

# OUT OF BOUNDS: MITIGATING THE CLIMATE CRISIS BEYOND THE CITY

SCOPING A ZERO-CARBON FUTURE  
FOR DEVELOPMENT, SERVICES, AND  
TRANSPORT IN RURAL ENGLAND

A REPORT FOR THE INSTITUTE OF  
ECONOMIC DEVELOPMENT

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## Out of Bounds: Mitigating the Climate Crisis Beyond the City

Scoping a zero-carbon future for development, services, and transport  
in rural England

Todd Olive

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### Notes

The views expressed herein are solely those of the author and do not constitute those of the University of Warwick, Institute of Economic Development, or other named organisations.

As part of the academic process, all efforts have been made to appropriately credit works by third parties.

Further details regarding study methodology are available from the author at [t.olive@warwick.ac.uk](mailto:t.olive@warwick.ac.uk), to whom any queries regarding the content of this report should also be directed.

Since completion of this study in August 2022, the author notes that two major papers relevant to its conclusions have been published: 'Mission Zero', an independent review of net zero chaired by the Rt Hon Chris Skidmore OBE, and 'A New Britain', a review of current governance and devolution arrangements in the UK in light of prevailing economic and democratic challenges produced for the Labour Party by a commission led by former Prime Minister Gordon Brown. For clarity, these reports occurred substantially after the cut-off point for literature reviewed by this study, and as such their conclusions have not been considered.

### About the Author

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## Executive Summary

Motivated by a material lack of policymaking attention for rural emissions abatement in response to the urgent imperative of tackling climate change, this study scopes pathways for the decarbonisation of rural England in the interconnected policy fields of spatial development, economic development, service provision, transport, and with an overarching perspective on systems of governance. The study examines the views of eight experts from academia, governance, and industry, seeking to account for uncertainty and a lack of empirical evidence by leveraging the expertise and experience of panel members. These findings are contextualised by academic, governance, and practitioner literatures.

This paper identifies a substantial challenge in responding to sparse development in rural England, with implications across all four major themes. Panel findings call for a substantial expansion in state funding, direction, and activism across all four areas, with more capacity for local governments to implement nationally coordinated, place-based policymaking, as well as a revolutionized approach to spatial and functional decentralization across England. New regional integration and cooperation on major relevant areas such as transport, housing, and economic planning – including appropriate powers, funding, and long-term governance capacity development – are also strongly advocated, though the government’s initial steps towards new forms of devolution under the ‘Levelling Up’ agenda are cautiously welcomed.

Items identified as having potential for further investigation are community and mobility hubs, combining integrated ‘hub-and-spoke’ transport systems with physical delivery of critical private and public services, together with the need to better understand complementarities between accessibility and decarbonisation agendas in transport and service provision. Finally, the panel highlighted the need for perceived flawed value choices in governance and policymaking to be re-examined – specifically regarding valuation of the environment, emissions, and communities, as well as “value for money” approaches to new policy developments. Beyond this, wider literature notes the need to be conscious of systems approaches to decarbonisation, in contrast to focusing on individuals’ footprints and decision-making, and raises the urgency imperative as a challenge for the scale of action and the processes of practitioners and policymakers.

The paper concludes by re-emphasising the need for local government and practitioners to step up and drive engagement, implementation, and innovation, as well as the need for all contributors to political and policymaking discourse to better foreground and account for rural realities.

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## 1 Introduction

### Knowledge gaps in rural decarbonisation

Tackling climate change is recognised as an urgent imperative of contemporary policymaking; the UN Secretary-General talks of “averting catastrophe” (1), while the Secretary-General of the Organisation for Economic Cooperation and Development characterises the crisis as “our single most important intergenerational responsibility” (2). The Intergovernmental Panel on Climate Change (IPCC), systematically reviewing global scientific evidence, reports that global heating represents a serious threat to terrestrial and marine ecosystems, human infrastructure, jobs and the global economy, and the fundamentals of human life – food, water, and health (3 [para. SPM.B.1.1-6]); modelling indicates that carbon emissions must begin to decline within three years, falling rapidly to 2050, for a better than 50% chance of limiting global average heating to 1.5°C (4 [para. SPM.C.1]).

In response, urban areas have benefitted from a broad range of technical assessments and best practice studies examining how best to achieve zero-carbon cities (4 [chap. 8], 5-7). Studies have detailed the drivers of urban emissions (e.g. 8), urban politics of responses (e.g. 9, 10), the impacts of differing urban forms on emissions and related objectives (e.g. 11, 12), decarbonisation scenarios (e.g. 13), and even the specific implications of trends such as on-demand meal delivery (14).

By contrast, rural decarbonisation has not been well-explored: no holistic visions appear to have been constructed, globally or for England or the UK. Indeed, the British government’s ‘Net Zero Strategy’, the government’s planned high-level trajectories for countrywide decarbonisation, mentions “rural” substantively only 18 times, mostly within a sub-chapter on land use and agriculture, compared to 55 references to urban areas (15). The last UK government rural strategy was released more than two decades ago (16 [p. 1]) – without a single mention of climate change in the entire introduction (ibid, chap. 1). As this paper will discuss, this appears part of a trend of UK government policymaking neglecting the rural realm, including a failure to appropriately ‘proof’ policymaking against rural issues (17-19) and to ensure consistent delivery for rural needs (18).

Along broader lines, the government's flagship long-term policy agenda, 'Levelling Up', mentions climate change in its aspirations only once (20 [p. 140]), and not at all in its outline of challenges or 'missions'; the best that the National Planning Policy Framework (NPPF) - the closest to a current government 'vision' for rural areas in England and Wales - can offer is that development should "avoid increased vulnerability to the range of impacts arising from climate change" and "can help to reduce greenhouse gas emissions, such as through its location, orientation and design" (21 [para. 154]).

The motivation for this review for the Institute of Economic Development sits at the overlap of these two areas of policy neglect: scoping pathways to net zero carbon emissions for rural areas in the UK<sup>1</sup>. Existing work has found that establishing visions for decarbonisation is a critical enabling factor for progress in emissions reduction (22, 23) - suggesting the importance of work in this field. However, given the potential breadth of this policy area, the existence of major assessments for some relevant sectors (e.g. 24-27), and the greater contribution to knowledge by works assessing a relatively uncertain field, this review scopes a subset of related sectoral decarbonisation pathways: those of spatial and economic development, service provision, and transport.

Interplay between these policy themes is principally through carbon emissions embedded in spatial relationships (28). The NPPF recognises that the location of new development relative to other development and service provision (e.g. shops, banks, post offices) affects carbon emissions generated by people's day-to-day movements (21 [paras 14 & 154]); similarly, our employment has complex implications for whether, and how far, we need to travel, and the emissions we generate as a result (29, 30). The methods by which we travel - whether active travel, electrified private vehicles, or hydrogen buses - also have implications for the emissions these spatial relationships generate (15 [chap. 3v], 31 [pt. 5]). In 2017, emissions from surface transport made up 23% of total greenhouse gas emissions<sup>2</sup>, of which private cars made up more than three-fifths (32 [p. 134]) - making this specific policy challenge important for nationwide decarbonisation. Given the nexus between these

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<sup>1</sup> For clarity, owing to a lack of necessity, this paper does not adopt a strict definition of rural - questions of ambiguity and overlap with urban areas have not required resolution for the methodology employed

<sup>2</sup> This includes transport emissions attributed to urban as well as rural areas.

four key themes, this paper subsequently refers collectively to them as questions of *spatial decarbonisation*.

After identifying this focus, investigation uncovered an overarching set of challenges whose resolution appears a necessary precedent to a decarbonised rural future: the structure and processes of governance - the fifth theme examined by this paper<sup>3</sup>. Additionally, to address the issue of differing governance regimes for spatial planning, some public service provision, and public transport across the devolved administrations within the UK, this paper will consider issues specifically for England - though it is noted that many of the issues it uncovers are nevertheless likely to be relevant to Scotland, Wales, and Northern Ireland.

Given these qualifying notes, this paper therefore reports the results of an inquiry against three core research questions:

1. What are the principal challenges for spatial decarbonisation in rural England that a rural decarbonisation pathway must address?
2. What might constitute desirable outcomes for the constituent themes of spatial decarbonisation in such a pathway?
3. What questions and challenges would need to be considered to enable and pursue these outcomes?

Uncovering findings to these questions requires navigation of substantial uncertainty regarding contrasting likely and desirable futures. As such, this investigation employs an adapted version of the Delphi method of qualitative study, which seeks to establish consensus on uncertain ground among an 'expert' panel, while incorporating existing knowledge embedded in published literature for additional detail. So as not to detract from the main narrative of this paper while retaining the transparency and accountability critical to good research, details regarding study methodology are available from the author,

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<sup>3</sup> For clarity, while this paper again does not adopt a strict definition of governance, it is broadly thought of as encompassing formal government - central and devolved - as well as government-adjacent regulators, operators, and such, that are directly subject to government decision-making and oversight.

examining panel selection decision-making, evaluations of criteria for consensus, and the incorporation of existing knowledge<sup>4</sup>.

Having foregrounded the contexts and primary mechanisms for this investigation, the next section of this paper integrates presentation of the results of novel fieldwork with an examination of existing literatures<sup>5</sup>. Building on this presentation, section three discusses areas of agreement and uncertainty that cut across the five core themes, while the implications of this review's findings for the practices of industry professionals and policymakers are discussed in the concluding fourth section.

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<sup>4</sup> To summarise, interviews with expert panel members were screened for areas of agreement and disagreement according to various quantitative criteria, the results of which are presented in Section 2, with references to an extensive search of academic, practitioner, and governance literatures comprising an extensive supporting literature review.

<sup>5</sup> As this paper is intended for a practitioner and policymaker audience, while integrating literature review with analysis and results is not an entirely conventional approach for an academic investigation, this approach has been selected to present a joined-up analysis for ease of interpretation *by issue*.

## 2 Results

### Expert positions and literature context

This section reports the conclusions of the expert panel, together with relevant points from existing literature. Section 2.1 provides a high-level summary of the data, commenting on initial general observations, before 2.2 onwards present detailed findings by theme<sup>6</sup>. Findings by theme are grouped by Issues & Forecasts and Goals & Options; statements not strictly relevant to the core interests of this study are retained for completeness, but are not included in commentary. Where panel conclusions are representative of points made in extant literatures, references are made to that literature without further comment; key cases where major points from literature are not covered in qualifying statements are examined in section three.

#### 2.1: Overview of Data

##### Panel & Interview Characteristics

Out of c. 60 invitations issued, a panel of eight was seated: one qualified on academic grounds, two as elected representatives, two as government officials, one practitioner, and two as members of special interest organisations. A semi-structured interview was carried out with each participant, transcribed, and the resulting transcript coded according to the five study themes.

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<sup>6</sup> These subsections report detailed findings of this study according to theme. Statements derived from interviews are presented in their full form, together with the number of interviewees agreeing (+) or disagreeing (-) with each; for simplicity, the quantitative ground on which the statement was qualified for inclusion has been omitted, fuller details of which are available from the author.

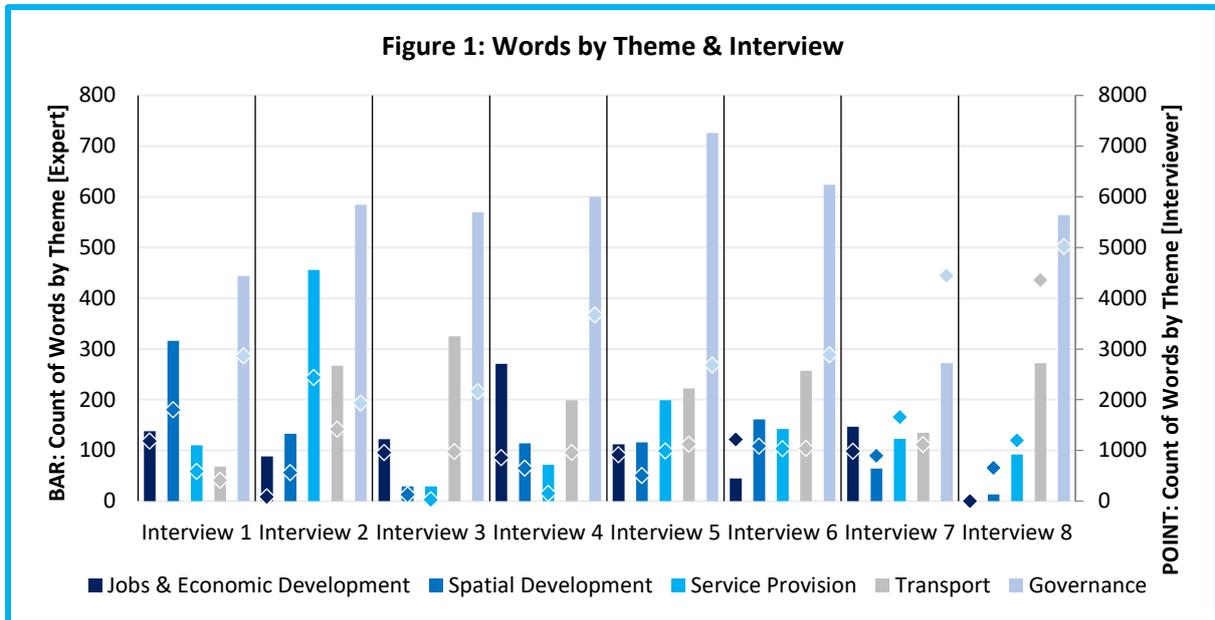
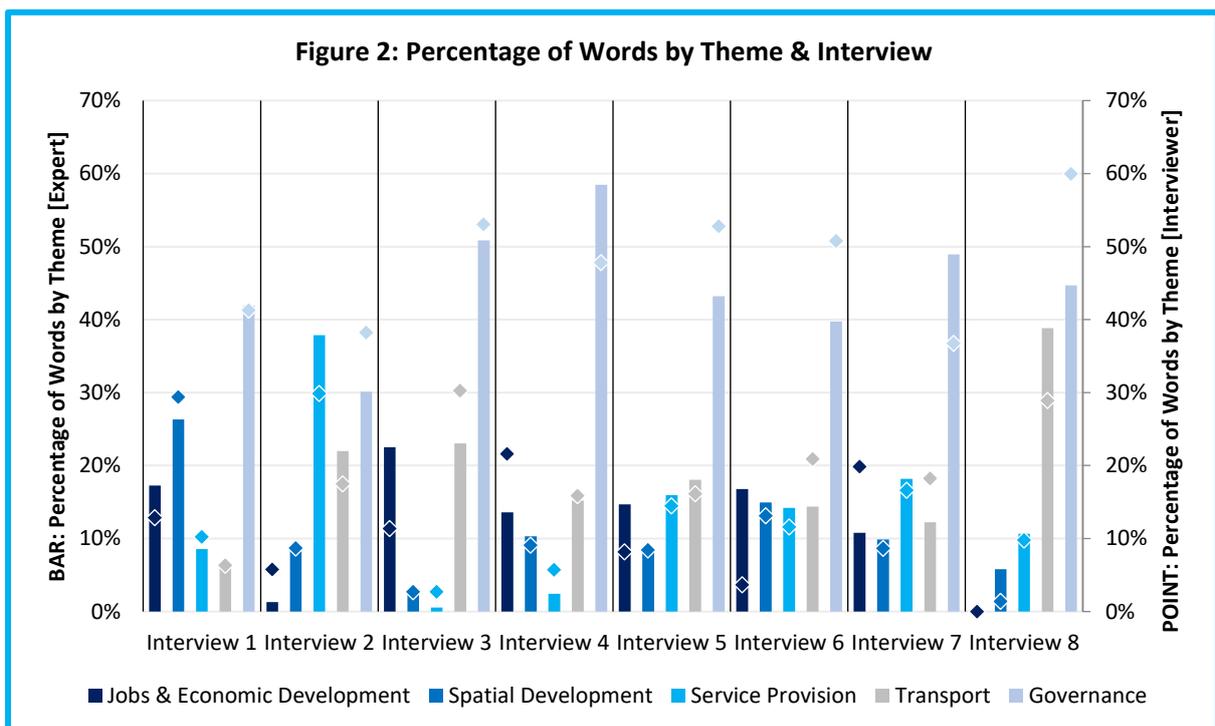


Figure 1 shows the number of words in each transcript by theme and party, exhibiting prevalence of discussion regarding governance. This prevalence is also present when calculated as a proportion of total words by transcript (Fig. 2). As interviews broadly followed participants' lead regarding major topics, this appears as initial indication of the substantial importance of governance factors.

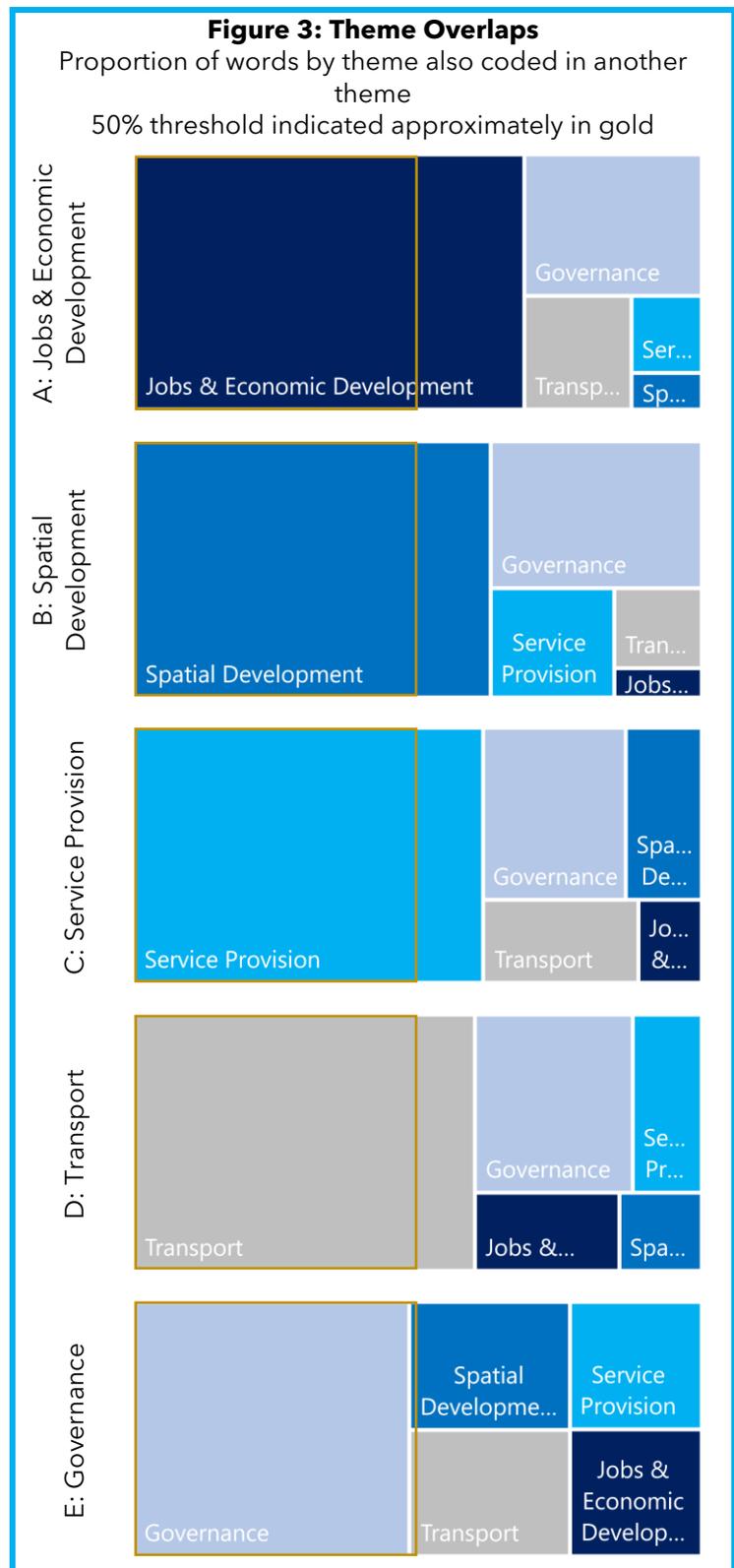


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As some comments made in participant interviews were relevant to more than one theme, coding was not restricted to a single thematic classification<sup>1</sup>. Figure 3 illustrates this overlap, showing the proportion of words in each theme coded solely to that theme and to any of the four other themes; seen principally in Figure 3E, governance is the only theme in which more than 50% of coded words are also coded under one of the other four themes, and overlaps in relatively consistent proportions to each of those four themes - suggesting governance constitutes a strong *cross-cutting* issue, requiring attention across the thematic nexus.

Statement & Position  
Characteristics

Examination of the number of statements (Figure 4a), and positions expressed on those statements (Figure 4b), follows broadly similar patterns, with governance dominating. Overall, the study identified substantially more *issue* and *goals* than *forecasts* or *options* - which accords well with the general idea that individuals are likely to be more willing and able to evaluate *current* problems (issues) and express desirable future



outcomes (goals) as opposed to make concrete predictions regarding future trends (forecasts) or provide material proposals for reaching those goals (options).

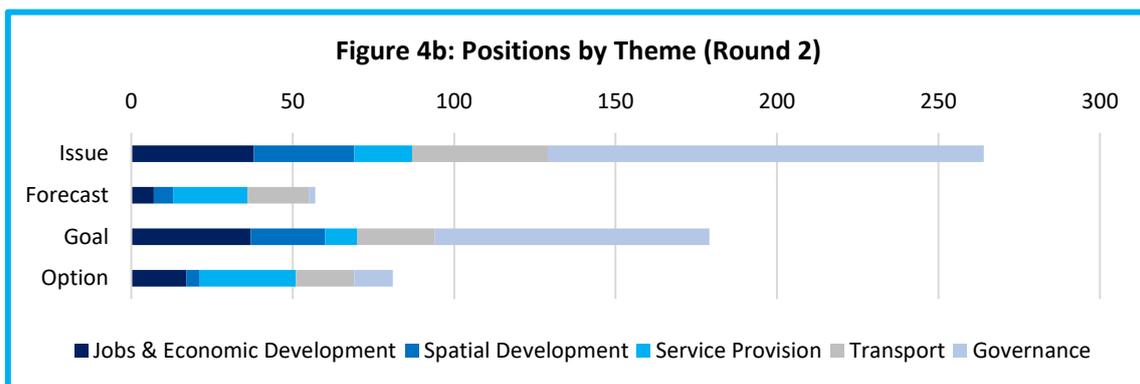
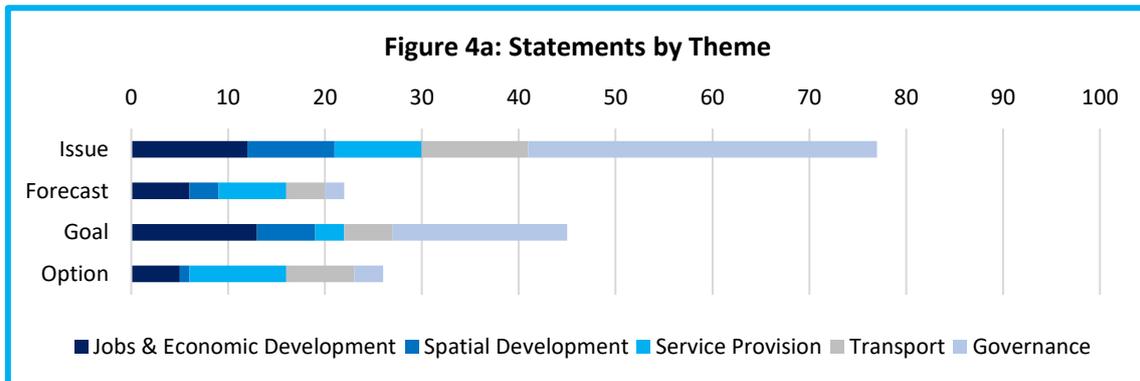
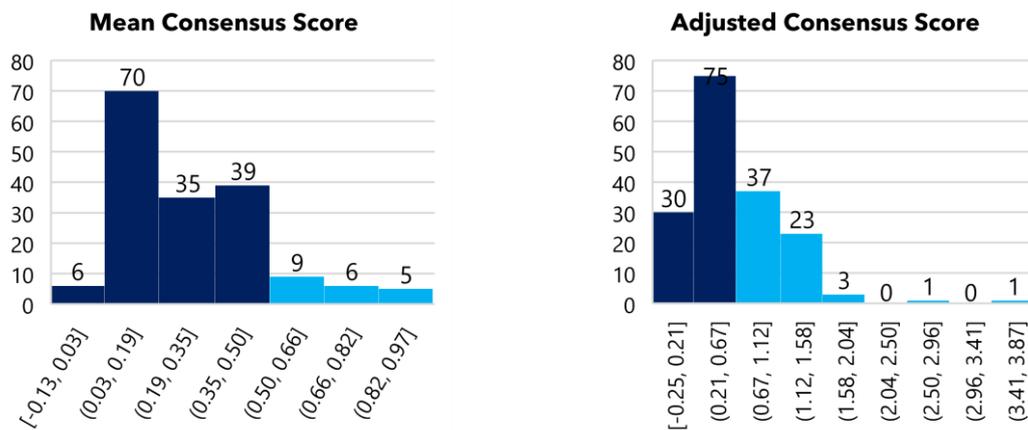


Figure 5 shows the distribution of statements according to both measures of consensus, highlighting the number of statements not/qualified in each round by each score. Several key observations result: principally, that the adjusted score consistently qualifies a greater proportion of statements than the mean score; that interpolations conducted to produce round 2 positions result in a substantially greater degree of consensus across the full ensemble of statements, suggesting generally broad agreement on the issues raised. A relatively small proportion of statements met qualification criteria on the grounds of a substantial (positive) *change*<sup>7</sup>, suggesting that average change between the two rounds was typically small – given the large difference in statements meeting consensus qualification thresholds on both measures between the rounds, this indicates a significant number of statements lying close to the qualification threshold in the first round.

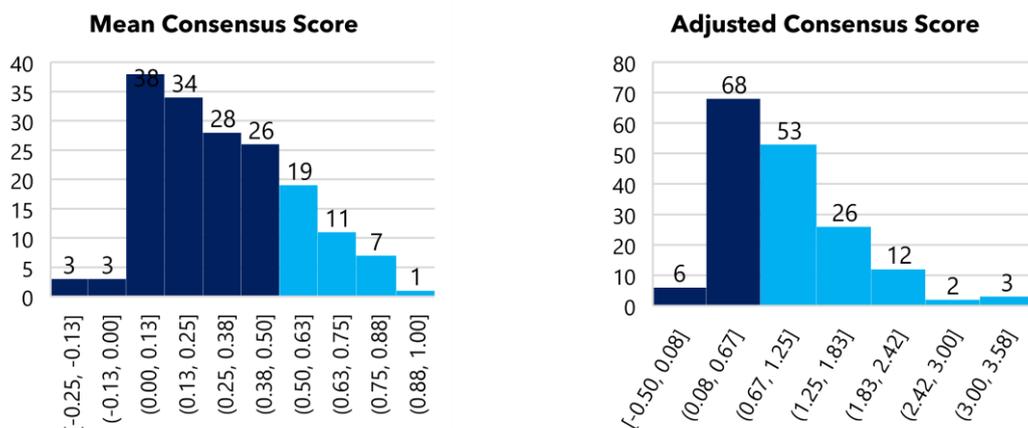
<sup>7</sup> As negative change indicates introduction of disagreement, these statements would be qualified under different criteria.

**Figure 5: Frequency Distributions of Statements by Consensus Scores**

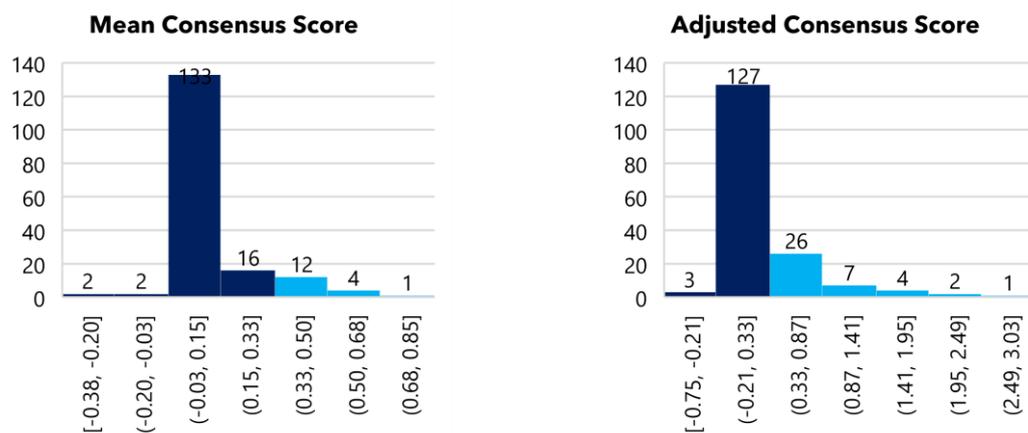
Round 1 (Pre-interpolation) Statement Frequency Distribution



Round 2 (Post-interpolation) Statement Frequency Distribution



Change in Statement Frequency Distribution



Not Qualified Qualified

**Table 2.1/1: Statement Qualification Status by Type & Theme**

Qualification Status & Criteria	# Statements	# Statements by Theme				
		JED	SPD	SVP	TRA	GOV
Not Qualified	57	9	2	15	9	22
Round 1 Disagreement	16	3	2	3	5	6
Round 2 Disagreement	6	1	1	1	2	2
Qualified	Round 1 Mean	0	0	0	0	0
	Round 1 Adjusted Consensus	9	4	4	9	2
	Round 1 Both	1	3	3	1	4
	Round 2 Mean	0	0	0	0	0
	Round 2 Adjusted Consensus	3	3	3	3	3
	Round 2 Both	0	1	1	0	2
Change in Consensus	1	0	0	0	0	1
<b>Total Qualified (%)</b>	<b>113 (66.5%)</b>	<b>27 (75%)</b>	<b>17 (89.5%)</b>	<b>14 (48.3%)</b>	<b>18 (66.7%)</b>	<b>37 (62.7%)</b>
<i>Of total statements</i>	170	36	19	29	27	59
% Qualified by Disagreement	19.5%	0%	23.5%	21.4%	38.9%	21.6%
% Qualified by R1 Consensus	53.1%	70.4%	58.8%	50.0%	33.3%	48.6%
% Qualified by R2 Consensus	26.5%	29.6%	17.6%	28.6%	27.8%	27.0%
% Qualified by Change	0.9%	0%	0%	0%	0%	2.7%

Note: statements allocated to first qualifying category (i.e. qualifying in D1 & D2 -> allocated to D1; qualifying in R1 & Change -> allocated to R1 - qualification category is listed in order of sorting)

These conclusions are broadly borne out when breaking down qualification status into type and theme (Figure 6). Around a fifth of statements are qualified on the grounds of resulting in *any* disagreement among the panel, while substantially larger proportions of statements are qualified in round 1, at approximately 50% of the overall statement ensemble, and approximately half of remaining statements being qualified following interpolation, for a total of around two of every three statements meriting reporting. The proportion of statements qualified by theme ranges approximately between half and three-quarters, consistent with the overall average of around two-thirds. Only one statement was qualified by exhibiting significant change without achieving consensus.

## 2.2: Thematic Results: Jobs & Economic Development

**Table 2.2/IF**

Type	+	-	Statement
Issue	4	0	A: Larger firms benefit from greater ability to make zero-carbon capital investments compared to SMEs, in financial and capacity terms
Issue	2	0	B: Rural areas do not sustain large numbers of well-paying jobs with career progression, so many rural residents are reliant on commuting into urban areas
Issue	3	0	C: Skills environments in rural areas may present a constraint for embedding the green transition in rural economies
Issue	4	0	D: Infrastructural issues will constrain opportunities for decarbonisation, e.g. broadband, mobile data, electricity networks
Issue	4	0	E: Opportunities for rural areas to benefit from the transition to a green economy require attention to the need for rural premises and transport solutions
Issue	3	0	F: Decarbonisation policy must properly account for transient populations, including seasonal workers and tourists whose transport needs may differ from conventional embedded economic relationships
Issue	3	0	G: Planning cannot precisely balance demand and supply for jobs in new developments
Issue	4	0	H: Policy support principally recognises the rural economy ('economy in rural areas') as "just agriculture"
Issue	4	0	I: Increasingly-digital delivery of economic activity could challenge demand for public transport
Issue	5	0	J: Concentrated economic function enables cheaper decarbonisation through economies of scale and minimum customer thresholds
Forecast	2	0	K: Renewable energy developments are expected to be substantially concentrated in rural areas with relatively abundant land

Rural areas are seen as **more challenging and expensive** for constituent businesses to invest in decarbonisation (D, J) (33), while smaller and less productive firms typical of rural areas (34, 35) also have substantially **less capacity to invest** (A). These factors also create a **dependency on urban centres** for better-paying jobs with career progression (B) (36 [p. 34], 37 [p. 11]), particularly as planning cannot precisely match a new settlement's job demand to creation (G). **Digitisation**, as a potential solution to these challenges, may have **knock-on implications** for viability of public transport (I), while itself being constrained (D) (18 [chap. 4], 29, 33, 38-41). Finally, the characteristics of **rural employment and economic sectors** (F) (42), the **rural jobs market** (C), and rural **economic facilities** more broadly (E), are expected to **constrain decarbonisation** (18 [chap. 6], 43-45). All-considered, rural businesses are seen as having less ability to decarbonise, while the nature of these businesses and their distribution complicates scope 3 decarbonisation.

**Table 2.2/GO**

Type	+	-	Statement
Goal	2	0	A: Agricultural businesses should seek to capture biogas from waste materials
Goal	3	0	B: Agricultural sectors need to undertake widespread adoption of evolved practices, including regenerative agriculture and vertical farming
Goal	3	0	C: Rural businesses in particular should concentrate on circular economy principles to reduce emissions from the transport and processing of waste
Goal	4	0	D: The zero-carbon transition implies opportunities for firms in training and 'green supply chains'
Goal	2	0	E: Virtual business activity, including WFH and virtual conferencing, should be substantially upscaled, particularly for service-based companies
Goal	2	0	F: The imperative to reduce transport miles should engender policy that encourages local training, supply, and installation chains for green technologies
Goal	2	0	G: The zero-carbon transition must be couched as an opportunity in other languages of growth, productivity, competitiveness, and regional rebalancing
Goal	3	0	H: Policy should take account of heterogenous needs for commuting across economic sectors
Goal	4	0	I: Governments must meaningfully support regenerative and restorative land uses by farmers and other landowners to restore nature and sequester carbon
Goal	4	0	J: SMEs require substantially more support to decarbonise, including in funding and advice
Goal	5	0	K: The imperative to reduce transport miles should be seen as highly compatible with ensuring feasibility of local service delivery in a "glocalisation" scenario
Goal	2	0	L: Spatial development and public transport should better enable and support rural business estates and hubs
Option	7	0	M: Mid- to long-term policy certainty and consistency is required to enable business' transitions
Option	4	0	N: Council land portfolios should be used to facilitate and trial new working practices and models, particularly in agriculture
Option	3	0	O: Councils should facilitate advice hubs and provide 'gateways' to approved private-sector providers of decarbonisation services and technologies
Option	2	0	P: Technology deployments with environmental benefits should be subsidised

Three themes are clear here. Firstly, on **'reorienting'** the rural economy towards self-reliance (46): adopting **circular economy** principles (C), and prioritising **local cultivation of skills and supply chains** to independently take advantage of the 'green transition' (D, F) - broadly, **reduction of transport miles** throughout rural business (K)<sup>8</sup>. This also relates to seeing decarbonisation as **highly interrelated** with other major policy areas (G) - particularly growth/productivity and regional rebalancing, reminiscent of the government's

<sup>8</sup> Though it should be noted that the NPPF currently permits development of new rural economic facilities even when not accessible by sustainable transport methods (21 [pp. 23-4]), while simultaneously restricting the broad-based economic development required to fuel such a transition (47 [p. 32]).

'Levelling Up' agenda and broader efforts to embed 'green growth' (15, 20, 31, 48 [chap. 7], 49 [sect. 3-4])<sup>9</sup>. **Teleworking** receives limited endorsement as an important component (E) (51, 52 [p. 483], 53 [pp. 14-5]), though this should be seen in the context of potential **negative implications for public transport** (see prior section) and emissions (29, 30), and with recognition that the opportunity for this **varies by location and sector** (H) (54 [chap. 4]). Thirdly, substantial comment on the role of government is made: that (local) **government should lead** (7, 52 [pp. 58-9], 55, 56 [pp. 8-10], 57), supporting innovation on their own estates (N), and **centralising and facilitating access to support and services** for local businesses to decarbonise (J, O). Direct government financial support is also advocated with varying degrees of consensus (J, P). Better policy facilitation for **local economic hubs** is also proposed (L), invoking cross-connections to other study themes - while with near-universal support, the panel commends the importance of **mid- to long-term policy certainty and consistency** (M) (36 [p. 32], 52 [pp. 58-9], 56 [pp. 8-10], 58 [p. 4]).

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<sup>9</sup> By contrast, the Levelling Up agenda has been criticized for substantially neglecting rural challenges - despite by the agenda's own metrics being of greater merit than any single geographical region of the UK (50 [p. 6]).

## 2.3: Thematic Results: Spatial Development

**Table 2.3/IF**

Type	+	-	Statement
Issue	1	1	A: Housing policy should take into account the possibility that some older dwellings may require planned obsolescence to meet emissions targets
Issue	3	0	B: Planning policy does not sufficiently address competition for land between agricultural and wind and solar power generation
Issue	2	0	C: Some rural areas 'price out' younger people through very high housing costs
Issue	7	0	D: Existing dispersed rural development is an across-the-board challenge for rural decarbonisation in sectors of interest
Issue	6	0	E: Spatial planning is excessively fragmented, particularly with regard to regional transport and public transport networks
Issue	4	0	F: Changing national planning policy environments create uncertainty for local policymaking and delay implementation of mitigation measures
Issue	4	0	G: Current spatial planning processes are too slow to respond to market and community needs, and as such lose out to market forces
Issue	2	0	H: Rural areas lack cultural facilities and career development opportunities for young people
Forecast	2	0	I: Declining household sizes means a greater number of dwellings, and different types of dwellings, will be required to service the same population
Forecast	3	0	J: National planning reforms are expected to reduce the weight of local planning instruments

Seven of eight participants agreed that dispersed rural development is challenging for spatial decarbonisation, principally by **embedding car use** and associated emissions (D) (47 [p. 18], 48 [sect. 3], 59 [pp. 29-31], 60 [chap. 5], 61-64)<sup>10</sup>. By contrast, assessments of decarbonisation by the government's independent climate change advisory group do not appear to consider the role of future spatial distributions of development in spatial decarbonisation (27, 32 [chap. 5]), while the NPPF considers it only briefly (21 [para. 154], 66 [chap. 4]), and planning reform proposals are silent on the matter (48 [sect. 3], 67-69). Beyond this, most findings in spatial development concern various **deficiencies in existing governance arrangements** as obstacles to decarbonisation. The panel finds that spatial planning is **excessively fragmented**, particularly in elements that require larger-scale planning (E) (70 [p. 138]); that **inconsistent national policy environments**, together with feared **reduction of local powers**, are obstructions to effective implementation of

<sup>10</sup> Though Baiocchi et al (65) find that average income, and its interaction effect with density, also represents a major contributor, and other works point out that planning must balance other sustainability objectives that do not necessarily complement decarbonisation strategies (11, 12)

mitigation policy (F, J) (71) – and that spatial planning processes are **too slow** to cope with demand (72 [pp. 27–8]), meaning planning loses out to market incentives and policy is less effective (G)<sup>11</sup>. On future requirements, consensus identified an **acute need for more dwellings to service the same population** on account of changing demographics (I) (72 [pp. 18–21], 73 [chap. 6]), exacerbating the need to resolve questions of siting development – but disagreement was identified in whether policymakers should account for **planned obsolescence** in some older, hard-to-decarbonise dwellings (A).

**Table 2.3/GO**

Type	+	-	Statement
Goal	2	1	A: Development in locations not accessible to services and public transport must only be permitted where the developer is obliged to create that provision
Goal	3	0	B: Future development must be located in areas where new dwellings and commercial space can access local service provision and public transport options
Goal	4	2	C: New development should be undertaken through settlement extensions in place of new settlements
Goal	3	2	D: Universal zero-carbon transport, public or private, would eliminate decarbonisation obstacles to the distribution of development and services
Goal	3	0	E: Garden village development models that integrate local and national planning and decision-making bodies to ensure service and transport provision represent best practice
Goal	3	0	F: Planning practitioners and councillors require more practical guidance on how to 'climateproof' development proposals
Option	4	0	G: Substantial additional capacity in the planning system must be developed to reduce asymmetries in financial viability negotiations between councils and developers

Panellists agreed that local authorities require more **capacity** to effectively implement development planning, including decarbonisation objectives (F, G) (74–77, 78 [p. 11]). Panellists also advocated **integrating planning** across local and national decision-makers and other areas of policymaking to improve governance and facilitate decarbonisation (E) (75, 76, 79). On the location of new development, however, the panel substantially disagreed: while agreeing that development should be located to **facilitate access to services and transport** (B), panellists disagreed regarding what development typology (edge-of-settlement vs. new settlement) best facilitates this (C), and whether development should be strictly required to comply with this to be permitted (A). While the former perhaps

<sup>11</sup> Recent reform proposals had sought to achieve acceleration of planning processes (68 [sect. 13]), but following consultation the future of those efforts is unclear (69).

alludes to confounding factors in the emissions of different settlement types (61, 64) and other sustainable development objectives (80), as well as differences in implementation (60 [chap. 4]), the latter conflicts with government reforms to provide development plans with greater weight and reduce exceptions (69 [pp. 6-9]). Panellists were further split over whether the universal decarbonisation of transport would eliminate decarbonisation considerations in siting new development (D) - perhaps reflective of concern that housebuilding commensurate with government targets would likely transgress national emissions targets (81).

## 2.4: Thematic Results: Service Provision

**Table 2.4/IF**

Type	+	-	Statement
Issue	3	0	A: Digitisation as a decarbonisation strategy involves substantial accessibility challenges for older populations typically more prevalent in rural areas
Issue	4	0	B: Digitisation may be constrained by limited access to adequate broadband and mobile data connections
Forecast	5	0	C: Widespread digitisation would substantially reduce carbon emissions
Forecast	5	0	D: Major elements of service provision are expected to move online, accelerated by pandemic experiences
Forecast	1	3	E: The pandemic has caused a fundamental step-shift in older generations' ability to access online services
Forecast	5	0	F: Permanent local service providers, particularly village shops, may be challenged by the advance of online service delivery, particularly of shopping

Consensus in this section was universally concerned with digitisation and online service delivery. **Digitisation** is espoused by five of eight panellists as a decarbonisation approach (C), and is predicted to occur *without further intervention* (D) – particularly as exacerbated by the pandemic (82 [chaps 6-7])<sup>12</sup>. It is notable that much commentary on digitisation, notably from labour unions (84, 85), the public sector (86) and in early government strategies (87) lacks attention to the decarbonisation angle of digitisation – with this only recently becoming evident (88) – suggesting a potential need for care in reconciling the two trends. Panellists expect that this will be **constrained by digital communications infrastructure** (B) (20 [sect. 3.2.4], 82 [chap. 6], 89), and will involve **accessibility challenges**, particularly for older generations and the less well-off (A) (82 [chap. 6], 90 [chap. 7]), which have not lessened as a result of the pandemic (E) (82 [chap. 6]). Finally, panellists note that **digitisation may reduce the viability of remaining local service providers** (F) (83). While statements not reaching consensus will mainly be discussed in section three, a substantial number of these here strongly relate questions of centralised service accessibility to decarbonisation, contrasted with trends in reducing local service provision to a highly dispersed rural population (91-93).

<sup>12</sup> This was identified as a trend in literature as early as the mid-2000s (83 [pp. 126-7]).

**Table 2.4/GO**

Type	+	-	Statement
Goal	4	1	A: Local community hubs should be principally local authority-led
Goal	3	0	B: Local councils should support pilot projects for community-based decarbonisation to encourage the development of community-led rural visions
Option	1	2	C: The 20-minute neighbourhood offers a fundamentally feasible vision for zero-carbon development
Option	4	0	D: The 20-minute neighbourhood offers a fundamentally sound vision for zero-carbon development
Option	3	0	E: Community hubs should offer internet access points for access to digital service provision
Option	3	0	F: Community hubs should offer training and support for access to digital service provision
Option	5	0	G: Community hub-based models should be promoted to collocate service delivery and help deliver 20-minute neighbourhoods
Option	5	0	H: Local public service provision should incorporate physical co-delivery with other public and private services, e.g. through the community hub model

Contrasting with predictions of substantial digitisation of service delivery, identified desirable futures for service provision focussed on **local physical service delivery and community hubs**. A majority finds that these should collocate public and private physical service delivery (G, H) (91, 94)<sup>13</sup>, as well as offer internet access and related training and support to ameliorate accessibility challenges resulting from digitisation (E, F) (16, 83). The panel also broadly finds that these should be **local authority-led** (A), though one suggested that community-led initiatives (e.g. Transition Towns) tend to see improved sustainability (96) - which would accord better with statement B, that local councils should **support community-led decarbonisations projects** (75). Finally, the panel found that **'20-minute neighbourhoods'**, in which services are accessible within 20 minutes' active travel, represented a desirable zero-carbon vision (D) (66, 97)<sup>14</sup> - but not that the model was feasible in rural contexts (C).

<sup>13</sup> Akin to the historical role played by market towns (95).

<sup>14</sup> The '20-minute neighbourhood' concept does not appear to be in widespread use in UK government vernacular, but sits reasonably comprehensively in the vein of 'social sustainability' objectives in planning that invoke the requirement for "accessible services... that reflect current and future needs and support communities' health, social and cultural well-being" (21 [para. 8b])

## 2.5: Thematic Results: Transport

**Table 2.5/IF**

Type	+	-	Statement
Issue	6	0	A: Regional transport planning is MIA, including and particularly in the contribution of the rail network to rural public transport
Issue	4	0	B: Heterogeneity in rural areas means some rural regions (e.g. more remote, older populations) are substantially more difficult to decarbonise
Issue	3	0	C: Journeys between rural and urban areas will require different decarbonisation solutions than within-rural journeys and 'through-rural' journeys
Issue	7	1	D: Insufficient state funding is provided for rural public transport schemes
Issue	1	1	E: Market-led provision of local public transport is a strong obstacle to decarbonisation
Issue	5	0	F: Existing rural public transport schemes, in the limited cases they exist, are typically patchy, infrequent, and not user-friendly
Issue	2	1	G: Residents' prioritisation of the convenience of private vehicles, given the length of rural public transport routes, complicates shifting behaviours towards shared zero-carbon transport
Issue	6	0	H: The cost of rural public transport is prohibitive, for users and providers, on account of sparse development patterns
Forecast	3	3	I: Relying on private electric vehicles to decarbonise rural transport is not a feasible future scenario
Forecast	6	0	J: Rural transport is not likely to decarbonise in line with emissions target on current trends
Forecast	6	0	K: Electricity and charging infrastructure will substantially constrain opportunities for decarbonisation through EVs

The panel concurred that **existing rural public transport is not fit for purpose** - coverage, frequency, usability, and integration were all mentioned in relation to statement F (79, 98). Major obstacles to zero-carbon rural transport are identified specific to the nature of rural regions and governance. Vast differences *within* rural areas mean strategy requires **place-based flexibility** (B) (66, 99, 100), while panellists emphasise **decarbonisation cannot be uniformly applied** to different categories of journey (C) (101)<sup>15</sup>, that sparse development patterns mean that **rural transport is prohibitively costly** (H) (90 [chap. 6], 101), and that electricity and electric vehicle (EV) charging **infrastructure will constrain decarbonisation by electrification** (K) (101). Panellists also tentatively suggested that uniquely-rural **social and behavioural factors** (e.g. convenience) are likely to represent a challenge in developing *viable* zero-carbon public transport (G) (66, 102). Substantial majorities agreed that the state provides **insufficient funding for public transport** (D) (52 [p. 61]), while

<sup>15</sup> Le-Klahn and Hall (42), for example, note the unique case of tourists.

**cohesive planning of public transport is effectively non-existent** (A) (66, 103). One participant suggested that **market-led provision of local public transport is problematic** - indeed, the Climate Assembly UK advocated full state control (52 [p. 61]) - but this was disputed (E), while other comments on state-market balance did not reach consensus. Finally, while panellists substantially disagreed regarding whether electric vehicles could be relied on to fully decarbonise transport (I)<sup>16</sup>, a majority concurred that without substantial intervention **decarbonisation of rural transport is unlikely in line with current national emissions targets** (J)<sup>17</sup>.

**Table 2.5/GO**

Type	+	-	Statement
Goal	3	2	A: Decarbonised public transport represents a potential across-the-board solution for eliminating decarbonisation challenges in spatial and economic development and service provision
Goal	6	0	B: Transport must be integrated into spatial and economic planning
Goal	3	0	C: Other transport policy objectives, such as social inclusion and traffic reduction, need to be carefully balanced against decarbonisation by policymakers
Goal	7	1	D: The role of the public sector in investing in and running transport and related infrastructure should be substantially upscaled
Option	3	2	E: Demand responsive transport represents an effective way of decarbonising transport
Option	4	0	F: Electric bikes and improved active travel infrastructure represent a cost-effective strategy for decarbonising last-mile/short-journey rural transport
Option	3	0	G: Substantially upscaled spatial data on commuter journeys, from organisations and in spatial clusters, offers the opportunity for fixed-route, DRT, or carsharing interventions to decarbonise

Recommendations for the future of transport principally concerned improving governance and planning. Specifically, the panel near-unanimously advocated properly **integrating transport with other relevant policy**, namely spatial and economic planning (B) (61, 79, 109, 110)<sup>18</sup>, and (with one objection) substantially **upscale the role of the public sector**

<sup>16</sup> Prior government commentary has focused on this as a 'silver bullet' for transport decarbonisation (104), but recent research in rural contexts has highlighted infrastructure and the need for further technical developments in EV technologies as critical if EVs are to play any major role for rural areas (105) or indeed more generally (106), while at COP27 the UK government signed a global declaration acknowledging that electrified cars and vans cannot themselves decarbonize the transport system (107).

<sup>17</sup> A 2009 paper produced for the Yorkshire and Humber region concurred with this expectation, even in the presence of substantial additional transport decarbonisation policies, though is by now meaningfully out-of-date (108).

<sup>18</sup> This is the case in London, where governance for low-carbon mobility has been lauded (111, 112).

in planning, developing, and running transport and constituent infrastructure (D) (66, 79) while ensuring that governance processes properly **balance decarbonisation against other transport policy objectives** (e.g. social inclusion, 113, traffic reduction, 114) (C). On specific technologies, the panel concluded that **electric bikes and active travel**, supported by improved infrastructure, could cost-effectively decarbonise a variety of short trips (F) (52 [p. 61], 66, 115, 116), but substantially disagreed on the role of demand responsive transport as a *decarbonisation* strategy (E)<sup>19</sup>. Consistent with section 2.3, panellists disagreed that decarbonised transport could fully eliminate other sectors' decarbonisation challenges (A). Finally, the panel advocated for much-improved **data gathering** (79, 118) to better illuminate potential 'quick wins' through decarbonising commonly-used commuter routes, for example with targeted car-sharing schemes (G) (119)<sup>20</sup>.

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<sup>19</sup> Limited evidence on the carbon reduction impacts of such systems currently exists; a 2014 qualitative study in Germany suggests meaningful possible reductions, but no large-scale study appears to have been completed in the UK (117) - though despite this, some practitioner literature explicitly recommends demand responsive transport as a component of future public transport systems (66).

<sup>20</sup> Akin to ideas regarding 'intelligent transport systems', which leverage data and technology to connect transport systems with other sectors and physical facilities, as well as to manage and optimise transport networks (120).

## 2.6: Thematic Results: Governance

**Table 2.6/IF**

Type	+	-	Statement
Issue	5	0	A: A lack of leadership and no clear central advocate for joined-up rural net zero thinking means existing work is disparate and disconnected
Issue	6	0	B: Governance of highly related policy areas is overly fragmented, particularly in rural areas
Issue	4	0	C: Rural areas lack clear guidance and support because heterogeneity in small populations makes providing this challenging for government
Issue	6	0	D: There is no cohesive extant knowledge about how to tackle net zero in rural contexts
Issue	4	0	E: Local government planning timelines are vastly inconsistent with central government timelines
Issue	6	1	F: Government focus on cities and city-regions is a direct cause of neglect of rural areas
Issue	2	4	G: Government focus on cities and city-regions is justified by the greater prevalence of challenges in these regions
Issue	5	0	H: Government strategies, e.g. the Industrial Strategy or Levelling Up, neglect the specific and differentiated characteristics of rural areas
Issue	5	1	I: Central government and public sector structures, including UK models of representative democracy, fail to ensure effective representation of local issues
Issue	5	0	J: Central government delineation of local government geographical territories impairs the ability of the governmental system to properly understand rural needs
Issue	5	0	K: Current local government geographical boundaries cause authorities to orient towards central urban areas, rather than see rural areas as an independent policy target
Issue	4	0	L: Rural areas lack a strong voice covering all rural issues, including decarbonisation, and are not typically well-heard by central government
Issue	7	0	M: Benefit-cost ratios inevitably skew policy spending towards urban areas where lower unit costs mean a greater impact for the same expenditure
Issue	4	0	N: Competition funding discourages collaboration between local authorities to fund regional decarbonisation initiatives, particularly on transport
Issue	5	0	O: Preparation of bids for competition funding from central government is a vast waste of local government capacity
Issue	7	0	P: Rural areas lack sufficient government financial support
Issue	5	0	Q: The public sector lacks leadership in accounting for rural needs and decarbonisation
Issue	4	0	R: The role of local government in delivering on the net zero agenda is unclear, particularly due to a lack of powers
Issue	5	0	S: There is no overarching rural strategy in England or the UK
Issue	3	2	T: Government over-relies on the market to deliver policy solutions for rural areas

As noted elsewhere, the panel identified a substantially larger number of challenges for spatial decarbonisation derived from governance than any other theme. Firstly, panellists considered **fragmented governance** - within governance tiers (A), between related policy areas (B), between national and local government (E), and as a result of local authority

geographical boundaries (J, K) – as a major obstacle to decarbonisation. Literature on this is widespread. In academic spheres, Marsden *et al* (103, 121) highlight **spatial<sup>21</sup> and functional<sup>22</sup> decentralisation** as separate obstacles to ambitious policy action, arguing that the latter is a substantially greater contributor than the former; Bulkeley and Betsill (122) find that climate change **challenges traditional delineations within local and national government** in England, while Castán Broto (10) coins a need to reconcile with the **“messy” governmentalities** of the crisis. Particularly on transport, but also in connections to spatial planning, numerous actors explicitly criticise current spatial and functional distributions of responsibility, calling for **greater integration and cooperation**. This includes professional transport and spatial planning organisations (66, 79, 123), pan-European industry associations and best practice studies (100, 124, 125), and civil society advocacy organisations (57, 126) – even the government’s own national rail and connectivity reviews (127 [p. 23], 128 [pp. 22–7]), ‘Levelling Up’ and Net Zero strategies (15 [sect. 4v], 20 [p. 133]), and ‘devolution deals’ (129, 130), as well as the National Audit Office (76) and Infrastructure Commission (58).

Panellists also considered that **representation of rural issues has broadly failed**, due to constituency-based Westminster elections (I), a failure of the Department for Environment, Food, and Rural Affairs (DEFRA) (L), and of a failure to integrate the rural voice (L), as well as an **unwillingness by central public sector leadership to direct action on the net-zero agenda** (Q) (18, 76). On a related theme, panellists felt current **government fails to provide appropriate leadership or guidance** on decarbonisation, generally and specifically for rural areas (C, D, H, S) (56), and that government focus on cities/city-regions has led to neglect of rural areas (F, K). It was suggested that this may be justified by cities experiencing greater policy challenges, but on balance this disputed (G)<sup>23</sup>; however, policy assessment through benefit-cost ratios resulting in the **skewing of expenditure towards**

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<sup>21</sup> Geographical decentralisation, or separation of powers between authorities in the same tier of governance

<sup>22</sup> Separation of specific powers or policy areas between authorities, which may cover the same geographic space

<sup>23</sup> Indeed, the Climate Assembly UK made explicit reference to the need to treat rural areas with particular care (52 [p. 61]).

**urban areas** with lower unit costs were considered partially responsible for this (M) (131)<sup>24</sup>. Panellists reserved **substantial criticism for competition funding models** (58 [p. 12], 75 [p. 8], 78 [pp. 6, 13], 136 [p. 41]), which **discourage regional collaboration** (N) and **waste scarce local government capacity** (O) (131 [sect. 4.3]) in a **restrictive funding environment** (49 [sect. 5], 75), particularly for rural areas (P) (37). Finally, panellists agreed that the **role of local governments in delivering net zero remains unclear**, in particular due to a **lack of devolution** from Westminster of powers (R) (58, 75, 76) - and disagreed over whether central government reliance on the market to deliver policy generally, and decarbonisation specifically, is appropriate (T). On the latter, the UK Climate Assembly unequivocally advocated for public transport to be state-run (52 [p. 61]), the government's Union Connectivity Review calls for substantial state support for strategic transport networks (128 [pt. 2]), and various other bodies have called for more substantial, long-term commitments from government to support various strategic agenda (49 [sect. 6], 58, 75, 79, 82). In contrast, government strategy on electric vehicles and associated infrastructure continues to rely on a market-led rollout - despite criticism in the same paper that the existing rollout has been too slow (106).

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<sup>24</sup> Curiously, other assessments of the potential for bias in benefit-cost assessment - whether supportive or critical of the measure - either neglect the rural-urban divide altogether (132-134), or conflate rural projects with *inter-urban* projects in analysis (135), rendering wider commentary on the quantitative accuracy of such observations challenging

**Table 2.6/GO**

Type	+	-	Statement
Goal	5	0	A: Local authorities must do more to understand and advocate rural issues and particularly decarbonisation, including by raising awareness, engaging, and working with communities
Goal	6	0	B: Effective local government should integrate transport, housing, and economic planning in a single authority as in the London/TfL
Goal	3	0	C: Joined-up regulation and co-operation across sectors of local and national government would improve public spending efficiency and allow more effective regional planning
Goal	5	0	D: Larger-scale authorities (e.g. CAs) can better address long-term planning for transport, housing, and related policy areas with regional implications
Goal	5	0	E: Local government should be restructured based on larger regional areas (including city-regions, travel-to-work areas) to facilitate effective governance of prevailing challenges
Goal	4	0	F: Central and local government should develop policy and investment to deal with multiple challenges simultaneously, foregrounding climateproofing to embed mitigation across all projects
Goal	7	0	G: Policymakers need an improved understanding of the Climate Crisis and how it relates to multiple policy challenges in order to better tackle the issue
Goal	7	0	H: Local governments need a consistent policy direction and environment to be set by central government to effectively deliver the net zero agenda
Goal	7	0	I: Local governments need substantially more capacity to deliver the net zero agenda
Goal	4	0	J: All government and public-sector decision-making should be climate-proofed
Goal	4	0	K: Effective rural proofing should be incorporated in all tiers of government and public sector decision-making
Goal	8	0	L: A revitalised rural strategy must not come at the expense of attention and funding for urban areas
Goal	4	1	M: Central government must be prepared to fund operational as well as capital expenses to enable delivery of net zero by rural authorities
Goal	4	2	N: Central government should commit to genuine devolution of funding and implementation powers to local authorities to upscale and accelerate decarbonisation
Option	2	1	O: More robust rules regarding distribution of local funding, akin to the Barnett formula, should be introduced
Option	3	2	P: Rural funding should be specific and separate from general allocations
Option	4	0	Q: Government should upscale its role as a 'testbed', and in providing advice and support to civil society, businesses, and individuals

Against numerous challenges, the panel proposed a similar number of goals to improve governance for decarbonisation in rural areas. Panellists advocated an **upscaled, more activist role for the state**, agreeing specifically on the need for local authorities to undertake stronger work on **advocacy, awareness, coalition-building, and engagement**

(A) (7, 15, 75, 76, 78, 137, 138, 139 [chap. 14.2])<sup>25</sup>, while government more broadly **expands its role as an innovator** for decarbonisation solutions (15 [chap. 4]), providing **more direct support** for decarbonisation (Q) (76 [para. 1.11, 1.13, Fig. 3]). Panellists also sought substantially **better understanding of the crisis and its relationships with other policy areas** among civil servants and politicians (G) (75), supporting better policymaking to address multiple challenges simultaneously in a form of **'climateproofing'** (F, J) (15 [chap. 4iv], 75, 139 [chap. 14.1]), alongside a substantially **upscaled role for rural proofing** (K) (18, 131) - all to better embed tackling climate change and supporting rural areas into government.

To turbocharge the ability of policy to effect change, the panel advocated **more functionally integrated local government**, including more sectors of policymaking, akin to a 'rural London' model (B); **regional integration** to better implement planning and governance for these sectors (D, E), and **renewed local-national government cooperation**, with more joined up regulation, policymaking, and delivery (C, F) (56 [pp. 192, 212])<sup>26</sup>. Strong consensus was found in favour of **more consistent and robust policy direction** from central government, with associated *long-term funding*, to enable more comprehensive longer-term planning (H) (52 [pp. 58-9], 78 [p. 6], 136 [p. 41], 141, 142), and - though this was disputed among the panel - **genuine devolution** of policy powers *and funding* to local government to implement the decarbonisation agenda (N) (49). On this note, the 'Levelling Up' White Paper, the government's blueprint for future devolution, lacked reference to climate change (20, 143).

Regarding funding and capacity, panellists nearly-unanimously agreed that local governments *ex ante* need substantially more capacity to be able deliver on the decarbonisation agenda (I) (74, 75, 144) - but materially disagreed over whether **rural funding should be separated from general allocations** as a rural proofing measure (P), whether **a new 'rural Barnett formula'** is needed to protect fair funding for rural areas

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<sup>25</sup> Evidence suggests that, if local authorities in particular seek a greater mandate to undertake action on climate change, environmental concern on the part of voters is a critical contributor to enabling more action (140)

<sup>26</sup> To save repetition, for literature on spatial and functional decentralization and integration, see references associated with statements 2.6/IF/A, B, E, J, and K

(O)<sup>27</sup>, and over whether central government should be **funding revenue and operational expenses** (e.g. cost of fuel for buses) versus only **capital expenses** (e.g. cost of new electric buses) for decarbonisation projects (M). Finally - and as the **only** statement to achieve fully unanimous backing by the panel - the panel emphasised that **a revitalised rural strategy must not come at the expense of attention or funding for urban areas** (L), implying both expanded government capacity, better attention to balancing central government legislative programmes, and more overall state funding.

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<sup>27</sup> Perhaps in the form of an augmented Shared Prosperity Fund, introduced as part of the 'Levelling Up' agenda to replace EU some allocations, which currently includes an element of fund targeting according to population density (145)

### 3 Discussion of Findings

#### Cross-cutting themes and wider contexts

Having set out detailed findings of the panel in the context of wider literature in section two, this section now discusses the key overarching implications of study findings - crucially, contextualising these alongside cross-cutting issues that did *not* reach the threshold for consensus, as well as other major points synthesised from literature that are not explicitly drawn out in either of these discussions.

Firstly, the panel has broadly recognised that resolving spatial decarbonisation in rural areas is a challenging endeavour. In particular, results emphasise that the distributed and sparse nature of development across rural England exacerbates difficulty in all manner of components of spatial decarbonisation: with implications for the size, investment power, and consequently scope 3 decarbonisation power of rural businesses (sec. 2.2); for resolving spatial planning strategies able to site residential development close to services and jobs, and as such minimise travel times (sec. 2.3); for infrastructure enabling decarbonised travel by electric vehicles (sec. 2.5), remote-working practices (sec. 2.2), and digital service delivery (2.4); and for planning cost-efficient public transport routes (sec. 2.5). Perhaps indicative of this difficulty, it is noted that current governance is broadly silent on specific directions: the NPPF is largely silent on specifics related to these issues (21 [paras 8, 154]), while infrastructure strategies continue to rely on private, market-driven roll-outs (89, 106).

Partly as a consequence, the study has found that there needs to be a substantial upscaling of the government funding environment for transport and local service provision, as well as ongoing expenditure on local government capacity to enable better local engagement and delivery mechanisms and the effective place-based policymaking that rural heterogeneity calls for. Long-term consistency of funding and strategy are also identified as relevant cross-cutting points. On all of these fronts, the extent of existing calls for such action is extensive. The nationally-representative Climate Assembly UK has explicitly called for public ownership and funding of public transport networks (52 [p. 61]), as well as - alongside other government and governance-adjacent organisations and projects - policy certainty and consistency (36 [p. 32], 52 [pp. 58-9], 56 [pp. 8-10], 58 [p. 4], 71).

Finally, and well beyond calls by the independent government advisory group, the Climate Change Committee, for a “duty to cooperate” (56 [p. 192]), panellists have called for a fully revised and revitalised approach to spatial and functional governance across England; existing multi-tier local authority structures are found to overly segregate delegated powers so as to prevent meaningful regional planning, while highly variable functional devolution of - for example - transport powers, some to national or regional bodies (e.g. Transport for London), some to new combined authorities (129), means that where in some locations best practice may evolve, in others an inability to effectively design, fund, or roll-out new policy - or indeed a lack of powers to do so - prevents meaningful action on decarbonisation. The government’s commitment to devolution and regional revitalisation in the ‘Levelling Up’ strategy (20) is somewhat promising in this regard, but with only recent announcement of the first devolution deal under the new framework (130) it remains to be seen to what extent this will be carried through - though initial indications of meaningful devolution to York and North Yorkshire of powers covering housing, transport, and material spending powers are all in the vein of the ‘London model’ advocated by the panel, and explicit recognition of poor rural digital connectivity and transport links are further encouraging signs (130 [pp. 4-6]).

Beyond these recurring points in consensus findings of the panel, there are several themes in issues that did not reach consensus that reoccur throughout and as such are considered worth highlighting. A full list of statements not qualifying under any criteria is provided for transparency, and to inform further study, at Appendix A.

Firstly, a cluster of proposals regarding local hub-based delivery and integration of services are identified. Mobility hubs, noted in the literature as critical components of decarbonised rural transport systems (66, 79, 110, 146), are highlighted, with other proposals for electric charging at community hubs suggesting that ‘hub-and-spoke’ rural transport and service systems<sup>28</sup> might offer a joint solution to decarbonisation, accessibility, and related social sustainability challenges should joined-up governance allow. Other perspectives

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<sup>28</sup> With ‘hubs’ offering key private and public service facilities connected to a ‘trunk’ fixed transport route, splitting into local demand-responsive or active travel options.

suggested empowering communities to map hub-based service delivery, as well as mandating distributed local public service delivery and introducing a 'duty for accessibility'.

Secondly, and as hinted at in results regarding service provision (sec. 2.4) and transport (sec. 2.5), a cluster of statements address potential complementarities between decarbonisation and accessibility. As noted in section 2.4, this is not an overlap that has appeared widely in public policy regarding digitisation to date, but has been highlighted in some discussions regarding decarbonising transport (e.g. 147) - and potentially represents a meaningful multiplier of incentives to undertake related decarbonisation policy and investment if properly explored and understood.

Finally, half of the expert panel expressed at one point or another a set of positions regarding value choices in governance and policymaking; valuations of natural capital, emissions reduction, and community cohesion, as well as the innovation and urgency constraint inherent in efficiency and "value for money" assessments, were all highlighted as areas of potential challenge for existing government practice, while other comments highlighted potential conflicts between net zero expenditure and other policy priorities in times of immediate challenge. The Institute for Government has highlighted how cost-benefit analysis can sometimes be inconsistently applied across government departments in assessing infrastructure spending (132), and wider literature has listed a multitude of critiques for the contingent valuation and revealed preferences approaches used in quantitative assessment, and as such that they should be avoided (148-150).

Two further points follow from this - neither materially expressed by participants in the study, but nevertheless documented in components of literature and possibly visible in an aggregate view. The first of these is the question of individual versus systems change: comparing statements on jobs and economic development (sec. 2.2) with those on transport and governance (sec. 2.4, 2.5), we see a reasonably different set of proposals - for the former, discussion of the challenges for individual small businesses, proponents of circular economy principles, training, and so on; for the latter, we broadly see a much more systemic perspective on challenges, focussing on high-level governance and strategic factors, rather than necessarily the action of firms. Marsden et al (151) discuss a predominance of policy approaches in UK governance focussing on questions of individual

choices and behavioural change, contrasted with collective action in sociocultural, economic, and political spheres - and propose that such a focus, embedded in powerful political discourses of individualism and economic growth, is incompatible with meaningful, effective policymaking to reduce carbon emissions. This implies the imperative not only to focus on governance reform for rural decarbonisation, but more broadly to reconsider the imperatives that guide policymaking in such a vein - to conduct policymaking in the broader vein of systems thinking. This is widely supported in literature on tackling climate change (152 [p. 4], 153).

Secondly, and explicitly in the vein of normative value preferences, two panellists *did* highlight the question of recognising value in avoiding climate breakdown. The urgency implied by scientific assessments of the potential harms derivable from the climate crisis is substantial (3 [para. SPM.B.1.1-6]) - and there remains a wider uncompromising reality of hard limits on our ability to continue to degrade Earth systems beyond their already-degraded state (154-157). In response to the technical and likely long-winded governance reforms that this review has tended to uncover, should we be asking: to what extent is this reflective of the urgency of planetary environmental imperatives, and are practitioners and policymakers authorised to act in the emergency terms (158) that might be called for in response? While this may go well beyond practical scoping of rural decarbonisation, this seems a critical question of underlying assumptions that has not been well-reflected in reported discussion.

## 4 Conclusion

### Study evaluation and implications for practice and policy

In the light of the relatively expansive reflections on the broader contexts of systems thinking and planetary emergencies at the close of the previous section, given the stated objectives of this paper it is important to briefly bring discussion back to the key question at hand: scoping a pathway to a zero-carbon future for rural England. In that vein, this paper has provided some specific suggestions - community hubs, 'ebikes' and active travel, and local public service delivery combined with better digitisation are obvious examples of these - but has found that flaws in the extant governance, or more specifically *governmental* configurations, of rural England offer a substantial strategic obstacle to achieving decarbonised futures in any of the themes originally identified for this study. As such, to some extent the most significant conclusions of this paper are not necessarily embedded in the vernaculars of rural England - though they are derived from the experiences and perspectives of those operating, advocating, and representing those spaces.

In the context of this finding, and given the wide-reaching proposals for reform that this paper reports, it should be noted that, as a small qualitative study backed up by a bounded but moderately systematic literature review - and broadly constrained by the limited time and resourcing available - this review alone does not and cannot constitute the sole evidence basis for such an agenda. In presenting results, this paper has offered a substantial number of references to works by others - individuals and organisations - where similar ideas are expressed; and where possible to areas of the current government's agenda where recommendations are already, to some extent, being implemented, and as such should be monitored. By doing so, this investigation is adopting four roles:

1. Supplementing and confirming the evidence base for these existing proposals,
2. Assembling discussion of proposals in separate but aligned policy fields to illustrate coherency and cross-cutting themes,
3. By providing a full account of positions uncovered by this work, whether achieving consensus or not, constructing a platform for further cross-sectoral investigation on the spatial decarbonisation policy nexus, and

4. Supporting, or even enabling, the signposting of professionals and policymakers operating in each discipline to the ideas and work of those aligned fields, including through the provision of this paper's systematically obtained bibliographical reference library.

Specific implications for further work, and practice, are numerous. On recommendations for governance reform, there is clear and substantial room for further investigation to explore in detail how the government's devolution agenda might be leveraged to implement new forms of spatial and functional decentralisation to better enable the regional planning for housing, transport, and the economy that are advocated for throughout this paper. For local governance actors, including local authorities, there are clear implications regarding potential policy and practice priorities identified by this review - in undertaking advocacy and engagement work, facilitating community participation in the net-zero agenda, and in exploring the potential for concrete localised proposals regarding community hubs, whether authority- or community-led. For practicing economic development and regeneration professionals, the implications of this study are perhaps more process-based than in specific terms: service- and advocacy-based work in such fields must remain conscious of the imperatives for community and cross-government involvement, integrated and cross-disciplinary/sectoral thinking, and 'climateproofing' that are identified both explicitly in recommendations and less directly in underpinning recommendations for devolution and decentralisation.

Finally, and perhaps most importantly, the background review of extant literature that has been a component of this study offers a lesson in and of itself. Many of the papers identified as part of the evidence base for this review offer either commentary that is nonspecific across rural-urban divides, or is explicitly founded in work on cities and urban areas; only approximately a quarter of the titles of surveyed documents include the word "rural", while this paper has commented elsewhere on the lack of specific advice, strategy, or policy for rural areas. This is despite nearly a fifth of England's population living in rural areas, and around a quarter of the country's Gross Value Added being generated in predominantly or significantly rural areas (35). Policymakers, supported by practitioners, civil society organisations, 'think tanks', advocacy groups, and the academy, can - and must - do better.

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## APPENDIX A Non-Qualified Statements

Theme	Type	+	-	Statement
Jobs & Economic Development	Issue	1	0	Rural housing stocks are not necessarily equipped to handle substantially-upscaled home-working
Jobs & Economic Development	Issue	1	0	Wage environments in rural areas may constrain the opportunity for high-skilled new green jobs in rural areas
Jobs & Economic Development	Forecast	1	0	Short-/mid-term higher energy costs will accelerate business' transition to greener energy sources for heat and electricity
Jobs & Economic Development	Forecast	1	0	Homeworking is not expected to be feasible or desirable for all workers
Jobs & Economic Development	Forecast	1	0	Increasingly virtual services sectors will lead to larger numbers of smaller businesses
Jobs & Economic Development	Forecast	1	0	The transition implies the end of the road for businesses involved in the distribution of fossil fuels for heating to non-grid rural premises
Jobs & Economic Development	Forecast	1	0	Market-based transitions in technology use are expected to accelerate
Jobs & Economic Development	Goal	1	0	Given more extensive transport needs, rural areas will need to be 'more net zero' in other sectors to account for any residual emissions
Jobs & Economic Development	Option	1	0	Social enterprises in the 20-minute neighbourhood model should be directly supported to facilitate community-led decarbonisation
Spatial Development	Issue	1	0	Existing local authority configurations broadly restrict councils' ability to lead, rather than simply loosely regulate, development
Spatial Development	Forecast	1	0	Ageing rural populations and the declining wealth of those populations mean that the unit cost of service provision rises and discretionary social spending falls
Service Provision	Issue	2	0	Digitisation may imply replacing customer emissions in travel to service providers (e.g. retail, grocery shopping) with postal provider emissions in transport
Service Provision	Issue	2	0	Centralised services offer the opportunity for more specialised service delivery
Service Provision	Issue	2	0	More unit cost-efficient, centralised services on the whole lead to larger carbon emissions
Service Provision	Issue	2	0	Rural areas typically rely on urban areas for centralised major services, e.g. secondary/higher education, healthcare, due to less concentrated populations
Service Provision	Issue	1	0	Time-limited outreach premises provide very limited service levels for intermittently served rural communities

Theme	Type	+	-	Statement
Service Provision	Issue	1	0	Questions regarding the carbon impact of centralised services overlap with questions of accessibility and related social considerations
Service Provision	Issue	1	0	Permanent local service providers are dependent upon a minimum level of custom for financial feasibility without subsidy
Service Provision	Forecast	2	0	More expansive funding environments would reverse the trend towards centralisation of local service delivery
Service Provision	Forecast	1	0	Increasing financial pressures appear to be maintaining the trend of loss of relatively high unit cost rural services, particularly of banks, post offices, and similar
Service Provision	Forecast	1	0	Widespread pressures on local service providers are further constraining opportunities for services to be collocated
Service Provision	Goal	2	0	Local communities should be empowered to map futures for service patterns, including demand for local community/work hubs
Service Provision	Option	2	0	Public service providers implicating bespoke transport solutions (e.g. non-emergency patient transport) should be integrated with standard public transport offerings
Service Provision	Option	2	0	Public services should be required to demonstrate ready accessibility to all communities
Service Provision	Option	2	0	Public services, e.g. health, should be required to deliver services locally where feasible, rather than relying on centralised premises as a default
Service Provision	Option	1	0	Community hubs should where possible incorporate electric vehicle charging facilities installed by local authorities
Transport	Issue	2	0	Deregulation of local bus services is a strong obstacle to decarbonisation
Transport	Issue	2	0	Increasingly sparse rural service provision means the challenge of decarbonising rural transport has substantially grown
Transport	Issue	1	0	Insufficient evidence exists regarding the carbon impacts of DRT, ebikes, active travel, carsharing, and other non-EV decarbonisation solutions
Transport	Forecast	1	0	Electric or hydrogen fixed bus routes represent the most likely scenario for decarbonising rural public transport
Transport	Goal	2	0	Multimodal hubs, planning, and integration should be used to develop public transport network effects
Transport	Option	2	0	Mandatory service levels and expanded access may uncover suppressed demand and help to develop financial viability
Transport	Option	2	0	Shared ownership/carshare schemes for EVs to improve accessibility for low-income residents

Theme	Type	+	-	Statement
				are not feasible in rural areas due to development dispersion
Transport	Option	1	0	Small market incentives and advice for incremental schemes, particularly with employers, can substantially boost decarbonisation, particularly of short-distance, local/last-mile journeys
Transport	Option	1	0	Large organisations should be viewed as a unit target for transport decarbonisation through targeted fixed-route or DRT interventions
Governance	Issue	3	0	Rural areas provide extensive 'carbon subsidies' to urban areas through sequestration and renewable energy
Governance	Issue	3	0	Centralised appeal and dispute processes undermine local visions and prevent effective planning by local authorities and communities
Governance	Issue	3	0	Rural proofing, by central government and other public sector organisations, and efforts to understand rural realities, have failed
Governance	Issue	3	0	Competition funding models undermine long-term planning and development
Governance	Issue	2	0	Civil society often does not understand the role and powers of local authorities
Governance	Issue	2	0	Rural residents want to contribute to net zero, but lack the benefit of a coherent policy framework to help them do so
Governance	Issue	2	0	Evaluations of spending benefits fail to account for the value of community cohesion and sustainability for smaller/more remote rural settings
Governance	Issue	2	0	Governance fails to recognise the overriding value in avoiding climate breakdown for its known and unknown impacts relative to the cost of interventions today
Governance	Issue	2	0	Greater incidence of commercial premises in urban authorities structurally biases local authority tax receipts towards more urban regions
Governance	Issue	2	0	Post-2010, austerity has concentrated public spending (on public services, transport, etc) in cities, where value for money is highest
Governance	Issue	1	0	Globalisation has led to the concentration of the economy and policy attention in better-connected, urban areas
Governance	Issue	1	0	Given rural-to-urban 'carbon subsidies', and technical difficulties in rural areas, rural areas should have longer horizons on net zero goals
Governance	Issue	1	0	Rural areas in urban authorities can benefit from funding concentrations and programmes in that authority

Theme	Type	+	-	Statement
Governance	Issue	1	0	Rural-to-urban migration resulting from rural decline decreases average unit costs of policymaking, creating perverse incentives for government not to act
Governance	Issue	1	0	Challenging economic environments mean councils must pay careful attention to balancing net zero with other priorities
Governance	Issue	1	0	Economic, efficiency, and value-for-money policy objectives largely rule out speculative or prototype policy interventions that could uncover hidden opportunities or challenges
Governance	Forecast	1	0	A failure to prioritise community cohesion and sustainability will continue to lead to the gradual decline of rural areas
Governance	Forecast	1	0	Increasing digitisation, particularly post-pandemic, will distribute more economic activity outside urban areas and, <i>ceteris paribus</i> , policy attention will follow
Governance	Goal	3	0	Local-national government partnerships on policy implementation have the potential to rapidly accelerate delivery and decarbonisation
Governance	Goal	3	0	To fix rural-urban funding imbalances, government spending should better recognise the value of protecting natural capital and reducing emissions
Governance	Goal	2	0	Local communities should be empowered to work together to plan for decarbonisation
Governance	Goal	1	0	Larger-scale authorities (e.g. CAs) can better address differences between rural and urban funding and policy attention