Public participation and energy system transformations

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Introduction

Making energy systems more sustainable will require largescale changes to the way society produces, distributes and consumes energy (IPCC, 2018). Such largescale changes are increasingly recognised as requiring the active participation of citizens, contributing to decision making at a variety of scales (Chilvers & Kearnes, 2020; EU, 2019; Stirling, 2014). This represents a significant departure from the past, wherein citizens were largely viewed as passive energy consumers and public participation typically amounted to periodic consultations on singular issues or topics.

Today, public participation in energy systems is widely recognised as being much more diverse than this (Chilvers & Kearnes, 2016; Denecke et al., 2016; Feldpausch-Parker et al., 2019). Citizens are now regularly engaging though consultations, opinion polls and behaviour change programmes. Protests against planning applications, as well as activism and lobbying, continue unabated. Across Europe and elsewhere, communities have come together to install, manage and sometimes benefit from renewable energy installations (Bauwens et al., 2016; Tosun et al., 2019). Regional social movements have formed with the intention of influencing local energy policy and, in some cases, aspiring to own and manage urban energy infrastructure (Becker et al., 2017; Blanchet, 2015; Hess, 2018). 'City labs', 'living labs' and urban experiments, through which diverse local actors including municipalities, citizens and businesses come

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together to experiment in new ways of using and distributing energy services, are increasingly advocated and deployed (Bulkeley et al., 2016; Nevens et al., 2013). Visioning exercises ask citizens to explore and shape possible energy futures whilst 'transition arenas' are encouraged as a tool to facilitate and act on collective visions (Frantzeskaki et al., 2012). Meanwhile, 'hacker' or 'maker' spaces are appearing in cities around the world and facilitating citizens (de)constructing new and old energy technologies (Smith et al., 2017). As a result of these diverse participatory forms, there have been calls to 'remake' or 'reclaim' participation (Chilvers & Kearnes, 2016; Denecke et al., 2016).

As public participation practices have evolved so too has our understanding of it. For a long time, energy participation was depicted in instrumental and deliberative terms, as necessary for legitimising the development of energy infrastructures. The idea entailed a variety of processes designed to inform, consult or involve publics in decisions that affect them (Rowe & Frewer, 2000). Since the turn of the century, this traditional conceptualisation has been challenged, resulting in the successive broadening of the term and research area. This broadening initially followed a relational turn, emphasising the performative, material and situated nature of participation and implicating a wider diversity of participatory collectives than traditionally recognised. More recently a further broadening of the term and research area can be identified, through which systemic conceptualisations have been advocated (Chilvers & Kearnes, 2020; Chilvers & Longhurst, 2016; Chilvers & Pallett, 2018). These emerging systemic perspectives aim to situate energy participation within the energy systems of which they are part and call for a greater awareness and understanding of systems of participation. In this chapter I seek to further develop this emerging systemic perspective on energy participation by drawing on research that studies socio-technical systems and their transformation (Smith et al., 2005; Stirling, 2014).

Research under the broad umbrella of sustainability transitions advocates a focus on the diverse yet pervasive systems that provide basic societal functions such as shelter, transportation or energy provision (Köhler et al., 2019). For the most part, such research has not foregrounded citizens as significant actors in

transformation processes. Nonetheless, this burgeoning area of work has amassed a rich conceptual armoury for understanding and seeking to intervene in systemic change processes. In the following chapter I argue this work aids emerging thinking on systems of participation by directing attention away from the study of individual, discrete participatory events and how they can be perfected; it reframes the relationship between participation, governance and energy systems by conceptualising participation and governance as co-constituent parts of socio-technical energy systems; it expands the agency of diverse publics from being solely deliberative to incorporating a far wider range of performative and potentially transformative capacities; and it challenges the relationship between participation and change. Collectively, this points to a variety of future research avenues and the study of regional participation as a possible point of departure.

To this end, I first explain why contemporary energy participation has become increasingly diverse through recourse to three societal mega-trends. I unpack why public participation in the evolution of energy systems is increasingly necessary, if not a vital component in deciding their future qualities, design and realisation. I then review how the study of energy participation has been successively broadened since the turn of the century, before outlining how insights from the study of socio-technical systems and their transformation could further advice thinking on systems of participation. This leads to a variety of open questions about how diverse participatory collectives interact, potentially influencing governance processes and co-shaping energy systems over time. I conclude with a synopsis of the arguments made and suggestions for future research. In doing so, I focus on public participation as a research topic and essential component in the study of energy democracy (Feldpausch-Parker et al., 2019; Szulecki, 2018; van Veelen & van der Horst, 2018) and by focussing on energy participation directly (c.f. examining it through the lens of energy democracy, research and practice), I review the evolution of this research field and set out future directions.

Decarbonisation, digitalisation, decentralisation, and democratization

To understand how contemporary energy participation has evolved we must also understand broader changes within global energy systems and society as a whole. Three 'mega-trends', thought to be influencing societal development, provide a useful entry point (Di Silvestre et al., 2018).

The first of these trends, **decarbonisation**, is a political commitment in response to the urgent need to curtail and ultimately halt societal reliance on carbon emitting energy systems. Global decarbonisation targets were set for the first time at COP21 in Paris with the aim of keeping global temperatures well below 2C by the end of the century and with the ambition to limited global temperature increases to 1.5C. Different regions and countries, including the EU and China, have subsequently pledged to reduce carbon emissions and set out strategies to achieve this. A variety of decarbonisation pathways are now evident, pursued at varying speeds depending on national circumstances, each entailing fundamental changes to the technological and social dimensions of energy systems.

The deployment of renewable energy generation technologies is probably the most striking change to have manifested in response to this commitment to date (Mitchell, 2016). Supportive policy contexts and rapid reductions in the price of renewables over the last two decades mean that their continued deployment appears nearly all but inevitable. Small renewable energy generation technologies such as solar photovoltaics (PV), have facilitated new forms of material participation as citizens start producing as well as consuming energy (Inderberg et al., 2018; Parag & Sovacool, 2016). As the penetration of renewable energy technologies increases, the challenge of incorporating variable power sources alongside the growth of demand response technologies, such as batteries, at local and household scales are expected to open up further avenues through which citizens can materially participate in future energy systems (Brown et al., 2019; Parag & Sovacool, 2016). Meanwhile, the deployment of household solar PV has been linked to the development of a more climate-informed and active citizenry in Germany and the US (Graziano, 2019).

Through a second trend, **digitalisation**, the world is experiencing a 5th 'great surge in development' (Perez, 2002). The Information and Communication Technology (ICT) revolution that began in the 1970's is resulting in structural changes across all sectors of the economy (production, distribution, communication and consumption). It is also resulting in profound, qualitative changes to society. The energy system is far from immune. The deployment of 'smart' meters has been a European continental imperative since at least 2010 and is opening up new avenues for citizens to engage with energy systems (Darby, 2010; Marres, 2011). Increasingly intelligent or 'smart' energy systems are thought essential in balancing variable power generated by renewable sources of electricity, for decoupling power generation and use and managing multiple forms of energy storage, for facilitating the development of increasingly complicated time of use and location based energy tariffs and for managing increasingly diverse, localised and dynamic regional energy systems. As the energy system becomes more 'active', opportunities for increased material participation by consumers and citizens are multiplying (Renström, 2019).

Digitalisation, as increased technological connectivity, has implications for how consumers engage with energy systems (Hansen et al., 2020). Digitalisation is changing the way consumers engage with energy networks, suppliers and markets. The growth of smart home appliances and associated communication infrastructures is facilitating new business models (Brown et al., 2019; Burger & Luke, 2017), including energy trading via peer-to-peer platforms through which households may trade locally produced electricity, individually, through community organisations or through aggregators who make decisions and act on their behalf (Hardy, 2018). Digitalisation is also creating new avenues for publics to contribute to decision-making. Government consultations and petitions increasingly employ digital methods whilst internet-based social movements have also proliferated in the last decade. Meanwhile, as Certomà et al. (2015) argues, the pervasiveness of digital infrastructures within cities is opening up new urban governance processes based on crowdsourcing. Digitalisation is subsequently creating new participatory spaces for citizens to engage with energy systems and offering new means to influence decision-making.

The third trend, **decentralisation**, strongly connects to the previous two and concerns the distribution of power, decision-making authority, security and control as well as energy hardware and systems of production and consumption. Contemporary communication systems and the internet have facilitated a return to more decentralised markets and social relationships. In energy systems, it manifests in the move towards managing supply and demand over increasingly short spatial scales, as innovation increasingly moves to the 'grid's edge' (Sioshansi, 2017) if not 'beyond the meter', and as power ebbs away from large incumbent energy utilities to a greater number of smaller players. In large part, this is a direct consequence of the rise of modular, scalable renewable energy generation technologies. It is also a self-reinforcing process, as the challenges associated with incorporating large amounts of renewably sourced electricity encourages and requires citizens (and others) to be more flexible in their local use of energy. Decentralisation is consequently resulting in new possibilities for material and economic participation by owning and managing energy system artefacts (through renewable energy cooperatives for example) and infrastructures (through municipally owned distribution networks) and it is taking power away from the previously dominant, large energy suppliers. Nonetheless, and as work by Judson et al. (2020) shows, decentralisation is a malleable term encompassing a multiplicity of locally distinct, energy pathways. In short, decentralisation further expands opportunities for citizens to get more actively involved in the design, governance and use of energy.

When viewed collectively, these trends suggest new roles for citizens in energy systems, as prosumers (actors who both produce and consume energy (Parag & Sovacool, 2016)) for example. They imply changes to the rules that guide participation and signal new rights and responsibilities of energy citizens (Devine-Wright, 2007). To Judson et al., (2020), Thompson and Bazilian (2014) and Soutar (2018), this points to a fourth underlying trend: **democratization**. More emergent and controversial than the previous three trends, these authors identify democratisation in the changing roles and associated responsibilities of citizens as central stakeholders in energy systems. That is to say, they take a pragmatic view of system transformation and observe how by moving from a time when citizens performed largely passive roles, the variety of new

opportunities for participation in energy systems is thereby making them more democratic. This leads to a crucial point: if energy systems are becoming more democratic by virtue of the increased opportunity afforded to citizens in increasingly smart localised energy systems, then what is at stake can be more appropriately framed as a question of how democratic energy systems might become. Viewed in this light, democratisation is an observable trend and social movements advocating energy democracy are agitators of richer participatory forms. The depth of energy democratisation, however, is uncertain and open to debate. As Soutar (2018) points out 'deeper' shades of energy democracy imply not only new opportunities to engage but also the capacity to contest and shape 'the rules of the game'. Implicated in this is a significant step change, as to date, consumers have had little say in the rules shaping how or when they might participate. The emergence of community and peer-to-peer energy trading holds promise but for deeper, more transformational and participatory systems to emerge greater awareness of and debate over future citizens roles and responsibilities in energy systems are required.

Deeper forms of energy democracy can be conceived through at least two entry points. On the one hand diverse bottom-up community-orientated energy trading schemes, such as the infamous Brooklyn microgrid, create spaces through which future rules and responsibilities of actively prosuming citizens can be negotiated in practice. On the other hand, traditional state-led democratic processes, such as voting and consultations, present avenues for energy citizens in shaping future energy policy. Either way, efforts to culture more effective 'deliberative systems' (Parkinson & Mansbridge, 2012) will require a combination of effective, strong, responsive and responsible governance institutions, the fostering of public debate and the willingness and capacity of institutions to shape energy system developments in more prosocial ways (Soutar, 2018; Szulecki, 2018). Although national governments will remain crucial actors in the process, the emergence of city and regional energy policy-making bodies are increasingly viewed as important, experimental sites for new participatory decision-making to emerge (Certomà et al., 2015; Hodson et al., 2017; Hodson & Marvin, 2009). This leads us back to this chapter's core topic, namely public participation, governance and energy system transformation, all pivoting around a single, largely overlooked issue.

Despite movement to more decarbonised, digitalised and decentralised energy systems there remains no clear, uniform or single post-carbon destination. A variety of technically feasible and economically viable futures have the potential to meet carbon targets (Sovacool & Watts, 2009; Stirling, 2009). In the power sector, options include the fitting of carbon capture and storage technologies to fossil-fuelled power stations, the use of large, centralised or small, modular nuclear reactors, the creation of centralised, continent sized renewable energy infrastructures or decentralised, 'smart' renewable energy grids. Potential heat decarbonisation pathways include the increased use of local heat networks or sustainably sourced biomass, the electrification of heat provision or the development of gas networks delivering hydrogen or other 'green gases'. Each of these pathways present orientating technical options. Not all can be realised, at the same time and in the same place, whilst costs are kept low. This implicates a variety of technical pathways as possible, even before discussing social, cultural and economic permutations within each (Walker & Cass, 2007). In short, societies face social, political and technical choices about the direction in which energy systems develop (Stirling, 2009). Choices that to date, seem largely unrecognised and undebated.

This has fundamental implications for our understanding of public participation and the governance of systems change. Since the post war period, the development of energy systems was largely uncontested (Chilvers and Kearnes, 2010): National infrastructures were created from scratch or through regional electricity networks being linked together; large, centralised and predominantly fossil-fuelled power stations were built, and power flowed in one direction, from generation plants through the 'grid' to businesses and households. The system was managed either by the state or by private interests. Although alternative development pathways clearly existed (Lovins, 1976) and there were fierce societal debates over the development of nuclear power, energy systems evolved in a remarkably settled and depoliticised way. Today, because diverse economically viable and socially desirable decarbonisation pathways exist – each entailing winners and losers – future transition pathways are contested, fiercely, if not openly. Public

participation thus conceived is an inherently political process. No longer can citizens be expected to feed into the objective, relatively uncontested management of 'the energy system'. Political decisions need to be made about the qualities of future energy systems. Choices, involving value-laden judgements that stretch far beyond the objective appraisal of technical options alone have to be made (Stirling, 2007). Consequently, traditional views of 'the public' feeding into the objective management of 'the system' no longer appear adequate. Instead, energy transformations fundamentally question the relationship between public participation, governance and energy systems evolution.

Recognising the multiplicity of possible decarbonisation pathways and the value-laden, political process required to make progress, it necessarily follows that a broad societal consensus about the direction and extent of change is required. Costs, after all, will ultimately fall on citizens (paying through taxes, their energy bills and the products they buy). Fundamental changes to individual and collective energy practices (such as shifting from individual to collective mobility) will require public willingness to adapt. Moreover, energy infrastructures – from pylons and wind farms to district heating and smart meters – permeate communities and their landscapes: the potential for citizens resisting energy developments being imposed on them is high (Devine-Wright, 2013). Unless citizens can engage in meaningful ways, with associated capacities to contest, explore, and construct future pathways, energy system transformations are likely to be less inclusive, equitable and environmentally sustainable.

Diverse governance actors recognise this and are exploring varied means to engage citizens as active participants. Broad, largescale attempts to promote citizens deliberation over climate and energy policy have been commissioned in the UK (e.g. Pidgeon et al., 2014). Contemporary calls from protesters, activists and think tanks for 'Climate Citizens Assemblies' (Hennig, 2018) - in which randomly selected citizens review the evidence on and deliberate over a particular issue of national importance - presents another example of possible means to engage 'the public' and contribute to decision-making. Nonetheless, these developments largely sit within traditional understandings of the role of public participation in energy governance. 'The

challenge' is viewed as a 'problem of extension': how to enrol publics into the decision-making process (Collins and Evans, 2002). At the same time and largely ignored, is how diverse participatory collectives, like Transition Towns (Seyfang & Haxeltine, 2012) or community-based energy movements (Blanchet, 2015), have emerged at diffuse scales and locales to explore energy system futures largely detached from traditional governance forums. These examples further question traditional conceptualisations of energy participation and support calls for 'reclaiming' or 'remaking participation' (Chilvers & Kearnes, 2016; Denecke et al., 2016).

Decarbonisation, digitalisation and decentralisation consequently help explain how and why contemporary participation in energy systems is more diverse than has historically been the case. Collectively, they point to the increasing democratisation of energy, whilst opening up questions of how participatory energy systems might become. They position public participation as an increasingly vital element in exploring and deciding upon the future qualities, design and realisation of energy systems. In short, the multiplicity of potential decarbonised futures, all with different social, cultural, technological and economic foundations requires citizens to engage with and contribute to the development of energy systems. These trends also challenge traditional conceptualisations of public participation as being primarily instrumental and deliberative. To further demonstrate this, I now turn to briefly review how understandings of energy participation have successively broadened since the turn of the century. In outlining three successive 'waves', I build on the work of Chilvers and Kearnes (2016).

Mainstream, relational and emerging systemic conceptions of energy participation

Mainstream perspectives

Mainstream or traditional perspectives on energy participation, are closely linked to historical energy system developments, including their centralised design, one-way power flows and limited role for citizens

as passive consumers (Chilvers & Kearnes, 2016). With a limited role in energy systems, public participation subsequently concerned the periodic consultation of citizens on particular energy issues, such as the siting of new energy infrastructure (Cowell & Devine-Wright, 2018). Public consultations, surveys and focus groups all fit within this framing, designed to elicit information from particular segments of society so that citizens views can be fed into larger decision-making processes. At the core of these mainstream conceptions of public participation is a focus on deliberation: participation is conceived as a purely deliberative process in which citizens contribute to decision-making. The overall objective being to manage system developments through the objective appraisal of socio-technical options and rational deliberation. The outputs of public participation are subsequently viewed as one piece of the decision-making jigsaw, placed alongside other considerations. As a result, each form of participation typically entails singular events on particular issues or topics and is typically led by experts with participants carefully selected to represent a particular area or a cross section of society.

To these formal, top-down forms of participation can also be added protests and some forms of social movements where the aim is to vocalise an opinion or challenge a decision. Meanwhile, more contemporary approaches for engaging citizens such as 'transition management' approaches (that seek to steer actors through a set of coherent interventions) (e.g. Rotmans et al., 2001) or behaviour change campaigns, like the Japanese government's 'Coolbiz' campaign (Tanabe et al., 2013), can also be grouped with more historically dominant forms. Although there is less focus on participation being a deliberative process, they all share a common set of assumptions, including: fixed ideas about what it means to participate, how participation occurs, who is to be involved and what is to be explored (Chilvers et al., 2018). They all assume there is an external public 'out there', ready to be known or consulted. Furthermore, publics are perceived as being separable from governance processes and energy systems. Framed in this way, public participation becomes the technical application of pre-given methods, that can be perfected, scaled up or rolled out through objective evaluation of 'best practice' criteria, to better understand, incorporate or placate(!) what a pre-

defined public think. Public participation is subsequently viewed as one input into the objective management (governance) of 'the system'.

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 increasingly challenged. It is now widely recognised that 'the public' cannot be conceived as a single homogeneous mass but is rather constituted by an ever-emerging variety of publics depending on the time, space and issue at hand (Pesch, 2019). This framing has also been criticised for closing down deliberation over potential energy futures, for ignoring the potential of publics to create new energy futures and for underplaying the role of publics to challenge and critique current policy and practice (Pidgeon et al., 2014; Stirling, 2014). At the same time, mainstream approaches have 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).

Relational perspectives

Largely analytical and influenced by advances in the study of Science and Technology Studies, relational approaches have challenged traditional conceptualisations of public participation by emphasising how individuals never participate alone or in isolation: participatory 'engagements' are actively constructed and shaped by – as well as shaping – their wider cultural, material, social, institutional and settings. This sets relational approaches apart from mainstream understanding because participation is no longer viewed as fixed or predefined. Instead participation is understood as being 'performative', shaped by the participants and the elements involved in and constructing participation. Participation is subsequently viewed as emergent and co-produced, rather than fixed or pre-given (Chilvers & Pallett, 2018).

A variety of different relational approaches have subsequently been developed. These include object-orientated approaches that emphasise '*material participation*' (Marres, 2012) and which challenge the idea of public participation as being centred on discursive or deliberative processes. Whilst such material participation can occur through everyday mundane objects (Ryghaug et al., 2018), the approach also gives rise to a broader understanding about how some objects appear to have distinctive or special characteristics that in particular situations can play a role in the enactment of public participation. A related approach has explored how particular participatory approaches or 'technologies of participation' – like focus groups, deliberative workshops – give rise to particular ideas or framings of the 'public' and what effects this has (Lezaun & Soneryd, 2007).

By questioning the 'who' participates, 'how' they participate and around 'what', relational approaches open up for analysis a far wider diversity of 'participatory collectives'. Relational approaches subsequently challenge what it means to participate and how participation occurs, as well as exploring questions of who is and isn't included. This has clear implications for our understanding of politics and power, who gets to shape societal developments. It asks which participatory collectives have a voice in governance processes, which are viewed as legitimate and which are not. This relational approach also speaks and responds to the diverse material ways through which publics actively participate in contemporary energy system developments, through for example, smart technology trials or eco-open home days (where members of the public open their doors and invite local residents to explore and learn about their practical experiences with energy). Nonetheless, the extent to which relational approaches engage with and have implications for the governance of energy systems change is less clear. Although increasingly influential, this relational view tends to critically examine individual instances of participation. They remain largely analytical and leave unanswered how diverse participatory collectives influence one another and the energy system of which they are a part.

Emerging systemic perspectives

To answer these questions a third, emerging perspective on participation seeks to take a more systemic, whole-systems view. Less cohesive than the previous two frames, emerging systemic approaches to participation have largely emerged as an extension of Science, Technology and Society studies (STS)-informed relational and co-productionist approaches.

In some instances, the relational STS approaches outlined above, have also moved to take more systemic views on participation. One strand of this work looks across collective participatory approaches, typically at the national level and explores the interactions and relations between the 'constitutional contexts' of participation and collective participatory entanglements. Emphasis is placed on the interplay of political cultures, histories and institutions which might explain particular 'socio-technical imaginaries' or shared visions of the future (Jasanoff & Kim, 2009). An alternative, object inspired approach seeks to map 'issue' or 'controversy' spaces to inquire into the different forms of participation taking place and of different publics being mobilised, as well as the links between them (Marres, 2015).

Both of these perspectives have subsequently been moulded into an 'ecologies of participation' framework (Chilvers et al., 2018; Chilvers & Longhurst, 2016) that stresses the interrelations between participatory practices and their wider political and cultural contexts. Application of this framework to a systematic study of energy participation in the United Kingdom highlights why and how some participatory practices become dominant whilst others, despite being firmly established remain less recognised and influential (Chilvers et al., 2018). The strength of this work lies in demonstrating the linkages between diverse participatory collectives and their wider settings. This work is also one of the first studies that actively seeks to engage with contemporary 'challenge' of participation as a problem of 'relevance'. That is, the research calls for the 'burden' of participation to no longer be placed on 'publics to participate' - as might be conceived under traditional perspectives – but, rather, a question of inadequate institutional reflexivity, requiring greater 'institutional listening' to rectify (Chilvers et al., 2018; Pallett et al., 2019).

This work represents a significant advance. Accounting for and responding to the multiple ways in which citizens already engaged in energy system transformation is important. But how to interpret the existence of diverse participatory practices and their relevance to policy questions requires further attention. Moreover, the analytical separation of 'participation' and 'governance', as two separate processes and areas of study, is maintained. To advance a systemic understanding of how publics contribute to energy systems transformations this divide needs breaking down and a greater understanding of how participatory collectives may already be contributing to energy governance and system change is required. Implicated in this is a greater appreciation of the diverse ways in which participatory collectives contribute to 'doing' system change. One means to advance these emerging systemic perspectives on public participation and to advance an understanding of participation and governance as being mutually co-constituting constituent parts of broader energy systems specifically, is to incorporate insights from the study of socio-technical systems and their transformation (Leach et al., 2007; Smith et al., 2005, 2010).

Advancing systemic perspectives of participation

Over the last two decades research under the umbrella of 'Sustainability transitions' has reframed the challenge of sustainability by calling for a focus on socio-technical systems as a unit for analysis and as the target for policy and action. Initial attention focussed on bridging micro and macro forms of change to understand broad patterns and dynamics of transformation as well as governance processes. This led to an appreciation of socio-technical pathways (Geels & Schot, 2007; Leach et al., 2007) and later, the agency and roles of actors driving change (Fischer & Newig, 2016). A growing conceptual armoury for understanding and seeking to intervene in socio-technical systems and their governance has subsequently been amassed. However, for the most part, such research has not foregrounded 'publics' as significant actors in transformation processes. This is curious considering how the perspective shifts focus away from the greening of industry or changing individual behaviours to the systems that fulfil societal (public?) needs and

functions (Meadowcroft, 2009). Nonetheless, this broad area of research offers a variety of insights that might advance systemic perspectives on public participation.

First, a focus on socio-technical systems implicates publics as important component parts of wider systems, alongside governance arrangements, institutions, markets, energy technologies and so on. It suggests an understanding of diverse publics being intertwined with and coproducing of energy systems and their governance. Smith and Stirling (2007) have elaborated on this difference by articulating two competing and idealised governance perspectives. The first, termed 'governance on the outside', views public participation as discrete from formal decision-making, which is, in turn, perceived as separate from the energy systems which it seeks to influence. At the same time, energy systems are conceived as a discrete, knowable objects. This form of governance, they suggest, is managerial in style and seeks independent knowledge of the energy system and public views, that can be fed into the objective management of 'the system'. In contrast, 'governance on the inside' is founded on (a) recognition that there are multiple ways of knowing energy systems and (b) the inseparability of governance participants (such as publics) from broader socio-technical systems. Because each position or participant view of energy systems is inherently contestable this implies that making decisions on the future shape and direction of energy systems changes is fundamentally a political process (c.f. an exercise in objective appraisal). This systemic perspective of 'governance on the inside' also directs attention to what diverse publics are actually doing, in what ways they are already influencing the development of energy systems and how they may already be shaping governance processes.

This leads to a second area where insights from the study of socio-technical systems and their transformation could add value. To date, significant attention has been dedicated to the roles of different actors in developing and advocating more sustainable solutions. One such branch has focused on the role of 'grassroots innovations', variously described as diverse, collective and participatory networks of activists and organisations generating novel bottom-up solutions to sustainable development (Seyfang and Smith, 2007).

This lens has been applied to the study of community currencies, ecovillages (Boyer, 2015), the transition town movement (Feola & Nunes, 2013; Seyfang & Haxeltine, 2012) and community energy projects (Hargreaves et al., 2013) amongst others, and has clear crossovers to the diverse forms of public, primarily civil society-led participation in contemporary energy systems. This work has subsequently pointed to multiple 'public good' outcomes of grassroots innovations, including the development of alternative, increasingly sustainable alternatives, the creation of critical knowledge (about power, institutions and systems) and the ability to challenge prevailing discourses and contest possible futures (Smith & Stirling, 2016). More broadly, publics and social movements are thought to play a variety of central roles in different stages of transitions including shaping societal values and world views, legitimating new technologies and transition pathways, whilst lobbying for and against particular socio-technical systems (Schot et al., 2016; Smith, 2012). This work is subsequently useful to emerging systemic understandings of public participation because it ascribes broader forms of agency to diverse participatory collectives (publics) and thereby extends the performative characterisation of participation as conceived under relational approaches. It consequently shifts attention away from participation being a purely deliberative process and places greater emphasis and explanatory power of publics to contribute to the 'doing' of change.

Third, sustainability transitions research recognises how multiple, diverse transformation pathways are possible, emerging from existing or new path dependencies, the alignment of resources, actors, and technologies (Leach et al., 2007). Diverse actors, including publics are thus conceived as influencing how transformations unfold through the decisions and actions they take. Studies that zoom in on actors subsequently show how they can collectively contribute to the 'directionality' of progress (e.g. Bird and Barnes, 2014). Yet to date few studies have specifically addressed the role of diverse publics in guiding change. Exceptions to this include studies focused on how particular social movements have influenced regional or urban decision making (e.g. Blanchet, 2015; Hess, 2019). This work offers a point of departure from which wider and more diverse forms of public participation in energy systems could be investigated: a

focus on emerging pathways creates space for investigating how diverse participatory collectives influence one another and the energy system of which they are a part.

To this, we can also add a fourth area of research inquiring into how diverse regional and urban energy system transformations are emerging, shaped by their particular contexts, including histories, resources, actor constellations and governance processes (e.g. Bulkeley et al., 2011; Dudley et al., 2019; Ehnert et al., 2018; Hodson et al., 2017; Torrens et al., 2018). This work further underlines the multiplicity of potential energy system decarbonisation pathways and positions regional energy systems as a potentially fruitful site for studying systems of participation.

Regional systems of participation

Collectively these insights suggest a potentially fruitful line of enquiry, studying regional systems of participation. Developing systemic conceptualisations will not be easy. Delineating system boundaries will be an important but challenging step. In practice, boundaries are perhaps best drawn for conceptual and practical reasons, as has been the case in much of the existing work to date. On top of this, prior studies by Chilvers et al. (2018) as well as Jasanoff and Kim (2009) indicate the considerable work involved in mapping and tracing public participation at national scales. For these reasons the study of urban or regional areas offers an interesting point of departure because they appear large enough to capture a diversity of participatory processes (as demontrated in Barnes, 2019) whilst being sufficiently contained to allow for the tracing of interactions and relations between participatory events. They also appear to contain a diversity of competing transformation pathways (Torrens, Johnstone, et al., 2018; Torrens, Schot, et al., 2018).

A variety of avenues offer interesting starting points. One avenue includes exploring how diverse participatory collectives co-produce each other over time. That is, how diverse instances of participation emerge, interact, overflow and connect. From this arises questions of how different 'patterns' of

interrelating participatory collectives emerge over time and evolve? And how such patterns and energy systems co-produce each other overtime. A second avenue might explore how regional participatory practices interact with (or not) diverse regional governance processes. One means to approach this is to follow participatory collectives as they engage diverse governance arenas (as in Barnes et al., (2018) or Hess (2018). Such an approach may facilitate knowledge of and for the 'transformative capacities' of publics (Wolfram, 2016). Equally, participation could be investigated from the vantage of contemporary governance arenas and processes in a search for the ways in which they listen and respond to (or not) what diverse participatory collectives are saying and doing. In some respects, these entry points continue the unhelpful analytical separation of participation and governance. But this need not be a retrograde step if the central challenge is kept in focus: viewing participation and governance as two sides of the same coin, mutually influencing and coproducing each other and being co-constitutive parts of broader energy systems.

Conclusions

This chapter examined public participation as a research topic and important component of energy democracy. It started by recognising how energy participation has grown increasingly diverse in recent decades and argued that previously stable expectations of what public participation is and does are no longer adequate.

This is perhaps no surprise given the rapid evolution of contemporary energy systems. On the one hand, decarbonisation, digitalisation and decentralisation are opening up new possibilities for citizens to participate in energy systems. Indeed, many new forms of participation can be viewed as experimental responses to and, in turn, further drivers of these trends. On the other hand, encapsulated within the idea of transformation is how citizens and society as a whole, face fundamental decisions about the direction and extent of change. For whilst decarbonisation, digitalisation and decentralisation provide a direction of travel there remains no single identifiable destination. A multiplicity of post carbon, local and smart energy

systems remain possible and deciding which paths to take means navigating diverse political choices. This implicates public participation as a central, if not vital component in the transformation of energy systems. It puts greater emphasis on participation as a diverse and evolving process and it potentially sets out a challenge to energy democracy advocates: if energy systems are becoming more participatory how can deeper forms of democratisation be fostered in which citizens actively shape 'the rules of the game'?

The chapter also suggested a concomitant evolution of the ways we conceive of public participation. Traditional conceptualisations have been challenged and the research area successively broadened. First, by scholars emphasising the material, situated and performative nature of contemporary participatory collectives and second, by scholars advocating systemic conceptualisations of energy participation. Nonetheless, work advancing systemic approaches remains at an early stage of development and have tended to focus in on particular forms of participation and their circulation rather than taking a more systemic view of how diverse participatory collectives interact and influence equally diverse forms of decision-making. To advance thinking on systems of participation and recognise how publics cannot be easily separated from governance processes, insights from the study of socio-technical systems and their transformation appear helpful.

Finally, the chapter argued for and outlined an emerging research agenda based on the study of regional systems of participation. This agenda argues for the meta-analysis of energy participation (c.f. the study of individual, discrete instances of participation). It asks how diverse participatory collectives interact, building capacities to engage in governance processes and thereby steer energy system developments, of which they are a part. Only through further theoretical and empirical work will we know if this suggestion is indeed fruitful. Either way, further theoretical and methodological advances seem required, given the scale of change currently unfolding in societies and energy systems in particular.

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