



Essays

Walking with Energy: Challenging energy invisibility and connecting citizens with energy futures through participatory research

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ABSTRACT

Since the shift away from burning solid fuels in the home, energy has become increasingly invisible in our daily lives and our contemporary relationship with energy is characterised by complete dependency and almost complete ignorance. The Walking with Energy project draws together a range of innovative research approaches to form a new research methodology that is social (offers opportunities for social learning), embedded (in the landscape in question), embodied (engages body and mind) and that is sensitive to the past. The resultant approach was tested through a pilot study which sought to better understand how our relationship with energy has evolved to become so distant and assess whether acts of research participation can promote a greater level of interest in and engagement with future energy policies and decisions amongst 'ordinary' citizens by enabling first hand encounters with energy generation. Using a case study of an Energy from Waste facility in the UK, the pilot revealed that such an approach offers significant scope to go beyond a process of data collection and promote a reconnection between people and energy with the possibility of effecting lasting changes in environmental citizenship.

1. Introduction

Since reticulated gas and/or electricity have been readily available in our homes and workplaces and we have stopped burning solid fuels as our main method of home heating, energy has arguably become taken for granted and perhaps even invisible in our daily lives. In the UK at least, we are not consulted on where our energy comes from in terms of how (and from what) it is generated and distributed and- although it can be sought out- this information is not easily accessible or widely known. Citizens therefore lack the basic knowledge required to make an assessment of the ethical, environmental and economic implications of the choices made on our behalves and our contemporary relationship with energy is arguably one characterised by complete dependency and almost complete ignorance. Moreover, the long timescales and high levels of uncertainty surrounding future energy policy may make it feel daunting and inaccessible and deter public engagement and interest (Grunwald, 2011).

This paper provides an account of an event which took place in November 2018 in Sheffield, UK, which piloted a new and creative approach to (re)engaging members of the general public with debates around future energy generation and promoting greater environmental citizenship. The event was held as part of a national programme of popular science events in the UK known as the Festival of Social Science. The event used the case study of Energy from Waste (EfW) as a fairly controversial energy generation and waste management approach to assess the potential of participative research methods to reconnect the public with debates around energy generation thus eroding so-called energy invisibility. The main focus of the event involved taking 15 members of the public on

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a walking tour of Sheffield City Centre which followed the route of part of the city's district heating pipeline to its source at the Energy from Waste facility (or incinerator) and taking a guided tour of the facility led by the plant manager.

This paper comprises of five sections in addition to this one. The section entitled Energy Invisibility describes the problem that the project seeks to respond to. The Literature Review then situates this debate in the context of several relevant bodies of literature including those concerned with citizen engagement with energy issues and decision making and those relating to participative research methods and how they might contribute to increased citizen engagement. The Methods section then sets out how insights from the literature review have informed the development of the Walking with Energy method piloted during the event. The data gathered during and after the tour is reported in the Findings section and the paper concludes with a discussion of the findings and some concluding thoughts about the potential for research participation to play a role in overcoming energy invisibility.

2. Energy invisibility

Cities face challenges to rapidly decarbonise and the engagement of citizens is critical in this respect, with domestic energy use an increasingly urgent priority (households account for 28 % of total energy consumption in the UK according to [The Department for Business, Energy and Industrial Strategy \(BEIS, 2018\)](#)). Yet, our relationship with our own domestic energy consumption has been said to suffer from a 'double invisibility' as it can no longer be seen nor connected to everyday actions ([Burgess & Nye, 2008](#); [Hargreaves, Nye, & Burgess, 2013](#)). This invisibility distances us from our consumption and the associated environmental, ethical and financial consequences. This represents a particular problem in the context of the increasingly urgent pressure on citizens to make more conscientious decisions about our energy consumption. Heat is a particular concern as, since we stopped burning solid fuels in the home as a primary form of heating, it has become almost entirely invisible to us yet estimates suggest it accounts for as much as 78 % of all non-transport related energy consumption in the UK ([Department of Energy & Climate Change, 2013](#)).

The problem of energy invisibility in a domestic context has, to date, only been considered in relation to the potential of feedback technology (i.e. In Home Displays (IHDs) linked to Smart Meters) to reconnect us with our consumption ([Burgess & Nye, 2008](#); [Hargreaves et al., 2013](#)). The literature on household responses to Smart Meters paints a variable picture of the effectiveness of this most prevalent of feedback technology in reducing domestic energy consumption. In Sweden, [Vassileva and Campillo \(2016\)](#)¹ found that the consumption information available through Smart Meters was not sufficiently detailed to allow users to reduce their energy consumption. [Buchanan, Banks, Preston, and Russo \(2016\)](#)² studied the British public's perception of smart meters and reported numerous barriers including "loss of autonomy/control, privacy concerns, and mistrust towards ...energy suppliers and concerns about how it would affect their ...daily lives". Other studies such as [Wallenborn, Orsini, and Vanhaverbeke \(2011\)](#) contend that households already engaged in energy saving are the most likely to engage with feedback technology- a case of preaching to the converted perhaps. Given the variability of the evidence on the effectiveness of feedback technology and the public mistrust identified, it appears we cannot rely on them alone to reconnect us with our energy consumption.

Research from around the developed world provides evidence regarding our lost connection with energy. Research by [Goodchild, Ambrose, and Maye-Banbury \(2017\)](#) conducted in the UK established that those who have lived through the transition from open fires to central heating felt that their own heuristic introduction to the management of household heating (handling and rationing solid fuel, building and maintaining fires) was far removed from that of their own children who are detached from the practices and costs of warming the home. Moreover, research by [Moore et al. \(2019\)](#) undertaken in Australia revealed how citizens have lost touch with simple, low energy practices for managing the effects of extreme temperatures. For example, where in the past residents would have opened the windows, slept on the lawn, painted roofs white etc. to cope with the heat; they now relied on air conditioning to keep them cool and struggled when it was unavailable. These studies alone highlight a series of risks associated with the disconnect between several generations and their energy consumption at a time when energy is more precious and controversial than ever before. They reveal that we demand heat and cool as we need it with little or no consideration for the resource implications and with little or no awareness of how it is being generated and the associated ethical, environmental and economic implications. Physical manifestations do of course exist (power stations, pylons etc.) but these are, for obvious reasons, situated outside of residential areas wherever possible and have therefore arguably become symbols of a largely invisible energy system.

We are disengaged from decisions about how energy is generated in terms of modes of generation and types of fuel, engendering a sense that energy related decisions are something decided on our behalf by unseen 'experts' ([Becker & Naumann, 2017](#)). This detachment, it has been argued, can breed mistrust in relation to energy providers and controversy around energy projects ([Corsini, Certoma, Dyer, & Frey, 2018](#)) and can therefore cause difficulties for those attempting to deliver energy project as well as for citizens.

The project with which this paper is concerned has been developed in recognition of the need to consider the existence of energy invisibility within the domestic sphere, its consequences and means of promoting a reconnection between households and their energy consumption that extends beyond the technological realm. It focuses, in particular, on home heating as one of the most prominent and carbon intensive energy uses in our daily lives, particularly in Northern Europe. This project aims to use first hand encounters to help (re)connect urban citizens with energy, raising their awareness of the consequences of their energy consumption, promoting greater environmental citizenship and (re)engaging them with the debates surrounding future energy policy through an

¹ Vassileva, I. and Campillo, J. (2016) Consumers' Perspective on Full-Scale Adoption of Smart Meters: A Case Study in Västerås, Sweden. *Resources*, 5, 1-18, <https://doi.org/10.3390/resources5010003>.

² Buchanan, K., Banks, N., Preston, I., Russo, R. The British public's perception of the UK smart metering initiative: Threats and opportunities. *Energy Policy*, 91, 87-97, <https://doi.org/10.1016/j.enpol.2016.01.003>.

innovative act of research participation itself. To this end, we have developed a methodology called Walking with Energy which brings urban citizens face to face with energy generation processes, sometimes for the first time in their lives. The methodology also offers the potential to help us better understand the processes through which energy has become so critical to yet invisible in our daily lives.

3. Literature review

Several bodies of literature are relevant to the focus of this paper, namely those relating to the increasingly invisible or 'taken for granted' nature of energy in our everyday lives; public or citizen engagement with energy issues and decisions (including the concepts of energy democracy and energy publics) and why it is important; participative research methods- particularly so-called mobile methodologies and how they might contribute to citizen engagement. A number of sources which highlight our changing and increasingly distant relationship with processes of energy generation are discussed in the previous section of this paper, therefore the remainder of this section focusses on exploring the two key questions of why it is important to involve citizens in future decisions about how and where energy is generated and how research participation might contribute to this.

In much of Europe citizen involvement is an established paradigm within public policy making, representing the "gold standard" for decision-making (Felt & Fochler, 2008) as well as being seen as a crucial determinant of energy futures (Owens & Drifill, 2008). Such involvement is pursued on the basis of accepted beliefs that it will achieve lower costs, fewer delays and reduce scope for controversy when a policy is implemented (Corsini et al., 2018; Department of Trade & Industry, 2007; Owens & Drifill, 2008). Fostering community awareness and support for any given policy or proposal is seen as a key step in environmental problem solving and one which will in turn motivate political action (Araya & Kabakian, 2004). Citizen engagement is also seen as a means of legitimising decisions (Beierle & Konisky, 2000) and making them more "socially robust" or socially responsible (Beierle, 1999). Specifically in relation to energy, Grunwald (2011) has argued that "more transparent and deliberative societal debate about future energy systems." (pp.820) is essential.

Although these rationales are persuasive and accepted, a number of studies suggest that they are not always meaningfully observed. The work of Cotton and Devine-Wright (2012) provides an example of this in an energy context through their study of rhetoric and reality in how electricity network operators approach public engagement in decisions about network development and the siting of significant infrastructure. They conclude that network operators adopt the rhetoric of deliberative engagement whilst failing to incorporate citizen perspectives into long term planning and specific infrastructure siting proposals and that the substantive engagement that does take place is "downstream" in the decision making process where there is less scope for influence. This approach, they argue, is in opposition to calls from the academic and policy communities to bring public involvement "upstream" where it can be more meaningful (Wilsdon & Willis, 2004) and where there is scope to improve the reliability, accountability and acceptability of decisions taken (Habermas, 2002). The Walking with Energy project has been developed in sympathy with these calls for more 'upstream' involvement and a meaningful dialogue between those developing energy policies and initiatives and their ultimate beneficiaries- the energy publics.

The literature also engages with questions about how citizen involvement is defined and how far it can and should go. Becker and Naumann (2017) seek to summarise the debate around energy democracy which they take to refer to moves towards more participatory forms of energy provision and governance including greater levels of decentralisation and cooperative ownership of energy utilities. Striking a Marxist tone, they persuasively argue that the current energy system based on the extraction of fossil fuels is closely allied to capitalism and that the necessary shift towards renewable energies provides an opportunity for social transformation, greater energy activism and an alternative approach to energy policy. Despite the seductiveness of their vision of change, Becker et al. do acknowledge the sort of difficulties that have inspired Walking with Energy, specifically that "energy is often seen as a taken for granted necessity confined to the world of engineers" (pp.9). The perception that future sustainability policy is the domain of experts was also identified by Carlsson-Kanyama, Dreborg, Moll, and Padovan (2008) in their attempt to undertake participatory policy planning with local stakeholders.

The work of Bull, Petts, and Evans (2008) is also relevant, assessing the extent to which public participation can result in a "lasting legacy of enhanced environmental citizenship" (pp.701) that transcends the act of participation to bring about permanent or at least long lasting change. In this paper, the authors subscribe to the belief that 'effective dialogue' has transformative potential to change 'hearts and minds'- an idea very much at the heart of the present project. By introducing the concept of 'social learning' to the debate around public participation in environmental issues, Bull et al. move the debate away from a focus on engaging individuals and towards an understanding of how a group dynamic or 'social' element to participation may enhance scope for change. Support for social learning is also implicit in the work of Becker and Naumann (2017) whose focus is on collective participation and action as opposed to the focus on either the individual or 'the public' in a very abstract sense adopted by many other commentators on this issue. Indeed, Bull et al. highlight a number of proponents of social learning who have argued that the potential for individuals to develop both cognitively and morally is greatly enhanced by social interaction (see for example: Bandura & Walters, 1969; Bandura, 1977; Lave & Wenger, 1991; Webler, Tuler, & Krueger, 2001).

Bull et al. seek to test this hypothesis by revisiting those involved in a significant and innovative act of public participation in the context of an environmental issue (waste incineration) a decade later to establish whether there has been a lasting impact on the ability of participants to "see beyond their own agenda and pursue a collective one of responsible citizenship." (pp.703). In brief, the study found evidence of lasting impacts on the way most participants thought about and behaved in relation to waste and allied environmental issues and as such underlined the value of public participation in promoting greater levels of environmental citizenship. It is also worth noting that those who reported the least impact associated with participation had always considered

themselves environmentalists. However, they are keen to emphasise that public participation does not automatically translate into enduring positive change. In this vein, they highlight a range of practical and logistical considerations (of relevance to the present study) that will affect the quality of learning including infrastructure, time and resources. Owens and Drifill (2008) raise further considerations for the present study such as the warning that the effectiveness of participation or educational initiatives may be limited if "it runs counter to other powerful influences such as social norms and prices." (pp.4414). However, in this case, as will be described in the Methods section below, the initiative (Walking with Energy) does not seek to directly go against the grain of powerful social norms and prices but instead hopes to instil a healthy curiosity amongst the public regarding processes of energy generation and energy policy more broadly which may lead to greater engagement with relevant debates and in some cases, may lead them to pursue or call for alternative approaches.

Having established a strong case for a greater level of public involvement in relation to energy issues - which might fall anywhere along a spectrum from a meaningful dialogue to community ownership and hopefully result in enduring social learning - our attention turns to how energy research might contribute.

There have been several key calls for a paradigmatic shift in the way we theorise and understand human interactions with energy and therefore how we approach energy policy development. Of most notable influence on the present study is the work of Wilhite and Wallenborn (2013) who acknowledge the gulf between citizens and policy makers in an energy context. In common with the sources discussed above, they are great advocates of greater citizen involvement in policy making and implementation but their argument is more specific and nuanced. They argue that theories about energy consumption are disembodied and decontextualised leading to misunderstandings about our relationship with energy and ineffective demand reduction policy or "stagnated change agendas" (pp.2227). At the heart of their argument is the idea- that goes far beyond the idea of 'effective dialogue' discussed by Bull et al- that reductionist assumptions adopted by academics and policy makers have "collapsed body into mind" (pp.2221) and that changing our energy practices relies upon "experiences and experiments in which bodies are explicitly involved" (pp.2221). Maser and Pollio (1996) have also argued for greater embodiment (usually through walking practices) in environmental conflict resolution, recognising the grounding and transformative potential.

Willhite and Wallenborn state the belief that "exposure to new experiences can be an important change agent for practices." This statement is a profound influence in relation to Walking with Energy, as is the related concept of 'practical learning' advocated by Lave (1991) who argues that 'practical' or 'first hand' experiences (i.e. those that involve the body) offer the greatest scope for us to reassess and adjust dispositions that are embedded in past experience. Wilhite and Wallenborn's characterisation of current energy demand reduction policies as ineffective and stagnant risks alienating the policy community from their message. Moreover, policy makers may struggle to know how to operationalise their calls for greater embodiment in energy policy. However, their plea is predominantly aimed at the research community, imploring us to take a lead in taking the kind of "epistemological risks" required to reinvigorate energy policy. We have taken up this challenge and hope, through Walking with Energy, to support policy makers and practitioners to rise to the challenge of enabling meaningful citizen involvement which encompasses both mind and body.

Methodologies explicitly or implicitly promoting a greater level of embodiment are becoming more common in certain fields, most notably in geography and sociology, but their influence is increasingly being felt within energy and environmental studies. Such methods include walking interviews (see for example, Evans & Jones, 2011) which aim to reveal rich insights into the relationship between people and place by embedding the research encounter in the landscape. In practice, this will commonly involve researcher and participant walking around a particular place (neighbourhood, building, street) whilst talking about that place and the participant's experiences and memories of it. This approach has provided a welcome alternative to reflecting on experiences of place from a distance and relying on respondents' descriptions as is required by traditional qualitative research approaches and has been shown to yield richer, more nuanced data and a more inclusive research experience where power imbalances between researcher and participant are reduced (Evans & Jones, 2011; Kinney, 2017).

Key pioneers of walking interviews Evans and Jones (2011) echo arguments about the need for greater citizen involvement in policy decisions visited earlier, contending that walking interviews are not just an innovative research method but are critical policy and decision making tools. Such methods, they argue, help to reveal the histories and preferences of local populations thus enabling fair and sustainable policy making which is embedded in the present yet sensitive to the past. In this sense, Evans and Jones are fully convinced of the argument that data generated as a result of a greater level of embodiment in the research process can enable more effective and sensitive policy making and adds to the debate by underlining the significance of history. Despite being embedded in the present landscape, Evans and Jones provide evidence that walking interviews are effective in eliciting events and feelings from the past. The work of Goodchild et al. (2017) underlines the importance of these historical understandings by providing an illustration, in an energy context, of how recalled experiences from throughout our lives are reflected in our attitudes and practices in relation to energy consumption in the present. On a practical note, Evans and Jones highlight how proximity and a clear line of sight to the place or feature under discussion are critical in terms of stimulating discussion, underlining the significance of first hand encounters.

Castan Broto (Castan Broto, 2019)) has also worked extensively with walking methods in an urban energy context and has spent time walking unfamiliar neighbourhoods with their inhabitants in a bid to immerse herself and her participants in the energy landscape. She has used this technique to understand relationships between citizens and energy infrastructure and the ways in which it has shaped and been shaped by the development of the city. Her conception of walking as a means of appreciating the 'extraordinary ordinariness' of energy landscapes and identifying what is distinctive in landscapes that have become familiar and indistinct to those around them, is a significant influence on the present study. Although she does not explicitly say it, the focus of her work is on making visible energy infrastructure that has become so familiar that it is almost invisible although she does this in order to understand relationships between people and energy as opposed to explicitly seeking to raise awareness and promote a reconnection.

Oral history techniques are also of interest in the context of understanding our changing relationship with energy over time. Such

techniques have rarely been applied in the field of energy studies but offer significant potential to situate current energy dilemmas in their historical context, thus revealing insights (that may otherwise be lost forever) into how they have evolved to their current state. The work of Goodchild et al. (2017) has effectively demonstrated the potential of oral history techniques to reveal detailed new insights into our changing relationship with heat. Oral histories, it is argued, are particularly useful for revealing stories that would otherwise remain confined to the heads and homes of the participant (Goodchild et al., 2017). The objective of their use in this instance would not be to understand energy transitions (such as the transition from solid fuel to central heating) *per se* and certainly not to provide a factual account of those transitions. Instead the objective is to understand, in the style of Darby (2017), how individuals have experienced energy transitions and how these experiences may have contributed to increasing (physical and figurative) distance between citizens and processes of energy generation and how (and the extent to which) this has resulted in greater apathy about how energy is generated. This notion is summarised by Goodchild et al. (2017) when they say that "oral histories provide a rich data source that enables reconstructions of personal and local impact to rise to the foreground." (pp. 3).

The next section seeks to articulate the methodology that has resulted from and advances the debates and methods discussed in this section and how it has been applied in the case study location.

4. Methods

In the pilot case study city of Sheffield, UK, a large incineration facility that supplies much of the city centre and some inner city areas with heat and also generates power, sits at the confluence of a number of the main transport gateways to the city and cannot fail to be noticed by the thousands of motorists and train and tram users entering the city centre every day. Aside from moments of visibility, specifically some controversy around emissions (in connection with a previous plant on the site) highlighted by Greenpeace in the 1990s which died down long ago, the facility appears to go largely unquestioned, receives no media attention and for these reasons, it is likely that the majority of the city's residents have little or no understanding of what it is and why it is there.

The Walking with Energy project was inspired by these observations, by the case for deeper and more meaningful citizen involvement in energy related decisions, the concepts of 'social learning' (Bull et al., 2008) and the appeal made by Wilhite and Wallenborn (2013) for a greater level of embodiment, experimentation and risk taking in our quest to develop more effective and democratic energy policy. The project methodology is influenced by walking interviews and their application in an energy context by Castan Broto (2019) as well as by the value of oral history approaches in helping us to understand individual experiences of energy transitions and how these have impacted on our contemporary relationship with energy.

The resultant methodology was piloted in Sheffield in November 2018 as part of a nationwide programme of events aimed at engaging the public with social research. The objective of the event was explicitly to promote a (re)connection between members of the general public and local processes of energy generation and as such, the events were open to anyone and places allocated on a first come, first served basis. The offer made to prospective participants was that the event would involve a 'walking tour with a difference', that they would learn about Sheffield's 'heat secrets', tour the incinerator and also contribute data to a linked research project. The lack of scope to purposively sample participants increased the chance of sample bias and an overrepresentation of 'middle class', educated participants of the sort typically attracted to such 'popular science' events. This meant that the event was unlikely to offer an opportunity to engage with those in society that are the most disengaged and detached in relation to key policy debates on any subject, a problem also noted by Carlsson-Kanyama et al. (2008) in their attempts to attract a diverse audience to participatory local sustainability planning workshops. However, it is rare for energy focussed events to feature in the Festival of Social Science programme which typically attracts those with a social science leaning. It is therefore possible that this event represented an anomaly in the programme thus reducing the chances of the event attracting participants who are already engaged with energy issues through their professional or educational background (or 'experts' of sorts).

Taking account of all of the influences outlined above, the methodology involved taking 15 members of the public (who signed up for the event), on a 45 min (1.5 KM) walking tour around the city centre and inner city which followed the route of part of the district heating pipelines that lay under the city's roads and carry hot water to 200 buildings around the city via 45 km of pipeline. The tour culminated at the source of the pipeline- the city's Energy from Waste (EfW) facility. The facility burns all domestic and commercial waste collected in the city to generate heat for civic, commercial and residential buildings and electricity that is exported to the grid. The event began with a 45 min briefing in a café that sits on the district heating pipeline where we provided some insights into the motivation for the event (to pilot a new approach to raising public awareness of contemporary processes of energy generation locally, in this case EfW) and a detailed explanation of how the walking tour and the visit to the EfW facility would operate including health and safety information. On the walk (which lasted about an hour as we walked slowly to enable discussion), one experienced researcher accompanied two or three participants and small informal walking focus groups were conducted (enabling social learning) as we traced the pipeline through the streets, stopping to point out and discuss prominent buildings supplied by the network. The things we saw along the way acted as a stimulus for discussion and a short topic guide was also used to inform discussions with participants and covered topics such as their motivation for joining the tour; discussion of how their own relationship with energy has evolved over time (through the lens of home heating); their knowledge of and feelings about how heat and energy are generated in Sheffield today and in the past and their preconceptions and expectations in relation to their visit to the EfW facility. The guided tour of the EfW facility led by its General Manager lasted one hour and included a health and safety briefing, a detailed explanation (using various schemas and props) of how the plant converts waste to energy and a guided walk around all areas including the entry point for the refuse, control room, furnace and mechanisms for recovering metals and ash and filtering of emissions. A de-brief was held after the tour where participants were asked to reflect on what they had seen and heard and how it had impacted on the attitudes and opinions they had expressed beforehand and whether it was likely to impact on their behaviour. All conversations were audio-

recorded and transcribed verbatim to enable rigorous analysis.

5. Findings

This section provides a short summary of the characteristics of participants and goes on to present the findings from the main data collection activities: the walking focus groups conducted at the start of the event and from the debrief conducted after the tour of the EfW facility. The section is organised thematically and a distinction is also made between data collected before and after the tour of the EfW facility to enable reflection on any shift in or elaboration of views between the two points in time. The themes which have been used to structure this section were generated through an inductive manual coding exercise. A discussion of the results in the context of the literature review is presented in the next and final section of the paper.

For reasons of safety, participation in the event was restricted to 15 people. There was surprisingly high demand for the event which suggests there is an appetite to find out more about energy generation- or perhaps EfW in particular- amongst the general public locally or at least certain groups within the population. The programme which the event was part of has a track record of attracting older, mostly middle class participants. It was hoped that this event might reach beyond this demographic and attract an audience more representative of the local population. To this end, additional support was put in place including free transport to and from the event and free refreshments in the hope of broadening participation. The event was also publicised in a mainstream local newspaper with a wide readership in addition to various social media channels and traditional leaflets and posters distributed widely around the city. In the event, a good mix of participants attended. Although most participants could probably be described as 'middle class' in terms of income and background, there was a good spread of ages ranging from 24 to 85. Six of the participants were between the ages of 50 and 70 plus one 85 year old, six between the ages of 30 and 50 and two under the age of 30. Data on their occupations and educational background was also collected in order to be aware of any specialist knowledge within the group. This was an educated group and most participants had a professional or skilled background and nine of the 13 were educated to degree level or higher. All participants cited an interest in environmental or urban issues as a motivation for signing up to the event but none of them had a related professional background.

5.1. During the walk (before the EfW facility tour)

5.1.1. Energy 'invisibility', mystery and intrigue

The idea that a key aim of the project was to explore the existence of and possible ways of overcoming so-called energy 'invisibility' was not explicitly discussed with participants to avoid biasing their responses. In spite of this, energy invisibility or at least the idea that energy is taken for granted in our daily lives was an implicit theme in discussions with participants throughout the event. This is partly reflected in the fact that most participants knew very little about the EfW facility prior to taking part in the event:

I was only very vaguely [aware of the EfW plant], but I was aware that the facility was there cos I'd walked past it going in and out of the city, but other than that not really. I knew we had an incinerator and that was the extent of my understanding. (M, 45)

This lack of knowledge appeared to give rise to a sense of intrigue around the facility and when asked what had motivated them to take part in the event, most participants referred to a curiosity about the EfW facility (over and above the associated heat network) which was regarded as something mysterious, perhaps even classified, that they had little prior knowledge of.

It was an opportunity to see something that you wouldn't normally get an opportunity to see and to learn about it. (F, 62).

It's pretty intriguing. I've never heard of anyone going inside the place [incinerator] before. (M, 40)

It feels kind of edgy. I feel like a sort of urban explorer. (M, 24)

Once I'd seen the advert, I wanted to know what happens in there and couldn't really believe I hadn't wondered that before. (F, 68)

As we walked the pipeline on the way to the EfW facility, discussion turned to participants' awareness of where the energy they use at home comes from before it enters their home. Invisibility was also implicit in these discussions in so far as there was limited awareness amongst participants and few felt confident in their answers. Several participants reported feeling slightly embarrassed at their lack of knowledge and one commented that it was only in that moment that they realised how little they knew about this and felt surprised at their own lack of curiosity:

How silly that I don't know. I've surprised myself with my ignorance there. (F, 68)

I: So you all use gas as a main source. Do you have any sense of where it comes from?

R: I haven't given it any thought. I presume the North Sea?

No. It's not the kind of thing you tend to talk about.

I lived in Sweden for three months this year and I never really asked where the heating came from but it could easily have been from district heating of some sort.

Obviously gas presumably it's imported natural gas? I'm guessing some coal or electricity are also used? I'm really not sure.

While most participants felt they should improve their awareness of where energy comes from, one participant questioned how necessary this was. For him, the fact that citizens have little input into decisions about energy generation meant there was one less thing to worry about:

We don't need to worry about who's supplying the heat, as long as we have it, cos we have all this other stuff to worry about.

(M.24)

As other studies have found (see [Goodchild et al., 2017](#)), participants were quick to (spontaneously) contrast the current 'invisible' and intangible nature of contemporary home heating with the highly tangible nature of solid fuel which was used to heat the majority of homes prior to the widespread adoption of gas central heating in the UK in the 1970s. Many participants recalled a time when their homes were heated by burning coal- something once abundant in the area:

I'm a retired GP and I worked in a [coal] mining village so most of the people there were miners and once a month or whatever, the miners had a free coal allowance but rather than deliver it to each individual house they'd just pile it up in the middle of each little side street and people went out and shovelled it back in. So you used to know exactly where your fuel was coming from. You might even have dug it out yourself. It couldn't be more different now. (M, 68)

Of the 13 participants, one still heated their home using solid fuel and recognised that their experience of home heating is in stark contrast to that of most households:

I'm unusual these days because I know where my heating comes from. I burn wood that I chop myself or forage it. I grew up in a house, my parents have coal fires in their house, and it's a terraced house, so they come and deliver a tonne of coal so it's always been within our own control. (M, 30)

5.1.2. Perceptions of the EfW facility

In terms of awareness of the EfW facility, the associated heat network and what they do, most participants considered that awareness was likely to be low amongst most people in the city and some were able to share anecdotal evidence of this. It was felt by some that awareness might have been higher in relation to an earlier EfW facility on the same site which became the focus of a Greenpeace emissions campaign in the late 1990s, but that interest had waned and the facility has since seemingly merged into the landscape, unnoticed and unchallenged:

I was at a meeting on Monday and I mentioned that I was coming here and nobody there knew about it, I thought that was terrible. I mean nobody knew about the [district heating] system. I don't think anyone noticed it. (F, 50)

Yes I suppose when it was new it was more in the news but now that it's been running for 30, 40 years it's not, there's no news there, no story there, so it doesn't get talked about and unless you actually know about it why would you hear about it? (M, 48)

I was aware of it, I remember when it was in the media when it was built and there was discussion about whether it's a good or bad thing. That must have been 30 odd years ago but not since. (M, 62)

In this vein, one participant shared an anecdote which they felt illustrated how few people are aware of how heat and energy is generated in the city and that those who were perhaps felt confused and conflicted about whether heat from waste was a 'good' thing or not. As she explains, there's potential to see heat from waste as a good use for the by-product of a waste disposal process or as a private company profiting from the provision of a public service:

Sometimes I've looked into the Winter Gardens[major civic building on district heating network] in winter and there's some people who don't know saying this is wasteful having it this warm in here and you could hear people saying no, it's actually waste heat that's being reused and that's a good thing, so it's almost like free energy, so therefore it's ok to use it in this way, but then equally I'm sure Veolia [network operator] don't count it as free energy, they count it as profit, we've produced this energy and sent it off to be used in Sheffield and so I think there is kind of a, something of a dual standard where some people want to count it as really useful, some want to count it as free energy that's used to heat palm trees, other people want to count it as free cos it's just waste, and ok I think that's a useful way to think but there is a bit of conflict there. (F, 84)

5.2. During and after the tour of the EfW facility

5.2.1. The tour of the EfW facility

The tour of the facility took around one hour and included a detailed explanation of how the plant and associated heat network works. Participants also had ample opportunity to ask questions and many did. Most of the questions posed related to emissions - how emissions levels are monitored, how harmful emissions are reduced and what happens in the event of an emissions level breach (the facility is legally required to keep harmful emissions within certain thresholds and may be sanctioned if these are breached). A number of less probing technical and logistical questions were also posed. The tour involved witnessing huge volumes of domestic and commercial refuse sitting in a giant pit (which 400,000 tonnes of waste pass through every year) and being transferred in relatively small quantities by a grabber into a furnace then seeing the resultant ash being cooled and transported along a conveyor belt where metals were removed from the stream by magnets. The ash and metals are then gathered in piles in a shed ready for sale or use in construction projects. After the tour had concluded, a debrief was held elsewhere on site where participants were asked for their thoughts and reflections on what they had experienced.

The reactions of participants to the tour of the facility were fairly consistent and involved a combination of discomfort at the volume and nature of the waste gathered from around the city and a degree of reassurance that it was being put to a perceived 'good use'. Several respondents also remarked on the volume of plastic in the waste stream and lamented that it wasn't being recycled. Others felt reassured that burning plastic waste that can't be recycled locally would prevent it entering the oceans, picking up on the

recent public concern about ocean plastics.

We're consuming more and more and I don't know how you tackle that but at least this way you can stop the waste building up and deal with usefully and keep it out of harms way. (M, 45)

Personally seeing all the waste is quite a sobering thing coming face to face with the consequences of our over-consumption really isn't it, seeing our waste pouring into a pit like that. (F, 36)

It's been reassuring. My husband and I have debates around recycling. We're both very keen recyclers but when things do go in the bin I can now say at least it's going to make something useful. (F, 52)

Overall, all participants were broadly positive (albeit with some caveats) about what they had seen, despite several showing concern about emissions levels from the facility during the tour. The approach was widely regarded as a favourable alternative to land fill. Concerns about emissions weren't widely raised at the debrief and participants seemed satisfied by the arguments put forward by the General Manager that the CO₂ emissions associated with the facility were less than those associated with landfill and that the heat network obviated the generation of large volumes of CO₂ compared to individual gas boilers.

It makes me wonder why it isn't happening more in other cities. So it seems like a good thing, ok it costs money presumably, but it seems like it's the way it ought to be. So really the question is why aren't other places doing it? And this is the good version cos everywhere else you see it pouring into a big hole in the ground and then the big hole in the ground grows until they can't contain it and then they dig another one. (F, 36)

There was however a degree of concern that relying on burning waste to heat many buildings around the city (and proposals to expand the network) would act as a perverse incentive in terms of reducing waste.

5.2.2. *Impact of the tour*

In terms of whether the event had been effective in overcoming (however temporarily) energy 'invisibility' and (re)connecting members of the public with key debates around energy production, it certainly appeared that it had prompted all participants to reflect on the benefits and disbenefits of EfW and arrive at a conclusion about whether it is 'good' or 'bad' and something that should be widely deployed. Prior to the tour, as some of the material in the previous section illustrates, there was far more ambivalence.

I'm thinking, it all seems like a good thing but we all put our own spin on things so we don't know what spin the guy from Veolia has put on it, but to me it sounds really simple and sounds really efficient and sounds as if it's a really good thing for Sheffield. It's important to be a bit cynical though I think. (M, 62)

Several participants remarked that events like this should be more common and could play an important role in raising awareness of issues allied to energy generation and waste management. EfW, it was felt, was a particularly good example for raising awareness of the interconnected nature of various forms of consumption.

Incredible to see it all burning like that. Everyone should see that. (F, 50)

I think it's good that there is an event like this. It's important to get more people involved and just get them thinking about it and becoming aware of it, just prompting them to consider a bit more, just awareness I think is an important first step. (M, 45)

You realise when you come here that it's all linked up. What we buy, what we waste, how we heat and how much we heat etc. So the more energy we demand, the more waste they need to collect. There's lots of focus on reducing waste but this is always looked at in isolation of its impact on energy. You can save energy by consuming less but systems like this rely on us consuming more or the same maybe. None of this had occurred to me before this evening. (F, 84)

In terms of whether the experience was likely to bridge from the specific (EfW) to the general (energy policy more broadly) and translate into greater levels of environmental citizenship or even behaviour change amongst participants; the largely positive view held by nearly all participants appeared to have the effect of vindicating their current behaviour with regards to waste disposal, with many feeling relieved that the waste they do not recycle is used positively, in their view. However, the experience had clearly stimulated interest in and sensitivity to both the volume of refuse we generate and debates around EfW. The event was arguably less effective in terms of prompting participants to reflect critically on how EfW compares to other approaches to generating heat and energy and the energy mix we subscribe to in the UK. However, there was no expectation that participants would stray into the domain of experts who are in a position to assess the relative contribution of different forms of heat generation, technical innovations in the field and future options.

It appeared that the issue of waste and waste volume proved the most compelling aspect of the experience for this group. One participant, however, was prompted to express discontent with the gas heating system he had in his home, seemingly experiencing a realisation about how little choice he had over this important aspect of everyday life, how poorly it aligned with his own ethical stance and how little power he had to change it:

It's made me think [...] I'm not happy with gas heating. I would prefer something renewable, more like this but it costs such a lot to convert it. It's not something you get a say in unless you have a lot of money. I would feel better if I was on the heat network as I would know that gas wasn't being extracted to heat my home. (M, 45)

6. Discussion

6.1. Energy invisibility and citizen engagement

The data collected during the event provides further insights into the taken for granted nature of energy in our daily lives, with many participants unable to even speculate about how the energy they use in their homes is generated. In terms of how we have become so distanced from energy production, participants alluded to explanations related to energy transitions in their lifetimes and drew unprompted comparisons between the very tangible nature of home heating in the past (solid fuel) and its current largely intangible form (gas central heating or electric heating). Of course it is not necessarily the case that we understood more about the policies and politics that determined how our homes were heated and powered in these times of tangibility but most would have had an understanding of what they were burning to heat their homes and where that was coming from. It was also recognised that energy generation has gone from being something we actively participated in to drifting out of our consciousness, only briefly reappearing at times of controversy.

It is not the intention of this paper to suggest that the widespread adoption of cleaner, safer and less laborious forms of domestic heat and power of the sort common today (i.e. gas central heating) represent a retrograde step, but it is argued that the loss of awareness of and connectedness to processes of energy generation can be problematic at a time when we are required to be more conscientious consumers than ever before and when energy can be a source of inequality and damage to the environment. It is also contended that this disconnect could be a factor in shaping conditions where less progressive modes of energy production are adopted with limited or ineffective public challenge or where a lack of public championing for progressive forms of energy generation means they are less likely to be pursued.

The general acceptance within the literature on citizen engagement that meaningful public participation represents the 'gold standard' in policy making (Felt & Fochler, 2008) and the recognition of all the practical and moral benefits this brings does not appear to have been heeded in relation to energy policy development in the UK. Although there may be some local exceptions, the fact that the 15 citizens that took part in this study, who are educated and interested in environmental issues, have little or no awareness of where their energy comes from and regard the local EfW facility as a source of intrigue or the territory of an 'urban explorer' is testimony to the inadequacy of attempts at citizen engagement in relation to energy. It could therefore be argued that those responsible for the development and implementation of energy policies are effectively avoiding their duty to ensure that their policies are socially robust and responsible (Beierle, 1999).

The extent of the disconnection between citizens and policies and processes related to energy generation illustrated by this and other studies suggests that the prospect of realising Becker and Naumann's (2017) vision of decentralisation and collective ownership of energy infrastructure remains distant. For this and many other reasons, the community energy schemes that have emerged in the UK in recent years are likely to remain in a niche. It therefore follows that the opportunities for the transformation of the current system to a more democratic model created by the necessary transition away from fossil fuels are unlikely to be widely capitalised upon by a poorly informed public - a state contributed to by the historic absence of citizen engagement in relation to energy policy - an area of policy that remains the territory of 'experts'. It can, of course, be countered that energy policy, as with all other areas of policy in the UK, is democratic because it is conducted by democratically elected and accountable ministers yet, in order to truly represent the views of the electorate they must be in dialogue with them and the electorate themselves must have a certain level of knowledge to participate in such dialogue. This study provides an indication that even amongst an engaged set of citizens, these necessary conditions are not in place. This therefore suggests that in terms of the spectrum of citizen involvement described in the literature that runs from meaningful two way dialogue between citizens and policy makers at one end to collective ownership at the other, even the most passive end of the spectrum appears challenging in the context of the status quo. In this vein, it is not the intention of this paper to suggest that citizens should become experts but it is argued that citizens would benefit from a certain level of healthy curiosity and the basic knowledge to be able to engage with and challenge the evidence base which shapes policy decisions and with those that represent them in the political system.

Should we care where our energy comes from? Perhaps in a context where energy was affordable and where processes of energy generation did not harm the environment then apathy would be more justifiable. Certainly there are plenty of other policy areas that should concern us and as stated by one participant, the fact that energy related decisions have essentially (and literally) been taken out of our hands means there is one less thing to worry about. In relation to this point, the aim of this paper is not to suggest that energy is more important than other policy areas where public opinion and media focus appears stronger (i.e. poverty or violence) but that it deserves at least an equal level of coverage and consideration as such a profound influence on our daily lives, the condition of the environment, our prosperity and our preparedness for the future.

6.2. What can research participation contribute?

In methodological terms, the project responds directly to the calls of Wilhite and Wallenborn (2013) for the research community to take the 'epistemological risks' required to reinvigorate energy policy. Inspired by the emergence of a raft of more participative research methods that take the entirely logical step of embedding the research process in the landscape or context in question, we have sought to bring self-selecting members of the public face to face with energy generation processes - in some cases for the first time in their lives. Walking with them along the pipeline and taking them into the incinerator immersed their bodies in the energy landscape and the process of research participation engaged their minds. We hope, therefore, to have responded effectively to the calls of Wilhite and Wallenborn to bring mind and body together in the kind of act of 'practical learning' that Lave (1991) contends

offers the greatest scope for us to re-evaluate historically embedded dispositions and in the hope of encouraging them to "see beyond their own agenda and pursue a collective one of responsible citizenship." (Bull et al., 2008).

On the basis of the data generated, it can be said with some certainty that participation in the event moved all participants from a position of relative apathy and being poorly informed to a position where they were keenly seeking information in order to make a (in the majority of cases) well-reasoned assessment of whether EfW was a 'good' or 'bad' thing. Moreover, by the end of the event, most had taken the view that EfW was, on the whole, a positive approach to combining lower carbon energy generation with the responsible management of waste whilst retaining sensible reservations about this acting as a perverse incentive to waste reduction. There is therefore a very clear sense that the event was successful in engaging participants with ethical and environmental debates around this particular (and often contentious) form of energy generation. Although their deliberations couldn't be described as forensic in nature, participants took on board new information, asked challenging questions and used this new knowledge to reach a position - hopefully sparking a curiosity and a confidence that will remain with them. Although we have no way of knowing, at this point in time, how long these impacts will last, the findings of Bull et al. (2008) provide indications that it is possible for meaningful public engagement to generate lasting increases in environmental citizenship. Of course, the exercise that Bull et al. refer to was a more in depth process that went on for many months and was in response to a specific and controversial proposal. It is therefore important to acknowledge the more limited 'quality of learning' and scope for impact associated with a one off event lasting a few hours. However, the contentions of Wilhite and Wallenborn, Lave and others that practical, social and embodied experiences offers greater scope for learning and challenging preconceptions than traditional forms of learning should also be borne in mind in this context - suggesting that the quality and depth of the encounter may be more significant than its length.

In the time available there appeared to be sufficient scope for participants to acquire and consider a reasonable depth of information regarding EfW. But, as noted in the findings, the event was arguably less effective (as would be expected) in terms of prompting participants to reflect critically on how EfW compares to other approaches to generating heat and energy and the overall energy mix we subscribe to in the UK. This suggests that if we are aiming to build the skills and knowledge amongst the general public to engage with strategic debates about our energy futures then short, one-off events will not be sufficient. However, this is arguably an unrealistic goal when we consider that the mechanisms to engage at that strategic level do not readily exist unless you are engaged with a pressure group or adept at gaining the support of an MP. Therefore, the reality of how most people engage with energy issues and decisions will be at the local level and probably in response to specific proposals or developments. In this context, Walking with Energy may offer a creative and effective means of engaging the public in the debates surrounding particular proposals and local debates equipping them with the knowledge to contribute to them and increasing their credibility amongst the expert community taking the lead in energy policy decision making. The results presented also suggest that the views of citizens and experts will not always be at loggerheads, which may be the fear within the expert community.

Given that the event had several components (the walk, the tour, the debrief), it is also worth reflecting on the functions fulfilled by each element of the event and whether any of the parts were more instrumental than others in reaching the identified outcomes. It was certainly clear that the tour of the incinerator was the most powerful aspect of the event for most participants and the multi-sensory nature (unfamiliar sights, sounds and smells were abundant) of the experience inside the incinerator appeared to captivate participants with many expressing surprise at various points and demonstrating a keen interest by asking lots of questions. It was during this part of the event where the bulk of the information was received and views on the benefits and disbenefits of EfW crystallised. However, the different components of the event fulfilled different functions. The walk along the pipeline appeared effective in preparing the ground for the first hand encounter with energy production that lay ahead. In particular, the walk provided the opportunity for participants to engage in a social encounter with other participants where stories of heating histories were exchanged. This made for a rich exploration of participants 'energy histories' where the researcher could step back and absorb the relevant data emerging from the group discussion. It also familiarised the group with the hinterland of the EfW plant, raising awareness of the role that the facility plays in heating many of the city's most frequently used buildings as well as raising awareness of the unseen infrastructure beneath our feet. The debrief was critical in terms of understanding the impact of the event and for giving participants the space to digest and reflect upon what they had been told and had seen. Therefore all components of the event are considered to have made a contribution to the outcomes identified.

The event proved popular with more than 30 people on a waiting list to join the event (with a capacity of 15), suggesting that there is public interest in both the topic and the format and a clear appetite for understanding more about where our energy comes from. It could, of course, be argued that this interest emanated from the 'usual suspects' - a group of educated and interested citizens but an initiative like this will nearly always start with a group like this and this is not necessarily a disadvantage given that they are well positioned to act on the new knowledge they've acquired. However, now the concept is proven, more work can be done to widen the reach of such initiatives including varying their forms and working outside of initiatives like the Festival of Social Science with a clear middle class leaning. In this vein, a key priority for this research agenda in future must be to consider how genuinely disengaged members of the public might respond.

6.3. Conclusion and policy implications

In conclusion it is worth reflecting on what is hoped will happen next and on the methodological considerations raised by the study. Was the tour intended to bridge from the specific to the general with the 15 participants going on to lobby MPs and take other steps to shape energy policy? Or is a more modest outcome such as small scale changes in the behaviour of participants a more realistic prospect? In truth this project was not shaped by any specific expectations and was certainly not conceived as form of moral guidance. The intention was merely to establish whether embeddedness in the energy landscape and first hand encounters with

energy production had the potential to interest and engage ordinary citizens in processes of energy production that we have long lost touch with and that this may lay the foundation for a greater level of engagement in energy policy and decisions in the future. Time will tell whether the encounter has had any lasting impact on participants and establishing this should form a priority for future research in this area.

In terms of the methodological lessons we can take from this experimental study, it is clear from the results presented that the key concepts brought together to form the Walking with Energy approach were effective- in concert- at promoting a reconnection between participants and energy. On this basis, it is suggested that research methods which are social (offer opportunities for social learning), embedded (in the landscape in question), embodied (engage body and mind) and that are sensitive to the past offer significant scope to go beyond a process of data collection and engage hearts and minds with the possibility (yet to be tested) of effecting lasting changes in attitudes and behaviour.

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