Food system tipping points – case studies

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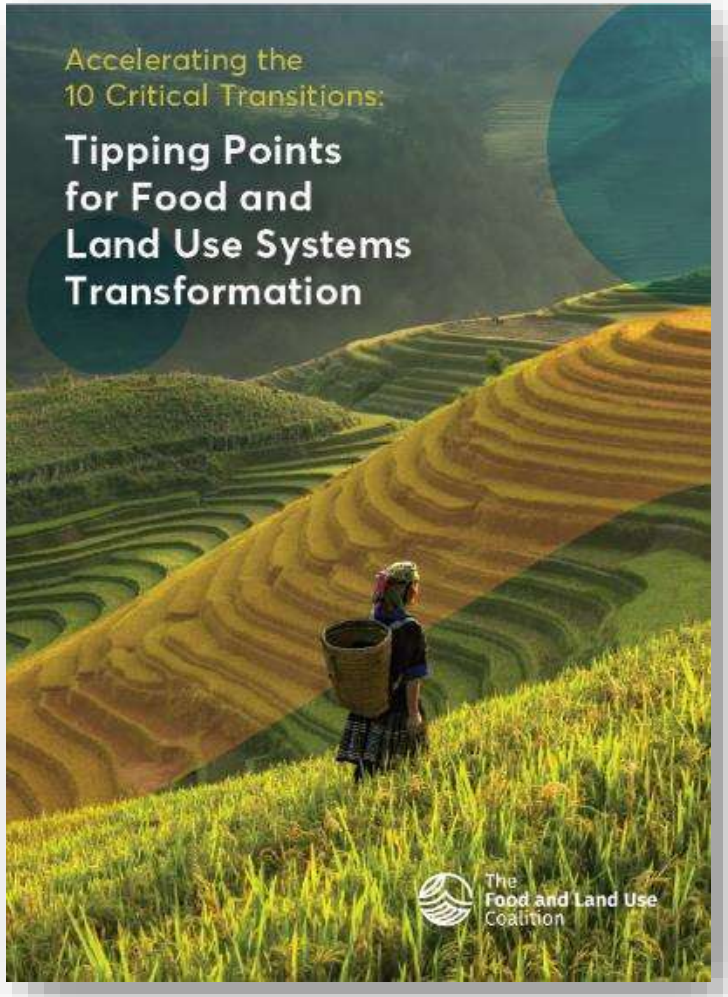

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Operationalising positive tipping points towards global sustainability

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Non-technical summary. Transforming towards global sustainability requires a dramatic acceleration of social change. Hence, there is growing interest in finding 'positive tipping points' at which small interventions can trigger self-reinforcing feedbacks that accelerate systemic change. Examples have recently been seen in power generation and personal transport, but how can we identify positive tipping points that have yet to occur? We synthesise theory and examples to provide initial guidelines for creating enabling conditions, sensing when a system can be positively tipped, who can trigger it, and how they can trigger it. All of us can play a part in triggering positive tipping points.

Technical summary. Recent work on positive tipping points towards sustainability has focused on social-technological systems and the agency of policymakers to tip change, whilst earlier work identified social-ecological positive feedbacks triggered by diverse actors. We bring these together to consider positive tipping points across social-technological-ecological systems and the potential for multiple actors and interventions to trigger them. Established theory and examples provide several generic mechanisms for triggering tipping points. From these we identify specific enabling conditions, reinforcing feedbacks, actors and interventions that can contribute to triggering positive tipping points in the adoption of sustainable behaviours and technologies. Actions that can create enabling conditions for positive tipping include targeting smaller populations, altering social network structure, providing relevant information, reducing price, improving performance, desirability and accessibility, and coordinating complementary technologies. Actions that can trigger positive tipping include social, technological and ecological innovations, policy interventions, public investment, private investment, broadcasting public information, and behavioural nudges. Positive tipping points can help counter widespread feelings of disempowerment in the face of global challenges and help unlock 'paralysis by complexity'. A key research agenda is to consider how different agents and interventions can most effectively work together to create system-wide positive tipping points whilst ensuring a just transformation.

Social media summary. We identify key actors and actions that can enable and trigger positive tipping points towards global sustainability.

1. Introduction

A tipping point is where a small intervention leads to large and long-term consequences for the evolution of a complex system, profoundly altering its mode of operation (Gladwell, 2000; Lenton et al., 2008). Such highly non-linear response is usually self-propelling and hard to reverse. Tipping points can interact across systems, spatial and temporal scales (Lenton, 2020). Crucial to their occurrence is the presence of strongly reinforcing positive feedback within a system, which can amplify a small initial change and turn it into a large consequence.

The recognition of 'negative' tipping points in the climate, ecological and biogeochemical systems was key to identifying and setting several of the 'planetary boundaries' (Rockström et al., 2009). Recently, evidence that such tipping points may be approaching has underpinned declarations of a climate and ecological emergency (Lenton et al., 2019). This in turn has led to increasingly ambitious targets to tackle climate change and reverse biodiversity decline – notably the target of limiting global warming to 1.5 °C. But such targets demand transformative rates of societal change – including a continuous, roughly 7% per year average global decline of greenhouse gas emissions from now on (Otto et al., 2020a) exceeding 10% per year in advanced economies (Anderson, Broderick, & Stoddard, 2020). Hence, there is a growing consensus that some social actors need to identify and trigger 'positive tipping points' (or 'sensitive intervention points') to accelerate progress to achieve the required, transformative rates of change for everyone (Farmer

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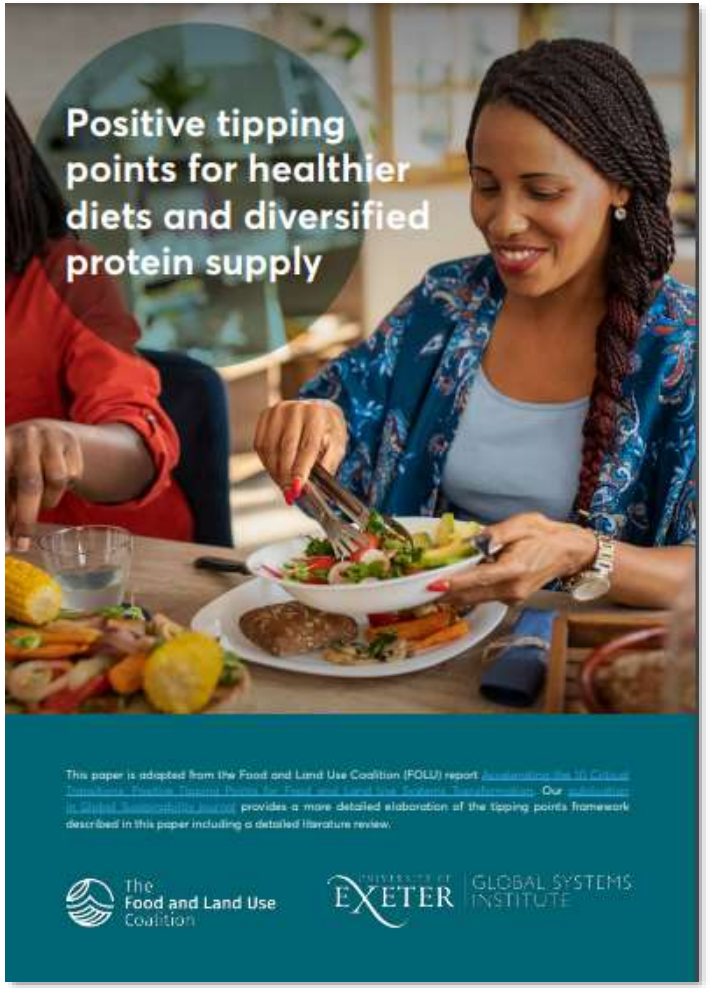
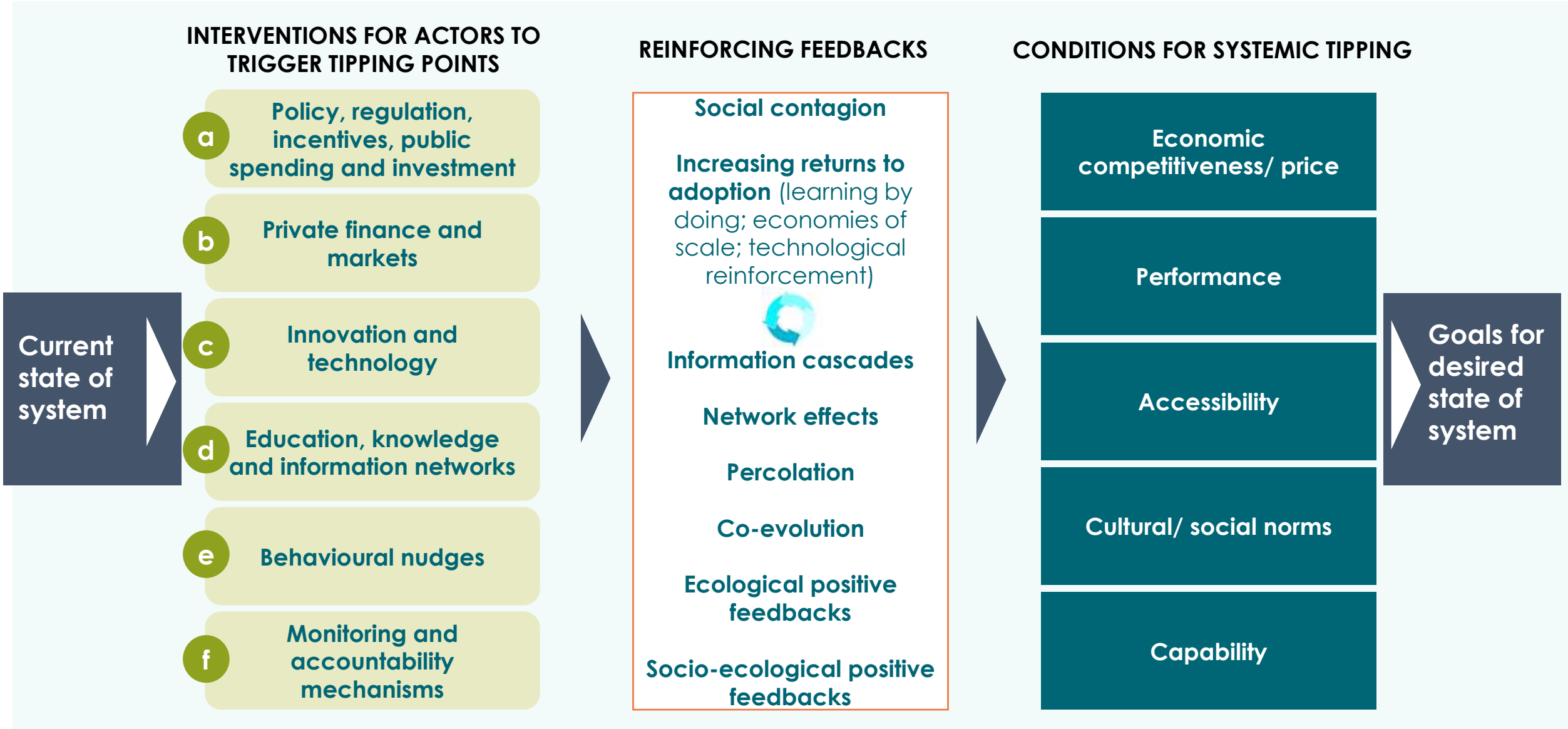


https://www.foodandlandusecoalition.org/wp-content/uploads/2022/06/Positive-Tipping-Points-for-Healthier-Diets-and-Diversified-Protein-Supply.pdf

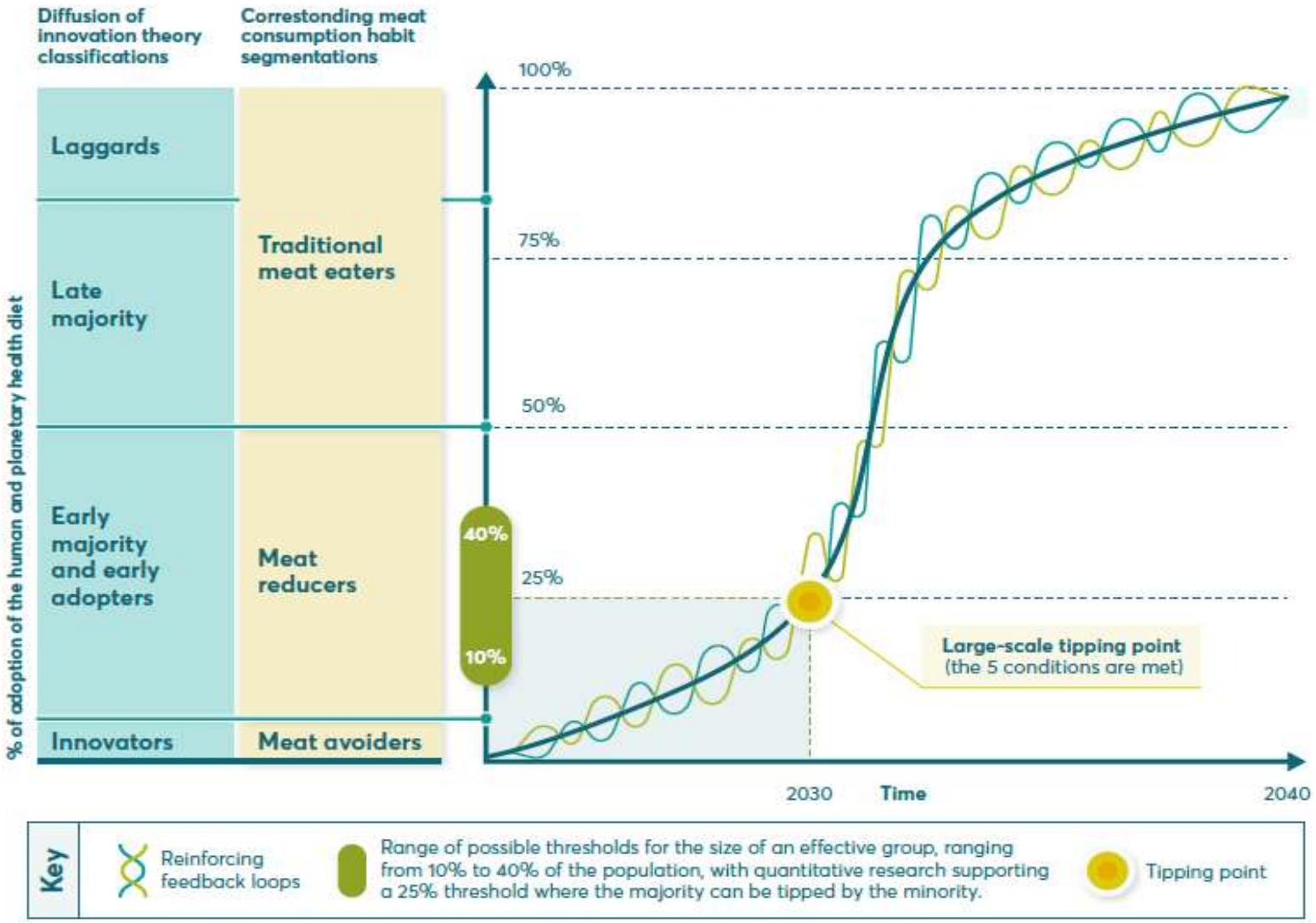
Framework for positive tipping



Source: FOLU, 2021. Accelerating the 10 Critical Transitions: Tipping Points for Food and Land Use Systems Transformation

Case study – shifting to plant-rich diets in Europe

Illustrating the tipping point…



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Step 1: Define the current state of the system & goals for a desired future state

Healthy Diets

Critical Transition 1: Promoting Healthy Diets

A transformation of global diets towards local variations of the "human and planetary health diet" (see box 2). As a result, consumers will enjoy a broader range of high-quality, nutritious and affordable foods, and global land use would be transformed providing numerous positive tipping point opportunities for regenerating ecosystems.

Diversifying Protein Supply

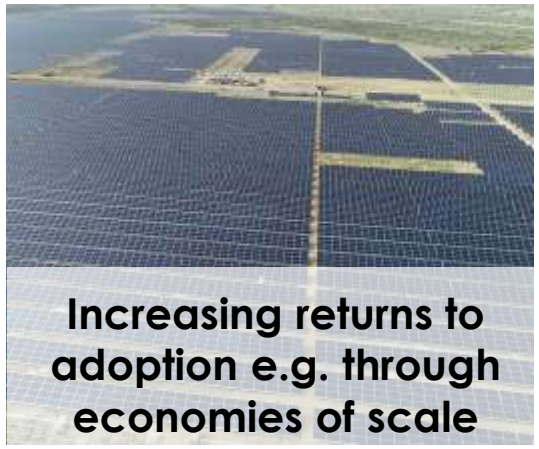
Critical Transition 5: Diversifying Protein Supply

Rapid development of diversified sources of protein would complement the global transition to healthy diets. Diversification of human protein supply falls into four main categories: aquatic, plant-based, insect-based and laboratory-cultured.

Step 2: Understand the enabling conditions for systemic tipping

1 Economic competitiveness	Tasty and convenient alternative proteins are at price parity or cheaper than conventional meat.
2 Performance	Alternative proteins have the same or better sensory and health properties as conventional meat.
3 Accessibility	Alternatives are observable, accessible, and easy to purchase in stores, online, and in restaurants, whilst choice architecture limits the convenience and availability of unsustainable produced meat.
4 Cultural norms	It is socially unacceptable to overconsume meat and alternatives are socially desirable and normalised throughout society.
5 Capability	Consumers and food service providers have the knowledge and skills on how to cook with alternative proteins, and consumers are aware of the health and environmental impact of their food choice.

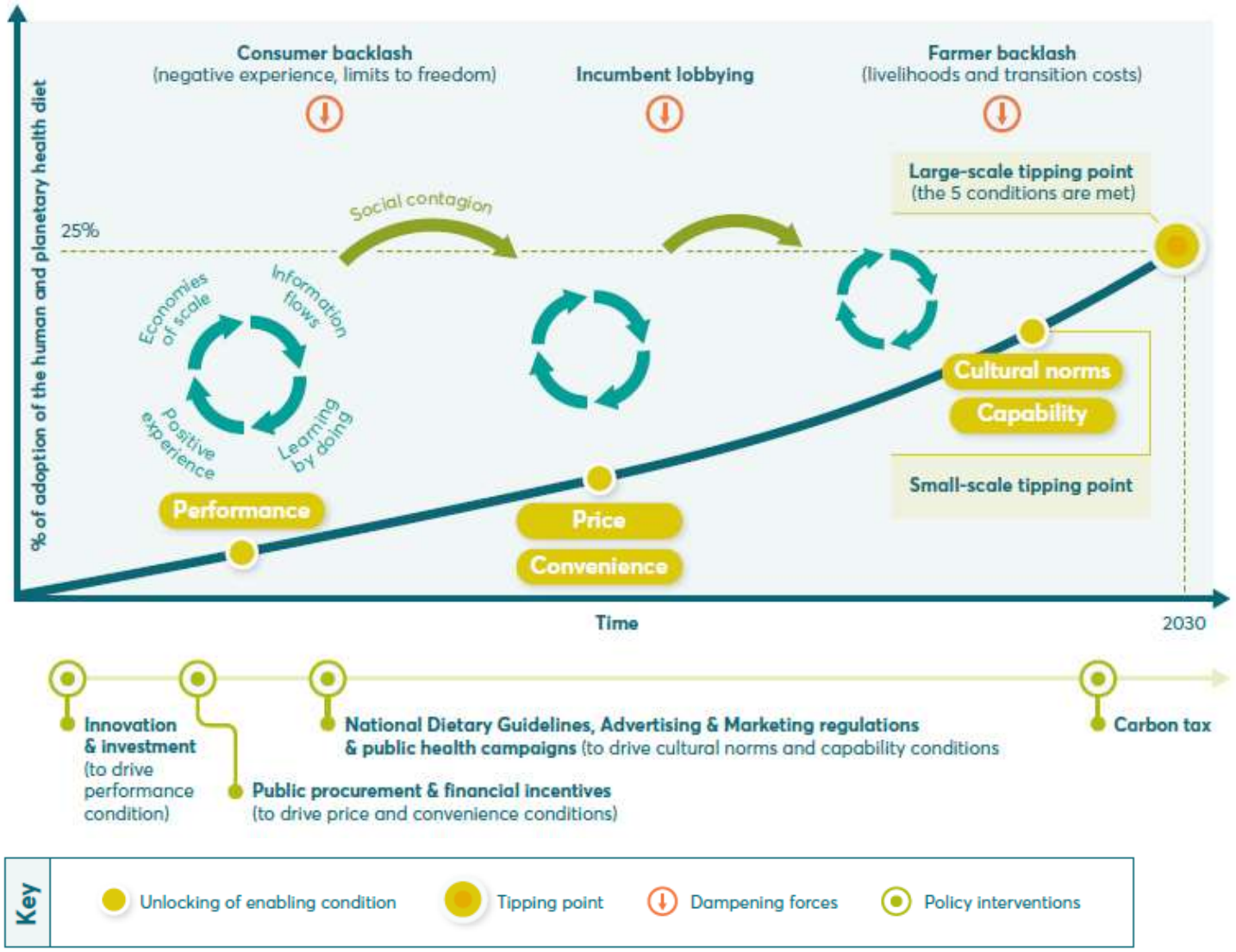
Step 3: Identify reinforcing positive feedback loops which will unlock enabling conditions



Step 4: Establish the interventions that different actors can take to triggering these reinforcing feedback loops

I have the agency and the power to make following the interventions to tip European consumers towards plant-rich diets		Which can trigger the following reinforcing feedbacks to have an outsized impact on the system	So that the following system tipping conditions are met
Policy, regulation, incentives, public spending and investment	e.g. Establish public procurement policy that favours alternative proteins	Social contagion Increasing returns to adoption	Price; Social norms
Private finance and markets			
Innovation and technology			
Education, knowledge and information networks			
Behavioural nudges			
Monitoring and accountability mechanisms			

Step 5: Consider how the sequencing of interventions is important



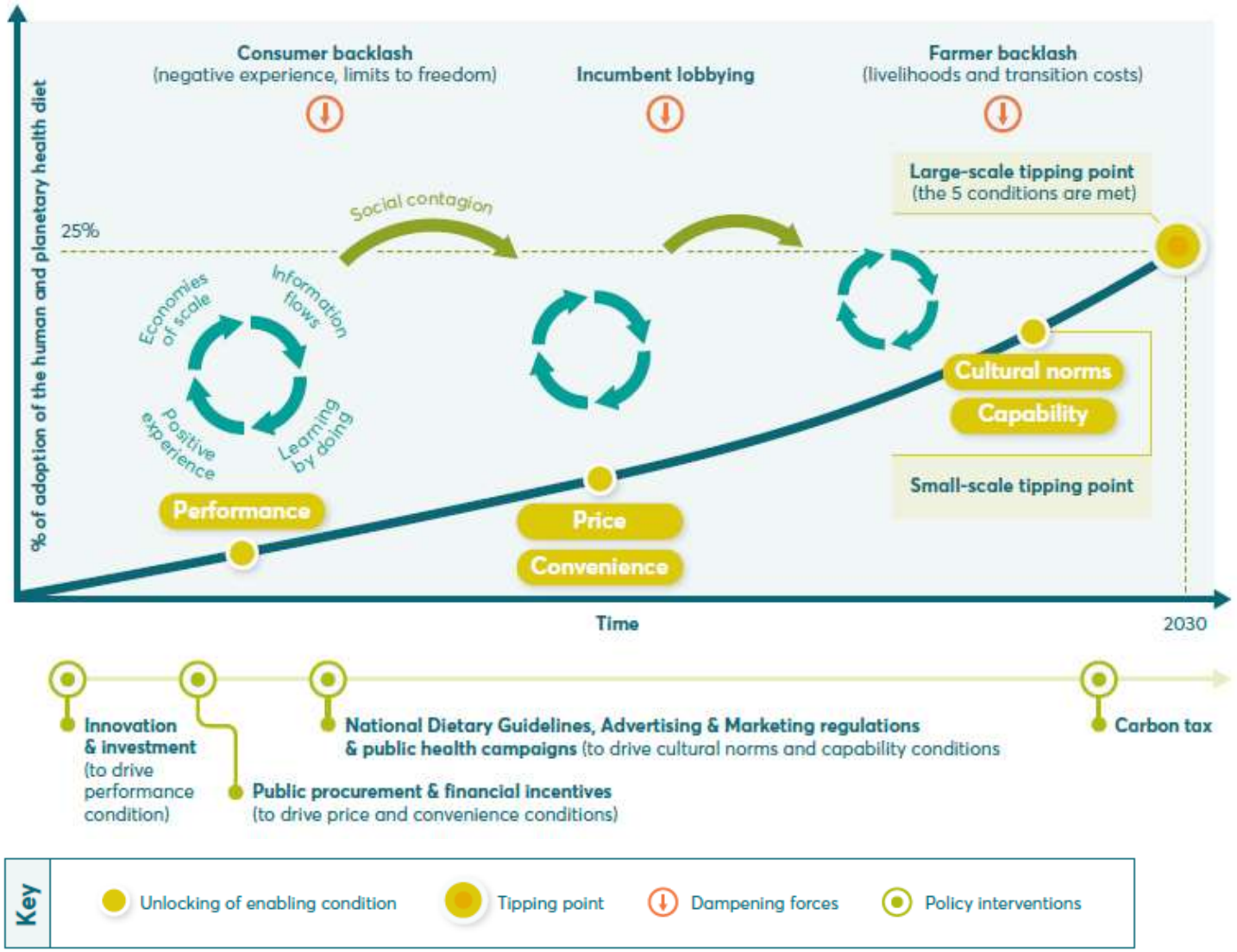
Investing in innovation to improve the taste, quality, affordability and social acceptance of alternative proteins.

For example:

- Stimulate open access innovation and R&D for meat mimicking products.
- Create fair and standardised regulatory pathway for innovation.

Policymaker example

Step 5: Consider how the sequencing of interventions is important



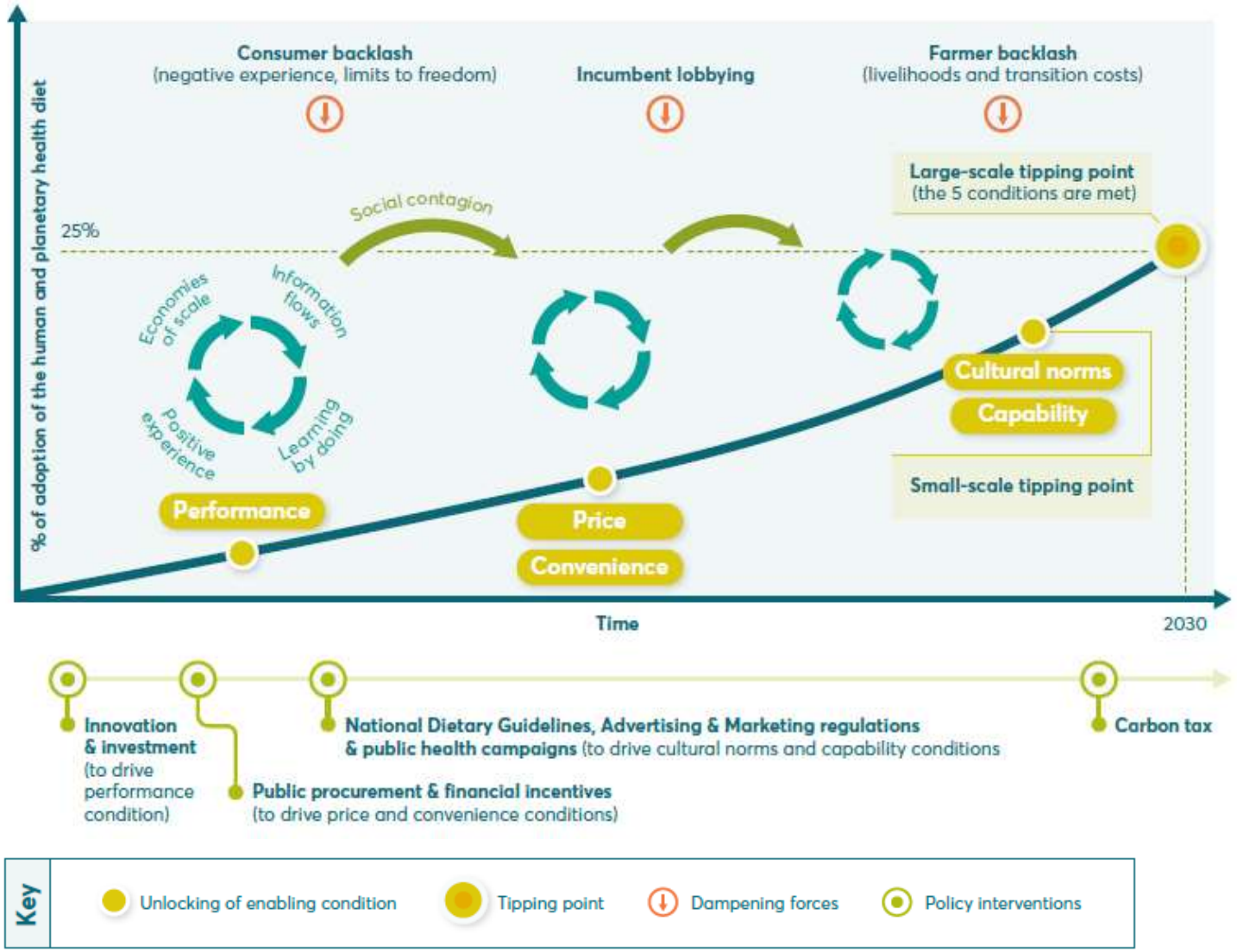
Deploying public procurement to increase demand and bring economies of scale and bring down costs.

For example:

- Establish public procurement policy that favours alternative proteins to create demand and drive down costs.
- Apply behavioural insights to policy design to nudge consumers towards healthy and sustainable diets.

Policymaker example

Step 5: Consider how the sequencing of interventions is important



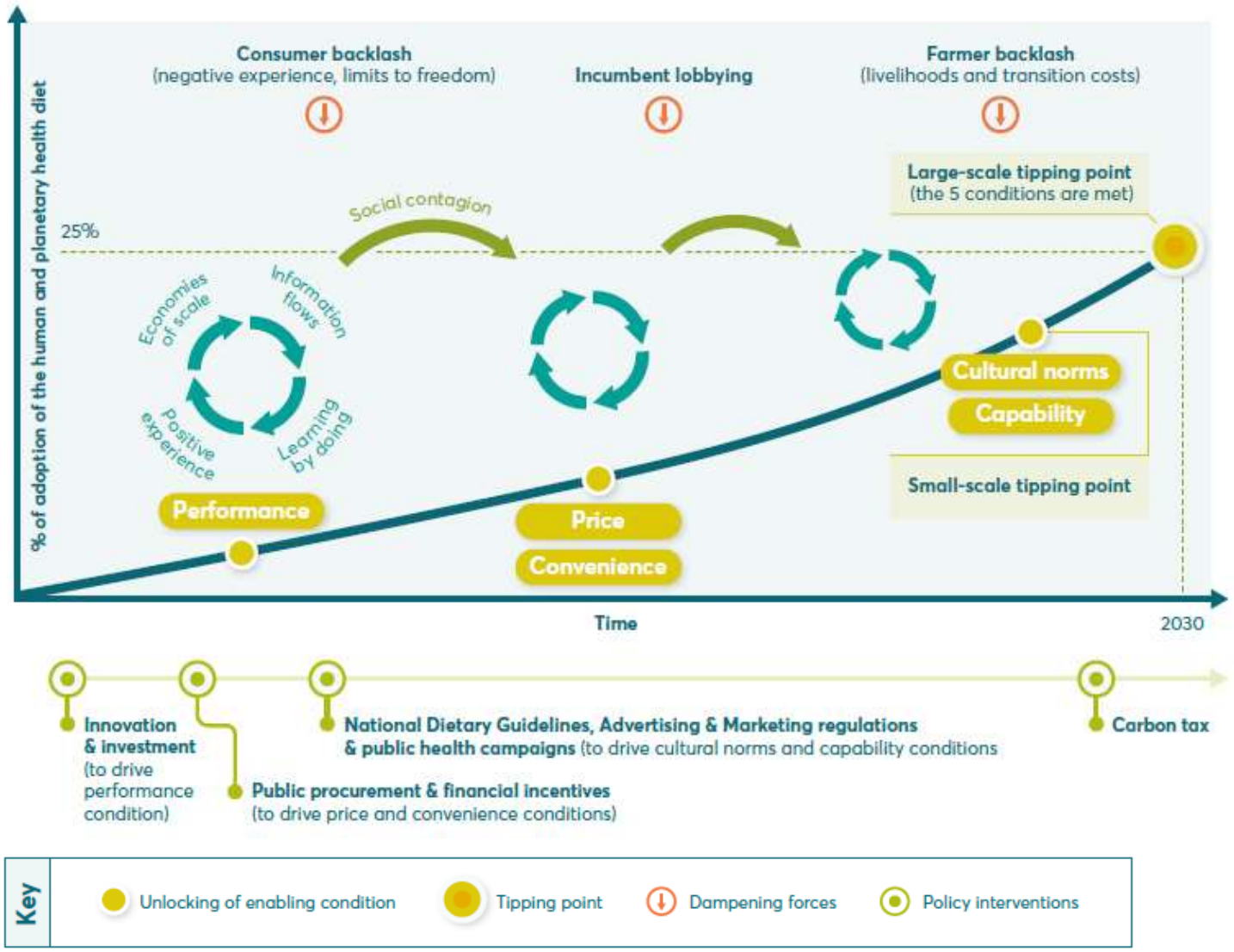
Regulatory interventions relating to national dietary guidelines and governance of corporate advertising and marketing to drive cultural norms and capability.

For example:

- Adopt integrated national food strategies, similar to the UK, which address food systems' impact on health, inclusion and environment in a holistic way
- Withdraw regulations that prevent use of familiar language on alternative products.

Policymaker example

Step 5: Consider how the sequencing of interventions is important



These earlier interventions are also designed to **limit backlash** associated with the sudden implementation of stringent policy measures that would encourage consumers to reduce meat consumption.

Positive feedback from these initial interventions allows more stringent policies to be added over the longer term, including tax and regulation.

Policymaker example

Case study – tipping the system towards regenerative and productive agriculture in India

Step 1: Define the current state of the system & goals for a desired future state

Productive & Regenerative Agriculture

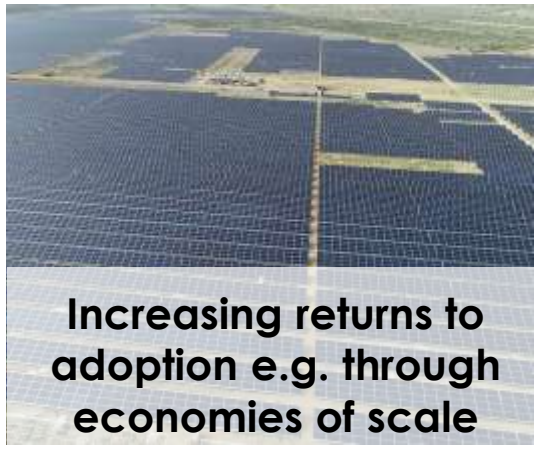
Critical Transition 2: Scaling Productive and Regenerative Agriculture

Agricultural systems that are both productive and regenerative will combine traditional techniques, such as crop rotation, controlled livestock grazing systems and agroforestry, with advanced precision farming technologies which support more judicious use of inputs including land, water and synthetic and bio-based fertilisers and pesticides.

Step 2: Understand the enabling conditions for systemic tipping

1 Economic competitiveness	Sustainable agriculture business models are more economically attractive than high-input conventional models. This includes de-risking the transition for farmers.
2 Performance	Sustainable agriculture outperforms conventional agriculture based on yield, strengthening rural livelihoods, and increasing diversity and supply of more nutritious, resilient crops.
3 Accessibility	Farmers have a market and access for their sustainability and regeneratively produced products.
4 Cultural norms	It is culturally and socially undesirable to continue producing agriculture conventionally. Farming sustainably appeals to the youth and attracts a new generation of farmers.
5 Capability	Knowledge networks facilitate dissemination of evidence for sustainable agriculture. Farmers have access to knowledge, tools and the capital needed to shift to sustainable farming.

Step 3: Identify reinforcing positive feedback loops which will unlock enabling conditions



Step 4: Establish the interventions for triggering reinforcing feedback loops

Step 5: Consider how the sequencing of interventions is important

Recommendation	Which of the five conditions does this address?
Redirecting distorting subsidies, coupled with social safety nets and transition support: • Shift incentives from input-intensive to sustainable and regenerative practices. • Scale up payments for ecosystem services. • Provide off-take guarantees for sustainable agricultural produce. • Provide social safety nets and/or transition finance to de-risk transition for farmers.	✓ **Economic competitiveness** ✓ **Performance**
Market innovation: • Agree an industry standard for regenerative agriculture sourcing, along the lines being developed e.g. by OP2B and SAI Platform. • De-risk transition for farmers by providing longer-term off-take agreements and financial instruments for farmers. • Develop value chains and infrastructure that will help channel regenerative agriculture products to the market. • Facilitate open access innovation and R&D investment in bio inputs, irrigation systems, nutrient recycling.	✓ **Price** ✓ **Performance**

Policymaker example

Step 4: Establish the interventions for triggering reinforcing feedback loops

Step 5: Consider how the sequencing of interventions is important

Recommendation	Which of the five conditions does this address?
Public procurement: • Use public procurement to stimulate demand and encourage local producers using regenerative practices. • Develop public procurement standards that value natural capital.	✓ **Price** ✓ **Performance**
Consumer awareness and communication: • Engage with traditional and social media to build consumer awareness on the benefits of sustainable food on health, nature and livelihoods. • Work with media in large demand hubs to raise awareness on the role of sustainable farmers in providing healthy food, stewarding nature and mitigating climate change. • Develop comprehensive metrics – like the one being developed by Sustainable Food Trust – for assessing the sustainability of farm operations and conveying this information to consumers.	✓ **Accessibility** ✓ **Cultural norm**
Farmer training, information networks: • Provide ongoing support to the development and operation of grassroots initiatives that promote the inclusive and participatory transition of vulnerable and small-scale farmers to sustainable agriculture models. • Scale up extension services (training and access to technology, knowledge, seeds, etc.) • Monitor sustainable agriculture initiatives over the long-term to better understand how they create value at the landscape and regional levels, to inform more accurately the design of public policies and fiscal reforms. • Provide better documentation data and evidence surrounding regenerative farming practices.	✓ **Capability** ✓ **Accessibility** ✓ **Cultural norms** ✓ **Performance**

Policymaker example