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# From coal town to smart town: Place, power, and the politics of energy decentralisation

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ABSTRACT

Globally, nation states are exploring the potential of decentralised energy systems – or socio-technical imaginaries (STI) - for reducing carbon emissions and increasing energy security. Narratives about decentralised energy tout how the localisation of energy generation, distribution and consumption can achieve greater social justice outcomes. However, significant differences exist between bottom-up, community-led decentralised STI and Top-Down Decentralised STI (TDDSTI), with the latter being designed by project implementors in isolation of communities. Past research shows how project implementors seek to legitimise TDDSTI in specific places using practices of emplacement, place-framing and place-making, yet, little research has explored how community actors respond to these practices. This is the gap this paper addresses. From a critical-spatial lens, we explore the local 'politics' of TDDSTI; focusing on how the place imaginaries held by community actors serve as lenses which refract responses to emplacement, place-framing and place-making a TDDSTI. We focus on one TDDSTI - 'Zero Carbon Rugeley' (ZCR). We triangulate five pieces of data: our subjective experience as project implementors for the community engagement aspects of the project, secondary research of project websites, community gatekeeper interviews, innovative 'cultural animation' workshops and social media engagement. Analyses reveal how project implementor's attempts to legitimise TDDSTI focus unequally on certain characteristics and are informed by generalisations about places, which miss important socio-spatial nuances in communities. Moreover, communities' responses are shown to be divergent; shaped by different positive and negative associations to existing place imaginaries which underpin why their responses to the TDDSTI refract differently.

## 1. Introduction

Reducing global carbon emissions through low carbon energy transitions is of great importance to global economies in the face of the climate crisis [1]. Nation states are exploring the potential of different centralised and decentralised 'Sociotechnical Imaginaries' (STI) - visions of 'good society' achieved through [energy technology] innovation' [2] (adapted) - to achieve this aim [3].

Centralised STI often take a 'whole system' lens to low carbon energy transitions, focusing on national processes of low carbon electricity and heat generation (e.g., wind), and/or upgrading national transmission grids, to support distant end users. Alternatively, decentralised STI focus on processes of local energy generation, storage and consumption [3], usually through a combination of domestic solar PV, heat pumps, batteries and smart technologies that enable residents to become prosumers (producers and consumers).

Both these types of STI promote different socio-cultural, political, economic and environmental consequences, both positive and negative. Because of this, social scientists have become increasingly interested in the critical-spatial dimensions which underpin societal responses towards centralised and decentralised STI – who supports and contests them, how they become popularised, and why they emerge at different scales and places [4] [5]. On the one hand, STI can serve as 'vehicles' around which diverse collectives of expert actors – or 'project implementors' - consolidate around to bring them to bear. On the other hand, STI also encode moral or behavioural shifts, or forbear as the deployment energy technologies where people live, which can incite different responses (e.g., support, indifference, rejection) from the public and/or host communities [4] [5]). In sum, diverse and asymmetric power relations can strive to legitimate and/or contest STI as they percolate across spatial contexts [5].

Recently, emergent critical-spatial approaches have focused on the

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performative dimensions of space, place and scale - how they serve as strategic tools – or 'socio-spatial resources -through which to legitimate and/or contest STI [5]. This includes both: i) how actors strategically and selectively draw upon the socio-spatial characteristics of places to legitimate why an STI might 'fit' in a specific location, or ii) how pre-existing 'place imaginaries' - collectively held, but not uncontested, beliefs about the characteristics of place - are strategically and selectively invoked by actors (namely, community actors) to legitimate or contest the diffusion of STI where they live. Taken together, this critical-spatial approach to low carbon energy transitions can illuminate the power struggles which underpin how energy innovation diffuses across society, including how democratic socially just such processes are, and whose visions of socio-spatial reality are prioritised and protected.

In this paper, we argue that adopting this critical-spatial approach is increasingly important for examining the emergence of different forms of decentralised STI.

The 'local' framing of decentralised STI is often regarded as synonymous with more socially just outcomes [3] [7], including greater degrees of community participation, decision making, ownership [8], and higher degrees of community acceptance [9]. However, critical differences exist in the structure and governance of decentralised STI [9] including the extent to which different actors are empowered within those structures. For example, some decentralised STI are grass roots, community-owned, energy systems which are founded on the principles of local community wealth building, local energy security, the democratization of energy, and place-based community development [9]. However, such systems are not perfect, as there are often inherent socio-economic disparities – including access to social capital - and power struggles which can prevent some social groups from access those benefits [9].

More recently, many national policies appear to be shifting towards Top-Down Decentralised STI (TDDSTI hereon). TDDSTI are designed and implemented by public-private coalitions of project implementors – seeking to legitimate TDDSTI in specific spatial contexts – underpinned by profit accumulation *vis a vis* decarbonisation [9] [11]. Existing research has shown how such actors engage in practices of emplacement (drawing upon the physical, cultural and social-psychological qualities of a place to promote its distinctiveness), place-framing (presenting a particular vision of how a place should change) and place-making (establishing the socio-spatial boundaries of a place) to present visions of the 'local' in TDDSTI and justify why TDDSTI 'fit' within a place [7]. However, to date little research has explored how affected communities respond to such practices; the extent to which these practices of emplacement, place-making and place-framing are seen to compliment or contrast with their own views of socio-spatial reality, and how this subsequently shapes their beliefs about the 'acceptability' of TDDSTI where they live. This paper addresses that gap.

From the perspective of community actors, our primary proposition is that community actor's responses to practices of emplacement, place-making and place-framing by project implementors will be shaped by the pre-existing place imaginaries that community actors hold. Hence, place imaginaries serve as lenses which 'refract' such practices, and shape different beliefs about the 'acceptability' of TDDSTI.

To operationalise this, we focus on one approach to TDDSTI – Smart 'Local' Energy Systems - which focus on utilising advances in the digitalisation of local energy generation and supply management, but which vary in size, scope, and functionality dependent on the needs of a population [11]. We focus on the Zero Carbon Rugeley (ZCR) project – devised by external project implementors - which aimed to design a Smart Local Energy System for the Rugeley community. We – the authors - acted as practitioners within ZCR, designing processes of community engagement and leading efforts at co-creation in the project (see section 2). Hence, the findings reflected here are also based on our experiential embeddedness of facilitating project implementor and community actor needs in the project.

Following the framework by Walker et al. [7], we draw upon secondary data and subjective experience to outline how project implementor actors engaged in practices of emplacement, place-making and place-framing in attempts legitimate the suitability of ZCR. Then, we draw upon triangulated qualitative data – including social media responses, community gatekeeper interviews, and innovative 'cultural animation' workshops – to capture the pre-existing place imaginaries held by community actors in Rugeley. We assess how these place imaginaries shaped responses to practices of emplacement, place-making and place-framing as attempts at presenting a vision of the 'local' in a SLES.

This paper addresses three gaps. First, it addresses a lack of research which focuses on how and why communities respond differently to TDDSTI, which can also generate important insights for other 'top-down' and 'place-based' decarbonisation efforts [12]. Second, it employs innovative cultural animation and social media methods, answering calls for more innovative methods in energy social science research [13]. Third, it addresses the need for research at the interface of research and practice in social science energy research, enabling less extractive research practices, and more nuanced understandings across the community, researcher/ practitioner, and developer triad of TDDSTI.

This paper is organised as follows. Section two reviews relevant literature pertaining to the role of sociotechnical and place imaginaries in understanding energy system transformation. It begins by outlining the recent development of critical-spatial approaches in social science research. Upon this theoretical basis, it emphasises that the co-production of STI with place imaginaries is an ongoing process fraught with conflict, focusing on how such conflict can arise between project implementors and community actors specifically. We focus primarily on 'top-down' STI. Section three provides context on the case, outlines the triangulated qualitative data sets used in the study, participant sampling, and our analytical processes. Section four presents the findings of the study. Section five discusses the key findings of the paper and provides suggestions for future research. Section six concludes by considering the policy implications of these findings, the limitations of the study.

## 2. Literature review

### 2.1. Critical-spatial perspectives on low carbon energy transitions

Following the 'spatial turn' of social science energy research, the energy geographies literature has brought relational conceptualisations of space, place, and scale to understandings of low carbon energy transitions [14] [15]. Relational approaches challenge ideas that scales are fixed or nested [16], but are rather socio-political constructs produced through the relationships that actors engage and negotiate from the contexts in which they are embedded [15] (p. 3). Thus, in geographic terms, what makes something 'local' is synonymous with conceptualisations of place: "both the physical aspect of a location" but also the "variety of meanings associated with that location by individuals or groups" [17] (p. 427).

Place ontologies contend that places are products of complex assemblages of social, psychological, environmental, political, economic and infrastructural relations, which are constructed using narratives of the past and visions of the future [18]. However, place is framed as an inherently political landscape, where struggles to exert control over spaces shape consequential geographies [19]. Inherent within this conceptualisation is the idea of voice; who has responsibility for a place [20], who is represented within a place [21], and who has the power to define social-local identities at the behest of others [22].

This can, for example, include associations with energy infrastructures and the socio-cultural and economic conditions brought by the presence of those infrastructures, such as past resource extraction legacies [23]. These associations can become circulated between different groups to generate collective, but not uncontested,

imaginations of socio-spatial reality – place imaginaries [7] – which can co-exist, be related or distinctive, and have different degrees of stability through their negotiation by actors over time [6]. This fluidity has encouraged scholars to view place imaginaries as performative, that is, not simply linguistic ways of talking about space and place, but embodied discourses which have material dimensions, and which shape how actors engage with socio-spatial reality [4] [5] [6] [23].

More recently, emergent critical-spatial perspectives within energy geographies research have focused on the performativity of place imaginaries – the strategic and deliberate processes by which place imaginaries are negotiated over time - who (re)constructs them, for where, and why - to legitimate and/or contest specific agendas associated with low carbon energy transitions [4] [5]. Through this framing, place imaginaries are situated as politically contested arenas [24], where boundaries between the real and imagined become contested by diverse groups of actors who are internal (community actors) or external (project implementors) to that place.

This has led social scientists to focus on how, where and why place imaginaries become co-produced with STI, as deliberate (performative) attempts to "adapt, anchor, legitimate or contest particular energy STIs in different contexts" [23] (p. 6). Hence, whilst STI encode normative ideas about the necessity of energy innovation through energy technologies, attempts to co-produce them with place imaginaries can help concretise their suitability as they diffuse [4]. Examining such processes can illuminate how asymmetric power relations aim to achieve greater control over space through 'othering' (marginalising) competing imaginations of space and place [5] [25].

We contend that focusing on the contested negotiation of place imaginaries is particularly useful for exploring how decentralisation STI percolate across space, place and scale. Processes of energy system decentralisation are inherently geographical processes reflecting the localisation of energy generation and consumption [3] [26]. In theory, they present the opportunity to challenge historically entrenched centralised 'elite power' which dominates processes of, and predominantly benefits from, processes of resource extraction, and energy generation, transmission, storage and consumption [9]. The 'localisation' of energy systems [27] can invite "new participants… non-traditional energy actors such as cities, community organizations, cooperatives, and private individuals" into decision-making for energy infrastructures [27] (p. 83).

However, TDDSTI reflect models of decentralisation and localisation which are primarily driven by powerful coalitions of public-private actors - project implementors - and which are less represented in the literature [27]. We focus upon the strategic and selective methods by which TDDSTI project implementers attempt to co-produce TDDSTI with place imaginaries [4] [9] to legitimate these models of decentralisation, and the consequent responses to those processes by community actors. Overall, "looking for incompatibilities or complementarities between local place imaginaries and wider energy imaginaries may thus help explain and potentially anticipate the logics and dynamic of contestations around specific energy projects" [23] (p. 6). Below, we synthesise existing literature on the co-production of STI and place imaginaries by project implementors and community actors and consider the implications of this literature for TDDSTI specifically.

#### *2.1.1. Project implementors: The strategic co-production of top-down STI and place imaginaries*

Initial conceptualisations of STI defined them as national scale constructs, aiming to concretise national visions of 'good society' [2], with state actors coalescing around them and trying to bring them to bear across space, place and scales [23]. Existing research on STI has often retained this national lens, for example, focusing on the diffusion of uranium and coal STI in the US [29] nuclear waste STI in Buan [30], or electrification, biogas and renewables deployment in Sweden [5] [31]. Hence, though STI are unlikely to have universal acceptance across geographies and actor groups [32], they serve as vehicles upon which actors try to consolidate and try to legitimate (or contest) STI across different scales and across different places [33] [34].

More recently, the literature has contended that STI can emerge at other scales, including at regional and local scales [23]. Here, their success is contingent on which local actors support them and the resources they have to promote them [23] For example, focusing on micro grid STI in a campus setting in Germany, Engels and Munch [35] identify how local microgrid STI become materialised as they interlink with place, and despite the incomplete and fuzzy nature of the STI, can generate cooperation and commitment between actor groups and sectors to bring the STI to bear. Otherwise, Lambert [18] examines how a Geothermal STI is legitimated through scales by aligning the project with local representations of a university as climate-forward, interested in protecting rural space, and aiming to create clean energy jobs, economic growth and revitalisation. Evident here is how – regardless of the scale at which they emerge - STI "gain social power when shared and performed by a group of individuals united around common ideas" [36] (p. 4) – and have inherently geographical dimensions [23].

However, critical-spatial approaches argue the need to interrogate these processes further, to not simply focus on the fact that STI emerge and diffuse at different scales, but to also focus on illuminating the power asymmetries, underlying agendas and strategic methods by which they are legitimated and contested across space and time [11]. This has led research to focus on the strategic practices of 'spatial thinking' that are employed to concretise those agendas [4] [5]. For example, some have focused on how practices of place-branding can be invoked to shape new place imaginaries which aim to commodify places [25] [37], using discourses around climate emergencies to enhance city competitiveness [38], or to ensure the success of socio-technical innovation in different localities through alignment with national policy [22]. Such processes often marginalise competing worldviews as they strive for local domination [36], and reflect that place imaginaries may not necessarily emerge by those within a lived space.

Critically, Walker et al. [7] illuminate how project implementors engage in practices of 'emplacement', 'place-making', and 'place-framing' (Table 1) to legitimate SLES/ TDDSTI. Practices of

**Table 1**
The definition of emplacement, place-framing and place-making as defined by the Walker et al. [7] framework.

| Practices of negotiating decentralised STI in places | Definition in relation to decentralised STI: | Example: |
|---|---|---|
| Emplacement | Drawing upon the physical, cultural and social-psychological qualities of a place to promote its distinctiveness and market the viability of decentralised STI. | Using place names to label a decentralised energy project as 'local'.<br><br>Focusing on the uniqueness of a place through generalised characteristics (e.g.) to justify why a place is ideal for decentralised STI and to market their competitiveness to other decentralised STI projects. |
| Place-framing | How actors exercise their power to present a particular vision of how a place should change through embedding a decentralised STI. | Promoting how a project will address particular 'non-local' policy goals promoted by decentralised STI, such as decarbonisation. |
| Place-making | Attempts to establish the socio-spatial boundaries where decentralised STI begin and end in a place, including who is involved, who makes decisions and who benefits. | Defining the spatial remit of decentralised STI projects, often in isolation and with limited interaction with the communities that live there. |

emplacement involved utilising place names and place-based characteristics (e.g., supportive political environments, existing expert knowledge) to develop marketing strategies which promote the uniqueness and superiority of TDDSTI in relation to others. Practices of place-framing where centred around local and non-local spatial goals. Local goals included addressing 'community-driven' goals of urban air pollution and fuel poverty. However, these were often secondary to non-local goals, which positioned places as catalysts to address 'big picture' problems (e.g., decarbonisation) and assumed support from communities towards these goals. Finally, practices of place-making allowed project implementors to be flexible about who/what was and was not included in their project over time as new opportunities/ challenges arose, a process of 'adaptive boundary-making'. Related, others have found that project implementors' constructions of the 'local' can determine opportunities for community engagement and participation in TDDSTI projects [40], raising important questions around the degree of empowerment for different social groups in relation to decision-making over local energy futures [41].

Taken together, the findings by [7,41] demonstrate how the 'slippery' and 'interpretative' nature of the 'local' in TDDSTI – as a spatial construct – enables different coalitions of project implementors to exemplify why a specific place is ideal for their specific TDDSTI to emerge. Both studies reflect strategic and selective forms of 'spatial thinking', performing specific practices of emplacement, place-making and place-framing to legitimate TDDSTI and aim to co-produce their projects with that specific place. Through such practices, project implementors decide which attributes of a place are important or marginalised, create place-brands which market those places in specific ways. However, no existing research has focused on how such practices are responded to by community actors – how perceptions about potential marginalisation in co-design, prioritisation of non-local goals and incompatibilities between external representations of place *vis a vis* their own.

#### 2.1.2. Community actors: STI and place imaginaries

Research has increasingly focused on the role of place imaginaries as collective and embodied conditions that shape community responses to top-down STI. Chateau et al. [23] contend that "looking for incompatibilities or complementarities between local place imaginaries and wider energy imaginaries may thus help explain and potentially anticipate the logics and dynamic of contestations around specific energy projects" (p.2). Hence, place imaginaries can equally serve as 'socio-spatial resources' held by community actors through which beliefs about the 'acceptability' of an STI are channelled [23].

For example, Chateau [4] identifies how national wind energy STI can be contested by local communities as they percolate down to local contexts, encountering 'incompatible' place imaginaries. Similarly, Ryder et al. [43] examine how shale gas STI can generate local conflict when they encounter local place imaginaries, viewed as destroying the local rural character and disrupting social cohesion, and hence their attachment to a place. Finally, Devine-Wright and Wiersma [44] noted how community and third sector actors are more likely to view local places as distinctive and a patchwork of groups rather than one of homogeneous place imaginary. Both papers suggest that place imaginaries can be multiple and differentially engaged with in by community actors to appropriate the STI affecting their local area. This includes to promote beliefs about whether a place should or should not change through an STI, or to demonstrate the uniqueness of a place and how it might be disrupted by an STI.

No existing research has explored such ideas in the context of TDDSTI. However, discussions about the implications of decentralised energy projects for communities are longstanding. Social scientists have critiqued the 'local trap' that decentralised energy projects fall into, whereby they assume that communities necessarily associate such processes with positive outcomes [44]. This marginalisation of community perspectives is problematic, since research has increasingly demonstrated the value of local knowledge in achieving equitable outcomes in energy plans [45], more effective environmental decision-making [46] and greater democracy in spatial planning, for example [47].

Overall, the literature has started emphasise the pivotal role that place imaginaries can play in shaping divergent community responses to STI. This moves beyond research that focuses on community responses to singular energy technologies, instead focusing how imaginations about STI – and the changes they propose – 'fit' within existing community imaginations about space and place, the changes they promote, and how democratic those agendas are. Existing studies show that place imaginaries can be multiple and contested, and different association to them can shape how STI are interpreted and accepted by community actors.

### 2.2. Summarising our theoretical framing

Through synthesising this burgeoning literature, and employing them in our specific interests in TDDSTI, our objectives are to examine: i) how project implementors seek to legitimate TDDSTI in a specific place through practices of emplacement, place-making and place-framing, and ii) how communities respond to those practices of legitimation in divergent ways based upon the place imaginaries they associate with, including their beliefs about the 'acceptability' of developing a TDDSTI in their community [5] or willingness to engage in co-design processes. We view place imaginaries as multiple and contested, whereby community actors can ascribe different meanings to them, and whereby they are differently embodied and performed to respond to TDDSTI. This is summarised in Fig. 1 below.

Using this framework, we explore two research questions:

1. How do project implementors attempts to legitimate a TDDSTI in a place – through practices of emplacement, place-making and place-framing - compliment or contrast with pre-existing place imaginaries held by community actors?
2. How do communities respond to the practices of emplacement, place-making and place-framing by project implementors, and how does this further shape their responses to TDDSTI?

## 3. Methods

### 3.1. Research approach

This research employs social constructivist epistemology, contending that imaginaries exist as "systems of meaning… expressed through images, language and stories" [18] (p. 2) which underpin how groups perform their lives [23]. This necessitates adopting a spatial ontology, contending that place is foundational to shaping social activity, individual and collective meaning, and identity [17] but which recognises that places are also shaped by economic and socio-political structures [3]. As such, we view place imaginaries as inherently contested and fluid, subject to rupturing and transformation – a process which is fraught with conflict. In this sense, place imaginaries can be multiple, and have different collectives of actors supporting or contesting them.

A qualitative approach is used to capture the subjective meanings, narratives and visions that underpin pre-existing place imaginaries and acts of legitimating TDDSTI, which can illuminate tensions in the capitalist re-invention of spaces [12].

### 3.2. Research context

#### 3.2.1. Rugeley

Our research focuses on Rugeley, a market town in the Cannock Chase District in Staffordshire, England. Rugeley has a population of ~25,000 (2021 census).

Rugeley has a distinctive energy heritage as a former mining

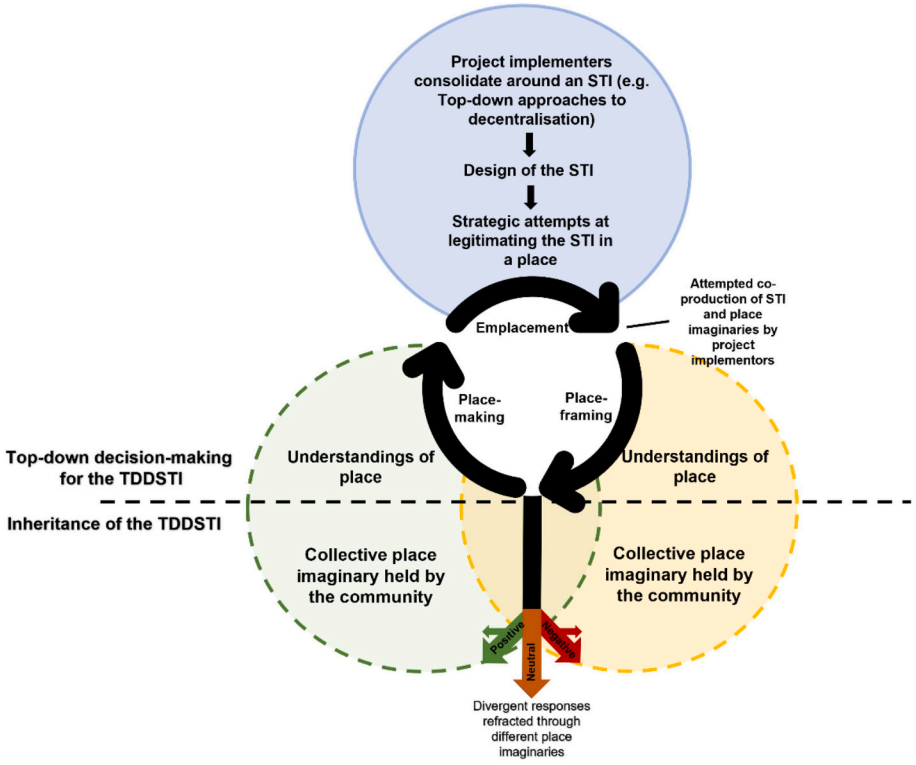


**Fig. 1.** The theoretical framework devised in this study, describing how project implementors acts of emplacement, place-making and place-framing of STI can 'refract' through different place imaginaries [7].

community, and previous hub for national coal-fired electricity production, which boomed in the 1960s and led to considerable growth in the town. At the time of data collection, the power station and two cooling towers were still dominant in the landscape (see Fig. 6). It has since been demolished. Combined, these industries – and their subsequent decline – can be said to have had a profound socio-economic and cultural impact on the area. As indicated on Fig. 2, the geographies of the area are particularly interesting. Despite its size, the area has two train stations and is *intersected by a major artery road, and smaller* roads, which connect the town to the surrounding villages. *The town* is surrounded by an abundance of wooded and pastoral rural land.

### 3.2.2. *Zero carbon Rugeley*

Zero Carbon Rugeley is the name given to the project aiming to design a TDDSTI for Rugeley. The project was funded as part of Innovate UK's 'Prospering From the Energy Revolution (PFER) programme. Rugeley was selected as a case by ZCR consortium leads Equans (formerly Engie), a transnational company who had existing interests in the area after purchasing the old coal fired power stations, which was closed in 2016, with aspirations for a smart home development on the site. Equans assembled a consortium of 10 organizations from an array of sectors, who focused on different technical aspects of the TDDSTI, ranging from buildings, mobility, and smart systems design, as well as non-technical feasibility aspects, including financial and regulatory barriers and developing innovative business models (Fig. 3 below).

The authors of this paper designed and delivered the 'user-centric design' (latterly referred to as community-centric design) and community engagement work package. The community-focused aspects were a

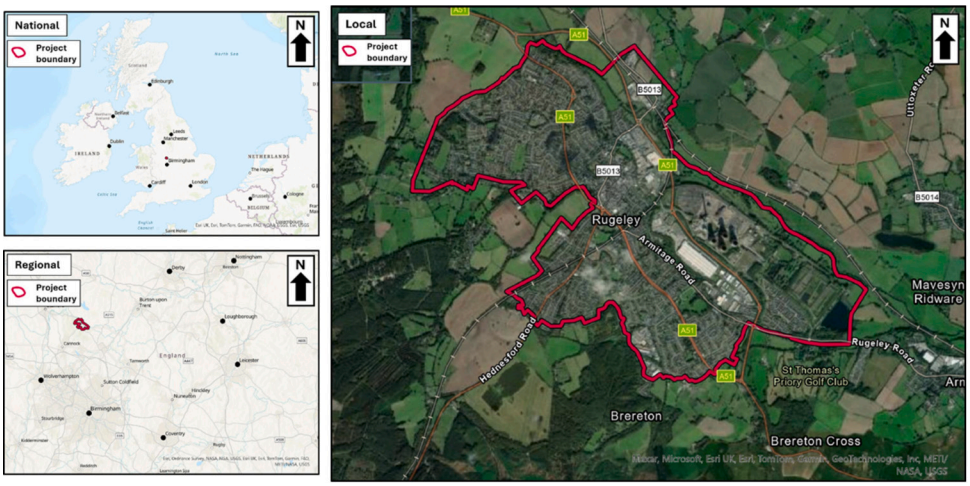


**Fig. 2.** The project boundary of Zero Carbon Rugeley and its location relative to the rest of the UK.


**Fig. 3.** The aims and objectives of Zero Carbon Rugeley, as proposed by the project consortium.

key element of the project with the aspiration of community views informing multiple aspects of the project design. This paper focuses on the first design cycle involving an exploratory phase of research. There were no confirmed design aspects of the TDDSTI in place at the project start with the project claiming to be 'technology agnostic', hence in the early stages of this project the community engagement broadly focused on understanding how the Rugeley community reacted to the ZCR TDDSTI, their expectations from it, and their willingness to engage in the project. Participants in the study were informed of some potential solutions to help define what decentralisation meant, including household retrofit and smart technologies and peer-to-peer energy trading. Hence, the project focused more broadly on the abstract concept of a TDDSTI from the community who would potentially be affected by it, rather than assessing responses to technologies.

### 3.3. Research methods

Our study draws upon three key pieces of primary qualitative data (cultural animation workshops, social media contributions, and semi-structured interviews) coupled with analysis of secondary documents.

#### 3.3.1. Cultural animation workshops with community actors

To capture the place imaginaries held by community actors, we primarily draw upon data from three 'Cultural Animation' workshops conducted with local residents and local gatekeepers. Cultural animation describes ethnographic, participatory and deliberative workshops which are delivered through artistic methods – typically informed by theatrical interventions [48] which have an emphasis on co-producing knowledge and dissolving 'hierarchies' [49]. The approach has been co-developed by New Vic Borderlines – a subsidiary of the New Vic Theatre in Newcastle-under-Lyme (England) and the Community Animation & Social Innovation Centre (CASIC) at Keele University.

In its broadest sense, cultural animation approaches aim to guide participants through a series of creative exercises and games, asking participants to consider their individual and collective associations to a place, including their attachment to different socio-cultural, economic and material characteristics of a place and to outline their beliefs about place identity [48] [49]. The approach sets a simple question or problem that participants are asked to interpret, reflect upon and address over a series of activities, leaving the resolving the problem or question to participants.

We contend that this approach is highly applicable for capturing the relations between place imaginaries and TDDSTI for three reasons.

First, place imaginaries are collective social constructs and hence require approaches which facilitate group thinking and empowerment. Traditional methods, such as focus groups, can be overly prescriptively defined by researchers [48], or 'louder' community voices to become more dominant in conversations. Moreover, some participants may have

higher levels of knowledge or cultural capital influencing confidence to contribute [48]. Instead, cultural animation dissolves these hierarchies by placing the emphasis on completing collaborative activities, emphasising the importance of diverse forms of knowledge and thinking, requiring full group participation to address a question or problem and placing all participants outside of their normal experiences of participation. Moreover, because an animateur aims to 'hand over' the problem or questions, this helps remove the power imbalances between 'researchers' and 'subjects' [48]. Animateurs are typically non-expert in the topics being explored.

Second, one conceptual complexity of place imaginaries is that they become 'naturalised' (widely accepted) over time by different groups, and hence, treated as 'common sense' because of how they are performed by actors in their everyday experiences [6] Accordingly, the creative methods embodied in cultural animation focus on deep personal and collective introspection. Creative methods are increasingly recognised for their potential to tap in to "connections, associations, linkages of conscious and unconscious elements, memory and emotion" [47] (p.15), and hence are particularly useful for unearthing the individual and collective – but often hidden - "subjective meanings, narratives, and visions associated with… place and energy" [17].

Third, cultural animation places specific emphasis on translating complex technological concepts into accessible lay language, enabling participants to develop their understanding of the proposed STI irrespective of their backgrounds and knowledge.

### 3.3.2. *Employing cultural animation in this study: 'Who is Rugeley?'*

We held three online workshops titled 'Who is Rugeley?', which were co-designed by the authors and members of New Vic Borderlines. Participants were provided a broad overview of what a TDDSTI (SLES) was, what the ZCR project aimed to achieve, and provided emphasis on the place-specific design of the SLES.

Our objective was to begin by capturing the existing place imaginaries in the community; the socio-spatial characteristics, values, histories and beliefs deemed to be important to the community; evidence of opportunities and challenges in Rugeley (broadly defined) and to draw from local biographies pertaining to experiences with energy in the past and present. The workshops aimed to encourage participants to recognise their experiential embeddedness within Rugeley. The workshops then explored how a TDDSTI was seen to 'fit' within these existing Rugeley place imaginaries, what the expectations associated with a TDDSTI might be, and to explore how the imposition of a TDDSTI was

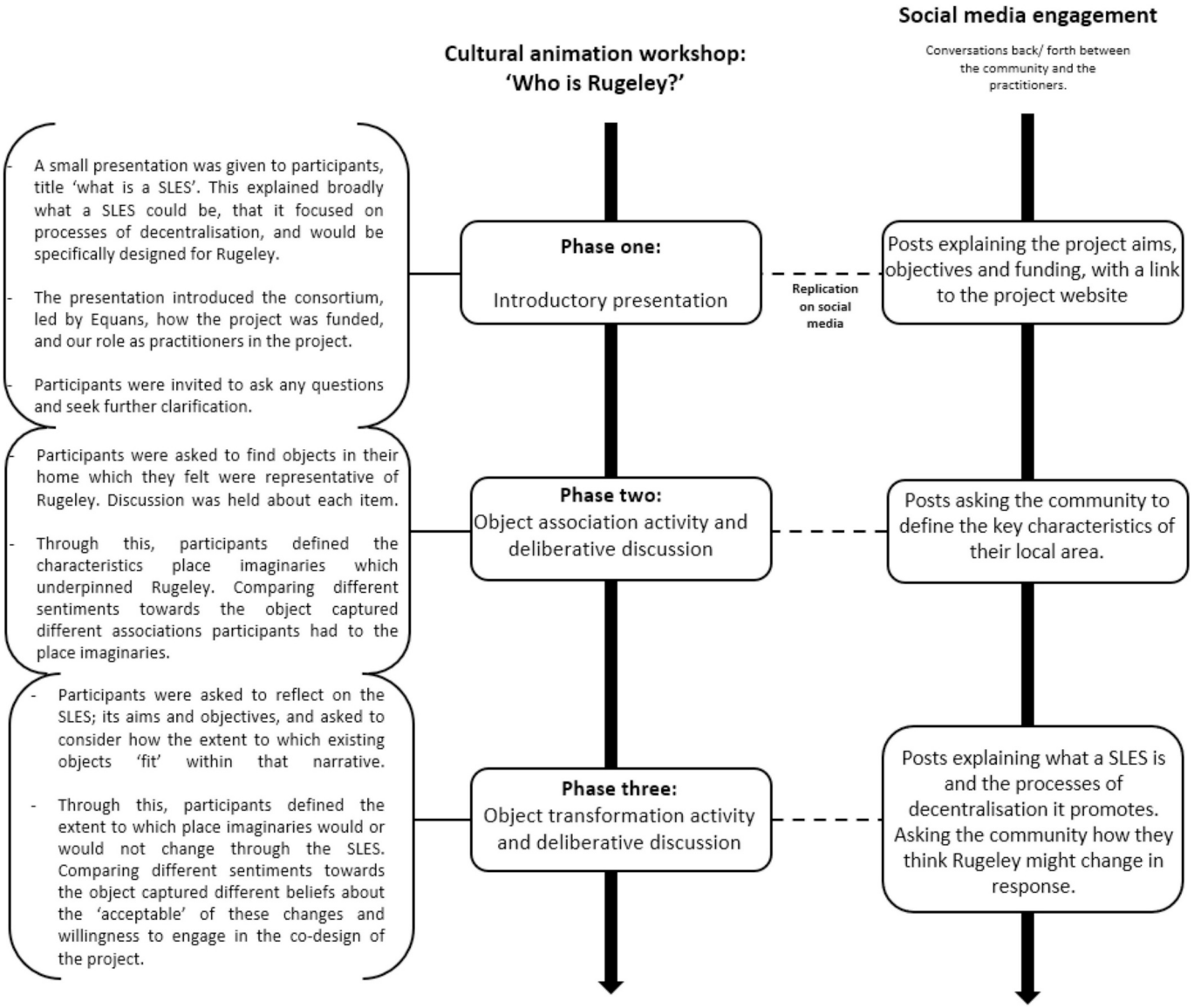


**Fig. 4.** The structure of cultural animation workshops and how these themes were extended to social media engagement to allow comparison between data sets.

seen to (re)configure relationships with energy. Three phases of activities and discussion were completed (Fig. 4).

Central to our approach was the use of processes of 'object association' and 'object transformation'.

*3.3.2.1. Object association.* The second phase of the workshop asked participants to collect objects within their home, present them to the group, and describe how that object was representative of Rugeley. This included its function, shape, texture, colour or where it originated from. As an example, one participant chose a piece of coal to draw attention to Rugeley's past involvement in electricity generation, and the socio-economic consequences which underpinned the closure of the local coal mine. Another chose plant cuttings taken from the local countryside to draw attention to the semi-rural character of the town. Accordingly, these objects helped illuminate the materialities of pre-existing place imaginaries, whilst concomitantly inviting participants to reflect on their experiential and emotional connections to those place imaginaries [48].

Once each object had been presented, others were invited to discuss their own perceptions of the object; the extent to which they agreed or disagreed with the sentiments that were attached to the object, or to offer alternative perspectives on how the object represented Rugeley. Progressively, we were able to build collective, though not uncontested, place imaginaries related to Rugeley.

*3.3.2.2. Object transformation.* The second phase of the workshop focused on object transformation. Here, participants were asked to hold up the objects they had collected once again. Through reference to the concept of a TDDSTI, participants were asked to discuss the extent to which those objects would still 'fit' in the future proposed by the TDDSTI. This process helped ascertain how they felt the TDDSTI currently matched existing place imaginaries in Rugeley; how it intersected with the pre-existing material and symbolic characteristics of those places.

### 3.3.3. Participant characteristics for cultural animation workshops

Participants were recruited through online advertisements on social media including existing and project-specific Facebook pages. All workshops were conducted online due to the Covid-19 pandemic lockdown restrictions restricting in-person research. Workshops lasted between 2 and 3 h and two workshops were conducted in total. A total of 10 participants were recruited (Table 2) ($n = 8$ for workshop 1; $n = 2$ for workshop 2). Gender and age characteristics were collected privately at the end of the workshop. Participants were diverse, having lived in the area over different lengths of time (Table 2).

**Table 2**
– Workshop participant (WP) characteristics. Note: to protect participant identities, age ranges have been used.

| Workshop Participant (WP) ID | Gender | Age range | Employment | Length of time living in Rugeley | Workshop attended: |
|---|---|---|---|---|---|
| 1 | Male | 40–49 | Employed – full time | Entire life | Workshop 1 |
| 2 | Female | 40–49 | Full time parent | 7 years | Workshop 1 |
| 3 | Male | 50–59 | Employed-part time | 18 years | Workshop 1 |
| 4 | Female | 60–69 | Retired | 20 years | Workshop 1 |
| 5 | Female | 40–49 | Self-employed | 27 years | Workshop 1 |
| 6 | Female | 40–49 | Full time parent | 12 years | Workshop 1 |
| 7 | Female | 30–39 | Employed-full time | 15 years | Workshop 1 |
| 8 | Female | 30–39 | Employed – part time | 8 years | Workshop 1 |
| 9 | Male | 60–69 | Self-employed | 3 years | Workshop 2 |
| 10 | Male | 30–39 | Employed – full time | 15 years | Workshop 2 |

Most participants that attended were interested in learning about the prospect of a TDDSTI in their local community and were engaged in other local sustainability activities. However, not all were fully supportive of the project, with many raising important questions about the affordability of home interventions, potential environmental disruption and degradation from the project, and scepticism about whether the project would ever come to fruition (e.g., beyond a design phase).

### 3.3.4. Social media engagement

For our second form of qualitative of data collection, we draw quotes from our social media engagement ($n = 244$ responses, 149 unique respondents). Social media engagement was offered to the local community as a less time intensive opportunity to provide perspectives on the TDDSTI. Social media explored the same topics and questions discussed in workshops (Fig. 4) (e.g., "what does Rugeley mean to you?"; "How would you define Rugeley?") but enabled us to reach a wider audience (although acknowledging challenges of digital exclusion for some). Rather than engaging in 'one-way data harvesting', the project team actively responded to participants' contributions and invited them to elaborate on their perspectives.

Discussions took place primarily on our public Facebook page (now closed). The page had a disclaimer stating that engagement would be used for research purposes. Participants were therefore recruited based on their decision to engage with social media. Socio-demographic data was not collected, other than gender (inferred from names/ profile pictures where possible). Social media contributions were used to consider the extent to which the sentiments collected in the cultural animation workshops were substantiated or challenged through online engagement, and to further examine the legitimacy of different place imaginaries from a wider audience. We looked for repeated themes (e.g., the relevance of the coal mining legacy in shaping ideas about Rugeley – see section 4). Overall, the use of social media proved to be effective in capturing the views of individuals who would be unlikely to participate in workshops, particularly more critical voices in the community, which were also less-represented in the cultural animation workshops.

### 3.3.5. Community gatekeeper interviews

To better understand the place-based distinctiveness of Rugeley, four interviews were conducted with local gatekeepers – defined as individuals engaged in leadership roles in the community and/or with local decision-making power - which included representatives from local charities, local councillors and local/ county government. They were selected through an extensive community mapping exercise which captured the local social networks which existed within the community.

Community gatekeepers were asked a range of questions pertaining to their perceptions of the local community, its socio-economic challenges, its history and heritage, and the likelihood of the community to participate in the engagement opportunities offered by the user-centric design of the project.

Overall, these interviews provided three benefits. First, they proved useful in evaluating any opportunities or barriers to local engagement, particularly in relation to other experience of engagement which might have been conducted with the community previously. Second, these actors held different perspectives on the socio-economic and cultural conditions of Rugeley (Table 3), which allowed us to 'sense check' the data from cultural animation workshops and social media. Third they helped contextualise the findings from cultural animation workshops from the perspectives of those working explicitly in supporting the Rugeley Community.

### 3.3.6. Secondary data

Finally, to capture project implementors acts of emplacement, place-making and place-framing, we draw upon secondary sources of

**Table 3**
Community gatekeeper interview participant characteristics. Participant names have been anonymised.

| Participant pseudonym | Professional background | Rugeley resident? |
|---|---|---|
| Paul | Manager – national fuel poverty charity | No |
| Jack | Community engagement – regional | No |
| Simon | Local councillor - Rugeley | Yes |
| Sarah | Local councillor - Rugeley | Yes |

information of relevance to the project. These include online news articles used by actors to communicate about the ZCR project, plus additional documents of relevance to the Innovate UK PFER programme (which are restricted for internal consortium use only). We also draw from our own subjective experience as practitioners working within the consortium.

Overall, the combined qualitative data used in this research is innovative in answering calls for "new data collection methods such as ethnography, diaries, life-history interviews and social media analysis" [48] (p. 3) in the context of energy research, and in relation to TDDSTI specifically. Traditional approaches in energy research have often been critiqued for their tendency to elicit elite or individualist representations of how people respond the energy innovation [43], or to be extractive and failing to empower local voices [46]. Our deliberative and creative approach seeks to build understanding of such issues by empowering participants to develop data largely independently.

### 3.4. Data analysis

Thematic analysis was conducted on all the data sets using NVivo by the lead author.

Cultural animation workshops were inductively analysed in two stages. First, they coded data in relation to discussions of place (i.e., phase two – Fig. 4). They also coded by focusing on the objects which were brought to the object association activity, the description of them and how they represented Rugeley, and the extent to which these sentiments were corroborated or challenged through group discussion. Through this, they were able to build themes which defined different place imaginaries. Then, focusing on the object transformation activity, they then examined how these objects were envisaged to 'fit' in a future Rugeley which had a TDDSTI. Throughout this process, social media data was then compared to these established themes (see Fig. 4) – looking for key words and sentiments which matched or conflicted with place imaginaries identified through the workshops.

Community gatekeeper interviews were analysed inductively, looking for evidence of consistency in how Rugeley was defined, the extent to which gatekeepers thought the community might respond to the project, and the extent to which they thought the community might engage.

Secondary data was deductively analysed in two stages. First, they evaluated the key discourses underpinning the TDDSTI and the underlying motivations and narratives for developing the project (presented at the start of the workshops). These were compared with our own subjective experiences as practitioners in the project. They then assessed how specific place-based characteristics of Rugeley were drawn upon within these documents, using the concepts of emplacement, place-making and place-framing to guide our analyses.

Through comparing these data sets, we built a cumulative picture of the characteristics of place imaginaries. This analysis was then shared with the co-author and checked for rigour, so that key themes and codes were agreed.

### 3.5. Author positionality

The authors of this paper have complex and blurred roles as both researchers and practitioners who were employed as project partners to design and deliver the community-engagement for the ZCR project. Hence, the primary data collection outlined above also served the twin functions of informing various aspects of the industry-led ZCR project itself (through the community-centric design approach to which the project aspired) and as research data. The authors therefore hold positions as 'outsiders' to the Rugeley community itself, and 'insiders' (in the role of practitioner) to the ZCR project itself. The nature of the project 'insider', practitioner role, which took place over three years, meant that relationships were also developed with engaged community members over this time.

There has been extensive debate on the merits of researcher insider/outsider relationships within communities under study and increasing acknowledgement that this dichotomy can be more complex with emphasis on the relative nature of researcher's identities according to specific research contexts [52] [53].

The blurred roles of researcher/practitioner, insider/outsider of the authors inevitably has had potential implications to the research in how it is executed, analysed, and used. Being an 'insider' to the industry-led ZCR project may have led to unconscious biases in the execution of the research which is more sympathetic to the ZCR project approaches as part of a coalition of actors engaged in legitimising the TDDSTI. Yet, many facets of the project, including the chosen locality and project boundaries were decided without the input of the authors during the earlier scoping and bidding for the project funding.

We also argue that the practitioner role of the authors, emphasising and creating mechanisms for the role of the community voice within the ZCR project design and delivery throughout and providing various channels for information and two-way communication has led to less extractive research practices than may otherwise be the case. Therefore, we argue that the role of community-centric design, and the blurred researcher-practitioner role, has avoided the risks of a 'doubly extractive setting' where both extractive relationships from developers and researchers exist [54], with the practitioner role creating a clear route for the 'extracted' data to inform the industry-led ZCR project team and help give voice to the community.

A further potential advantage of the blurred researcher-practitioner roles of the authors is the tacit knowledge about the ZCR project and the actors within it that will have informed the research, providing an account which is more truly emplaced within both the place, community and project, than that which can be achieved through traditional, distanced, and often extractive, yet ostensibly more 'objective' research approaches.

The reflexive practice of the authors' and consideration of positionality throughout their engagement as researchers and practitioners involved in the ZCR project has enabled explicit recognition of the authors' diverse roles and responsibilities and their positions of power and relationships within the study between both community members, local gatekeepers and project partners [52] which has informed this research.

## 4. Results

This section presents the results of the analyses. Following Fig. 1, section 4.1 outlines the practices of emplacement, place-framing and place-making employed by project implementors to legitimate ZCR (see Fig. 5). Section 4.2 outlines two place imaginaries identified by community actors: a 'natural' Rugeley place imaginary, and an 'energy heritage' place imaginary (Fig. 6), and which have diverse positive and negative associations from community actors. We examine how project implementors attempts at emplacement, place-framing and place-making connect to these place imaginaries, and then, how the 'acceptability' of ZCR – and willingness to engage in project co-design - are refracted through these two place imaginaries.

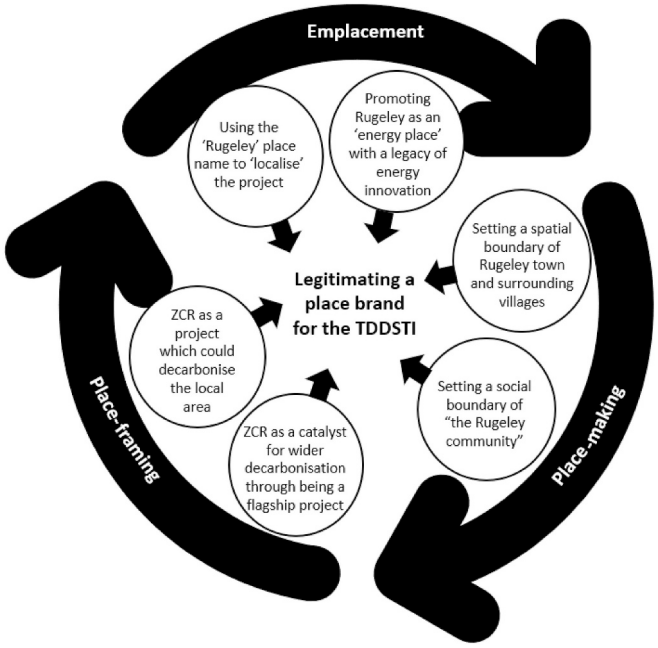


**Fig. 5.** The specific acts of emplacement, place-making and place-framing employed in the ZCE TDDSTI.

### *4.1. Legitimating ZCR through practices of emplacement, place-framing, and place-making*

#### *4.1.1. Emplacing ZCR*

Practices of emplacement involve drawing upon the physical, cultural and social -psychological qualities of a place to promote its distinctiveness can including the use of place names as a form of branding. We identified two practices of this form of emplacement. First, the project name includes the place name – Zero Carbon 'Rugeley'. Through our experiences as implementors, we understood this was a strategic decision; an attempt to help personalise the project and promote it as 'local' and centred on Rugeley specifically.

Second, project implementors strategically constructed a representation of Rugeley as an "energy place" [40] (p. 11) - a form of place-branding. For example, in press releases - which were written by consortium leads EQUANS - Rugeley was represented as "a town that has for many years been reliant on its coal industry, for generations, energy has been part of its story" [56] (no page number). This represented Rugeley as a palimpsest of resource extraction and energy generation processes, with terms such as "many years", "generations" and "story" creating a distinct sense of longevity underpinning Rugeley's energy heritage.

Combined, these practices of emplacement served as a way through which to legitimate the TDDSTI, situating it as another layer on top of a pre-existing palimpsest of energy history. Throughout the press releases, phrases such as "maintain[ing] the essence of a place while at the same time speaking to its future" [56] and "neatly uses the legacy of the coal-powered energy industry as an opportunity to reimagine the way a whole town generates, stores, uses and shares energy at a local level" [56] create a connection across time, which link Rugeley's energy heritage to the TDDSTI.

#### *4.1.2. Place-framing in ZCR*

Previous research has illustrated how TDDSTI projects often 'frame' places through the articulation of non-project goals [3]. In ZCR, both local and non-local project goals were evident. Local project goals centred on local decarbonisation, for example, through low carbon travel or retrofit. Non-local goals were centred on global decarbonisation efforts, representing Rugeley as a flagship scheme that "could catalyse systems change [other TDDSTI] in a wider area" [56] (no page number).

Achieving these goals was framed as contingent on community participation, co-design (where possible) and potential behavioural change, which in part determined the interest EQUANS had in emphasising community engagement in the project:

*"At the centre of this pioneering project is the Rugeley community… [We are] using innovative community engagement methodologies to ensure the wants and needs of the community are addressed. Zero Carbon Rugeley will create "a bespoke Rugeley SLES", not simply an "SLES for Rugeley".* [54] *(no page number).*

In sum, through place-framing, the ZCR project was simultaneously framed as having multi-scalar aims, with emphasis on the importance of Rugeley as a catalyst for change.

#### *4.1.3. Place-making in ZCR*

Previous research has shown how project implementors draw on flexible and fluid constructions of the 'local' to define who is included and who is excluded from being part of a TDDSTI [6], as well as *how* project stakeholders enable and expect participation in the TDDSTI [40]. The placing of project boundaries has implications for place identities and attachments with implications for community-centric design approaches [58].

From an implementer perspective, upon joining the project, we were presented with social and spatial boundaries of ZCR – a map showing the extent of the town and surrounding villages (shown in Fig. 2). This also reflected the proposed social boundary of ZCR; the population that could be directly affected by the TDDSTI. These processes of place-making were made in isolation of the community – and the authors as practitioners - despite the community-centric ethos of the project, again demonstrating the top-down decision-making which underpinned the project.

#### *4.1.4. Summarising practices of legitimation*

Overall, these practices of emplacement, place-framing and place-making were strongly interconnected. For example, using the Rugeley place name (emplacement) reinforced the social and spatial boundaries set within the project (place-making) (Fig. 5). Otherwise, the positioning of ZCR as a design project which could catalyse other TDDSTI (place-framing) was reinforced through framing Rugeley as an 'energy place' (emplacement), situating its importance within the UK's energy history as a longstanding space of energy innovation. Hence, through these practices, project implementors developed both an overarching place-brand for the ZCR project, whilst concomitantly legitimating the uniqueness of the project.

### *4.2. How practices of emplacement, place-framing and place-making refract through the place imaginary lenses held by community actors*

In this section, we address both how project implementors try to legitimise the project through place, and how the community responds to these practices of emplacement, place-making, and place-framing by examining the different place imaginaries held by community actors in Rugeley, and the extent to which practices of emplacement, place-framing and place-making are refracted through the community's place imaginaries. We have consolidated these findings on Fig. 6, synthesising findings from the cultural animation workshops and social media and how these shape perspectives on the acceptability of the TDDSTI.

Two interrelated place imaginaries were revealed: a 'Natural Rugeley' place imaginary, and an 'Energy heritage' place imaginary.

#### *4.2.1. The natural Rugeley place imaginary*

Community actors identified a 'Natural Rugeley' place imaginary (left side, Fig. 6), founded upon the characteristics of the countryside; the greenbelt, wildlife and forest (SM1; SM2; WP8a, WP1b, WP6). Through the cultural animation workshops community actors brought potted plants, decorations made from local conkers, and plant cuttings

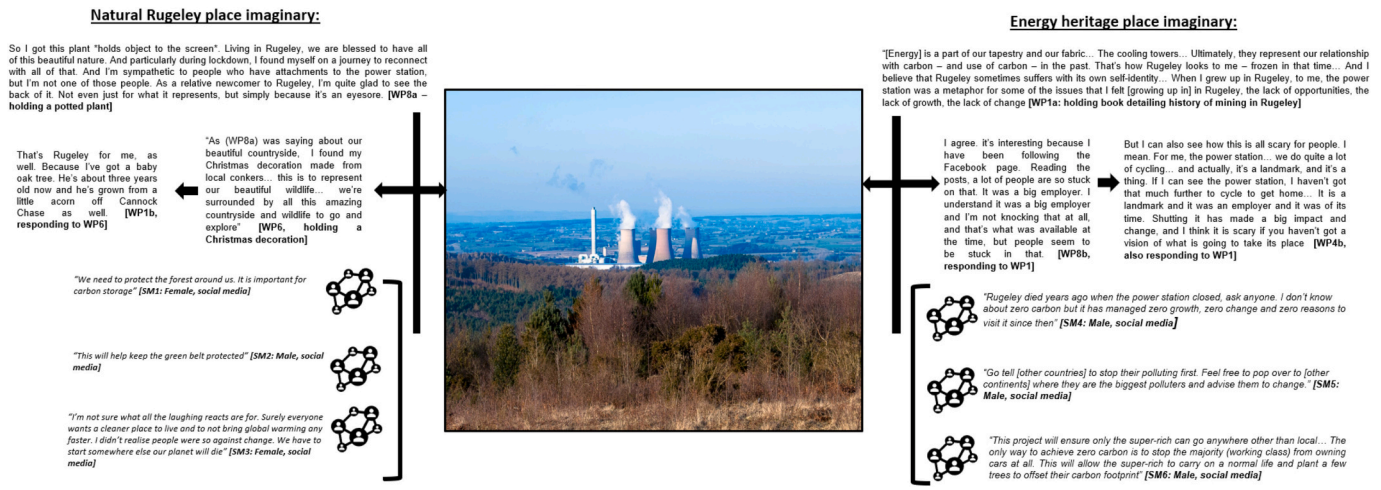


**Fig. 6.** The outputs of the cultural animation and social media engagement activities, revealing the 'natural Rugeley' and 'energy heritage' place imaginaries held by community actors in Rugeley (Image credit: user: Bs0u10e01; used under creative commons 4.0: https://creativecommons.org/licenses/by-sa/4.0/).

to exemplify this place imaginary. Through discussion, some community actors revealed how they had first met each other whilst hiking in this landscape or had rediscovered their passion for the countryside through engaging in such processes (WP8a). This situates this place imaginary as foundational to developing local social cohesion for some as it is performed. Hence, community actors demonstrated strong attachments to the 'natural Rugeley 'place imaginary. Of particular interest is how community actors took these items from the surrounding landscape and brought them into their homes, using them both to fashion new objects (the decoration), or as a reminder of the importance of this place imaginary to them within their personal and private spaces. Individuals who referenced this place imaginary were often involved in other local sustainability initiatives, including organising litter picks, running a 'Plastic Free Rugeley' group, or with careers based around sustainability.

This place imaginary is not strongly reflected in the practices of emplacement, place-making or place-framing (section 4.1) by project implementors and hence is less strongly represented in the subsequent 'place brand' created for Rugeley, which reflects the energy focus of the project funding and lead project implementors.

Nonetheless, we found that some individuals that referenced this place imaginary were often highly motivated by the ambitions of the project. As exemplified by WP2 below, the use of the Rugeley place name in the project (emplacement), and practices of place making which centred on the social and spatial boundaries of Rugeley, seemingly offered hope for a more sustainable future. Accordingly, they were receptive to place-making efforts of the project, displaying a sense of pride that Rugeley could be at the forefront of these efforts:

*[ZCR] does give me some hope for the future. I like the idea that there is a generation out there that are growing up in Rugeley that will be inspired and interested in these sorts of things. It's only when we sit down and have these conversations that we realise they're in our own backdoor in Rugeley. They are happening. There are people there.* **[WP2] .**

### *4.2.2. Energy heritage place imaginary*

Second, and more prevalent in the data, community actors represented an 'energy heritage' place imaginary; centred on the coal mining and subsequent electricity production legacy of Rugeley. Through object association, workshop participants brought items such as local mining history books and pieces of coal were presented to the group. Some used their camera to show how the cooling towers from the Rugeley power stations (see image on Fig. 6) were visible in the landscape from their homes.

Workshop discussions (right side; Fig. 6) – coupled with the selection of objects - demonstrate how the presence of the cooling towers served as both a symbolic and material reminder of Rugeley's energy history, upon which the present lived experiences of residing in Rugeley were navigated. Participants focused upon the materialities of the piece of coal; notably the black stains it left on a participant's hand and the dark colour, which shaped references to the "unclean", "polluting" and "carbon-centric" legacy underpinning this place imaginary.

We identified complex and multi-faceted associations to this place imaginary. Some described the cooling towers as a "landmark" which represented 'home' (WP4, Fig. 6), or shared positive childhood memories, reminiscing about their relatives working in the coal industry. However, others felt it reflected longstanding poor socio-economic conditions they had experienced growing up in Rugeley (WP1c, Fig. 6), whilst social media participants focused on the implications since its closure, such as a lack of job opportunities (WP4b; SM3, SM4, Fig. 6).

There are clear connections between this place imaginary and the practices of emplacement (section 4.1) centred on Rugeley's energy heritage. However, these practices of emplacement are comparatively superficial; only promoting a positive association to the energy legacy which failed to account for these negative associations and lived experiences.

Nonetheless, we identified different responses towards the TDDSTI based on these negative representations. As noted by WP1 and WP6 below, through the process of object transformation, the TDDSTI offered a positive opportunity to challenge the negative associations they held towards this place imaginary:

***Looking at a piece of coal** I think we've probably got a hangover in our use of carbon [in Rugeley]. That's what brings us all here today, isn't it? What we're left with is that backdrop of where we started. But through schemes like this [ZCR], we can take our relationship with carbon and adapt that and change for a better and a brighter future* ***[WP1].***

*I think it's this idea of legacy for me. That's something that keeps coming up here… And there's something about the legacy we've created in Rugeley, that we shaped in Rugeley, and then maybe the legacy we want to leave in the future through a sustainable project like this.* ***[WP6, referencing WP1 holding up a piece of coal].***

Others continued to focus on the negative implications following the closure of the power station (SM3, Fig. 6). Concerning place-making and place-framing many social media responses challenged the idea that the Rugeley community should have responsibility as leaders for global decarbonisation efforts (SM6; SM7, Fig. 6), given the perceived negligible contributions to global carbon emissions made by the community compared to other countries (SM6) or by the 'elite' (SM7).

Community gatekeepers provided insightful context for these different responses. Below, Paul and Jack both represent Rugeley as "two bits", defined by the populations residing in different parts of Rugeley; distinctive eras of housing development linked to the coal-mining legacies and 'energy heritage' place imaginaries, with former mining estates likely to be more resistive to ZCR:

*"There's definitely two bits to Rugeley. There are the estates, and there are the old Georgian houses. So [with the former] there's the ex-mining estates and that cohort, and [with the latter] there are the people that have been brought by the new service jobs, and things like the Towers Industrial Estate"* **[Paul].**

*"The other side of Rugeley's an easier sell… The [ex-mining] estates will be a tougher sell… They're a very, very closed community. The other side - completely different. Easy sell. You'll be able to talk to them, explain to them.* **[Jack].**

Another gatekeeper, Simon, identifies that these perceptions are deeply entrenched, and might shape willingness to engage in the project:

*Their heritage should give them a good basis in understanding for some of the [climate change] challenges we're faced with. Unfortunately, it* ***probably leads them away from engaging with this situation****. Some have an* ***old school mentality towards our energy production*** *that is generally carbon based through the burning of fossil fuels. How do you reach those people? I'm not sure* ***[Simon].***

This suggests that the attempts at place-making in ZCR were overly narrow and disconnected from the intra-local socio-spatial experiences of living in Rugeley.

The choice of energy-related objects may have been influenced for some by the project narrative that was provided to participants before being asked to find objects that represented their perceptions of Rugeley. However, the gatekeeper interviews provide effective triangulation of the importance of energy as one of Rugeley's place imaginaries.

## 5. Discussion

Existing research has exemplified how project implementors can engage in spatial thinking – using practices of emplacement, place-making and place-framing (Table 1) to legitimate why Top-Down Decentralised Energy Systems (TDDSTI) 'fit' in specific places [6]. STI pre-date the deployment of specific energy technologies, representing the "diversity of actors, stories, discourses, imaginings and practices at different scales" that shape energy futures in specific places [33] (p. 210). This study aimed to develop this line of enquiry by exploring how the community actors - situated within those places - respond to those practices of legitimation.

To accomplish this, we adopted a critical-spatial perspective on low carbon energy transitions [5], which viewed these practices of legitimation and contestation as strategic and selective attempts to utilise place-specific characteristics to support or contest sociotechnical agendas. Moreover, we examined how place imaginaries – collective and/or contested representations of places which are performed by community actors – provided different lenses which differentially 'refracted' these responses (Fig. 1).

Three important insights have been generated from these analyses, and which have distinct implications for future academic research and top-down approaches to decentralisation and decarbonisation more broadly.

### 5.1. Fixed boundary-making and the legitimation of TDDSTI

First, our study demonstrates how practices of emplacement, place-making and place-framing are deeply interconnected processes, each sustaining the other (Fig. 5). Project implementors represented Rugeley as a place with a carbon-intensive past (emplacement), a historic role in centralised energy production (place-framing), and hence a place that has championed different eras of sociotechnical change over time, promoting its suitability as a place-based catalyst for TDDSTI (place-making) [57]. These acts reflect selective and strategic practices of legitimation, aiming to develop an interconnected project-place brand that would make ZCR 'self-propelling' for the duration of the project [59].

However, in contrast to Walker et al.'s [7] concept of 'adaptive boundary-making' – whereby project implementors view places as flexible and temporary containers – we suggest that ZCR was rather more a process of 'fixed boundary-making' which is contingent on temporal (energy heritage) and socio-spatial (fixed project and social boundaries) fixities to anchor it in place. These fixities sought to mask the 'fuzzy' technological dimensions of the project, offering flexibility within the design process of ZCR to develop suitable technological solutions.

Hence, focusing on the distinction of TDDSTI - as 'top-down' constructs implemented by coalitions of public-private actors aiming for capital growth - this technological fuzziness but place-based certainties could create social injustices, whereby the project goals and technological solutions that communities are presented with may shift. Because of this, social injustices can emerge, as the lack of bottom-up thinking in deciding to focus on Rugeley raises important questions about "who does the imagining and who can speak for the future of places" ([29], p. 6). Evidenced here is how fuzzy TDDSTI which consolidate specifically on a place can transmit social anxieties, or shared fears about the future [57].

### 5.2. Socio-spatial generalisations can undermine fixed-boundary making in TDDSTI

Second, evidenced in the analyses is how this overarching project-place brand were founded upon generalisations that ignore important socio-spatial nuances in Rugeley, and which paradoxically undermined acts of fixed boundary-making. Analyses reveal that project implementors overlooked important intra-local and multi-generational associations to the 'energy heritage' place imaginary, connections to which were spatially differentiated by housing developments - longstanding established communities with distinct emotional connections to the mining and power station legacies (a sense of loss – WP4b; SM4, Fig. 6). Otherwise, analyses reflect different positive and negative associations towards Rugeley's past from community actors external to these places, including those wanted to move beyond this energy heritage (WP1a, Fig. 6), and those who were nervous about the 'fuzziness' of the TDDSTI in relation to these fixities (WP4b).

We suggest that the concept of 'imagined publics' - shared ideas about imagined 'lay people' that circulate within networks of experts or stakeholders [5] – can help contextualise these generalisations further. Imagined publics are typically distinguished by 'Publics in Particular' (PiPs) - constructs which focus upon the specific socio-spatial characteristics and nuances of a population within a place compared to other places - and 'Publics in General' (PiGs) - which are often broad and unspecific representations of the public [5]. Our analyses suggest that project implementors 'one-size-fits-all' attempt at place-making arose from utilising PiGs (e.g. the Rugeley community) and failing to distinguish between intra-local and spatially differentiated PiPs.

Overall, this suggests that project implementors fell into the 'local trap' prevalent in other decentralised energy projects [44]. Despite the emphasis on co-design in ZCR, acts of emplacement, place-making and place-framing were made without community involvement, ignoring important local knowledge [45] [46] [47], and without insight from the authors as practitioners and with social science expertise which could have been impactful in navigating that trap. Again, this raises important questions about how democratic TDDSTI are and emphasises the need for projects 'top-down' projects to be more inclusive at the early stages of their conception.

### 5.3. Place imaginaries refract ideas about 'local' places catalysing global decarbonisation efforts

Third, and related, we have demonstrated the distinct role of pre-existing place imaginaries have in shaping divergent community responses to TDDSTI, particularly in relation to the non-local goals of decarbonisation.

Evident within our analyses are contested beliefs that community actors that Rugeley should champion low carbon futures through engaging in ZCR. Though many community actors recognised Rugeley's legacy as an energy place, this framing of the TDDSTI as another layer on top of a palimpsest of energy heritage did not axiomatically shape positive responses towards the local and non-local goals of project, nor increase willingness to engage in the project. Instead, the "old school" and carbon-centric mentality of some in Rugeley was seen to "lead people away" from engaging in ZCR. Community gatekeepers emphasised how those in ex-mining communities were working class with strong community cohesion, who had progressively 'lost' when it comes to energy. This 'losses appeared to sustain this cohesion by creating a shared identity for ex-mining individuals.

Instead, we found it more likely that those who felt stronger 'attachments' to the 'natural Rugeley' place imaginary (though we employ this term cautiously as we did not set out to measure attachment specifically [17]) were willing to engage in the project, notably because they were individuals already engaged in other sustainability initiatives, which was also ignored in emplacement, place-making and place-framing efforts.

Equally, it is highly plausible that other Rugeley place imaginaries are circulating which were not captured in this study, as suggested by our theoretical framework (Fig. 1). However, given the robust analytical process employed in the study, and strong evidence of data saturation, we contend that these alternative place imaginaries may be less prominent. This echoes previous findings from Peacock and Devine-Wright [5] that place imaginaries can be 'established' – concretised over time by collectives of people and imbued with historical and material legitimacy – or 'emerging' – newly constructed and undergoing negotiation to become concretised. Accordingly, our analyses may have captured the more established place imaginaries in Rugeley. Moreover, as practitioners leading engagement, participation in this engagement may have also shaped new place imaginaries. This is emphasised strongly in Fig. 6, where some participants envisioned a future Rugeley which was transformed by ZCR.

Overall, these findings reify the socio-spatial complexities of 'local' places. In particular, they emphasise the value of adopting critical-spatial approaches to such places, which can sufficiently interrogate and illuminate these complexities [5].

### 5.4. Cultural animation and social media are productive methods for capturing place imaginaries

Fourth, our study has shown the value of creative and online social media methods for capturing place imaginaries. Through cultural animations, processes of object association were vital in elucidating the material, symbolic and emotional characteristics of place imaginaries, whilst object transformation activities helped assess how those characteristics are seen to fit within potential low carbon energy futures. The strength of these methods is in their ability to create a rich and reflexive setting. This is useful for investigating place imaginaries, since their performative and embodied dimensions [29] – and subsequent 'naturalisation' (accepted as common sense) over time [5] - means they can become implicit and hidden for people.

In particular, cultural animation helped participants to focus on 'otherings' – the belief that certain people, places or ideas are naturally different and unequal" within their community [5] (p. 511). Through the combined use of objects and deliberative discussion, these cultural animation techniques promoted a deep introspectiveness amongst participants, forcing them to and consider what is/ is not related to these materialities, and helping them to move outside their own perceptions of socio-spatial reality.

Social media was a very complementary method of engagement alongside cultural animation, not only in promoting workshops and events, but also offering a less time-consuming method for the community to engage with project co-creation. A key reflection is that social media engagement works best when all comments are replied to, regardless of their support of the project, offering participants to opportunity to reify or reflect upon their thoughts over a longer period of time.

An important consideration pertains to the more typically positive responses represented by cultural animation workshop participants compared to the more typically negative responses represented through social media engagement. There are nuances evident within this binary categorisation, and we were unable to collate data specifically on social media users' political views or beliefs (e.g., the extent to which they support low carbon or net zero policies). However, we conjecture that the greater time commitment required to attend workshops may have attracted those who subscribed to the 'zero carbon' framing of the project, whilst comparatively disengaging those who did not. Alternatively, social media offers an opportunity to critique the project from a distance. Nonetheless, this does reify the need for pluralistic approaches to community engagement and public deliberation in place(s) to ensure that these intra local nuances are captured.

## 6. Conclusions

The localisation of energy generation, storage, transmission and consumption through decentralised STI has often been associated with more socially just outcomes [3] [7], including greater degrees of community participation, decision making, ownership [8], and higher degrees of community acceptance [9]. However, emergent top-down approaches to decentralisation (TDDSTI) are becoming more prominent [10], and which can undermine these benefits. This requires greater scrutiny of how project implementors aim to legitimate TDDSTI in different places, and how communities respond to those practices. Evaluating community responses to TDDSTI has been regarded as an important gap within the literature [3]. We aimed to address this gap.

Overall, this research demonstrates that TDDSTI are imperfect, and raise questions about whether external social forces (project implementors) that consolidate on places can achieve "more just and sustainable societies… within the very same socio-economic and political structures that produce, use and capitalise fossil fuels for economic growth" [11] (p. 5).

There are two policy implications. First, ZCR represents a potential policy shift in the UK from community energy to 'local' energy with potential to exclude the community *vis a vis* the prioritisation of more powerful market actors [40]. ZCR was unique in that it had a dedicated user-centric design and community engagement work package. However, much of the decision-making in the project was made ahead of mobilising engagement practices with the community, reflecting tensions in the delivery of genuinely user-centric design in TDDSTI. Findings show that issues of power are prominent in community responses to TDDSTI, and there is a need to ensure communities are, at minimum, included in processes of co-design from the very beginning. Preferably, community actors should be empowered as active partners in decision-making to support a just transition.

The second policy implication is a conceptual paradox regarding the desire to 'scale up' local energy system design; if it is truly able to address the "unique qualities and characteristics of different communities living in different spatial areas". Moreover, our research has shown that replicability through place framing, place-making, and emplacement may only be effective for sustainability-oriented individuals, or those disillusioned with pre-existing local socio-economic contexts (levels of deprivation, for example). Yet, it is notable that

more recent funding for place-based decarbonisation programmes, extend beyond singular concerns of 'energy' to include pillars encompassing green spaces and nature [58]. Projects which incorporate wider sustainability aspects, such as green spaces and nature into their emplacement, place-making and place-framing may align more closely with a broader set of community-held place imaginaries, and through this reduce disparities between project and community place imaginaries.

This research has some limitations. First, though we used social media as a tool to further engagement and 'sense check' workshop findings, we were unable to collect other demographic characteristics (e.g., age, socio-economic status; other than gender, which was dubiously inferred based on profile pictures) which could be used to interpret the data more rigorously. Second, the cultural animation workshops had small and uneven numbers of participants ($n = 8$; $n = 2$). This means that greater bias was likely placed on the analyses of the first workshop. However, we contend that similar findings were found across both workshops, particularly the legitimacy of the 'natural Rugeley' and 'energy heritage' place imaginaries, and that social media helped extend our reach of voices captured in our results. Third, our analyses of acts of emplacement, place-making and place-framing are based on subjective experience, coupled with analyses of a limited number of project websites and blogs promoting the project. Some internal documents utilised are restricted for consortium use only and cannot be shared. In hindsight, we could have interviewed project implementors to capture the extent to which the collective place-brand for the project was hegemonically shared amongst all project implementors within the consortium.

We suggest that future research should continue to test these findings in other TDDSTI – or decentralised STI (e.g., bottom up) - contexts, particularly in communities which may not have a strong energy generation heritage. Ensuring a diversity of places within research and practice is critical to robust theory building both for social science literature on TDDSTI and other decentralised energy projects. Furthermore, the use of longitudinal studies to capture how initial community reactions to TDDSTI might evolve over time through sustained engagement – ranging from tokenism to legitimate co-design [58,61] - would improve practical understandings of the application of engagement tools/methods.

## CRediT authorship contribution statement

**Adam Peacock:** Writing – review & editing, Writing – original draft, Visualization, Project administration, Methodology, Investigation, Data curation, Conceptualization. **Zoe Robinson:** Writing – review & editing, Writing – original draft, Supervision, Project administration, Funding acquisition, Formal analysis, Conceptualization.

## Declaration of competing interest

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## Data availability

The data that has been used is confidential.

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