Food and Agriculture Organization of the United Nations

SUSTAINABLE DEVELOPMENT GOALS

Global Food Loss and Waste Reduction: A Hopeful Outlook

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12 RESPONSIBLE CONSUMPTION AND PRODUCTION

SDG 12.3: By 2030, halve per capita global food waste at the retail and consumer levels and reduce food losses along production and supply chains, including post-harvest losses.

Food Loss and Food Waste: Definitions and Boundaries in the Chain

Food Loss is the decrease in the quantity or quality of food resulting from decisions and actions by food suppliers in the chain, excluding retail, food service providers and consumers.

Food Waste is the decrease in the quantity or quality of food resulting from decisions and actions by retailers, food services and consumers.

FOOD LOSS **FOOD WASTE**

Source: FAO, State of Food and Agriculture 2019

The Food Loss and the Food Waste Indices

Food and Agriculture Organization of the United Nations

UN environment programme

FOOD LOSS INDEX
SDG 12.3.1.a

EXTREME EVENTS
SDG 1.5

Losses in the Food Balance Sheet

FOOD WASTE INDEX
SDG 12.3.1.b

PREHARVEST/ PRE-SLAUGHTER | HARVEST/ SLAUGHTER | ON-FARM POST-HARVEST/ SLAUGHTER OPERATIONS | TRANSPORT, STORAGE AND DISTRIBUTION | PROCESSING AND PACKAGING | RETAIL | PUBLIC AND HOUSEHOLD CONSUMPTION

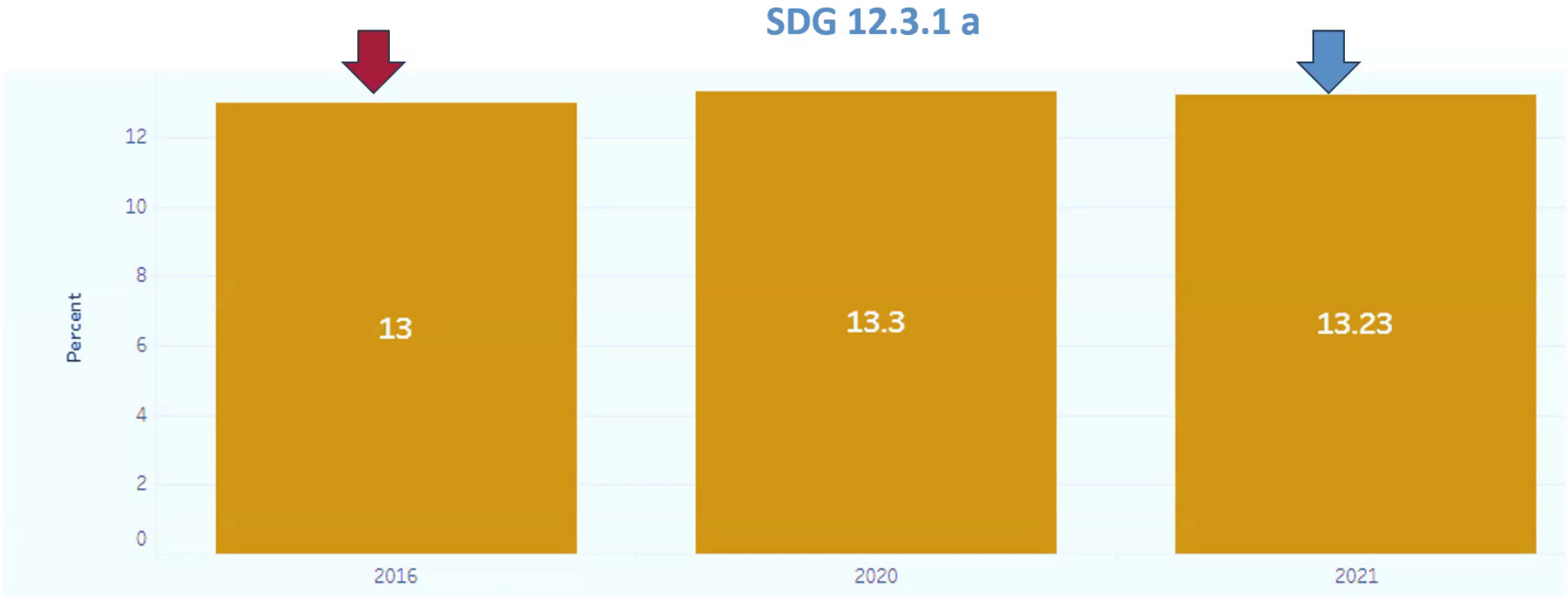
STAGES OF THE FOOD SYSTEMS

HARVEST LOSSES
Can be added to the index coverage and measured with crop-cutting surveys

FOOD LOSS INDEX AT THE NATIONAL LEVEL
SDG 12.3.1.a

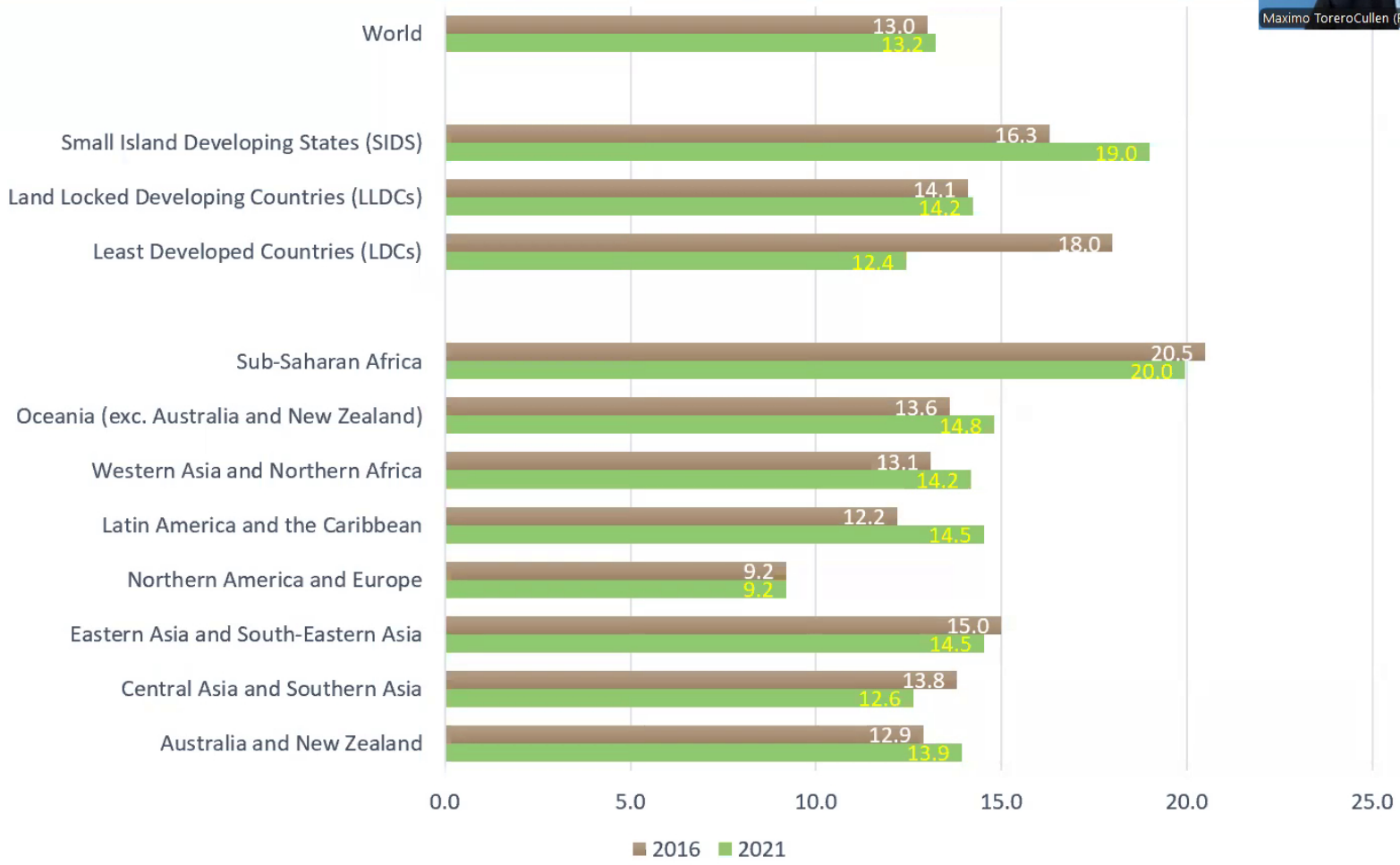
Source: https://www.fao.org/sustainable-development-goals/indicators/1231/en/

Global Food Loss Percentages (2016 - 2023) - FAO



Source: FAO [SDG Indicators Data Portal]

Food Loss Percentages by Region (2016 and 2021)



Source: FAO. 2023. Indicators. In: *Sustainable Development Goals*. Rome. Cited 8 June 2023. www.fao.org/sustainable-developmentgoals/indicators/enhttps://doi.org/10.4060/CC7088ENfig52

The Food Waste Index (12.3.1b)

The Food Waste Index 12.3.1.b

- Globally, an estimated **19 percent of food – the equivalent of 1.05 billion tonnes of food - was wasted** in households, food services and in retail in 2022 (UNEP, 2024).
  - Households account for sixty percent (60 %) of the food that is wasted globally.
  - Around the world, each day, over 1 billion meals are thrown away in households alone (UNEP, 2024).

Why Reducing Food Loss and Waste Matters

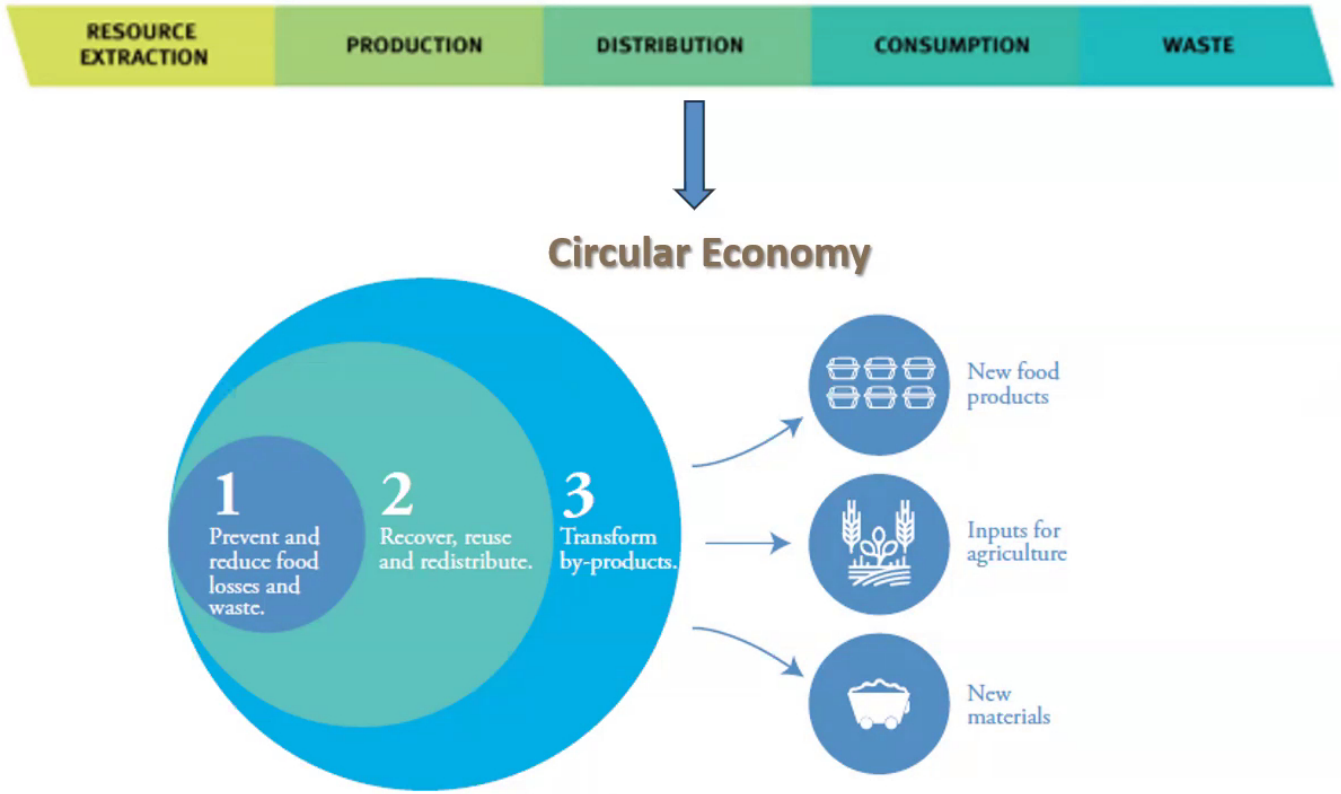
- Approximately **28.9 percent of the global population** – 2.33 billion people – **were moderately or severely food insecure in 2023** (FAO et al., 2024).
- **One out of eleven people in the world, faced hunger in 2023** (FAO et al., 2024).
- FLW represents **a waste of natural resources (water and land)** used in food production as well as a **wastage of human resources**, **energy, and inputs** - fertilizers, seeds - **used for production and all activities downstream in the supply chain**.
- **FLW generate 8 to 10 percent of global greenhouse gas emissions**.
  - Impact climate change and environmental sustainability and contribute to ecosystem and biodiversity loss, posing a threat to food security.

The security of food supplies across the globe is increasingly threatened by unexpected shocks

- The world's population currently at 8.2 billion, is expected to grow to close to 9.7 billion by 2050 (UNDESA).

- Action is needed to reduce food loss and waste toward reducing the social, environmental and economic costs associated with the current high levels of food loss and waste.

The Circular Economy: A framework to address the unsustaina of current food systems

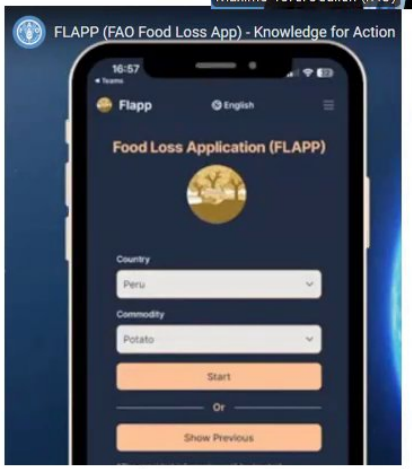


Source: Adapted from Ellen McArthur Foundation (2023).

Prevention and reduction of food losses in a sustainable mann smallholder operations

Increased attention to improving the efficiency and sustainability of smallholder post-harvest operations through :

- The use of Apps that share information, support data collection, facilitate deliveries and cash transactions of smallholders.
- Improved post-harvest handling and treatments to minimize damage and maximize quality
- Improvements in bulk packaging and transportation of produce to minimize damage.
- Improvements in hermetic grain storage.
- Harnessing the use of renewable energy for quality and shelf-life extension – cold hubs, evaporative cooling - and primary processing operations – solar drying of grains in primary processing operation.



The FAO Food Loss App supports data collection and analysis

Grain storage in silos for household food security

Prevention and reduction of food losses in a sustainable ma smallholder operations

- Optimizing water use in post-harvest operations.
- Applying circularity principles – composting – on farm.
- Collective learning initiatives through various forms of media – radio, television and internet – are being used to develop skills and capacities to sustain the good practices and innovations introduced.

Emerging challenges brought about by climate change

Insect damaged mango

Heat stress – Impacts of climate change

Maize damaged by fall armyworm.

©Photo: ©FAO/Edward Ogolla

Maize damaged by the fall amyworm

Systems approaches are needed to assure the sustainability of cold

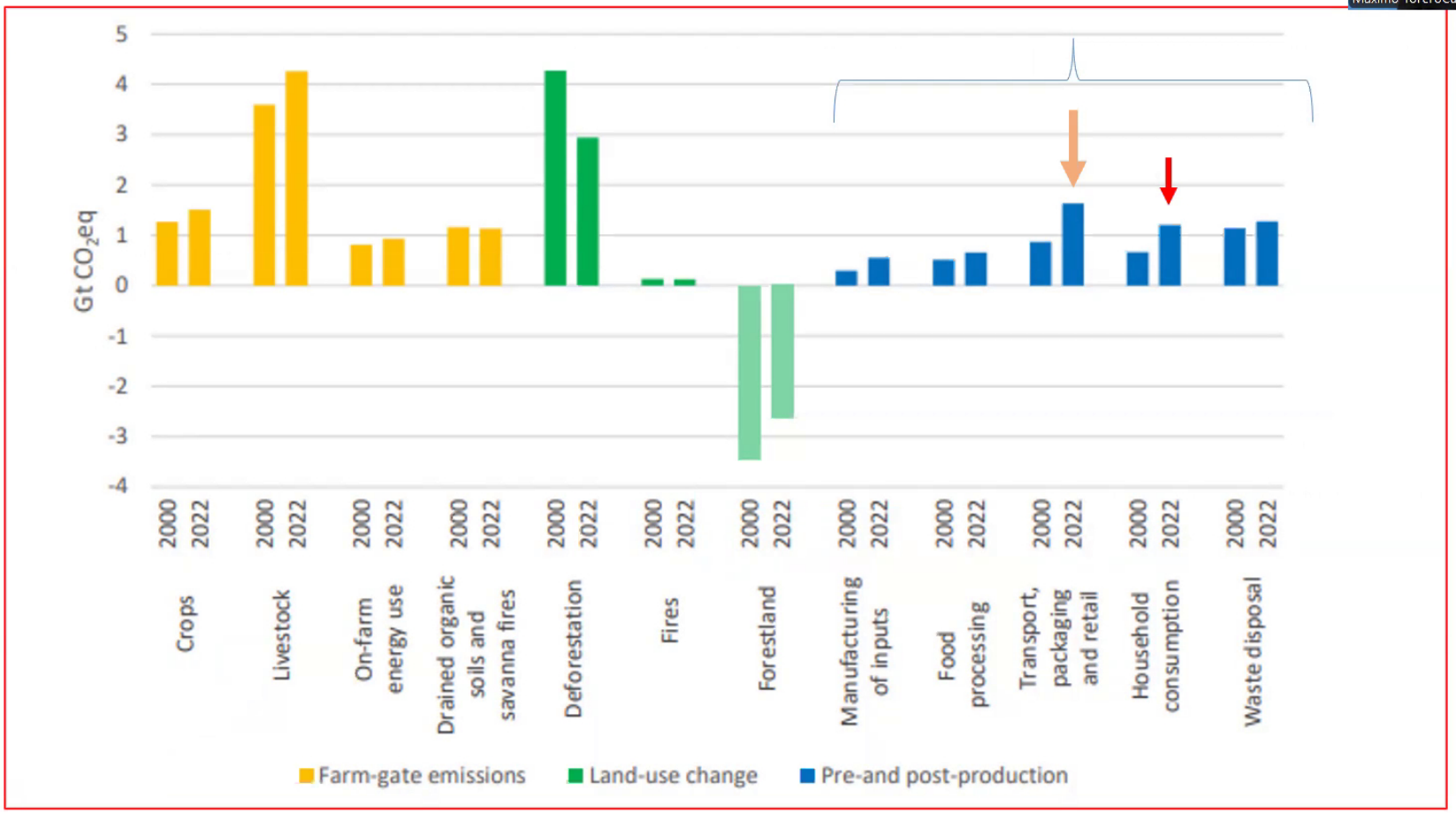
With rising global temperatures, the demand for cooling technologies to reduce food losses continues to increase.

Comparison of Pre- and Post-Production Emissions by GHGs (2020 – 2022)

Greenhouse Gas	Pre – and post-production emissions
Carbon Dioxide	A 48 % increase in CO_2 from 2.4 Gt CO_2 eq to 3.6 GT CO_2 eq
Nitrous Oxide	A 42 % increase in the CO2 eq emissions of nitrous oxide
Methane	A 10 % increase in the CO2 eq emissions of methane
F-Gases	A 517 % increase from 0.07 GT CO2 eq to 0.46 eq -which reflects accelerating expansion of food cold chains especially in developing economies

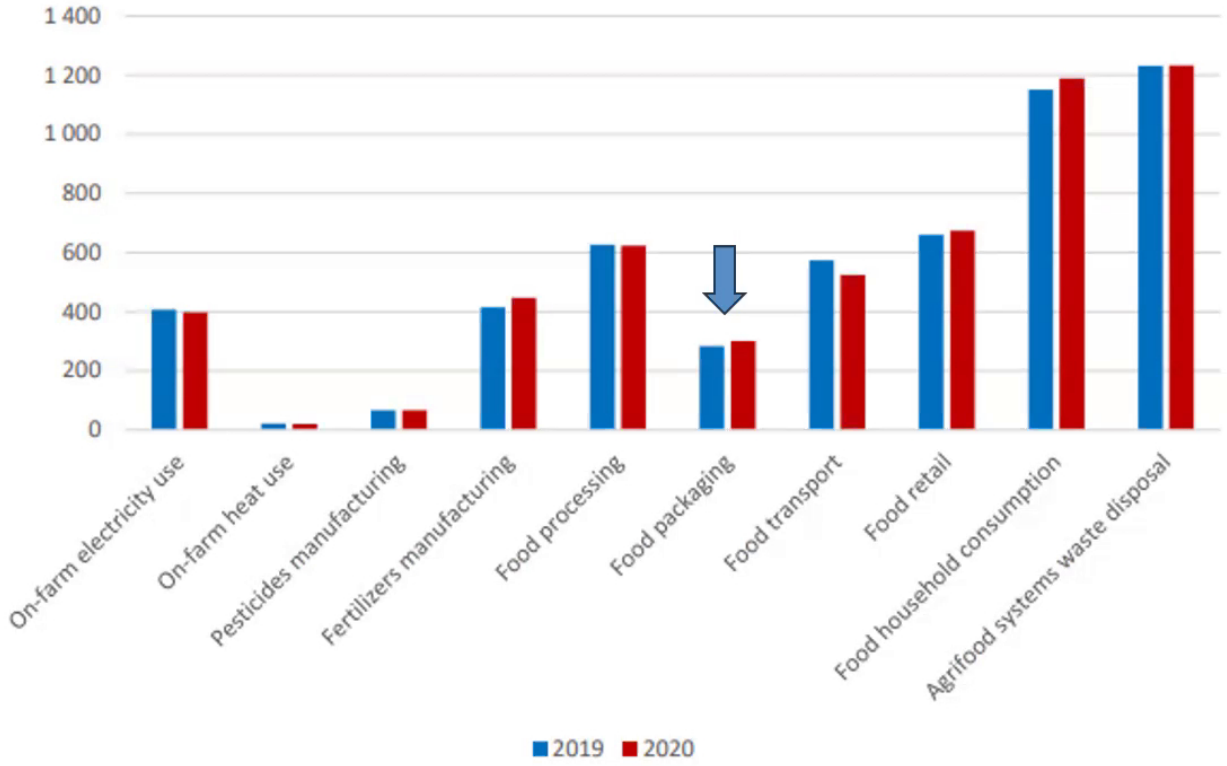
Source: FAO. 2023. Emissions from pre- and post-agricultural production. In: FAO. Rome. Cited May 2025. https://www.fao.org/faostat/en/#data/GPP

Agri-Food Systems Emissions by Component



Source: FAO. 2024. FAOSTAT: Emissions totals. [Accessed November 2024]. https://www.fao.org/faostat/en/#data/GT. Licence: CC-BY-4.0.

Change in global pre- and post- production emissions by co



Source: FAO. 2023. Emissions from pre- and post-agricultural production. In: *FAO*. Rome. Cited May 2023. https://www.fao.org/faostat/en/#data/GPP

Packaging Innovations : Flexible Pac

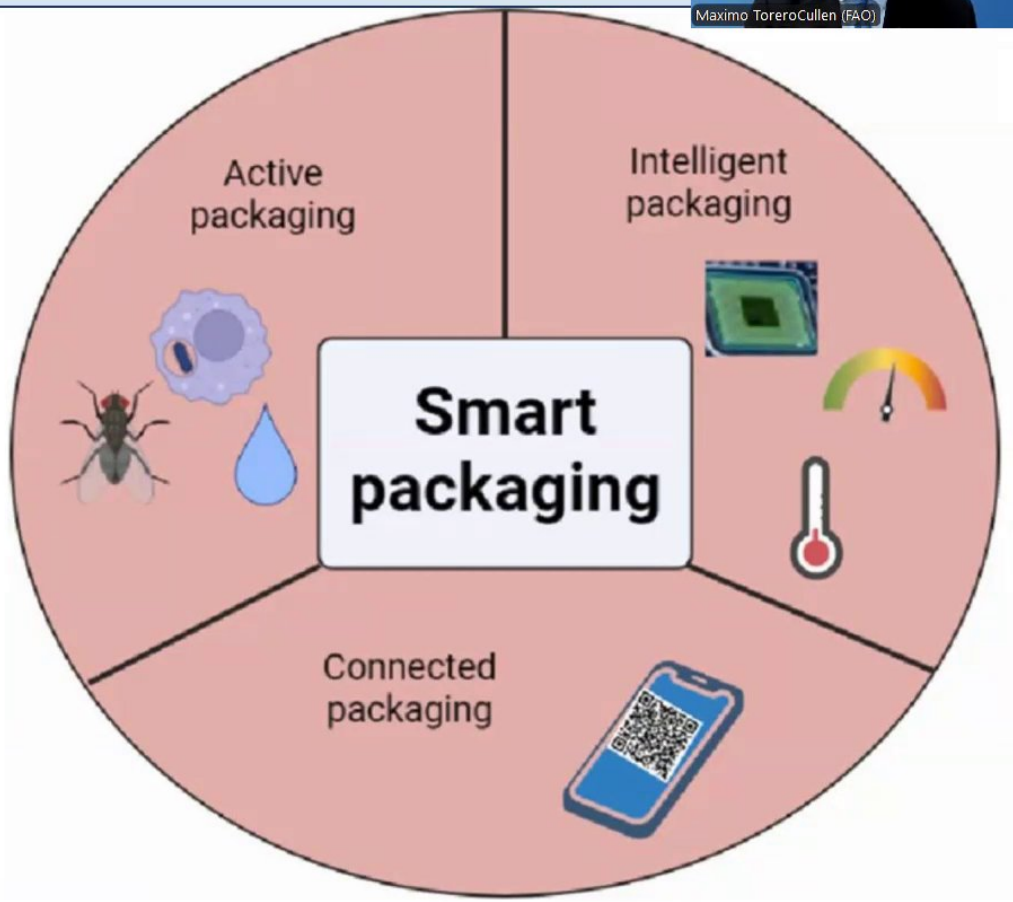
©FAO/Melvin Pascall, 2024

Lightweighting strategies such as switching to lighter, more flexible packaging:

- - reduce food waste
- - lower material and energy consumption
- - improve transportation efficiency
- - reduce the carbon footprint from transportation.

Packaging Innovation : SMART PACKAGING

Smart Packaging technologies, and particularly **active** and **intelligent packaging**, offer a promising approach to reducing food loss and waste from farm to fork, when integrated with real-time innovative monitoring technologies.



Source: Ganneson et al., 2023 https://doi.org/10.1016/j.fpsl.2023.101044

Consumer-level food waste: A critical issue to be tackl

Tools	Functions	Description
Smart phone and AI-powered apps and platforms - that support the prevention and reduction of consumer food waste	To guide consumers on actions to plan food purchases, properly store and prepare food	Help to educate and inform consumers on actions to prevent and reduce household food waste

Leveraging technology and innovation to support circula

Tools	Functions	Description
Smart phone apps – that support rescue, redistribution and circularity	Food sharing apps and apps for the redistribution of food	Recovery and intelligent redistribution of surplus food by food banks.

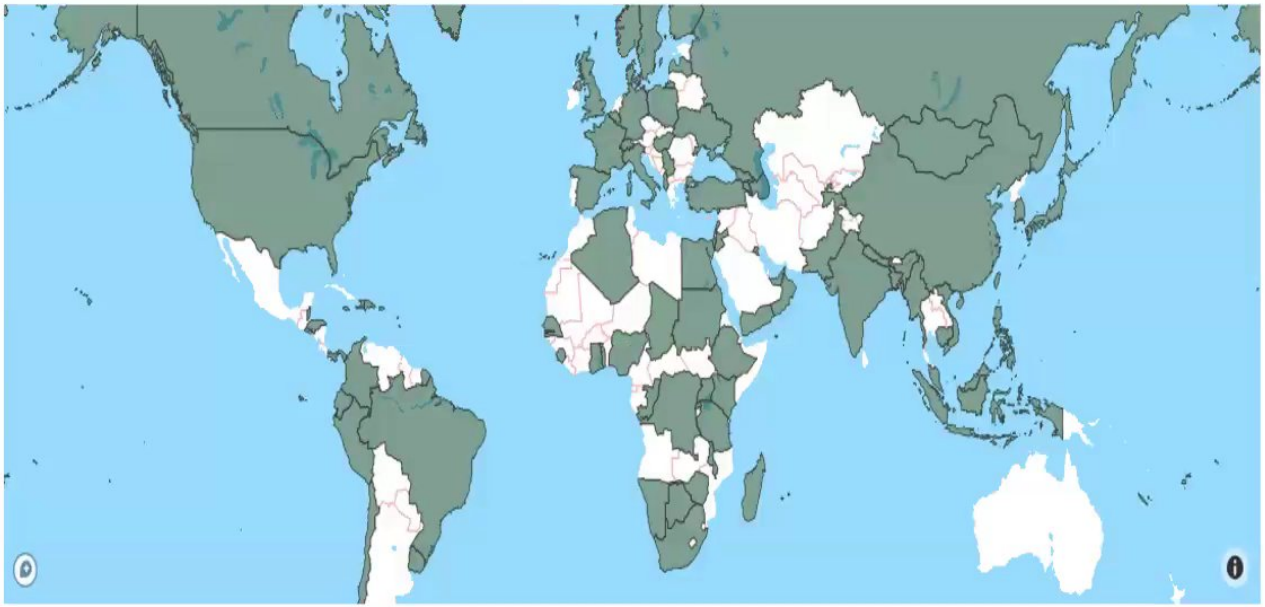
Leveraging technology and innovation toward improving circula
focus on food security

Tools	Functions	Description
Food rescue and distribution platforms that make use of AI and block chain technologies to feed the food insecure	AI – optimizes matching between food donors and recipients. Blockchain – transparent records of donations	Recovery and intelligent redistribution of surplus food

Pathways Focus on Food Loss and Waste – UN Food Systems Summit

Map of country involvement:

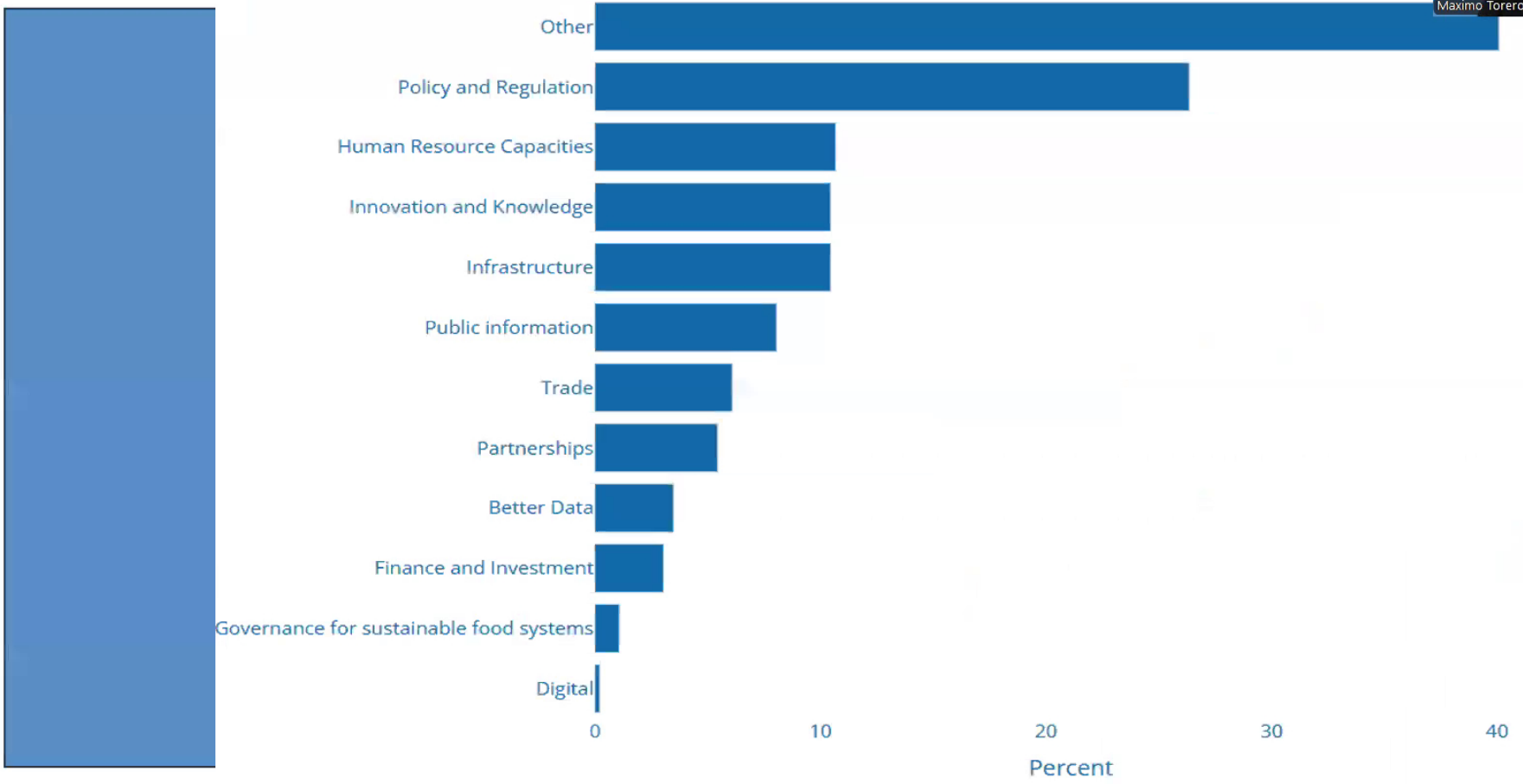
- As of 28/08/2024, 129 National Pathways were submitted and available online on the Member State Dialogue Convenors and Pathways Website.
- **90 countries** - included FLW in their pathway documents.



Green areas, represent countries that submitted Pathway Documents

Source: https://datalab.fao.org

Means of Implementation for FLW Reduction Identified in Country Pathwa



Source: https://datalab.fao.org

Recommended priorities going forward:

- Prioritize the collection of **high-quality data** to inform **policy development** and **investments to incentivize actions** to scale up good practices to reduce food loss and waste in a sustainable manner.

- Promote **cross food chain collaboration**, **partnerships, network-building, integrated approaches and awareness-raising** to effectively tackle food loss and waste issues in a sustainable manner.

- Keep **monitoring evidence from the emerging technological innovations** that drive the reduction of food loss and waste from farm to fork.

- Invest in **human resource capacity development** to support the implementation of actions to reduce food loss and waste.