MOVING FOOD FORWARD

How can reducing food loss and waste advance the transition to more sustainable food systems?

White paper series in collaboration with EY-Parthenon

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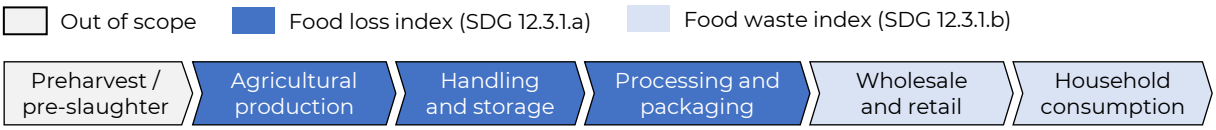
Foreword

In our white paper, 'How could global food systems better sustain our planet and its people by 2040?', we highlighted how current food systems cannot sustain our planet and its people in the long term, unless they transition towards more ecologically, socially, and economically viable conditions.[1] This transition requires us to reimagine the 'art of the possible' by bringing policymakers, businesses, communities, and consumers on a journey that is safe and just.

In this paper, we frame the issues food systems face in the form of food loss and waste (FLW), and present various opportunities for policymakers, businesses, and consumers to contribute to its mitigation. Food loss and waste occurs at every stage of the value chain, and impactful, mitigative decisions require mobilisation of a wide range of stakeholders across those value chains. United Nations Sustainable Development Goal 12.3, measured by two indicators, aims to halve global food waste per capita and reduce food losses along food production and supply chains. In this paper we focus on the two indicators from agricultural production to household consumption.

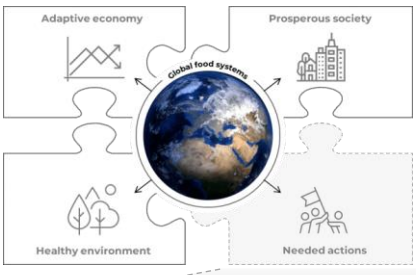


Tetra Pak's contribution to reducing food loss and waste is two-fold - developing food processing technologies that help reduce food loss during production, including new solutions to turn side-streams into value-added products. Our aseptic packaging solutions also help reduce food waste by keeping perishable products safe for longer.

We recognise that the transition requires transformation across geographies and value chains, which needs to be addressed through collaborative efforts. Hence, in this paper we aim to:

- Increase awareness of the key challenges ahead and highlight the urgency for action
- Provide perspectives on the key transition enablers that decision-makers should address
- Call on decision-makers to take collective and collaborative actions across the value chain to advance the transition

Tetra Pak white paper series: Actions to drive the transition



This pathway paper is the fourth part of an insights series focused on the safe and just transition towards more sustainable food systems[16].

By examining each pathway, we identify the critical actions and collective efforts needed to drive meaningful change.

In this paper, we discuss FLW reduction measures and highlight key enablers to make the needed transition.

White paper	Global focus areas and collective actions to drive safe and just transition
Pathway paper	Enabling transition towards more sustainable dairy
Pathway paper	Innovating for new food sources
Pathway paper	Reducing food loss and waste
Pathway paper	Scaling access to safe nutrition via sustainable food packaging

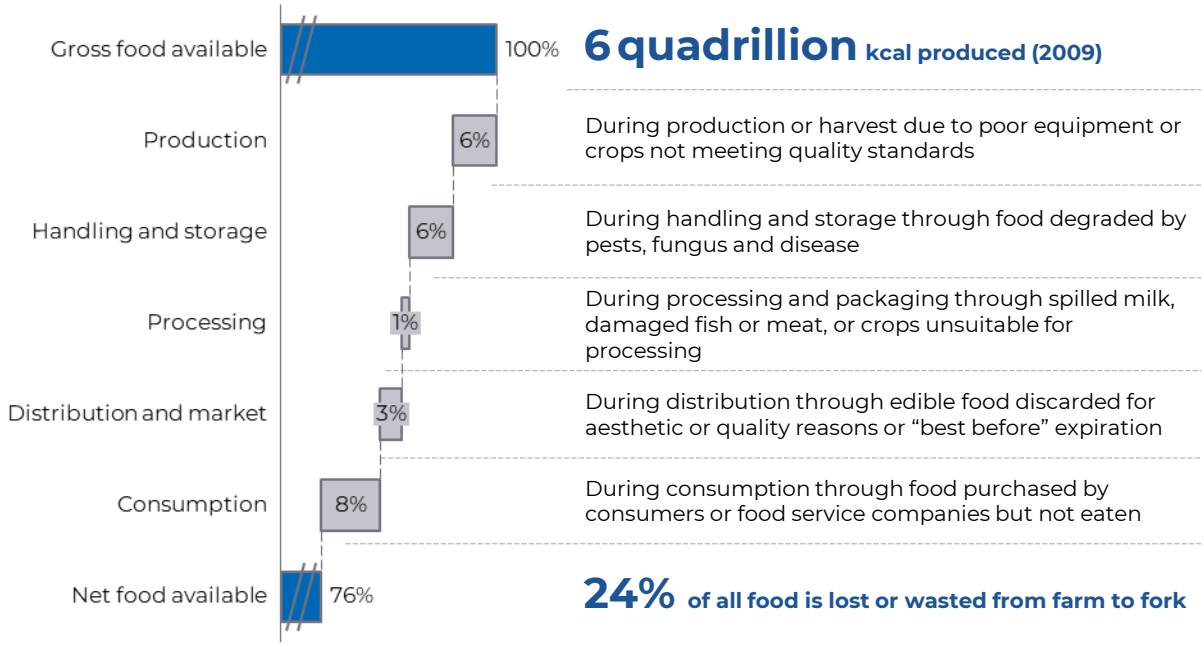
The challenge: Reducing food loss and waste plays a critical role in improving food security

Nearly a third of the food produced for consumption in the world is wasted, resulting in losses of almost $1 trillion USD per year.[2]

Food loss and waste (FLW) refers to food produced for human consumption that is not eaten. According to FAO estimates[3], approximately one third of all food produced measured by weight is lost or wasted in the farm-to-fork cycle.

Globally, this inefficiency in the food system amounts to 1.3 billion tonnes of edible food wasted and results in losses of almost $1 trillion USD per year. This amount of food lost or wasted could feed 1.26 billion people every year.[2,14] Moreover, FLW causes depletion of natural resources as it consumes circa 25% of all water used by agriculture[4], requires an area of agricultural land greater than the size of China[2], and generates up to 8% of global GHG emissions annually[2].

Food loss and waste throughout the farm-to-fork cycle by caloric content



Source: WRI analysis based on FAO (2011)[5]

Disparity between developed and developing regions in FLW is significant. More than half of FLW in North America, Europe, and Oceania occurs at the consumption stage, whereas production and storage contribute to more than two thirds of FLW in South and Southeast Asia and Sub-Saharan Africa[2].

Developed regions have been able to address FLW in the production and storage parts of the food supply chains. Technically the same could be achieved in developing regions, but a larger challenge lies in increasing awareness and collaboration to reach the billions of individual farmers, processors, retailers, and consumers in developing regions[5].

Whilst we as individuals all have a role to play, the most important levers to impact FLW are in the hands of policymakers, businesses, and collective coalitions. Initiatives aiming to mobilise resources, spread awareness and provide solutions on FLW reductions need to focus on all stakeholders, including consumers, businesses, and farmers. In this paper, we present a range of key enablers to reduce FLW through policy, partnerships, technology, and financing.

Enabling the transition: Policy mechanisms

Lack of clear knowledge about the real magnitude of FLW is a major barrier to addressing the problem and developing national targets.

An essential first step to address FLW is the alignment on measurement and definition of the issue. Lack of clear knowledge on the magnitude of the phenomenon is a clear barrier to effective policy development. Rooted in a common definition and understanding on FLW, policies should aim to provide actors with actionable goals and targets, both quantitative and qualitative, as well as to provide targeted interventions to the most critical stages in food value chains and regions.

Key policy approaches

Regulation | Incentivisation | Pricing | Standards & labelling | Support programmes

Examples of policy approaches

	Regulation	Incentivisation	Pricing	Standards & labelling	Support programmes
Mandatory national FLW targets	✓				
FLW targets set as part of implementing a country's Nationally determined contributions (NDCs)	✓				
FLW targets at the subnational level, including cities	✓				
Targets among agribusiness companies		✓			
Support programmes to improve access to infrastructure, harvesting techniques	✓				✓
Guidance and support on food storage and preparations					✓
Changing food date labelling practices				✓	
Foster education and awareness-raising initiatives on food loss and waste prevention for all actors in the food supply chain, including consumers.	✓	✓			

Sources: Adjusted from Hanson and Mitchell (2017)[7], Hadi and Brightwell (2021)[11]

Collective actions needed

Looking beyond the business case for FLW reduction, there are wider economic, social, and environmental gains to be achieved from minimising wastage across food value chains. Reducing FLW has the potential to boost societal well-being by improving productivity, and improving food security and nutrition of the most vulnerable. Additionally, this would help mitigate the negative environmental impacts in GHG emissions and land and water resources[8].

This broader set of benefits provides justifications for public intervention on FLW. Therefore, governments should act swiftly on including FLW reduction in public funding and climate policy.

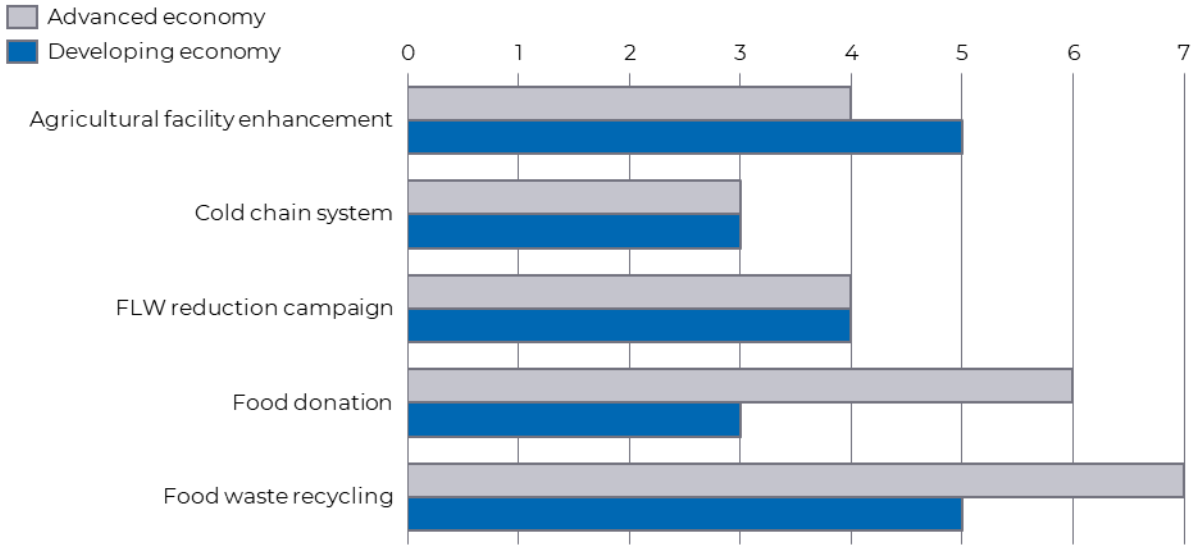
Enabling the transition: Partnerships

Each region has to identify best fitting partnership models based on priority areas.

FAO report on FLW argues that actors in the food value chain make rational decisions to maximise their profits (suppliers) or well-being (consumers), including the decisions made on the level of FLW they can tolerate.[9] Partnerships and collective action plays a key role in interventions to reduce FLW either by public actors introducing incentives or legislation, or by the private sector undertaking new opportunities that promote circular economy and commoditisation of wasted food.

In terms of public-private partnerships (PPP), the partnerships formed are likely to vary based on region. More developed economies in the APEC region have formed partnerships more often to address food waste borne in the retail and consumer stage, whereas developing economies have sought improvements via partnerships to address food loss in the agricultural production stage[8].

Type of interventions towards FLW reduction by PPP in APEC* countries (number of partnerships)



Source: FAO[9], APEC[13]

Reducing FLW through cross-industry partnerships also presents an opportunity for agrifood companies to undertake circular economy actions through maximising reuse of lost food materials in economically productive uses. The potential for waste reduction, reuse of materials, and greater circularity in food value chains start in the design phase, persisting through production, consumption, and waste management phases.[10]

Collective actions needed

Both the public and private sector play essential roles in mitigating FLW. Public entities and policymakers should seek to form partnerships and interventions to reduce FLW on the basis of more than direct economic cost and take into account the potential contributions to mitigating the negative environmental impacts of FLW, decent job creation, and food safety.

Responsibility to reduce FLW lies with actors from across the food supply chain, including consumers. Additionally, FLW reductions must take into account the need for a just transition that ensures fair and inclusive transition for vulnerable groups. Stronger cooperation and stakeholder engagement is needed to progress towards the ambitious FLW reduction targets outlined in the UN SDGs.[11]

*Asia-Pacific Economic Cooperation

Enabling the transition: Technology

A wide range of approaches could contribute to reducing food loss and waste

The UN Sustainable Development Goals have outlined a 50% FLW reduction target by 2030[10]. According to the global agriculture and land-use accounting model (WRR), such reduction would require breakthrough technologies that dramatically alter the way food is treated and stored along food value chains.[7]

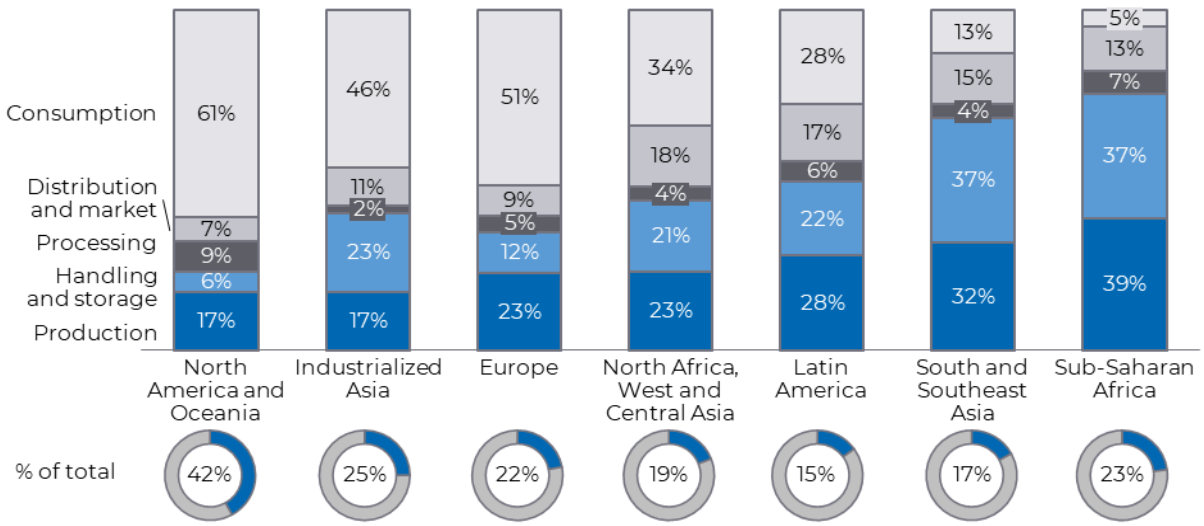
Examples of technological interventions for reducing FLW

Value chain stage	Examples of technologies and innovations
Production/harvesting	• Harvesting and agro-processing equipment, such as motorized crop threshers, improved harvesting equipment, which reduces crop damage
Handling and storage	• Improving storage technologies, such as evaporative coolers, off-grid refrigeration
Processing and packaging	• Improvements in machinery, order forecasting, and responses to changes in orders • Developing packaging that improves product resistance to spoilage • Processes to upcycle side-streams of production into value added ingredients
Distribution and market	• Improved stock ordering and inventory control, through e.g., advanced analytics and AI
Consumption	• Improving smart labelling systems and product “use-by” practices

Sources: WRI[5], UNCTAD[8], Aschemann-Witzel et. al. (2023)[15]

Regional differences affect the relevance of innovation and technological interventions at different stages of the food value chain. Developed countries have already been able to mitigate losses at production and storage stages, while developing regions have overall lower shares of FLW in the consumption stage.

Share of FLW generated by region and value chain stage (2011)



Source: WRI analysis based on FAO[5]

Collective actions needed

Technological solutions are needed across food value chains to achieve ambitious FLW reduction targets. Both public and private stakeholders across the food value chain with established networks are likely to play a key role in speeding up adoption of technologies capable of reducing losses and waste.

Enabling the transition: Financing

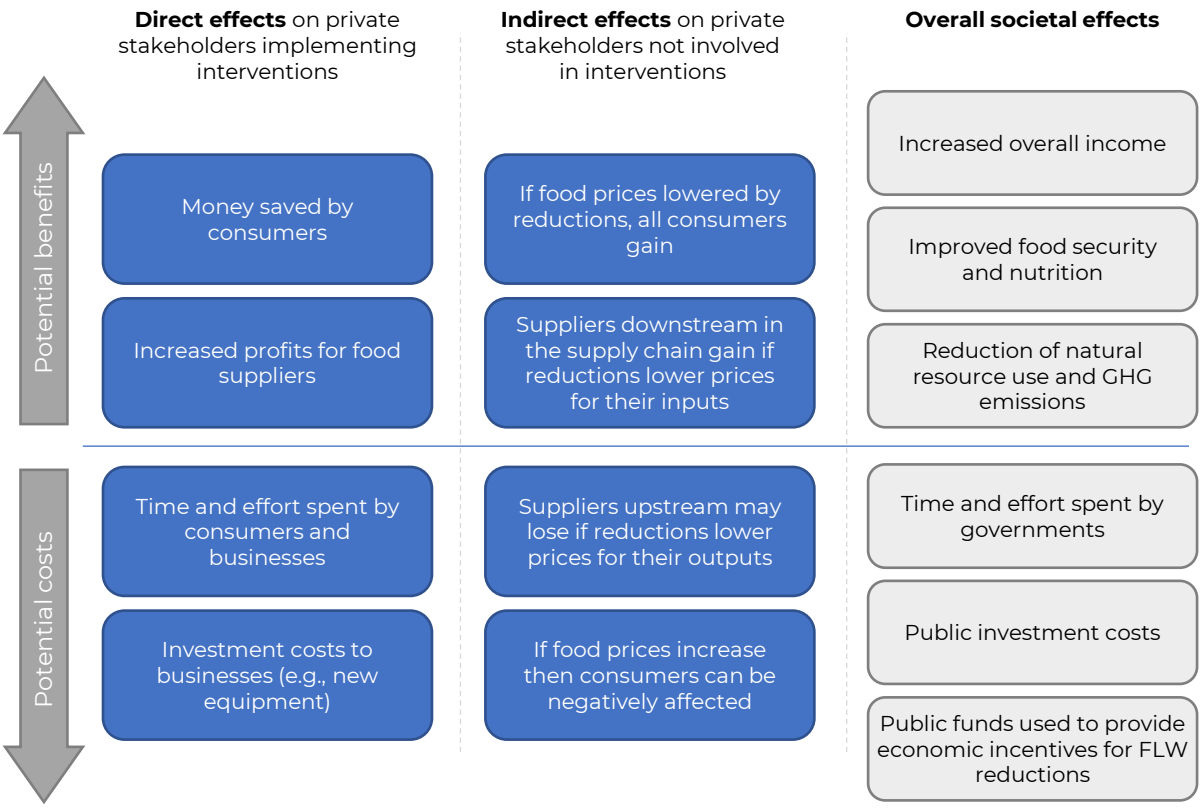
The business case for financing FLW reductions benefits both private actors involved and society as a whole.

Individual food systems actors may seek reductions in pursuit of private interest in increasing their profits and well-being. This incentive, as argued by FAO[9], is not always strong enough, as often the FLW reduction measures require investments. On the other hand, public objectives, in the form of environmental targets or improving food security, may provide governments a greater incentive to provide financing to mitigatory measures.[9]

Financing has in recent years been the most prevalent way for public interventions: two thirds of all APEC governments in a 2018 study used public financial support in the form of loans, insurance, or grants to implement measures aimed at reducing FLW.[9]

The business case from private investments and private incentives is largely based on financial return. Studies have shown positive correlation between financial return on investment and reductions in food loss[6]. Further, the positive environmental and social benefits of such investments may attract ESG-focused institutional investors who may play a key role in mobilising private capital to activities aimed at reducing FLW.

Potential private and societal benefits and costs of FLW reductions



Source: FAO[9]

Collective actions needed

FLW reductions benefit not only private actors involved, but also society as a whole. Public financial support, and mobilisation of private capital should be incentivised based on not only the direct economic benefits, but the wider impact on environmental and social aspects and targets.

Endnotes

1) Tetra Pak: How could global food systems better sustain our planet and its people by 2040? Global focus areas and collective actions to drive safe and just transition

2) FAO: Food wastage footprint & climate change (2015) https://www.fao.org/3/bb144e/bb144e.pdf

3) FAO: Global Food Losses and Food Waste (2011) https://www.fao.org/3/i2697e/i2697e.pdf

4) Kummu et al. (2012), Lost food, wasted resources: Global food supply chain losses and their impacts on freshwater, cropland, and fertiliser use, https://doi.org/10.1016/j.scitotenv.2012.08.092

5) WRI: World resources report: Creating a sustainable food future, https://files.wri.org/d8/s3fs-public/wrr-food-full-report.pdf

6) Hanson & Mitchell (2017): The business case for reducing food loss and waste, https://champions123.org/sites/default/files/2020-08/business-case-for-reducing-food-loss-and-waste.pdf

7) GlobAgri-WRR model

8) United Nations Conference on Trade and Development: The role of science, technology and innovation in ensuring food security by 2030, https://unctad.org/system/files/official-document/dtlstict2017d5_en.pdf

9) FAO: The State of Food and Agriculture (2019), https://www.fao.org/3/ca6030en/ca6030en.pdf

10) EEA: Progress and prospects for decarbonisation in the agriculture sector and beyond, https://www.eea.europa.eu/publications/Progress-and-prospects-for-decarbonisation

11) UN Sustainable Development Goals, https://sdgs.un.org/goals/goal12

12) Hadi and Brightwell (2021), Safety of Alternative Proteins: Technological, Environmental and Regulatory Aspects of Cultured Meat, Plant-Based Meat, Insect Protein and Single-Cell Protein, https://doi.org/10.3390/foods10061226

13) APEC survey report on feasible solutions for food loss and waste reduction, https://www.apec.org/docs/default-source/Publications/2018/9/APEC-Survey-Report-on-Feasible-Solutions-for-Food-Loss-and-Waste-Re/218_ATC_APEC-Survey-Report-on-Feasible-Solutions-for-Food-Loss-and-Waste-Reduction.pdf

14) UN Environment programme (2021), Food Waste Index Report 2021, https://www.unep.org/resources/report/unep-food-waste-index-report-2021

15) Aschemann-Witzel et. al. (2023): Defining upcycled food: The dual role of upcycling in reducing food loss and waste, https://doi.org/10.1016/j.tifs.2023.01.001

16) Tetra Pak: Our four pathways to drive change, https://www.tetrapak.com/sustainability/acting-for-sustainability/moving-food-forward

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