Public participation in a West of England energy transition: Key patterns and trends

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1. Introduction

This report addresses the question: ***how and where is public participation in energy systems occurring in the West of England?***

To achieve deep and timely cuts to carbon emissions, fundamental changes to the way society produces and consumes energy is required. That unfolding energy transitions will require changes in technologies and infrastructures is largely taken for granted. That they will also require the active engagement and participation of citizens is slowly becoming more widely accepted, for three connected reasons: to achieve a transition will require (1) fundamental changes to individual and collective energy practices, (2) acceptance of the direction and extend of change, as well as (3) a willingness to pay for it. As a result, the involvement of citizens and the fostering of public participation has subsequently emerged as a central concern for those interested in building increasingly sustainable and inclusive energy systems.

Traditionally, citizens have been viewed as passive energy consumers and public participation in energy system developments have typically amounted to periodic consultations on singular issues. Today, the ways in which citizens are participating in energy systems is thought to be much more diverse. The rise of community renewables projects presents one example. Citizen science initiatives another. Visioning exercises, participatory planning processes, hacker spaces, smart technology trials and 'city labs' are all further examples of the diverse ways in which citizens are actively shaping energy system developments and contributing to collective decisions about their energy futures. In response attention has sought to explore the diversity of contemporary energy participation in the UK (Pallet et al., 2017). Less understood and, to date, little studied, is the extent and diversity of public participation occurring in particular places, such as the West of England. This report, the outcome of a project funded by the Bristol Sustainable Energy Research Fund[1], seeks to address this gap by answering the question posed above: how and where is public participation in energy systems occurring in the West of England?

The West of England

The West of England region is a geographic area in South West England (Figure 1). The region has roots in the former county of Avon but has gained increased political and economic significant in recent years through the introduction of a West of England Local Enterprise Partnership (LEP) in 2010, and through the devolution of powers to a new West of England Combined Authority (WECA), agreed in 2016. The LEP comprises four local authority areas, including those of Bristol, South Gloucestershire, Bath and North East Somerset and North Somerset. The WECA covers the same local authorities minus North Somerset who opted out of the process. In this project, the West of England is used to refer to all four local authority areas.

Figure 1: The West of England region, comprising four local authority areas

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The region contains two large cities. Bristol is home to approximately 450,000 people, is the largest city in the South West and is one of the UK's ten core cities. The city is widely recognized for being a melting pot of energy-related innovation and enterprise and civic and public experimentation in and for more sustainable, socially just energy systems. The city contains the largest cluster of environmental technology and service businesses of any core UK city, it has a municipally owned energy company, Bristol Energy, it hosts the national charity, Centre for Sustainable Energy, and entertains a wide variety of community energy initiatives including Bristol Energy Network. Bath is home to approximately 100,000 people and is ninth largest city in the South West of England. The city has a rich culture and history and is a UNESCO World Heritage Centre. The city has an active local authority and hosts Bath and West Community Energy.

Project aims and objectives

The primary aim of this research is to investigate how citizens engage with unfolding energy transitions and in so doing contribute to the development of a more sustainable, equitable and democratically accountable energy system in the South West of England.

The project subsequently entailed three research objectives:
- To design and undertake a systematic mapping of energy participation within the West of England;
- To identify, explore and illustrate key patterns and trends within contemporary regional energy participation;
- And to reflect on what these findings might mean for developing a more sustainable, inclusive and socially just energy system in the region.

To achieve these objectives and answer the question posed, the project undertook a rapid assessment of contemporary public participation in the region's energy system. The approach adopted was exploratory and experimental. It resulted in the identification of 435 individual participatory events, which were compiled into a database and analysed in a search for key patterns and trends.

This report

This report forms the primary output of the project. It provides a snapshot of public participation in energy systems within the West of England between January 2015 and December 2017, identifies and explores key trends within the data and reflects on the results.

- **Section 2** introduces contemporary thinking on energy participation. It outlines traditional understandings of energy participation as well as recent conceptual advances before outlining a concise conceptual framework subsequently used to unpack and facilitate understanding of contemporary instances of energy participation. The section ends with a brief discussion on identifying public participation in practice.

- **Section 3** outlines the exploratory and experimental approach taken to investigate public participation in West of England energy systems.

- **Section 4** introduces the various forms of public participation observed within the region before exploring key patterns and trends within the dataset.

- **Section 5** summarises these emergent patterns and reflects on what they mean for the development of more sustainable, inclusive and democratic energy systems in the region before concluding with a series of key messages and implications for further research.

2. Understanding public participation

Public participation was once described by Sherry Arnstein (1969) as 'a little like eating spinach: no-one is against it in principle because it is good for you'. Her point was simple. As a matter of principle, very few people question how citizens should be involved in decisions that affect them. However, in practice the participation of citizens in their governing can easily become controversial. This typically occurs over questions about who is allowed to participate and what constitutes legitimate participation: Do some voices count more than others and are some means of expression (ballots versus protests for instance) more legitimate than others?

Sherry Arnstein was contributing to fierce debates in a culturally divided America in the 1960s. Yet, her insights on citizens power, the meaning and responses to diverse forms of citizen participation still hold value today. In the preceding 50 years there has been lively debate about what it means to participate. For the present project it is useful to briefly outline mainstream or traditional understanding of public participation in energy systems, before addressing recent conceptual advances, which underpin how energy participation is understood within this project.

Mainstream, relational and systemic understandings of energy participation

Mainstream or traditional approaches to energy participation, such as Public consultations, surveys and focus groups, emerged largely as a result of various material and cultural factors. The centralised design of energy systems alongside the one-way flow of electricity from large generation plants to businesses and households meant citizens were principally viewed as consumers. With a limited role in the energy systems, public participation subsequently concerned the periodic consultation of citizens on particular energy issues, such as the siting of new energy infrastructure. In practice, traditional forms of energy participation tend to entail singular events on a particular issue or topic and are led by experts with participants carefully selected to represent a particular area or a cross section of society. For this reason, traditional forms of participation share a common set of assumptions. This includes fixed ideas about what it means to participate and who is to be involved. Moreover, they each assume there is an external public 'out there', ready to be known or consulted. Framed in this way, public participation becomes the technical application of pre-given methods, that can be perfected, scaled up or rolled out, to better understand what a pre-defined public think (Chilvers and Pallett, 2018).

This understanding of public participation is highly influential in policy-making and practice. Yet, as centralised energy systems collapse and diverse, distributed, participatory and post-carbon energy systems emerge this framing has been criticised for closing down deliberation and the potential of energy transitions to lead to more inclusive and socially just societies (Pidgeon et al., 2014; Stirling, 2014). Mainstream approaches and the philosophies underpinning them have also been criticized for neglecting diverse and emergent forms through which citizens are actively getting involved in and contributing to energy system change (Smith and Stirling, 2016, Chilvers and Longhurst, 2015; Cowell and Devine-Wright, 2018).

Since the turn of the century our understanding of what it means to participate has been opened up to more diverse framings (Radtke et al., 2018). Following Chilvers, Pallet and Hargreaves (2018) two strands can be usefully distinguished.

Relational approaches to energy participation argue that individuals never participate alone, but always through collective practices (Marres, 2011: Shove and Walker, 2014). Largely analytical and influenced by advances in the study of Science and Technology Studies and Social Practice Theory, this approach argues that participation can only be understood as collective experiences in which material elements, infrastructures, technologies, meanings, other people and so on interact. Unlike traditional framings, participation is no longer viewed as fix or predefined. Instead it is understood as being 'performative', shaped by the participants and the elements involved in and constructing participation. In turn this implies how instances of participation cannot be devoiced from wider contexts of action: participation is conceived as

shaping and being shaped by wider contexts of action, such as the energy system. Participation is subsequently viewed as emergent, rather than fixed or pre-given.

Such relational approaches open up for analysis a wider diversity of participatory collectives than under mainstream or traditional apporaches. It challenges what it means to participate and how participation occurs. It also explores questions of who is and isn't included and purposefully seeks to question power relations and politics. Although increasingly influential, this relational view tends to critically examine individual instances of participation. As a result, it opens up questions about the possible (theoretical) diversity of energy participation but leaves unanswered the extent of participation occurring. It also remains unclear how such diverse forms of participation influence energy system developments.

Emerging systemic approaches to energy participation have been shaped by researchers emphasising whole system understandings of system development and change (Pedgeon et al., 2014; Stirling, 2011). For example, research on socio-technical transitions has for a long time focused on understanding broader patterns and dynamics of change. It is also increasingly looking to better understand how different regions, with different actors, cultures and forms of participation, follow appreciatively different development paths (Torrens et al., 2018). Although, largely a developing area of inquiry, researchers following this systemic turn are less concerned with perfecting singular participatory events and are more interested in how various instances of participation interact and influence energy system developments. Under this view, emphasis is subsequently placed on building supportive environments where multiple forms of participation can interconnect, flourish and contribute to both doing and governing energy system change.

The following research builds on both of these recent conceptual advances.

A concise theoretical framework

For the present research what is needed is a broad framework for opening up diverse instances of participation in a way that allows for comparison and the search for common patterns and trends in participation. To achieve this the project employees a framework developed by Jason Chilvers and Noel Longhurst (2016), which conceives all instances of participation as comprising three basic elements (Figure 2):

- **Subjects of participation**: that is who is involved and how participants are framed, i.e. as affected citizens, as interested publics, as activists or as experts etc.)

- **Objects of participation**: what is participation about or rather, what is being discussed or action upon, (e.g. energy technologies, issues or governance)

- **Models of participation**: how participation is organised (e.g. surveys, focus groups, protests, conferences etc)
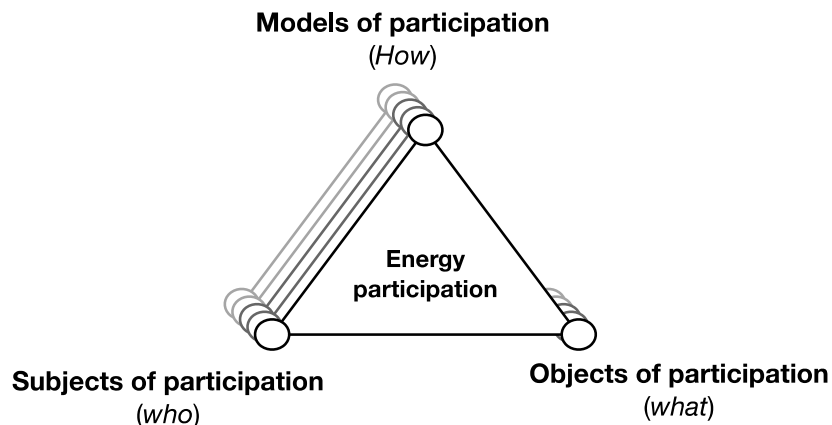
Models of participation
(*How*)

Energy
participation

Subjects of participation
(*who*)

Objects of participation
(*what*)

Figure 2: central elements for understanding energy participation[1]

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By understanding who is involved, what is being discussed and how it is organized they argue it is possible to capture the full range of participation currently occurring in UK energy systems. For instance, this might involve UK citizens being consulted on the design of new transmission pylons through a deliberative workshop or invited users experimenting with smart home appliances through a technology trial.

Energy participation is subsequently understood as *collective practices through which people address common public problems (i.e. energy issues) whether deliberately or tacitly.*

This concise framework is useful because of its ability to open up diverse forms of public participation to closer scrutiny without defining, from the outset, who is participating, how or on what. By the same token, it also does not indicate what they might look like in practice, which is explored below. Instead the framework opens up a space to look at participation in its diversity and provides a basis on which to look for patterns and trends. The results should, therefore, open up the ways in which participation is currently understood and create space for reflecting on current practice.

Public participation in practice

In its most basic sense, public participation can be thought of as an extension of participation more broadly, which implies the ability to take part in something. Citizens participate within contemporary energy systems typically as consumers, e.g. when they switch on a light or when they switch energy supplier. But citizens are also increasingly engaging as active participants by generating their own electricity, by getting involved in neighbourhood energy projects or enrolling in smart technology trials. The point at which participation becomes 'public participation' is subsequently blurred but hinges on the degree to which participation is undertaken collectively, in a public space and contributes to collective decision-making.

From this we can begin to map out what this means in practice. Figure 3 situates a range of contemporary energy participation according to the degree to which it is undertaken individually or collectively and the extent to which it contributes to collective decision-making.

Turning on a light, switching energy supplier or installing a domestic solar PV system are all instances of energy participation (bottom left-hand corner of figure 3). But since they are undertaken on an individual basis and have no link to decision-making they are not classified as public participation here. In contrast, a consultation on the development of a Local Plan is classed as public participation because large numbers of citizens are involved and there is clear and strong link to how it contributes to local decision-making (top right-hand corner of Figure 1). Online and paper petitions are also classified as instances of public participation because they involve multiple citizens and entail a clear attempt to alter energy governance. Hustings around elections provide an interesting example (where they cover energy topics) and are included as instances of public participation because they are undertaken in public and contribute to informing how citizens subsequently vote, as well as influencing candidates.

Instances of participation where it becomes harder to draw a distinction include DIY Solar workshops, energy talks and energy advice sessions. DIY solar workshops – in which people (de)construct solar panels and in the process discuss their position in the energy system – are undertaken together but have little direction impact on decision-making. Equally, energy related talks (e.g. on climate change, divestment, fossil fuel industries) are typically followed by open Q&A sessions or discussions in which people publicly question how the energy system is constructed or could change. These types of participation are included because they are undertaken collectively in public, even though they have a weak links to decision-making. Energy advice sessions are also included because they are undertaken in public spaces with others, even though their current contribution to decision-making is negligible.

Finally, whilst a household switching energy supplier is not included as an instance of public participation, a collective switching campaign would be included because it is a public campaign in which people publicly pledge to switch supplier. Equally, an eco-open home day – where a collection of households who have installed solar PV or made a variety of other social and technical modifications to their homes, open their doors to the general public to share their experience – would

count as an instance of public participation because it involves multiple people and is undertaken in public. Following the same logic individual investments in a community renewables project are not counted as a form of public participation. However, a share offer for a community renewable energy project would be included because they are typically undertaken as a form of collective public campaign.
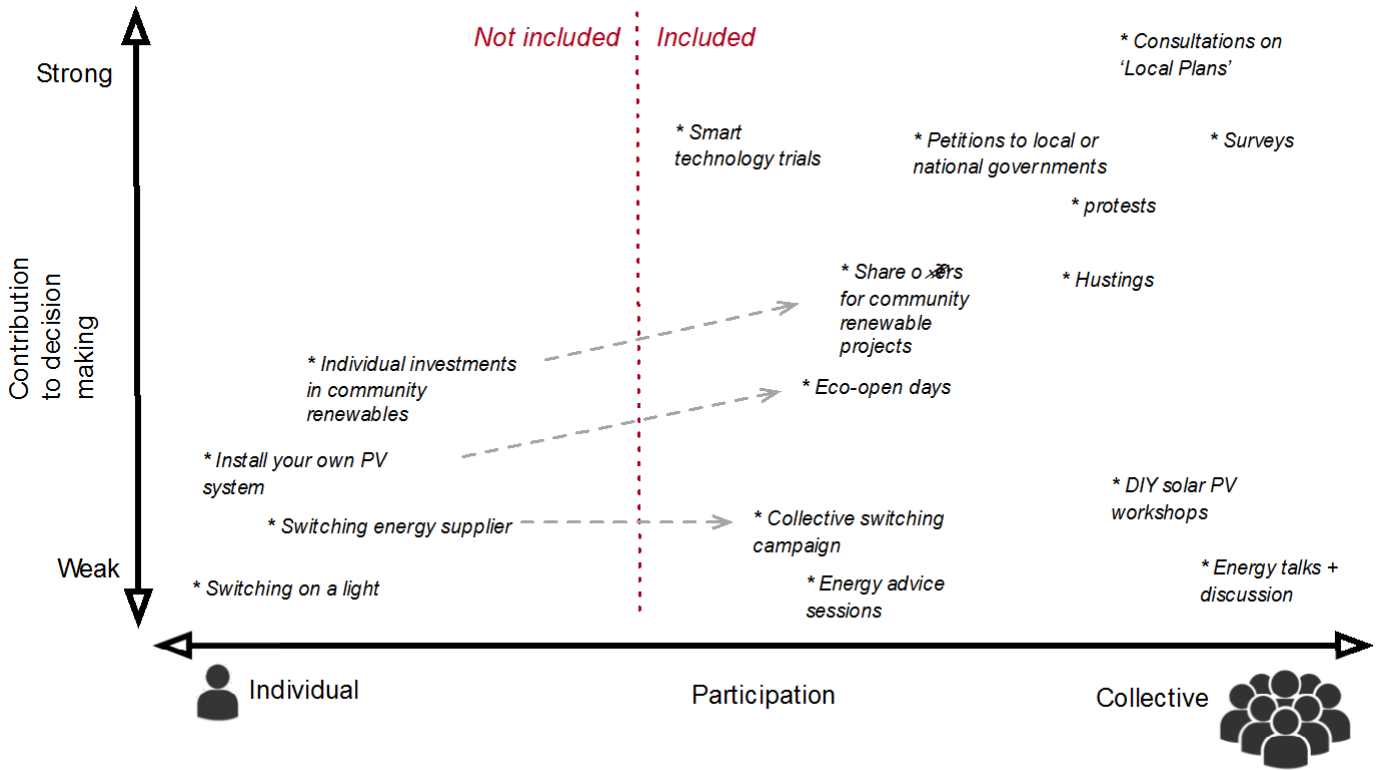

Figure 3: Locating public participation in practice

3. Investigating public participation in the West of England

To answer the question posed – how and where is energy participation occurring in the west of England? – a rapid review of evidence was undertaken following the principles of a systematic review. Alternative approaches, such as a largescale survey or interviews with key regional stakeholders were considered but deemed less appropriate for the research objectives.

Online surveys offer cheap, flexible routes to reach (potentially) wide audiences. Yet they can also be considered blunt instruments, their rigid form providing little flexibility to explore a diverse phenomenon such as energy participation. In practice, survey-based research often struggles to reach the attention of intended respondents. Where this does happen, there is also no guarantee of respondents having the appropriate institutional knowledge required to complete the survey. In-depth interviews with key regional stakeholders provide more flexibility than surveys, allow for a broader understanding of a topic to emerge through conversation. A weakness of interview methods, is the amount of time they take to organise, undertake and analyse. In both instances, input from a large number of organisations would be required to cover the suspected breadth of energy participation within the region. Both approaches would also necessitate significant input from respondents, to share the information on diverse instances of energy participation. As a result, both approaches would likely suffer from respondent fatigue (i.e. getting tired of searching for and communicating the requested information) and recall bias (i.e. only being able to provide information on what the respondent could remember at the time).

In comparison, a rapid review of evidence based on the principles of a systematic review meant the project could (a) take a deliberately broad definition of energy participation, (b) create a space through which diverse participatory events could come to light unhindered by prior participant conceptions, and (c) gather large amounts of data. As an approach, systematic reviews use systematic methods to collect and appraise all the evidence on a particular topic (Pettigrew and Roberts., 2006). To achieve this requires following a set of steps outlined at the start in relation to a specific question. Keywords are then used to search for all materials on a particular topic within a set number of databases. This material is then reviewed to answer the question posed. The strength of systematic reviews lies in their use of explicit, transparent and systematic methods, which in turn allows such research to be more accountable, replicable and updateable.

Figure 4 sets out the key stages to the rapid review employed here. The following pages outline each step in more detail.

1. Approach
- Develop framework + research methods
- identification of stakeholders

2. Feedback
- Feedback on approach
- Review of stakeholders identified + incorporation of additions

3. Search and screening
- Systematic search
- Screening of results
- Analysis of individual cases to create database

4. Analysis
- Analysis of full database following the framework in a search for key patterns and trends
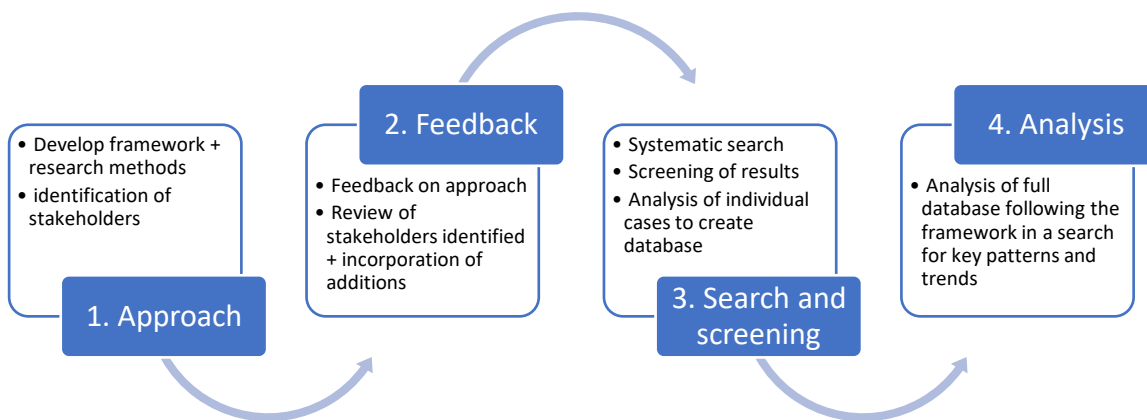
Figure 4: Key stages of the rapid review of evidence

Approach

This initial step concerned developing an understanding of the research topic, adopting a conceptual framework (see above) and exploring possible means to gather data. The central challenge can be summed up as follows: if energy participation is diverse (as suggested in contemporary research) where can one access and collect empirical data on it? Adopting a systematic review approach, provided robust methodological steps but in order to adapt the approach to investigate a contemporary empirical phenomenon two principal adaptations were required. They concerned:

a) Which public database could be searched to collect evidence of contemporary energy participation? and
b) How could search results be confined to the West of England region?

Traditional systematic reviews use academic databases (Web of knowledge, Scopus etc) or search engines (Google scholar or Google) through which to systematically search for relevant materials. This approach is appropriate for reviewing peer reviewed academic literature for which the systematic review methodology was developed. Best practice systematic reviews also seek to gather data from grey literatures (i.e. 'unpublished' work). However, broader searches, using Google for instance, typical stop after the first 50 or 100 hits due to the large amount of material returned. As a result, this type of approach faces significant challenges when trying to identify all instances of a given phenomenon (energy participation), within a particular location and timeframe. For instance, Google search provides 'about 192,000 results' for the search 'Bristol AND energy AND participation': far too many results to realistically screen for eligibility. Nonetheless, web-based methods offer a promising avenue through which to collect information on contemporary activity.

In this project the principles behind systematic reviews (explicit and transparent methods, replicable and scalable) were applied but in an experimental way, with a social media platform providing the database from which to search for energy participation.

Research on and using social media is becoming increasingly popular. Social media platforms, like Facebook, Instagram, Whatsapp and Twitter provide huge amounts of data – 'Big Data' – that can be employed for a variety of public and private purposes. Social media data mining is also becoming increasingly big business, for industry wanting to better understand consumers, for law enforcement to monitor social unrest and for political parties seeking to understand and mobilise voters. Within academia the examination of social media data is also spawning new research avenues. For the present project, social media platforms provide alternative databases through which to conduct a systematic search. Nonetheless their use is also likely to have implications on the form and purpose of energy participation uncovered. In using social media, it is necessary therefore to recognise how the medium is likely to communicate particular forms of participation more than others, be directed at particular publics and not others and

Twitter was selected as the primary database through which energy participation could be identified.

Twitter is by no means the most popular social media platform in terms of global monthly users. Facebook, YouTube and Whatsapp have the highest number of global monthly users at just over 2200 million, 1500 million and 1500 million respectively. Twitter is currently ranked twelfth, with 330 million average global monthly users[2]. Despite this Twitter is the most popular platform for social media research because unlike other platforms, Twitter is unique in providing access to nearly 100% of its data through APIs (application programming interfaces). Twitter is also more open than other social media platforms, allowing any user to connect or follow any other user. This means that it is more easily searched than other platforms. Furthermore, Twitter, more so than Facebook and Linkedin for instance, is utilised by a diverse range of users (including individuals, businesses, local authorities, charities and grassroots associations) to communicate, report on and share their activities.

To limit search results to the West of England the project only searched organisations identified as interested or involved in energy participation within the region.

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[2] https://www.statista.com/statistics/272014/global-social-networks-ranked-by-number-of-users/, accessed 20 June 2018

To identify organisations interested or involved in energy participation within the region the project used prior research on energy participation within the UK to infer the types of organisations likely to be involved (i.e. local authorities, universities, community energy initiatives, energy charities or energy business for instance). A list of organisations covering these categories was subsequently drawn up. The list included organisations both located within the region as well as organisations located outside the region but likely to be interested in energy participation within the region. This list of organisations was subsequently sent to 12 regional stakeholders (from local government, civil society and businesses) to review and provide additions. Eight of those contacted, provided additional organisations, taking the total number of organisational Twitter accounts to 59. The final list of organisations is presented in Table 1 alongside their associated twitter handles (i.e. account names).

Table 1: Identified organisations with an interest in energy participation in the West of England
NB. In practice, those accounts in italics and coloured red were excluded from the search due to limitations with Twitters API.

Category	Organisation	Twitter handles
Local authorities	Bristol CC	@BristolCouncil
	BANES Council	@bathnes
	North Somerset Council	@NorthSomersetC
	South Gloucestershire Council	@sgloscouncil
	West of England LEP	@WofEnglandLEP
Universities	University of Bristol	@BristolUni @Bristol_SU @cabotinstitute
	University of the West of England	@UWEBristol @TheSUatUWE
	University of Bath	@UniofBath @thesubath
	Bath Spa University	@BathSpaUni @bathspasu
Energy organisations & charities	Centre for Sustainable Energy	@cse_bristol @cse_communities
	Bristol Energy Network	@BristolEnergyNw
	Environmental sustainability network, B&NES	@GreenBathNES
	Bristol Green Capital partnership	@bgreencapital
	Regen	@Regen_insight @RegenCommun1ty
Grassroots organisations	Bristol Energy Coop	@briznrg
	bath and West CE	@BWCE
	Ambition Lawrence Weston	@ambitionlw
	Low Carbon Gordano	@LCGordano
	Easton Energy Group	@eastonenergy
	Bristol Green Doors	@BrstlGreenDoors
	Demand Energy Equality	@DemandEnEq
	Fossil free Bristol	@FossilFreeBris
	Uni of Bristol People & plant society	@BristolUniPandP
	FOE, Bristol	@bristolfoe
	Chelwood Community Energy	@Chelwood_CE
	Keynsham Community energy	@TransitionKsham
	Bath:Hacked	@BathHacked
	Energy Sparks	@energy_sparks
	Bath Green Homes	@BathGreenHomes
	transition Bath	@transitionbath
	Love Co2mbe Down	@LoveCo2mbeDown
	Bristol Rising Tide	@BrisRisingTide

	Re:work	@Reworkcharity
	Rade Bristol	@RADEBristol
Media	Bristol post	*@BristolLive*
	the Bristol Cable	@TheBristolCable
	The Spark Magazine	@Spark_Magazine
	Bath Chronicle	*@bathlive*
	Bath Echo	*@BathEcho*
	Ecojam	@EcojamB
	BBC West Live	*@BBCBristol*
	Bristol24/7	*@bristol247*
Businesses	OVO	@OVOEnergy
	Low Carbon South West	@LowCarbonSW
	Business West	@bw_businesswest
	bristol Energy	@BristolEnergy
	Mongoose energy	@MongooseEnergy
	Western Power Distribution	*@wpduk*
	Good Energy	@GoodEnergy
	Ecotricity	@ecotricity
	Wales and West Utilities	*@WWUtilities*
Other	We the Curious	@wethecurious

Feedback

Having set out a concise conceptual framework and developed a research approach, a research protocol was written and was sent to the research funders (The Centre for Sustainable Energy and Bristol Energy Cooperative), three academics and a software engineer for feedback. Their feedback was subsequently incorporated before the protocol was placed online[3].

Search and screening

Key search terms were derived from the projects focal interest, 'energy' and 'participation'. To capture as broad a range of public participation as possible a wide range of synonyms were employed (Table 2).

Table 2: Key search terms 'participation' and 'energy' and their respective synonyms

Participation		Energy		
Engagement	Discursive	Electricity	fracking	Feedback
Survey	Demonstration	Gas	"hydraulic fracturing"	meter
Attitudes	Grassroots	transport	"low carbon"	"time of use tariff"
Dialogue	Communication	Heat	Pylon	DECC
Deliberation	Crowdsourcing	Fuel	Microgeneration	BEIS
"behaviour change"	Makerspaces	"fossil fuel"	Grid	"big six"
Nudge	Hackerspaces	Coal	Smart	EDF

Co-operative	Visioning	Oil	"Green Deal"	Npower
Protest	events	Nuclear	Ofgem	E.ON
"social movement*"	workshops	Renewable	"zero carbon"	"Scottish Power"
Experiment*	talks	Hydropower	"feed-in-tariff"	SSE
Inclusion	festival stalls	"solar power"	"fuel poverty"	
Empowerment	Programme	PV	Eco-home	
Consultation	trial	Biomass	Insulation	
Bottom-up	Initiative	Bioenergy	Efficiency	
Co-design	Living lab	"carbon capture"	"Demand reduction"	
Co-production	performance	"radioactive waste"	"demand side response"	
Partnership	lobbying	shale	"demand side management"	

To limit the search three criteria were used:
- each instance had to conform to the definition of public participation outlined above,
- each instance had to have taken place somewhere in the West of England area (i.e. Bath and North East Somerset, Bristol, North Somerset and South Gloucestershire), and,
- each instance had to have taken place between 2015-2017[4].

This search process resulted in the identification of **24,633 tweets.** To sift this number of tweets, website URLs were first expanded before tweets were sorted by website URL. All tweets without websites (approximately 10,000) were removed due to there being no data to follow up on. All remaining tweets were subsequently reviewed using the above criteria. Where an instance of energy participation was suspected, the website was subsequently reviewed. If the event fitted the criteria, an entry in the project database was created within which details of the event were recorded. This database of 'Energy Publics within the region' has subsequently been made available online[5] and includes detail on the name of each instance, a website for future details as well as high-level analysis of the who, what and how of participation. This dataset was subsequently reviewed for key patterns and trends. The results are presented in the following section.

Figure 5 provides an overview of the search and screening process.

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[4] This timeframe was chosen because it covers a contemporary period and includes Bristol's year as European Green Capital after which one might expect to see a change in the frequency and form of events.
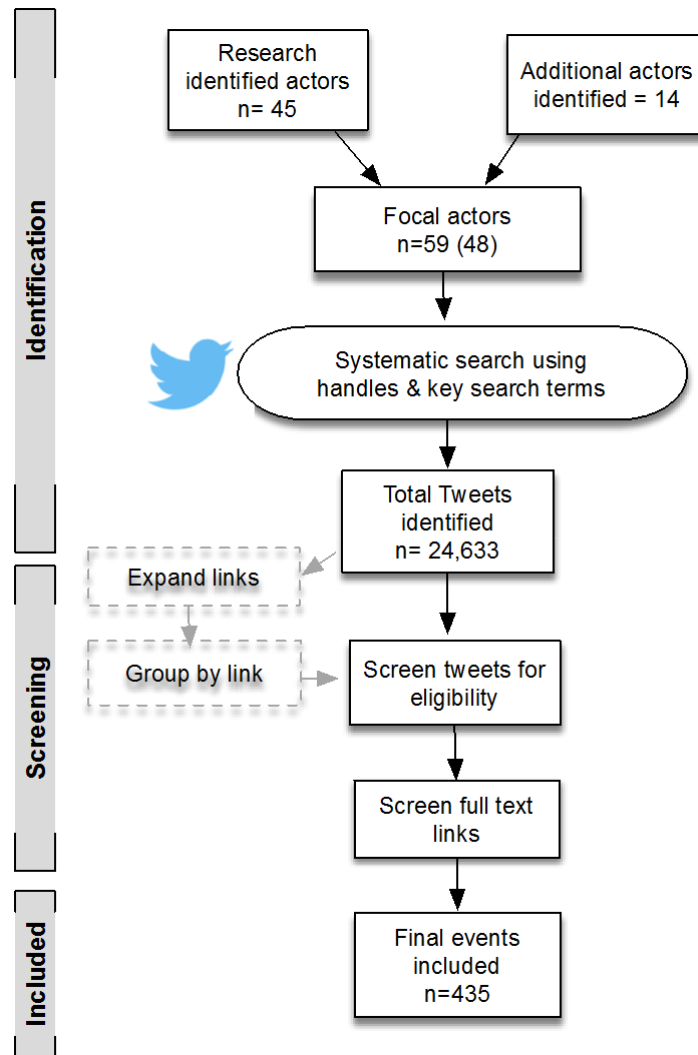[5] https://www.eci.ox.ac.uk/research/energy/energy-publics.html

Figure 5: Flow diagram of search and screening process

Limitations to the approach

The project was confronted by one major setback. Obtaining Twitter data turned out to be much harder than initially thought. In short, this was a question of cost and expertise. To engage with Twitter's API – application programming interface – requires significant coding expertise and time. Whilst this project had substantial input from a web engineer, the resource was not unlimited. It subsequently turned out that to search Twitter's historical archives in the way suggested was financially prohibitive (costing $25 per searched day, so approximately $25 x 3 years = $23,575). The only way around this was to 'scrape' individual twitter handles for their most recent tweets. This process was limited to last ~2300 tweets per Twitter account. For the small organisations identified (approximately half) this covered tweets going back to the start of 2015. For the very prolific tweeters this covered a couple of months. These twitter handles were subsequently excluded from the search (italised and coloured red in Table 1). For those organisations in the middle, where 2300 tweets covered a large part of the data required, their twitter handles were scraped with the remaining time period searched using the public search function on Twitter's website[6].

Beyond this there are a variety of further limitations. These limitations are outlined below:

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[6] This is an imperfect solution because it is unlikely that Twitter's public search function returns all hits but, rather, a selection of hits.

- The approach is only capable of identify instances of public participation that have been tweeted about. In practice this means participatory events need to have been promoted via twitter or reported on via twitter. The retweeting of events and information helps to combat this to an extent.
- Twitter has a particular culture and type of user (typically younger and savvy), so its utilisation is likely to capture participatory events that are directed more to this audience and is less likely to capture energy participation primarily directed at other types of citizen (e.g. older citizens and those not connected to the internet).
- The adopted approach only followed up on suspected instances of participation where there was further detail, in the form of a website URL. This was a methodological choice taken for practical reasons. Website links provided a means to follow up on and examine each instance of participation (i.e. answering questions about who is involved, what the topic and form of participation is). Clearly some instances of participation, such as stalls at local events, do not require a website and so these will have been missed. Whilst it might have been possible (with additional time and resource to list all of these participatory events) it is by no means clear that any substantial data could have been generated which would have allowed the identification of patterns and trends.
- The approach only investigates how instances of participatory events are framed, not how they are performed nor what their results are.

4. Key patterns and trends of energy participation in the West of England

In total 435 participatory events were identified across the West of England between 2015 and 2017. These participatory events covered a large variety of topics and employed multiple forms, including but not limited to:
- **Public talks**, both large and small organised by universities through to charities and community groups,
- **Demonstrations** on a range of topics including climate change, divestment and diesel generators,
- **Online petitions** to local and national government,
- Public **consultations** on Local Plans or infrastructure developments,
- **Surveys**, on public perceptions of planning or energy support services,
- **Energy advice surgeries**
- **Debates** and **hustings**, and
- **Hands-on workshops**.

In the follow pages the full dataset of participatory events is reviewed in a search for patterns and trends. The aim is to provide an exploratory analysis of energy participation in the West of England.

When did these events occur?

An easy first step in looking for trends in energy participation is to look at when they occurred. Figure 6 shows the frequency of participatory events by month across the three-year time period[7]. September 2015 recorded the most events of any month (30) and appears to have resulted from a variety of activity including eight events held as part of the national community energy fortnight. For the rest of the period the number of events fluctuated between 5 and 20 per month. The dataset also indicates a slight increase in participatory events over time, rising from 128 in 2015, to 139 in 2016 and to 158 events in 2017, reflecting either increases in energy participation or changes in the use of Twitter over the period studied.
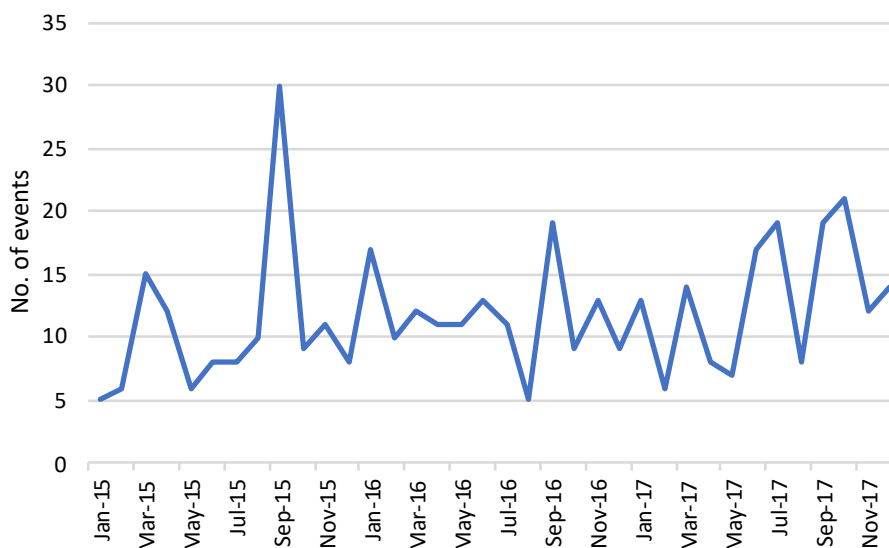

Figure 6: Frequency of events per month

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[7] Where participation was conducted over a period of time, the final date was used.

Where is public participation taking place?

A second means to assess contemporary energy participation is to look at the location of participation (Figure 7). More than half (58%) of all public participation occurred within the boundary of Bristol City Council, followed by Bath and North East Somerset, North Somerset and south Gloucestershire, with 15%, 12% and 4% respectively. The remaining 10% of participatory events were predominantly conducted online and concerned energy governance and use at larger scales (i.e. within the West of England, the South West, nationally or internationally).

These results reveal an imbalance in the number of participatory events held between local authority areas. The reasons for this are potentially multiple and varied. Different local cultures and practices are likely to play a role, as is the political orientation of each local authorities during the period studied. A more detailed look at the geographical spread of events further reveals a concentration of activity within inner city areas as opposed to rural locations.
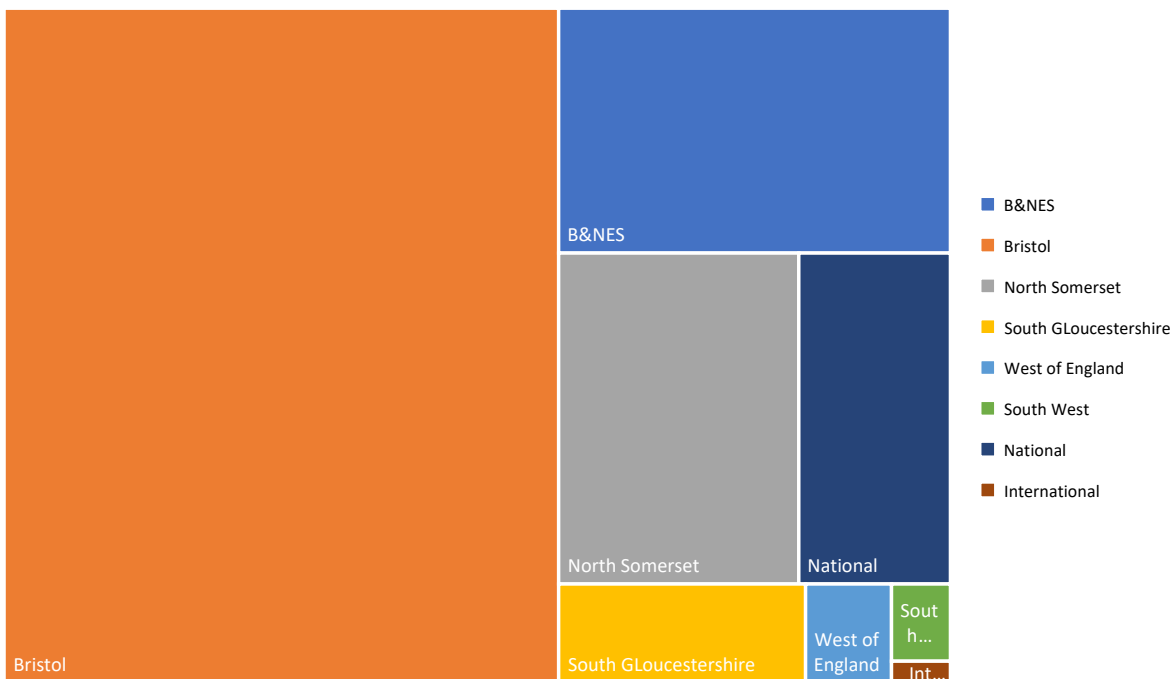

Figure 7: Locating public participation

Which organisations are facilitating public participation?

From the dataset a diverse picture of organisations leading public participation emerges. In total 74 organisations were identified as facilitating at least one participatory event. Just over half (38) facilitated only one event. Of the remaining, 22 conducted 5 or fewer events, whilst 9 organisations facilitated 10 or more events (Figure 8). Of these 9 organisations the Centre for Sustainable Energy (CSE) conducted the most, in large part due to the activity the Home Energy team who conducted 144 energy advise sessions over the period studied. These advice sessions typically sought to engage and educate lay publics and provide advice and support on energy saving in the home.
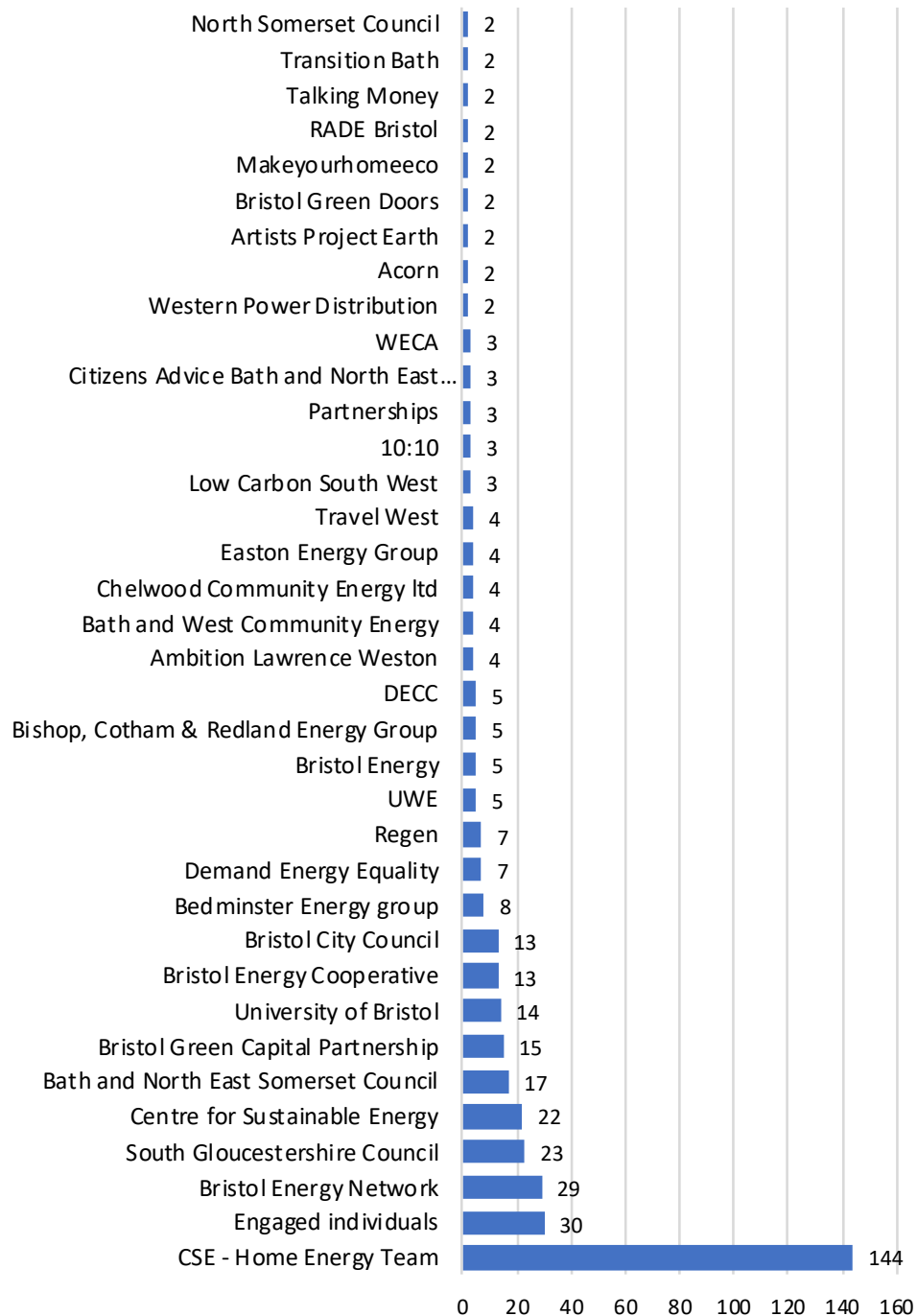
Figure 8: Organisations facilitating public participation in the West of England

Organisations facilitating only one participatory event include: 350.org, 38 degrees, Arup, BEIS, Bristol Citizens advice, Bristol Doors Open Days, Bristol Environmental Activists Together, Bristol Friends of the Earth, Bristol Green Party, Bristol Peoples Climate Marchers, Carbon Coop, Centre for Cities, Cheese project, Electric nation, Energy 4all, Energy saving trust, Fit for the Future Network, Fossil free Bristol, Frack Free Bristol, Friends of the Earth, Fuel poverty action, Good Energy, Greater Fishpnds Energy Group, Green party, Greenpeace, Konichiwa Agency, Make Bristol Mobile, Saxon Road green space, SumofUs, Superhomes network, The Architecture Centre, The Bristol Cable, The Town and Country Planning Association, The University of Bath, Watershed, Wethecurious

Which sectors are facilitating public participation?

When looking at the sectors of facilitating organisation, the majority (73%) come from civil society, 16% come from government, 4% from academia, 4% from cross sector partnerships and 3% from businesses (Figure 9).
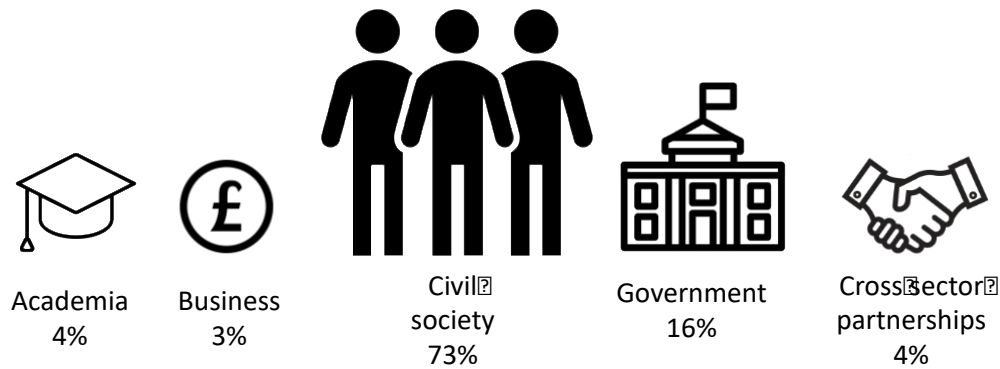
Academia 4%   **Business 3%**   **Civil society 73%**   **Government 16%**   **Cross sector partnerships 4%**

Figure 9: Sector of facilitating organisations

The suggests that more civil society organisations are getting involved in organising participatory events than any other sector. This makes sense, to an extent. There are four local governments and four universities contained with the region, whilst there are vastly more civil society organisations. However, the number of businesses within the region is also large, so the limited identification of participatory events led by businesses cannot be accounted for in the same way.

Looking behind this headline level data provides one explanation. There appears to be qualitative differences between the forms of participation that each sector undertakes. Participatory events led by civil society tend to be smaller and more discrete than other sectors. A talk followed by a discussion provides one example of a typical participatory event organised by civil society and since they are relatively simple to set up, this allows more civil society organisations to get involved. Participatory events led by local governments tended to be larger in terms of the amount of participation they are seeking, (e.g. regional online consultations on Local Plans) and they are often linked together into larger participatory exercises. For instance, 46 out of 71 local government-led participatory events related to 11 consultations on Local Plans and transport infrastructure.

The limited number of business-led participatory events is less easily explained. It might be the case that businesses are not engaging people in the energy transition. This seems unlikely, at least to the extent recorded here. A more plausible explanation is that businesses use alternative means to engage and recruit participants: Twitter maybe not be their favoured means of publicizing or reporting on participatory events. The data also indicates how energy companies, like Ecotricity, Good Energy and OVO, are frequently participating in participatory events but they tend not to be the organisers. For instance, Good Energy contributed to numerous events where the public was invited to learn and debate changes to the energy system but these events were not organsied by Good Energy. Instead, these events typically occurred at local festivals or city events organised by others. Where present in the data, such tweets typically contained little to no data - on the subjects, objects or forms of participation - and were therefore excluded from the dataset.

Overall, these results suggest civil society is playing an active role in facilitating public participation in the energy system. These results also suggest academic and business-led participation may have been under-identified as a result of the approach taken.

How are citizens participating?

The form or model of participation entails one of three keys elements thought to make up all instances of public participation. This element of the concise conceptual framework asks about the forms through which collective participatory events are being organised or expressed. Across the dataset a wide range of models can be identified through which participation was realised. Figure 10 shows the 13 most commonly produced forms of participation. The most commonly employed model of participation was the use of various energy themed advice stalls, cafes or days, accounting

for 157 instances of participation. The second most commonly employed model featured variations on the idea of a talk followed by discussion. This form of participatory events ranged from large, high profile public lectures by distinguished speakers through local energy conferences to small neighbourhood meetings and were organised by a wide range of organisations.

Public consultations formed another dominant model of practicing participation. These consultations were typically led by or for local government and typically sought public views on local planning (including housing and transport). Surveys comprise another 'traditional' models of public participation, accounting for 15 instances, whilst deliberative workshops account for 51 participatory events. These workshops can be distinguished from 'talks' as being more discursive, participatory and typically action-orientated. These workshops were facilitated by a large range of organisations across all sectors and can be distinguished from traditional focus groups because they seek to explore and promote local action rather than elicit public opinion. Less frequently practiced models of participation included 13 petitions, 11 site visits, 10 campaigns, eight protests, six community share offers, three film + discussion evenings, two technology trials and two instances of collective lobbying.
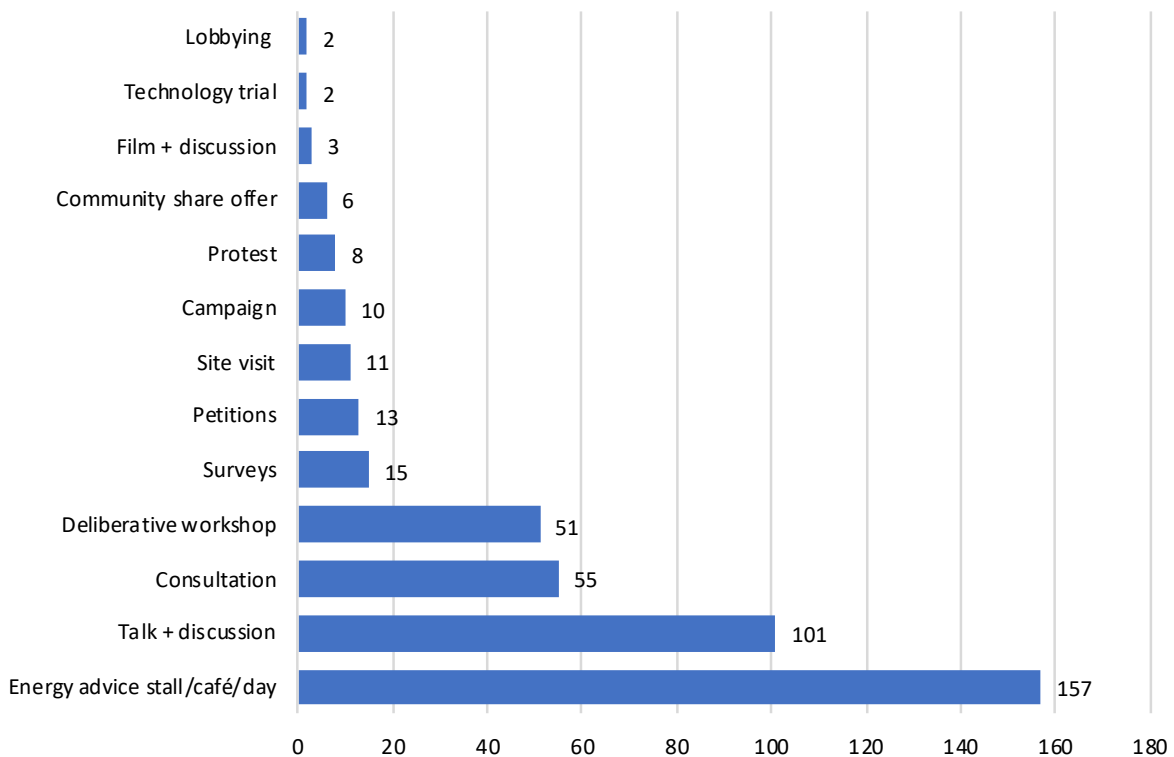

Figure 10: Forms of participation

What emerges is a diverse picture of the means through which publics are participating. Of particular note is how traditional or mainstream manifestations of participation, which seek to gather information and opinions from publics through consultations, surveys and focus groups, do not dominate. In fact, traditional forms of participation (consultations and surveys), accounted for 18% of participatory events whilst traditional focus groups - where public understanding on a particular topic is sought - were absent. This means the remaining 82% of participatory events comprised more diverse and emergent forms of participation including activism, community-based engagements with energy as well as technology trials and site visits. Overall, this result supports the proposition that public participation in contemporary energy systems is more diverse than traditional understanding suggests but perhaps not as diverse as suggested within contemporary research.

Who is participating?

A second element of the theoretical framework concerns how participants are framed. Whilst traditional forms of participation typically provide clear, often discrete roles to participants, contemporary participatory events are often more ambiguous because they typically create a space in which participants can also shape the meaning of participation. Despite this, participation is still typically organised (at least to a certain extent and even if participants are welcome to challenge the way events are framed during the process). Addressing the way participants are conceived within participatory events can subsequently generate insights into the types of participation being taking place.

Across the dataset the public was framed in a wide variety of ways. The most common (approximately 42%) framing or vision of the public was that of consumers (i.e. consumer citizens) (Figure 11). For the most part, these instances of participation consisted of energy advice stalls and events, directed at helping the public save money and energy on heating and electricity bills. Examples of such instances include the annual Blue Monday Fair held in Bristol, CSE's Home Energy Team energy advice stalls and a 'Wood fired heating and your home' event organised by Bristol Green Doors.

The second most prevalent framing of the public was as a body to be consulted (i.e. consultative publics). This accounted for approximately 17% of events and constitutes a traditional form of public participation in which the views of the public are sought on a particular issue. Of these the majority can be understood as targeting 'affected publics' in the sense they sought the views of people affected by new roads or local planning policy for example. The remaining instances under this framing sought views of the public as interested or engaged citizens around particular topics, including transport, government policy, support services, fuel poverty, storage or energy tariffs.

In a smaller but still sizeable percentage (15%) of events the public was framed as taking a more active and experimental role in energy system change (i.e. innovative citizens). Here it was very common to find participants being framed as active *energy practitioners.* In other words, these citizens were thought of as 'going beyond' their own household, typically interacting with energy systems at a 'community' level. Here, the purpose of public participation was often concerned with eliciting information about or views on community scale action or promoting and facilitating wider community and city level participation in the energy system. Such instances of participation included site visits to renewable energy installations, conferences and workshops on the development of community energy as well as the local energy system more broadly.

An equally sizeable percentage of instances (approximately 15%) framed the public as interested and deliberative citizens. Here, the most common type of event was a talk followed by a discussion. An explicitly activists framing of participants accounted for just under 8% and included campaigns, protests, marches and a 'sun dance' celebration. In the last category the public was framed as investing citizens in approximately 3% of instances. This category was comprised entirely of the public collectively financing renewable energy installations.
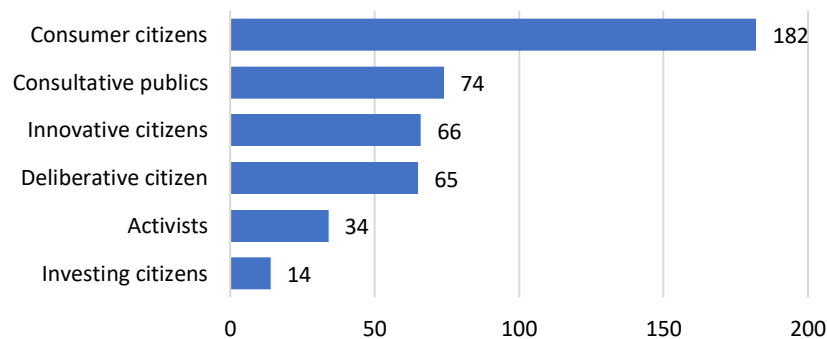

Figure 11: Subjects of participation

At which point in the energy system is participation directed?

The third element of the theoretical framework concerns the 'objects of participation', i.e. what participation is about. To begin unpacking the 'what' of participation, all events can be ascribed to a technical part of the energy system (Figure 12).

Reviewing the dataset in this way suggests 76% of participation events were principally concerned with energy use, 23% of events were principally concerned with supply and only 1% of events were principally concerned with distribution[8].
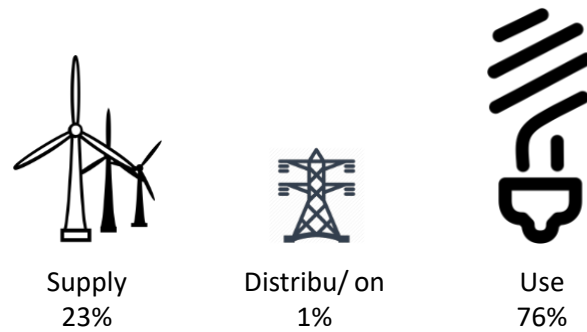

Figure 12: Locating participation within conventional (technical) parts of the energy system
(N= 370. 65 events were ambiguous)

Participatory events exploring energy use covered a large range of energy use applications including draught busting, retrofit, transport, switching, air pollution and fuel poverty. This makes sense as energy is required throughout all aspects of modern life. Energy use is highly decentralized, making it amenable to local participation and control (i.e. decision-making).

In contrast, the supply of energy has historically been dominated by large, centralised power stations. In the last decade and with increasing speed, this is changing. The supply of energy is becoming more decentralised resulting from the increased deployment and use of renewable sources of energy, such as wind turbines and solar PV. The supply of energy has also become more contested with far ranging societal debate on the value and benefit of nuclear power, the exploration of shale gas and more recently the promotion of 'back up' diesel generators. These changes have subsequently opened up a space in which participation can flourish. Further supply-side participatory events captured within the dataset included activity under the divestment movement and community campaigns to own local renewable energy installations.

Meanwhile, participatory events focused on the distribution of energy variously sought to examine local energy tariffs, develop heat networks, challenge national supply companies and explore opportunities for local renewable energy generators to sell electricity directly to end-users. The much smaller number of events focused on distribution can in large part be explained by historical circumstances. Up until recently distribution of energy has concerned the one-way flow of energy from large power stations to end users. It also has the qualities of a monopoly. Both of these aspects are now being challenged as more distributed energy generation requires the two-way flow of energy over distribution networks and as energy vectors (i.e. electricity, gas and district heating systems) come into competition with each other, for instance over the provision of zero carbon heat.

What are citizens participating about?

Beyond technical location, all instances of public participation can be grouped by the central issue they seek to address. Figure 13 displays the 16 most frequently observed issue areas. Fuel poverty was the issue that received the most attention and in large part derives from the activities of CSE's Home Energy team. As an issue area, fuel poverty covers all aspects of reducing energy bills switching, draught busting, changing energy practices, energy efficiency through to household retrofit. Renewable energy amounted to the second largest issue, with 29 events focused on solar PV, four on wind power, six on renewable heat and five events framed around renewables in general. Other supply side issue framings included 6 events focused on nuclear and 12 events focused on fossil fuels (biodiesel, diesel generators, fracking and natural gas). Mobility provided an explicit issue focus for 39 events, primarily led by local government. Planning (i.e. consultations on local Plans incorporating both housing and transport) also featured highly, again led by formal local governance actors (local governments but also Bristol Capital Partnership and the West of England Combined Authority).

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[8] Distribution is understood here to encompass both the national transmission network and local distribution networks].

Community participation was the central focus for 33 events. These events were typically discursive and action-orientated. Demand reduction was the issue focus for 20 events and took a slightly different focus to events centered on retrofit (19), smart (7) and housing (4). Financing change was the central focus for a small but substantial number of events. Meanwhile, the broader topic of climate change was a rallying focus for 27 events, alongside 5 events focused on the energy transition. Finally, energy governance and energy markets also featured a handful of times.

Overall, these results reveal the wide diversity of issues covered by instances of energy participation within the West of England. Very few of these issues are discreet and in most cases issue spaces overlapped.
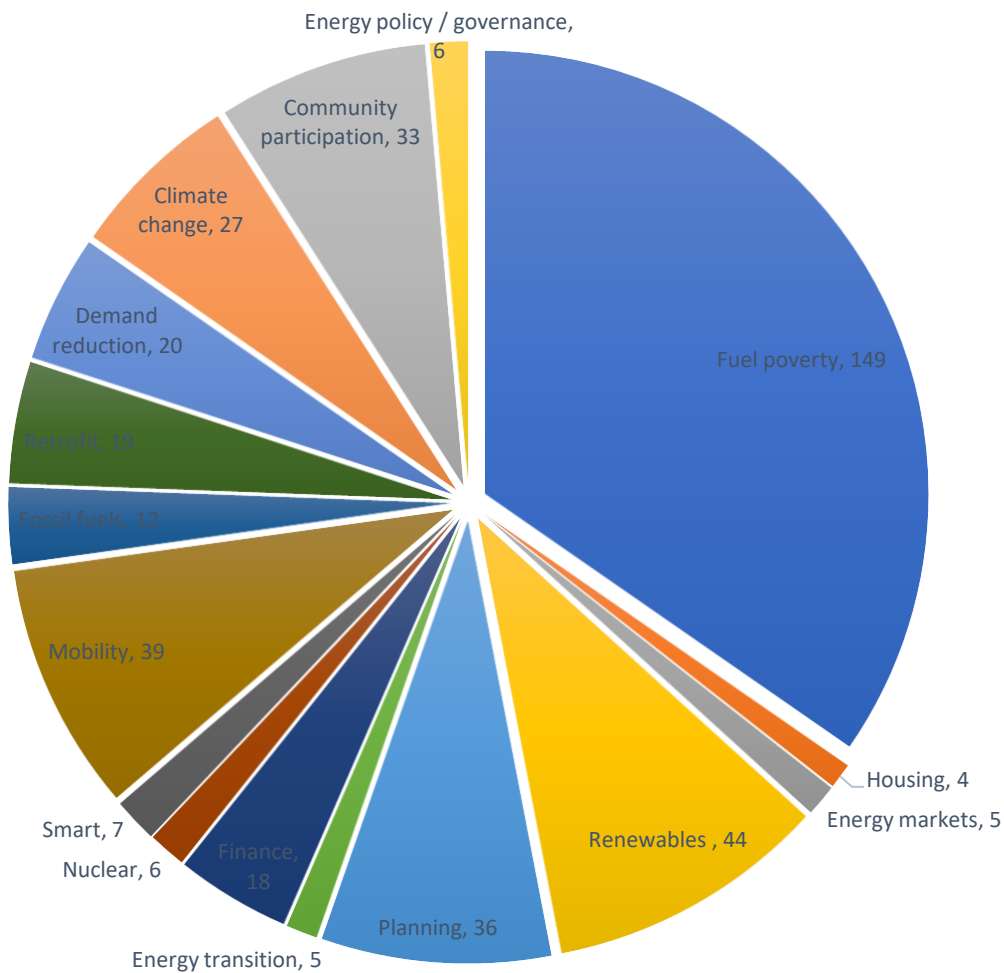

Figure 13: Central issues in public participation

What, if any, material artefacts is participation organised around?

Increasingly material artefacts, like solar panels, draught busters or energy feedback devices, are being used to spark interest and encourage participation. Eco-open home events are a good example of this because participating homes are typically displayed as 'experimental' 'demonstrations' of alternative energy futures and lifestyles. DIY solar PV workshops provide another contemporary example. Through the soldering of solar cells and the construction of PV panels participants learn about the energy system and their role within it. In both cases, the home and the PV panel are central to the participatory event serving as a means to deconstruct contemporary and future energy systems. Looking at these material artefacts subsequently provides a third means of exploring the 'what' of participation.

Within the dataset material artefacts provided a central focus for 23 events (Figure 14). Solar PV was the most common artefact followed by households within eco-open home events.
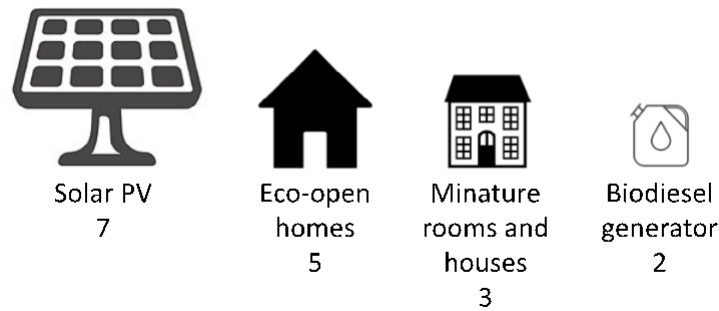

Figure 14: Common artefacts of participation

What is the (implicit) purpose of participation?

Having now addressed the various theoretical elements conceived as defining all participatory events (the who, what and how of participation) further patterns can be identified within the intended purposes of participation.

Figure 15 provides a high-level indication of the (implicit) purposes of participation across the dataset[9]. Education and engagement was the most common category. The second largest category covered events that sought to facilitate action at the household level. Elicitation - to seek opinion or knowledge from publics on a particular topic - was the third most common category. The promotion of local action and the challenging of power were smaller but still significant categories. The remaining instances sought to demonstrate alternatives, develop new technologies or domesticate technologies (help people accommodate new technologies into their lives).
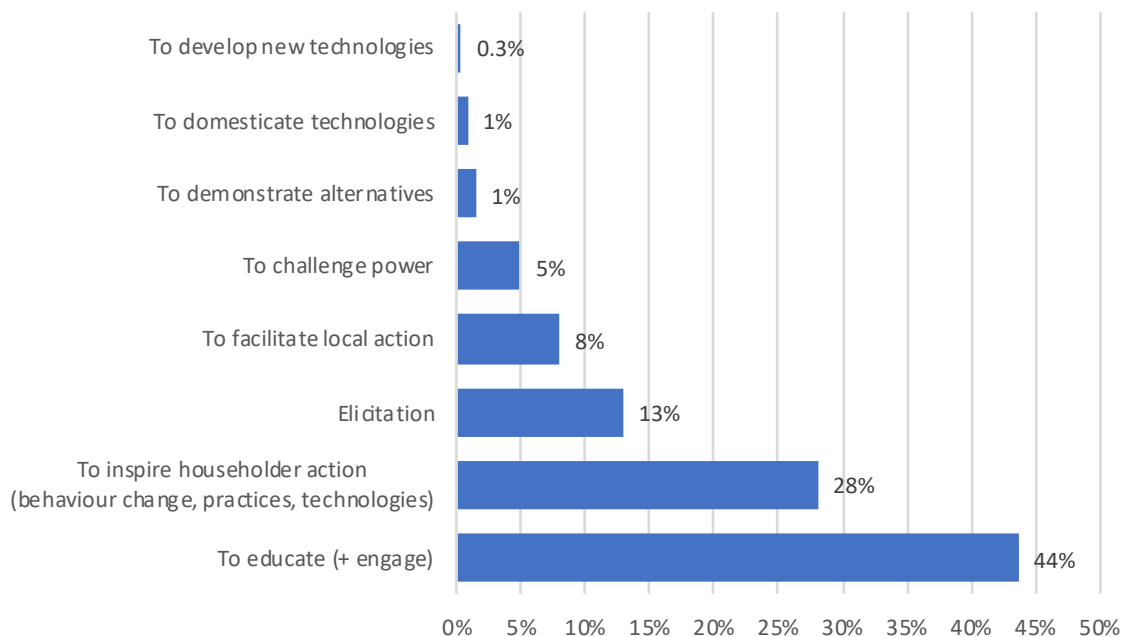

Figure 15: Implicit purpose to public participation

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[9] Because of the ambiguity of assigning a single 'purpose' to each event, multiple objectives were assigned to events where apparent.

These results suggest that participation is primarily directed towards increasing awareness and knowledge of citizens to changes in energy systems, whilst promoting public participation in the doing of energy transitions featured less highly and facilitating public participation in the governing of energy system change the least.

At what scale are the outcomes of public participation seemingly directed?

Finally, when considering public participation as the process of contributing to decision-making it is useful to explore the scale at which the outcomes of participation are directed. For instance, a protest can be directed at a particular business, to a local authority or to national government. Assessing and exploring the dataset in this way subsequently provides an indication about who, in principle, should be listening to contemporary participation.

Figure 16 presents an assessment of the scale at which the outcomes participatory events were directed[10]. The dataset subsequently suggests local authority or city scale decision-making was the most common focus for participatory events (city scales implying broader actors and arenas than local authorities alone). Neighbourhood or community scale decision-making was the second most common focus. National decision-making was the focus for 13% of events regional decision-making 7% and international decision-making 0.5%. For a subset of events outcomes were directed at individual organization decisions.
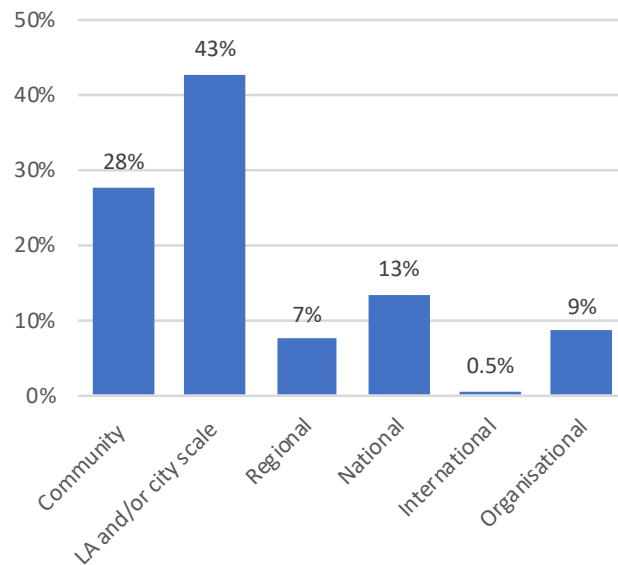

Figure 16: Where are the outcomes of participation directed?
(N = 188 events)

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[10] Events targeting individual and household practices and decisions have been removed.

5. Discussion and conclusion

That energy systems need to be transformed to mitigate against the most extreme consequences of climate change is largely undisputed. It is also widely agreed that citizens need to be placed at the heart of these new, post-carbon energy systems and that in doing so, the extent of change will be greater, the pace of change will be faster, and the outcomes will be more socially just. But just as the social side of energy transitions is receiving more attention, there is growing consensus that previously discrete conceptualisations of public participation no longer capture the diverse ways publics are contributing to energy systems change. The amount and diversity of public participation in contemporary regional energy system also remains, largely, unknown. As a first step in addressing this gap in knowledge, this project has mapped contemporary energy participation in the West of England by employing a systematic review methodology, with Twitter as the primary database.

This experimental approach successfully captured a range of formal and informal forms of energy participation, particularly those organized by civil society and local government. It was much less successful at capturing energy participation that occurred at very diffused scales (i.e. holding a stall at a festival or food market) or where the results weren't widely publicised and failed to capture energy participation where participants were recruited through personalized means (emails, letters) or via print newsletters or notice boards etc. As a result, the amount of energy participation facilitated by businesses and universities is likely to be underplayed within the data. Reasons for this are multiple and varied and relate to the research approach adopted (as discussed in section 3) as well as the forms and reasons some organisations have for undertaking public participation exercises. Despite these limitations a wide variety of energy participation was captured through the approach taken and analysis of the resulting dataset has subsequently revealed a variety of clear trends with implications for developing a more sustainable, inclusive and socially just energy system in the region.

First, the West of England region contains a significant amount of energy participation. Between January 2015 and December 2017 there averaged just under 150 participatory events per year (or one event every 2.5 days).

Second, these participatory events are led by diverse organisations from across all sectors, employ multiple formats (consultations, talks, protests etc), cover a large variety of issue spaces (community participation, fuel poverty, housing, nuclear etc.) and span all three areas of the energy system (supply, distribution and use). Energy participation within the region can subsequently be described as diverse. This suggests citizens are participating in contemporary energy systems and in a variety of ways, which in turn is likely to make future energy systems more inclusive and socially-just. However, and whilst energy issues clearly rise and fall overtime, it is noticeable how some energy issues are covered only sparingly within the dataset. This includes 'decarbonised heating' and 'smart'. The former issue represents one of the largest challenges yet to be confronted in transforming existing energy systems. Meanwhile, the implications, benefits and challenges associated with 'smarter' energy systems do not appear to have received much attention to date (at least by 2017) despite being widely talked about within energy cycles. 'Distribution' as a broader issue area also appears to have been little addressed by the end of 2017 (although Western Power Distribution (the regional electricity distribution network) and Regen have started important public debates about it in the last year). To create a more sustainable and inclusive energy system these issues (and others) will need to be addressed in the near future if public concerns, needs and aspirations are to be met.

Third, energy participation is unevenly distributed across the region. The majority of events (58%) occurred or were concerned with energy systems within the boundaries of Bristol City Council. In contrast, South Gloucestershire contained only 4% of the participatory events identified. Bristol is widely recognised as containing a thriving counter culture and pro-active attitude, recently underlined and recognised by the city becoming the European Green Capital in 2015. It is likely

that these cultural factors contribute to the higher levels of activity within the city. Nonetheless, all energy systems across the region will require transformation, so lower levels of citizen participation outside of Bristol suggests processes of change are likely to be less inclusive and socially just whilst participation remains low.

A fourth clear trend concerns how traditional forms of formal public participation - such as consultations, surveys and deliberative workshops - account for only a small percentage of participatory events identified. The majority of participation is therefore more informal, more exploratory and to a certain extent, emergent. This supports the notion that energy participation is more diverse than traditional or mainstream understandings of public participation allow and appears primarily to result from the extent of civil society organisations facilitating events. From the dataset, civil society organisations appear to be organising more energy participation than all other sectors put together. There are a variety of good reasons for this, including the limited number of local authorities and universities in the region. Yet, this also points to the way in which public participation is or has shifted from being actively designed and organised by experts to feed into formal decision-making processes towards a more diffuse, distributed activity led by a variety of organisations often with multiple overlapping and contending purposes. This is likely to support the development of more sustainable and inclusive energy systems but also presents challenges to traditional, dominant and managerial views of steering transitions from above. It is likely that more democratically accountable energy transitions will appear messier and more contested than expert driven, technocratic processes which are likely to be less accountable. This is something that regional governance actors and publics in general will need to get used to if citizen's needs, aspirations and concerns are to be cultured and incorporated into change processes.

Fifth and as a result, regional energy participation appears to be quite fragmented. Examples exist of coherent and joined up participatory exercises. This includes consultations on local plans typically led by local authorities or CSE's Home Energy Team's series of energy advice sessions. Yet, when looking across the dataset, few instances of participation, particularly those organised by civil society, appear to be linked into larger, coherent participatory exercises. It is not uncommon to find participatory exercises within the dataset as standalone events. For instance, of the 101 events classified as following a 'talk and discussion' format, very few were linked to wider participatory exercises. This has implications for the rate and scale of change because it is far from clear (from the current dataset and analysis) if and how each of these participatory events leads to wider impacts or more specifically, collectively adds to understanding, doing and governing system change.

Sixth, across the dataset the implicit purposes to energy participation can be distilled into three basic categories: to educate and engage, to facilitate action (doing change) and to contribute to decision-making (governing change). The most common implicit purpose to energy participation was education and engagement (44%), closely followed by facilitating the 'doing' of participation (38%) whilst contributing to the governance of energy system change was the primarily implicit purpose for only a small subset of participatory events (18%). These basic categories are not exclusive, they overlap. Nonetheless, this suggests that where energy participation is solely focused on educating and engaging publics there is room to enhance participation by highlighting and linking to the various ways engaged publics can further contribute to doing or governing energy transitions. For example, the numerous energy talks and discussions captured within the dataset could be enhanced by directing participants to the ways in which they can actively take part in unfolding energy systems (e.g. in local community groups or in wider city projects) or where they could contribute to the formal governance of energy system change (e.g. through creating a neighbourhood plan or contributing to a local plan). Furthermore, these three categories challenge traditional understanding of public participation, where doing and governing are relatively discrete activities. Moreover, if education and engagement is a prerequisite for doing or governing change, what becomes clear is how they majority of energy participation is directed at doing system change rather than contributing to formal decision-making. This also has implications for creating a more inclusive and accountable energy system in so far as the formal governance of energy system change will need to give equal weight to how publics are doing system change not just the vocalization of citizen concerns or aspirations through formal 'listening' exercises, which are likely to result in a variety of different messages.

From this it is possible to subsequently identify two loose 'camps' within the dataset.

On one side sits 'traditional' forms of public participation including consultations and surveys, which are typically led by formal governing bodies such as local and national governments as well as city regional bodies like Bristol Green Capital Partnership and the West of England Combined Authority. These instances of participation were typically linked together into larger participatory exercises (e.g. on Local Plans or city strategies) and normally contained clear aims and means to contribute to decision-making processes. In this 'camp' participation typically focuses on a narrow range of energy topics, such as planning, transport and infrastructure. On the other side and in the second 'camp' sits more informal, exploratory and experimental forms of public participation. Here participation often consists of discrete events (e.g. talks, conferences or energy advice sessions) weakly linked together and typically led by civil society. Here participation covered a more diverse and emergent range of energy topics and issues, from fossil fuels to renewables, retrofit to energy policy, divestment and community action.

Characterised in this way it becomes clear that 'traditional' forms of participation are well equipped to capture the input of publics in a narrow range of energy system topics. They typically focus on planning and transport infrastructure. They also have clear pathways to action, where multiple public voices are considered in line with a range of other factors in a decision-making process. But these traditional forms of participation appear less developed and able to cope with emerging energy system issues, of which there are a growing number including the development of smart grids or the use of diesel back-up generators to balance the grid. Historically, traditional forms of participation have also consistently failed to tackle issues such as fuel poverty. In contrast, the often smaller and more discreet forms of public participation facilitated by civil society tackles a far wider range of energy topics and appears more able to respond to energy issues as and when they arise. These forms of public participation facilitate publics getting actively involved in doing change, whilst, the ways in which they contribute to local decision-making are far less obvious.

This loose distinction between the two camps suggests both approaches have strengths and weaknesses. It also suggests that to further progress towards inclusive and socially-just, post-carbon energy systems effort should be directed towards linking up these camps for mutual benefit.

Concluding messages

- To encourage a more sustainable, inclusive and socially just energy system in the region, diverse forms of public participation should be encouraged to emerge, flourish and connect.

- The process through which more sustainable, inclusive and democratically accountable energy emerge is likely to be messier, more contested and therefore 'heated' than the development of sustainable energy systems guided by experts. This is a basic point but one that implies how multiple voices should be recognized, celebrated and encourage to participate, whilst the governance process is likely to feel more unorganized, less clear cut and less easily managed than before.

- Whilst multiple discrete participatory events are useful, more effort should be made to link up diverse instances of participation into more coherent and larger participatory exercises. This presents a huge challenge for small, resource-poor civil society organisations and will likely require increased coordination by larger organisations or networks. Nonetheless, the extent of public participation suggests there is an existing base on which this can be achieved. The facilitation of larger participatory exercises is subsequently likely to create more impact, in both senses of 'doing' and 'governing' energy systems change.

- From the diverse forms of energy participation observed there arises the question of how well positioned existing forms of energy governance are to respond? Traditional forms of public participation and energy governance are

being challenged by the huge variety of issues involved in transforming the energy system. In some instances, they are unsuited to engage with and tackle these emerging energy issues. To achieve a more inclusive and socially just energy transition will require fostering responsive and responsible forms of governing energy systems change, giving equal weight to how publics are getting involved in the 'doing' of system change and in formal energy governance bodies recognizing, valuing, embracing and responding to increasingly diverse forms of citizen participation.

- Due to the diverse ways publics are participating in the region there is a need for experimentation to link different forms of citizen participation with different forms and scales of energy decision-making. This is likely to involve the fostering of relationships between different organisations and between different forms and scales of governance as well as new tools to transfer information and experience.

Implications for further research

This research tackled an area of growing societal concern: how and where are citizens contributing to energy systems change. It employed a novel research approach based on the utilization of big data, was exploratory and experimental. As recognized above the approach managed to identify some forms of energy participation and not others. To identify additional instances of public participation would likely require further, alternative complimentary approaches. This might include reviewing the types of participation led by universities and business as well as reviewing their motivations for organization energy participation and through doing so further understand how and where instances of energy participation led by or with universities and businesses could be captured.

As with any research there are always areas for improvement. To improve the identification of public participation in regional energy systems three avenues offer immediate promise:

Refining the key search terms - Whilst a wide variety of search terms were used, many were highly technical. Future work could explore the different forms and styles of engaging citizens in energy systems and then apply a revised and likely expanded set of search terms through which to identify instances of public participation.

Expanding the list of organisations interested in energy participation - This could involve further preliminary research on energy organisations within the region to expand on the current list. It could also involve seeking more input from diverse regional stakeholders about which organisations should be on the list.

Collecting Twitter data in real time - Limitations to Twitters API (application programming interface) meant that it was financially prohibitive to historically search twitter accounts. One means to overcome this issue is to capture and search tweets in real time. Another option is to periodically 'scrape' twitter accounts every few months.

Research of this nature also typically generates more questions and research avenues to explore. This piece of work was no exception. The analysis presented provides high level insights into contemporary energy participation within the region. Further analysis of the dataset could reveal further insights. Some possible avenues to explore include differentiating the dataset by facilitating sector to explore the forms of participation or issue spaces covered. This could also be done by local authority area. Equally the data could be differentiated by the model of participation and then addressed over time. This might reveal patterns in the flow of participatory events over time. There is also likely to be a variety of social network mapping tools, like Gephi.org, that could be used to reveal further patterns in the data.

The current work has provided a static snapshot of energy participation within the region. Future research could therefore address how different instances of participation emerge. Why is there public participation on a particular issue now? Why did it take the form it has? Future research could also explore how different forms of participation unfold and impact each other. To what extent is energy participation comprised of discrete unrelated events and do some instances of participation lead to others? This points towards addressing public participation as a diverse phenomenon that

emerges and unfolds over time in a particular place. This is likely to require alternative and potentially new research methods to trace public participation overtime, e.g. issue mapping.

A final related research avenue concerns exploring the links between diverse forms energy participation and the doing and governing of energy system change. Whilst this work has addressed the diverse forms of energy participation, it is less clear and perhaps more important to understand not only the forms of participation but how they lead to doing and governing system change. A potentially fruitful line of inquiry could explore the links between diverse instances of energy participation and existing and new, formal and informal decision-making.

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