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Lever, John  and Sonnino, Roberta  (2022) Food system transformation for sustainable city-regions: exploring the potential of circular economies. *Regional Studies*, 56 (12). pp. 2019-2031. ISSN 0034-3404

**DOI:** <https://doi.org/10.1080/00343404.2021.2021168>

**Publisher:** Taylor and Francis

**Version:** Published Version

**Downloaded from:** <https://e-space.mmu.ac.uk/634584/>

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To cite this article: John Lever & Roberta Sonnino (2022): Food system transformation for sustainable city-regions: exploring the potential of circular economies, *Regional Studies*, DOI: [10.1080/00343404.2021.2021168](https://doi.org/10.1080/00343404.2021.2021168)

To link to this article: <https://doi.org/10.1080/00343404.2021.2021168>



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# Food system transformation for sustainable city-regions: exploring the potential of circular economies

John Lever<sup>a</sup>  and Roberta Sonnino<sup>b</sup> 

## ABSTRACT

Calls for food system transformation to strengthen synergies between socio-economic and environmental goals have been growing in recent years. As yet, however, insights from theoretical debates have not been tested against the actions and perceptions of food system actors. To add empirical weight to this debate, we focus on a region in the north of England where the Covid-19 crisis has challenged the embeddedness of linear thinking and siloed policy approaches. Based on an exploration of the potential of 'circular food economies', the analysis provides insights into the capacity of 'city-regions' to reorientate food system dynamics towards sustainability objectives.

## KEYWORDS

circular economy; city-region; Covid-19; food governance; food system; food system transformation

JEL Q18, Q20, Q28

HISTORY Received 28 September 2020; in revised form 1 December 2021

## INTRODUCTION


Since the mid-1980s, global food system dynamics have been increasingly recognized as major contributors to the degradation of ecosystems, the generation of greenhouse gas (GHG) emissions and public health concerns (Ellen MacArthur Foundation (EMF), 2019; Marsden & Sonnino, 2012; Lang, 2020). There is also increasing awareness that conventional linear models focused on food supply and value chains do not adequately represent the complexity of food system dynamics, nor do they help consumers to engage with their less and less visible social, economic and environmental consequences. Siloed policy approaches that are strictly interrelated with those models are also undermining, it is argued, our ability to address the underlying socio-economic and environmental problems that affect food systems (Oliver et al., 2018; Webb & Sonnino, 2021; Zhang et al., 2018). A growing number of academics are thus calling for a radical transformation of the food system (e.g., Den Boer et al., 2021), or, as Patterson et al. (2017) define it, a process of fundamental change in the structural, functional and relational aspects of the food system that leads to more just socio-ecological relationships, interactions and outcomes.

Within these debates, the notion of city-region food systems (CRFSs) has been deployed to expose the limitations of traditional linear models and highlight the byzantine nature of the conventional food system, whereby the aims and objectives of different actors, institutions and policies come into direct conflict. The original intention of the CRFS approach was to pursue food localization and strengthen rural–urban linkages to move towards more sustainable food systems (Blay-Palmer et al., 2018; Dubbeling et al., 2017; Jennings et al., 2015). The relevance of the concept, which is applicable to medium-sized cities and smaller towns (with connections to small-scale rural growers and food producers) as well as to megacities and urban areas (dependent on vast agricultural hinterlands) (Jennings et al., 2015), came into particular focus during the early weeks of the Covid-19 pandemic. As overlapping images of produce left to rot in fields (due to the lack of migrant labour) and of people queuing outside food banks in larger cities (the hardest hit during the Covid-19 crisis) emerged, debates about the importance of reconnecting cities with their surrounding food production areas and harmonizing the urban–rural policy context were reignited (see the special issue on 'Agriculture, Food and Covid-19' in *Agriculture and Human Values*, 2020). At

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the heart of these debates is the search for new development models that activate ‘metabolic flows of resources, knowledge, and skills’ (Firbank et al., 2019, p. 2) between cities and their surrounding rural hinterland.

In this paper we progress debates on new regional development models for food system transformation through a focus on the concept of ‘circular economy’ (CE), which has important synergies with the CRFS approach – particularly through its emphasis on the transformation of material overflows into circular flows of resources (Donald & Gray, 2019; Gregson et al., 2015; Hultman & Corvellec, 2012; Valenzuela & Böhm, 2017). Specifically, we ask: How and to what extent can CE provide the basis for new development models that enable food system transformations for sustainable city-regions? To address this question, we focus on efforts made by a region in the North of England, over time, to change its food system and its wider development trajectory. As well as highlighting how a lack of policy integration and coordination across government hinders any sustainable transformation (Velenturf & Purnell, 2021), our analysis shows that there is great scope bringing the concepts of CE and city-region together. Indeed, the CE lens facilitates a vision of city-regions as composite wholes capable of bringing about systemic social, economic and environmental transformations. Ultimately, this allows us to respond to Donald and Gray’s (2019) recent call for new regional development models that help us to understand, more coherently, movement and progress towards sustainability.

The paper proceeds as follows. In the next section we bring together insights from debates on CRFSs and CE on food system transformation. This is followed by a discussion about the research context and the data collection methods employed in our research. We then turn to our three phases of empirical data collection where we explore the emerging potential for sustainable city-regions and for a circular food system over time. In the conclusions we offer some reflections on the potential of a more balanced and less materialistic approach to CE in bringing about sustainable food system transformation.

## TOWARDS CITY-REGION CIRCULAR FOOD ECONOMIES

### Contextualizing the city-region

The *city-region* concept, which can be traced back through 20th-century social science, has provided an important prism through which to enhance understanding of the complex spatial relations that cut across urban areas. While early debates concentrated on the extent to which rapidly growing cities impacted the natural environment and their rural hinterlands (Geddes, 1915; Mumford, 1925), by mid-century an ‘urban-centred’ approach, focused on economic and labour market concerns within expanding conurbations, had emerged (Davoudi, 2008). The discussion here largely concentrated on the extent to which city-regions could be defined geographically by

levels of economic, social and institutional linkages, both nationally and globally (Watson, 2021).

Since the 1990s there has been a resurgence of the term in academic and policy circles. The *city-region* has since emerged as a ‘territorially integrated node of a socio-spatial architecture to reconfigure rural–urban linkages’ (Sonnino & Coulson, 2021, p. 13) – and, by implication, as a way of exploring convoluted governance dynamics and systematic problems within the food system. Efforts in this respect have revolved around the concept of the CRFS (Blay-Palmer et al., 2018; Dubbeling et al., 2017; Jennings et al., 2015), which rests upon the fundamental idea that increasing support for food localization around an urban centre and its rural hinterlands is critical to transitioning towards sustainability. In addition to highlighting the need for a more integrated food system, the importance of ‘strong and well-resourced local governance’ to encourage movement in this direction has also been emphasized (Battersby & Watson, 2019, p. 516). Seen as a means of relationally exploring the geographical divisions and dominant food sustainability discourses (Sonnino & Coulson, 2021) that have rendered urban food insecurity invisible (Battersby, 2013), the city-region thus provides a unique prism to critically explore the competing demands of diverse food system actors and policies across the rural and urban domains.

The CRFS approach is not without its problems. Battersby and Watson (2019) have recently warned against the danger that behind attempts to align city-regions with spatially constrained definitions of food production lurks the ‘local trap’ (Born & Purcell, 2006), which bypasses consideration of the wider contextual differences that allow cities to be seen as ‘hubs, drivers and nodes’ of change (Battersby & Watson, 2019, p. 515). Their critique echoes Jennings et al.’s (2015) earlier argument about the limits of food localization, which, on its own, cannot foster movement towards CRFSs; in their view, integrating local food production into global value chains is equally critical to design city-regions that can realistically contribute to improving food security. All food system outcomes, we could argue, are dependent on the actors and agendas (empowered by social relations) in a given locality, as well as on the ways and extent to which local (and, by implication, city-regional) food systems are connected to the conventional food system. These debates are particularly pertinent to the development of circular food economies in city-regions, where, as will be shown, the interplay of regional innovation and state power (Agnew, 1994) dictates how the CE unfolds over time (van den Berghe et al., 2020).

### Contextualizing circular food economies

The notion of CE originated out of debates about the ‘limits to growth’ and the importance of systems thinking during the 1960s and 1970s (Meadows et al., 1972) when calls to align industrial and biological ecosystems became particularly influential (especially in the field of industrial ecology). In a key text, Frosch and Gallopoulos (1989) drew analogies with material and energy flows, arguing that material loops must be closed if we are to move

towards sustainable development through industrial symbiosis. This history is currently reflected in the thinking of the EMF (2021), which has been calling for a CE that is restorative and regenerative by design for over a decade (Velenturf & Purnell, 2021).

Although CEs are now recognized to be ‘plural, multiple, diverse’ (Pascucci, 2021, p. 318), in relation to food there are two main discursive positions. The first can be aligned with the principles and practices of industrial ecology. The focus here is on addressing the problems created by large multinationals and agribusinesses by closing key nutrients loops (i.e., water, nitrogen and phosphorus), cascading materials (i.e., those used in packaging) and recovering energy from biological materials (i.e., via anaerobic digestion). Circular food economies, so understood, are designed to reconfigure the ‘linear’ or ‘extractive’ industrial food system via technological fixes. This can involve designing vertical farming systems and novel food products, for example, and closing biological waste streams to enhance resource recovery and energy production in ways that reduce waste, emissions and pollution (Pascucci, 2021). A key element of this position, as the work of The Waste and Resources Action Programme (WRAP)<sup>1</sup> in the UK illustrates, has been the emergence of corporate retailer-led food-sharing and redistribution initiatives that attempt to create new resource flows (Jurgilevich et al., 2016; Morone et al., 2018) by redirecting ‘surplus food’ to people in need (Evans, 2011; Michelini et al., 2018). This is a contested policy area. The literature shows that although such initiatives have economic benefits (for corporate actors) and social benefits (for people in need) (Mourad, 2016), the focus on individuals and household waste often neglects how retailers and other supply chain actors shape the ways in which food is wasted (Bradshaw, 2020; Warshawsky, 2016), and how financial incentives dictate the wider biowaste agenda (Jenkinson, 2020; Ng et al., 2019).

The second discursive CE position revolves around a range of diverse agricultural and community issues (in particular, soil health, biodiversity and nutrient biocycles) embedded in social practices (Pascucci, 2021). This ecological worldview is often combined with a social justice perspective that defines ‘regenerative food systems’ in line with the agro-ecological principles and practices embodied in diverse food cultures around the world. Under this ‘place-based’ and ‘community-oriented’ approach (Marsden, 2013), the regenerative capacity of an ecosystem maintains and restores cycles of key nutrients by limiting (as far as possible) the use of external inputs. By maximizing diversity and reducing the quest for a standardized system of food production and consumption, circular food economies and provisioning systems become embedded within socio-ecological and political relations (Pascucci, 2021), thereby contributing to their balance (Marsden & Farioli, 2015). Although an emphasis on regenerative agriculture is present in large-scale initiatives discussed in the first position,<sup>2</sup> in general the focus here is aligned more closely with attempts to sustain yields and

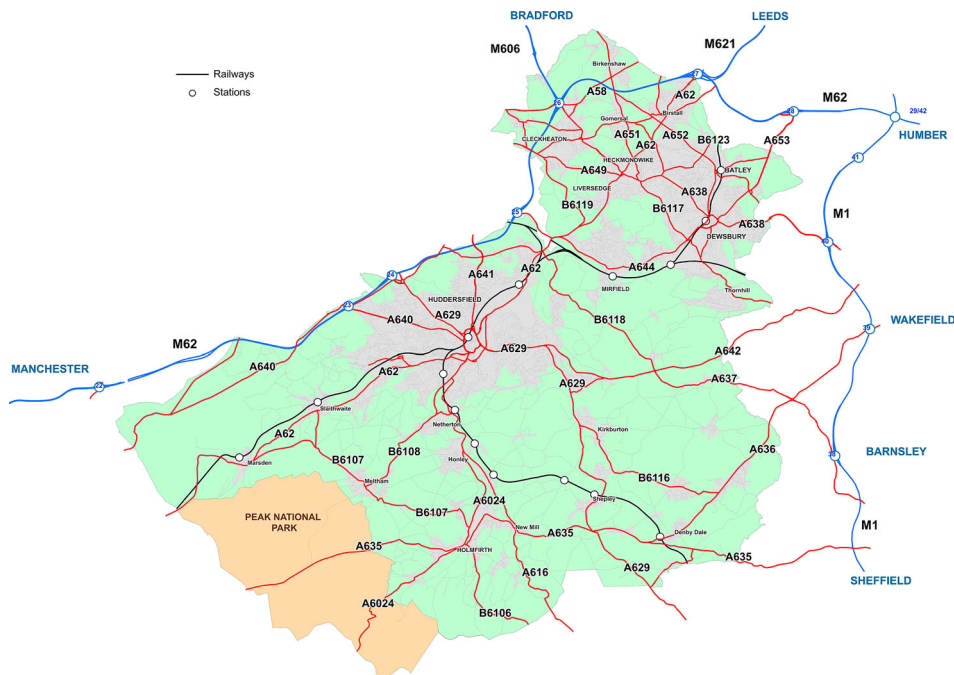
optimize resource use in regional economies (Pascucci, 2021).

Recent examples of movement in this direction are provided by the cities of Riga in Latvia and Milan in Italy, which embody the principles discussed above in different ways. In an effort to deal with the socioecological problems resulting from the increasing volume of food waste going to landfill, Riga has developed an ecological waste management site that has reduced landfill and produced biogas from organic food waste. The biogas is used to grow indoor cucumbers and tomatoes all year round, which are supplied to the public via supermarkets; the site is also used as a focal point to educate citizens about the problem of food waste (Sonnino, 2019). Milan has developed a similar approach working at the neighbourhood level (Fassio & Minotti, 2019). Farmers located around the city have been encouraged to supply products to urban residents and a food waste hub has been established as a focal point for the collection of waste from supermarkets, schools and other food businesses; to square the circle, biodiesel trucks transport organic waste to anaerobic digestion and composting facilities to produce biogas (for the local gas network) and compost for farms outside the city.

While these examples are promising, it is important not to abstract empirical realities uncritically and to consider them carefully in line with the distinct context and particularities under investigation (Gong & Hassink, 2020). If we agree that circularity can potentially operate successfully at the city-region level, it is also important to remember, as Van den Bergh et al. (2020, p. 1) caution, not to fall into the ‘territorial trap’ and to consider the extent to which regional dynamics are embedded into wider socioeconomic structures. Any successful CE, we could say, is likely to be ‘glocal’ (Swyngedouw, 2004) – that is, to achieve a sustainable balance between global, national and local policy priorities. Just as the local trap critique suggests that local and CRFSs are not inherently more sustainable than the conventional food system (Battersby & Watson, 2019; Born & Purcell, 2006), so the two discursive positions outlined above must be considered simultaneously if an overall picture of the potential success of CE is to emerge. An enhanced understanding of the diversity of needs and priorities at stake, we contend, provides a crucial starting point to develop city-regions that are capable of setting in motion and supporting ‘circular food economies’ (EMF, 2019; Fassio & Minotti, 2019; Pascucci, 2021) – a desired outcome of food system transformation.

## RESEARCH CONTEXT AND METHODS

The municipality of Kirklees (Figure 1) in West Yorkshire (North of England) was constructed in 1974 following a reorganization of local government.<sup>3</sup> With Huddersfield as its administrative centre, Kirklees has a well-established governance framework, encompassing 11 former local government districts over a mixed urban and rural area of 408.6 km<sup>2</sup>. With a diverse population of almost



**Figure 1.** Map of Kirklees.

Source: Adapted from Kirklees Council (2019). Copyright statement: Contains Ordnance Survey data © Crown copyright and database right 2021.

440,000, the region provides a useful case to explore the potential for a food system transformation towards sustainability, not least because competing national and regional food policies are intertwined within its economic system in convoluted and overlapping ways. Compared with the more prosperous southern parts of the region, which have a rural character and an established horticultural and agricultural sector, urban North Kirklees has high levels of food poverty, and the average life expectancy can be up to five years less (Kirklees Council, 2013, 2019).

In 2006, the UK government (Department for Environment, Food and Rural Affairs (DEFRA), 2006) suggested that social, economic and environmental benefits could be accrued by making better use of 'food surplus' and 'food waste'. While growth-based models focused on redistributing food surplus from supermarkets have since dominated national food policy discourses, there has also been a proliferation of what Donald (2008) would call 'self-organizing local food systems'. Kirklees is no exception and various measures have emerged to further the development of a more sustainable food system, including the Food 2020: From Farm to Fork Strategy (Kirklees Council, 2014a) and the Kirklees Food Charter (Kirklees Council, 2014b). However, while various food sectors (i.e., production, processing, distribution and provisioning) across the West Yorkshire region are key elements of regional economic growth strategies and national food policy priorities, little is known about how much food is grown or how much gets to market within the region (Jensen & Orfila, 2021).

In this paper we draw on three interlinked phases of research on the changing dynamics of the food system across the Kirklees region between 2014 and 2020. During the

initial phase of research, we explored in what ways a regional food partnership could help to build a sustainable food economy to position Kirklees within the Sustainable Food Cities Network (SFCN),<sup>4</sup> thus building on work initiated through the Food for Life (FFL) partnership.<sup>5</sup> Our subsequent phase of research looked at how attempts to move in this direction were hindered by national policies focused on addressing the food waste crisis via the CE, which, in a national policy context characterized by extensive funding cuts and financial austerity, placed Kirklees Council in a difficult situation. In the final phase of research, we explored the changing dynamics of the conventional and regional food systems during the Covid-19 pandemic.

Consideration of the role and positionality of researchers in place-based sustainability research is growing (Hornings et al., 2020). This was particularly significant in our first phase of research, when the research objectives were co-designed with Kirklees Council Public Health Directorate. This type of situation can fundamentally shape the ways in which research is conducted, and throughout this period reflexivity was required to remain aware of our own normative position in relation to the questions asked of research participants. The impact of this questioning is evident in the data, when an interviewee asks explicitly what the council is looking for. We feel that although this positionality presented challenges during data collection, it had no direct impact on research findings.

Across the entire period of research, approximately 70 semi-structured interviews (which largely focused on the tensions between regional priorities and initiatives and national food policy and governance) were conducted with a range of food system actors (purposely recruited via snowball sampling strategies) at the regional and national

levels (see Appendix A in the supplemental data online). In the early phases, semi-structured interviews were complemented by informal interviews conducted during visits to regional food businesses. During the Covid-19 pandemic, data were collected through interviews conducted via video-calling (e.g., Skype or Zoom), while informal discussions took place via mobile phone, text messaging (e.g., WhatsApp or Telegram) and email; online methods were also used to keep abreast of rapid developments in food delivery methods, for example. The process of data analysis initially involved multiple readings of all interview transcripts to identify rich passages of text. All interviews and observational data were then coded using Excel and (later) NVivo to identify key themes, which were used to develop the theoretical concepts that inform our analysis.

## THE DYNAMICS OF FOOD SYSTEM TRANSFORMATION IN KIRKLEES

Findings from the initial phase of research suggested that the dominance of economic priorities in national food policy often impede partnership working and constrain efforts to expand sustainable regional food production. Particularly relevant here were attempts, as laid out in the Local Plan (Kirklees Council, 2015), to establish links between the Joint Health and Well Being Strategy and the Kirklees Economic Strategy (KES). This was far from straightforward and plans to improve public health by making better use of land to grow food often came into conflict with economic development priorities focused on housing across the wider region, with KES containing no specific plans for food, the environment or the rural economy.

Competing priorities also emerged in regional food policy debates, which largely focused on the power of corporate retailers and supermarkets ‘as gatekeepers to (and by implication buyers for) the large majority of food consumers’ (Rayner et al., 2008, p. 155).

The tensions created by these asymmetrical power relations became evident in a village in south Kirklees, when a new Aldi supermarket opened after a long, drawn out and contentious planning application.<sup>6</sup> The prioritization of economic development plans over social and environmental concerns was highly controversial, not least because it hindered the ability of food system actors to build a more balanced food system along the lines of the CRFS model, which was considered vital to support the regional economy and, at the same time, produce social and environmental benefits:

So growing food is one outcome, the food value, but you’ve also got the people who are employed on the land, so you’ve got local economic development potential ... you’ve also got the social aspect of getting people with perhaps mental health issues onto the land, and then you’ve got things like managing land better. ... So you’ve got win, win, win.

(3)

While Kirklees Council was moving towards an overall vision of sustainability tied to economic growth models that aligned

with the linear food system priorities embedded in national and regional policy, Kirklees Council Catering Service (KCCS) – spurred on by work funded through the FfL partnership and the SFCN – was using ‘sustainability’ to catalyse new collaborative practices between a wide range of regional food system and institutional actors, including schools, care providers, regional farms and wholesalers. During the FfL commission, KCCS had twice won the silver award for school meals and approximately 100 schools had enrolled in FfL across the borough. In this period, two schools in urban North Kirklees achieved a gold award for stimulating the growth of (and enhancing awareness about) sustainable food provision from a range of local, organic and conventional sources, which was being increasingly linked to the second CE framing discussed above – notably, through plans for the development of community food hubs and other regional infrastructure.

Expanding these ways of working was far from straightforward, not least because siloed thinking was widespread and pervasive. Discussing the problem of understanding the regional food agenda vis-à-vis national policy demands to produce cheap food for supermarkets, a National Farmers Union (NFU) representative argued that there are too many ‘departments and they all have conflicting priorities’ (interviewee 16). A regional livestock farmer also expressed concerns about seemingly incongruous policy priorities: ‘So it depends ... are they wanting to improve the health in North Kirklees or are they wanting to build an economic resilience for the agricultural and horticultural small business sector [in rural South Kirklees]?’ (interviewee 7).

The pressures created by local authority funding cuts and financial austerity were an important factor here, since they compelled Kirklees Council to prioritize short-term economic objectives, as and when the need arose, over long term-term sustainability.

Things came to a head in 2016–17 when the FfL commission ended and the expertise and funding underpinning the emerging regional food system infrastructure quickly unravelled. This was also a significant moment in movement towards CE in UK policy. During the six-year period in which Kirklees Council had been experimenting with a more regional approach to food governance, the number of people using Trussell Trust food banks increased from 61,000 to 1.18 million (Loopstra, 2018) and pressures to find solutions to the waste crisis intensified considerably (Report of the Government Chief Scientific Adviser, 2016).

It was at this juncture that Kirklees Council was compelled to choose between competing priorities about the future direction of regional food governance, which would in turn influence their approach to CE. This was a difficult decision, as a policy officer stated:

I can understand a lot of things that national government are doing, and I can understand lots of other things that other authorities are doing differently to us. But it’s just a bit of a minefield ... [and] if you don’t focus enough in one area you could find yourself stuck in that minefield.

(interviewee 30)

The council made the strategic decision to align regional food policy with the principles embedded in the first understanding of the CE by developing a series of collaborations with international supermarket chains, which set out to deal with the problem of food waste through community education and cooking programmes based on the redistribution of ‘surplus’ flows of food from the conventional food system.

As these changes unfolded, our research began to explore the extent to which the redistribution of supermarket ‘food surplus’ could facilitate a transition towards a CE at the regional level. As mentioned above, this was a contested policy area. While several interviewees argued that even a sustainable food system will generate a degree of ‘food surplus’ to be redistributed to people in need, others argued that the UK food system actively ‘promotes an unsustainable level of food waste’ (interviewee 23). In many cases, it was emphasized, food waste results from the unsustainable practices of supermarkets and unachievable supply chain pressures underpinned by the constant drive for economic growth. Even so, a food policy officer from a national supermarket chain argued that retailers have gone into redistributing ‘surplus’ positively in the belief that it ‘is a better way of disposing of food that can be eaten than sending it to anaerobic digestion’ (interviewee 22).

At the same time, however, concerns were expressed about incentivising supermarkets to send surplus food to anaerobic digestion: ‘At the moment, there are tax incentives and tax breaks for companies to send waste food to anaerobic digestion and not to feed people ... which means companies are making a financial decision’ (interviewee 26). To complicate matters, there is no anaerobic digestion facility in Kirklees, which meant that when the local authority and regional food banks lacked the capacity to redistribute ‘food surplus’ from supermarkets. This went directly to an incinerator or land fill as ‘food waste’, thus increasing costs through increased carbon emissions.

Several interviewees argued that old ways of working dominate the waste agenda in Kirklees, and that overcautious interpretations of legislation hinder innovation, thus embedding (when combined with the wider constraints imposed by financial austerity) linear practices across the waste sector. Such ‘linear’ practices are quite widespread in England. Between 2012 and 2018, incineration rates doubled nationally, with sites being disproportionately located in low-income areas such as Huddersfield in North Kirklees (Roy, 2020). The pressures to work in these ways were intense, and throughout this period we observed a widespread acceptance of the value of incineration among policy officers. In a national policy context where waste management has been largely privatized at the local authority level, competitive markets have increased the value of incineration considerably, thus making sustainable circular innovations less attractive and less likely (Van den Berghe et al., 2020).

This was confirmed by a Kirklees policy officer when referring to the joint pressures of redistributing food alongside the costs of waste management: ‘That’s where waste management disposal costs come in. So, if Sainsbury’s is giving me something that’s gonna go off in a

day or two and I don’t have a van that I can distribute to certain residents, what is the point’ (interviewee 27).

National policies that displace political responsibility for food redistribution and waste management to regions such as Kirklees without delegating commensurable power and financial resources to address the food waste crisis clearly strengthen this impasse (Lever et al., 2019). This was alluded to by another policy officer: ‘Things are happening at a government level that local authorities don’t always get a say in. ... There’s always formal consultation processes, but actually, how considerate are they in their thinking?’ (interviewee 30). The council’s ‘negative operational’ capacity for food waste (Van den Burghe et al., 2020) is underpinned, as Jenkinson (2020) argues, by ongoing political lobbying, which will no doubt lead to the ongoing expansion of incineration capacity (Roy, 2020). A corollary of this situation was the unwavering support for the redistribution of ‘surplus food’ to people experiencing ‘food poverty’. While it was difficult to raise the issue of alternative food waste prevention measures with this group, those not directly involved were more willing to question the sustainability of national food policies. As an interviewee from SFCN stated:

I think ... the sort of sharing economy at a food level, I think it’s amazing ... I suppose the worry that we’ve got is the food policy/poverty agenda or industry is becoming normal and no one is really tackling the conditions.

(interviewee 28)

Despite the obvious benefits to people experiencing ‘food poverty’, these ways of working add another level of governance to the existing linear model, including more costs and carbon emissions. An environmental consultant confirmed this view, stating that: ‘it’s still a linear model, you know, it’s not a circular economy model’ (interviewee 21).

As the pressure to address the waste crisis continued to intensify, movement towards CE was reflected in a new Resources and Waste Strategy for England (DEFRA, 2018; Velenturf et al., 2018). Food waste was identified as a key government priority. Separate food waste collections for households were mandated at the local authority level by 2023 and the strategy committed the government to reducing per capita retail and consumer food waste by 50% in order to eliminate food waste from landfill by 2030.<sup>7</sup> However, the ensuing debate was arguably underpinned by discursive attempts to shift responsibility further away from the state and powerful corporate actors who stimulate the overproduction and overconsumption of food to stimulate economic growth. Although there were reports at this time signalling movement away from ‘consumer blame’ (Evans, 2011) towards ‘distributed responsibility’ for food waste among retailers (Welch et al., 2018), as Bradshaw (2020, p. 343) argues, the lack of government oversight and coordination for food waste facilitated ‘fragmented rather than distributed forms of responsibility’ underpinned by ‘a codified preference for profitable waste management’ (Bradshaw, 2020, p. 331). For some, food redistribution is only pursued by supermarkets in



the absence of financially profitable alternatives (Swaffield et al., 2018) that incentivise the removal of edible food from the supply chain to generate energy via incineration and anaerobic digestion (Jenkinson, 2020; Ng et al., 2019).

As these national policy processes were unfolding, several innovative CE initiatives were beginning to emerge across the region. A food wholesale cooperative, for instance, which had been directly involved in the FfL programme, developed approaches to food surplus (by providing free meals for staff) and food waste (by revamping a bio-digester) in ways that valorized local skills and knowledge. A consortium of commercial and public sector stakeholders was also exploring the possibility of renovating a Victorian mill to develop hydroponic growing, aquaculture production and bio-waste hub facilities connected to Huddersfield railway station (Figure 2). The business plan revolved around generating energy for growing via anaerobic digestion by collecting organic waste from retail, restaurant and household customers through reverse-optimized delivery and logistics; as in the Riga example discussed above, there would also be a facility to educate the public about food waste.

Those involved argued strongly that implementing a CE at the city-region level provides an opportunity to improve food system sustainability and strengthen the regional economy:

There is a real opportunity now to actually invest more in UK agriculture ... and a circular economy which is regionally driven at scale. So city region is my thinking. ... I think that's the right scale, where you're ... able to leverage and breakup and reconnect from a whole systems thinking approach, which ... will be more sustainable for people and a commercial return in economic terms.

(interviewee 21)

Despite the growing emphasis on the CE in national policy (Velenturf et al., 2018), it was extremely difficult to attract investment and support for a project that would arguably foster better connections between the regional and conventional food systems and waste policy. This situation was underpinned, it was argued, by a lack of understanding about what is needed to move in this direction by national policymakers: 'It's not just innovative solutions, it's innovative business models, and I don't think we talk about that enough in the UK' (interviewee 21). Innovative food production and circular waste strategies were clearly not national priorities, despite the potential they provide for regional economic development and jobs (Jensen & Orfila, 2021). We explore the issues involved in more detail below through an examination of how linear practices, which are locked into national food and waste policies on a number of levels, demonstrated all of their inadequacy during the Covid-19 pandemic in 2020.

## THE COVID-19 CRISIS AND THE POTENTIAL FOR A CITY-REGION CIRCULAR FOOD ECONOMY

The inertia of the national governance level and its inability to foster circularity at the city-region level

came into stark focus in the early weeks of the Covid-19 pandemic, when the regional food system began to draw on latent resources, skills and knowledge to feed the Kirklees population in innovative ways. During this period, our research focused on the pressure points in regional food supply and demand, the solutions that emerged in response to these challenges and the innovations required to strengthen the regional food system. In the early days of the pandemic, the UK food system was soon recognized to be 'stretched, open to disruption and far from resilient', as Lang (2020, p. 4) argued. Many disadvantaged socio-economic groups (including those working on the Covid-19 front line in low-paid jobs) were disproportionately affected by the unavailability of, and lack of access to, regular food supplies. Moreover, as consumers were 'panic buying' and a 'bullwhip effect'<sup>8</sup> in international supply chains emptied supermarket shelves, the just-in-time system of production and delivery revealed its fragility, with dominant food supply channels quickly faltering.

It was widely reported at this time that 3 million people in the UK households had to skip meals (Boons et al., 2020; Power et al., 2020). Moreover, with food donations and volunteer numbers falling because of social distancing measures, some food banks closed, while others had to reorganize their services. As a volunteer noted:

Families ... the schools closed, so ... they weren't getting free school meals. So, families started struggling, they came on to our books. Certain individuals because of job losses and so on, you know, income dropped. ... It was very quick.

(interviewee 49)

Food banks were also inundated with requests for help from a new group of people who could no longer source their usual supply of cheap food from supermarkets. An interviewee noted how this quickly became problematic, as 'people who were already on the bread line ... were having to spend more' (interviewee 43).

Various government initiatives quickly emerged to prop up the conventional food system and the national food surplus redistribution network at pre-lockdown levels (Boons et al., 2020). While this was needed and welcomed at the time, some interviewees working in food redistribution argued that this was not necessarily a good thing and that, going forward, it is likely that 'the number of people who are potentially reliant on food aid will increase rather than decrease' (interviewee 52). At the same time, those working in food redistribution networks were now much more willing, it appeared, to question the country's dependence on food banks as a means of addressing food poverty. As the manager of a large food bank stated:

The level of state welfare and support that has been exacerbated by Coronavirus has shown what we're capable of providing to people as a country and. ... It brings ... to the fore



**Figure 2.** Proposed location for the circular economy food and waste hub at Huddersfield railway station. Photo: Andy Hirst from AH! PR (<https://ah-pr.com>).

... more than ever, that question of why there are people who can't afford to eat week to week when we could put provision in place.

(interviewee 32)

Despite the intensity of the problems that emerged at this time, and notwithstanding the fact that many smaller food businesses struggled to survive, the regional food system quickly came into its own, adapting virtually overnight to a rapidly changing situation. At the start of the first national lockdown, when food services (cafes, restaurants and hotels) closed, a regional dairy farmer and food producer admitted that he was estimating potential bad debts of up to £1 million. As the crisis unfolded, however, it became apparent that since his business had retained the ability to sell to independent outlets (rather than becoming completely locked into supermarket supply chains), the situation was far better than he had anticipated. The farmer explained:

What has absolutely gone through the roof has been things like farm shops, local shops, home deliveries, recipe boxes, online selling. All that kind of stuff has absolutely gone bonkers. So we've actually been running absolutely flat out trying to keep up with the demand.

(interviewee 33)

Farm shops, in particular, thrived during 2020, forging new networks of urban–regional food system actors who were strongly depending on each other to address the needs of communities across the region. As one farm shop owner noted: 'You know ... we only sell us own grown reared produce, or things we do buy are from local businesses, and we

didn't really have a supply problem' (interviewee 40). As the regional food system continued to expand, an emergency system of regional food governance also crystallized around a broad range of stakeholders along the lines of the CRFS model. Supported by Kirklees Council, this involved independent retailers, food banks, mutual aid groups and other regional service providers coming together to coordinate public food donations and food deliveries to communities across the region. Some of the work done was realized by opening old food infrastructure (i.e., indoor markets) and developing new ways of working that the local authority had previously been unwilling to support and that, as a policy officer suggested, were a clear reminder 'that we shouldn't always be so reliant on big supermarkets' (interviewee 55).

Much like farm shops, independent retailers played a key role in these developments, it was argued, providing access to fresh fruit and vegetables and supporting food banks with donations:

A lot of independent high street food retailers have adapted a lot quicker and ... been able to get food to a lot of people. I'm not saying they'd be able to compete with supermarkets, but they've definitely adapted faster.

(interviewee 48)

Discussions about how to embed the changes that were emerging by linking farmers and growers with other regional stakeholders were at times heated. Kirklees Council bore the brunt of criticism, and there was a feeling that, in recent decades, it had done little more than support the setting up of a network of out-of-town supermarkets, which had left the region largely unprepared for the pandemic. As well as better planning and collaboration,

there was a perceived need to develop new market opportunities for farmers and growers. While innovations such as ‘click and collect’ and ‘direct sales’ were considered to be incredibly useful during the pandemic, and will continue to be so, it was argued that the council needs to develop new ways for regional food businesses to sell, such as, for example, ‘being allocated shelf space in a supermarket’ (interviewee 33). This echoes research findings that emphasize the need for a combination of local, regional and conventional food networks to support the consolidation of a more sustainable food system (Battersby & Watson, 2019; Jennings et al., 2015).

## TOWARDS CIRCULAR FOOD ECONOMIES?

As our research progressed, evidence began to emerge that some regional farms and other food businesses thrived during 2020 because they were underpinned by latent circular thinking and practices. For farm shops and independent retailers, this was often about keeping money in the regional economy, supporting each other, developing new skills and knowledge, and serving regional communities. For others, including farmers and food producers, it was about making the most of regional resources and the by-products of production, as an interviewee stated:

We’ve got fields which, you know, grow grass, and then the grass feeds the cows. The cows produce milk, the milk comes to the dairy. The dairy by-product is whey, the whey goes to a pig farm, our own pig farm and the pig manure goes on the land to produce grass which goes back to produce milk. So ... that circular approach has been followed by, you know, day dot with us.

(interviewee 33)

Similar ways of working were discussed by a manager of a national supermarket chain, who highlighted the innovations the company was introducing across the wider region:

So we make our own bread. ... The waste yeast that comes out of that production we send on to Saltaire Brewery, Saltaire Brewery then make a special brew for us out of that waste yeast that we have. That goes back into our stores, we sell it and ... our waste becomes their raw materials to be able to make a product.

(interviewee 34)

Both examples provide insights into how closing biological waste streams can enhance resource recovery and how this can in turn save energy and reduce GHG emissions and pollution. There were numerous other examples of working in this way from growers, bakers, coffee processors<sup>9</sup> and microbreweries, all of whom were using the by-products of production to develop innovative CE practices. For many other food businesses, however, things could much more challenging.

Biowaste is UK’s largest waste stream and 5 million tonnes of biowaste go to land fill annually. However, since it has a ‘negative value’, there are few markets for its products (Jenkinson, 2020). Much as there are for supermarkets, there are also incentives for farmers to send biowaste to anaerobic digestion for energy generation, which largely dictates how the market operates. This was confirmed by a farmer who pointed out that he knows other farmers who now ‘grow crops as feedstock’ (interviewee 33) because they can sell it to waste operators. There are, however, much more effective things to do with biowaste, as several interviewees recognized, including the production of composts and fertilizers (with a much higher environmental value) for regenerative agricultural practices (Duncan et al., 2021). Jenkinson (2020, n.p.) argues that with the quality of English soils declining rapidly, the continuing use of incentives to produce energy in this way constitutes the greatest ‘strategic failure to future-proof English farming’.

The knock-on effects of this void in circular policy and practice were evident in discussions with smaller regional food businesses, many of whom suggested that adopting circular methods was extremely difficult. As an artisan chutney maker pointed out:

Because we’re a registered food business we get an annual or bi-annual inspection by Trading Standards. One of the things that they always ask is what do we do with our food waste. And if the answer is anything except throw it in the bin, then that sort of thing is very much frowned upon, I’d say we’ve been warned.

(interviewee 46)

The owner of a fish farm that uses biowaste to grow micro-vegetables provided further insight into these debates. Discussing negotiations with inspectors from DEFRA over the use of a composter that enabled financial savings by producing a biofertilizer from ‘blood fish and bones’, the farmer suggested that: ‘They’d prefer they were collected by a third party and incinerated. But we managed to convince them that this was a valuable resource to us that would be hindering revenue if it wasn’t allowed’ (interviewee 69). Conversations with several other research participants confirmed the difficulties of developing bio-based resources with socioeconomic structures, and there was a widespread feeling that agriculture does not get the attention it deserves in national and regional development policy. We heard many times that funding for regional CE development programmes does not cover primary food production and that CE initiatives are focused more on the development of novel food products and technological fixes (Pascucci, 2021). The general implication of these observations, we contend, is that CE strategies in the UK food and agriculture sector are very much linked to economic growth, to the continued over-production and overconsumption of cheap food, and to the power and influence of the corporate food sector actors involved, as several scholars have argued (Bradshaw, 2020; Jenkinson, 2020; Rayner et al., 2008).

This was evident during the final period of research. Whereas some regional farmers and growers were sufficiently distanced from the conventional food system's demands to support the pivoting of the regional supply chains during the pandemic, others were in a far more challenging position. The demands to produce cheap food for supermarkets are intense and this creates many pressures and impediments to the development of a circular food system transformation. As a regional livestock producer confirmed, such pressures have many knock-on effects:

It's on a very, very fine line and it concerns me greatly ... food security in the long term. I mean, you know, farmers are always. ... I don't know, price wise, I would say they're always just kept just there, like a carrot ... they are walking a tight rope in terms of the national food policy.

(interviewee 68)

For others, the power of the state and other corporate food system actors was closely connected with the lack of regional food infrastructure needed to support movement towards a more sustainable CRFS:

Infrastructure is probably one of the biggest blockers ... because I think a lot of it has been under funded recently and a lot of it has just been centralised into big warehouses and big facilities, you know, in a smaller number of regions.

(interviewee 62)

The need for farmers' cooperatives, food hubs, community fridges and mobile abattoirs, for example, was repeatedly highlighted as a means of furthering a sustainable transformation in CRFSs, as was the potential to grow food in greenhouses. Others linked the need for new infrastructure to the potential for a more circular food economy:

If you ... could get food processing back into more regions ... you know, take a cooperative idea. If you could have fifteen farmers in a valley processing their own food, that creates jobs, it creates income, all those things.

(interviewee 61)

A coffee processor providing by-products for a neighbouring organic vegetable grower made a similar point, arguing that in this situation: 'That little local circular economy can start to work with the same thing that's happening in the next valley, or the next town, and you build it up that way from the bottom up' (interviewee 39). The volume and quality of food waste is likely to increase significantly when the requirement for separate household food waste collections come into force from 2023 (Jenkinson, 2020), while the Environmental Bill is also raising the possibility that more commercial waste will enter the market. Unless something changes, however, the lack of capacity and of investment in regional infrastructure suggest that the production of energy will continue to be prioritized over food initiatives with valuable social, economic and environmental outcomes.

Evidence has recently emerged that closing waste and resource loops to increase the availability of fertilizers through composting contributed to the functioning of CRFSs in some parts of the world during the Covid-19 crisis (Blay-Palmer et al., 2021). If similar solutions are to become embedded in socioeconomic structures in the UK, better policy integration and coordination across government will be crucial (Velenturf et al., 2018; Velenturf & Purnell, 2021). As an interviewee stated, this is imperative, as 'the current approach to urbanisation does not have circular economy in mind and sustainability is not in the equation' (interviewee 33). Moving towards city-region circular food economies will thus only be possible, we conclude, if UK waste policy focuses more on the concerns of those seeking to reimagine the food system, than on those whose interest's national food and waste policy currently reflect.

## CONCLUSIONS

There is clearly much to be learnt from the ways in which the Kirklees' regional food system innovated during the Covid-19 pandemic, and how the region emerged as a vibrant and flexible governance context with the capacity to self-organize. As we described above, while the global food system struggled to adapt at the start of the pandemic, in Kirklees a network of actors and stakeholders mobilized and pooled local skills and knowledge to establish new and, to some extent, more sustainable connections within an evolving city-regional system of food governance (Battersby & Watson, 2019; Jennings et al., 2015).

By making visible the processes underpinning urban food insecurity (Battersby, 2013), our relational CRFS analysis also demonstrates that food waste policy discourses continue to generate high societal, economic and environmental costs (Jenkinson, 2020). In this sense, our empirical focus on the city-region has been particularly useful, providing a unique means for understanding the extent to which the CE challenges the dominance of linear thinking in national food and waste policy discourses and potentially contributes towards a wider food system transformation. Implementing a CE transition within CRFSs, we contend, is about much more than decoupling economic growth from resource use through waste minimization strategies; it is about developing the skills and knowledge that can encourage and support the use of regional resources to develop more resilient and sustainable economies, therefore addressing, more coherently, the complex interplay of systemic social, economic and environmental problems.

In conclusion, our analysis uncovers the potential for developing policy interventions that bring together, support and embed innovations in circular food governance at the city-region level. It is also instructive in enhancing our understanding of the continued reproduction of the connections between food insecurity and socioecological crises that hinder food system transformations and the achievement of wider social, economic, and environmental development goals at the regional, national and global

levels. Transforming the functioning of the food system should itself be a key development goal. This raises the need for action-based, transformational research that uncovers context-specific barriers to change and identifies specific development objectives. Moving towards a view of city-regions as composite units of analysis and intervention for the design and implementation of more coherent regional development models (over and above food system transformation) should, we conclude, become a key priority for both researchers and policymakers.

## ACKNOWLEDGEMENTS

We are grateful to three anonymous reviewers for their helpful comments and constructive feedback on earlier drafts of this paper. We also thank all the research participants who contributed to our research over several years. The usual disclaimers apply.

## DISCLOSURE STATEMENT

No potential conflict of interest was reported by the authors.

## FUNDING

The research on which this paper draws was funded by Kirklees Council, Huddersfield Business School and the University of Huddersfield Research Fund over several years.

## NOTES

1. See <https://wrap.org.uk>.
2. Danone, for example, has initiated a project to improve soil health among a network of over 140,000 farmers (<https://www.danone.com>).
3. Known as a metropolitan borough, Kirklees emerged through The Local Government Act 1972.
4. The SFCN (<http://sustainablefoodcities.org>) (now Sustainable Food Places) aims to address a range of interconnected social, economic and environmental challenges (i.e., obesity and diet-related ill-health, food poverty and waste, climate change, biodiversity and social dislocation) through cross-sector partnership work.
5. FfL is a national school food programme that aims to make healthy, tasty and sustainable meals more widely available by reconnecting communities with food provenance and food production ([www.foodforlife.org.uk](http://www.foodforlife.org.uk)).
6. Aldi is a German-owned discount supermarket chain with more 10,000 stores in 20 countries.
7. In line with the UN Sustainable Development Goal (SDG) 12, and Sustainable Production and Consumption Target 12.3.
8. This occurs when demand distortion in the supply chain travels upstream from the retailer to wholesalers, producers and, in the case of food and agriculture, farmers and growers.

9. West Yorkshire is something of a hub for micro-coffee processors and suppliers.

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