CHAPTER 3

# Democratic and Participatory Pilot Projects?

**Abstract** This chapter starts from the normative assumption that since pilot projects are key sites in the shaping of future societies, it is essential that they are conducted in an inclusive and democratic way. Building on key perspectives from STS, we focus on two aspects: First, we consider participation as an orchestrated and distributed phenomenon, highlighting the fact that the way actors participate in such innovation activities will be shaped by technologies, assumptions and the work of a series of actors related to pilot projects. Consequently, we also note how new forms of participation can be actively nurtured. Second, we explore the role of technologies in shaping material participation. Here, we explore how material traits might produce new forms of awareness, knowledge or literacy, and new practices or action, amounting to what we call *energy citizenship*.

**Keywords** Pilot projects • Participation • Orchestration • Energy citizenship

In the last chapter we made the case that pilot, and demonstration projects are political entities. On the one hand they may be sites that seemingly promote relatively narrow technological agendas, but on the other hand they also formulate and materialize future socio-technical orders across an increasing span of societal sectors. Through our discussion we illustrated



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how pilot projects legitimate and amplify the interests and resources that produce them. We indicated that many pilot projects tend to be centred around a few technology oriented interests, and that formulations and enactments of social relations within such projects are often limited to consumption or technology use.

It is with this as a backdrop that we now turn our attention to pilot and demonstration projects as potential sites of participation. On our behalf this is both a normative and an analytical move. It is analytical in the sense that it allows us to probe another facet of such projects, normative because we follow Delina and Sovacool (2018) and other scholars who highlight that transitions should not only entail implementing new technologies and phasing out old ones, but that this should be done in a just way. Achieving just transitions requires the mobilization of a plurality of voices in processes of innovation.

While sustainability transition scholars working from the multi-level and related frameworks (e.g. Geels 2005, 2010b; Kemp et al. 1998) have primarily been preoccupied with the process where technologies are developed from a narrow and alternative niche to an established and powerful regime (see Chap. 1 for a more detailed discussion), STS has a long tradition of asking precisely how technoscientific processes can be opened to the participation of broader publics. The interest in this comes from observations that scientific expertise and technology developers often overestimate the universality of their proposals (e.g. Wynne 1996; Irwin and Wynne 2003; Ryghaug et al. 2011), and that this might result in the production of technologies that do not work in practice, and scientific facts that misses out on insights anchored in everyday lives and other rationalities than the technoscientific. A relevant example here could be the development of a technology that seeks to transform the way energy is consumed in households, without mobilizing insights about the lives within households in the production of knowledge and the production of technology.

Michel Callon (1999) has sketched a development where ideas about public participation in scientific and technological development processes have been expanded to encompass three models for public participation. The first and classical model is the public education model. Here, publics do not participate in the production of technology or scientific facts. Rather, publics are informed through acts of education, with the rationale that if they only knew the benefits of new developments, they would accept them. Hence, this is a model that builds on technocratic ideals and

signals that public knowledge deficiencies are barriers to progress. The second model described by Callon is the public debate model. Here, technologies and scientific proposals are publicly debated, often through mechanisms such as public hearings, consensus conferences of citizen panels. This is a form of democratization which opens decision making to public scrutiny, and which assumes that the voices of different interests can enrich and improve decision making. Callon first two models have in common that they render public participation as a process that is as external to the actual production of knowledge or technology (Chilvers and Kearnes 2015; Marres 2012).

Finally, Callon (1999) points to the most radical model, which is the co-production model. Here, publics are not only allowed to debate technoscientific developments that are of concern to them at a distance, they are actively mobilized in the process of technoscientific development and production. This latter model has become significant in what some scholars have dubbed 'the participatory turn' in technoscience (e.g. Felt and Fochler 2010), where narratives of increased and new forms of public participation is expected to improve the relationship between technoscience and society.

Over the last years, such accounts of public participation in technology processes have been expanded further, in part because of criticisms that have emerged against the models discussed above. Approaches such as participation in the form of public debate or processes of co-production have been pointed to as institutionalized to the point of becoming political machines (Barry 2001), that produces publics through "offering" fixed discursive and practical spaces of engagement (Felt and Fochler 2010). Hence, in this book we take inspiration from scholars who zoom out from a focus on discrete sites where participation is enacted towards studying participation as a *distributed phenomenon* which is produced by a range of diverse actors across sites (Chilvers and Longhurst 2016; Chilvers and Kearnes 2015; Chilvers et al. 2018). A key element in these perspectives that are of crucial importance to us is the roles that technologies and materiality play in articulating interests and publics, and through this also enabling new forms of participatory practices (Marres 2016).

These insights lead us to a dual focus in the remainder of this chapter. First, we will probe the ways that participation is produced or *orchestrated* by a range of actors (e.g. Skjølsvold et al. 2018). This is a move that illustrates not only that participation is a distributed phenomenon, but which points to the distributed responsibility of making conditions that cater for

a diversity of voices, rationalities and practices of participation. Second, we will look at how participation might be *enacted*. Here, we give significance to the enactment of a form of material participation that we discuss as *energy citizenship* (Ryghaug et al. 2018), a term intended to open participation in energy transition activities to broader and more politically informed actions.

## The Orchestration of Participation in Pilot and Demonstration Projects

As discussed in Chap. 2, many pilot and demonstration projects reflects the involved actors strong focus on technology development and deployment, with a limited focus on potentially transformative effects such as the ability to scale up, or what Marres highlights as the potential to actively tinker with political and societal aspects. Many projects only marginally focus on 'real' technology users, which means, that insights from users do not feed into further technology development. One consequence of this that has been observed in the research literature is that prospective "publics" or "users" are cast as groups that strongly resemble the technology developers (Strengers 2014; Skjølsvold and Lindkvist 2015). In instances when publics are imagined differently, they tend to be envisaged as barriers to success, with the preferred scenario often being automated technological solutions that work in the background without being noticed (see also Fjellså et al. forthcoming). Such projects, it seems, rejects all models of participation proposed by Callon (1999).

Despite of such observations, much of the *rhetoric* surrounding pilot and demonstration projects tends to be anchored in notions of involvement, active engagement and user centric design. These are signifiers that all point towards high levels of participation. Funding bodies increasingly also demand that technology developers take measures to include knowledge from technology users in new projects. This is reflected more broadly in European energy policy, which highlights that a key goal of the energy transition is to make future energy systems 'citizen centric' (Ingeborgrud et al. 2020). Yet, citizenship promoted through such rhetoric tends to be reduced to finding new ways of making people act as rational agents in economic markets (e.g. Wallsten and Galis 2019). How can we begin an analytical and normative process of working towards alternative models of participation?

Our account is inspired by recent scholarship within STS, which highlights that participation is co-constructed, relational, emergent and in the making (Chilvers and Kearnes 2015). Within such an understanding, participation is not the individual act of opting into or opting out of a particular technology trial, but an outcome of a process involving a wide array of actors and objects (see also Marres 2016). Participation, then, emerges in interaction between actors, in-situ, which amplifies a long-standing point made by STS-scholars that participation is not external to technoscientific endeavours, but rather an integral aspect constituted by scientific practice (e.g. Shapin and Schaffer 1985). A metaphor that makes this point explicit is that of *orchestration*. Orchestration points to how the work of actors who conduct pilot and demonstration projects seeks to produce specific types of participation. In sum, our interest here is in "participation in the making", and especially the ways that participation-making entail attempts at producing new forms of social and political order.

This interest leads us to ask what the consequences of such a move would be. On the one hand, participation within such a framework is a phenomenon that is subject to the same processes of shaping and construction that we discussed for technologies in Chap. 2. This means that the way participation looks in a project is contingent on the cultural, historical, social, economic and technological specificities of the project, as well as the work done by actors in that particular site. This does not mean that participation is a phenomenon fully constituted by local aspects. It is also shaped by the distributed work of actors—actors working from a long distance. Examples of this include the work of national and international policy makers, large companies and international organizations. Thus, within such a perspective, participation is both localized and specific, and connected to and embedded within wider circuits of actors and networks across scales (Chilvers and Kearnes 2015). An important consequence of this line of reasoning is that we come to see participation as a collective endeavour constituted by collectives of participation, and wider ecologies of participation.

Pilot and demonstration projects are a particularly suitable case in point here for exploring participation in the making. Orchestration within this context consists of two processes. First, enrolment, which "refers to the way in which different (human and non-human) actors are drawn into a particular form of participatory collective practice and definition of the issue at stake" (Chilvers and Longhurst 2016, p. 591). The second is mediation, which refers to "the way in which a participatory collective is

held together by different devices, processes, skills, or 'technologies of participation'" (ibid., p. 591). In what follows, we will explore how these processes might emerge within and around pilot projects that seek to advance technologies associated with energy and sustainability transitions.

If we briefly re-visit the pilot projects discussed in Chap. 2, we can describe them in terms of processes of enrolment and mediation. The pilot projects are shaped and constructed by a series of actors and resources, who formulate quite different issues that the pilot projects are expected to address. Our example of a smart grid pilot shaped in part by local healthcare interests can serve as an example. Here, actors within the energy and ICT sector first enrolled healthcare actors in the work to produce issues to address though smart grid piloting. This participation was mediated through a series of workshops, which sustained the healthcare workers participation in the production and stabilization of this issue. In turn, this constellation made necessary the enrolment of prospective technology users, who would participate primarily by using the technology. Here, this participation was mediated through the pilot technologies, but also through a broader political interest both in how to deal with the local demographic transition, and in how to make electricity consumption smarter. Hence, orchestration is multidirectional, multiple and enacted by a range of actors.

In the past we have identified collectives of actors engaged in such work as collectives of orchestration (Skjølsvold et al. 2018). Such collectives are primarily identified through the activities that they engage in. On the one hand, the activities of these collectives are often anchored in very localized spaces or institutional settings, where they participate in the transition through engagement with concrete issues. Many of the pilot projects discussed in Chap. 2 contain a series of such issues: how the electricity grid handles the influx of renewables, making technology that caters for the needs of the healthcare system, working to produce a new piece of hardware to be tested in a laboratory, or working to produce a new standard or piece of legislation. In doing so, these collectives, on the one hand, perform acts of participation. They participate in transition-oriented activities through their work. On the other hand, they also engage in targeting and aiming to transform practices beyond their own immediate site and situation, working to format the participation of other actors at a spatial and temporal distance. Thus, we come to see participation as co-produced, but also as a politicized phenomenon. What participation is, what it should be

and what the goals of participation should be can be contested and transformed.

Arguably, there are a set of at least three ideal typical collectives of orchestration (Skjølsvold et al. 2018), that work to orchestrate participation at a spatial and temporal distance around the types of projects that we discuss in this book. These three are (a) collectives of policy production and regulation, (b) collectives of research, development and innovation, (c) and collectives of technology design. In the following, we give some illustrative examples of how such collectives work to orchestrate participation within pilot and demonstration projects, primarily within the energy domain.

### *Collectives of Policy Production and Regulation*

In Chap. 2 we discussed how policies and regulations are resources for and enablers of innovation activities. One way of elaborating on this, is to highlight how policies seek to orchestrate participation in energy transition activities across time and space. An example of these dynamics is found within the field of smart energy technology.

Through the production of policies and regulations, actors have for a long time worked to format how ordinary citizens engage with energy. Through policies of liberalization and privatization policy makers have tried to cultivate active and rational economic consumers (Karlstrøm 2012; Silvast 2017). Policies and regulations stimulating the implementation of smart energy technologies can be seen as an expansion of these logics, aiming to produce consumers who act flexibly and rationally as economic agents, e.g. by buying and selling electricity, as well as changing the timing of their consumption and thus providing flexibility to the energy system (Ballo 2015; Skjølsvold 2014; Christensen et al. 2020). Hence, policies, for example for smart meter implementation produce visions of future societies where the use of smart meters is widespread and produce visions that render the desired effects of such use visible. Through this, such policies seek to enable a specific form of participation in future markets on behalf of customers.

Hence, one can say that the production of these policies seeks to orchestrate how citizens engage with energy. However, and just as importantly, policy production is also central in orchestrating the work of actors within the energy industry, ICT industry and others who work to establish smart energy pilots. In Chap. 2 we saw an example of this from the island

of Samsøe, where local authorities formulated local policies and visions with the aim of attracting external innovators. Similarly, the policy priorities of the European Commission and other funding bodies are of vital importance in shaping the strategies of such innovators. Beyond such priorities, innovators and technology implementers take cue from policy and regulation, particularly in questions regarding the implementation of technological standards. In sum, this points to collectives of policy production and regulation as key in enrolling a range of various actors in participating in energy transition-oriented pilot activities in different ways.

### *Collectives of Research, Development and Innovation*

Pilot projects and demonstration projects have been central for the development of smart energy technologies over the last years. Through these developments such projects have arguably been instrumental in orchestrating the participation of ordinary households and citizens, particularly through developing and testing technologies, price schemes and modes of organization that seek to change timing or character of energy consumption often referred to as demand-response or demand side management. In such projects, ordinary households can typically participate in transition activities as consumers, for example by responding to price signals. However, smart energy pilot projects practically do this in quite different ways. Some projects explicitly seek very active engagement on behalf of citizens, who are expected to work as energy managers within their own homes. In other instances, pilots orchestrate a more passive form of participation, where new tasks are delegated, for example to new automatic technologies. Hence, pilot projects are a way of enrolling citizens in participation, often through using new technologies or engaging in new types of consumption of prosumption.

The actors who establish pilots, however, do not necessarily only seek to orchestrate the way technology users participate in transitions. As we saw in Chap. 2, the actors behind such projects might also become more politically ambitious, and seek to transform practices of policy making and public procurement. In such instances we saw how innovators worked to produce visions of future societies anchored in their own technologies, and thereby worked to enrol policy makers and legislators in co-producing a reality that renders those very technologies part of a more plausible alternative future. Thus, the actors involved have ambitions of transforming

the participation of technology users, policy makers, and in turn, also other actors within their industry.

### *Collectives of Design*

In the discussion above, the orchestration of participation by policy makers and R&D actors unfold through the production of networks of material devices, organizations and visions. Collectives of design form around similar concerns, but are anchored more concretely in the production of the specific things that make up for example pilot projects. Hence, collectives of design produce interfaces, switches, apps, screens and other concrete objects. The issue around which they form relates to how these technological objects should be shaped to do effective work in the kinds of networks discussed above.

In STS, design has for long been understood as a form of orchestration at a distance, through the notion of scripting (Akrich 1992) which more recently has also been linked explicitly to the production of public participation (Marres and Lezaun 2011). The orchestration of participation through design is arguably a two-step process of (1) producing visions of future technology use (Borup et al. 2006), and (2) translating the consequences of such visions into concrete objects. Within smart energy pilot projects such as those discussed in Chap. 2, one can distil at least four ideal-typical user-characters that designers often mobilize in the production of technologies. The first character can be described as 'greedy', a trait translated into participation through a rational form of consumption. This entails visual devices focusing on numbers (money saved, money earned, kilowatt hours not used), and graphs communicated via in-home displays, apps, bills or websites, providing information on consumption and production levels as well as costs and income. The second character is understood as politically motivated and green, driven by a desire to mitigate environmental problems and participate politically as a citizen, a mode of participation increasingly identified as promising, and that we will discuss at length later in this chapter (e.g. Devine-Wright 2012; Ryghaug et al. 2018). These users are often enrolled through scripts that provide information about CO2 savings, communicated through apps, displays and websites, thus providing what could be understood as means to enact *energy citizenship* through material participation (Ryghaug et al. 2018).

The third user character is 'simple'; disinterested in technology or energy use, with main motivation related to comfort and convenience.

Such users are often enrolled through scripts that minimize the need for active input, for example as pre-programmed household settings like 'night', 'day' or 'home' and 'away'. Participation is often delegated to technology, under the assumption that their disinterest would be a threat to the goals of the system (see also Chilvers et al. 2018). Finally, some projects envisage a 'social' or collective user, imagined operating in groups (multi-person households, neighbourhoods, communities). This character is orchestrated to participate primarily through two mechanisms: competition or cooperation. Scripts targeting this group often enrol users by focusing on political engagement and citizenry concerning environmental issues. These issues can be presented on online platforms that consist of gaming elements or competitions (gamification), or discussion forums, where platform users would be encouraged to discuss openly their experiences with solar energy, energy savings and environmental issues in general (Skjølsvold et al. 2018).

## Technology Users as Orchestrators of Participation

In discussions about the implementation of new technologies, or in discussions about energy transitions more broadly, the users of technology are often discussed in terms of social acceptance (e.g. Wolsink 2018; Ingeborgrud et al. 2020). Discussions about acceptance can provide important insights. As an example, models of participation that see citizens primarily as consumers requires citizens to accept and act on new price signals, often with new technologies to work. However, technology users or citizens can take on other roles than receivers of ready-made solutions. Arguably, they can also advance innovation, and orchestrate the participation of other actors in the energy transition. In past studies (Throndsen and Ryghaug 2015; Throndsen et al. 2017) we have argued that as households become enrolled in pilot projects, they might re-interpret the purpose of such a project, thereby also transforming the future direction of work within the project. An example of this can be that a technology-oriented project becomes re-defined as a project that is also a political endeavour, in the sense of communicating the virtues of sustainability.

Another example can be found in the discussions of Norway as a national laboratory for electric vehicles discussed in Chap. 2. Here, early technology users arguably played a vital role in shaping the national policy landscape. They did so by organizing in new ways and explicitly targeting

policy makers and industry in attempts to make them re-think the way private transportation was conducted in Norway (Ryghaug and Skjølsvold 2019; Skjølsvold and Ryghaug 2020). Further, these technology users, through their use of and communication about EVs worked to influence the desires and expectations of other Norwegian drivers. Through this work, they were also part of establishing a critical mass of enthusiasts that enabled a new EV market, which in turn made EV production more attractive for international automobile producers.

## Implications of Perspectives from Studies of Ecologies of Participation, Contestation and Orchestration

Through a focus on policy production, research and development and design over the last paragraphs, we have come to see participation as a phenomenon beyond individual choice and individual technology encounters, but rather as carefully orchestrated activities, distributed across an ecology of participatory collectives. Further, we have seen how the technology users have an active role in shaping their own modes of participation, and that they are important for shaping wider spaces of participation, including a potential role as co-orchestrators of the work in other collectives. This analysis has both theoretical and practical implications. Theoretically, the discussion serves to raise some challenges to the multi-level perspective (MLP) (Geels 2002) as the ways participation unfolds through the staging and carrying out of innovation activities, as discussed above, are not easily categorized within a niche-regime scheme. If one interprets the MLP strictly, one would expect transitions in the organization of participation to, above all, grow out of protected or nurtured niches, or through new practices formed in alternative energy communities gradually breaking into and destabilizing regime-level norms and behaviours. However, in the analysis we have conducted, we find that instances of participation are in-fact partially produced and shaped through work of actors that in accordance to the MLP would be considered regime actors (e.g. policy makers, large construction companies, DSOs). Thus, our focus on co-production, orchestration and situated analysis provide a more heterogeneous narrative, where the potential of nurturing desired traits such as participation can be done by a broad range of actors across different levels or domains in society.

The practical implications of this are substantial, but also surprisingly simple. On one level, this discussion highlights the merits of working to link different forms of practice, across collectives, epistemic foundations and through different technologies and objects in innovation endeavours. Our analysis, as the analysis of other STS scholars, suggest that this is currently done too conservatively and that it is too uniformly rooted in dominant understandings of participation (Chilvers et al. 2018). In other words, we find very strong networks of policies, institutions, research programs and new technologies supporting participation as individual consumption and behaviour change, while the collectives around more experimental and radical forms of participation are fewer.

Accordingly, we should not think that simply linking existing policymaking, R&D, design and households would serve to produce radical new forms of participation, or that this would result in participatory practices rooted in new concerns. An ecological understanding of participation opens up a broader understanding of what experimentation in this domain could entail. Such an understanding stresses that experimentation may be seen as something beyond testing new technologies in and around households. Thus, experimentation to increase participation in energy transitions might also entail trying new ways of producing policy, standards and regulations, new modes of working within R&D, and experimental design practices. In other words, we believe there is an active role to be played here for innovation policy. We will return to this point in Chap. 4.

## An Object-oriented Perspective: Material Participation

A potential critique of our focus on participation as a distributed phenomenon is that through re-casting the activities of many actors as participation, we risk losing sight of involved power dynamics. It might be argued against our case that a symmetrical perspective where the activities of citizens, large corporations and policy makers are all understood as different forms of participation, might lead to the conclusion that one should not prioritize any of these groups in the pursuit of democratic legitimacy. Rather than reducing the importance of citizens, our aim here is to elevate their position. The shift from pure individual choice to distributed responsibilities helps us achieve this, as it actually opens for a broader repertoire of action.

An emphasis on technology users has been highlighted in various streams of literature that focus on concepts such as public acceptance or user acceptance of new technologies, public perception of new technologies, and public engagement with new technologies. Such literatures implicitly point to technology users as a barrier to the success of technologies (Karlstrøm and Ryghaug 2014; Heidenreich 2015). As a contrast, the concept of energy citizenship has been put forward (Devine-Wright 2012) to highlight the potential political engagement of citizens in the face of environmental and climatic issues. We believe there is much to be gained by linking the concept of energy citizenship to developments in STS that provide an object-oriented account of the constitution of politics and publics (e.g. Latour 2005; Marres 2016; Throndsen and Ryghaug 2015). In such accounts, publics and issues materialize and are constituted around things that might enable new forms of material participation. Building on this, we propose this as a promising avenue for exploring material energy citizenship (see also Ryghaug et al. 2018).

## Energy Citizenship as Means of Material Participation

The concept of energy citizenship exemplifies the growing strand of research, arguing that energy transitions require active citizen participation and not only passive acceptance (Ingeborgrud et al. 2020). Adding to this, we bring the concept of material participation from STS into this discussion (Marres 2016). Material participation is an 'object-oriented' or 'device-centered' perspective that focuses on the role of technologies and material objects for participation in political matters of concern. The concept of material participation has grown from a body of STS inspired work on 'Dingpolitik' (Latour 2005), highlighting the ways material objects enable the configuration of issues, concerns and publics, thereby potentially producing new ways of representing diverse interests and voices around such concerns. This literature considers publics and issues to be emergent rather than static and highlights the political potential of technologies as objects that might both enact a political reality and intervene in the world (Marres and Lezaun 2011) for example by "enrolling actors such as local communities, governmental organizations and environmental researchers" (Marres 2013, p. 427). Material participation, then, can be thought of as a specific mode of engagement (Marres 2012). Thus, by

linking the concepts of material participation and energy citizenship we have wanted to turn the discussion to the ways new technologies can offer new means of enacting concerns when it comes to issues like climate change and sustainability.

More concretely, material energy citizenship emerges as objects enable the formation of a set of concrete capacities and competences that are in part shaped by the new material realities and technologies. These capabilities are:

- The formation of new forms of awareness
- The formation of new forms of literacy or knowledge
- The formation of new practices and actions

These capabilities allow the formation and enactment of political projects in everyday life (Ryghaug et al. 2018). However, as Martiskainen et al. (2018) has pointed out, there is no determinism in this: one should not confuse the existence of material participation with general assumptions about the social and political potential of certain objects. Instead, technological objects can acquire a range of political capabilities as they become part of different relations, and different configurations. This also suggests that technologies can become mobilized actively in the orchestration work of actors such as policy makers and researchers. To us, this is a hopeful notion because we believe recognizing that objects might have political significance might open new avenues of design and innovation. In what follows, we will look briefly at one example, namely how electric vehicles might enable the formation of a new form of energy citizenship.

## The Co-production of Energy Citizenship in Collectives with Electric Vehicles

At a first glance, electric vehicles might resemble an electric duplicate of its fossil counterpart. It has a similar form and function: it is a car that takes its driver and passengers from one destination to another. Yet, electric vehicles often take on more significance for its owners. For many, the electric vehicle serves to formulate a more active political and practical engagement in relation to energy and climate issues (Ryghaug and Toftaker 2014). Electric vehicles might enable new forms of sensitization or awareness with respect to one's mobility, new types of literacy or knowledge

with respect to energy and climate issues and finally the formation of new practices and new actions. In this way, electric vehicles can facilitate a new form of energy citizenship (Ryghaug et al. 2019).

The constitution of such capabilities is related to the material qualities of electric vehicles, which can be seen at different stages of using the car. Electric vehicles are powered by a battery that needs charging, and the driving range of most EV models is limited compared to petrol cars. In the process of buying an EV, this means that many are immediately confronted with their current driving habits, and the need to reconcile these habits with what EVs allow for. After having acquired the vehicle, many EV drivers need to incorporate new attentive practices, such as monitoring battery levels and planning when and where to charge, in order to make the vehicle function in everyday life (Ryghaug and Toftaker 2014; Ingeborgrud and Ryghaug 2019). Trips must also be planned according to battery status and the availability of charging infrastructure. Thus, once purchased, the EV, with its batteries and charging infrastructure, enters into collectives of mundane mobility, materializing the issues of energy scarcity and mobility needs, typically constituted through visual displays in the car that indicate battery levels and remaining driver distance or mobile phone apps providing similar information. At a practical level, EV drivers might become sensitized to minute-by-minute electricity use while driving. In turn, this allows for self-evaluation of the efficiency of driving styles and opens for experimenting with new driving styles to increase energy efficiency (Anfinsen et al. 2019).

These material qualities of EVs can serve to problematize current mobility habits and for some open up for evaluating understandings of normal mobility patterns and driving ranges, as well as more active engagements with mobility alternatives such as biking, walking and public transport (Ryghaug and Skjølsvold 2019). In some instances, the introduction of EVs and the actualization of availability of electricity and infrastructure as important issues have amplified an interest in participating in other energy transition activities such as improving home energy efficiency or local energy production. Some EV drivers' for instance, take an interest in acquiring in-home battery technologies or local micro-production of electricity such as solar panels (Ingeborgrud and Ryghaug 2019).

In Chap. 2, we discussed how new institutional links between the renewable energy industry, the transport industry and the ICT industry have opened a new strategic action field, where new modes of innovation might unfold (Canzler et al. 2017). Our discussion here illustrates how

links between renewable energy and transportation can also provide impulses for change in the everyday life of ordinary households. Hence, what we see here might resemble a mundane form of sector-coupling, pointing towards the importance of new modes of action amongst such ordinary householders.

In sum, EVs can represent a material and discursive actualization of climate and environmental issues. As such, acquiring and driving EVs constitute a tangible way to act upon the climate change issue for some, through more environmentally oriented consumption. However, electric vehicles also take on other roles, which are important for the formation of energy citizenship. Electric vehicles frequently become contested, and their sustainability has been subject to substantial public controversy (Ortar and Ryghaug 2019). For many, these controversies become yet another way to participate in transition activities. Many EV owners report that they are often forced to defend their transportation choices, hence engaging in everyday deliberation over how a future transportation system should look, in ways they would never have to if they drove a petrol vehicle. Some report "reading up" as a deliberate strategy of planning for such encounters. Armed with new knowledge, some become active proponents of environmental arguments in their local communities, promoting electric mobility, but also other ways of participating in energy transitions.

Above, electric vehicles have been discussed as a technology that may evoke material participation and energy citizenship. Other objects and technologies such as solar panels and in-home displays and feedback systems have also proven to have similar qualities in certain contexts (see Ryghaug et al. 2019 for more on this). However, there is no determinism in such technologies producing participation. Further, participation does not automatically lead to justice. While an electric vehicle can be constitutive of energy citizenship, electric vehicles are also, for many, expensive, and hence provide a means to participate for those that are already well-off. A challenge, therefore, is to mobilize the dynamics of material participation not only around luxury items for the few, or in wealthy countries, but to actively work to produce a material reality that caters for broad and socially transformative material participation.

Summing up, energy citizenship consists of a set of concrete capacities and competences: the formation of new forms of awareness, the formation of new forms of literacy or knowledge, and the formation of new practices and actions. This avenue of research illustrates the benefits of not thinking of publics only as pre-existing entities formed around discrete or

pre-defined issues. Instead, things, devices and technological objects can constitute issues such as those related to climate change and environmental issues. They can produce new ways of engaging with the world, and hence there is a need for broader scholarly engagement with the role of objects in producing citizenship. This is important also for actors who orchestrate participation through new devices such as smart energy technologies. These actors tend to frame and orchestrate participation as consumption. Material participation and energy citizenship suggests that a much broader repertoire is possible and that we should focus more on object issue-oriented publics, who come into the political arena to take part in constructing scientific and technological futures (Marres 2007; Stilgoe et al. 2014; Ryghaug et al. 2019).

## Pilot Projects and the Production of Collective Energy Citizenship

The above discussion and the literature on material participation and energy citizenship have tended to focus on the potential of mundane objects that internalize and enable action primarily within and around individual households. Examples are electric vehicles, solar panels and smart energy meters (Throndsen and Ryghaug 2015; Ryghaug et al. 2019), eco homes and mobile phone chargers (Marres 2016). Our focus on pilot and demonstration projects allows us to make expansions to arguments that have been made within this arguably device or 'gadget centred' literature.

We will now expand on the concept of material participation and energy citizenship, by looking at an example of how the socio-technical configurations of pilots might enable new forms of citizenship. In doing so, we are amongst other things able to discuss how the capacities and qualities of specific places not only serve as resources for pilot project innovators, but as reservoirs of potential political issues around which engagement might form. This indicates, on the one hand, that the material, cultural and practical specificities of places might be generative for innovation, and that the same capacities can serve as basis for sketching out explicitly political technoscientific endeavours. Hence, energy citizenship is potentially a more collective phenomenon which does not only depend on the relationship between technology user and technology/gadget, but which is also shaped by the broader material and institutional setting of pilot and

demonstration sites. Hence, we expand on insights which highlight the link between systemic innovation and resonance with political realities of everyday life and mundane experience.

The gradual shift from centralized and fossil-based production sites to more decentralized and distributed systems based on renewables will likely make electricity production a mundane matter for increasing numbers of people, as discussed in Chaps. 1 and 2. This may create new types of interaction between traditional energy suppliers and citizens, producing new roles and actor constellations throughout the system. This type of decentralization will typically include new modes of renewable energy production (microgeneration), micro grids, local storage solutions, automation, feedback technologies (such as energy displays) and combinations of such technologies (Parag and Sovacool 2016; Skjølsvold et al. 2018; Ryghaug et al. 2019). Can these dynamics feed into the formation of new types of energy citizenship and material participation?

## The Material Political Dynamics of Shared of EV-charging

One example of how this development can unfold in practice can be found through following the Norwegian EV-transition. On the one hand, this development entails implementing electric vehicles. We have discussed this development in Chap. 2, as well as in the last section of this chapter. Here, we are interested in aspects of this transition beyond the immediate situation of driving and buying a car, and rather zoom in on what is arguably the emergence of a new form of systemic material form of participation and politics which forms around the charging of EVs. This exemplifies that introducing EVs at large scale represents a systemic change affecting different sectors as well as affecting the institutional organization of social life.

Here, we are particularly interested in the relationship between EV implementation and changes in the electricity grid. Electrification of transport entails increased electricity demand. Historically such challenges have been addressed by expanding the electricity grid and the electricity production capacity. Today it is has become just as common to address this issue by working to transform the character of the electricity demand, typically thorough smart charging technologies aimed at providing more flexible timing of EV-charging. In the Norwegian case, the dynamics of implementing flexibility are arguably creating a new form of localized

politics around the implementation and use of such charging infrastructures. This is particularly visible in areas that are organized as a form of condo or collective housing, which is a quite common form of home ownership in Norway and the other Nordic countries. In such arrangements people own the apartments, while buildings and other infrastructure such as parking, garages and other outdoor spaces are typically owned communally, often managed by an elected board of housing representatives.

Over the last years, such housing condos have seen a massive influx of EVs. This indicates that EVs are in the Norwegian case no longer a niche for the wealthiest. The EV-surge, therefore, provides a means of participating in the energy transition, and serves as a potential enabler of mass individual energy citizenship. On the other hand, the influx of EVs have also enabled a more collective form of energy engagement in such areas, because implementing charging infrastructure is subject to collective forms of decision-making. Garages and parking spaces are often a scarce resource and part of the shared community space in condos and apartment buildings; this means that expenses related to these infrastructure arrangements are typically also shared among dwellers. Similarly, local electricity grids are often pressed for capacity, which means that many neighbourhoods are forced to take an active stance towards local electricity grid management. This means the influx of EVs also transforms the role of actors that in the past have not been engaged or interested in energy issues—inhabitants and elected boards now become central in making decisions about the implementation of new, complex energy infrastructures.

On one level, this issue may be seen as a quite straightforward infrastructural capacity problem on how to ensure that enough power capacity is available to charge all EVs that are connecting to electricity grids. Smart charging has been pointed out as one solution to these capacity challenges, and is currently being implemented by pioneering neighbourhoods, that for our purposes serve as, what we in Chap. 2 discussed as geographically bound pilots. In what follows we will discuss the emergence of one such pilot, by enquiring about the resources mobilized and processes of legitimation, as we did in Chap. 2. Here, however, we emphasize the emergence of a new network of material and discursive elements, and the way that this pilot re-configures the local material-politics of energy transition participation.

## The Role of National Legislation in the Orchestrating New Material Political Dynamics

While we emphasize the material aspects of EV charging, national legislation has played a key role in the shaping of the new material political dynamics. First, national policies have been important for establishing Norway as a national EV laboratory (Skjølsvold and Ryghaug 2020), as discussed in Chap. 2. Here, however, we are more interested in the way that the national legislation has pushed EV charging from being a purely individual responsibility towards becoming recognized as a more collective challenge, and through this arguably orchestrating potential ways of participating beyond the individual. In early phases of the EV introduction, most EV owners in shared garage spaces simply used available electricity wall sockets. This resulted in increased fire hazards, and with time, also a lack of power capacity in some garages. The consequence was that many apartment buildings banned EV charging in shared spaces, thus effectively making EV ownership difficult. This made the headlines of local newspapers around the country, describing new conflicts between EV owners and elected boards of such neighbourhoods, signalling the emergence of a new form of local political battleground around the practices of EV charging.

These localized battles between EV owners and elected boards were echoed in parliament, where Norwegian politicians now realized that, in an unexpected way, the actions of these community boards had become what they perceived as a barrier to further advancing electromobility. Striving to counteract such movements, in 2018, parliament passed a new law, which essentially requires boards to facilitate for EV charging. Though this act, elected boards of such neighbourhoods were given the formal responsibility of standardizing and harmonizing charging solutions locally. Hence, the national legislation transformed elected housing boards into key actors in the production of future local energy systems.

## Promoting Smart Charging Through Highlighting Values such as Fairness and Equality

The contemporary material politics of smart EV charging has been shaped in part through national regulations, and in part through experiences generated through interaction between individual homeowners, commercial actors and consulting electricians who work within the field. These encounters have been and continue to be central in shaping the material politics of smart charging. In the early phases of EV implementation in Norway, EV owners would contact professional actors to install private chargers. Many electricians and professional actors in this field, however, quite early recognized that these assignments had broader and systemic implications, and that there was a distinct political quality to the work they were doing. These actors articulated that the power capacity of shared garage spaces could be understood as a form of common good or 'a common pool resource' (Ostrom 1990; Wolsink 2012), which needed governance and regulation due to escalating peak loads and capacity problems. This meant that they recognized the fact that immediate individual needs and desires for installing electricity chargers should be suspended somewhat to cater for the needs of future collectives of citizens.

Amongst professional actors, such as consulting engineers, and especially electricians, it became an outspoken ambition to raise the awareness amongst housing boards and inhabitants related to needs concerning the electricity grid. Through these articulation processes, these actors were key to enabling local material politics of smart charging through actualizing the grid as an object of concern for more actors. Hence, they mediated and enrolled elected boards and citizens on behalf of the grid, which illustrates how material publics and material politics emerges through the work of a range of human and non-human actors (Chilvers and Kearnes 2015). A key point here is that this work did not primarily entail attempts to educate boards about technicalities of electricity grids and smart charging. Rather, the issue tended to be framed in terms of values and principles of equality and fairness that often was metaphorically linked to the political systems that different constellations of garages, electricity grids and electric vehicles were seen to emulate.

Thus, electricians who were operating in what has been defined as the second stage of the Norwegian EV transition (Ryghaug and Skjølsvold 2019) where EVs became mainstream expressed this sort of care, both concerning the grid, and for the communities served by the grid. For

them, implementing a planned and structured system was considered a key to realizing equity and fairness, which were framed as being the opposite strategy of "infrastructural anarchy". Consulting engineers and electricians who worked either for their own firms or the electricity industry saw themselves as promoters of such ideals and worked actively to enrol other actors such car dealers in the promotion of planned and smart charging technology. These actors were key in orchestrating the participation of housing boards, who were enrolled primarily by the translation of material constraints and peak load electricity problems into tangible community concerns such as equity and fairness, which could be addressed through implementing smart charging.

## Citizens and Elected Housing Boards Co-producing Material Participation

The actual implementation and standardization of such technologies is the responsibility of housing boards. Such boards tend to be comprised of individuals with a wide range of social backgrounds and competences. Through the influx of EVs the electricity grid is actualized as an object of concern for such management boards, as well as for many of the inhabitants of such neighbourhoods. One example of how the political dynamics might unfold can be found in the largest neighbourhood of this type in Norway, consisting of 1113 units. At the time of our study, the neighbourhood had installed 55 EV charging points. The adoption of EVs increased rapidly, however, and there was a strong pressure from residents to increase the capacity and to install more chargers. About 60 tenants in the community were on a waiting list for acquiring an EV charging point, and the board was frequently petitioned to increase the power capacity. Hence, EVs actualized an interest in engaging more actively with grid issues. After a lengthy dialogue with a local electrical engineer as well as the electricity provider and grid operator, the board decided to install 765 new smart EV charging points with a centralized load management system intended to minimize peak loads.

The board was convinced that introducing smart EV charging with load control would both ensure fair access to electricity and charging. Hence, they decided to work to anchor this decision amongst residents through voting over it at a general meeting. This illustrates how the board's sensitization to the grid had catered for an appreciation of the grid

as a common pool resource (Wolsink 2012), and further, raised the need for producing a legitimate form of governance of electricity grids through smart charging.

First, they produced a vision in which smart charging was part of a broader set of infrastructural upgrades that would improve the quality of the urban residential community. Hence, making the area attractive for EVs was seen as a way to raise the value of the residential area in general. Further, the board invited a series of actors from the electricity sector to the meeting. These actors were mobilized to make the case that smart charging would be a good solution for the residents, but also to discuss what was the most suitable solution and the needs for charging with the residents. The electricity sector actors used the occasion to speak on behalf of the grid, and to articulate how the 'state of the grid' depended on the ways that the residents live their lives and use electricity. A key aspect here was illustrating that the grid was too weak to handle the new EV charging demand. The actors present at the meeting gave presentations that also concerned trends within electricity provision, expected developments in the future, as well as potential consequences for the urban residential communities of the different choices they could make collectively (installing shared smart charging vs. not installing). There was also elaborate room for questions and answers, which also extended more broadly into discussions about the role of urban residential communities in sustainability transitions.

In effect, the meeting became what Martiskainen et al. (2018) have called a material and discursive space of diverse voices, which enabled a new form of engagement with social and material aspects of the grid. This space, the presence of these diverse voices and forms of competences, as well as the materiality of EVs and the grid itself became part of an ecology (Chilvers et al. 2018) through which awareness, new knowledge and new practices could be constructed. Thus, one of the consequences were the increased attention to key aspects of energy use, and hence the emergence of a more collective form of energy citizenship than discussed earlier in this chapter. Hence, the influx of EVs into this urban residential community generated a new form of material politics, where sensitization to aspects of the electricity grid on behalf of a range of actors was key. The elected community board became champions for a relatively complex system of smart charging. The discussions about smart charging spilled over into discussions about equity and fairness, for example with respect to equal access to electricity for all across both time and space and the idea of

capacity as a common good, but also about broader visions for what role this urban residential community should be in future society and energy system. Here, focus was that technologies such as smart charging could provide new benefits to the community. Finally, this process illustrates that material participation here, transgressed the domestic sphere where it has most frequently been analysed (e.g. Marres 2016; Ryghaug et al. 2019), to take the form of a formally organized democratic process through which a decision of implementing the technology was reached collectively.

## Conclusion: Orchestration, Participation and New Collective Material Politics

In this chapter we have sought to open participation as a phenomenon within and around pilot and demonstration projects. In sum, our observations add to an understudied aspect of energy and mobility transition discussions. There has been a tendency in the research literature either to focus on aspects of pilot projects and demonstration projects that point towards top-down implementation, or to focus on bottom-up processes as a key mode of participation. These literatures are often linked to quite different discourses: on the one hand, the focus on top-down processes links to ideas about a neoliberal or post-political order, where control over critical infrastructure is moved from public and political institutions to private and economic actors under the pretence of empowering citizens or governments to make more active and better decisions. On the other hand, the focus on bottom-up lends itself to ideas about new forms of democratization, inclusion and decision making.

In contrast, our discussion in this chapter illustrates how bottom-up and top-down seemingly co-exist, in the same cases and in the same sites, but where focusing on the material objects provides new ways of seeing the formation of issues and publics. First, we have highlighted that the work to materialize visions of future technoscientific realities through making pilot and demonstration projects not only produces technologies that citizens can accept or reject, but that they inherently produce or orchestrate different modes of participation. A central aspect of this is that pilot and demonstration projects do so not only for citizens but for a range of actors. Hence, working to advance certain technoscientific realities is a form of material participation, which in turn produces conditions for the

participation of others. This illustrates the way innovation is a political activity: it shapes our understanding of potential futures, it shapes our opportunities of acting within or towards such futures and it re-configures the roles and competences of a wide ecology of actors. In future research as well as for improving practice, it is central to understand better how such conditions are orchestrated, and how one can work to orchestrate the participation in more diverse and inclusive ways.

In this chapter we have been especially interested in the ways that objects and technologies might enable new forms of material participation, or what we have called energy citizenship. To recap, energy citizenship entails that engagement with objects are productive of new forms of awareness, new forms of literacy or knowledge, and the formation of new practices and actions with respect to energy issues. These traits of energy citizenship point towards the merit of relatively open forms of orchestration, that seeks to identify broader repertoires of action than those that are anchored in for example accept/reject dichotomies, or choices of consuming/not consuming. Seeking to build on traits such as learning, working together, building competence and new ways of acting seems promising, but there is a need for a much more systematic assessment of which modes of participation exists and how technologies can be produced and shaped to cater for this potential diversity.

Further, this chapter has hinted at how one can envision the formation of more systemic forms of material participation, which are enacted beyond individual households or beyond objects and "gadgets". We see great promise in this approach. For instance, we have discussed how the relationship between electric vehicles and the energy system has opened for a wider actualization of the electricity grid as a political object: one that can be mobilized and enrolled into a range of issues that perhaps do not intuitively stand out as related to EV charging. We have observed how such infrastructures, when made part of mundane discussions, indeed enable both awareness, knowledge and new practices and the way these articulations may be translated into participation both with respect to the energy system, and with respect to wider related political discussions about how to transform local communities into more fair or just communities with respect to energy.

In sum, this Chapter points towards a wide ecology of actors shaping participation, and the links between developing pilot projects and developing broader societal projects. This suggests an increasingly important role for social science and STS in deepening our understanding of and

stressing the central role of science and technology in the making of democratic life (Laurent 2017; Jasanoff 2005); the implications of innovation and technology development for the orderings of society. While we have pointed towards some promising routes for thinking anew about the relationship between technology and participation, current dominant logics of innovation and technology development tends to (re-)produce technologies that open for very limited forms of participation. Technology development and innovation processes are still most often rooted in ideas about participation through market mechanisms and consumption, which means that as a whole, the current deployment of pilot and demonstration projects cannot necessarily be described as a democratic development. Rather than seeking to tweak or optimize this system, we believe there is a need to systematically re-think current research and innovation systems and policies. Research and innovation systems and policies should not only be more transparent and nurture new types of technologies. They should more actively seek out to nurture and experiment with social forms and more open forms of participation. This will be discussed in greater detail in the next chapter.

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