

POLICY BRIEF

EMPOWERING FARMERS FOR A JUST ZERO FOOD WASTE TRANSITION



ZeroW tackles Food Loss and Waste (FLW) through a coordinated set of innovations piloted in nine real-world Systemic Innovation Living Labs (SILLs) aiming to achieve significant reductions across all stages of the food supply chain - from pre-harvest to consumption. A dedicated Policy Team complements this work by defining a 'Just Transition Pathway' toward near-zero FLW, offering a practical framework to bridge systemic barriers (e.g., fragmented and lengthy nature of the food supply chains, the digital divide, challenges in scaling innovative waste reduction technologies) and on-the-ground FLW solutions. Drawing on economic modelling and insights from the stakeholders and the SILLs, the team identified key recommendations promoting a flexible, equity-focused transition.

FLW reduction in primary production is deeply interconnected with broader structural, economic, and technological dynamics, making it necessary to pursue a systemic and just transition that prioritises farmers' needs, especially those of smallholders and marginalised groups. This policy brief outlines evidence-based recommendations to help governments create enabling environments that support farmers in the EU's Just Transition towards more FLW reduction, which will guide the action plans of Member States for the newly adopted binding targets.

Policy Problem

Small-scale farmers face multiple barriers that prevent them from engaging in or benefiting from FLW-reducing innovations. These include limited access to infrastructure, finance, fair markets, and digital technologies. Ongoing digital divides, weak enforcement of fair trade protections, and lack of tailored support worsen inequalities in the food system.

Key insights from ZeroW project

- Digital tools boost efficiency and reduce losses but must be paired with sustainable farming to prevent environmental harm and avoid deepening inequalities.



- Bridging the digital divide requires investment in infrastructure, training, and fair data-sharing to support scaling innovations through trust and peer learning.
- Weak enforcement of fair trading laws (EU Directive 2019/633) continues to disadvantage producers (e.g., limited protection and access to market data), making sustained public funding and collaborative support essential for innovation and equity.

Actionable Policy Recommendations

Farmers, positioned at the forefront of efforts to create more sustainable food systems, face a direct intersection between climate action and FLW reduction. These vectors are closely linked: both aim to lower GHG emissions and depend on access to timely, actionable data to guide sustainable farming practices. Moreover, reducing FLW contributes to climate resilience by supporting more efficient food systems and easing pressure on ecosystems and natural resources. The remainder of this brief therefore outlines key recommendations that simultaneously advance climate objectives and FLW reduction goals.

1. Enhance farmers' resilience to climate change through sustainable practices

1.1. Accelerate adoption of Climate-Smart Agriculture (CSA)

Climate-Smart Agriculture (CSA) provides a comprehensive framework for transforming food systems to address climate change by sustainably increasing productivity and incomes, enhancing resilience, and reducing greenhouse gas emissions. It encompasses a wide range of practices - from low-tech, ecologically based methods like composting, mulching, crop rotation, and agroecology to advanced digital tools such as precision farming and climate monitoring technologies. These approaches improve soil health, water efficiency, and crop resilience, contributing to both mitigation and adaptation. Digital innovations such as precision farming further enhance CSA by enabling data-driven decision-making, early warning systems, and improved resource management. The Smart Villages concept complements CSA by integrating digital tools with participatory governance to boost rural resilience and economic vitality. However, CSA must be implemented inclusively, respecting farmers' diverse capacities and choices, and ensuring that those who do not adopt digital technologies are equally supported.

1.2. Mobilise policy support to enable CSA implementation

Provide financial incentives to support CSA practices that may not be cost-effective at first. CAP 2023–2027 eco-schemes offer key incentives for sustainable farming, rewarding practices that lower environmental impacts and deliver public goods like biodiversity and carbon sequestration.

Deliver technical assistance and advisory services to help farmers adopt innovations, understand regulations, and implement CSA practices effectively. Farm advisory services guide farmers in using digital tools, diversifying income, and complying with policy requirements. They also ease the transition to modernised CAP systems by simplifying processes, reducing bureaucracy, and improving access to payments. Facilitate knowledge transfer and farmer engagement to make CSA effective. Governments should support networks that engage farmers directly, especially those less connected to centralised hubs or digital platforms.

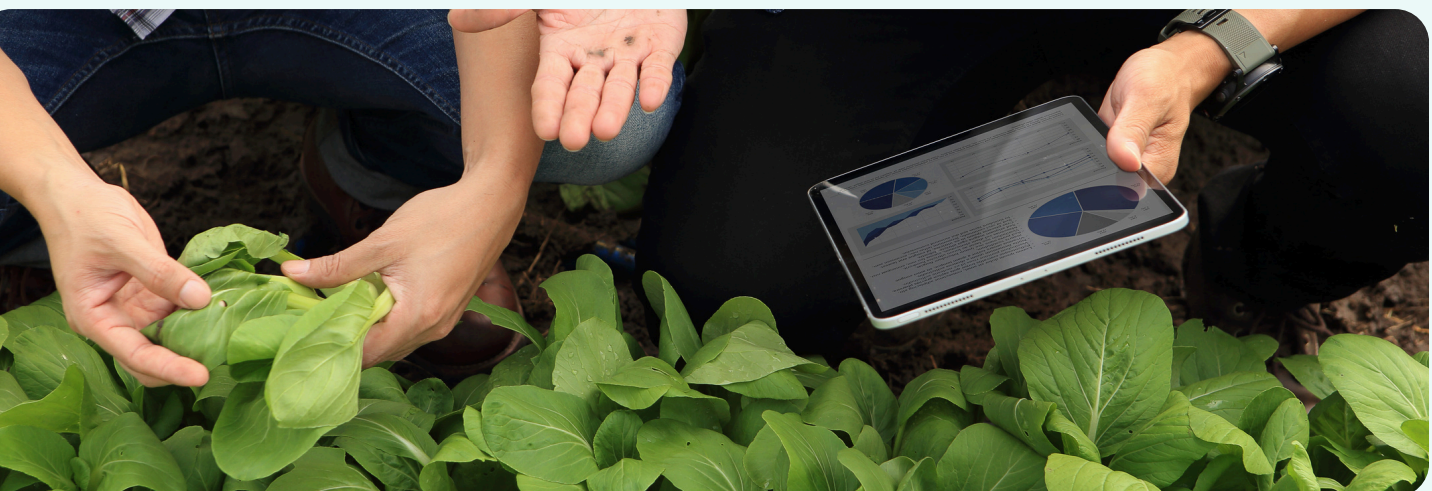
1.3. Role of digital tools and innovation in resilience

Enhance sector capacity by integrating digital technologies, which enables informed decision-making, improving efficiency and supporting sustainable practices. Tools like precision agriculture and real-time data platforms help farmers optimise inputs, boost yields, and reduce environmental impacts. Working conditions can be enhanced with automation and smart machinery, easing the physical and mental demands of agricultural labour. This would reduce repetitive and strenuous tasks, thus making working environments in rural areas more attractive.

2. Support small-scale farmers' digital transition

2.1. Build digital infrastructure and deliver training

Advance digitalisation by investing in infrastructure, providing targeted training, and fostering public-private partnerships.





Ensure basic connectivity, data systems, and supportive regulations are in place, especially where private investment is limited. Prioritise hands-on training and demonstration-based learning, particularly for small-scale and vulnerable farmers, to bridge digital skill gaps. Incentivise participation and align technologies with farmers' practical needs to encourage adoption and improve data quality for decision-making.

2.2. Promote the use of digital tools' role in farm management efficiency and resource optimisation

Digital technologies significantly improve farm management by enabling precise monitoring and control of resources. These tools allow farmers to apply water, fertilisers, and pesticides with greater accuracy, minimising waste and environmental impact while boosting crop yields. Furthermore, by analysing both consumption (demand) and production (supply) data, digital solutions can help optimise crop planning, thereby reducing overproduction, surplus, and food loss.

Digitalisation also enhances producers' ability to market their products by increasing their visibility to potential buyers. Notably, as Michel-Villarreal et al. (2021) emphasise, low-cost digital tools - including freeware and social media platforms - can be especially effective in connecting producers with markets, often playing a more significant role than anticipated. Digital technologies can also contribute to the development of rural areas by providing better accessibility and connections in line with the Long-Term Vision for the EU's Rural Areas.

2.3. Bridging the digital divide among rural farming communities

Digitalisation can boost efficiency but risks worsening rural inequalities due to limited connectivity, high costs, and low digital skills. Tools must be user-friendly and tailored to farmers' needs. The CAP 2023–27 and regional initiatives like CreceA in Spain support rural digital inclusion through personalised advisory services, funding access, and ongoing technical support.

2.4. Address behavioural and gender barriers to digital adoption

Even when digital tools function well, farmers often hesitate to adopt them due to lack of trust, limited usability, unclear benefits, and fears over autonomy or data ownership. Cultural, geographic, and gender norms further shape adoption, ranging from trust dynamics in different regions to traditional gender roles that exclude women from decision-making. Effective strategies must be inclusive and context-specific: invest in infrastructure, tailor training, co-create tools with users, and leverage trusted local networks. Policymakers should support early adopters, respect farmer autonomy, and design flexible frameworks that encourage adoption without penalising those who opt out.

2.5. Ensure responsible data use, sharing, and innovation scalability

Scalable digital innovation in agriculture depends on high-quality, interoperable data and trusted sharing systems. Farmer trust must be built through governance models that ensure data privacy and user control, like the Akkerweb Platform's opt-in sharing approach. This "controlled access" approach helps foster a sense of security and encourages data sharing.

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