Concept Note 6

ZERO EMISSIONS, ZERO HUNGER

How can decarbonization of food systems contribute to reducing hunger?

GOAL

The Food Systems Summit convened by Antonio Guterres, Secretary General of the United Nations, on September 23, 2021, noted that food systems are extraordinarily linked to the environment. According to the Intergovernmental Panel on Climate Change (IPCC) special report titled *Climate Change and Land* (2019), between 21% and 37% of total greenhouse gas (GHG) emissions could be attributed to the global food system. These emissions arise from the production, land-use change, processing, packaging, distribution, preparation and consumption of food, including food loss and waste. The 2021 Food Systems Summit confirmed that food systems need to undergo a profound transformation.

CONCEPTUALIZATION

According to data from the latest IPCC report, more than one third of all greenhouse gas emissions come from food systems. On the other hand, according to a study published in the journal *Nature Food* in March 2021[1], based on 2015 data, global emissions from the food system amounted to 18 Gt of CO_2 equivalent per year, representing 34% of total greenhouse gas emissions. The largest contribution came from agriculture and land use and land use change activities (71%), with the remainder coming from supply chain activities: retail, transportation, consumption, fuel production, waste management, industrial processes and packaging.

Greenhouse gases are produced at all stages of the food chain, which absorb and re-emit infrared radiation, contributing to climate change. The food system, which includes all the elements and activities developed along the food chain, is closely related to aspects such as nutrition, population health, socioeconomic growth, equity and environmental sustainability. For this complex system to be sustainable, it is necessary to ensure food security and nutrition, so that the economic, social and environmental bases for future generations are not compromised.

Emissions are generated from time zero in land use and land use changes, such as the application of fertilizers and pesticides. Methane emissions are generated, for example, in the digestive process of cattle or the management of cattle manure. In the case of carbon dioxide, emissions are generated by the clearing of forests for the expansion of agricultural and livestock land, or through other sources such as the burning of crop residues and the use of fuels for tillage. In addition, emissions from food refrigeration and transportation, industrial processes in food processing, the production of packaging materials such as paper, plastic or aluminum, and waste management should also be considered. It should be noted that food waste also has an impact on greenhouse gas emissions.

[1] Crippa, M., Solazzo, E., Guizzardi, D. et al. Food systems are responsible for a third of global anthropogenic GHG emissions. Nat Food 2, 198–209 (2021).

According to data from the European Commission and the FAO, more than 1.3 billion tons of food are wasted every year in the world, which is equivalent to one third of the world's production. FAO warns that food wastage generates between 8% and 10% of global greenhouse gas emissions. At the European level, it is estimated that food waste generates a cost of 132.000 million euros and accounts for 16% of greenhouse gas emissions in the food system. In addition, this waste also implies an inefficient use of natural resources, including water, land and energy needed to produce the food that is ultimately discarded, with a major environmental and social impact.

FAO estimates that in 2050, agriculture will have to produce almost 50% more food, fiber and biofuels than in 2012 to meet global demand and stay on track to achieve zero hunger. However, if food production continues within the parameters described above, it will be difficult to meet climate targets. Therefore, it is essential to continue working on the transition to a sustainable and environmentally more responsible food system that ensures food security and promotes healthy and sustainable consumption patterns.

In this sense, it is necessary to promote environmentally friendly agricultural practices that allow the production of crops and livestock without damaging ecosystems. This implies preventing adverse effects on soils and water, slowing the loss of biodiversity and protecting ecosystems. Agricultural practices such as permaculture, agroforestry, mixed farming, multiple cropping or crop rotation are possibilities and approaches to be explored. In the livestock sector, the IPCC highlights the potential of the sector as a GHG sink through sustainable management practices, such as improved manure management (composting, biodigestion), silvopastoral systems, rotational grazing, improved livestock feeding and agroforestry.

In this transition towards sustainability, regional governments have a fundamental role to play by accompanying all actors in the food system. The goal is to have a sustainable food system that protects biodiversity, promotes healthy eating habits and is also a dynamic economic sector, offering employment and opportunities for young people.

Tools and good practices regarding the quantification and assessment of emissions from food systems are of vital importance. In this sense, Catalonia, as part of its food strategy, has implemented a guide and self-assessment calculator for the achievement of the Sustainable Development Goals (SDGs) in agri-food companies. This tool aims to promote joint action and helps companies in the sector. First, it evaluates the degree of compliance with the SDGs through a series of indicators, and second, suggests a wide range of actions to position economic, social and environmental sustainability at the center of their production and distribution.

Many regional governments with responsibilities in this area are promoting agricultural vocational training. In the face of challenges such as drought and heat, it will be necessary to adapt many crop varieties and adopt practices that reduce greenhouse gas emissions. Environmental education plays a crucial role in rural development by encouraging the development of sustainable agricultural practices. Through training programs, farmers and ranchers can exchange knowledge and learn about soil conservation techniques, efficient water management, responsible use of pesticides and fertilizers, crop diversification and measures to halt biodiversity loss, among others. These practices not only help conserve natural resources and protect biodiversity, but also contribute with social and economic benefits, improving the profitability and quality of life in rural communities. Agricultural vocational schools should provide information,

practices and methods to promote the transition to sustainable food systems, and this can be a fruitful area for exchange and cooperation between regions.

QUESTIONS AND CONCERNS

- What do you think is the main milestone for reducing GHG emissions in the agri-food sector? Where should we focus our efforts to reduce GHG emissions?
- Is it necessary to change dietary patterns to reduce emissions from the agricultural sector?
- What measures can be taken in the food industry to reduce its GHG emissions? And in food distribution and marketing channels?
- Is it possible to reduce emissions working towards the fight against hunger?
- How can we eliminate the use of fertilizers derived from fossil resources, such as natural gas? Is it feasible to synthesize the ammonia required for fertilizer production using alternative compounds or technologies that do not rely on natural gas and do not produce CO2?
- How do we ensure the health and conservation of agricultural soils?
- How does agricultural vocational training work in your territory?