

THE FOOD TOWER: Written explanation

1. Problem definition

Food production has been depleting the earth's resources and contributing significantly to greenhouse gas emissions, soil fertility and biodiversity loss, water scarcity, and to the release of large amounts of nutrients and other pollutants that affect ecosystem quality, e.g. the application of nitrogen and phosphorus fertilizers pollute water. In Europe, 31% of the total greenhouse gas is from food production. Our current food system failed to provide a healthy diet which can be attributed to the provision of contaminated, unsafe, or altered food from food systems and unhealthy dietary patterns arising from the overconsumption of certain food. Although success has been obtained in food safety and hygiene, the risks of foodborne illnesses remain high. Public health outbreaks frequently originate from the consumption of meat, poultry, and animal products. In Europe, eggs and poultry meat are big contributors to *Salmonella* and *Campylobacter*. Water and soil contamination described above also result in unhealthy diets. Traditional food processing methods in food systems today may be connected to an increased risk of non-communicable diseases (NCDs). Unhealthy diets are considered the leading risk factor for all healthy life years lost in Europe. High consumption of added sugars, sodium, saturated, and trans fats, and low consumption of fresh fruits, vegetables, pulses, whole grains, and unsaturated fats leads to obesity and NCDs around the world today. The average European diet is deemed too high in red and processed meat, sugar, saturated, and trans fats. Marketing campaigns are encouraging people to eat snacks; government and policies give more support and subsidies to meat and dairy industries; processed food is in the dominant place in high-income countries to the detriment of fresh and diversified food consumption. These changes in food consumption, marketing, and transformation then create a vicious cycle of food systems to provide more commodities that are unhealthy to meet the requirements of the public.

Not all people have meaningful access to sufficient healthy and culturally appropriate food, and the benefits and burdens of the food system are inequitably distributed in today's food systems. Poor people, especially those who live in urban areas, have limited access to and/or can not afford a healthy diet. It was reported that 6.1% of households in Belgium declared that they could not afford to buy every other day meal including meat, chicken, fish, or a vegetarian equivalent in 2016. Moreover, marginalized and vulnerable groups, like women, children, and old people are always neglected.

A growing population means increasing demand for food and corresponding pressure on food systems. If we keep the way we produce and consume food today, the impact associated with food production with the food production system will surpass the planetary boundaries.

2. Future vision – imaginary and the problems will be tackled

Our vision is to tackle real-world issues related to food security, affordable healthy diets, and the environmental impact of food systems by creating a "food tower" in Ghent. It will be government-owned and accessible to all, as access to food is a basic right in the year 2123.

This tower will be constructed using sustainable materials such as cross-laminated timber, potato chipboard, and mushroom insulation, with vegetated facades to enhance its eco-friendliness.

This tower would grow vegetables and insects and supply raw material and their products, such as oil, and flour. The ground floor would house a "free grocery," while the upper floors would be dedicated to vegetable cultivation, insect breeding, and the production of derived products like flour and oil, utilizing advanced technologies to monitor and optimize production and breeding. The rooftop will be a community space: a communal kitchen. These spaces would help to foster a sense of community around sustainable food production and environmental stewardship while also promoting social equity and inclusivity. Machinery would also be used to manufacture and modify raw materials into derivatives such as oil, flour, bread, and cream.

The tower would operate in a circular manner, with waste from vegetables being used to feed the insects, and solar panels providing clean energy. A composting system would also be incorporated to create a closed-loop system and use the waste compost as fertilizer. Water for cultivation would be drawn from

the nearby river and treated upon input and release. The tower would function without the need for transportation, as all necessary resources would be available within the building.

To realize this imaginary, great progress in the technology of machines, solar panel systems, and construction materials should be achieved. Also, the development in agriculture practices and food processing technologies should be made.

3. proposed solution

To tackle the challenges of ensuring food security, promoting affordable and nutritious diets, and mitigating the environmental impact of food systems, a proposed solution is to establish a sustainable "food tower" in Ghent. This government-owned tower would be a powerful symbol of equal access to food as a fundamental right by 2123. By incorporating state-of-the-art technologies, eco-friendly materials, and circular economy principles, the food tower aims to address these pressing issues in a practical and innovative way.

Food towers can solve food insecurity by producing and processing food in controlled environments, independent of external conditions. Government ownership and global expansion can eliminate hunger by providing free food whereas vertical production eliminates space concerns. Sustainable materials, low pollution, and food waste valorization make food towers environmentally friendly. Transport is unnecessary which additionally reduces environmental impact and rainwater collection and river usage save water. Food towers also serve as community spaces, educating and engaging people. To make this happen, the government should acquire shares, upscale technology, conduct research, and promote insect-based food.

Frison, E., & Clément, C. (2020). The potential of diversified agroecological systems to deliver healthy outcomes: Making the link between agriculture, food systems & health. *Food Policy*, 96, 101851. <https://doi.org/10.1016/J.FOODPOL.2020.101851>

McMichael, A. J., Powles, J. W., Butler, C. D., & Uauy, R. (2007). Food, livestock production, energy, climate change, and health. *Lancet*, 370(9594), 1253–1263. [https://doi.org/10.1016/S0140-6736\(07\)61256-2](https://doi.org/10.1016/S0140-6736(07)61256-2)

Springmann, M., Clark, M., Mason-D'Croz, D., Wiebe, K., Leon Bodirsky, B., Lassaletta, L., De Vries, W., Vermeulen, S. J., Herrero, M., Carlson, K. M., Jonell, M., Troell, M., Declerck, F., Gordon, J., Zurayk, R., Scarborough, P., Rayner, M., Loken, B., Fanzo, J., ... Willett, W. (2018). *Options for keeping the food system within environmental limits*. <https://doi.org/10.1038/s41586-018-0594-0>