



REDUCING CONSUMER FOOD WASTE USING GREEN AND DIGITAL TECHNOLOGIES

A global perspective from the UN Environment Programme

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DAKOFA Food Waste Webinar

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Food loss and waste is huge global environmental and economic problem

The amount of food loss and waste is absolutely massive!

Production of food that is not eaten generates 8% (4.4 Gt) of global greenhouse gas emissions

The market value of lost and wasted food is nearly 1 trillion USD (= GDP of the Netherlands)

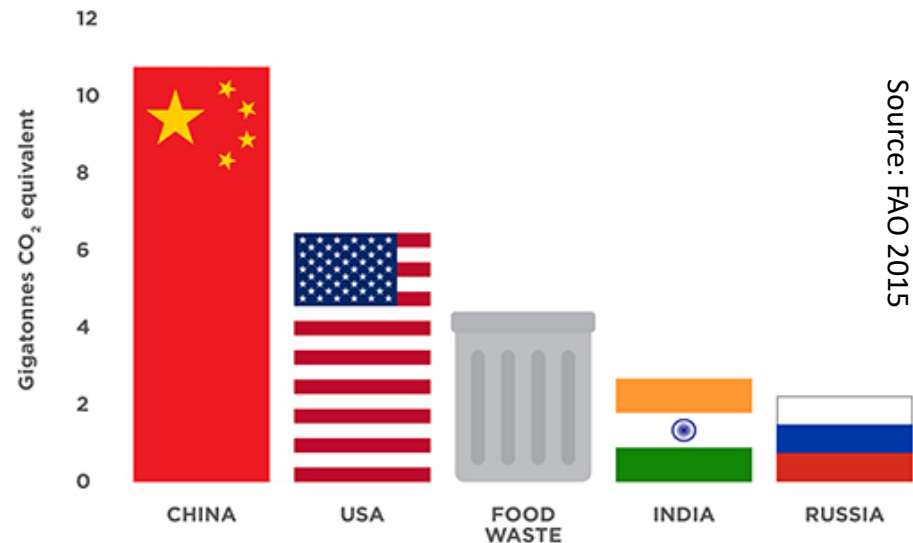


Did you know that **931,000,000 tonnes of food** is wasted globally every year by retailers and consumers?

Enough to fill **23 million 40-tonne trucks**



Source: UNEP DTU Partnership



Source: FAO 2015

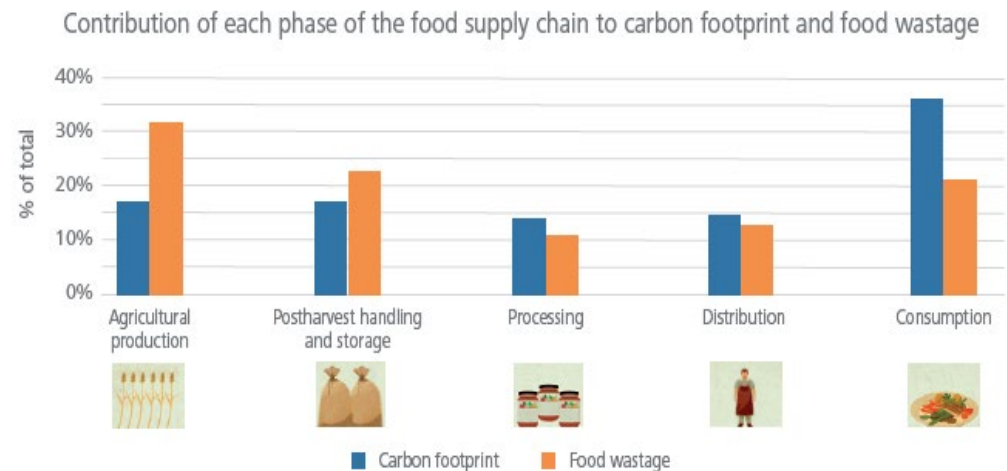
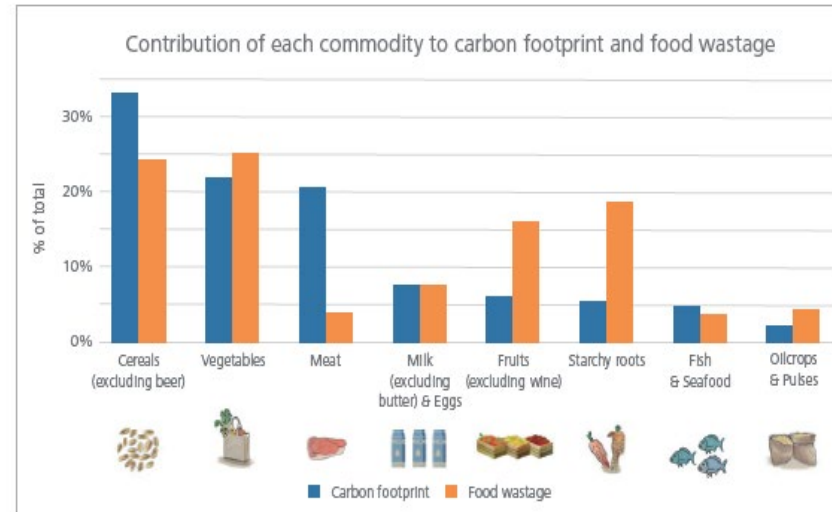
Where does food loss and waste occur?

Cereals, vegetables and meat account for ca. 75% of all GHG emissions

Fruits and starchy roots represent high volumes

Significant waste occurs at all phases of the supply chain

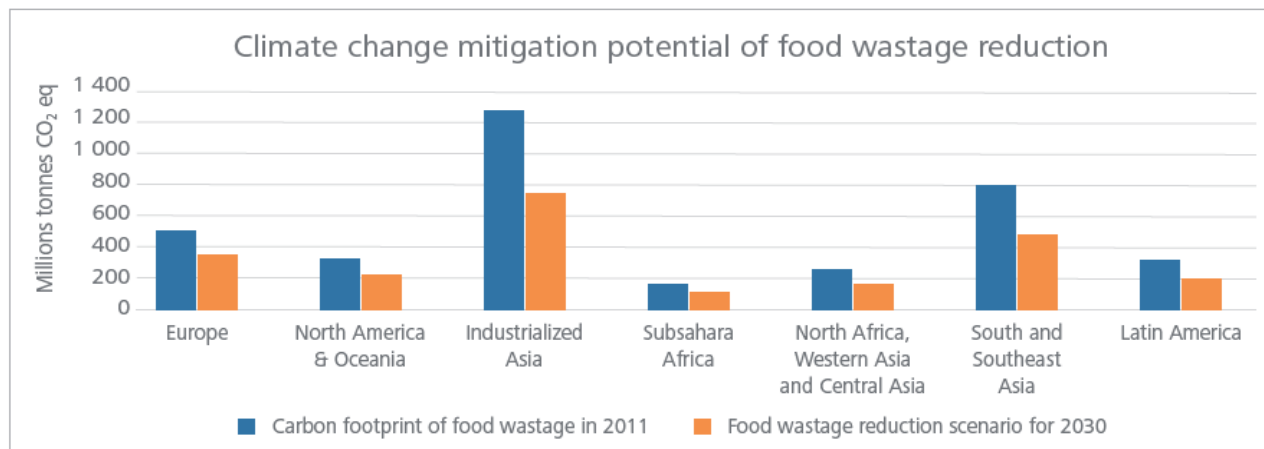
Consumption phase dominates GHGs, primary production volumes



Food waste patterns and impacts in rich and poor countries

Income group	Average food waste (kg/capita/year)		
	Household	Food service	Retail
High-income countries	79	26	13
Upper middle-income countries	76	Insufficient data	
Lower middle-income countries	91	Insufficient data	
Low-income countries	Insufficient data		

Source: UNEP 2021



Source: FAO 2015

Content of the global report

Executive summary including key findings and message

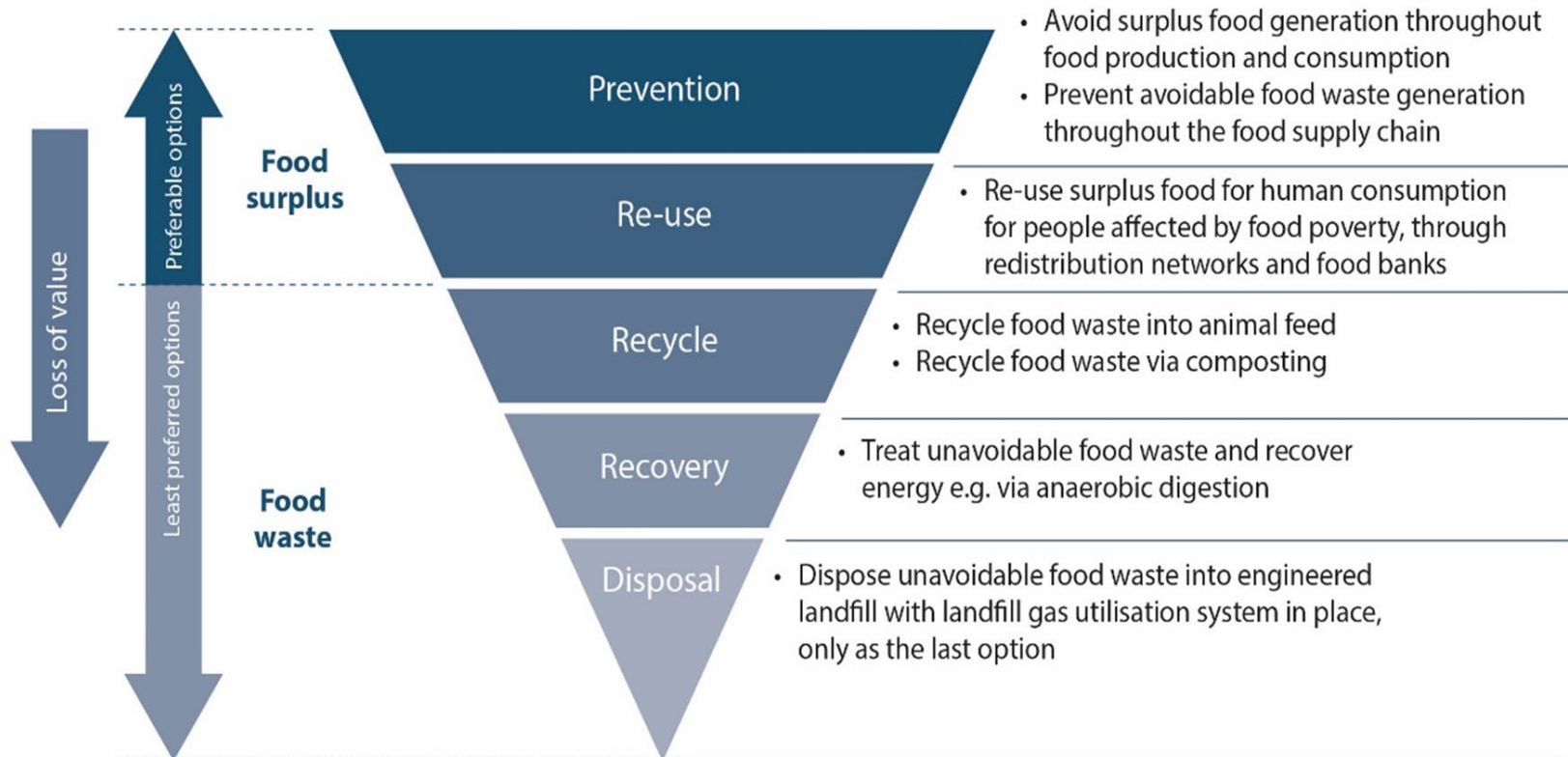
1. State of food waste and its consequences in relation to SDGs
2. Understanding the causes of consumer food waste
3. Green and digital technologies
4. Actors, policies and instruments in food-waste reduction initiatives
5. Comparative analysis of five cities
6. Conclusion and recommendations

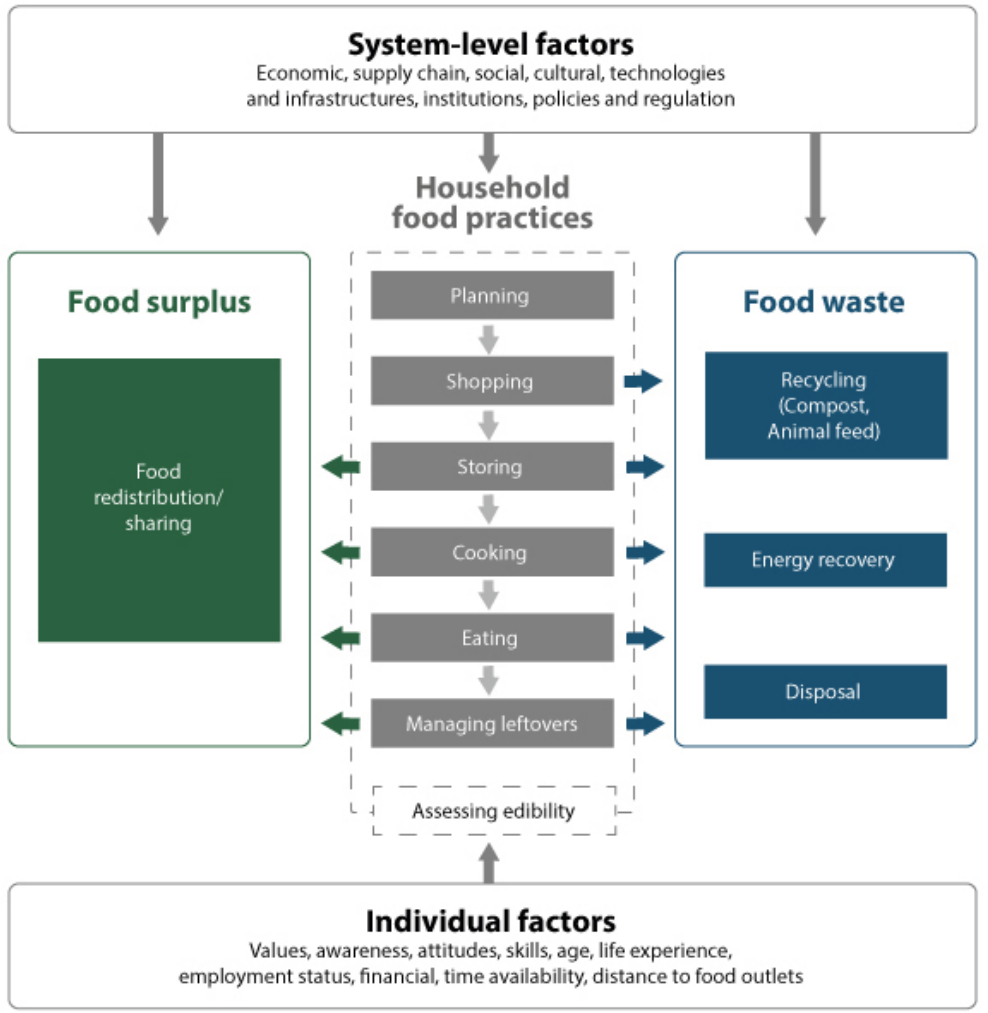
References (239)

94 pages, richly illustrated with figures and examples



The food waste hierarchy is a key to plan and prioritise actions against food waste

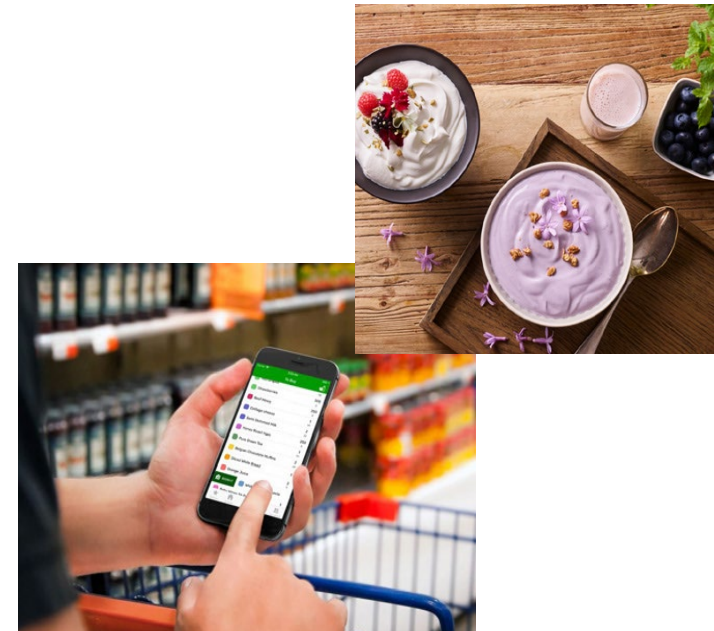




Food surpluses and food waste are generated as a result of interacting individual and system-level factors embedded in everyday food practices of households

PREVENTION		
Type	Function	Description
Green	Thermal preservation	Refrigeration and cold chains
	Biological and bio-chemical preservation	Use of essential oils and natural extracts in active packaging
Green + Digital	Smartphone apps: Food planning, shopping, storage & cooking	Guide, track and inform consumers in food related choices to reduce food waste
Green + Digital + IoT	Smart packaging	Use of sensors and data carriers to monitor food quality
	Smart labelling	Use of data embedded barcodes (DEB) to improve information about food quality
	Smart storage and disposal	Wifi connected fridges and bins equipped with cameras and sensors to monitor food quality and food quantity
RE-USE		
Type	Function	Description
Green + Digital	Smartphone apps: Food sharing and redistribution	<i>Different types of food sharing apps: Sharing for money, sharing for charity or sharing for the community</i>

Green and digital technologies can enable and accelerate of food-waste interventions



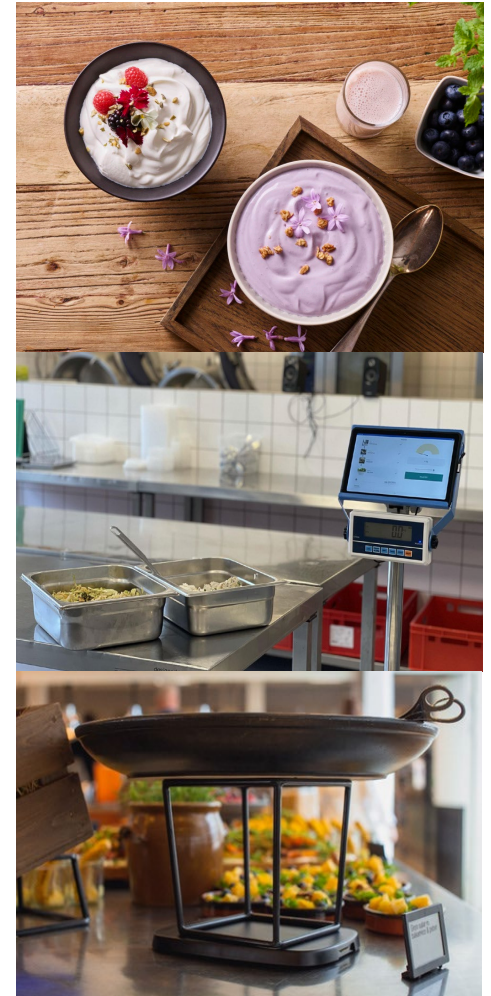
Tech insights

- Green and digital technologies are increasingly being used to prevent, reuse and recycle food waste, opening **new opportunities for economy and society**.
- **Green technologies** include thermal preservation, biological and bio-chemical preservation, solar-powered cold storage, active packaging, composting, waste-to-energy, etc.
- Emerging **digital technologies** such as mobile applications and the Internet of Things provide innovative solutions for food-sharing, smart labelling, dynamic pricing, product traceability, intelligent redistribution, planning of shopping and meals, and smart storage.



Show casing Danish technologies

- **Chr. Hansen** - a culture that can help protect dairy products such as yoghurt against spoilage caused by yeast and mould, thus **increasing shelf life** and **reducing waste** at the consumption, retail and manufacturing stages
- FoodWaste by **eSmiley** - a digital tool that helps organize and simplify tasks and organization concerning food-waste measurements, applied e.g. in **Comwell** kitchens.
- **FoodDOP** - reducing food waste in food service and catering through **IoT scales** connected to smart menu-planning and tracking platform
- **Denmark Against Food Waste**, the biggest Danish food suppliers and stores have agreed to create more transparency and actively work to reduce individual levels of food waste

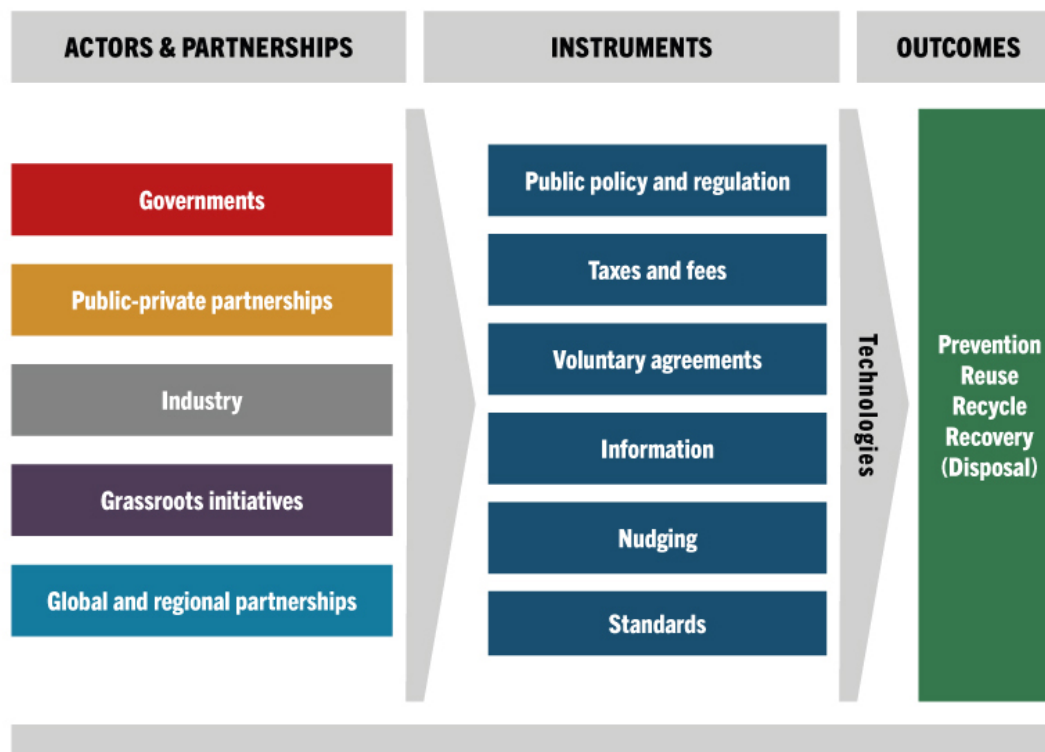


Enabling environment for tech diffusion and uptake

Technologies require an **enabling environment** to thrive and to fully unlock their potential in reducing consumer food waste. Most of the green tech solutions face **challenges in upscaling and going beyond the 'niche market'**.

Diffusion and uptake is often very **patchy**.





Many food-waste reduction initiatives and policies have emerged in recent years. They are driven by different actors and partnerships deploying a variety of instruments, often enabled by technology.



Urban areas are hot spots of consumer food waste in all countries.

Case studies from five cities in different world regions are compared.

Food waste is not only an environmental and resource issue, but has also important social, cultural, business and health dimensions.

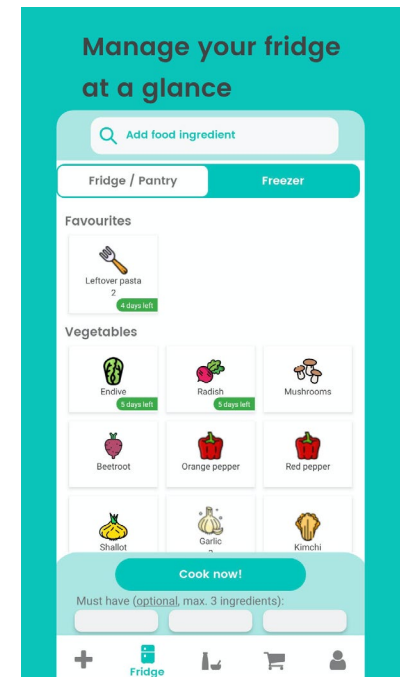
Recommendations

- Governments, businesses and civil society should pay more attention to **preventing the generation of a food surplus** before embarking on re-use, recycling and recovery strategies.
- **Better data** is needed to improve our **understanding** of consumer food waste, to support the design and implementation of interventions, and to **track progress** in achieving SDG targets.
- Design and implementation of food-waste interventions must be tailored to **local circumstances** and take into account **everyday food practices** as well as **social and cultural factors** - values and norms, gender, food security, health and equality - to ensure their success and impacts.





- A **comprehensive and integrated approach** is needed that links technology, policy, regulation, incentives, infrastructure, information and behavioural science in a way that makes them mutually supportive and complementary to each other.
- Governments at national and municipal levels can establish systems to **measure** and **manage** food waste, track progress in achieving SDG targets, and **provide the right incentives and opportunities** for changes in consumer behaviour and business practice.
- Support **SMEs**, local food vendors and community-based service providers, which play a big role in waste management





Contact and download

REPORT

UNEP DTU Partnership and United Nations Environment Programme (2021). Reducing Consumer Food Waste Using Green and Digital Technologies. Copenhagen and Nairobi. Authors: Simon Bolwig, Anne Nygaard Tanner, Barbara Redlingshöfer, Paul Riemann and Ying Zhang.

Download report and supplementary materials here: <https://unepdtu.org/project/build-back-better-using-green-and-digital-technologies-to-reduce-food-waste-at-consumer-level/>

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REFERENCES

FAO, 2015. Food wastage footprint and climate change. <http://www.fao.org/nr/sustainability/food-loss-and-waste>

UNEP, 2021. Food waste index report 2021. <https://www.unep.org/resources/report/unep-food-waste-index-report-2021>