

EFFICIENT USE OF RESOURCES

A SUSTAINABLE AND DYNAMIC VALUE-BASED FOOD SYSTEM

FOOD 2030: CIRCULARITY



Optimising processes from agricultural input to consumer behaviour is relevant for the overall sustainability of the food system. Such optimisation does not necessarily require further intensification of production, but rather involves significant reconfiguration of many different dominant practices and structures that constitute our food systems.

SPECIFIC R&I BREAKTHROUGH TOPICS

Efficient water use: Global agricultural production currently uses about 70% of the world's fresh water supply. Optimising and transforming the way water is used in food systems requires technological innovations reducing water losses as well as optimising irrigation and food processing, as well as transformative interventions that address water scarcity in vulnerable areas, innovations and interventions that reduce and prevent water pollution, and new farming (management) methods that lead to more resilient soils and production systems, enhancing adaptivity and sustainability of the food-water-energy nexus.

Efficient land use: Increasing demand for food has led to greater pressure on and competition for land. Optimising and balancing land-use activities is a critical topic in the transformation of food systems. Efficient land-use can be achieved through (high-tech) innovations (increasing crop yields, vertical farming) that lead to more efficient production, but don't necessarily require intensification of agricultural practices. Instead, moving away from monocultural production and intensive livestock farming, while increasing crop diversity and implementing new innovative practices that combine land-use functionalities (such as agroecology, conservation agriculture, integrated crop-livestock systems and urban agriculture) might pave the way for transformation towards more local, (bio)diverse and resilient food systems.

Efficient nutrient use: Current nutrition efficiency in food systems is hampered by ineffective and large-scale use of fertilisers (in monocultural production) including the adverse effects of this usage on the environment, and large quantities of food waste throughout the value chains. Innovations and interventions are required that

enhance nutrient circularity (in particular in nitrogen and phosphorus cycles), improved livestock and manure management, and reduce food waste. Efficient nutrient use could be further enhanced through the transition towards plant-based diets, thereby accommodating more efficient water and land use.

Efficient energy use: More efficient energy use in food systems could be achieved through optimising energy use throughout the entire value chain. This means, for instance, moving towards the use and scaling-up of sustainable and renewable energy sources in food production, but also redesigning and innovating industrial food processing. Furthermore, it requires the optimisation of logistical processes, including experimenting and innovating towards shorter supply chains and local food systems to reduce carbon emissions.

EXPECTED IMPACT

Optimisation of our processes from agricultural input up to consumer behaviour is relevant for the overall sustainability of the food system. The impact on the way we produce, process, distribute and consume food will therefore be very significant, as will the impact on biodiversity, climate change, human health, economies and societies.

MARKET OPPORTUNITIES / CHALLENGES

- Increasing awareness of the need to protect the environment, enhance soil quality, reduce pollution, and restore biodiversity is an opportunity to reconsider current land, water, nutrient and energy use practices.
- (Local) governments are increasingly facilitating experimentation with non-conventional production methods that aim to alter land and water use practices and move towards local supply chains.
- Further optimisation of water use in agricultural production might be technologically challenging.
- Lack of infrastructure, expertise and/or collaboration throughout the food chain can hinder absorption of innovative practices at the system level, while incumbent players and institutions might seriously hinder uptake of radically novel practices.
- More institutional and financial support is needed to engage and facilitate farmers in the uptake and upscaling of novel innovations that might optimise land, water, nutrient and energy use.

EXAMPLE REFERENCES

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ASSOCIATED TRENDS IN FIT4FOOD2030 (URL)

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|---|-------------------------------------|
| ○ Urbanisation | ○ Changes in farm structures |
| ○ Scarcity of natural resources | ○ Agricultural pollution |
| ○ Rise in energy consumption | ○ Biodiversity loss |
| ○ Economic globalisation | ○ Urban agriculture / urban farming |
| ○ New and game-changing digital technologies in agriculture | ○ Consumer engagement |

ASSOCIATED CASES IN FIT4FOOD2030 (URL)

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| ○ Kipster | ○ Kiverdi |
| ○ High tech Green House 2020 | ○ Agrophotovoltaics from Fraunhofer |
| ○ NoviFarm | ○ Farmers cut |
| ○ Soilfood | ○ EggXYt |
| ○ Recare | ○ Beeflow |
| ○ Ostara | ○ Urban Beekeepers (AT) |
| ○ Bioward Planty Organics | ○ Bee urban (SE) |