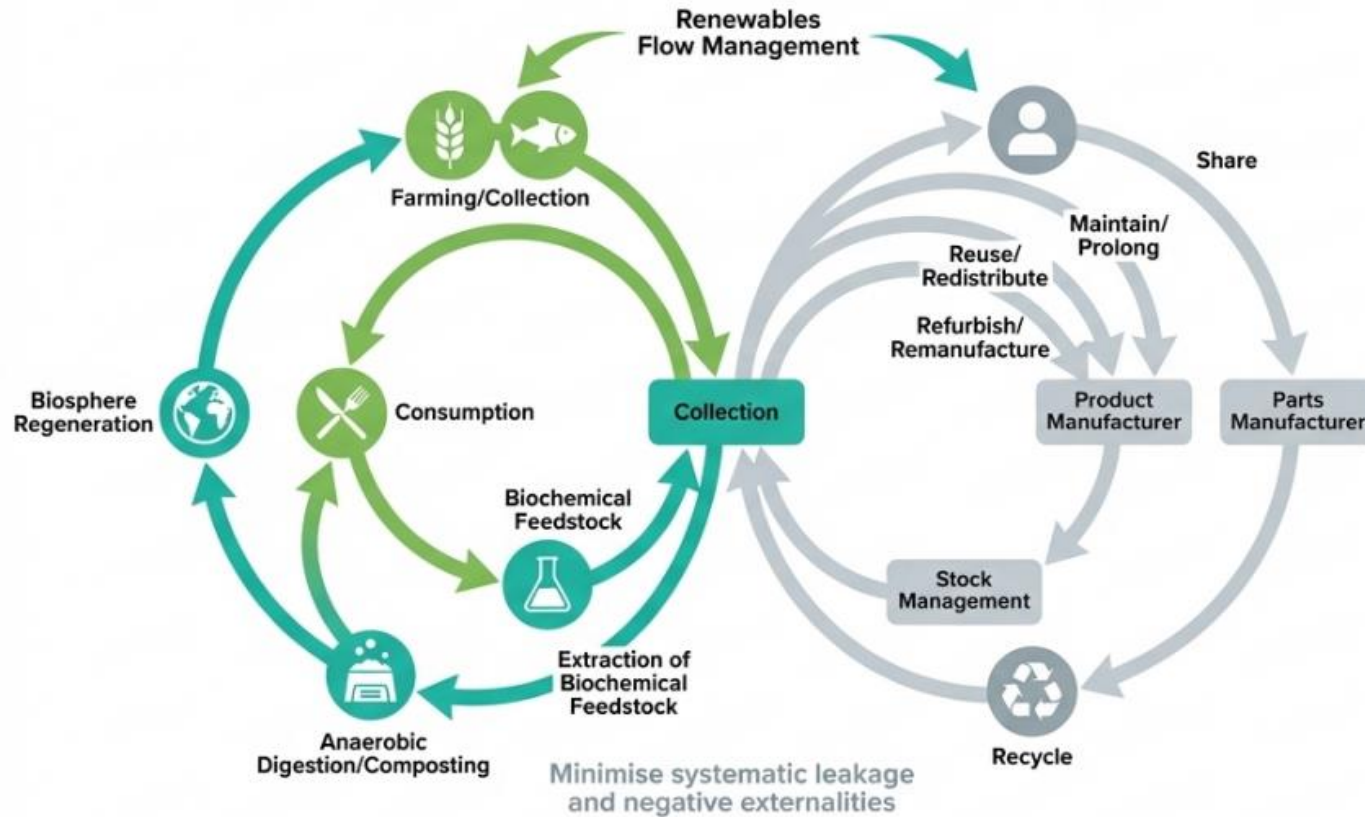
CIRCULAR ECONOMY FOR LAND AND WASTE MANAGEMENT

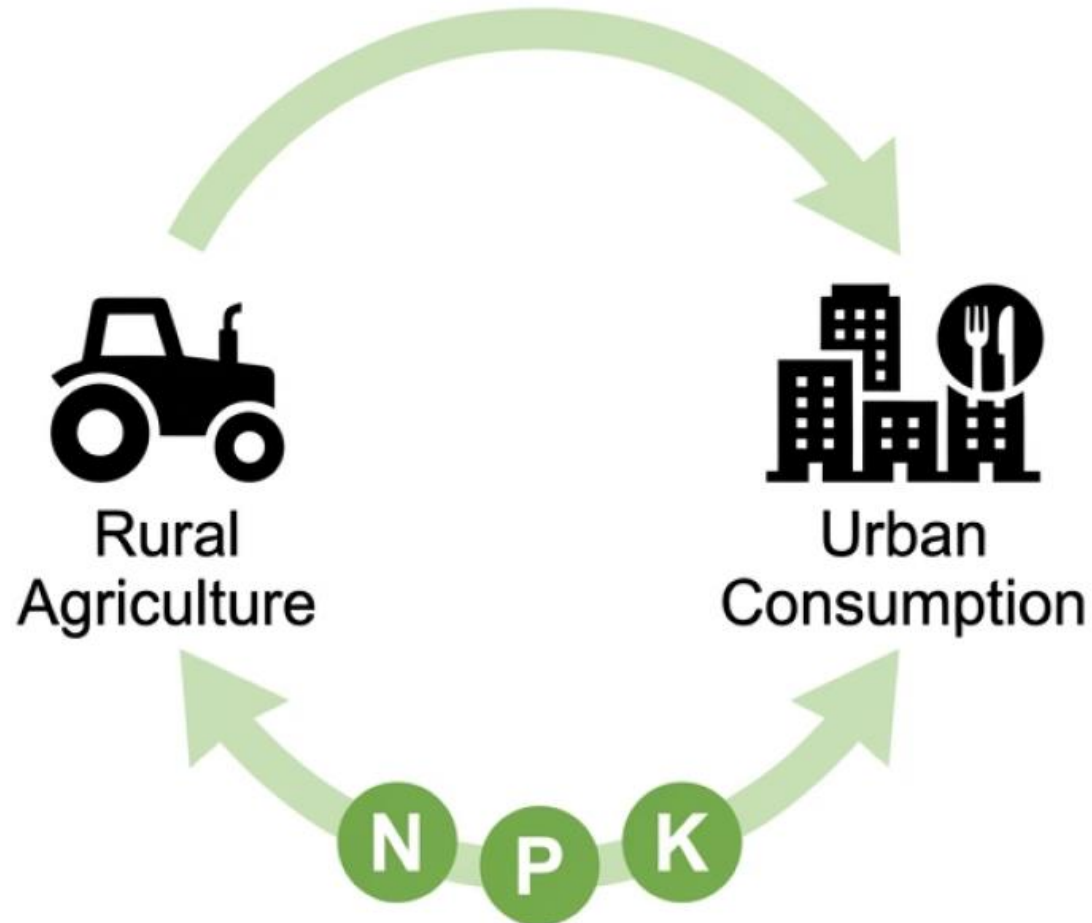
7.- Organic Waste and Biological Cycles

Agricultural waste in CE

CELWS-W07-V04

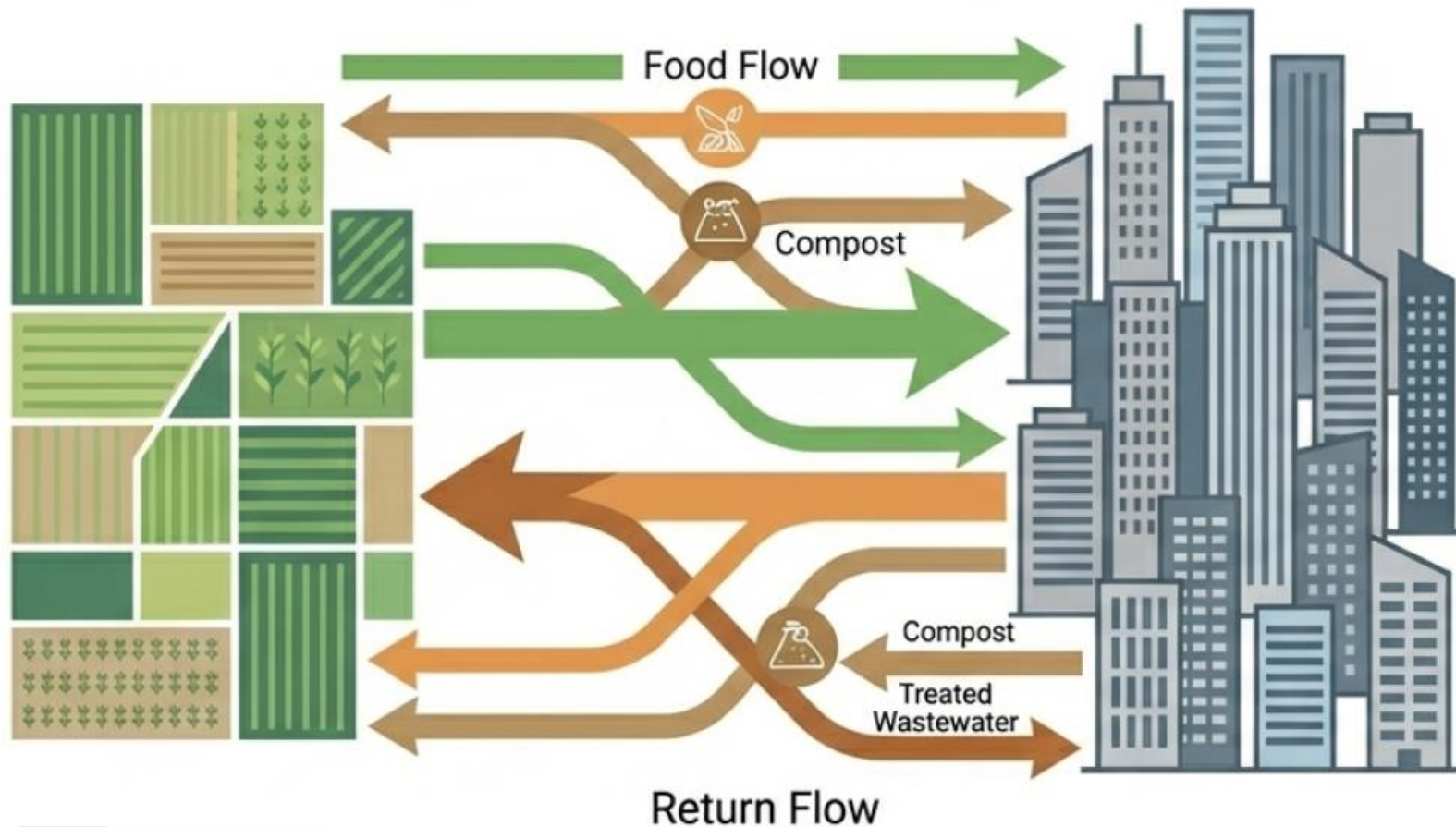
Integrating Biological Cycles into Circular Economy



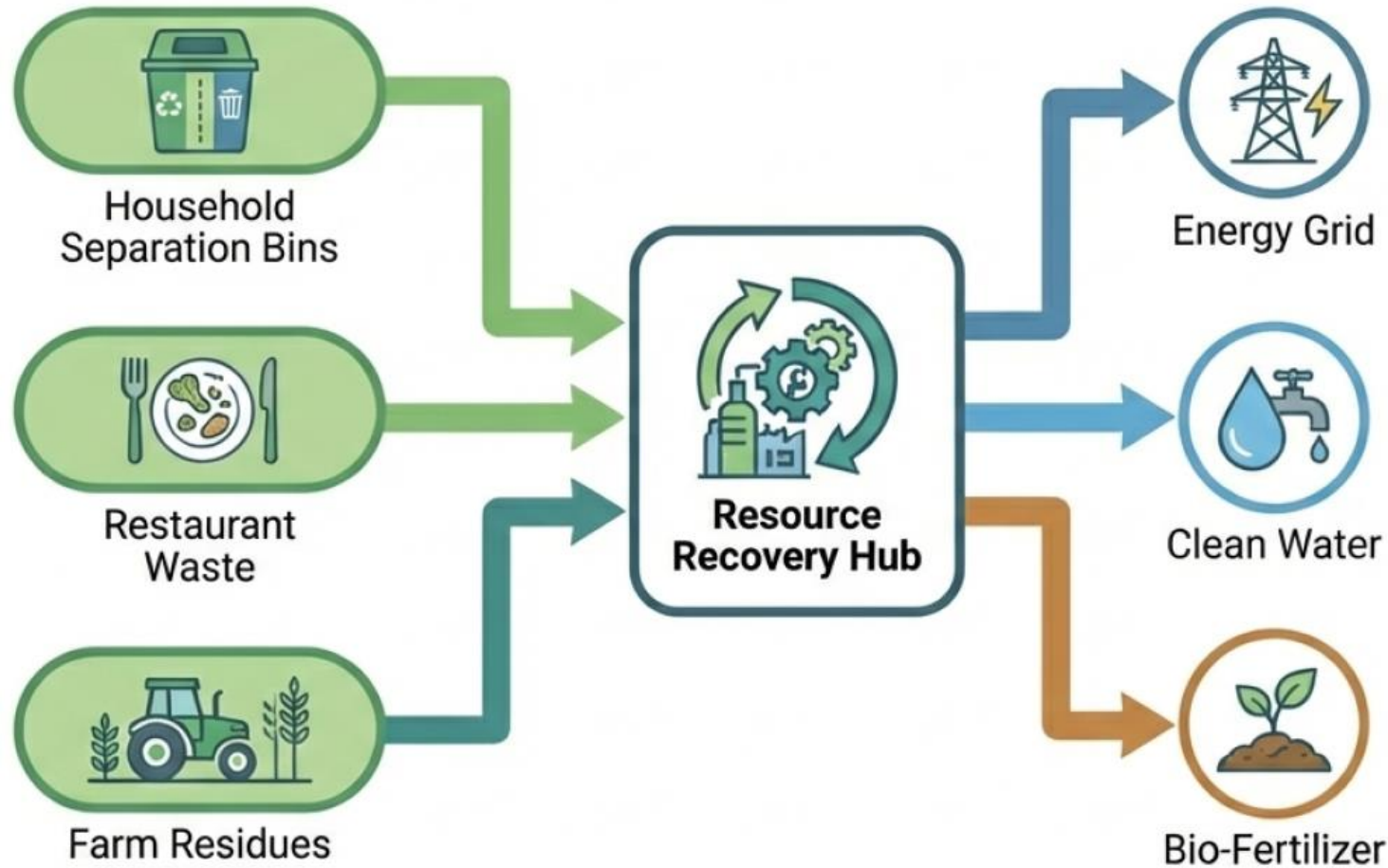


- Core principle: “Waste Equals Food.”
- Biological nutrients—Nitrogen (N), Phosphorus (P), and Potassium (K)—are captured from human and agricultural byproducts.
- Safe return of nutrients to soils decouples global food production from finite, fossil-based fertilizers.

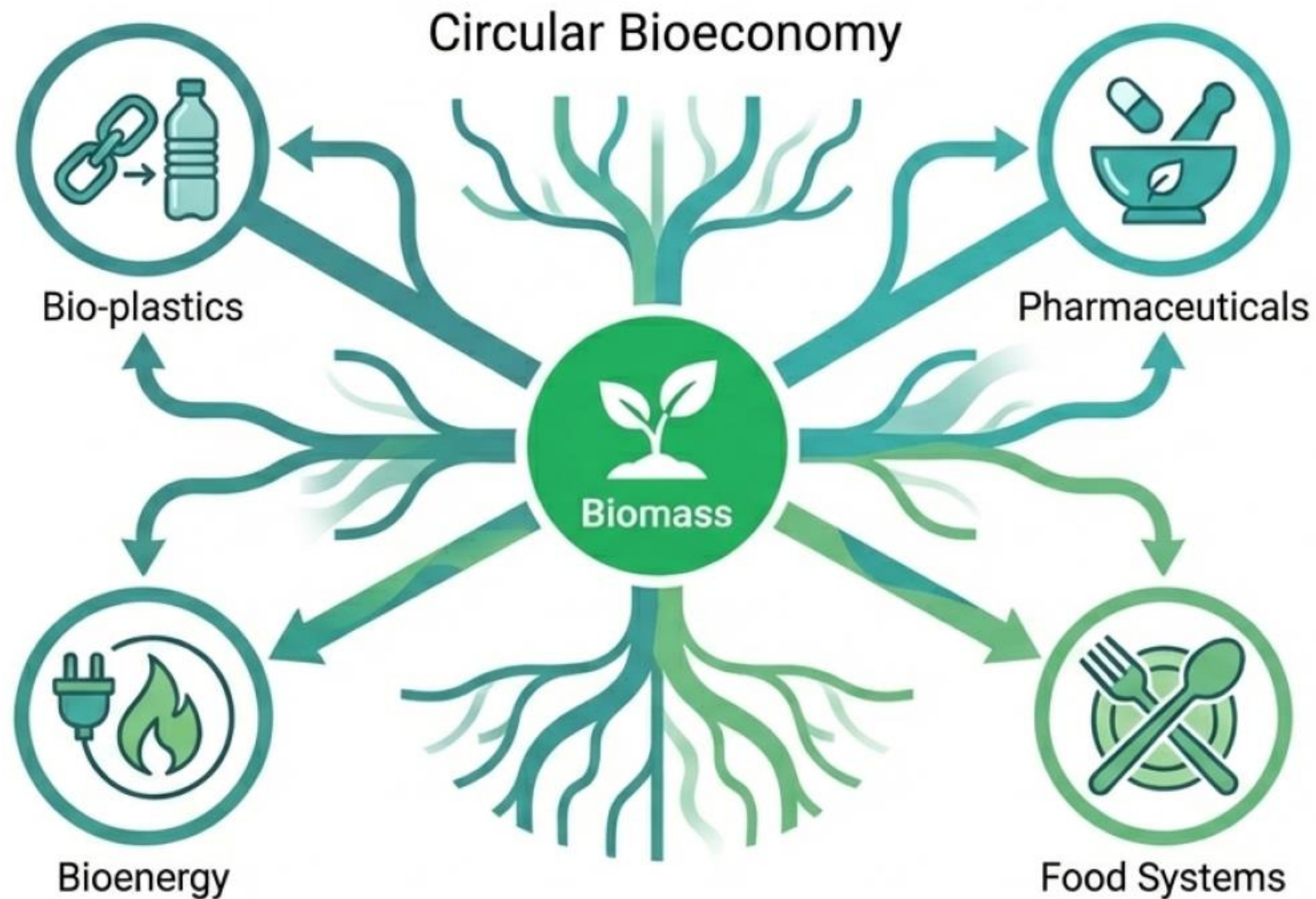
Urban–Rural Linkages

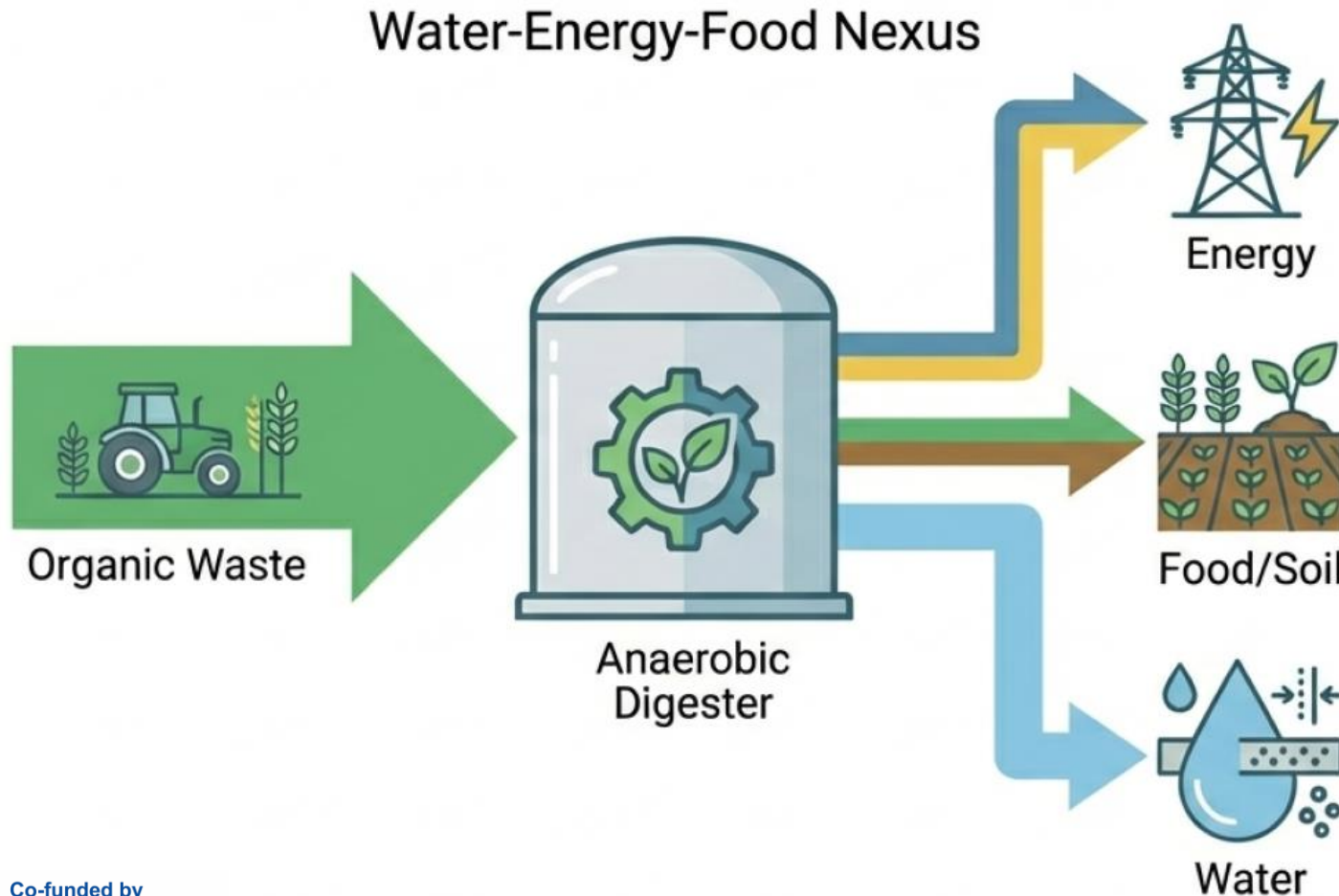


- **Urbanization** centralizes food flows but disrupts natural nutrient return, stranding 2.8 billion tons of urban organic waste annually.
- **Circular systems** engineer geographical bridges, converting city biowaste back into vital agricultural inputs.

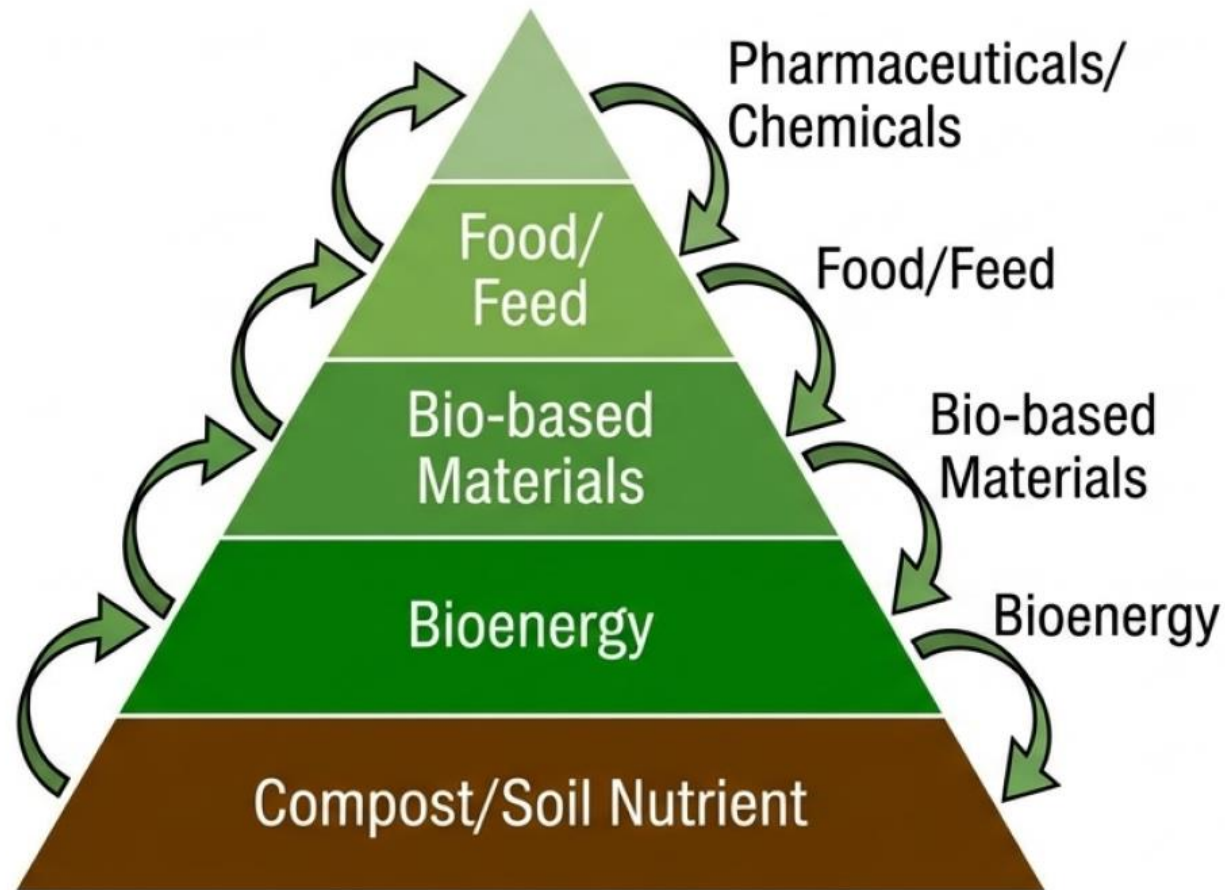


- **Fragmented** waste streams must be aggregated to achieve necessary processing scale.
- **Centralized recovery hubs** transform mixed organic inputs into standardized, high-value commodities.

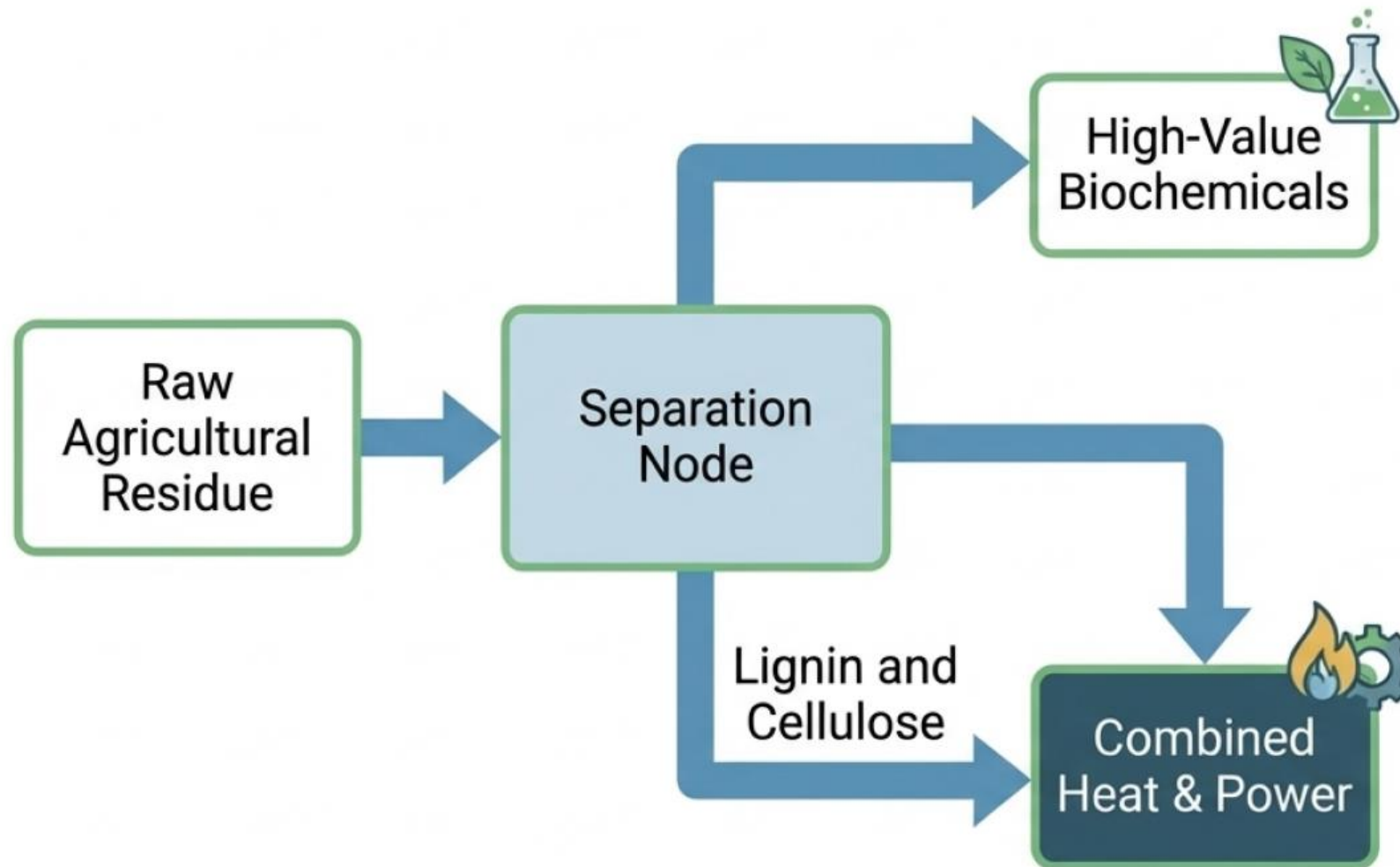


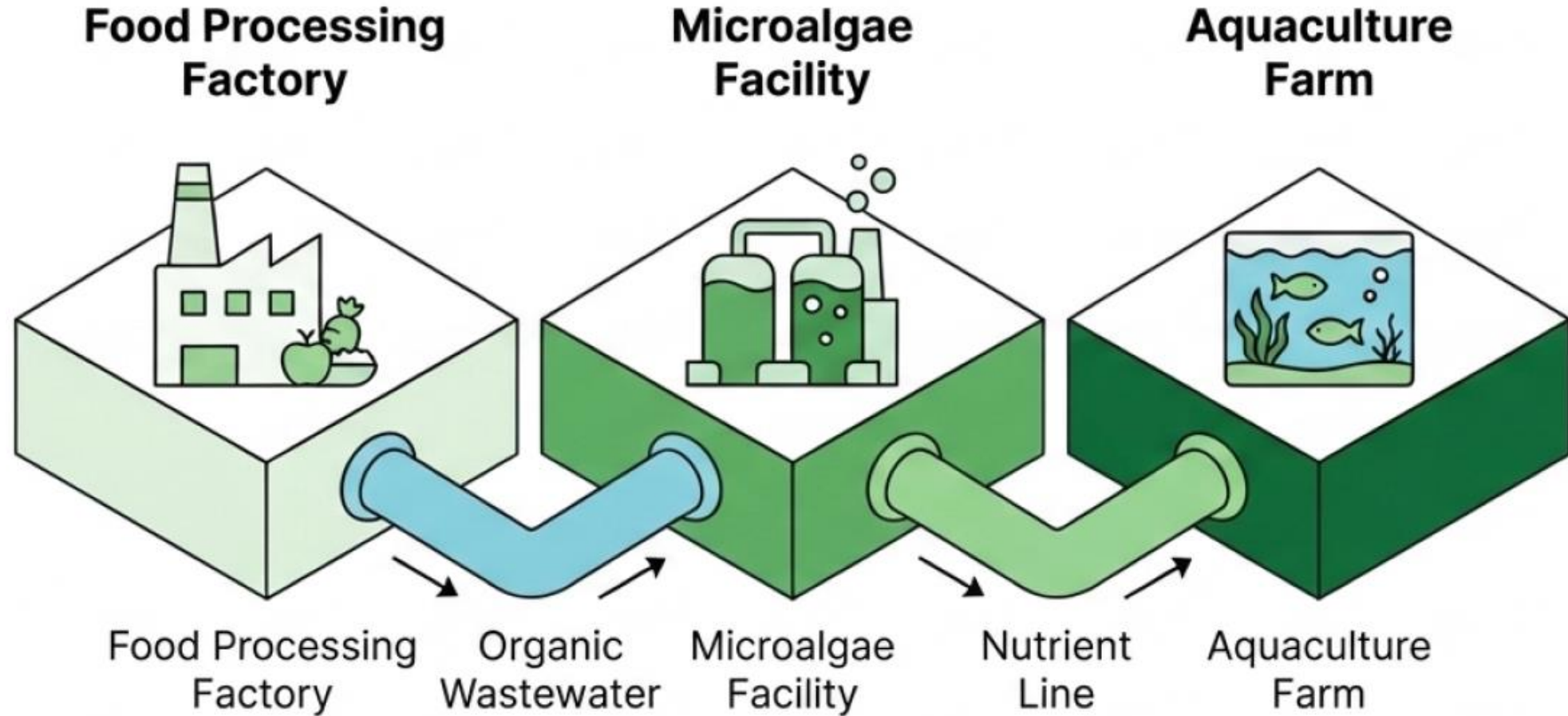


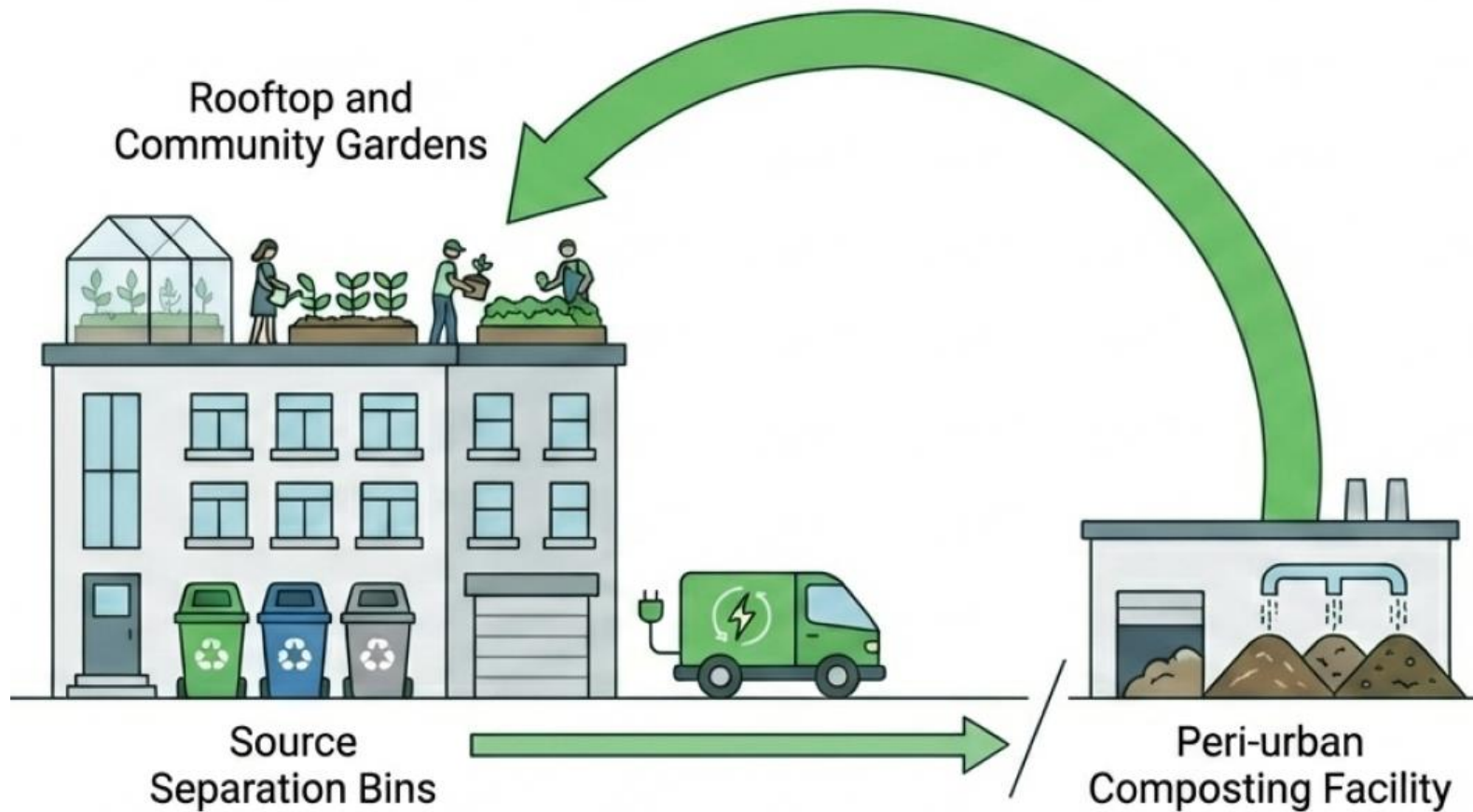
- **Anaerobic Digestion (AD)** serves as the ultimate nexus technology for biological circularity.
- It treats waste while simultaneously generating renewable biogas (60% methane) and nutrient-rich digestate for soils.



- Biomass must be utilized at its highest possible value before being chemically degraded.
- Successive loops extract maximum economic and chemical value from a single organic resource.

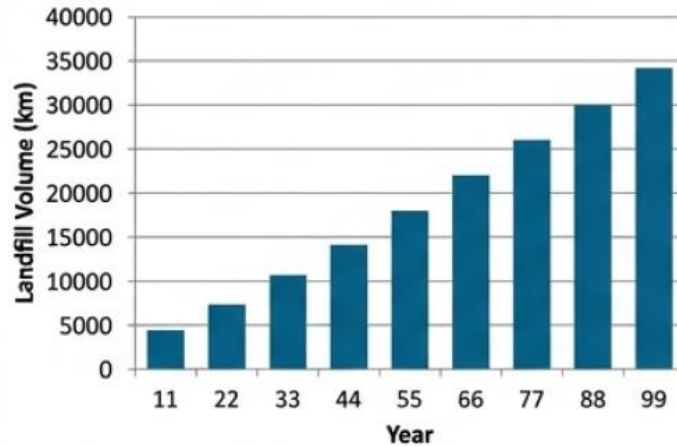




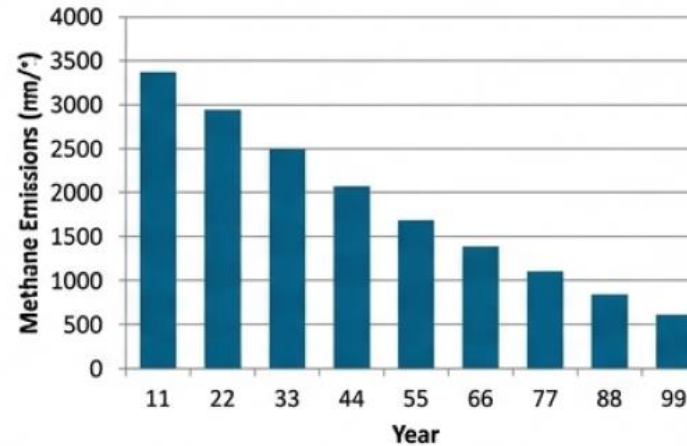


- High-density environments enable highly efficient reverse-logistics for organic collection.
- Peri-urban agriculture and vertical farming close the loop locally, ensuring resilient food security.

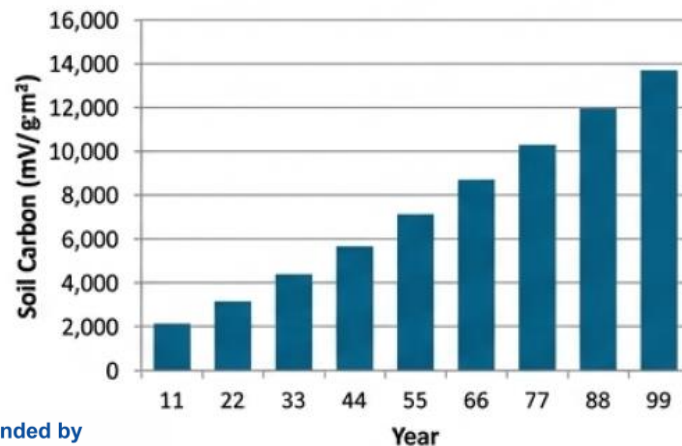
Landfill Volume



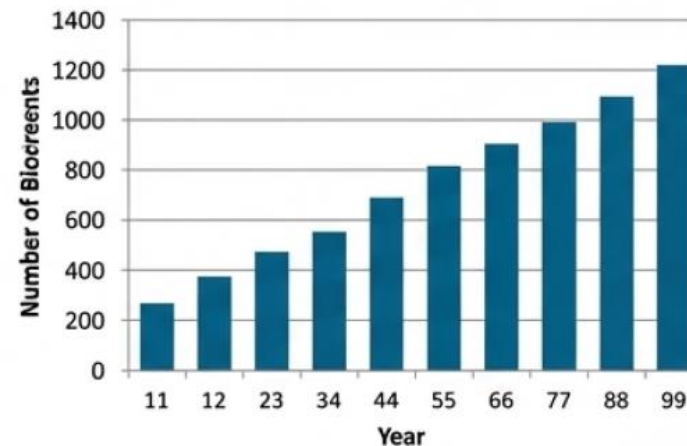
Methane Emissions



Soil Carbon Sequestration

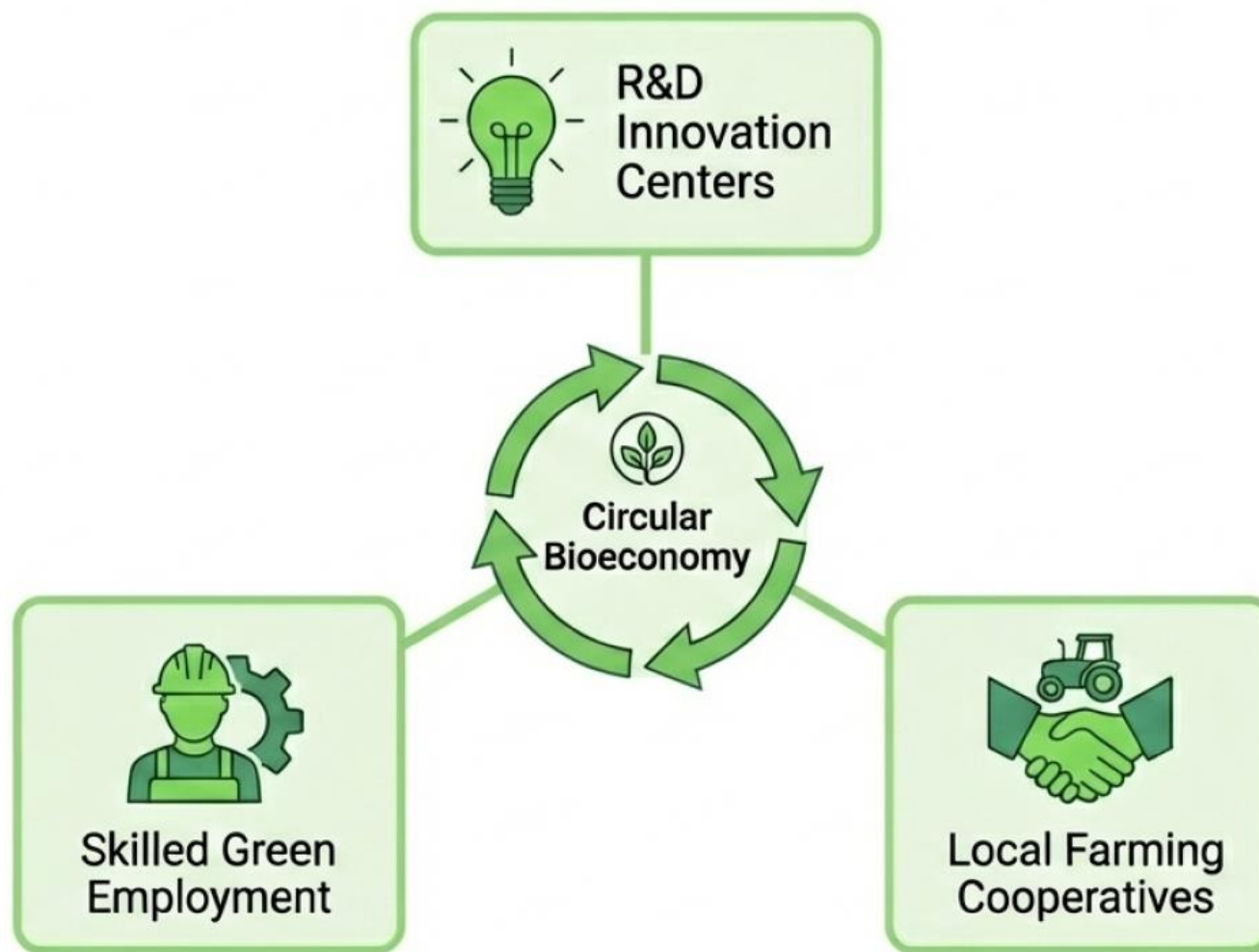


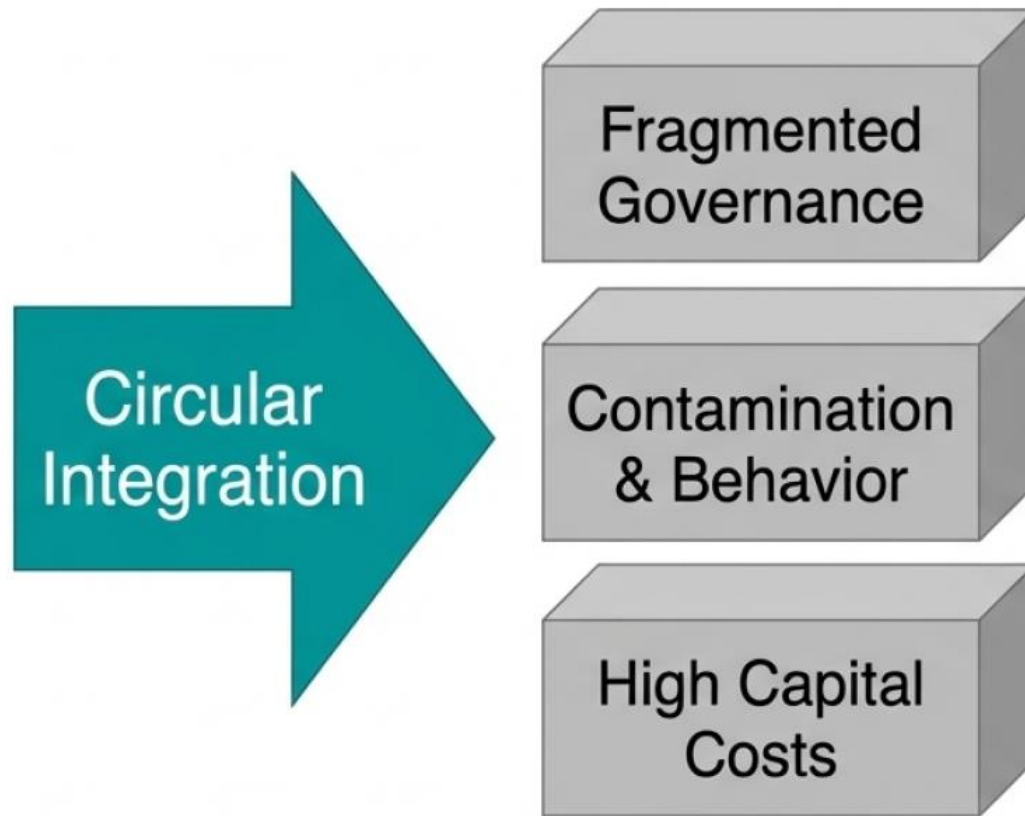
Biodiversity



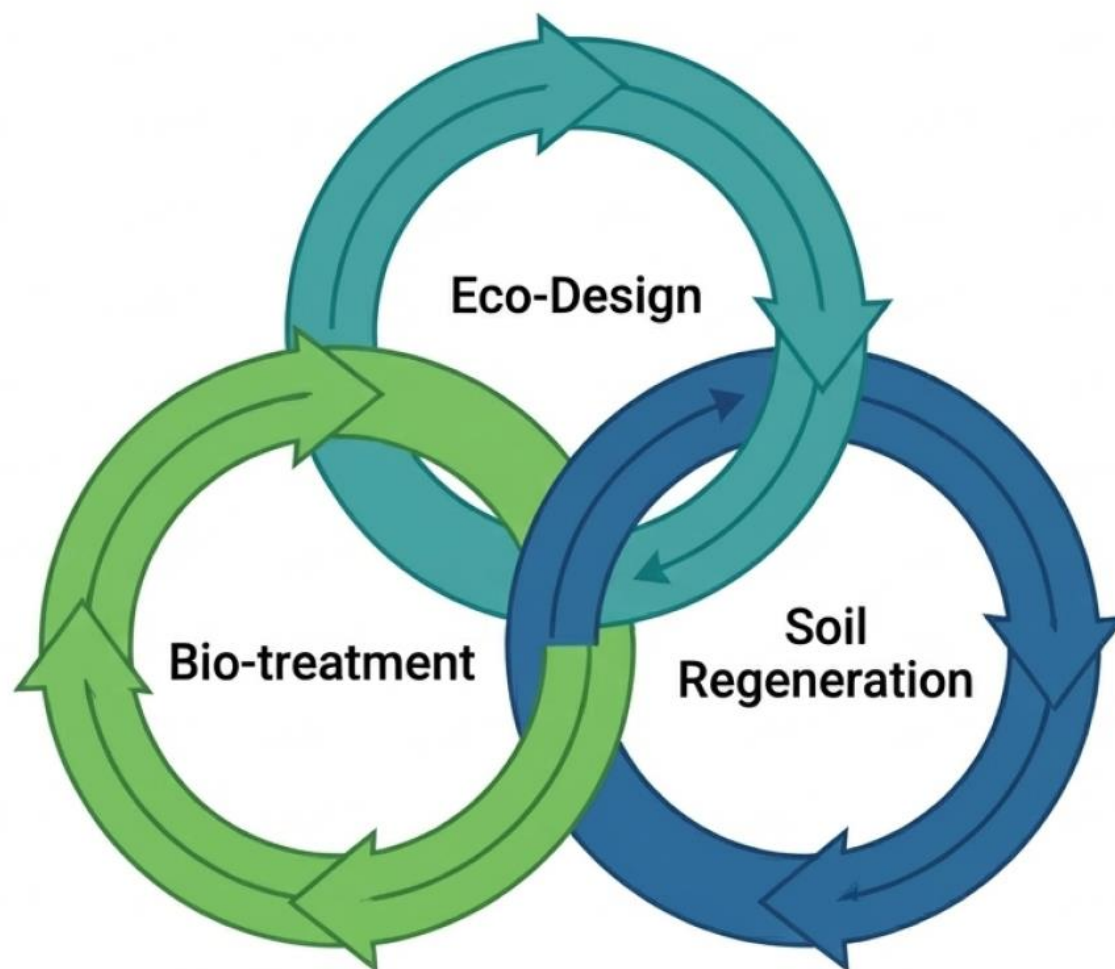
- Diverting organics to landfill iod distributes and farm founded organics store t-methane cids and benefits

- Returning nutrients to earin organics forms for normal oids and resource aflets with renerse future





- Systemic transition requires overcoming significant structural and economic hurdles.
- Success demands strict alignment between policy mandates, consumer separation behaviors, and heavy infrastructure investment.



- Biological nutrients are the fundamental engine of a regenerative future.
- True circularity optimizes the entire metabolic system, permanently decoupling growth from ecological degradation.



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