


The European Green Deal and the food supply chain: insights from policy, knowledge creation and governance

- All food supply chain (FSC) stages, from food production to waste, shall go through fundamental changes to promote the phase-out of fossil fuels and refrigerants with global warming potential.
- Political directionality is mostly general and fails to consider the specificities and challenges of every FSC stage.
- Food production –agriculture and land use change– is the exception, with some specific proposals.
- Research and development projects mainly focus on decarbonization of production systems and invest proportionally less in food packaging, transportation and retailing stages.
- There are insufficient monitoring tools available to accurately quantify and collect corporate emissions data for both SMEs and large companies.
- A harmonized monitoring system is needed to develop an emissions benchmark and to design better strategies to achieve net-zero emissions.

The European Green Deal (EGD) is the main political blueprint to transit to a greener economy, setting ambitious decarbonization targets for EU industries. The food sector is at the heart of the EGD not only because climate change poses serious risks to food production, but also because greenhouse gases (GHGs) are emitted throughout all stages of the food supply chain (FSC).

About a third of global anthropogenic GHG emissions originate from the food sector, mainly due to energy use, industrial operations and waste management (Crippa et al., 2021). EU countries have progressively reduced emissions at different FSC stages, but emissions coming from post-farm gate activities (e.g., processing, retail, transport and logistics) remained high and even increased in the last decade (Crippa et al., 2021). So far, a clear design of applicable strategies to decarbonize food industrial activities seem to be absent, partly due to the lack of standardized corporate GHG reporting. In parallel, there are aspects of policy, knowledge creation, innovation and governance that should be considered to support political interventions to decarbonize the European FSC.



EVEN IF FOSSIL FUEL EMISSIONS ARE REDUCED, THE PARIS AGREEMENT TARGET OF STAYING BELOW 1.5°C WOULD NOT BE ACHIEVED IF THE FOOD SUPPLY CHAIN'S EMISSION PATTERNS FOLLOW THEIRS CURRENT TREND

(Clark et al., 2020)

Policy

Political efforts are central to align the activities along the FSC to the transition proposed by the EGD and the farm to fork strategy. The “Fit for 55” package demands fundamental limits in national GHG emissions, mainly from sectors not covered by the European Trade System (ETS), including agriculture and waste management. EU members, with their own individual quotas, shall yearly increase the share of renewable energy sources by at least 1,1% in the heating and cooling sector (European Commission, 2022). Additionally, the Carbon Border Adjustment Mechanism poses a tariff that will increase the price of imported goods in emissions-intensive sectors that are not produced under low-emission standards. Nevertheless, in the first phase, only reporting is compulsory for a few sectors (cement, iron and steel, aluminum, fertilizers and electricity). These legal actions, applied to selected productive sectors, may modestly affect the FSC stages. Thus, despite the relevance of the food sector to reach carbon neutrality, current policy proposals are general and do not target the food supply chain and its stages specificities. For



instance, the “F-gas regulation” is a law applied in all sectors utilizing F-gases that is, within the FSC and beyond. This regulation introduces a mechanism to reduce F-gases by phasing down production and import of high global warming potential (GWP) refrigerants. As a result, high GWP refrigerants are banned in new equipment such as fridges in households or supermarkets, air conditioning, foams and aerosols, and also when producing such equipment. Yet, F-gases emissions from existing equipment shall be monitored to guarantee F-gases management and reduced use. Food energy-intensive operations, such as food processing, retailing, transport, and domestic energy use will face high costs due to higher carbon prices and hence, more investments and incentives are needed to develop clean technologies. Such technologies will be widely and rapidly adopted if the necessary political moves to regulate markets and enforce the regulations are made. In this way, the demand for green products and services by consumers, as well as by firms throughout the entire FSC will increase.

Knowledge creation and innovation

Research and innovation should serve as a link between today's problems and future solutions to decarbonize the FSC. The challenge of building sustainability within the

FSC involves multiple stakeholders, their perspectives, uncertainties, and trade-offs (Riccaboni et al., 2021). Over the years, research and development (R&D) has made progress in tackling specific problems concerning the FSC, but with a narrow focus on increasing food availability at affordable prices. This ensures food security for a rapidly growing population, however, does not solve nutritional challenges, biodiversity loss, and the increasing GHG emissions throughout the FSC (Garnett, 2013). Thus, actors from the entire FSC, from producers to the government, have a distinct role in encouraging R&D focused on reducing GHG emissions and communicating why and how to innovate (Herrero et al., 2020; Riccaboni et al., 2021). Likewise, we recommend a shift towards more R&D and innovation, dedicated to harmonize the many existent digital platforms, standards, and initiatives at the EU level. This shift should consider the specificities of each stage as a base for policy proposals and implementation, as well as a structure that enables science and society to work together toward solving complex societal challenges (Kok et al., 2019).

The funds allocated from 2021 onwards to Horizon 2020 food-related projects under the Climate Change and Environment category are unevenly distributed across food supply chain stages. For instance, 31% of the total budget has been allocated to food production, followed by sustainable agriculture (18%) and aquaculture (14%). Post farm gate stages such as processing and transport only received 2% of the budget each, highlighting the unequal investment effort in certain sectors.

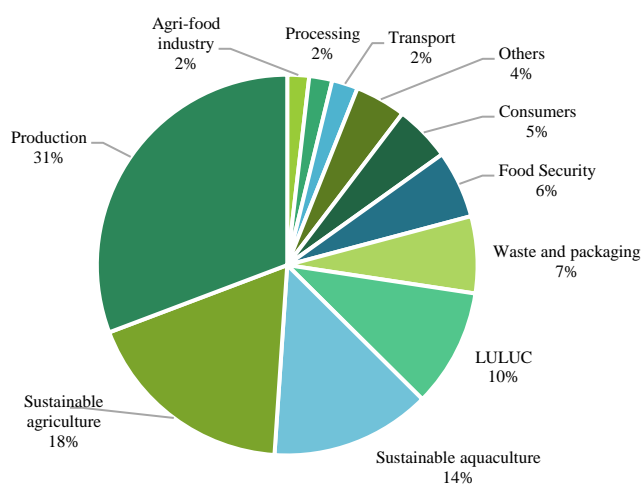


Figure 1. Horizon 2020 budget distribution of food-related projects by domain of application across the Climate Change and Environment categories. Data for the period of 2021 to 2023. Data source: <https://cordis.europa.eu/projects/en>.

Building capacity for governance and change

Technology and governance should act synergistically to transform the economy in the long-run (Pianta & Lucchese, 2020). The FSC has a very diversified set of companies, with access to formal and informal

markets, and having different production realities. The shift to clean energy sources and the implementation of energy efficient systems should be accompanied by technical knowledge integrated into building governmental capacity (Nilsson et al., 2021). This means that political institutions shall develop information tools to progressively monitor production systems, processes, their demands, and impacts. Additionally, informing consumers about the origin and production processes of the products they buy

POLITICAL AND INVESTMENT PLANS TO DECARBONIZE THE FOOD SUPPLY CHAIN DEPENDS ON POLICY INTEGRATION WHERE ALL STAGES (FROM FARM TO FORK) ARE TARGETED.

can potentially influence market behavior and increase the demand for food produced under environmental standards. In this context, food-related voluntary certification and eco-labelling initiatives are in the raise. More specifically, in relation to food and beverages, the “Eco-design Directive” obliges EU manufacturers to reduce energy consumption in the production process, and in some cases, to mitigate other negative environmental impacts occurring throughout the product’s life cycle. The “Eco-design Directive” is considered one of the most successful regulations applied in Europe. A recent report from the European Environmental Bureau estimated that Eco-design could account for a third of the total emissions reductions needed to achieve the 55% greenhouse gas reduction target by 2030 (Schweitzer et al, 2021). However, reporting mechanisms still need to be enhanced. Moreover, transportation is a stage of the FSC in which legislation related to refrigerants is still lacking, in particular in relation to refrigerated transport units.

Climate finance is also crucial to make clean energy sources and technologies more accessible. Yet, there is some divergence regarding where current investments should be allocated. Despite the advantages of investments targeting R&D and technology demonstrations, investment in these area is still insufficient. Meanwhile, the green transition should promote an increasing demand for sustainable goods, services, and training so that low-carbon technologies generate profit, jobs, and incomes.

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