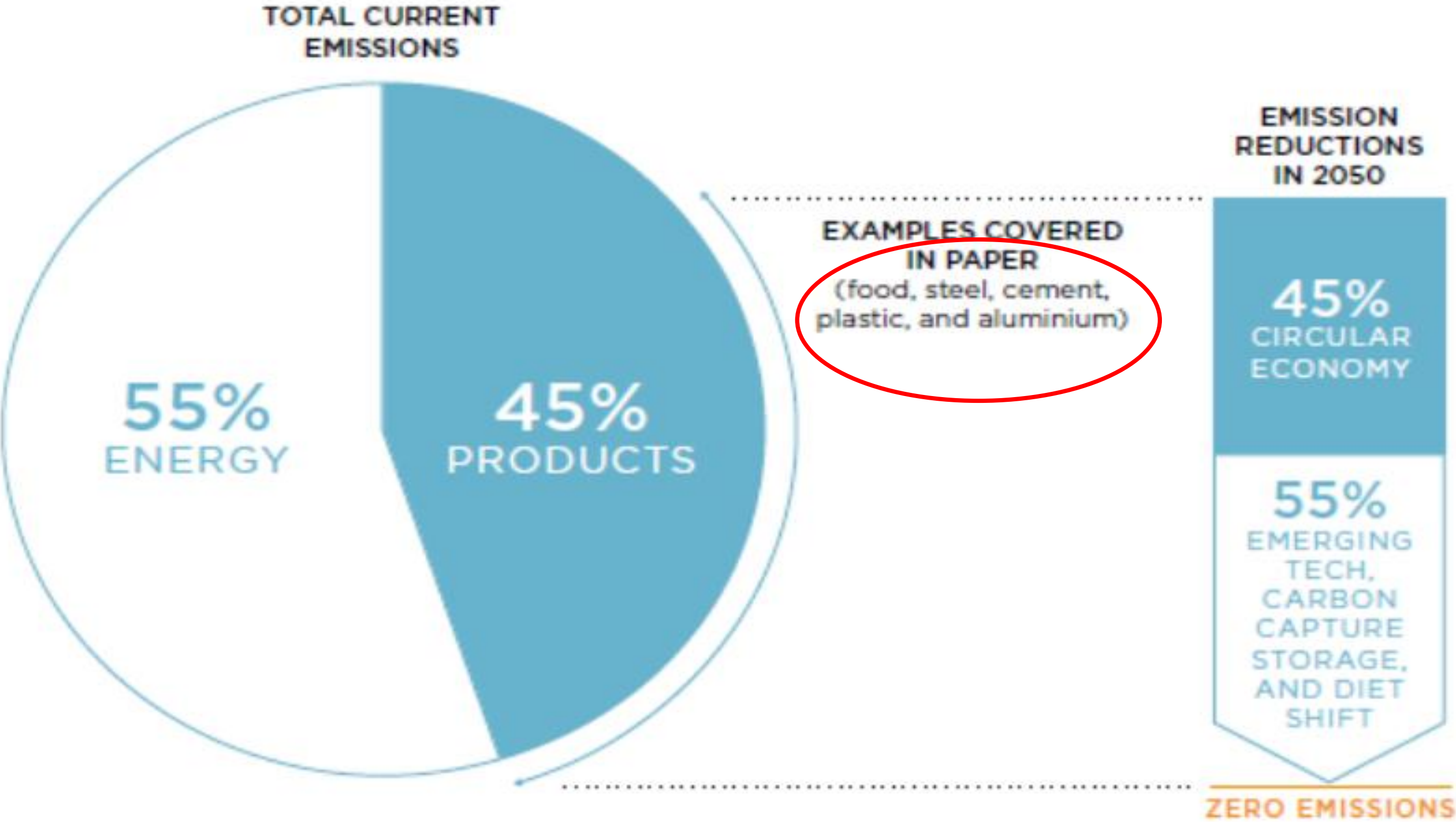


# Circular Economy for Climate Mitigation

Economic and Social Commission for Western Asia (ESCWA)  
Capacity Building Workshop  
on Circular Economy in Agriculture and Water Sectors  
Amman, Jordan, 28-29 October 2024

**Piotr Barczak**  
Circular Economy Program Manager  
African Circular Economy Network Foundation (**ACEN Foundation**)

# COMPLETING THE PICTURE: TACKLING THE OVERLOOKED EMISSIONS



Source: Ellen MacArthur Foundation, Material Economics.

# In Solidarity for a Green World



## COP29 Declarations and Pledges Letter

**Date:** 16 October 2024  
**Location:** Baku, Republic of Azerbaijan

### Dear Colleagues,

Last month, I wrote to you to present the individual Presidency-led initiatives and envisaged outcomes and how they support the COP29 Presidency's vision to enhance ambition and enable action.

Enhancing ambition and setting clear targets and plans are crucial in the fight against climate change, providing a solid foundation for us to measure progress and identify areas needing improvement. These commitments send strong market signals, which can help us direct financial flows and identify priority areas for research and development. Moreover, they foster a sense of shared responsibility and urgency, galvanising action across all sectors of society. By aiming high, we create the momentum needed to transform aspirations into tangible results, pushing the boundaries of what is possible.

In this context, I am writing to share the COP29 Pledges and Declarations, which aim to contribute to this process. These outcome documents form part of the initiatives launched by the COP29 Presidency, as outlined in previous correspondence.

We are grateful to everyone who provided feedback on the COP29 Pledges and Declarations. To ensure maximum inclusivity, we extended the formal consultation period beyond the timeline set out in my previous letter and we continued to receive comments on draft documents until 10 October 2024.

The COP29 Presidency's Pledges and Declarations are now attached as annexes. These documents offer all stakeholders - including governments, local administrations, municipal authorities, international organisations, UN agencies, multilateral development banks, multilateral climate funds, civil society, private and philanthropic entities, and other stakeholders - the chance to enhance their commitment to climate action.

The list of COP29 Pledges and Declarations is as follows:

- COP29 Truce Appeal
- COP29 Global Energy Storage and Grids Pledge
- COP29 Green Energy Zones and Corridors Pledge
- COP29 Hydrogen Declaration
- COP29 Declaration on Green Digital Action
- **COP29 Declaration on Reducing Methane from Organic Waste**
- COP29 Multisectoral Actions Pathways (MAP) Declaration to Resilient and Healthy Cities
- COP29 Declaration on Enhanced Action in Tourism
- COP29 Declaration on Water for Climate Action

## Annex 7: COP29 Declaration on Reducing Methane from Organic Waste

We, national governments;

**Recognising** that by reducing methane emissions in all relevant sectors, principally in fossil energy, agricultural and waste sectors by at least 30% below 2020 levels by 2030, the world has the potential to avoid projected global warming by at least 0.2°C by 2050 as outlined in the Global Methane Assessment, making it an important action to keeping the global average temperatures within the 1.5°C threshold;

**Further recognising** that such reductions could generate important health, nature, livelihood, and economic benefits, preventing an estimated 255,000 premature deaths annually, 775,000 asthma-related hospitalisations, 73 billion hours of lost labour due to extreme heat, and significant crop losses in the agricultural sector while protecting biodiversity by reducing ground-level ozone pollution and impacts from rising temperatures;

**Noting** that methane in the waste sector is the rapidly growing source of anthropogenic methane emissions, resulting primarily from the decomposition of organic waste in landfills, open dumps, and wastewater, and contributing almost 20% of anthropogenic methane emissions;

**Acknowledging** food waste and food loss is a significant global issue affecting countries worldwide, with substantial environmental, economic, and social impact. Noting that the UNEP Food Waste Index Report 2024 estimated that 8-10% of total global emissions relate to food loss and waste alone;

**Noting** that poor waste management and the effects of open dumps or illegal landfills adversely impact social and environmental justice efforts;

**Emphasising** the importance of cooperation at local, regional, and global levels to tackle waste management challenges, including those related to shipment of waste and ocean pollution;

**Recalling** the findings of recent Intergovernmental Panel on Climate Change (IPCC) assessments that to be consistent with IPCC 1.5C scenarios, globally methane emissions from the waste sector must drop by 30-35% below 2020 levels by 2030 and nearly 55% by 2050;

**Noting** that the outcome of the first global stocktake (GST) under the Paris Agreement recognised the need to substantially accelerate the reduction of methane emissions by 2030;

**Underscoring** that addressing and reversing the current surge of waste generation necessitates action on waste prevention, circular economy and zero waste practices adhering to the waste hierarchy, including composting of organic waste or other treatment of organic waste;

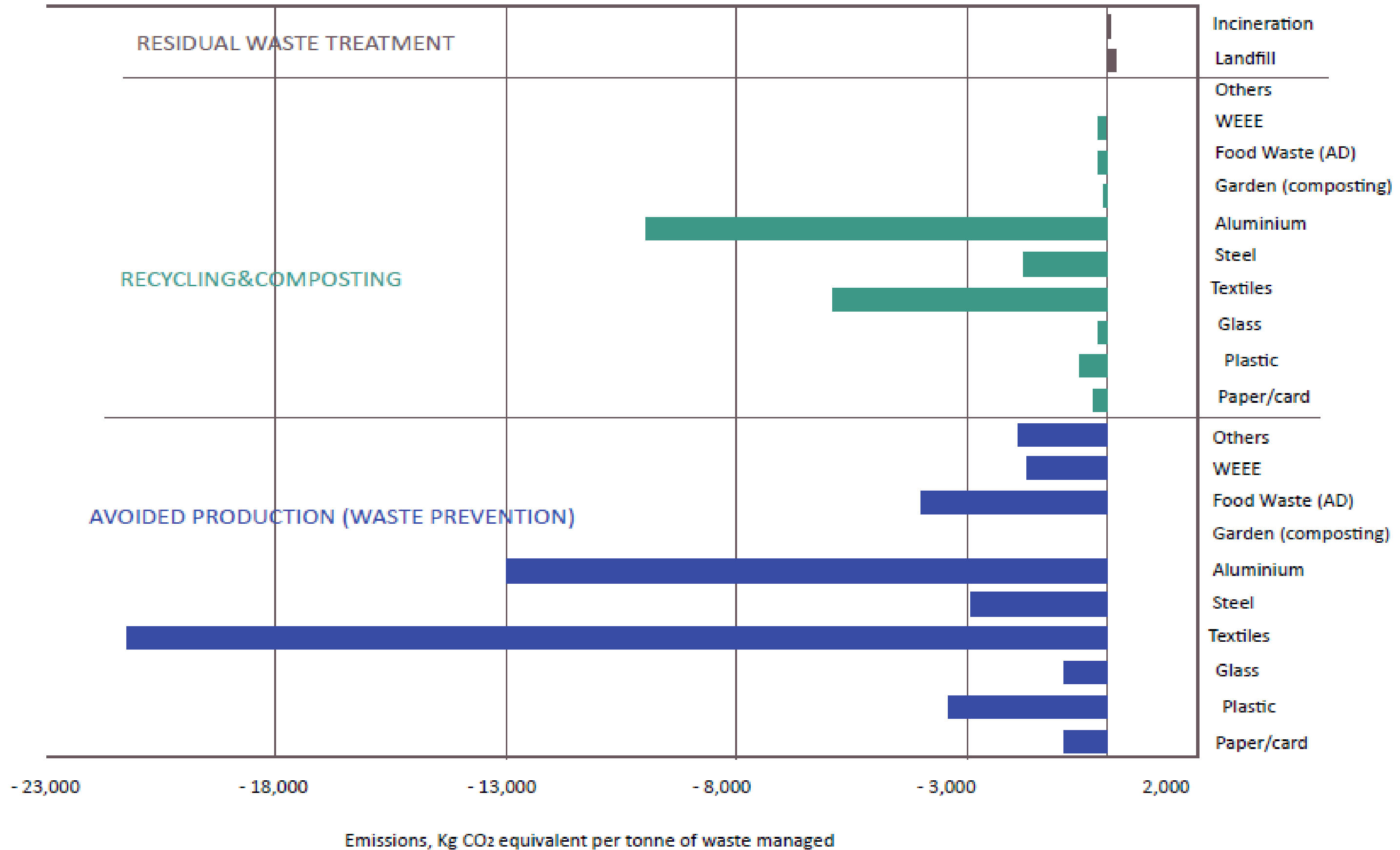
**Noting** that these actions come with important economic opportunities as well as opportunities to address the triple planetary crisis of climate change, pollution and biodiversity loss;

**Recalling** that today, about 25% of the total land area across the globe is degraded, directly impacting 3.2 billion people, especially small-scale farmers and rural communities, and affecting millions more through food insecurity, higher food prices, climate change, environmental hazards, and the loss of biodiversity and ecosystem services, making solutions to rebuild soil an issue of urgency;

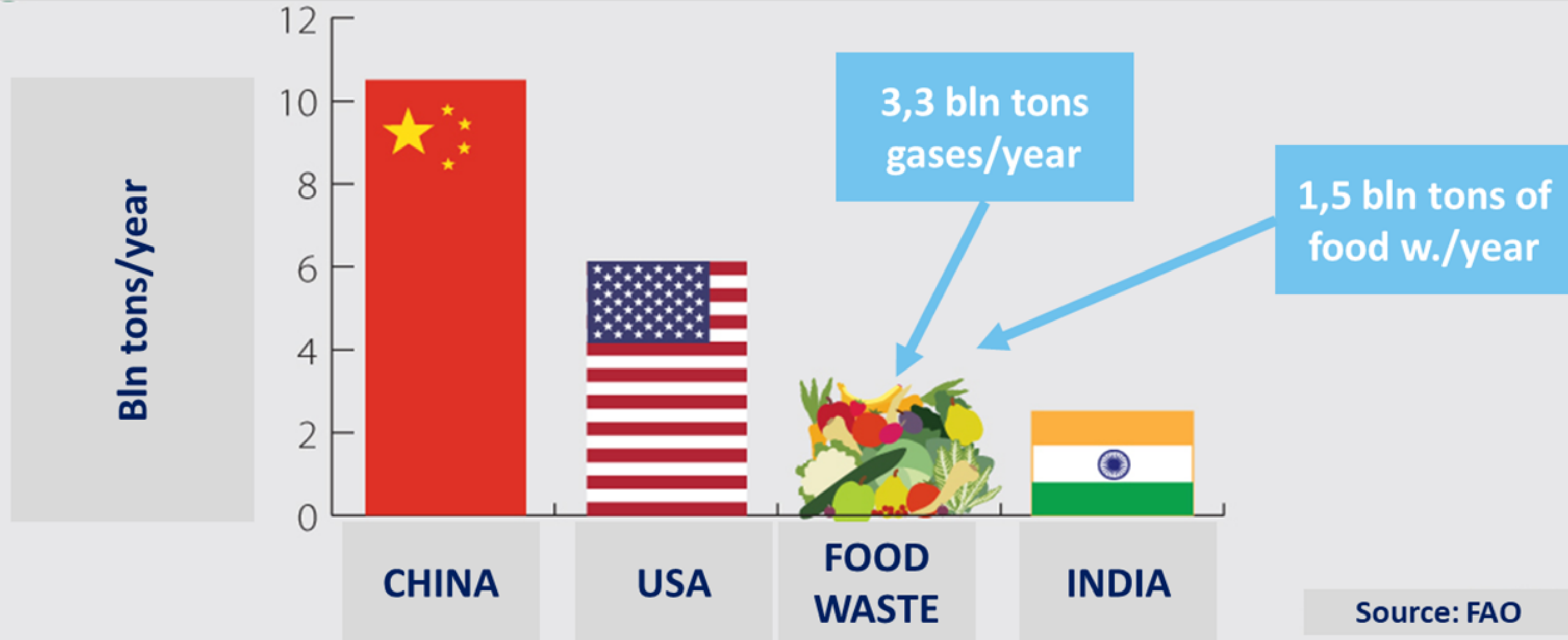
**Recalling** the UN Framework Convention on Climate Change and the Paris Agreement, the Convention on Biological Diversity and the Kunming-Montreal Global Biodiversity Framework, the UN Convention to Combat Desertification, and noting outcomes of the UN Food Systems Summit, the 2030 Agenda for Sustainable Development and the Pact of the Future;

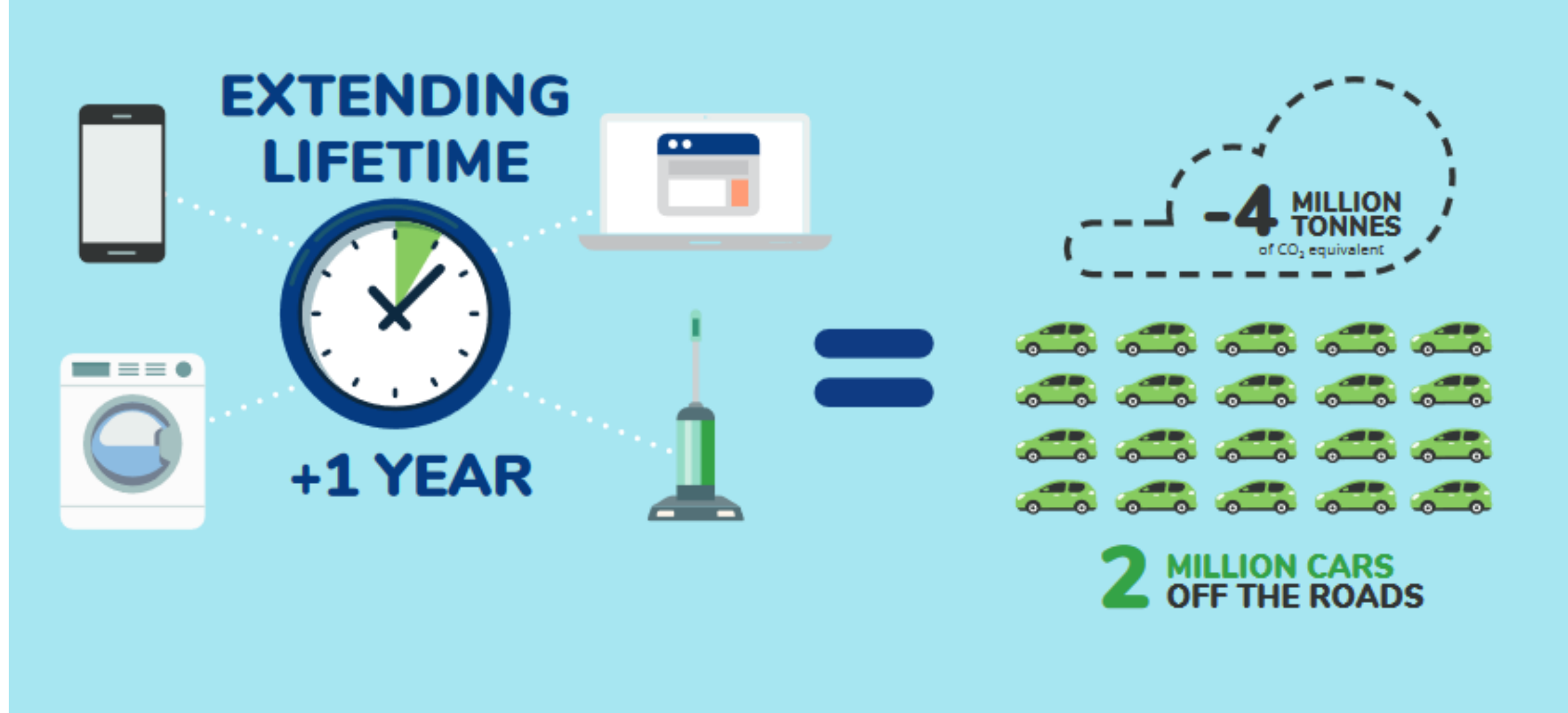
**Recognising** that strategies to prevent, reduce and reuse organic waste, whether by making use of it as a resource material, composting it to enrich soils as fertilizer, or using it to produce bioenergy offer numerous economic and environmental benefits. These strategies serve as climate solutions while also contributing to enhancing food security and energy access, promoting bioeconomy, avoiding open burning and related air pollution, creating local jobs, improving living standards and reducing costs for cities while contributing to more sustainable urban development;

# Figure E- 2: Indicative Climate Change Impacts of Key Waste Management Activities (excl. CO<sub>2</sub> from biogenic sources)

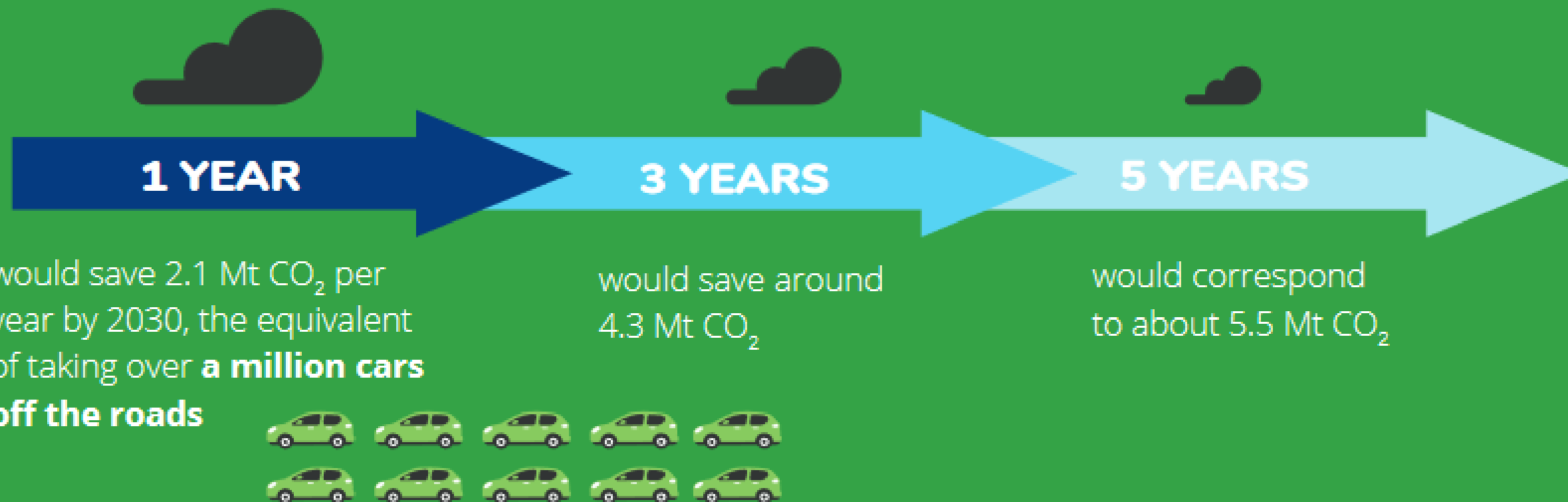


# If food waste was a country it would score 3rd in emmissions of greenhouse gasses/year

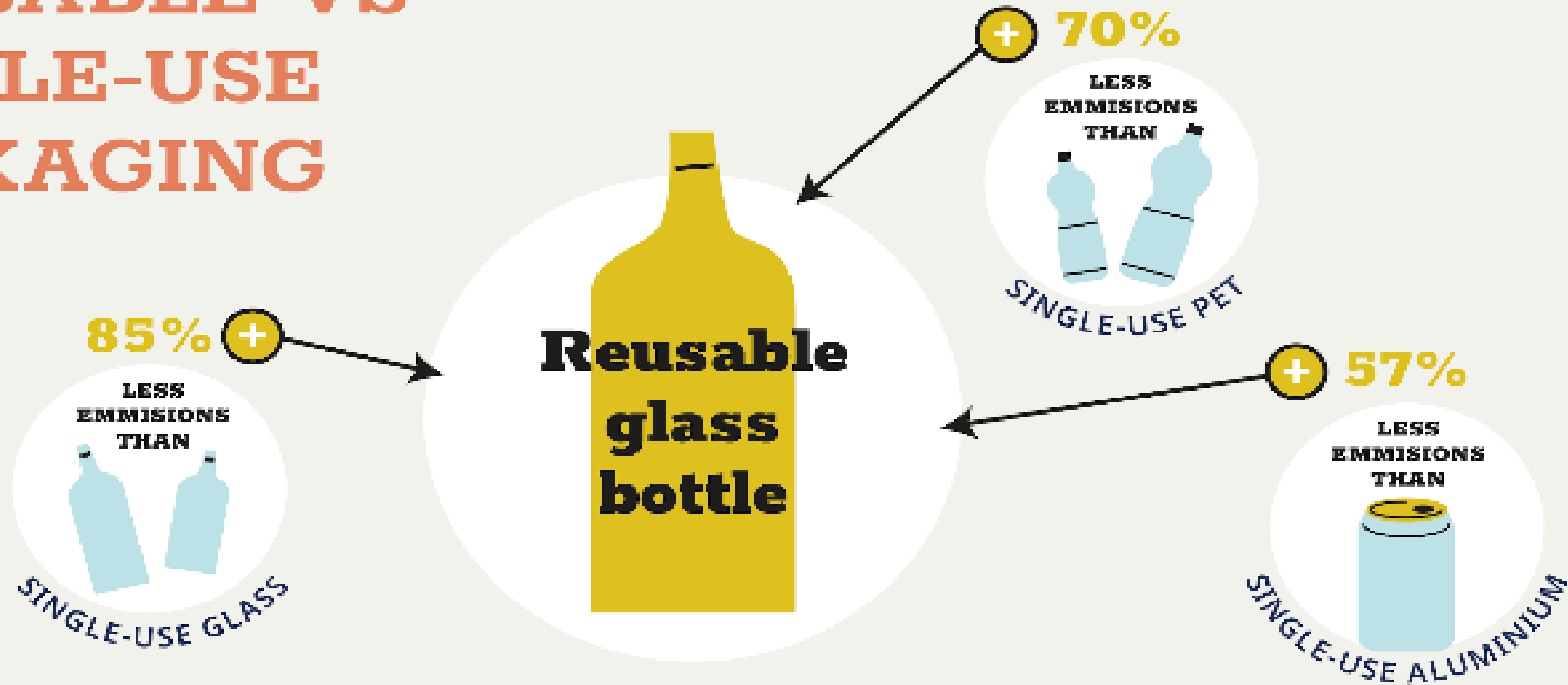




Extending the lifetime of all smartphones in the EU by



# REUSABLE VS SINGLE-USE PACKAGING



#breakfreefromplastic

#WeChooseReuse

- GHG emissions savings thanks to the largest share of refillable packaging on the market





# Waste Sector

Waste account for **20%** of anthropogenic methane emissions

- Oil and Gas: **25%**
- Coal: **12%**

1.5°C-consistent global reductions of **30-35%** below 2020 levels by 2030 and nearly **55%** by 2050

If current trends continue, the amount of waste will increase by over 70% to 3.88 billion tonnes per year by 2050

## REDUCING SHORT-LIVED CLIMATE POLLUTANT EMISSIONS FROM WASTE

Many common waste disposal methods generate short-lived climate pollutants like methane and black carbon - powerful climate forcers that damage our environment and health. Changing our consumption habits and managing waste differently are important steps in the fight against climate change and air pollution.

Without action, global waste could grow by **70%** by 2050



### WE CAN STOP EMISSIONS WITH



# Biowaste – often an untapped resource

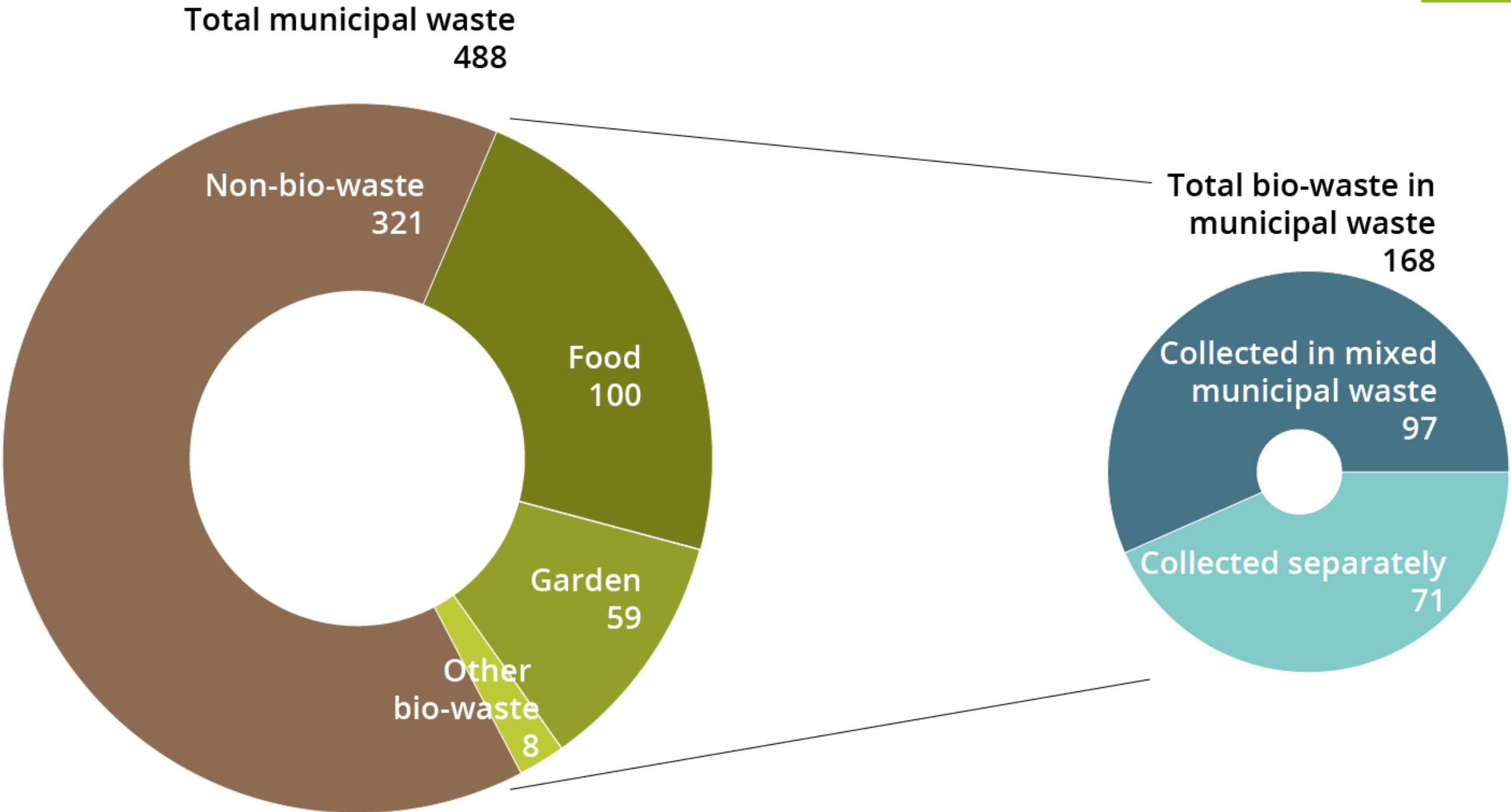


# Recycling of different waste fractions



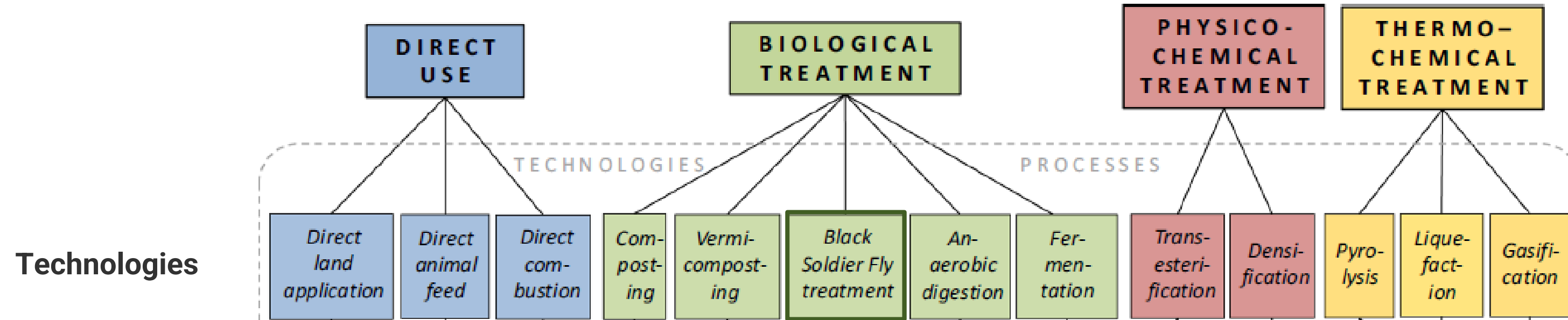
What to do with the organic fraction?

# Biowaste in MSW in mln tonnes - Europe



Source: EEA

# Options for biowaste treatment

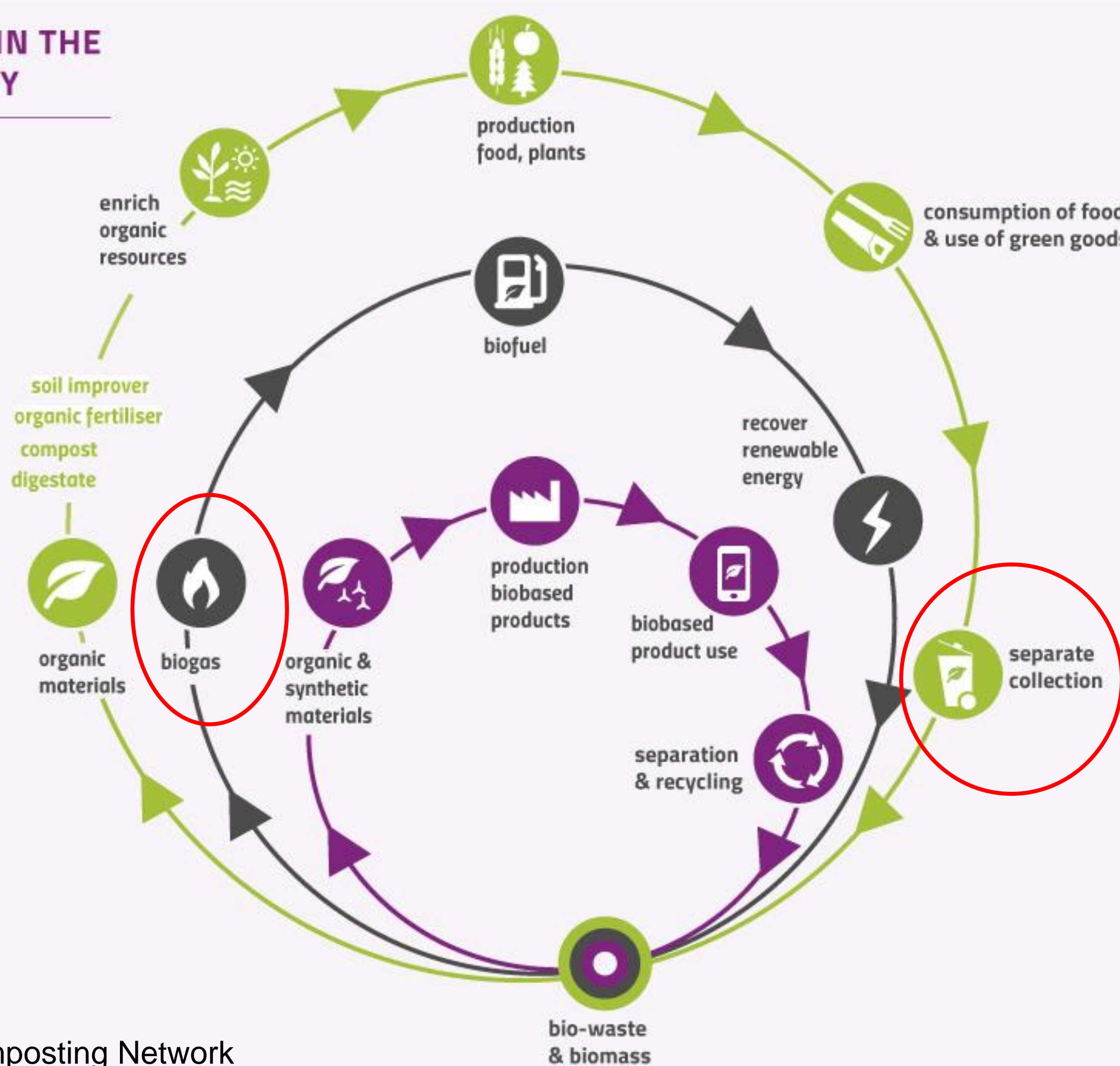


**Technologies**

**Products**

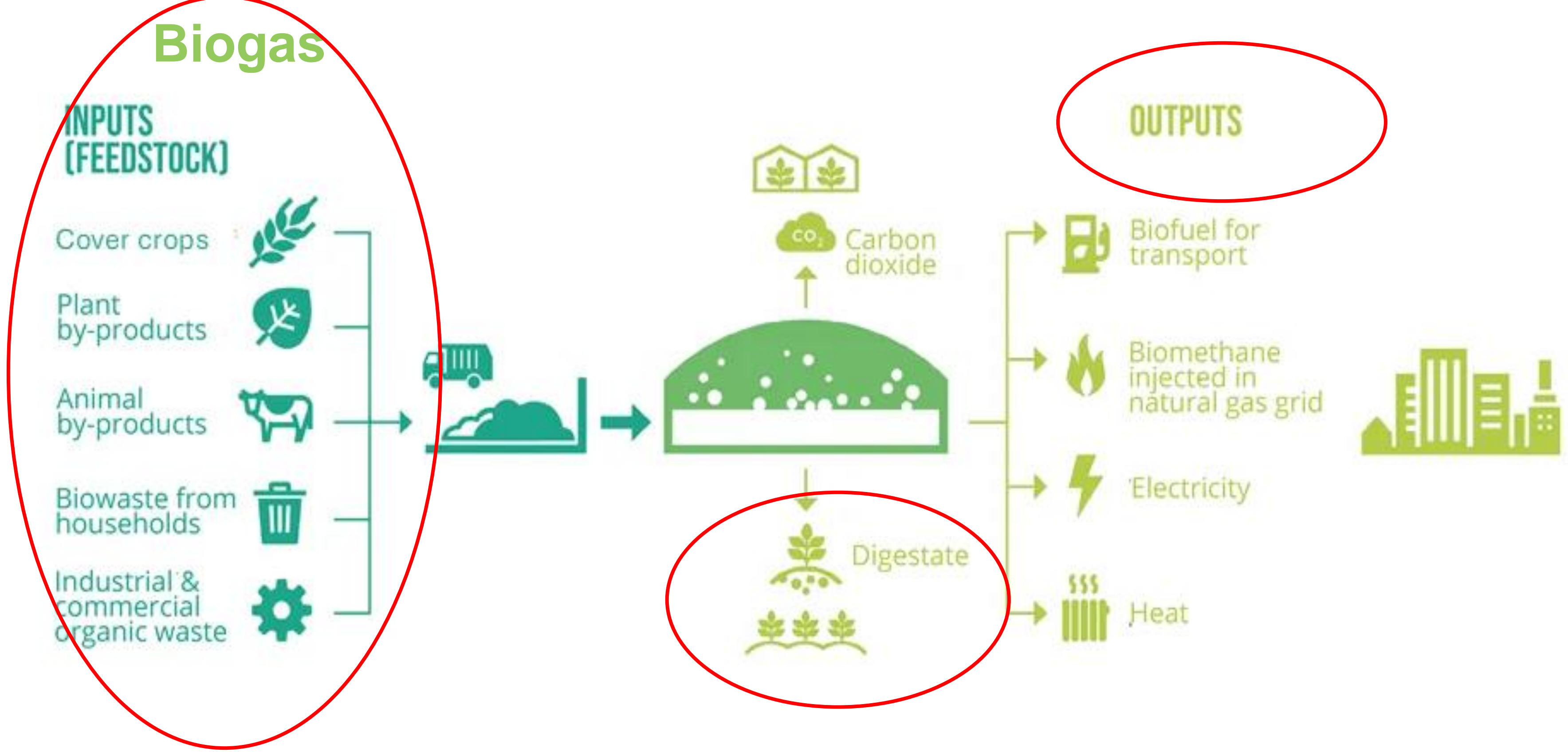
**End-Use**

# BIOLOGICAL CYCLE IN THE CIRCULAR ECONOMY

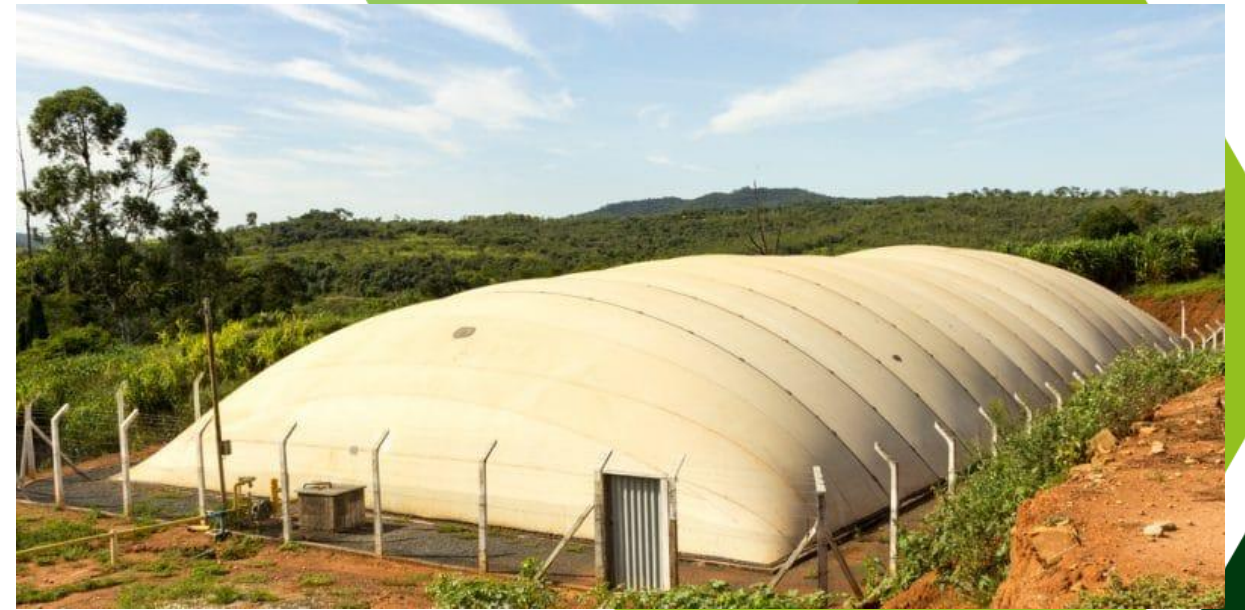
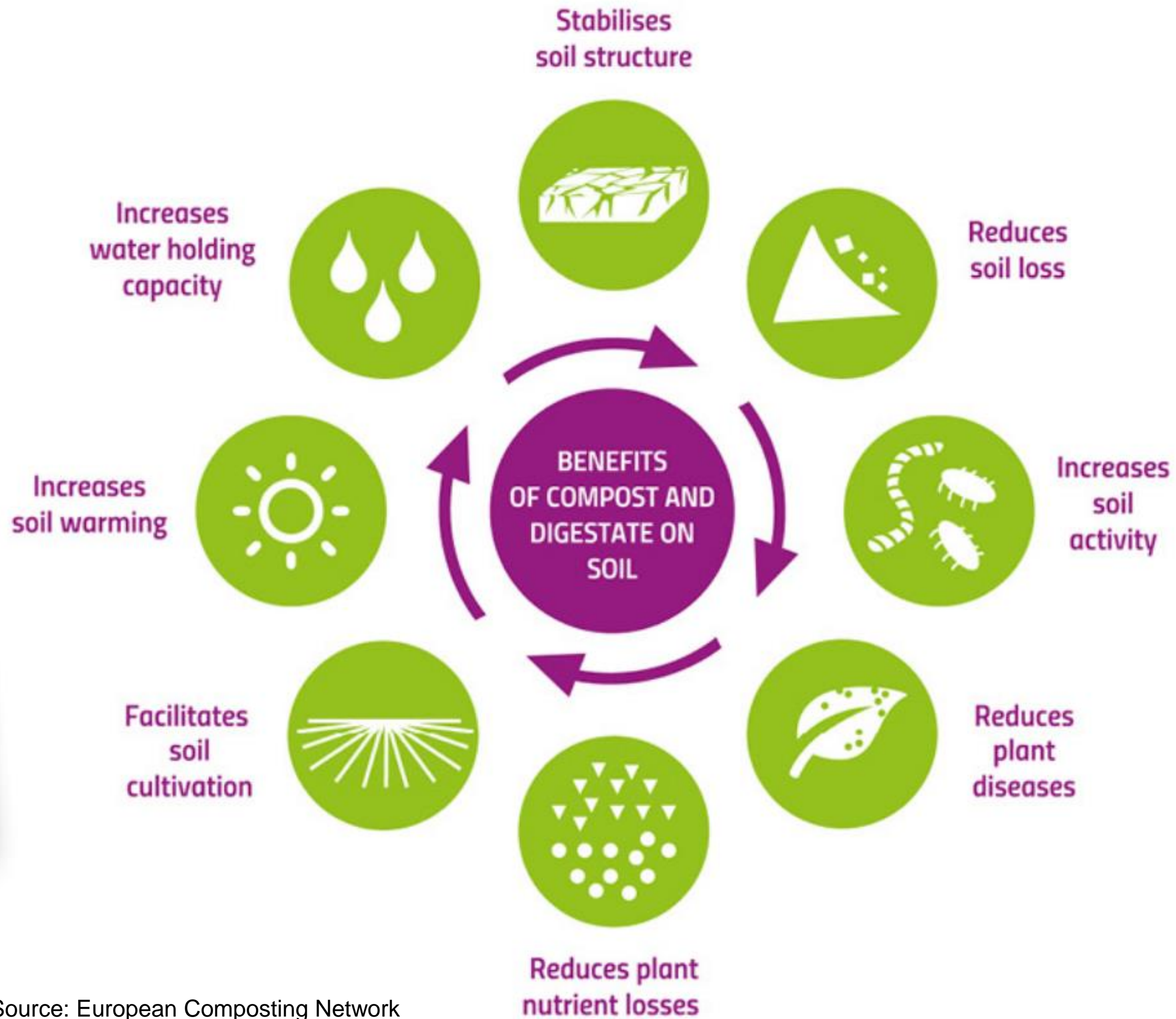


Source: European Composting Network

# Biogas



**Figure 1.1:**  
Schematic overview of inputs and outputs of the biogas and biomethane production process



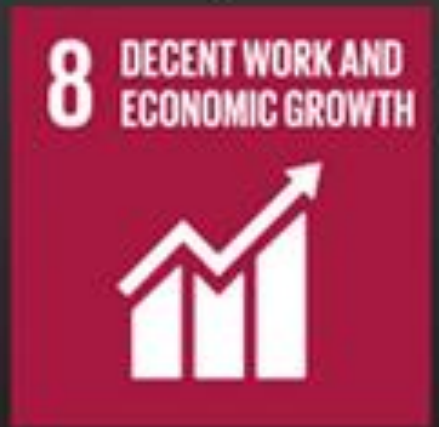


# Savings and Benefits of Bio-waste Recycling

- Replacement of mineral fertilisers
  - ▶ 30-50 kg CO<sub>2</sub>-eq/tonne
- Biogas Production
  - ▶ 100-150 kg CO<sub>2</sub>-eq/tonne
- Peat replacement
  - ▶ 300-400 kg CO<sub>2</sub>-eq/tonne
- C sequestration
  - ▶ 11 to 326 kg CO<sub>2</sub>-eq/tonne



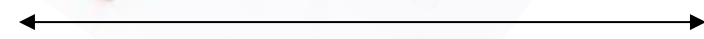
- Further environmental benefits:
  - ▶ Reduced N<sub>2</sub>O release + Improved workability + water retention + replacement of pesticides, biodiversity.....
- Creation of green jobs:
  - ▶ 800 t of bio-waste one full-time employment
  - ▶ 100.000 green jobs



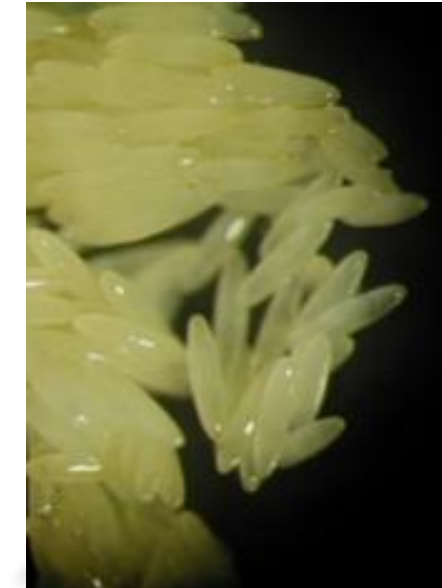
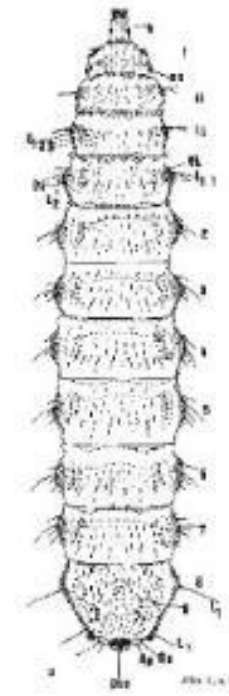
Biodigesters contribute to nine of the seventeen SDGs (Figure by: ABPP Hivos SNV)

# The black soldier fly (BSF), *Hermetia illucens*

Black Soldier Fly



ca. 18 mm



House fly



ca. 6 mm



45° N

40° S



# Black Soldier Fly - Create value from waste

## Waste management



- Fruits & vegetables
- Food waste
- Slaughterhouse waste
- Chicken/pig manure
- Human faeces



## Business opportunities



# Medium-scale BSF facilities



1-30 tons of waste per day



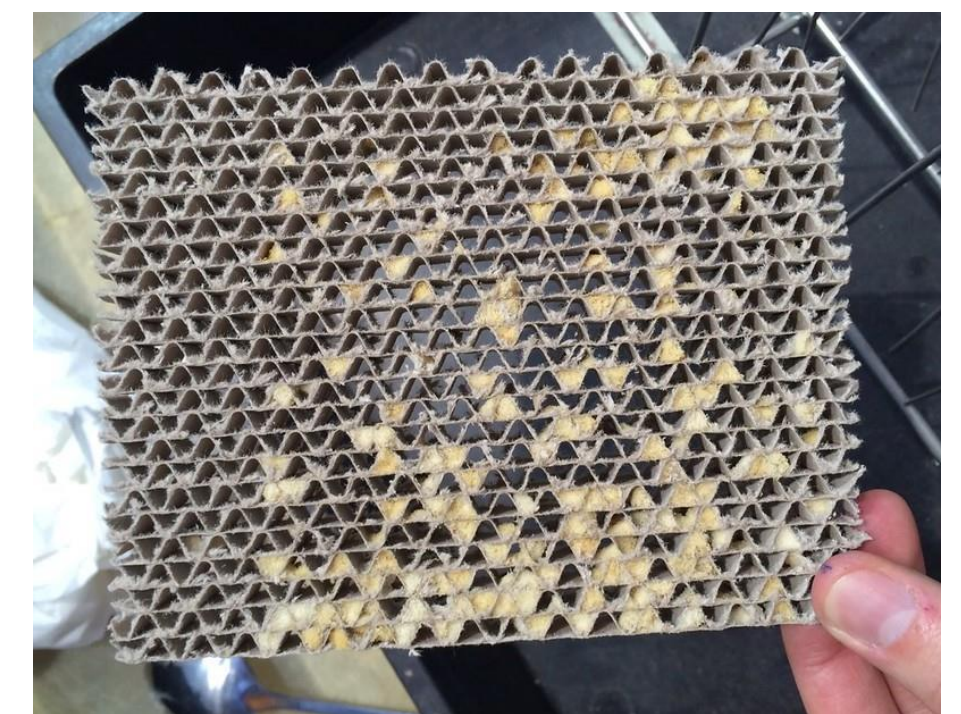
# Reproduction: Walk-in cages



# Reproduction: Walk-in cages



# Reproduction: Egg laying in the love cages







# BLACK SOLDIER FLY TECHNOLOGY

Using nature to valorise organic waste and create circular economy emissions mitigation.

## 2 BSF PLANT

BSF facilities can be:

### Small scale

<1 ton of organic waste per day

### Large-scale

>250 tonnes of organic waste) per day

In a BSF plant, the environmental conditions are optimised to enhance waste digestibility and larvae growth.



## 3 DIGESTION PROCESS

Black Soldier Flies (*Hermetia illucens*) lay thousands of eggs on or near organic waste

The larvae hatch from the eggs and then feed on organic waste, aiding in its decomposition and nutrient recycling for plants.

## 4 PRODUCTS FROM DIGESTION

Processing of **1 ton** of organic waste with BSF larvae produces about:



**400 kg** of frass fertilizer



**200 kg** of larvae

## 5 OUTPUTS AND BENEFITS

**Outputs:** Grown larvae are harvested and processed into:



Protein



Oil product



Fertiliser

- Benefits:**
- + Substitution of chemical fertilizer and replacement of conventional animal feed (soybean and fish meal)
  - + Bio-fuel, industrial oils, agricultural feed, fertilisers, high quality compost

- + Commercially viable
- + Employment and business creation
- + Decentralised solution
- + Reduced impact on landfills
- + Decreased methane emissions

Organic waste methane emissions from BSF plants are less than half of the emissions of traditional composting.

Organic waste will serve as the food source for black soldier flies.

## 1 INPUTS TO SYSTEM

Organic waste from households and markets

Agricultural organic waste

## Summary

- The BSF technology is **one among many options** for the valorisation of organic waste
- BSF is a young technology but already applied at different scales and degrees of technology
- The motivations to operate a BSF facility are diverse
- Chose the business model which fits your situation and preference
- Consider obstacles and opportunities before planning  
→ feasibility assessment
- **CO2 emissions savigns:**  
Mertenat et al. (2019) estimate that direct GHG emissions of BSF treatment are **47 times lower** than from windrow composting and respectively more than **100 times lower** than from uncontrolled disposal.



# Methane to CO<sub>2</sub> swap is unacceptable



IPCC has set a clear guidance that we need to reduce both CO<sub>2</sub> and all non-CO<sub>2</sub> GHG all together with rapid and deep decarbonization of our economies.

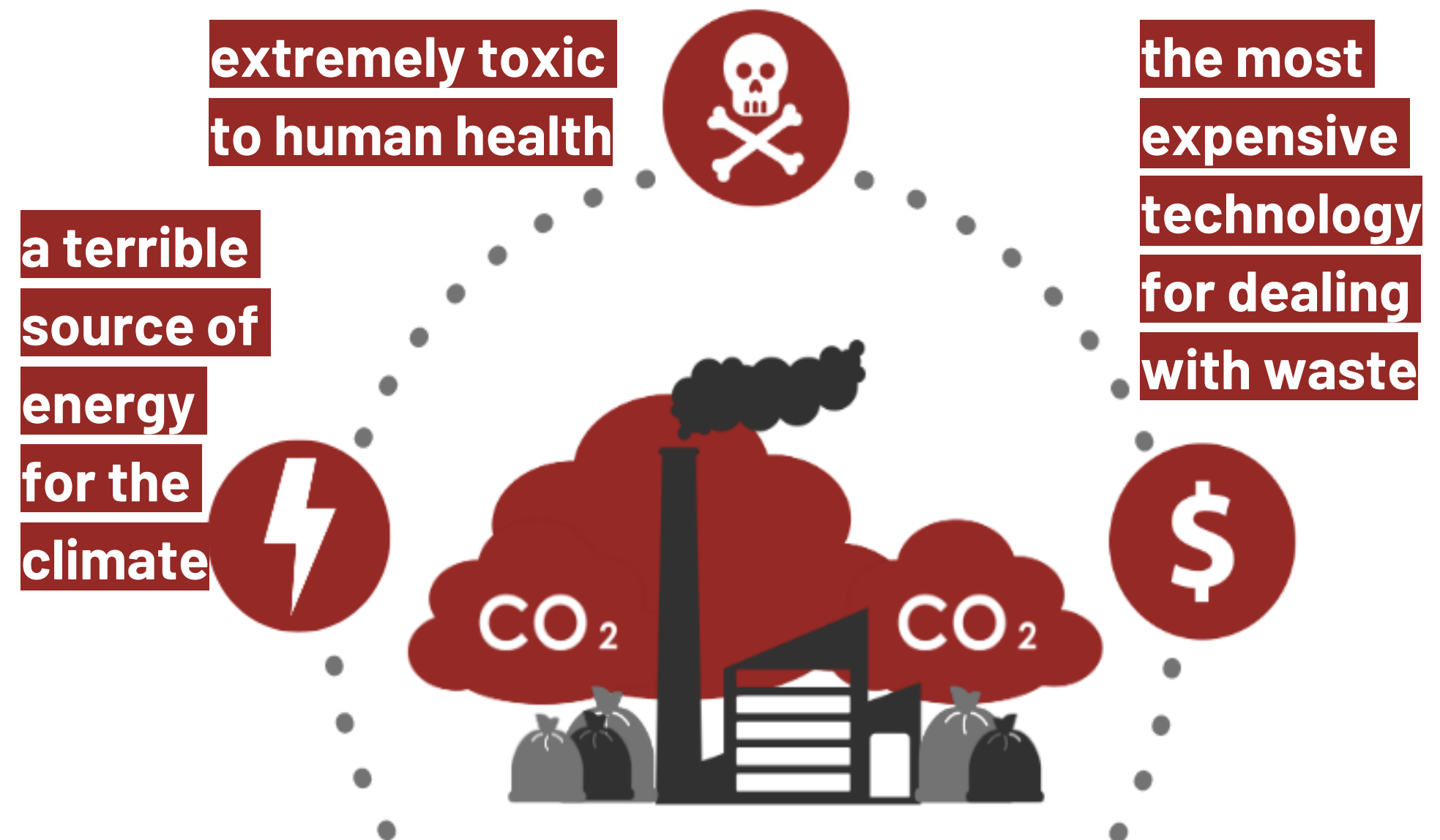
## Burning waste in any form:

- **has a high greenhouse gas intensity.** In the context of mixed waste, burning organic waste only “exchanges” methane emissions for carbon dioxide emissions.
- **is the most expensive option**, locking in public budgets for at least 20 years, hampering prevention efforts, composting, etc.
- **High risk to public health and the environment** especially vulnerable communities around the site.
- **Eliminate livelihoods** for waste pickers, waste workers, and recyclers.

## Thermal technologies:

WTE incineration / EfW

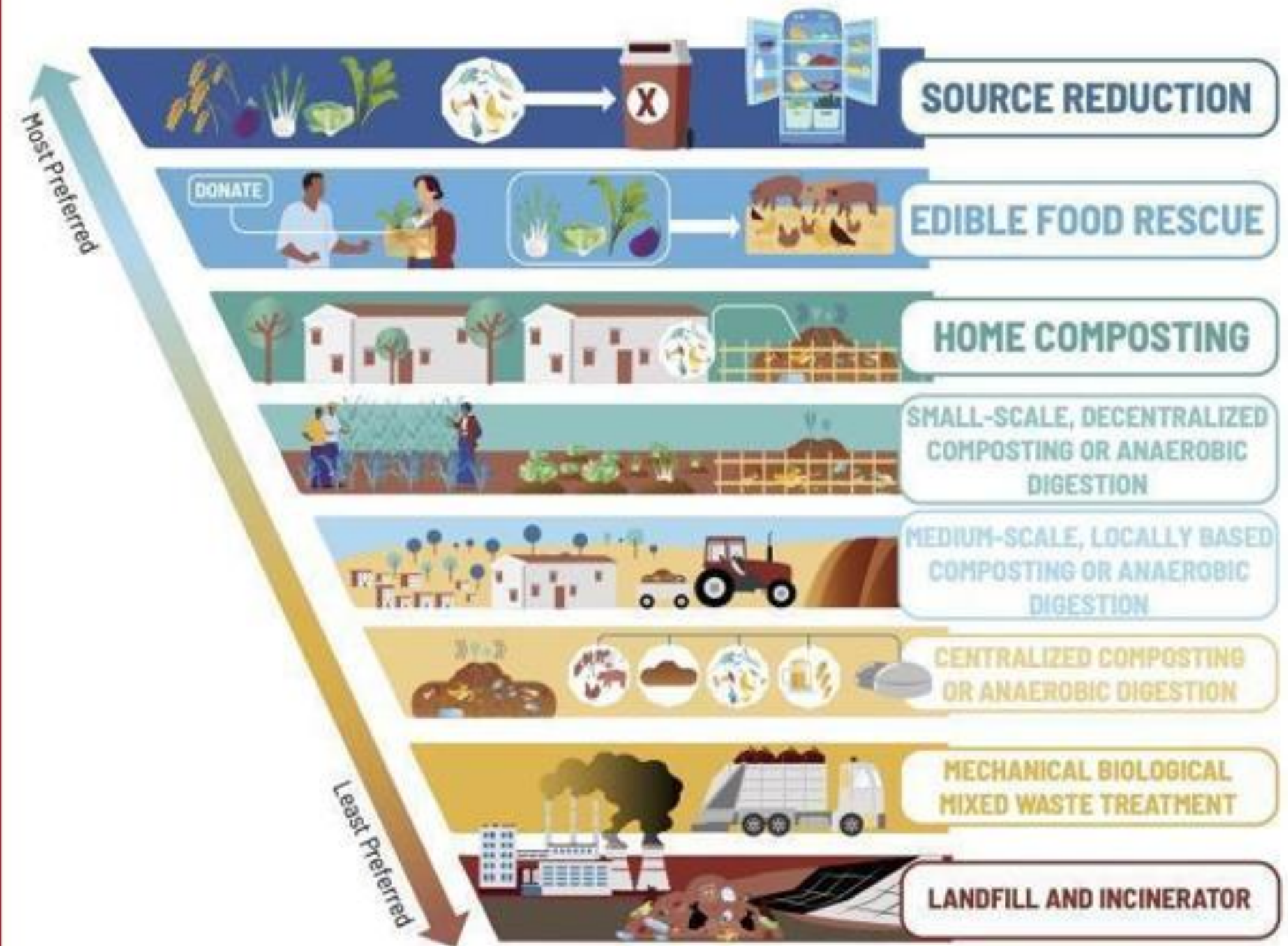
Refuse-Derived Fuel (RDF) production / co-generation



# Waste Hierarchy: focus on high-impact solutions



- Waste methane emissions can be reduced by 95% thanks to composting, bio-stabilisation and biologically active cover for dumpsites in the waste sector.
- Waste segregation and organic composting can reduce methane emissions from landfills by 62%.



Source: Institute for Local Self-Reliance

# Dar es Salaam, Tanzania

In Dar Es Salaam, Tanzania, the groundbreaking zero waste initiative led by Nipe Fagio has secured funding for its expansion.

- Bonyokwa ward collects 1.74 tonnes of waste daily from 4.500 households (95% of households)
- Achieving 95% diversion (source segregation rate) and 100% of organic waste diversion from disposal.
- This is equivalent to a reduction of 16.4 tonnes of methane emissions per year.

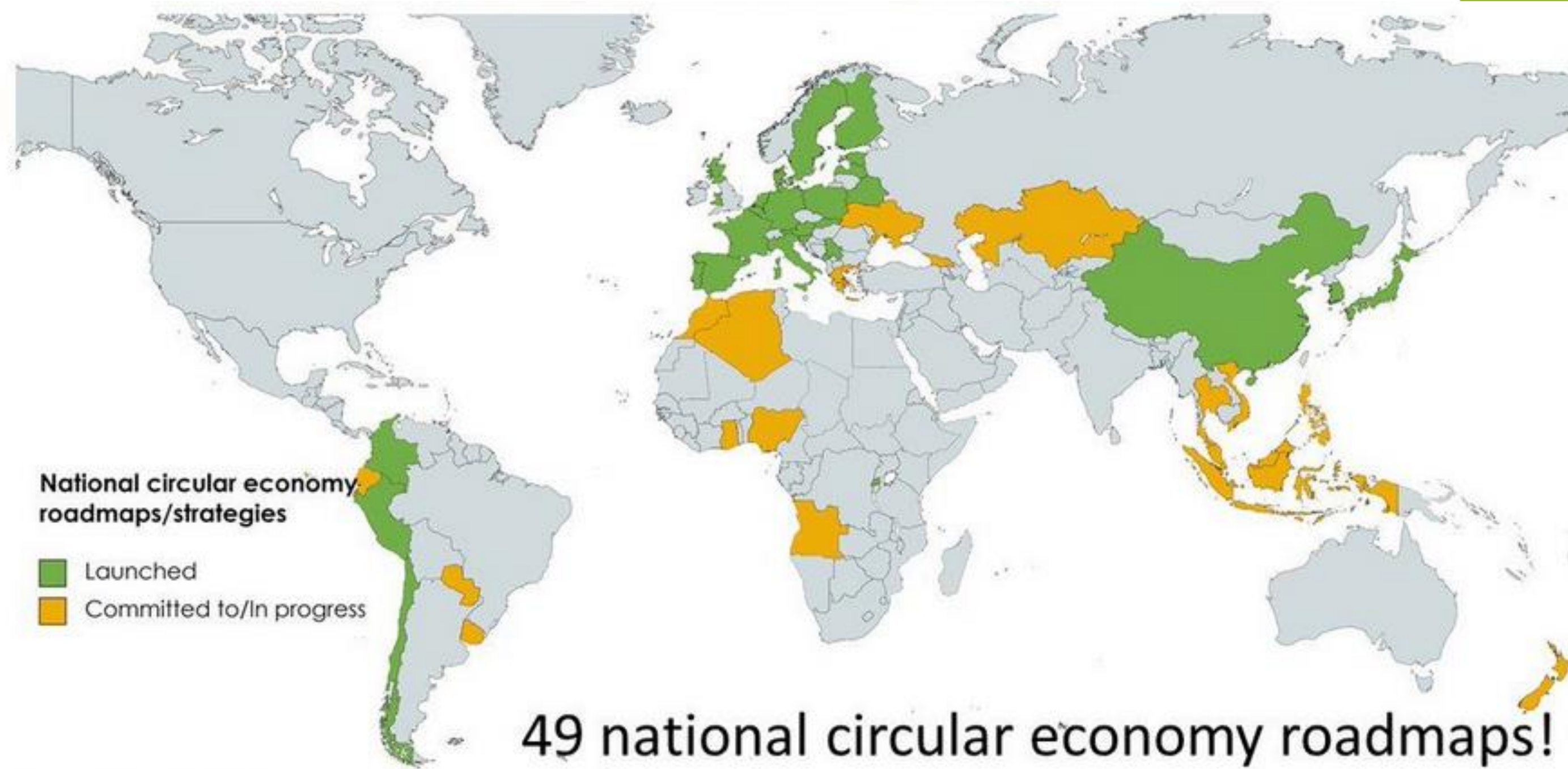


GAIA/Nipe Fagio Case Study [here](#)

Nipe Fagio

# Circular Economy Roadmaps

- **systemic change** towards a circular economy.



(launched or under development)

African Circular Economy Facility (AfDB + ACEA) program for roadmaps  
AUC developing the continental roadmap.



# Thank you for your attention



FOUNDATION

[www.acenfoundation.org](http://www.acenfoundation.org)

**UNITED NATIONS**



Shared Prosperity Dignified Life



**IWMI**  
International Water  
Management Institute



**EXPERTISE  
FRANCE**  
GROUPE AFD

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