

Who has the power? On engagement and ownership in district heating schemes in the UK and Sweden.

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Abstract

District heating (DH) schemes linked to Energy from Waste (EfW) and Biomass facilities have been championed for their potential to decarbonise heating yet their role in energy policy is contested. These schemes are a unique intersection between two vital environmental

policy agendas - waste and energy - and can offer opportunities for citizens to affect both environmental agendas and future energy infrastructures.

Much has been written on the technical opportunities of DH and its policy landscape. This paper explores an important missing piece, to explore to what extent and how DH schemes support citizen engagement in local heat infrastructure decision-making. The benefits of citizen engagement are understood but there is currently no clear and consistent implementation of stakeholder engagement policy in this area. Evidence from four qualitative case studies is presented from the UK and Sweden to investigate strategies used by developers and operators to engage with stakeholders and how this influences their decision-making. However, limited examples of bottom-up, unplanned moments of citizen engagement were found as practice fails to live up to theory and policy rhetoric: ownership structures came through in our research as a key factor in this disconnect.

Keywords

District heating, energy from waste, citizen engagement, governance

1. Introduction

District heating has a potentially vital part to play in Net Zero 2050 strategies. The International Energy Agency (IEA, 2021) argues that to reach net zero the collective share of renewable sources and electricity in global district heat supplies together need to increase from 8% globally to about 35% in the next ten years. In a period of acute energy security challenges, the potential use of alternative heating sources to gas provides an additional policy rationale. Any sustained change of course requires ambitious national policy and effective local adoption by municipalities and their citizens. There is an emerging body of energy studies literature exploring this topic and the lessons to be learnt from existing practice, particularly in countries with high levels of DH uptake, like Denmark and Sweden (REFs). This paper adds to that debate by exploring citizen engagement in low carbon district heat networks using case studies from England and Sweden. Drawing on theories of citizen engagement, it helps to provide better understanding of changing policy, practice and the impact of ownership structures for how heat network providers engage with citizens, in a context of historic dis-engagement and 'invisibility' of heat infrastructure (Ambrose, 2020). Conceptually the paper opens up tensions between focusing on highlighting different publics and their emergence across different sites of participation and investigating the differential possibilities for empowerment or influencing decisions between different forms and sites of citizen engagement and participation. In particular we highlight the need to consider how governance, ownership and the material configuration of energy infrastructures shape power relations that impact on the possibilities to build meaningful citizen participation.

Any investigation into citizen participation in energy systems must be set in the context of changes to energy system governance over the last 30 years, across the global north. This

period saw a move away from state ownership of energy production, distribution and supply to increasing focus on creation and maintenance of competitive energy markets. This has been overseen at an international level by organisations such as the European Commission, who have implemented programmes to privatise and ‘liberalise’ energy systems (Eadson and Foden, 2019). Energy markets are now the predominant means of organising production, distribution and supply, even where state bodies retain ownership of some institutions. These markets have often not provided clear benefits for energy users and have required a series of measures to regulate markets to address lack of transparency, weak competition and in some case market abuses (Nolden et al, 2022).

District heating prevalence varies across Europe. For example, while in Sweden over half of heat supply is provided by district heating (55% in 2014; Werner, 2017), it remains a small proportion (under 2%) of the UK’s overall heat supply (Ambrose et al, 2016). There are also differences in organisation and ownership of district heat systems. In the UK, district heating systems set up prior to 1990 were predominantly local authority owned. Over the last 30 years many of these have been leased out or transferred to private sector organisations, and new systems have tended to be developed as joint ventures between local authorities and private sector organisations, or in some cases as entirely private sector-led, with private sector organisations managing supply arrangements. Some examples of alternative, non-profit ownership structures do exist – such as in Nottingham, where the district heating system is managed by a partnership of local authority and voluntary sector organisations. Swedish municipalities have traditionally played key roles as suppliers of gas, electricity, and district heating to households, more so than in the UK. However, like in the UK, deregulation of the electricity market in 1996 led to privatisation of many municipal energy companies (Wretling

et al., 2018) and correspondingly ownership of district heating systems in Sweden has also become predominantly liberalised (Magnusson, 2016).

Regardless of energy source and across prevalent ownership models, energy users remain distanced from the technicalities of where their heat and power come from, in part reflecting the predominance of centralised energy supply (Soutar and Mitchell, 2018). From a user perspective, energy markets deliver relatively homogeneous products, making energy difficult to marketize as a consumer good (Giulietti et al, 2005) and distancing energy users from energy systems, fuelling what is commonly referred to as 'energy invisibility' (Ambrose 2020).

This paper proceeds as follows. After a review of contemporary themes in citizen engagement the methodology is presented before discussing the policy implications for citizen engagement. The four case studies are then discussed before the final conclusions and policy recommendations.

2. Contemporary themes in citizen engagement

Citizen engagement in decision-making is important for better governance and achieving societally beneficial outcomes. Sovacool (2014) notes three key benefits of citizen engagement: First, democracy is increased as all citizens have a right to participate and be represented in environmental decision making; second, non-experts are often more attuned to the ethical issues of a situation; and third, greater acceptance can often be achieved by involving all those affected by the particular situation the engagement is focused on. A fourth benefit that is often overlooked is that processes of public engagement can create conditions for social learning which can potentially lead to behaviour change (Bull et al. 2008).

While citizen engagement is recognised as important for making policy decisions, engagement and/or participation takes a wide range of forms, which also vary in the extent that they are empowering and participatory. Viewed as a seminal model of participation, Arnstein's (1969) ladder of participation defined practical steps to empowerment (Figure 1). She advanced the normative and ethical argument that citizen involvement is an improved and more just way of governing society. Further, she saw participation as having the potential for empowerment, supporting redistribution of power to those traditionally excluded from political and economic processes whilst creating a route for citizens to participate in social reform (Arnstein 1969).

INSERT FIGURE 1

Contemporary debates in the space of citizen engagement in energy systems have moved beyond evaluating single stand-alone examples of participation to considering both the systemic context of participation (Chilvers & Longhurst 2016) and on-going emergent dimensions to engagement (van Veelen & Eadson, 2020). Questions have also been asked of the validity of Arnstein's ladder and the dismissal of engagement that does not result in empowerment (Zakhour, 2020).

Chilvers and Longhurst (2016) emphasise four benefits of viewing participation from a systemic perspective. First, the need to view participation through a systemic lens and not isolate individual acts of engagement; second, this perspective expands what participation may look like; and third, this in turn changes the actor dynamics within participation and how people are enrolled. Finally, it stresses the importance of political or systemic change.

Practically this manifests itself, for example, in how publics are framed in the process of engagement. In mainstream approaches to engagement, as outlined above, the public are a defined group who are 'engaged' with a specific purpose. In a constructivist approach it is argued that the 'public' are not a static group who are engaged, nor is engagement a neat defined process but instead an emerging and dynamic phenomenon.

Alongside these themes Chilvers and Longhurst (2016) note four overlapping approaches to complement our understanding of citizen engagement with energy transitions:

1. Deliberative democracy: citizens who are engaged in a deliberative way and encouraged to contribute via fora or surveys in order to inform the decisions of others.
2. Citizens as practitioners: this approach explores the role of citizens as consumers in the energy system.
3. 'Grassroots' innovations: typically, formal civil society groups who are proactive in contributing to local policy contexts rather than simply responding to being 'engaged'.
4. Social movements: these are actors or groups engaged in more contentious politics.

An important issue to consider is not just how to engage with different publics, but also who or what consists of legitimate publics to engage with. Contemporary debates emphasise that publics are not 'out there' to be discovered, but rather consist of a range of different interests and groups that might vary depending on the subject under discussion (Barry, 2013). Publics are *constructed* by material and discursive processes in relation to particular (sets of) issues (Chilvers and Kearnes, 2019). This includes decisions about who/what does matter, which in

turn highlights power inequalities about how such decisions are shaped: which publics are visible and to who? In addition to changing understanding of publics as constructed entities, there has been increasing attention given to the important role materiality plays in shaping and constructing publics. Marres and Lazaun (2011) argue that it is necessary to examine how material settings, devices and objects shape how publics are constructed. This way of thinking changes how we think about where engagement is enacted. Thinking about participation as being embedded in the material world draws attention to everyday engagement with objects, technologies and landscapes. Thinking about materiality is important for our project: energy systems are inherently (socio)-material, they shape and are shaped by material landscapes (Castan Broto, 2019) and everyday experiences of people in contemporary societies (Eadson and van Veelen, 2021). These different approaches are reflected on and explored further in section 4 as these varying models of engagement are applied and critiqued in our real-world context.

3. Methods

This research formed part of a Swedish Energy Agency research project, Walking with Energy (see Ambrose 2020 for more details). An initial literature review was conducted focusing on citizen engagement literature, as well as a review of the policy landscape in Sweden and the UK.¹ This was supplemented by primary research conducted in England (Nottingham and Sheffield) and Sweden (Malmö and Helsingborg). Alongside documentary analysis of relevant websites, policy reports and journal papers pertaining to these cases, semi-structured interviews were secured and undertaken with 5- 10 key stakeholders related to each site, including those running and operating energy from waste plants and associated

¹ <https://www4.shu.ac.uk/research/cresr/sites/shu.ac.uk/files/citizen-engagement-literature-policy-background.pdf>

heat networks, customers of the network, local authority representatives and elected officials. Each interview was undertaken utilising a semi-structured approach, that is with the spirit of a 'conversation with a purpose'. A broad set of questions were utilised based on the literature and then each interview, lasting between 30 mins and 1 hour, was transcribed and analysed via Nvivo 12. The following types of stakeholders were interviewed:

- Nottingham: Head of district heating network at the city council, local authority energy officers (x2), elected official, representative of the company operating the local energy from waste facility and district heating network.
- Sheffield: Energy from waste plant and district heating network managers x 3, local authority officers, large customers of the network, residential customers of the network, national and city energy leads.
- Malmö: local authority officer, district heating network manager, elected official, regional governance official, large customer of the network.
- Helsingborg: district heating company representative, board members x 2 (chair & deputy chair), politicians x 2 (deputy mayor and opposition), civic activist, industrial heat provider.

INSERT TABLE 1

4. Results (1) An analysis of heat network policy and citizen engagement

Understanding the role of policy in citizen engagement with heat systems requires consideration of different governmental organisations operating across different geographic spheres. This includes national and local government as well as intermediary and non-governmental regulatory bodies such as market regulators (the Office for Gas and Electricity Markets (Ofgem) in the UK, the Energy Markets Inspectorate (Ei) in Sweden) and city-

regional or regional governmental organisations. These each have different responsibilities and resources relating to heat policy. A review of policy in Sweden and the England reveals three main ways that existing policy and energy system operators seek to engage citizens:

1. Citizens as energy users: protections and engagement with decision-making about pricing and terms of service. (Akin to a narrow interpretation of *energy practitioners* in Chilvers and Longhurst's typology.)
2. Citizen involvement in planning and development process. (Variations of *deliberative democracy*)
3. Citizens as governance stakeholders (including beyond those who use the energy produced): participation in decisions about on-going governance or as owners of projects (depending on nature of engagement could be understood as *deliberative democracy, grassroots innovations, or social movements*).

These different roles suggest differing levels of engagement and empowerment – which we might loosely relate to Arnstein's participation ladder – and raise questions about which publics 'matter' and are being produced by different processes of engagement. Even within these roles existing practice and possibilities for active participation vary.

4.1 Citizens as energy users

First and foremost, citizens are energy users of heat produced and distributed through the network. As heat networks often operate as de facto monopoly suppliers for residents of buildings supplied by district heating, these residents are automatically 'engaged' with the system in a basic sense as consumers, but the lack of alternatives and automatic enrolment (for many) can limit levels of engagement with systems. Although mechanisms vary across networks, price-setting is a technical process and does not usually involve citizens. As such this effectively places these users at the bottom of the participation ladder with real potential to be open for manipulation. In the UK there is no existing regulatory framework for

consumer protection in heat networks and qualitative research by BEIS (2018) found that approaches to consumer protection varied across heat networks. Private sector operators focused on a relatively narrow set of obligations around contractual arrangements between landlords, developers, and users. Public sector operators were more likely to take a holistic view of their obligation to users, however, in part because they were often also users' landlords as well as energy supplier (ibid.). Where heat users take heat from their landlords, this offers additional engagement mechanisms, for instance through landlord communications with individual tenants, Tenant Unions, Tenant Management Organisations and other forms of tenant-led organisations. Overall, however, district heat users have little awareness of their rights as consumers (ibid.). In response to these challenges, the Competition and Markets Authority (CMA, 2018) recommended establishment of a formal consumer protection body for heat networks: in December 2021, the UK government announced that Ofgem would take on this role although as of July 2022 no date has been set for this to take effect. A voluntary consumer protection organisation was set up in 2015, named Heat Trust. Members agree to abide by a code of conduct which Heat Trust says is compliant with wider UK electricity and gas market regulation. In 2018 its members covered around 10% of total heat network users (Heat Trust, 2018).

Despite a much longer history of widespread connection to district heating, liberalisation of energy markets in Sweden has produced a similar regulatory picture to the UK. Heat networks are considered market providers of energy and as such pricing is not directly regulated (IEA, 2019). However, following price rises over the 1990s and 2000s the District Heating Act 2008 introduced the 'price dialogue' mechanism as part of measures to improve transparency over pricing (ibid.). An independent not-for-profit organisation was established in 2011, called Prisdialogen ('Price Dialogue'). Prisdialogen assesses district heat prices and works to

improve transparency in accounting. Local agreements (covering 72% of DH supply in 2017) set out principles for any price changes. This process has reportedly improved transparency and consumer trust (IEA, 2019). But such mechanisms offer limited potential for more engaged participation in energy system decision-making. More broadly, viewing energy users through a market prism – as consumers of a commodity – provides a very narrow framing for user participation. It also creates a narrow definition of energy publics, focusing only on those who buy heat through heat networks rather than wider communities who might be affected in different ways by heat networks (for instance as residents living close to incinerators or pipelines, or people/communities excluded from networks). The question is whether there is a way of considering the role of citizens as climbing the ladder out of non-participation into a more active role in the development process, considering their potential as stakeholders who shape decision-making about whether and in what ways to develop heat networks in particular places.

4.2 Citizen participation in heat planning process

Citizen participation in heat network planning and local energy planning in general in Sweden and England has mostly been limited to statutory consultation regarding specific planned developments. When considering planning in the UK, it is important to differentiate between England and Wales, which have broadly the same planning system, and Scotland, which has devolved powers for planning. Here we focus on England and Wales, given that our empirical focus is on England.

The planning system in England and Wales is not a strong mechanism for delivering local low carbon energy or for building citizen engagement in local energy developments. An RTPI research report on Planning for a Smart Energy Future (2019) reported that:

At present, with a few exceptions, planning policy in England and progress on the ground lags behind the opportunities offered by smart energy to support clean growth and mitigate climate change. Notable strides have been taken to cut emissions using existing planning powers and tools. However, based on current progress, the pace of change is not sufficient to harness the ambitions and benefits set out in the Clean Growth Strategy, or to meet the UK's legal commitments to decarbonise. (p.6)

There are various issues behind this statement. First, local plans have not tended to be strong mechanisms for community engagement in England and Wales (see Baker et al, 2007 and Brownill and Carpenter, 2017). Much of the engagement is through statutory consultation, rather than genuine participation in planning processes. Overall action on energy and decarbonisation has been hampered by changes to planning frameworks since 2010 which have focused on housing supply, with limited emphasis on energy planning. After 2010 national planning policy weakened previous commitments to delivering renewable energy through local planning, in turn weakening any links to local democratic processes.

However, the introduction of neighbourhood planning through the UK government's Localism Act in 2011 has created scope for more active citizen engagement in planning. Neighbourhood plans cover small community areas and are prepared by neighbourhood planning fora rather than local authorities. Plans must be agreed through community referenda. In principle neighbourhood plans could be a useful vehicle for low carbon and renewable energy projects (CSE, 2015; 2020; Shared Assets, 2019) yet neighbourhood planning is underfunded, relies on voluntary commitment, and they tend to be in more affluent communities with the overriding emphasis on house building (Bailey and Pill, 2015; Parker, 2017).

A number of towns and cities in England are beginning to develop Local Area Energy Plans, which outline priorities for development and investment for secure, decarbonised energy systems. However, the role of citizens within these processes is unclear. More specifically, in 2021, the UK government introduced proposals for heat network zoning in English towns and cities:

“In a heat network zone all new buildings, large public sector and large nondomestic buildings – as well as larger domestic premises which are currently communally heated – would be required to connect to a heat network within a prescribed timeframe”

It is proposed that heat network zones will be identified using a nationally determined methodology and delivered in partnership by “central and local government, industry and local stakeholders.” Again, the role of citizens within the zoning process is unclear at present, and the proposal also refers to the possibility of central government overriding local authorities where agreement on implementation of a zone is not agreed.

In Sweden, there is a more developed system of planning for local energy. Local authorities are required to produce a local energy plan covering supply, distribution and use of energy, introduced through the Municipal Energy Planning Act (1977). The later Planning and Building Act (2010) mandated ‘stakeholder participation’ in decision-making:

The idea is to involve all participants, combining influence, inclusiveness, and deliberation, embracing democratic values such as citizens' rights to information, justice, and participation. The deliberative agenda has achieved a privileged position; even though several examples exist on how difficult it is to accomplish these normative ideals. (Gustafsson, Ivner and Palm, 2015 p207)

However, there remain concerns that municipal planners continue to be highly influential over problem definition, presentation of options, and deciding which participants are engaged.

Further, Gustafsson, Ivner and Palm (ibid.) argue that the Act on Municipal Energy Planning (2015) has in comparison with the Planning and Building Act narrowed down participation, concentrating instead on a smaller range of actors, focusing on: municipalities, large stakeholder organisations, and energy producers. They also argue that weak implementation of the Act means uneven compliance across local authorities.

4.3 Citizens as active stakeholders

A third mode of engagement, and Arnstein's ideal, is for citizens to actively participate in on-going decision-making about heat as formal stakeholders (for instance through community representatives on heat supplier boards). At present there are no policy levers in place to ensure this happens in England or Sweden. Energy market liberalisation in both countries has weakened the link between citizens and district heat projects. In England and Sweden, most heat networks were municipally owned up until the 1990s. In principle this provided a degree of democratic accountability for heat networks: elected officials, with a statutory responsibility to protect the wellbeing of citizens were in theory democratically accountable for the performance of heat networks. Energy policy in England and Sweden has gradually eroded this democratic link however, with heat network development and operations increasingly conducted by private sector organisations, albeit often in partnership with, or under contracts with local authorities (Palm, 2007; Rutherford, 2014; Hawkey, Webb and Winskel, 2013). As noted above, where district heating networks are operated or at least contracted by social housing organisations there are potentially more opportunities for direct resident engagement in decision-making (BEIS, 2018). The possibilities for more democratic

citizen engagement in governance processes through municipal and third sector partnerships is examined in our empirical investigation below.

More direct participation might be possible through community or resident ownership of district heating networks. In recent years there have been calls for citizen ownership of energy systems in the name of energy democracy (Becker and Naumann, 2017; Eadson and van Veelen, 2021) alongside growth in community energy initiatives across Europe. However, community-led heat networks are relatively rare in England and Sweden, at least in part due to the high capital costs involved in setting up. The UK government has published guidance for citizen groups seeking to set up community-led heat projects (DECC, 2016) but there is little existing evidence on how these have fared in practice.

5. Results (2) Citizen engagement in practice

This section presents findings from the case studies. It incorporates insights from the semi-structured interviews into how and to what extent heat infrastructure developers and operators engage with their stakeholders. The case studies build from our review of policy in England and Sweden to build understanding of how engagement happens in practice and what this means for understanding existing and potential participation in DH within urban energy systems. We present them here as four cases representing different ownership structures and citizen participation with a summary table at the end (Table 2).

5.1 Nottingham: multi-stakeholder ownership with citizen communication

Nottingham is a major city in England with a rich industrial heritage of coal mining, manufacturing and textiles. Nottingham is widely regarded as a pioneer of Energy from Waste (EfW) with a first incinerator built back in 1874 (Wang et al 2020). Eastcroft, a 170,000 tonne

EfW facility was built in the early 1970s after the first Memorandum of Agreement being Nottingham City Council and the National Coal Board was drafted in 1972. The facility was upgraded in 1988 to cogenerate combined heat and power (CHP) from municipal waste and has been owned and managed by multi-national waste management firm FCC Environment (formerly the Waste Recycling Group) since 1998. The EfW facility currently feeds the district heating network via the London Road Heat Station (LRHS) which has a significant history, dating back to 1953. The plant was purchased in the early 1970s by Nottingham Corporation and leased to British Coal. From the outset the corporation was a joint venture, originally with the National Coal Board. The scheme then had two sources of heat: Eastcroft and the LRHS. After the demise of British Coal in 1995 the scheme transferred wholly to Nottingham City Council and began trading as EnviroEnergy (Nottingham) Limited. EnviroEnergy is now an autonomous company but wholly owned by Nottingham City Council based at LRHS. The scheme's main source of fuel is the 170,000 tons of municipal refuse burnt annually at Nottingham's Eastcroft incinerator. This currently provides 180,000 megawatts of high-pressure steam which, courtesy of a 14.5 megawatt condensing turbine and 68km of piping supplies around 4,700 homes and 100 businesses across Nottingham including the Victoria and Broadmarsh shopping centres, the National Ice Centre Arena, Nottingham Trent University and various other large local developments.

Both NCC and Eastcroft recognise the need to engage local residents and they are able to cite examples of *communicating* with the 'general' public, although engagement implies something more than this. However, there are limits to wider engagement during complex contractual negotiations. In terms of community engagement in the district heating scheme, there is an engaged community liaison group, and planned schools and education outreach

(once the new site is complete) but there is not much perceived scope to engage the public, for example in the new contract negotiations.

A key question for these case studies is what influences the direction of these facilities in terms of ownership, national policy and decision-making at the local level. Whilst there is nothing especially unique or innovative with regards the public engagement, the ownership and governance structure of Eastcroft and the district heating scheme is distinctive and enabling Nottingham to do some interesting work. What is unique is the existence of a 1970 agreement between Eastcroft and the city council: as a key employee of Eastcroft states *“it’s written in old language with a distinct absence of a commercial angle . . . the way that the relationship works with Nottingham is we don’t have any of that, so we both understand that we’re all part of this same system, so what’s good for me is good for the local authority as well and what’s bad for them is bad for me”* (N05).

This agreement is managed through EnviroEnergy, the wholly owned subsidiary of NCC that manages the district heating scheme. The contracts that exist for waste disposal are now tripartite between the city council, the county council, and Waste Notts Reclamation through FCC. The city council still retains a majority control of the capacity available at Eastcroft for delivery of waste. The board meetings, chaired by an elected member, manage the relationship and it is the essence of the relationship that is key. The nature of these relationships and how this links to engagement will be returned to in the final section.

5.2 Sheffield: private contracts with sporadic citizen activism

In Sheffield city centre, a multi-national private contractor leased energy generation and heat distribution infrastructure from Sheffield City Council on a 35-year lease set to expire in 2038. Ownership of the heat network is important to understanding its relationship to citizens. It primarily sees its role as a service provider of waste management, heat and power: citizens are foremost customers; public-facing bodies like the council are first of all contractors of the operator's services. This contractual relationship is the main cause of deliberation: for example, in 2017 the council renegotiated its contract with the operator, requiring extensive negotiation, and support from external legal consultants to agree the changes. Otherwise, deliberative engagement was limited. For example, the engagement process over potential decarbonisation measures for the network's back-up boilers involved presenting plans to the district heat lead at the local authority, then once plans were finalised the operator then intended to communicate the changes to customers via mailouts. A company executive described this process, which is very much an example of top-down communication or consultation rather than engagement:

In the initial stages we bring the council on board because they're the key stakeholder because we're in partnership with them . . . After that we'll test different fuels on the boiler and check emissions and so on and if that's successful we'll look to do any kind of upgrade to the boiler fuel systems ... At that point where we've proven the results and we've got a clear direction we'll communicate that to all our customers to say this is what we're doing (S01)

This was confirmed in a further conversation about new developments in the network. The heat network operator did say they would do some engagement with 'citizens-as-customers':

We'll probably hold a few open days, we would send out a communication to all the customers which will just be a newsletter, put it on the website and take any opportunity to promote what we do. (S02)

Citizen engagement, then, was mostly limited to periodic communications about changes to the network. Some engagement took place around contracts and pricing with building owners but generally not for residential households: residential contracts and billing were managed by third parties, usually contracted by landlords. As such, the operator's engagement stopped at the point the heat entered residential buildings (e.g., a block of flats). Pre-Covid, the operator would hold an annual open day to invite people to look round the energy from waste plant. But stakeholders felt that most citizens were not aware of the incinerator or the heat network, although this might be beginning to change with greater awareness of decarbonisation agendas.

Against the backdrop of limited formal engagement, at several points over the last 20 years the heat network has been subject to points of disruption when citizens and civil society groups have mobilised around specific issues.

1. In 2001, seven Greenpeace protestors occupied the previous incinerator (which was replaced in 2006), protesting against pollution from the incinerator.
2. Unions representing waste workers took industrial action in 2012, 2016 and 2021, related to job losses (2012) and pay and conditions (2016 and 2021).
3. A dispute between residents at a large block of flats, which is supplied by the network, and the building's owners and management company over proposed price rises in July 2020.

In each instance these moments of disruption have created some change to – for example – prices for residents in the flat development, shifts towards environmental controls on incinerators, and some concessions around pay and conditions for workers. But they have not impacted on the overall business model. The Sheffield city centre network fits with a model of privatised provision where heat users are engaged as consumers rather than citizens. Other stakeholders tend to be engaged on a practical basis to achieve specific objectives. Although decarbonisation pressures are forcing some change and increased engagement with corporate stakeholders, the services contract to 2038 acts as a disincentive to invest in wholesale changes to the system.

5.3 Malmo: public-private partnership for coordinated energy systems

In Malmo, the heat network was also privately owned by a multi-national energy company. Unlike Sheffield, however, the energy company did not own or operate the EfW facility – which was owned by the municipality - and heat was also taken from other sources including waste heat from a large engineering firm and from a wastewater treatment plant. The energy company had a broader relationship with the local authority, inputting to its energy strategy, and working in partnership with the council around decarbonisation across the city, for instance to develop a new ‘smart suburb’ in the city, providing a range of renewable energy and smart grid technologies. As in Sheffield the central mode of engagement with citizens was as customers of the network. However, there were examples of more in-depth engagement relating to new developments. Energy infrastructure developments and innovations were relatively frequent in Malmo, in part owing to the city’s proactive approach to energy and climate action. For instance, at the time of conducting the research, a public engagement campaign was planned relating to a proposed deep geothermal heat generation plant. The company was also developing an initiative called ‘Go Local’ for each of the four

regions it operated in within Sweden. Go Local involved improving communication with citizens around developments, repairs, and maintenance as well as wider environmental campaigns like local cycling initiatives. Despite similarities in ownership structure, the difference to Sheffield can be ascribed to several factors, including: a broader strategic relationship on energy and climate action between the operator and municipality; a more proactive local authority with greater capacity for action; the energy company's position as owner of the heat network but not heat generation facilities, allowing greater flexibility over heat sources; and the energy company's role across Sweden in facilitating urban energy transitions beyond heat network development and operation. That said, the shared approach to energy system governance and citizen engagement did not extend to direct involvement in strategic decision-making.

5.4 Helsingborg: municipal ownership with democratic activism

In Helsingborg energy infrastructure (including a large district heat network) was owned and managed by a municipal company which managed utilities across the city. Citizens were indirectly engaged through election of councillors to the local authority, some of whom sat on the board of the company. In the last decade the implementation of *Prisdialogen* in Sweden changed how the municipal company interacted with citizens as customers, with the operator holding a round table event three times per year with customers to discuss prices and wider developments. In general, however, the heat system was largely seen as a settled part of the urban landscape (although the network continues to expand, including linking to neighbouring cities) and citizens were not historically involved or seen as interested in its operations. That changed with a proposed sale of the company to a private buyer in 2018, which led to political and citizen-led campaigns to prevent its sale, ultimately resulting in a local referendum on its future. An overwhelming 96% of voters voted against its sale, and more broadly interviewees

felt that the importance of local energy infrastructure was reasserted within citizens' imaginations.

Like protests against price rises in Sheffield, a point of rupture was a key source of citizen engagement with heat infrastructure. Because the network was owned by the municipality citizens were able to assert their democratic rights to a say on the future of energy infrastructure in the city. Even so this was not 'invited' engagement but 'claimed' by activists who mobilised citizens to create a political challenge for elected leaders in the municipality.

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6. Conclusions and policy implications

This paper sought to address a gap in literature on DH to explore contemporary approaches to citizen engagement and participation in DH systems and consider what factors shape these approaches. We now draw together our empirical findings and policy review to consider implications for how we understand citizen engagement in district heating, and what these findings mean for existing theories of engagement and participation.

Our findings show that specific challenges remain in two areas. First, large scale district heating is tied into long-term contracts of up to 30 years. Once they have been negotiated, they become legally settled, often leaving little of substance to engage citizens about, beyond the monitoring of the emissions which many EfWs will have community liaison groups for. Although very different in nature, examples in Sheffield (as part of a local dispute) and through the nationally mandated *Prisdiologen* in Sweden do also provide some points of deliberation and negotiation around the customer-provider relationships, but both prompted

by external pressures. Second, there is still a sense that district heating linked to the burning of waste is a controversial area and many waste contractors have shied away from going beyond statutory planning requirements for minimal consultation.

So what does the future hold for district heating, EfW and engagement and ownership? A final insight from Nottingham, and the latest policy steer from BEIS in the UK may give us a glimpse of the future and a final opportunity for innovation in engagement. Nottingham City Council have committed to being net zero by 2028 and the district heating scheme is key to that ambition. One of NCC's Energy services team acknowledged that "we've got a little bit of time at the moment to sit back and take stock and think where this is going to go in terms of UK decarbonisation as a whole (N03)." Central to this hope is the acknowledgment that district heating schemes are fuel agnostic. As one interviewee said, "the heat network is there to be an energy system, distribute more efficiently and to be a more efficient way of providing heat where it's needed at the time it's needed (N02)." Nottingham, and other cities face a critical moment in time then as they reflect on what might be the alternative fuel sources for their district heating schemes. It is hoped that this would provide an opportune time for meaningful engagement though that remains to be seen. There is both a disconnect and a pressing need to connect policy makers and practitioners with innovation with the latest thinking engaging the public.

In September 2021 the UK Government launched its 'Green Heat Network fund' which included a commitment to 'support low-carbon technologies like heat pumps, solar and geothermal energy in the roll out of the next generation of heat networks which will enable more towns and cities to take up this tried and tested technology from 2022'. This, combined with the example of the Coal Authority in the UK trialling the use of mine water energy for

district heating offers intriguing signs for the future.² These points of change might in turn provide more positive opportunities for citizen and stakeholder engagement, although the technological focus of GHNF will not in itself incentivise deeper involvement of publics in decision-making: a key question will remain around the ownership and management of heat systems. For now, we are left calling on local authorities and waste contractors to be more ambitious with their citizen engagement plans. Both EfW and district heating offer meaningful opportunities for citizen engagement, especially as the low carbon future for these schemes are currently being negotiated, and, as the wider project findings of Walking with Energy have shown (Ambrose, 2020), the benefits for all concerned are clear.

We have also used this investigation to reflect on how to conceptualise citizen participation and engagement within energy systems. There have been advances in critical thinking in recent years around what constitutes citizen engagement, as academics adopt a more critical and reflective tone to understanding participation and avoid ‘one size fits all’ approaches to engagement. This is to be welcomed although it may be too soon to throw away Arnstein’s ladder, if we want to avoid risks of instead creating a series of intertwining Escher staircases that do not lead anywhere. There is a potential tension between the welcome calls to adopt constructivist, system-wide approaches which more clearly highlight different forms of engagement, and the need to emphasise power relations that shape (for example) the clear impact that ownership and governance structures have to impinge engagement. Chilvers et al (2021) show how different types of citizen participation groups tend to prioritise different criteria for assessing energy transitions. There is also a need to distinguish between and better understand the possibilities for different forms of participation – or different configurations

² <https://www.gov.uk/government/news/uks-first-district-heating-scheme-using-mine-water-energy-now-in-development>

within ecologies of participation - that bring about meaningful systemic change. This includes policy options for building deliberation, partnership and citizen empowerment into on-going governance of DH as well as in initial development phases. It also includes highlighting potential points of disruption within existing systems whereby citizens can 'claim' participation through activism. This is an on-going challenge with large infrastructure projects which by dint of their material organisation and often complex operations are often seen as difficult to open-up for citizen involvement, and prevailing approaches to urban energy system governance exacerbate these challenges. That said, within the wider energy policy landscape there are interesting and innovative examples of citizen and community engagement with energy. However, the landscape of EfW and district heating is lagging behind, at least as far as this foray into these case studies in the UK and Sweden have shown.

Acknowledgements

This research was funded by the Swedish Energy Agency as part of the Walking with Energy project. The authors gratefully acknowledge the time and support of the respondents across the four cities. An early draft of this paper was presented at the ECEEE Summer Study in June 2022 following which substantial revisions and additional material were added for this substantially revised paper.

References

- Ambrose, A., Eadson, W., and Pinder, J., (2016). The role of actor-networks in the early-stage mobilisation of low carbon heat networks. *Energy Policy* 96, 144–152.
- Ambrose, A. (2020) Walking with Energy: Challenging energy invisibility and connecting citizens with energy futures through participatory research. *Futures*, 117.

Arnstein, S. (1969). "A Ladder of Citizen Participation." *Journal of the American Institute of Planners* 35: 216-224.

Bailey, N. and Pill, M. (2015) 'Can the State Empower Communities through Localism? An Evaluation of Recent Approaches to Neighbourhood Governance in England', *Environment and Planning C: Government and Policy*, 33(2), pp. 289–304. doi: 10.1068/c12331r.

Baker, M., Coaffee, J., and Sherriff, G. (2007) 'Achieving successful participation in the new UK spatial planning system' *Planning Practice and Research* 22 (1) 79-93

Barnett, C. (2008) *Convening publics: the parasitical spaces of public action*. In: Kevin Cox, Murray Low and Jenny Robinson (eds) *The handbook of political geography*. London: Sage.

Barry, A. (2013) *Material Politics. Disputes along the pipeline*. Chichester: Wiley.

Becker, S and Naumann, M (2017) *Energy democracy: Mapping the debate on energy alternatives*. *Geography Compass* 11(8) <https://doi.org/10.1111/gec3.12321>

Brownill, S., and Carpenter, J. (2007) *Increasing participation in planning: Emergent experiences of the reformed planning system in Planning Practice and Research* 22 (4) 619 - 634

Trzmielak Institution of Civil Engineers Publishing.

Bull, R., Petts, J., & Evans, J. (2008). "Social Learning from Public Engagement: Dreaming the impossible?" *Journal of Environmental Management and Planning* 51(5): 703-718.

Cástan Broto, V. (2019) *Urban Energy Landscapes*. Cambridge, Cambridge University Press.

Chilvers, J. & Kearnes, M. (2020) "Remaking Participation in Science and Democracy". *Science, Technology and Human Values* 45(3): 347-380

Chilvers, J. & Longhurst, N. (2016) *Participation in Transition(s): Reconceiving Public Engagements in Energy Transitions as Co-Produced, Emergent and Diverse*, *Journal of Environmental Policy & Planning*, 18:5, 585-607, DOI: 10.1080/1523908X.2015.1110483

Competition and Market Authority (CMA, 2018) Heat networks market study: final report.

CMA.

https://assets.publishing.service.gov.uk/media/5b55965740f0b6338218d6a4/heat_networks_final_report.pdf

Eadson, W and Foden, M (2019) State, community and the negotiated construction of energy markets: Community energy policy in England. *Geoforum* 100 pp.21-31.

Eadson, W. and van Veelen, B. (2021) Assemblage-democracy: Reconceptualising democracy through material resource governance. *Political Geography* 88

<https://doi.org/10.1016/j.polgeo.2021.102403>

Giulietti, M., Price C.W., and Waterson, M., (2005) Consumer choice and competition policy: a study of UK energy markets. *Economics Journal* 115, 949–968.

Gustafsson, S, Ivner, J and Palm, J (2015) Management and stakeholder participation in local strategic energy planning: Examples from Sweden. *Journal of Cleaner Production* 98 pp.205-212

Hargreaves, T (2011) Practice-ing behaviour change: Applying social practice theory to pro-environmental behaviour change. *Journal of Consumer Culture*, 11, no. 1, pp. 79-99.

<https://doi.org/10.1177/1469540510390500>

Hawkey, D, Webb, J and Winskel, M (2013) Organisation and governance of urban energy systems: district heating and cooling in the UK. *Journal of Cleaner Production* 50, 1 pp.22-

31. <https://doi.org/10.1016/j.jclepro.2012.11.018>

Heat and the City (2019) *Briefing Note*. Heat and the City, University of Edinburgh

<https://heatandthecity.org.uk/wp-content/uploads/2019/03/DH-Briefing-note-Final.pdf>

Heat Trust (2018) *Annual Report*. Heat Trust <https://heattrust.org/annual-reports-v2/7-heat-trust-annual-report-2018/file>

House of Commons Library (2018) 'Briefing paper 05838, neighbourhood planning'. House of Commons Library.

IEA (2019) *Policies of IEA countries: Sweden review 2019*. International Energy Agency.

Inch A, 2012, "Creating 'a generation of NIMBYs'? Interpreting the role of the state in managing the politics of urban development" *Environment and Planning C*: 30(3) 520 – 535

IEA (2021), District Heating, IEA, Paris <https://www.iea.org/reports/district-heating>

Lidskog, R. (1997). "From Conflict to Communication? Public Participation and Critical Communication as a Solution to Siting Conflicts in Planning for Hazardous Waste." *Planning Practice & Research* 12(3): 239-249.

Local Energy Scotland (2019) Local energy plans [webpage].

<https://www.localenergy.scot/what-is-local-energy/local-energy-plans/>

Nolden, C., Towers, L., Schamrothe Rossade, D., Thomas, P., Speciale, G. and Watson, R (2022) Can liberalised electricity markets deliver on climate change and energy poverty?

Evidence from community projects in Great Britain. *Local Environment* 27(9) pp. 1151-1171

<https://doi.org/10.1080/13549839.2022.2104829>

Marres, N and Lezaun, J (2011). "Materials and devices of the public: an introduction."

Economy and Society 40(4): 489-509.

Magnusson, D., (2016). Who brings the heat? – From municipal to diversified ownership in the Swedish district heating market post-liberalization, *Energy Research & Social Science*, Vol 22: 198-209.

Palm, J (2007) District Heating as a Secure Heat Supply – A question of regulation.

Environment and Energy 18, 6 pp.747-760.

Parker, G. (2017). The uneven geographies of neighbourhood planning in England (pp. 75-92). Bristol: Policy Press.

Richard Cowell, Geraint Ellis, Fionnguala Sherry-Brennan, Peter A. Strachan & David Toke (2017) Rescaling the Governance of Renewable Energy: Lessons from the UK Devolution Experience, *Journal of Environmental Policy & Planning*, 19:5, 480-502, Doi: 10.1080/1523908X.2015.1008437

Royal Town Planning Institute (RTPI, 2019) Planning for a smart energy future.
<https://www.rtpi.org.uk/media/1435/planning-for-a-smart-energy-future.pdf>

Rutherford, J (2014) The Vicissitudes of Energy and Climate Policy in Stockholm: Politics, Materiality and Transition. *Urban Studies* 51 pp. 1449-1470.

Scottish Government (2017) Barriers to community engagement in planning: a research study. Scottish Government
<https://www.gov.scot/binaries/content/documents/govscot/publications/factsheet/2017/05/barriers-to-community-engagement-in-planning-research/documents/executive-summary-barriers-community-engagement-planning-research-study-pdf/>

Scottish Government (2020) Improving public services – community planning [webpage].
<https://www.gov.scot/policies/improving-public-services/community-planning/>

Soutar, I. and Mitchell, C. (2018) Towards pragmatic narratives of societal engagement in the UK energy system. *Energy Research and Social Science* 35, 132–139.

Sovacool, B, (2014). What are we doing here? Analyzing fifteen years of energy scholarship and proposing a social science research agenda. *Energy Research & Social Science* 1, 1-29.

UK Government (2019) National Planning Policy Framework 2019. UK Government
https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/810197/NPPF_Feb_2019_revised.pdf

UK Government Department for Business, Energy and Industrial Strategy (BEIS) (2018)
Qualitative research with consumers and operators of heat networks. BEIS

https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/762331/heat-network-consumer-operator-experiences.pdf

UK Government Department for Energy and Climate Change (DECC) (2016) Community-led heat projects: a toolkit for heat networks. DECC. https://s3.eu-west-2.amazonaws.com/prod-wl-cee/resources/files/Community_Heat_Networks_Toolkit_Final_2.1.pdf

UK Government Department of Communities and Local Government (DCLG, 2012) *National Planning Practice Guidance*. DCLG

<https://webarchive.nationalarchives.gov.uk/20120919133846/http://www.communities.gov.uk/publications/planningandbuilding/nppf>

Van Veelen, B. and Eadson, W. (2019) Assembling community energy democracies, *Voluntary Sector Review*, vol xx, no xx, 1–19, Doi: 10.1332/204080519X15740562779512.

Wang, D., He, J., Tang, Y., and Robinson, D. (2020) Life cycle assessment of municipal solid waste management in Nottingham, England: Past and future perspectives. *Journal of Cleaner Production* 251 119236.

Werner, S (2017) District heating and cooling in Sweden. *Energy* 126 pp. 419-429.

Wills, J. (2016) 'Emerging geographies of English localism: The case of neighbourhood planning', *Political Geography*. Elsevier Ltd, 53, pp. 43–53. Doi: 10.1016/j.polgeo.2016.02.001.

Wretling, V, Gunnarsson-Östling, U, Hörnberg, C and Balfors, B (2018) Strategic municipal energy planning in Sweden – Examining current energy planning practice and its influence on comprehensive planning. *Energy Policy* 113 pp.688-700.

Young (2014) *Energy, Politics and the Consumer*. Yougov

http://cdn.yougov.com/cumulus_uploads/document/9ex03cskhs/YouGov-Cambridge-ReportSpring201acc4.pdf.

Preprint not peer reviewed