FOOD TRAILS

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Table of contents

1. Background and objectives

This Report is one of the products of the Food Trails project, a Horizon 2020-funded project that focuses on building pathways towards FOOD 2030-led urban policies. Specifically, it is the outcome of Task 1.2 of Work Package 1 (WP1), which aims to provide a map of existing urban good practices and innovations in the realm of food that contribute to the four pillars of the EU's FOOD 2030 Framework. The latter aims to support the development of food policies and strategies that promote carbon sequestration (Climate), enhance access to healthy and nutritious foods (Nutrition and healthy diets), facilitate changes in food preparation, storage training, the handling of fresh produce and waste management so as to promote resource-use efficiency (Circularity) and foster innovative market solutions while empowering all citizens (Innovation and empowerment). By using a food systems approach, the Report analyzes and identifies the contributions (actual and potential) of different kinds of innovative food practices to food system transformation.

In order to gauge the extent to which an innovative food practice contributes to systemic change, the Report uses a new conceptual framework (the CLIC) that emphasizes the ability of the practice to deliver on four key aspects of food system sustainability: interrelated economic, social and environmental objectives (**Co-benefits**); the (re-)establishment of reciprocal environmental, socio-cultural and economic linkages between urban, peri-urban and rural areas and between land and sea (**Linkages**); the active involvement and inclusion of all food system actors in the innovation process, also through a fairer distribution of its outcomes (**Inclusion**); and the establishment or strengthening of connectivities between the food system and other sectors and policy priorities (**Connectivity**). The CLIC needs to be seen as a normative framework that identifies a direction of travel (rather than a destination) for systemic innovation processes, offering a prism to facilitate, at the same time, their analysis, their implementation and their evaluation. The assumption behind this framework is that the overall goal of a sustainable food system transformation will only be achieved through the implementation of a mix of synergistic innovations that deliver, as far as possible, all four objectives (or system-level properties), which will be more fully described in the next Section.

In the context of the Food Trails project, the objectives of this Report are primarily to support the 11 partner cities with the establishment of the Living Labs and the co-designing of the pilot projects that are at the heart of the project and to do so in a systemic way. By analyzing data and experiences from a wealth of cities around the world (see Appendix 1), the Report has several aims: to inspire partner cities as to the types of pilot actions they wish to put in place under WP 3; provide suggestions on how to ensure their systemic framing; give advice on supporting actions that have been

successful in other cities, but also on actions to avoid; and give suggestions as to possible stakeholders to include in the Living Labs under WP 2[1].

The next section will give more details on the review process and on the CLIC framework that was used to analyze the data gathered, while Section 3 will illustrate the results of the analysis process by pillar of the CLIC framework. This will be followed by Section 4 that will make some reflections on the overall regulatory enabling/disabling environment that frames local-level action and, in the light of the analysis made, the last section will make some suggestions for local-level decision makers on how to best foster innovative food practices with a potential for food system transformation.

2. Methodology

The review process

The material used to collect the evidence illustrated in this Report ranges from articles published in peer-reviewed journals to "grey" literature produced by the UN, by international NGOs and related to ongoing and closed EU-funded projects on food. With regards to the scientific literature, the search (using Web of Science, Scopus and Google Scholar) began by seeking for articles published in the last six years that would fit with the four Food 2030 pillars -- i.e., healthy diets/nutrition, climate change, circularity and empowerment. Initially the word "innovation" was accompanied to each of these terms with a view to capturing a wide array of innovative food practices. Due to the paucity of articles retrieved using this word, other words were utilized, including "food", "interventions", "practices" accompanied by the term "urban", "city" or "municipal", and were later manually reviewed to identify those articles that indeed focused on innovative food practices. This system enabled the research team to retrieve a total of 62 articles and, after a manual process of review, 48 were finally reviewed and analyzed. The criteria for the review included the innovativeness of the practice, whether socio-technical or institutional, and its breadth, i.e. if it covered at least 2 of the pillars of the CLIC framework. It is important to note that the aim of the search was not to carry out a systematic review

[1] It is strongly suggested to read this Report in conjunction with Deliverable 1.1, as the results and analysis made in this Report are usefully complemented by the data collected under Task 1.1. Indeed, the projects analysed in Deliverable 1.1 have not been analyzed here so as to avoid overlaps.

of all types of urban food practices (such as urban agriculture, short supply chains, waste-related activities, etc) but, rather, to identify within each type those practices with innovative features.

The "grey" literature reviewed corresponds to key documents (project reports, case studies, handbooks, information briefs, etc) produced by the UN, by international and local NGOs/institutes, or concerning ongoing or closed EU-funded projects that focused on food and that had seen the involvement of members of the Food Trails consortium. The projects that were reviewed were chosen based on the length of their implementation, the innovativeness of the food practices described and the quality of the final (project) document.

The CLIC – a framework for analysis

As mentioned above, the review process used the CLIC framework to understand to what extent the innovative food practices were making an actual or potential contribution to food system transformation. With respect to **co-benefits**, implicit in this pillar is the acknowledgment that often activities that realize benefits in one sustainability dimension impact other parts of the food system (or other connected systems) in a positive or negative way, leading respectively to synergies (co-benefits) or trade-offs. To maximize the former and minimize the latter, innovative food practices need to embrace (and, as far as possible, integrate) different and potentially conflicting sustainability objectives. Innovations that aim to increase the production of food in one particular region, for example, will only deliver co-benefits if, in addition to creating new job opportunities for citizens, they will also enhance their social cohesion (through fair wages to food workers and a more equitable distribution of food) and preserve the integrity of the natural environment – through circular production processes and the adoption of environmentally-benign methods such as agroecology and organic practices.
Innovations with potential for systemic food transformation are not territorially exclusive or defensive. They do not, in other words, prioritize the needs and interests of a particular community at the detriment of the needs and interests of other communities. This brings to the fore the importance of creating or strengthening positive environmental, socio-cultural and economic **linkages** between urban, peri-urban and rural areas and between land and sea. Systemic innovations, by their very nature, break spatial fixes (i.e., the urban-rural divide); they create hybrid places where urban and rural actors exchange knowledge, resources, goods and services. In the food system, place-making strategies should be sustained by systemic innovations that create alternative food distribution channels (territorial markets, wholesale markets, farmers' and fish markets, box schemes and Community Supported Agriculture initiatives).
A key aspect of a systemic and transformative approach to food is a shift towards the **inclusion** of all food system actors in the innovation process, while ensuring also a fairer

distribution of its outcomes. Through their emphasis on co-benefits and the adoption of a territorial approach informed by reciprocity values, systemic innovations activate metabolic flows of resources that bypass the unequal power dynamics that continue to exclude disadvantaged groups from the benefits of participation in sustainable development. Examples of systemic inclusive food innovations that have established or strengthened relations between different groups of actors across the food system, often specifically targeting vulnerable social groups, include the provision of technical support and financial incentives to street food vendors to enhance access to local and fresh produce in disadvantaged areas, or the use of fresh fruit and vegetables from community gardens to make meals for food bank users healthier and more nutritious. As a system-level property, inclusion raises the need for a robust multi-actor approach to the co-design and implementation of innovations.

As a fourth desired property of a sustainably transformed food system, **connectivity** is about policy integration and the adoption of a coherent "place-based" approach around it. Food Policy Councils and multi-actor platforms such as Living Labs are embryonic examples of governance mechanisms that bring together different groups of stakeholders around a shared agenda that connects food system transformation with context-dependent concerns around climate change, resource scarcity, biodiversity conservation, sustainable transport, affordable housing and employment. The multi-scalar nature of these problems requires place-based solutions that actively involve different levels of governance. Systemic innovations, in other words, must create two types of connections: between food and other policy goals and, at the same time, between the different governance dynamics that continuously (re-)shape the food system.

In reviewing the selected articles, each innovative food practice was analyzed using the four pillars of the CLIC framework, and each pillar was critically analyzed with a view to identifying opportunities and barriers, (i.e., in identifying the benefits generated by an innovative practice, the researcher noted any factors that facilitated the process or created obstacles for the generation of multiple benefits). Conscious of the importance of the overall regulatory and institutional context in shaping local level policies, in addition to critically analyzing each pillar of the CLIC framework, the review also identified particular aspects of the **enabling or disabling environment** (at local, but also at regional and national level) that strongly influenced the effectiveness of the practice (e.g., the availability of regional funds and regulatory framework for the solidarity economy and anti-obesity campaigns).

3. Results of the CLIC analysis

3.1. An overview of the innovative urban food practices analyzed

The analysis of the peer-reviewed articles and grey literature mentioned above allowed to identify food practices located in 44 cities covering 19 countries (see Appendix 1 for a full list of cities). The urban food practices analyzed are varied, reflecting the variety and multitude of food practices that have burgeoned and been consolidated in urban areas and city-regions in the past decades (Ilieva, 2016; Sonnino et al., 2019). From a "food chain" (linear) perspective, the food practices analyzed may be placed along the whole continuum that goes from production to disposal. Some activities, such as urban gardens in Taipei, the community farms in Singapore, the aquaponics enterprises in Milwaukee and the food forest in Parma, focus prevalently on food production; the breweries and wineries in Dayton are concerned with the transformation of raw agricultural products; the food coops in Boston or the "healthy" convenience stores in New York "belong" to the retail end of the chain, while social dinners in Melbourne involve the final users of the chain. Finally, food waste disposal activities - such as food banks, social supermarkets (SSMs) and circular catering initiatives - have been implemented in a number of cities, including Rotterdam, Torino, Verona and various cities in Germany and the UK. Some activities described in the literature cut across two or more parts of the food system, such as the farm-to-school food procurement scheme in Brooklyn, green public procurement programmes in Turin and Barcelona, local food hubs in Alabama and Brisbane, and the Farmers Markets and Municipal Markets in Bologna and Barcelona.

By its very nature, food systems include a variety and diversity of actors, some of whom may have a greater influence on specific aspects of the system and at different times (Tansey & Worsley, 2014). The practices analyzed in the Report differ with respect to the actors that have spurred the action. While, as we shall see below, almost all of the practices have delivered multiple co-benefits, those practices that were prompted by a desire to empower vulnerable communities have been in many cases the result of civil society action from the grassroots, with a few coming as a result of small private sector efforts to set up profitable food businesses (aided by initial public seed-corn funding). Health-related practices have mainly been initiated by local public authorities keen to tackle a public health issue such as obesity, while actions on circularity were often motivated by an initial push by national governments to increase resource management efficiency that then "trickled down" to local authorities and local private sector. Notwithstanding the initial springboard, all initiatives have created links with civil society,

private sector or local government actors, resulting at times in actions/products that go far beyond the capacities of the single stakeholder.

In terms of funding, grassroot activities tend to be not-for-profit, and in some cases rely heavily on public funds, charities and volunteers, with some making efforts to become economically sustainable, such as the community farm in Boston that uses half of its greenhouse to pay its operating costs for the half dedicated to community uses. Some are born as for-profit small private sector enterprises/start-ups, such as some of the SSMs and the circular catering start-ups that focus on reducing waste, while others are set up by local government with the aim of becoming viable businesses, such as the Green carts in NYC. Public food procurement deserves a special mention as a way for the public sector to use its financial clout to make significant shifts in the sustainability of the food system.

3.2. The contribution of innovative urban food practices to the FOOD 2030 pillars and to systemic change

3.2.1. Co-benefits

While the **urban food practices** reviewed so far may have been spurred by a particular concern – be it health, social empowerment of vulnerable communities, or environmental concerns - **all have delivered more than one benefit in the context of aiming to contribute to sustainable food systems**. This sub-section will begin by describing the results reached by the practices by benefit. It will then critically examine the reason/s why some practices were not able to deliver on all benefits – albeit this being possible – by pointing out missed opportunities and trade-offs.

Social benefits

All of the practices that have social empowerment as a primary aim and some of the others too, have brought about strong social benefits. In terms of poverty reduction, almost all of these practices are either based in, or serve, low-income neighbourhoods/individuals. Some of the practices are specifically aimed at certain vulnerable groups, such as **migrants**, as in the case of Melbourne, Wales, Bologna and Torino (Sonnino and Hanmer, 2016; Alberio and Moralli, 2020; Fassio et al, 2019) where efforts have been made to foster intercultural interaction and integration through food. In Turin for example, the redistribution of unsold fresh fruits and vegetable from three large municipal markets of the city is carried out thanks to the help of asylum seekers workers (albeit as volunteers), while in London and Bristol the social enterprise Migrateful seeks to

empower refugees as paid leaders of cooking classes (see box). In Boston and Springfield, efforts are made to make food more easily available to **the elderly** either by delivering it in the form of locally produced meals, or by making it more directly accessible through mobile carts. In Torino, Verona, Vantaa and several cities in the UK, unused school meals, unsold fresh fruits and vegetables from the local markets and food close to the expiry date in retailers are distributed to **low-income groups** either through box delivery schemes, or SSMs – or Community Stores - that have been specifically opened to cater for vulnerable groups living in poverty (Falascioni et al, 2015; Bech Larsen et al, 2019; Tikka, 2019).

London and Bristol: fostering migrant integration through food

Migrateful is an award-winning social enterprise based in London and Bristol in the UK. It is empowering refugees, asylum seekers and migrants as the leaders of cookery classes, where they teach the preparation of foods from their home country. Since its beginning in 2017, it has supported 57 chefs and engaged over 18,000 participants. The cookery classes provide ideal conditions not just for building skills and confidence, but also for promoting

From a social inclusion perspective, in line with the literature on the benefits of urban agriculture (Ilieva, 2016; Milbourne, 2018), some of the activities aim at **fostering a sense of togetherness, community and conviviality**, as in the cases of the urban gardens in Taipei and Copenhagen, that specifically tackle problems linked to a growing sense of isolation, especially amongst certain groups such as the elderly (Hou, 2020; Rutt, 2020), or those living alone, as in the cases of social dinners in Melbourne (Edwards and Davies, 2018). On the topic of inclusion however, it is important to note that the use of ICT-based platforms has had mixed effects: while on the one hand it has allowed a greater mobilization of users/clients, as in the case of the RipeNearMe app in Melbourne (Edwards and Davies, 2018), on the other it can lead to the exclusion of certain categories of vulnerable groups that do not have access to ICT such as the elderly and asylum seekers.

Bringing people together through food also leads to an increase in knowledge and skills related to food, as in the case of the online platform in Singapore, the cooking classes in Wales, the educational and awareness raising activities in Milwaukee on the importance of aquaponics for a sustainable food system, and the didactic activities that rotate around the food forest in Parma, such as guided tours, conferences and regular visits by schools (Laidlaw and Magee, 2016; Riolo, 2019). An innovative approach was introduced in Bristol where an artist-led collaboration between the city, schools, NGOs and small businesses led to Soil Culture, a project aimed at raising awareness on the importance of the link between soil and food that uses cultural events around the city to do so (CCANW, 2015). Lastly, and more closely related to urban planning, the use of abandoned buildings in depressed neighbourhoods in Dayton and Milwaukee for food-related enterprises, has

contributed to the revitalization and liveliness of the neighbourhoods (Jones and Franck, 2019; Laidlaw and Magee, 2016).

Nutrition (and healthy diets) is one of the pillars of FOOD 2030, and in the context of this Section, may be classified as contributing to social sustainability. **Some of the food practices analyzed had healthy diets as an explicit objective of their effort:** mobile carts selling fresh fruits and vegetables (FFV) in food deserts, such as Go Fresh in Springfield or the Green Carts Program in NYC, introducing more "healthy" options in fast foods in London as part of the London Healthier Catering Commitment, or the "Healthy Bodegas" in certain neighbourhoods in NYC. In Quezon City in the Philippines, the mayor Belmonte adopted a strong intervention tool by issuing an Anti-Junk Food zoning ordinance in 2017 which bans selling and advertising junk food inside and within a 100-meter radius from any school premise (UNICEF, 2020a). A noteworthy example of a holistic approach to combating childhood obesity and overweight is the Amsterdam Healthy Weight Approach. The initiative was based in low-income neighbourhoods and adopted a strong participatory approach combining educational activities with children and families, the introduction of healthy school environments and physical activity. The result was a reduction of childhood obesity and overweight prevalence of 12% for all age groups between 2012 and 2015 compared to an unchanged national average (UNICEF, 2020b).

Shifting urban diets towards sustainable diets in Copenhagen

The 3-year project that started in 2019 aims to change the urban food environment in such a way as to make a healthy and sustainable diet an easy and affordable choice. Led by EAT, the project has operated in two neighbourhoods and has targeted adolecscents. Prototype interventions have been co-designed with the target group and have included food trucks offering healthy and sustainable food items at affordable (and subsidized) prices, placed in strategic locations close to

Another noteworthy initiative is the Shifting Urban Diets project in Copenhagen that explicitly focuses not only on healthy, but also sustainable diets (see box). **In other cases, the food practice contained some elements aimed at either increasing people's knowledge about healthy eating practices and nutrition**, as in the case of the online platform in Singapore and the urban gardens in Wales, **or in simply making FFV more available** in the context of populations who do not eat enough FFV, such as Farmers Markets in Bologna, City Fresh and Food Coop in Boston and the Farm to Early Care Program in Brooklyn. In Turin, efforts were made to link environmental and nutritional concerns by introducing a (partially) vegetarian menu in schools and by distributing unsold food from three municipal markets through the use of boxes of fruits and vegetables filled with a mix of foods to meet, both from a quantitative and nutritional point of view, the needs of a standard family for two days (Cerutti et al, 2017; Fassio and

Minotti, 2019). More than 200 people benefit from the weekly redistribution of these products.

In the context of COVID-19, a number of cities made efforts to ensure the continued availability of nutritious food such as fresh fruits and vegetables to all segments of the urban population, particularly to the most vulnerable. This was the case – among others - in Washington DC, Mezitli (Turkey) and Quezon City in the Philippines. By way of illustration we will focus on the latter, where two noteworthy initiatives were set up. One is the Community Mart app, a mobile platform developed to ensure access while families were forced to stay at home to nutrient-rich fresh produce from the city's wet markets located in the peri-urban areas of the city. Fresh Market on Wheels is the second programme initiated during COVID-19, driven by the City's Small Business Cooperative Development and Promotions Office (SBCDPO). It created itinerant markets to help address food access challenges specifically for the *barangays* (municipalities) that were left without access to the larger wet markets, while at the same time helping small farmers bring food into the city (UNICEF, 2020b).

Economic benefits

The practices have also been active, and in certain cases successful, at creating jobs or at providing entrepreneurial skills that could potentially lead to economic empowerment. The Green Carts programme in New York for example has provided jobs to about 200 migrant workers, mainly Bengali, who in addition to having obtained an affordable license to sell fresh fruits and vegetables in a mobile cart, have also received training on business development and marketing (Fuchs et, 2014). With the support of the municipality, a number of "green start-ups" have emerged both in Rotterdam and Amsterdam. In the latter, attention has been placed on the "last mile", whereby food is being delivered by bikes and/or electric cars to retailers in the urban areas (Covarrubias et al, 2019). A number of urban agriculture activities, such the urban farms in Newark and Singapore, the social food enterprises in Boston and Melbourne and the credit lines made available by the Revolving Fund created by the Food Bank in Alabama, have contributed to generate employment in low-income neighbourhoods and for particularly vulnerable groups such as minorities or ex-offenders. Given the not-for-profit status of some of these, such as the social enterprises, their economic, and thus overall, sustainability is unclear however. The aquaponics enterprise in Milwaukee for example, after a few years of activity, had to close down as it relied too heavily on public funds. While it is still too early to assess results, the Food Tech 3.0

Circular catering start-ups in Rotterdam

In Rotterdam, in the context of the Blue Lab, start-ups have focused on circularity: one enterprise uses spent coffee grounds to grow oyster mushrooms, which in turn are used to make a vegetarian substitute of a traditional Dutch bar snack by another entrepreneur, while another start-

Accelerator Lab set up in Barcelona under the auspices of the Food Shift project and aimed at developing urban and peri-urban agriculture for commercialization purposes, has taken up a particularly innovative approach by focusing on disseminating open-source technology that can make food production more efficient and profitable for all. The ROMI (Robotics for micro farms), for example, is an open-source robotic tool that can support organic small-scale farmers with labour-intensive work such as mechanical weeding, while the Smart Citizen kit includes an open source sensor that, among other variables, can measure soil humidity (FoodSHIFT2030, 2020).

In addition to creating jobs in urban areas, some of the activities have contributed to supporting local (often small) farmers find a (urban) market for their products, such as the Farmers Markets in Bologna, the box-delivery schemes in Pisa and Rome (Brunori et al, 2012; Fonte, 2013), the producer shops in the cities of the Ardeche region in France, the restaurants in Genoa that receive their local products directly from the producers, and the 30 child care centres in Brooklyn that receive food grown by local African-american and Latino farmers (Silver et al, 2017). From an economic point of view farmers stand to gain from these outlets because, having reduced the number of intermediaries between producers and consumers, farmers earn a larger share of the final price. In some cases, the price is negotiated between the farmer and the consumers so as to reach a "fair price" – such as in Bologna and in the AMAPs in France - thus allowing low-income consumers to benefit from these schemes too (Chiffoleau and Prevost, 2012). A noteworthy project, aimed at creating new jobs in peri-urban agriculture, is the OpenAgri project in Milan. This public-private project is located in the urban "fringe' of the city, where the Municipality has made 33 hectares of public agricultural land available for experimentation and "incubation" of small-scale and promising agri-businesses, such as an artisanal brewery, a sustainable freshly-cut flower small-scale enterprise and a regenerative agroforestry agribusiness (Sousa, 2020). Milan is also making an effort at revitalizing its 23 municipal open-air neighbourhood markets through its REFLOW project with a view to creating more food retail jobs, improving the sustainability of food logistics, and fostering circular economy practices amongst consumers (Boszhard et al, 2020).

Besides job creation, some activities have led to other types of economic benefits, such as the savings generated by the municipal markets for not having to pay the landfill fees for their unsold products in Turin, **or the economic gain of selling the compost and biogas** by Sao Paulo and Alappuzha through their urban organic waste management programmes (De Siqueira and Abreu, 2016; Dhanalakshmi et al, 2018), or again the economic gain from less food waste being generated, as in Gothenburg, where waste in public kitchens was reduced by 50% (Osttergren & Backlund, 2019). In Barcelona, a number of markets introduced some energy saving (and thus more economically efficient) appliances such as automatic lighting, LED lighting, solar photovoltaic panels, solar water heaters, common freezing chambers with low energy consumption and water saving taps (Covarrubias and Boas, 2020).

Environmental benefits

Several practices that were born out of a concern for the environment focused on delivering environmental benefits related to climate change reduction and circularity, and used different strategies to do so. **Reducing levels of food waste sent to the landfills, particularly those from schools and public markets, was a widespread tool used to reduce the city's carbon footprint**. Cases in point are the largest municipal market in Turin and schools in Verona, where partnerships were sought with food aid organizations, food banks and SSMs to collect and distribute the excess food. Other cities, like Sao Paulo, have invested in **making it easier for citizens to dispose of their food waste**, by placing small-scale composting facilities in a number of neighbourhoods: their small size makes them more accessible for the public to visit, and they are regularly visited by schools, authorities, and people interested in gardening and compost use (Ricci-Jurgensen, 2019). An innovative approach in the field of organic waste management was introduced by the city of Maribor in Slovenia through the Urban Soil 4 Food project. This is a circular soil-based economy project aimed at reducing the amount of biological and construction waste that ends up in landfills and diverting it into producing soil to be used (partly) to grow food in urban gardens and for the maintenance of the city's green areas. By September 2019 the project had established four urban gardens, and work is underway to create more (Patti, 2020). **On waste, it is important to note that greater environmental and economic benefits would accrue if waste were stemmed at the origin**, i.e. if measures were taken to reduce waste to the minimum before the consumption phase of the food cycle. In the case of Verona, for example, recommendations were provided by experts to revise menus and meal presentation in line with preferences and to subsequently develop less rigid food procurement specifications (Falascioni et al, 2015). An important initiative aimed at reducing levels of food waste due to institutional/legislative distortions is the Fruta Feia (Ugly Fruit) initiative in Lisbon (see box).

The Fruta Feia Initiative – Lisbon (Portugal)

The initiative began in 2015 in the context of the EU-funded FLAW4LIFE project and is aimed at changing consumption patterns by exploring alternative market opportunities for fruits and vegetables that are categorized as low grade (or "ugly") according to CODEX standards, but that are still edible. A cooperative organizes a weekly sale of boxes of "ugly" fresh products at very low prices (e.g. a small box containing 3 - 4kg of 7 different varieties of fruit and vegetables costs 3.6 euros). As of the beginning of 2021, the scheme counted with about 7000

Cities have used other strategies to reduce their carbon footprint, such as the **introduction of a (partially) vegetarian school menu, as was the case in** Turin, Barcelona and Turku (see box), in line with the FOOD 2030 and MUFPP pillars on sustainable and healthy diets (Aschemann-Witzel et al, 2017; Battle-Bayer et al, 2021). **A number of cities have invested**

in new environment-friendly technologies aimed at reducing the food supply chain carbon footprint and increasing circular resource efficiency: in Barcelona for example, solar panels were set up in the municipal market to run the market cold chain, while in Amsterdam an aquaponics greenhouse has been set up to serve as a lab where prospective aquaponic entrepreneurs learn how to use this method. The lab is integrated with the waste of the local houseboat community, cafe, biogasboat, and greenhouse (Metabolic Institute, 2018). In relation to organic waste management, Sao Paulo, Alappuzha and Malmo municipalities have invested in biogas plants and in technology for the production of biofertilizers (De Siqueira and Abreu, 2016; Dhanalakshmi et al, 2018; Bolger & Doyon, 2019). Other cities have invested in packaging, either by ensuring that food packages are recycled, or that more environment-friendly materials are used: Hanoi's effort at recycling milk cartons collected from schools is an example of the former, while Quezon City's ban on single use plastic bags in food outlets is an example of the latter (C-40 Cities, 2021). Lastly, a few cities have made efforts to **maintain or revive biodiversity** in and around the urban areas. In Durban, a landfill that surrounded the city, was partially reforested: 750 000 trees were planted saving about 55,000 tons of GHG. More importantly, all trees are indigenous and have reinvigorated about 200 hectares of surrounding natural habitat (C-40 Cities). In Germany, the Dortmund Environment Agency and the Association of Local Authorities for Biological Diversity have set up a cooperative agreement aimed at sending open source "Sunviva" tomato seeds to residents to grow at home. In addition to encouraging food self-reliance, the action aims to promote awareness on the benefits of having access to a variety of open pollinated seeds in contrast to the more widespread commercial patented hybrid seeds that specialize on a limited amount of varieties, and cannot be resown when harvested by farmers, due to biological and/or legal reasons (Dortmund Agency, 2021).

Introducing plant-based meals in schools in Turku, Finland

In the context of Turku's Carbon Neutrality Plan, the city set out to reduce GHG emissions produced by its public kitchens. The city used a GHG emission monitoring toolkit, map out all the major factors influencing the carbon footprint of Turku's school food services, such as heating the buildings, kitchen equipment, electricity consumption, transportation, the share of vegetarian food and food loss. Results show that 84% of carbon emissions comes from the composition of school meals

Other practices, while placing less explicit attention to environmental concerns, still contributed to this realm. Urban agriculture/gardens, for example, by their very nature, deliver ecosystem services to the extent that they provide greater space for green areas where there is a constant "push" for urban development. By the same token, activities that favour short food supply chains, such as locally-sourced food for schools and other institutions (as in the case of Boston, Brooklyn, Singapore or the municipal market in

Barcelona that has increased the amount of local food being sold in the market) reduce the carbon footprint created by the food system.

A number of practices focus on ensuring the use of sustainable agricultural practices both within and beyond the city -- such as the Farmers Markets of Bologna, the AFNs in Melbourne and Brisbane that source their products from organic farmers (Canal Vieira et al, 2020), the aquaponics enterprises where the fish-vegetables symbiosis reduces the use of synthetic chemicals and pollution (Laidlaw and Magee, 2016), the box delivery schemes in Pisa and Rome that source from organic farmers (Brunori et al, 2012; Fonte, 2013) and the food forest in Parma, which also encourages biodiversity (Riolo, 2019). Noteworthy efforts have been made in Brazil, specifically in Belo Horizonte and Curitiba. In the former, the urban programme "Straight from the Countryside" that provides support to local small/medium farmers, led to an increased uptake of more sustainable agricultural practices that used less pesticide and focused more on agrobiodiversity conservation. The city then provided the farmers with low-cost access to municipal markets located in high-traffic areas of the city (Chappell et al, 2016). **Other activities, however, did not foster an uptake/use of sustainable agricultural practices,** such as the community farms in Boston or Singapore, for example, which do not practice organic agriculture or similar methods, and neither do the farms from which urban markets/institutions source their food, as is the case of the vegetarian meals in Verona and Barcelona. **This is a missed opportunity to contribute holistically to the sustainability of the urban food system.** The same can be said for those practices that aim to foster healthy diets: in spite of their relative success in making FFV more available and, therefore, in contributing to healthy diets, only Go Fresh makes an explicit effort to link the mobile markets to local farmers, in addition to the examples of Copenhagen that explicitly focuses on sustainable diets, and the Minneapolis Staple Food Ordinance, which supports convenience stores to source their food from local growers.

Trade offs

Reaching the three co-benefits, so as to be truly sustainable, is a goal that only a few practices have been able to achieve. Examples include Farmers Markets and box-delivery schemes that focus on products grown in an agroecological (or similar) way, "green" public food procurement initiatives, producer shops and the distribution of organic food waste to low-income households (i.e., practices that reduce the distance between consumers and producers, where (local) farmers use agroecological methods and can sell their product at a convenient price, and where the final price to the consumers allows low-income households to have access to sustainably grown food). **The difficulty of reaching the three co-benefits at the same time lies in the trade-offs that exist between some of them.** A common trade-off is the one between environmental and poverty reduction/social goals, given the high cost of introducing environmentally-friendly techniques/technologies that translates into high final prices to consumers, as in the case

of the high cost of organic products which may benefit the environment and farmers, but not poor urban consumers. This tension also emerges in the climate smart/circular economy realm, which is increasingly dominated by concerns for resource management efficiency and technological innovation (and often business-led) – such as the circular catering initiatives in Rotterdam - and therefore less prone to ensure an inclusion of aspects related to social justice and the empowerment of vulnerable communities (Maye, 2019), as well as in the new food sharing initiatives that use ICT-based platforms, as the ones analyzed in Michelini et al (2018). The latter describes the case of some of the new IT platforms that allow restaurants, SSMs and other food outlets to sell their almost-expired products (i.e., products that they would have previously/otherwise given away for charity through food banks, for example) at a very low price. While on the one hand IT platforms help commercial stakeholders to reach a wider audience and to increase their efforts at reducing waste (environmental benefit), on the other hand they tend to exclude those clients who do not have access to those outlets (i.e. the poorest) and introduce a competitor to food banks and some SSMs (social benefit). Another common tension between the co-benefits is between ensuring a healthy diet and social inclusion -- i.e., making sure that even the poorest can afford a healthy diet by lowering the relative price of those products that increase the cost of an overall healthy basket, such as fresh fruit and vegetables (FAO et al., 2020).

The above trade-offs and tensions are often minimized through public interventions, as is the case of public (at times organic) food procurement in schools, hospitals and prisons (Morgan and Sonnino, 2008), the use of public funds for the creation of social food enterprises, as we have seen above, or for the "incubation" of food enterprises with a view to them becoming financially viable. This is the case of the Green Carts in NYC, where the Municipality set up a public-private fund (together with the private Illumination Fund) aimed at ensuring an initial investment that would help "incubate" the small businesses (mobile FFV carts run by migrants) with the objective of shifting consumer demand towards FFV to such an extent that the businesses would no longer need external support (Lucan, 2019). The challenge was only partially met, as is clear from the small number of licenses that were sold, although the data collected on the financial viability of the Carts is encouraging (Fuchs et al, 2014).

3.2.2. Linkages

Link between rural, peri-urban and urban areas

Some of the practices analyzed, such as urban gardens and plots, by their very nature tend to be physically confined to urban settings, notwithstanding some contact/alliance with farmers for training, as in the case of Taipei, where the local Government recruited the local farmers' association to train the novel urban gardeners on how best to use their gardens (Hou, 2020). In other cases, the contact with rural areas is forged at an immaterial

level, through education for example, or through building a narrative related to "rurality", as in the case of a community farm in Singapore, which explicitly aims to rekindle the Kampong's (indigenous farmers of the area) spirit and identity of its customers, in line with recent Government policies (Rut and Davies, 2018). Although in these activities the relationship with the rural areas is not tangible or direct, they may still have an impact on the meaning that urban consumers attribute to food, which may in turn lead to a shift in practices, should consumers find themselves in a position to be able to acquire food grown in a local and sustainable way (Brunori et al, 2012). A case study of migrants' food cultures in Sweden highlights the trend of people migrating from more agrarian societies with tighter linkages between the urban and rural (such as Afghanistan, Somalia and Bangladesh), to post-industrial cities in Europe, with weaker urban-rural ties (Terry, 2020). In this case study, as well as bringing with them different cultural values related to food, some migrants continued material practices such as growing kitchen gardens in their new contexts using traditional agroecological methods, and this allowed for the continuation of cultural linkages to their homeland. Others faced barriers, for example difficulty in acquiring an allotment space from the local municipality (Terry, 2020).

Other practices have created a direct and strong link between urban and rural areas. In several cities this has occurred thanks to the support of the municipality that has used part of its physical and financial capital to support local agriculture. This is the case, for example, of the Farmers Markets of Bologna, founded on a PGS that further strengthens the relationship between farmers and urban consumers, or of procurement schemes that rely on local sourcing, as in the example of City Fresh in Boston or municipal markets that reserve a greater share of their stalls to local (organic) producers such as Curitiba (De Carvalho et al, 2017). Barcelona too aims to offer more "proximity" food in its 39 municipal markets where urban consumers buy about half of the meat and fish they consume and about a quarter of their fresh produce (Covarrubias and Boas, 2020). **In other cases, the driving force behind the urban-rural link has come from consumers.** In Brisbane and Melbourne, the food hubs and buyers' groups showed their commitment to farmers' livelihoods by negotiating a fair price (as in Bologna too) and by adapting their business models to better engage with agroecological farmers, such as adopting a flexible demand for products, observing seasonality, and using local and diverse varieties of food. Ties are forged between producers and consumers through information and events: stories about the farmers are shared in weekly newsletters and farm tours are regularly organized and promoted (Canal Vieira et al, 2020). These are also common practices among users of box delivery schemes – be they entirely run by consumers, as in the case of Solidarity Purchase Groups in Pisa, or managed by a single intermediary as in the case of Rome (Mattioni and Caraher, 2018). An interesting case is that of the Community Supported Agriculture scheme in Boxtel where consumers own a farm that regularly provides them with agricultural products (see box). **Lastly, the private sector has at times played an important role in forging ties with local suppliers,** especially the HORECA sector. An example of this is seen in Rotterdam, where the SUPURBFOOD project identified those

restaurants, hotels and private catering services that use short supply chains and origin chains in their food provisioning or organize workshops between farmers and chefs for them to exchange products and recipes (Schans, 2013). As mentioned above, it is the urban-based practices that focused prevalently on healthy diets – such as the Green carts, the "Healthy Bodegas" and the vegetarian menus in school in Turin – that have often missed the opportunity of creating a link with the surrounding rural areas. Given the scale of their operations, the impact on the rural areas could have been considerable.

The "Herenboerderij" of Boxtel (The Netherlands)

Born in 2013, Herenboerderij is a small farming co-operative, owned by approximately 200 families ("Herenboeren") who live in the town of Boxtel. Each has paid a one-off entrance fee of 2,000 euros for the establishment of the mixed crop-livestock farm, and now shares in the annual operating cost (about 500 euros a year). This includes the farmer's salary, real estate costs, utilities and farm inputs. In return

It is important to note that urban areas can be supportive of (and bring resources to) rural areas not only by changing consumer demand towards products that are more sustainable, but also by creating closer ties with the "cultures, knowledges and collective capacities of the producers" (Pretty, 2002). Examples include territorial approaches that bring together actors from rural, peri-urban and urban areas in a given "foodshed" around a specific product (or groups of products) with an aim to valorize it in a less institutionalized manner with respect to geographical indication (GIs). An example is the geographical collective brand (voluntary label) called *Consorzio della Quarantina* in the area around the city of Genoa that brings together different stakeholders – small farmers, restaurant owners, grocers and consumers – who feel connected to one another as inhabitants of the same geographic area (Lamine et al., 2019). Other examples include activities tied to tourism (agri/eco-tourism and gastronomic routes or the recycling of nutrients, as in the case of the production of bio-fertilizers/compost from urban waste. With respect to the former, wine routes in the Mediterranean region, for example, represents one of the main products that attracts national and international tourism towards rural areas generating income, employment and enhancing the multifunctional role of rural areas (Chiodo et al, 2020; Dancausa Milla et al, 2021).

Link between land and sea

The desire to relocalize food has not only invested rural areas but also maritime zones. The last decades have witnessed efforts at relocalizing seafood markets as a way to counter the ecological externalities caused by the globalization of fishing fleets and seafood markets, which in turn have led to widespread overexploitation of sea resources (Berkes et al. 2006). **Consumers have played an important role here too by setting up Community Supported Fisheries (CSFs) initiatives**. In the USA and Canada, where the first reported CSF

was born in 2007, there were by 2014 at least 40 active CSFs, operating approximately 190 delivery locations in coastal communities (LocalCatch.org). The main aim of CSFs is that of guaranteeing a fair share of the profit margin gained by the fish catch to small-scale fishers. SoleShare, a CSF born in London, is a monthly membership-based scheme whereby consumers pay a monthly fee to small-scale fishers in exchange for a box of diverse, seasonally caught fish. The scheme encourages environmentally sustainable fishing methods, as the small-scale fishers who form part of the scheme use traditional low-impact fishing methods (Douthright, 2014). A similar example is that of Walking Fish, a fish box-delivery scheme based in Carteret County in North Carolina, USA. Here, subscribers buy a share for a 12-week season and, in doing so, agree to "take what they get" in their CSF box at each delivery. Fishers have used various strategies to improve the sustainability of their fishing methods, for example by giving the fish scraps generated from processing seafood for each week's delivery to fishers to use as bait in the blue crab pot fishery, or by hauling it to a local organic farm to use as fertilizer. They have also attempted to more fully utilize whole fish for food by exposing consumers to different parts of fish, e.g., fish heads, row, "gizzards," and even skins (Stoll et al, 2015).

The private sector, supported by local authorities, has also spearheaded a number of activities aimed at encouraging the local consumption of underutilized species or bycatch. An example is that of the Ax Foundation, a private enterprise active in Stockholm and the surrounding lake region of Malaren. In order to take off pressure from over-fished salmon stocks, Ax Foundation focuses on revitalizing underutilized fish species caught by using "gentle" methods. It has done so by developing a new fish meat product: Braxenfars, a fish burger made up of a variety of species that it sells mainly to restaurants and, together with the Stockholm County, to kitchen schools. **Lastly, the public sector has made some efforts to revitalize its fish sector for local consumption**. An example of this is the Spanish coastal city of Vigo that has launched a number of "Blue Growth" projects such as the Fish Market 4.0 project aimed at restoring the ecological health of its port and improving the energy infrastructure of its fish market. In order to stimulate the consumption of local fish in Vigo, the municipality has set up the Vigo Seafest that focuses on the gastronomy and culinary culture of seafood (Autoridad Portuaria de Vigo, 2021).

3.2.3. Inclusion of all food systems actors

As mentioned in Section 2, a key aspect of a systemic and transformative approach to food relates to a greater involvement and inclusion of all food system actors in the innovation process. This section will analyze firstly the extent to which the food practices reviewed have been successful in allowing for a greater interaction between food system actors thus expanding the circle of involvement in food-related activities at urban level,

and secondly their ability to include actors who do not usually have voice in decision-making processes related to food. Interactions between food system actors occur in different ways and have so been analyzed in this Report. A first level of classification of interactions has been carried out by subdividing these into horizontal relationships, i.e. relationships forged amongst grassroots organizations, small business and academic institutions, and vertical relationships, i.e. those built with local decision-makers and/or other administrative levels of power.

In terms of horizontal interactions, **in a number of cities grassroot organizations were able to forge strong links and wide networks of alliances.** The reason for setting up these alliances ranges from the need to share information, organize joint action, increase the impact of the organization's activities, to advocacy and political action. In the case of the latter, alliances can be broad and strong enough to advocate for changes at the level of urban legislation/regulations, as in Boston, where the Community Land Trust joined hands with City Growers (a commercial urban farm), the Urban Farming Institute (UFI), The Food Project (a non-profit that runs a community greenhouse and two farm sites), and other community and urban farming stakeholders to advocate for and obtain Article 89, an urban agricultural rezoning code (Loh and Agyeman, 2019). In Melbourne and Turin, interactions were sought both to improve the activities of the particular practice - as in the case of Open Table that collaborated with local restaurants to organize social dinners, or of the alliance forged with the Food Pride movement in Turin to collect unsold and expiring food among the markets and shops of Turin by bicycle – and to increase the organization's/network's political capital, by forging alliances with larger food movements such as the Food Sovereignty Alliance and Sustain (Edwards and Davies, 2018; Fassio and Minotti, 2019). In these cases, as in the case of the linkages created by the community gardens in Wales and between grassroots organizations in Taipei, alliances are forged spontaneously by the organizations themselves. A separate and stand-alone case is that of Restoration in Brooklyn, a community development corporation territorially based in certain areas of the city, and whose (partial) mandate is that of coordinating neighbourhood-level charitable activities – in this case it offered a platform for coordinated action related to local food procurement. In spite of the manifold successes of grassroot organizations in forging alliances, there are barriers that stand in the way of stabilizing the alliances in time, such as the high turnover of grassroots staff, or simply the competition of civil society groups for the same funds (Loh and Agyeman, 2019). Local government bureaucracy, in the form of stringent regulations or long formalization processes needed to access funds for example, have also been highlighted (Rutt, 2020).

It is interesting to note that other organizations such as the Food Banks in Alabama and the neighbourhood housing NGO AVCM in Barcelona were very effective in creating links with other non-food organizations and in obtaining changes in legislation related to housing or welfare for example, but no efforts were made to build interactions with other *food* organizations and to advocate for broad and long-term changes related to urban

food (Strickland and Whitman, 2020; Blanco and Leon, 2017). This too may be considered as a missed opportunity.

In terms of vertical interactions, links were forged with different municipal departments/actors in a number of ways. As hinted at above, in some cases the relationship was the result of a series of awareness raising, campaigning, advocacy and, in some cases, civil disobedience actions. This is the case of the Parma Picasso food forest: the action of Fruttorti, together with other grassroot partners, technicians and municipality officials, led to the drafting of the council regulation on "Active citizenship" in 2015 and the allocation of budget for the participatory creation of the food forest (Riolo, 2019). In other cases, the initiative to forge a link with the government, be it local or national, as in the cases of the Welsh cities, comes from the government itself, or at least there is a greater willingness to work together on food-related issues. This is the case of the breweries in Dayton and the aquaponics enterprises in Milwaukee: in the first case the local government not only supported the breweries in the bureaucratic process of getting the food enterprises off the ground, but also decided to set relevant standards to make it easier for other breweries to open, while in the second case the local government supported aquaponic-based enterprises by issuing a number of grants and "reinterpreting" food safety regulations (Laidlaw and Magee, 2016). There was, in both cases, a desire by local authorities to promote local and environmentally-oriented enterprises that redeemed abandoned warehouses and buildings. In Taipei, after an initial effort by the Farming Urbanism Network to place urban gardens on the Mayor's agenda, the local government launched the Garden City Initiative, thus taking ownership of the project, and created an effective coordination mechanism to jointly implement the initiative. Local government initiative is particularly strong in the case of those practices centred around encouraging health, such as the Healthy Bodegas and Green Carts in NYC spurred by the Health Department of the City, and in settings where the State plays a strong role, as in Singapore.

In a number of cases, local government played a proactive role in setting up multi-actor platforms that could stimulate ideas and actions around innovative food practices. Spurred by the Dutch Government's commitments to carbon neutrality targets, the municipalities of Rotterdam and Amsterdam set up multi-stakeholder Urban Labs focused on circular economy topics. In Amsterdam, the Municipality oversees the creation of an informal platform of exchange between the Municipality and the plethora of small private-sector food distributors bringing fossil-fuel-free solutions for the "the last mile" (through the use of food delivery with bicycles for example). In Rotterdam, the Municipality brings its resources into an existing Blue City Lab, a space for circular innovations developed initially as a network of circular entrepreneurs of Rotterdam, with a view to attracting more businesses in the catering sector and in the adjacent sectors. Indeed, to be part of the Blue City Lab, companies must meet the minimum circularity guidelines for eligibility, thus "forcing" them to rise to a higher standard and pressure their

second-order suppliers to do the same. Other actors of the Lab include academia, national infrastructure and electricity companies, and a Green Fund (Greer et al, 2020). Barcelona is another example of a multi-stakeholder platform set up by the Municipality around the theme of proximity that brings together the wholesale market, the municipal markets and the operators of a local agricultural park (Covarrubias and Boas, 2020).

While noteworthy for their efforts to bring together various stakeholders, these examples fall short of being fully inclusive both in terms of content and actors. As highlighted by Greer et al (2020) in the case of Rotterdam and in relation to other sectors, the focus of the multi-stakeholder platforms around punctual food-related themes is a missed opportunity as the Municipality could have used the platforms described above to "open up" discussions, exchanges and decisions concerning the food system as a whole, rather than focus only on circularity and proximity. The Labs could have also been used to include a wider array of stakeholders, particularly citizens, as was done in Malmo and Edmonton (Alberta). In the context of its plans to reduce urban waste and promote circularity through the production of biogas and biofertilizers, the city of Malmo set up a series of urban living labs with the innovative approach of bringing together urban planning, academia, business, and the community to test urban innovations (von Wirth et al, 2019), while the Alberta Flavour Learning Lab of the city region of Edmonton brought together actors from across the food chain with the aim of setting up a local food system (Beckie et al, 2019). In both cases the Municipality played a key role as facilitator of relationship among stakeholders. Other examples of inclusive food-related multistakeholder platforms include the Quezon City Food Security Task Force (see box below) and the neighbourhood-based community networks set up under the Amsterdam Healthy Weight Approach.

Quezon City Food Security Task Force – an example of inclusive food governance

Strongly backed by Mayor Belmonte, the FSTF was set up in May 2020 in response to the COVID-19 pandemic, but with the long-term view of "seeing the pandemic as an opportunity to reorient the food system to a 'new normal' based on the SDGs". The Task Force is comprised of representatives of a wide number of municipal departments and, importantly, of community leadership. It is this inclusive aspect that has allowed the City to act effectively at different scales. For example, urban agriculture has been implemented by the Task Force on multiple scales: household gardens (e.g. containers and vertical farming), community gardens, institutional gardens (e.g. schools) and

3.2.4. Connecting food with other complex systems/sectors

Overall there have been limited and piecemeal attempts at connecting food to other sectors/policy priorities in the framework of reaching urban sustainability goals. Food has been used as an entry point to tackle problems related to economic disempowerment, namely lack of social security/welfare support, poor housing conditions, education and health. The Food Banks in Alabama were very active in creating alliances with non-food grassroot organizations (such as the Legal Services of North Central Alabama and the NAACP Legal Defense & Education Fund) to prevent the eviction of low-income families from their homes, and, in terms of welfare, one of the Banks jointly created Alabama Arise, an advocacy organization involved in welfare legislation such as raising Alabama's taxable income threshold (Strickland and Whitman, 2020). In Boston, many members of the Community Land Trust network set up a campaign for just cause eviction, which provides protection for renters and challenges the power of landlords (Loh and Agyeman, 2019). In Wales the four projects reviewed have been defined as "non-institutionalized referral agencies" as they help tackle issues of unemployment, ethnic marginalization, gender discrimination and low social and educational capital (Sonnino and Hanmer, 2016). The link with housing has also been created through planning: the Greater Boston Community Land Trust Network for example, successfully pressured the City of Boston to include Community Land Trusts within its housing strategies, while in Taipei urban gardens are increasingly being integrated into planning for social housing, hospital complexes, park designs and neighbourhood spaces. The many initiatives described above concerning the role of food in schools, shows the strong ties created between food and education.

In terms of health, food practices that were designed with the specific aim of reducing levels of obesity, were closely tied to overall municipal or regional/state level health policies. In NYC, for example, the Department of Health and Mental Hygiene (DOHMH) of the city is the lead administrative agency of the program, while both in the case of the Farmers Markets introduced in low income areas of New York (Cohen and Ilieva, 2015) and the mobile FFV vendors in Springfield, there is a strong link with the Federal Supplemental Nutrition Assistance Program (SNAP) whereby those who hold SNAP vouchers can redeem them at these outlets. In other cases, such as Amsterdam and Barcelona, the city set up multi-stakeholder platforms that facilitated dialogue between the department of health and other departments. In Barcelona, the "Caixa" Living Lab is physically located in a hospital with the aim of facilitating the link between the health sector and other departments (FIT4FOOD, 2020). The above examples, and that of the Food Security Task Force in Quezon City, show **the importance of having a multi-stakeholder team at City level in charge of taking decisions in the urban food realm, as it increases the likelihood of ensuring sectoral coordination and integration**.

Given the natural capital on which the food system rests, there would be scope to use food as an entry point for tackling problems related to climate change and circularity. This link has been successfully made by some cities, especially in light of the commitments taken in the realm of climate change. San Francisco for example, set its organic waste targets in the context of its Climate Action Strategy (C40 Cities, 2021), and Turku engaged in shifting school meals towards vegetarian options with a long-term view of reducing its GHG emissions. The urban farm in NYC received a green infrastructure grant from NYC Department of Environment Protection designed to reduce storm water runoff into city sewers, while the city of Malmo firmly included organic food waste as a source of energy in its Comprehensive Plan on Energy and Heat (Corvellec, 2016). In some cases however, this link has not been created. This is the case of Amsterdam, where an experiment carried out in the water-energy nexus realm led to the successful recovery of nutrients and energy from wastewater flows to produce biogas and heat. Due to institutional lock-ins and a rigid regulatory framework, however, it was not possible to add an extra step that would have been crucial for the production phase of the food cycle -- i.e., extract materials for fertilizers and feed from the already separated streams of wastewater (Covarrubias et al, 2019). In other cases, food has been linked to circularity – as in the circular catering examples of Rotterdam – but the link has not been developed to its full potential, since the notion of circularity has been limited to the retail stage of the food cycle, thus reducing the impact of food on environmental sustainability.

4. Enabling/disabling environment

Cities that have taken action in the food arena, such as the ones described above, have been able to act within the limits of their remit. In other words, there are certain areas of action where cities have the power to decide relatively independently which actions to take, such as land use planning, or the use of public procurement instruments, but others where they rely more heavily on decisions taken at higher administrative levels (e.g. actions in the realm of trade).

In some cases, city actions can be facilitated (or obstructed) by regulations or funding policies designed at the regional or State level. In Italy, for example, the NGO that led the creation of the FMs, Campi Aperti, was able to sign a "Collaboration Pact" with the Municipality, achieving institutional recognition after years of risking being evicted, thanks to a regional law (n.19 of 2014) that supported solidarity economy activities (Alberio and Moralli, 2020). In 2009 the Federal Government approved the Healthy Food Financing Initiative (HFFI) as part of the US Government's efforts to combat childhood obesity which was used by various cities to introduce mobile FFV vendors and FMs in low-income neighbourhoods (Hsiao et al 2018; Cohen and Ilieva, 2015), while the State of New Jersey developed a series of tax incentives for the creation of urban indoor farms (Jones and Franck, 2019). In 2018, the UK Government updated its National Planning Policy Framework and explicitly mentions the potential of "planning policies and decisions to enable and support healthier lifestyles […] through [greater] access to healthier food", thereby paving the way for local level planners to use their powers to design exclusion zones, specifically for hot food takeaway outlets (Keeble et al, 2019). Similarly, in the context of climate change, the Dutch Government set up a Fund for Climate and Development and allocated grants for research into circular solutions. This "inspired" Amsterdam to set itself the target of reducing by 2040 its CO2 emissions by 75% (compared to 1990) and to do so by increasing its renewable energy production and consumption, recovering energy and nutrients from waste and wastewater flows, and further promote the use of bikes as medium of transport of goods, including food (Covarrubias et al, 2019).

The cases reviewed in the Sections above reveal that **some grassroot actors have seen their food practices facilitated by local level policies/actions.** In Brooklyn, the community development corporation Restoration was able to leverage a series of food policies designed by the Municipality of NYC, such as the Mayor's Regional Food Hub Task Force and Action Plan to expand the distribution of regional foods to the New York City marketplace (Silver et al, 2017), while in Taipei the Municipality developed a series of programmes that support urban gardening, such as "Open Green", which aimed at

activating vacant properties for community use. Some cities have created specific posts in the municipal offices with the objective of facilitating the creation of bottom-up projects by grassroots organizations/citizens. This is the case of the "community planner" in Taipei, supported by the District Environment Improvement Programme, and the Volunteer Coordinator within Copenhagen's Technical and Environment Administration (Hou, 2020; Rutt, 2020).

In some cases, local, regional and State level policies had a "disabling" effect on potentially transformative urban food actions. Examples here include the existence of "grey" areas in urban land access legislation that makes it difficult to fully develop urban agriculture or stringent food safety regulations that make food sharing initiatives more difficult to implement (Edwards and Davies, 2018). In Barcelona for example, (semi) commercial urban agriculture is hindered by aspects related to food safety and traceability (FoodShift 2030). The lack of coherence between the policies/guidelines being issued at different administrative levels can create obstacles, as in the case of Taipei, where, in spite of a municipal body of norms very much in favour of urban agriculture, national level policies on management of public lands remain averse to urban gardens (Hou, 2020), while in Australia, in the face of strict local level food safety measures in Melbourne, the State of Victoria intervened by coming up with more flexible rules (Edwards and Davies, 2018).

The implications of the above are manifold for city action. First of all, prior to designing any urban level practice, it is important for local level actors to "map" local, regional and State-level relevant policies so as to identify potential levers, obstacles and misalignments. In addition to helping design realistic practices, this mapping exercise could be the springboard for advocacy actions by the cities themselves (and other local level stakeholders) to create an enabling environment for local level action. In Ohio for example, pressure from local authorities led to a change in State brewery licensing laws that made it possible for small scale breweries to be economically viable at city level (Jones and Franck, 2019). Other examples of policy alignment touched upon above concern the adaptation of regulatory frameworks on hygiene and food safety to the needs and constraints of micro- enterprises and consumer co-operatives that are the most active at local level (Howlett and Rayner, 2007).

5. Fostering innovative food practices with a potential for food system transformation: a proposed model and recommendations for local-level decision makers

The urban food practices examined in this Report have contributed – in varying degrees and often in innovative ways – to all the FOOD 2030 pillars. Efforts have been made to reduce obesity by giving special attention to fostering healthy diets and, in some cases, sustainable diets. Climate-smart and environmentally sustainable food systems have been fostered through the uptake of sustainable agricultural practices, a reduction of food miles, the preservation/creation of green areas in cities, the revival of biodiversity and the encouragement of a reduced consumption of meat. In terms of circularity, much emphasis has been placed on the recycling of food waste and on attempts to stem the creation of waste in the first place. Lastly, some efforts have been made to create new jobs (although with some difficulty in ensuring the economic sustainability of the actions), and above all to empower communities, both by including those who do not have voice in the appropriate food governance mechanisms, or by including vulnerable citizens in the practices themselves.

The CLIC – an innovative framework for understanding and delivering food system transformation

This report proposes the adoption of a new conceptual framework or model to assess the extent to which policy initiatives are delivering food system transformation. The **CLIC framework** provides a critical and holistic approach to both understanding and delivering food system change. It does this by focusing on the connections between different dimensions of the food system and the linkages between food and other policy sectors. The CLIC stresses the importance of four key connections. The first concerns the relations between the social, economic and environmental aspects of the food system, and the extent to which policy interventions can deliver sustainability co-benefits. Second, the CLIC focuses on the significance of engendering spatial connections between the urban

and rural dimensions of the food system within policy interventions. Third, the framework stresses the importance of bringing together a diverse range of organizations, groups and individuals, as well as giving voice to marginalized populations, within decision-making processes concerning food. Last, the CLIC emphasizes the criticality of connecting food-based interventions with other policy initiatives, most notably those concerning health and welfare, through the development of an intersectional approach to food policy-making.

Many of the practices analyzed in this report have shown that city governments can play a key role in supporting the creation of co-benefits (by maximizing synergies and minimizing trade-offs), fostering linkages between urban, peri-urban and rural areas, as well as between land and sea, creating the right environment/building relevant spaces for interactions between food systems actors that ensure inclusion and for connecting food to other policy realms. Drawing on the review of the practices included in this report, we propose **10 recommendations** that should be utilized by the Food Trails partner cities in relation to policy-making, participatory policy processes, impact financing and capacity-building actions. Implementing these recommendations will increase the prospects that city government food actions will have a transformative effect on the urban food system as whole.

Recommendations

1. Food Trails partner cities should **utilize the CLIC framework to guide, support and evaluate their efforts to transition towards more sustainable urban food systems**. Doing this will help reduce the risk of avoidable trade-offs that prioritize one element of food system transformation over others.

2. In order to increase the effectiveness of actions aimed at enhancing social cohesion, cities should **focus practices on low-income/vulnerable communities** by: locating the practice in low-income neighborhoods and/or close to where vulnerable groups (such as the elderly or the disabled) live; actively involving migrants in the implementation of the practice; and explicitly targeting the vulnerable and disadvantaged groups and individuals.

3. Cities should foster activities, such as social dining and community gardening, that **tackle problems of social isolation**. It is important here to ensure wide dissemination of information on such communal activities - using social and more traditional media - to avoid excluding particular groups, such as older people.

4. When designing actions aimed at increasing the consumption of healthy foods, cities should ensure that these **foods are sustainably sourced** (i.e., locally-grown using agroecological methods) as much as possible.

5. In terms of ensuring the delivery of economic benefits, **cities should support the direct sale by farmers in urban areas** either by creating spaces/infrastructure for them to do so (such as Farmers' Markets and Food Hubs), by increasing their share of sale in municipal markets or through public procurement schemes. Cities should also **support the creation / further development of food enterprises that use sustainable technology / methods**, particularly in low-income areas.

6. In relation to developing environmental benefits, cities should encourage changes in menus to **support sustainable diets** (consisting of less red meat, more plant based produce and increased use of foods grown using agroecological methods) in institutions **where food is publicly procured** (schools, prisons, hospitals), **introduce environmentally-friendly technologies in local food-related infrastructure,** such as municipal markets, and **foster environmentally-friendly technologies / practices in public programmes designed to support food start-ups / social enterprises**.

7. City governments should use various tools to **create and / or strengthen spatial linkages between rural and peri-urban areas**. Municipalities should create physical spaces – such as Farmers Markets or Food Hubs - for farmers to sell their products directly to urban consumers, including consumers in low-income areas. They should also set aside spaces for grassroots initiatives – such as box delivery schemes - to facilitate the exchange of food. Municipal markets in some countries represent an important source of food for urban dwellers. **Upgrading municipal markets and guaranteeing a share of the stalls for local producers** is recommended as an important way to strengthen linkages with the rural areas.

8. The evidence found in this report supports the findings on the capacity of alternative food networks to generate innovative food practices (Goodman et al, 2012). It is recommended that **city governments enhance support for grassroots organizations and social entrepreneurs to innovate by easing some of the barriers they face** - simplifying bureaucracy, creating spaces for organizations to come together, earmarking funds in such as a way as to foster joint action, and adjusting regulations to fit the realities of such small-scale actors.

9. In terms of enhancing interactions between various food-based stakeholders, it is recommended that municipalities take the lead in **establishing inclusive multi-actor platforms** - such as Living Labs or Food Policy Councils - to promote the generation, testing, out-scaling and up-scaling of innovative food practices and, in doing so, consider

using professional facilitators or facilitation techniques that can encourage dialogue and co-learning between actors with potentially conflicting interests.

10. **City governments should work to improve the connectivity between food and other policy actors** by mapping the multiple positions of food within the public sector system and then implementing more effective cross-departmental forms of policy delivery. Planning regulations, zoning restrictions and public health regulations can be operationalized and / or amended to support food projects and remove barriers to transformative practices. Partner cities should work with local planners and other city government departments to develop a supportive legislative infrastructure that will allow food initiatives to realize their true potential.

Appendix 1: Cities covered by the review

City	*Country*	*Initiative/s analyzed*
Alabama (several cities)	USA	Innovative foodbanks
Alapphuza	India	Biogas from organic waste
Amsterdam	The Netherlands	Electric cars in last mile, the Healthy Weight Approach and aquaponics lab
Barcelona	Spain	Vegetarian meals in schools, local producers in whole sale market upgrading of wholesale market, "La Caixa" Living Lab, and Food Tech 3.0.
Belo Horizonte and Curitiba	Brazil	Short supply chains
Bologna	Italy	Farmers' Markets
Boston	USA	Social food enterprises
Boxtel	The Netherlands	Community Supported Agriculture
Bristol	UK	Migrateful - empowering refugees, and Soil Culture
Carteret County	USA	Community Supported Fisheries
Copenhagen	Denmark	Urban gardens
Dayton	USA	Food related enterprises in abandoned buildings
Dortmund	Germany	Fostering biodiversity
Durban	South Africa	Fostering biodiversity
Edmonton	Canada	Alberta Flavour Learning Lab
Genoa	Italy	Geographic indication (GI)
Hanoi	Viet Nam	Waste management
Lisbon	Portugal	"Ugly Fruits" initiative
London	UK	London Healthier Catering Commitment, Soleshare and Migrateful
Malmo	Sweden	Circularity and multi-stakeholder engagement

Maribor	Slovenia	Circular soil based economy
Melbourne	Australia	various food sharing initiatives and an aquaponics enterprise
Milan	Italy	OpenAgri and Reflow (Food Market 4.0)
Milwaukee	USA	Urban aquaponics
Minneapolis	USA	Staple Food Ordinance
New York City	USA	Farmers Markets, Green Carts, Healthy Bodegas, urban farms
Parma	Italy	Food forest
Pisa	Italy	Box delivery scheme
Quezon City	The Philippines	Food Security Task Force, "The Joy of Urban Farming", waste management
Rome	Italy	Box delivery scheme
Rotterdam	The Netherlands	Circular catering enterprises, and Local to local food retail connections
San Francisco	USA	Organic waste management
Sao Paulo	Brazil	Organic waste management
Singapore	Singapore	Community farm and online foodsharing
Springfield	USA	Mobile carts
Stockholm	Sweden	Encouraging consumption of underutilized fish
Taipei	Taiwan	Garden City initiative
Torino	Italy	POPP
Turku	Finland	School vegetarian meals
Vantaa	Finland	Organic waste management
Verona	Italy	School vegetarian meals
Vigo	Spain	Fish Market 4.0
Wales (several towns)	UK	Urban gardens

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