RESEARCH ARTICLE

From dispersed practices to radical socio–technical imaginaries: the role of action labs for supporting collective energy citizenship

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How to engage diverse groups of people in the energy transition in Europe is a pressing issue, one that requires grappling with the role of collectivities and social change dynamics. Based on the results of multi-form Citizen Action Labs (CAL) in four European cities, this article details the different ways in which energy citizenship was practised, drawing from an analysis

of survey and workshop data, national reports, and exchanges between research team members. From tiny houses in Overhalla, renewable energy production in Berlin and citizen-led action plans for the climate in both Città di Castello and Geneva, the CALs had different objectives, but all revealed how citizens, research teams and local partners engage with technical solutions, as an established socio-technical imaginary, as well as sufficiency measures and collective political action, as emerging and more radical socio-technical imaginaries. We introduce 'dispersed' practices, such as planning and imagining, as central to collective forms of action, and differentiate individual action from collective action in relation to complexity, defined as increased coordination. We demonstrate how citizen collectives are limited by more complex dynamics, such as existing infrastructures or regulations. In the conclusion, we highlight what measures could be taken to further support collective energy citizenship in the future.

Introduction

The European Green Deal requires massive investments in renewable energy capacity and energy efficiency improvements by 2030, yet the Intergovernmental Panel on Climate Change (Pathak et al, 2022) also calls for sufficiency measures, or an overall decrease in energy demand. Citizens have a role to play in relation to all three measures: investing in and producing renewable energies; prioritising more efficient energy usage and technologies; and decreasing energy usage. But these forms of engagement fail to reach a greater part of the population. For instance, community energy production attracts mostly elite populations (Radtke and Ohlhorst, 2021). In addition, citizens are often seen in their role of individualised consumers: more work is needed to understand how diverse citizens might be engaged collectively – beyond individualised household energy production and usage – in supporting profound and necessary social and economic transformations.

A growing literature is calling for new forms of citizen experimentation with democracy, such as citizen forums, or the political representation of future generations (González-Ricoy and Gosseries, 2016; Smith, 2021). Such forms of experimentation are increasingly being applied to climate issues and the energy transition, with citizen forums emerging across Europe (Willis et al, 2022), for example, Climate Assembly in the UK, the French Citizens' Convention on Climate, the Klimarat in Austria, Bürgerrat Klima in Germany. There is also a growing literature that points to the quality of deliberation, not solely towards consensus-building among citizens, but for drawing out political contestations and agonistic expressions of citizenship towards realising the radical ambitions of such democratic innovations (Curato and Niemeyer, 2013; Machin, 2023). In parallel,

living lab methods are increasingly being used in the energy transition to create sustainable impact in real-life settings. For example, over 300 households in Europe experimented with reducing their indoor heating in the winter of 2019 in energy living labs (Sahakian et al, 2021).

In this contribution, we analyse the results of four Citizen Action Labs (CALs), or spaces where energy citizenship was explored in a co-creation process that involved researchers, citizens and partners from local institutions. By energy citizenship, we refer to all the ways in which people engage and act as citizens in the communities and societies in which they are based – irrespective of their legal status – to bring forward an energy transition. Rather than focusing solely on energy production, distribution and consumption, we explore different ways in which people engage with energy in society. Energy citizenship in this article thus pertains to the ways in which energy production, distribution and usage is discussed, planned for, organised or imagined. We use the notion 'action lab' to suggest a space where active practices of energy citizenship can be experimented with, without adhering to any strict definition of what is a 'living lab'. While much of everyday life is based on habits and routines, these 'action labs' created a space and time that encouraged reflexivity and deliberation around the role of citizens in the energy transition. As such, the labs allowed participants (including researchers and partners) to deliberate around emerging socio-technical imaginaries – those that are less dominant in society. What is potentially 'radical' about these experiences is twofold: they encouraged people to hone skills in 'dispersed practices' (such as planning, communicating, organising), and to imagine ways of moving beyond the level of individual action, to work at the level of collective action and increased complexity in an energy transition.

The four different CALs took place in Germany, Italy, Norway and Switzerland, and are not intended to be representative of energy citizenship in any given community in the European Union (EU), but rather serve to reflect the diverse ways in which such practices can play out. The specificities of place are central to the energy transition, in recognising that any practice is contingent upon existing knowledge, understandings, know-how and material arrangements that are collectively constituted and embedded in specific spatial-temporal settings (Schatzki, 2019). With energy as the main theme of the CALs, the outcomes of the labs naturally reflect local conditions, as well as global preoccupations such as climate change. For example, different countries in Europe have already laid out diverging priorities for the energy transition, with dependence on nuclear in one context, and the promotion of renewable energies in another. Building on the premise that participating in the energy transition should reflect diversity and emerge from processes of co-production (Chilvers and Longhurst, 2016), the action labs were agnostic when it came to what solutions were proposed. In this contribution, we focus on the process and outcomes only as they relate to how citizens understand and experiment with change, and how such understandings reflect dominant or alternative socio-technical imaginaries, with a sensitivity to place-specific knowledge.

The main aim of this article is to understand how energy citizenship can be further supported. We achieve this aim by describing how energy citizenship, involving dispersed practices, plays out in four action labs, and in what way (radical) socio-technical pathways around collective change were imagined by participants. In the next section, we introduce our conceptual framework that focuses on social practices, imaginaries and the role of deliberation. We then present our methodology, and

continue with our results; first, describing the action labs, to then discuss how the action labs challenged or supported dominant socio-technical imaginaries around the energy transition, beyond technological and individual change. We end with reflections on how to further support collective forms of energy citizenship.

Conceptual framework

Social practice theories aim to overcome the dichotomy between social structure and individual agency: it is the practices – the doings and sayings – that are central to social life. Much ink has been spilled on energy-using practices that take place in the home, such as keeping warm, cooking or doing laundry (see, for example, Halkier, 2009; Gram-Hanssen and Georg, 2017; Mylan and Southerton, 2017). While Schatzki (2019) bundles together practices and material arrangements, Shove et al (2012) provide a more compact definition of practices as made up of material arrangements, meanings, and skills and competencies (Shove et al, 2012). Agency, defined by Ortner (1989), is the capability or power to be the source and originator of action. When considering any given practice, 'agency' can be seen as distributed between these different elements of practices; a change to the practice might occur when more than one element is changed (Sahakian and Wilhite, 2014).

Performing an energy-using practice in the home, such as doing the laundry, requires certain competencies, such as airing out clothes or removing stains, but also the availability or not of a laundry machine in the home, and collective understandings of what is clean or dirty, all of which affect how that practice plays out. Yet there are other practices that prefigure how laundry is done, in the ways in which machines and homes are designed, how meanings around cleanliness are normalised by the advertising industry, the availability or not of certain forms of energy, or work–leisure time arrangements. For Schatzki, prefiguration denotes some 'bearing of the present on the future' (2019: 43), but it also *qualifies* future possible actions. Prefiguration makes future actions more or less desirable; easier or harder to perform; more or less energy intensive. A laundry machine that does not have a cold wash feature prefigures how energy is used for laundry in the home, for example.

The example of 'doing laundry' is not the most significant energy-using practice in the home, but it is performed and coordinated at both personal and societal levels (Mylan and Southerton, 2017). Nonetheless, doing the laundry is quite different as a practice from designing a laundry machine. The notion of complexity becomes useful. Schatzki provides a distinction between simpler and more complex social phenomenon: the latter are 'composed of more practices, arrangements, and relations than simpler ones are' (2019: 135). Doing the laundry might happen in parallel to preparing a meal, with one or two people coordinating those practices. But designing a laundry machine requires the coordination of many practices at the same time, with more complex skills and competencies, involving more complex processes. We introduce the notion of coordination to define complexity as necessitating an increased coordination between practices, but also between different skills, materials and meanings. In Figure 1, we illustrate how a practice can be prefigured by other practices, going from more to less complexity. It would be difficult for the same group of citizens to have agency over all the practices that prefigure doing laundry in the home.

Figure 1: A sample of practices that prefigure how doing the laundry could be performed in the home
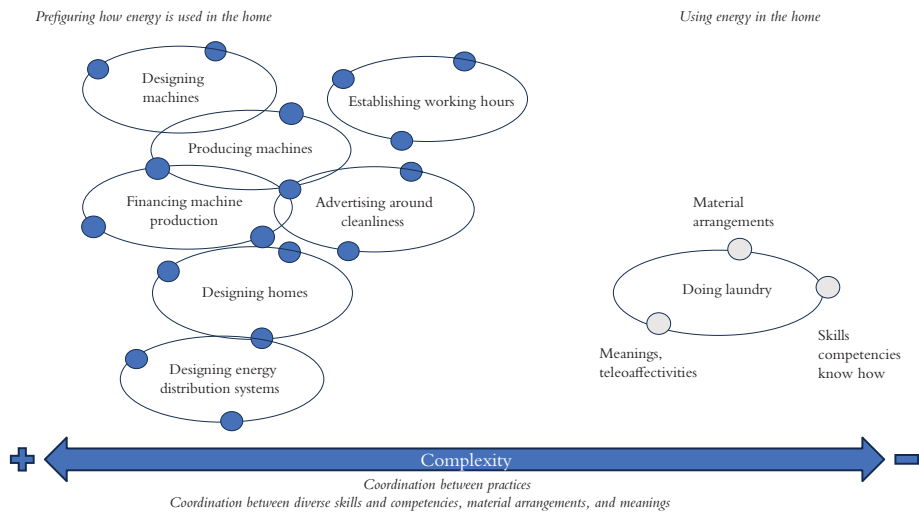
What does this imply for energy citizenship as a practice? Engaging in energy citizenship is also more complex than doing the laundry. Not only does it require different skills and understandings, in relation to systems of energy production and distribution, but it also involves a future-oriented posture: organising, planning, designing all tend towards an aim, and can prefigure how energy will be used in the future. People as individuals can play a role in the energy transition by voting, by producing renewable energy at the household level, investing in more efficient appliances, or reducing their energy usage. We see these as practices that involve coordination with other household members and perhaps energy system providers, but that are not as complex as coordinating between several households on how energy can be produced and consumed in a region, or indeed, planning for future ways of reducing energy usage collectively. When people come together to bring about change as a collective, a more varied set of skills and competencies are brought into the picture. Different 'ecologies of participation' are manifest (Chilvers and Longhurst, 2016), beyond what an individual household can perform.

Schatzki (1996) provides a useful distinction between what he calls an 'integrated practice', such as doing the laundry, and 'dispersed' practices, such as organising, planning, deliberating or imagining. Such dispersed practices are represented by action verbs and are tied to a certain mastery or competency to do something. When it comes to running an Environmental Ministry, such dispersed practices might involve higher degrees of coordination than organising a town hall meeting. Both practices imply precise skills but while most people learn how to perform certain 'integrated' practices, like doing the laundry or preparing a meal, not all people are trained to perform the practice of 'energy citizenship', defined as the ways in which energy production, distribution and usage is discussed, planned for, organised or imagined. In Figure 2, we illustrate the kinds of dispersed practices that people *could* perform in coming together in collectivities, and how they might influence the dispersed practice of 'using energy in the home'. Deliberating, planning and implementing

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Figure 2: How 'dispersed' practices might affect how 'using energy in the home' plays out: example of laundry
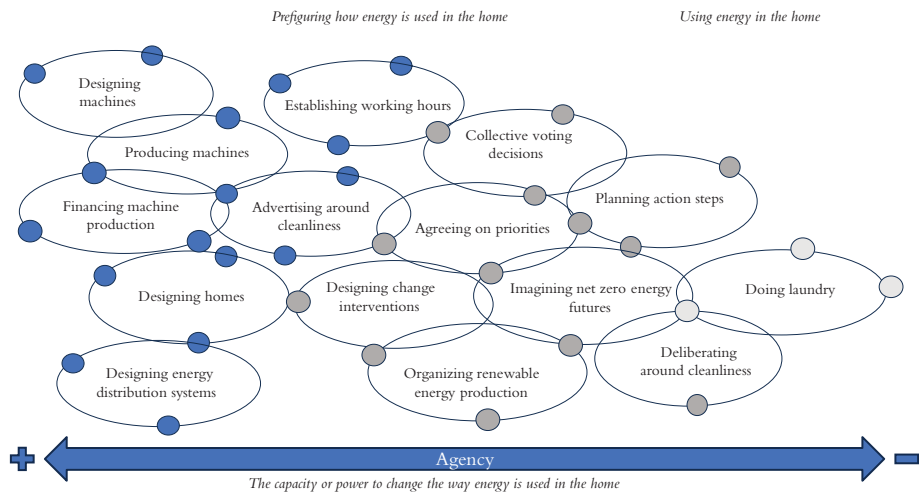
change might affect the types of energy used, but also the shared understandings of why it might be important to reduce overall usage, for example, by doing less laundry. Thus, the agency or capacity to affect how energy is used in the home is increased and made more accessible to groups of citizens. Warde (2017) suggests that, in consumption studies, there has been less research on dispersed practices, such as planning, organising or imagining. We see this study on energy citizenship as contributing to that gap.

In their study of community empowerment in the energy transition, Coy et al (2022) found that developing knowledge, skills and the capacity to work together was essential. But practices also involve shared understandings of how the energy transition ought to play out, or what Schatzki (2019) calls 'teleoaffectivities' – a combination of shared goals and affects associated with those goals. A teleoaffectivity can be related to the concept of a 'socio-technical imaginary', which Jasanoff and Kim define as 'collectively held, institutionally stabilized, and publicly performed visions of desirable futures, animated by shared understandings of forms of social life and social order attainable through, and supportive of, advances in science and technology' (2015: 6). Socio-technical imaginaries are manifest in political decisions, investments, media discourses or degrees of inclusion of certain actors, reinforced by material and institutional arrangements. For example, the transition to renewable energies in Germany is part of the socio-technical imaginary that carries with it positive teleoaffectivities around renewables as desirable.

When it comes to understanding what role citizens might play in an energy transition, we posit that existing socio-technical imaginaries are quite limited: people are treated as individuals who must change their behaviour, by reducing their energy usage, taking up more efficient technologies or, more recently, investing in renewable energies. This is reflected in how most energy initiatives aimed at households frame their 'solutions' for bringing about change (Jensen et al, 2019). Research in Switzerland has found that dominant socio-technical imaginaries on social change in

the energy transition tend to focus on the role of technology as a silver bullet solution, but that alternative imaginaries are emerging around more collective and collaborative forms of action (Hirt et al, 2021). How such imaginaries might be performed as a dispersed practice is one key focus of this article; we describe how CALs contributed to different imaginaries, in spaces of deliberation. We do not presume that citizens coming together with researchers and practitioners will necessarily lead to immediate consensus, but rather that these spaces allow for tensions to emerge. Following Machin, it is through rupture and agony that 'alternative pathways, perspectives, and coalitions on climate change can circulate, align and consolidate' (2023: 861). We also do not presume that deliberation leads directly to changes in energy usage, but rather we suggest that the CALs allowed for the honing of diverse dispersed practices that could support energy citizenship, such as planning, deliberating, imagining, among others.

Given the theme of this special issue, the notion of *radical* socio-technical imaginaries is relevant to the practice of energy citizenship, as it implies that the usual approaches to planning energy usage will not suffice – when it comes to the urgent need to change current patterns of energy usage. There are many ways of treating the notion of radicality. Our work is inspired by Castoriadis (1975), on how the emergence of new imaginaries can contribute to 'radical discontinuity'. While each historical period has its own singular way of living, seeing and making its existence, through mental constructs, images and ideas, such images are not only shaped by a given socio-historical context (arguing against Marx's more deterministic reading of the weight of history), but can also bring about change. The emergence of alternative political imaginaries is a fundamental precondition for substantive political transformation (Jasanoff and Kim, 2015). These novel conceptualisations function to 'defamiliarise' the current political landscape, revealing the potential for alternative social configurations (Death, 2022). It is crucial to distinguish this process from the deliberate or conscious selection and imposition of specific imaginaries by dominant actors. Rather, these imaginaries are shaped, perpetuated and challenged through a dynamic interplay between diverse agents and institutions, encompassing government agencies, social movements, journalistic discourses and scientific explorations (Milkoreit, 2017).

This article provides evidence for how diverse groups of people can experiment with and coordinate the dispersed practices that make up energy citizenship, understood as the ways in which energy production, distribution and usage is discussed, imagined, planned for, organised or used, but also prefigured.

Methodology

Four CALs around energy citizenship took place in Switzerland, Norway, Italy and Germany, reaching a total of 459 people. In Norway, the CAL was located in a small, rural community in the north of Trøndelag county, addressing interlinked challenges concerning energy consumption across domains. In Germany, citizens from Berlin were invited to co-creatively reflect on participation in energy production, with a strong focus on the diversity of prosumers by working together with migrant communities, family centres and social initiatives. In Città di Castello, the implementation partners – the social department of the city of Città di Castello, the Catholic charity Caritas and the third-age association UniTre – recruited a group of elder citizens, single mothers and immigrants, with an emphasis on facilitating the emergence of energy imaginaries among people distant from the ecological

transition discourse. In Switzerland, the CAL took place in a suburban area, grouping together the wealthy neighbourhoods of Collonge-Bellerive, Choulex, Meinier and Vandoeuvres. The main aim was to devise a local climate action plan that could be implemented by citizen collectives. For each CAL, recruitment methods differed towards the aim of gaining a diverse sample within the target audience (that is, from migrant communities in Berlin to wealthier households in Geneva). These ranged from working with local associations as gatekeepers, to promoting the workshops in local papers, post offices, or on social media, among other mechanisms.

The variety of CALs addresses a knowledge gap regarding the energy transition in rural populations (Naumann and Rudolph, 2020; Skjølsvold and Coenen, 2021), the complexity of urban energy systems (Bögel et al, 2021), as well as the unique needs among 'hard to reach' groups such as migrants (Komljenović, 2022), the elderly (Lepetit et al, 2022) and wealthy populations (Sahakian, 2017; Johnson et al, 2020). All the CALs emphasise the importance of place-specific knowledge and practices concerning energy citizenship.

The CALs were designed as a co-creation process, drawing on a set of methods that engage stakeholders not as research subjects, but as partners who are 'experts of their experience', facilitating ongoing interaction among participants (Labib et al, 2023). The different stages of each CAL are illustrated in Annex 1, and an overview of socio-demographic information for the pre-CAL survey is presented in Table 2. The CALs involve participants made up of scientific actors (the research team), local institutional actors (representing municipalities, associations, the private sector) and citizens. The interactive approach was designed to reflect needs and practices that are specific to places and communities. In some instances, the research team had a pre-existing idea of what low carbon solution might be put forward, but in all instances, pre-existing expectations were either challenged or further developed by all participants, as will be discussed in the results. In addition to data produced by participants, each research team followed a common reporting template and produced a comprehensive report of their CAL based on their analyses of the different sources of data (see Table 1 for an overview). Socio-demographic data was gathered from a recruitment survey (N=123; see supplementary material, Annex 2).

Planning the action labs started in 2021, and the active phases varied (see Table 1 and Annex 1). Most CALs were affected by the war in Ukraine and rising energy prices in Europe. Note that duration refers to the 'active' phase of the CAL, when citizens were most solicited; the planning phase lasted several months, starting in 2021, and in some CALs, action is still ongoing at the time of this writing, beyond what the research team originally planned for.

There are several limits to the research. Based on the results of a recruitment survey, participants who were there at the start of the CALs all consider energy and climate issues when voting, and a majority participate in environmental activities or voluntary associations. This reflects a certain bias: most people who participated in the CALs are already interested in the energy transition, although their reasons for participating vary. In Norway and Switzerland, participants were primarily interested in their local community, as well as on nature issues (Norway) and wellbeing (Switzerland). Taking part in an action lab also implies that you have the time and capacity to do so. Each lab addressed this issue in a specific way: for example, in Geneva and Germany, childcare services were offered to attract young parents. In the Norwegian action lab, young professionals were permitted by their employer to take time off during their workday

Table 1: Overview of the four CALs and data gathered

Column 1	Column 2	Column 3	Column 4	Column 5	Column 6	Column 7	Column 8	Column 9
Key information				**Data gathered**				
Location	Duration	Events	Co-creation	Recordings	Transcripts	Notes	Recruitment survey	Report
Berlin, Germany	7 months	5 events (49 participants in total)	8 local partners	✓	✓	✓	N=32	✓
Città di Castello, Italy	8 months	3 events (42 participants each) plus a final town hall meeting (75 participants)	3 local partners	✓	✓	✓	N=42	✓
Overhalla, Norway	20 months	8 events (50 participants in total)	2 local partners	1 event	1 event	✓	N=10	✓
Geneva, Switzerland	5 months	5 events (114 participants in total)	4 local partners	✓	✓	✓	N=39	✓

Note: 'Duration' refers to the number of months during which the events were actively running. 'Notes' refer to notes generated by ordinary participants (for example, outputs from various group exercises and other written materials) and researchers (for example, summaries of discussions). 'Report' refers to the comprehensive reports of the CALs written by the different country research teams based on all sources of data gathered, following a common reporting template.

Table 2: Overview of socio-demographic information from the pre-CAL survey

	N	%
Total	**123**	
Country		
Germany	32	26
Italy	42	34
Norway	10	8
Switzerland	39	32
Age		
18–24	15	12
25–34	15	12
35–44	21	17
45–54	28	23
55–64	23	19
Above 64	21	17
Gender		
Female	77	63
Male	40	33
Non-binary	2	2
Prefer not to disclose	4	3

to participate in the workshop. Events with migrant communities took place with a dedicated moderator on location to translate technical terms. The third limit is that energy citizenship does not solely take place in an action lab: the laboratory mode has become popular in recent years, however there are always issues about how such experiments can be 'upscaled' and their relevance to the need for broader, structural change. We will come back to this point in the conclusion.

Results

We introduce the four CALs, and emphasise how deliberation was facilitated, and what skills and competencies were developed, in what spaces. Then, we consider what new meanings emerged from the action labs and how these relate to either dominant or emerging socio–technical imaginaries around social change.

Introducing the CALs: collaborations between scientists, citizens and other actors

The objective of the CAL in *Berlin*, Germany was to understand how diverse citizens can participate in energy production. The CAL looked at dynamics of individual and collective prosumption, as well as collective action with respect to Berlin's energy policy. Particularly in cities, the agency of citizens on an individual level is limited due to the ownership structure of property. In rural areas, citizens owning a family home are more able to invest in solar panels, wall boxes and heat pumps. Due to the complexity of citizen–centred urban energy production, energy prosumption practices are under–developed. One well-known possibility for collective prosumption are energy cooperatives, allowing citizens to participate in local energy production. As they may alleviate energy poverty, promote energy democracy and contribute to

an accelerated clean energy transition, energy cooperatives represent an important pathway of citizen participation.

Led by researchers in partnership with Berlin's largest energy cooperative and an association dedicated to gender and climate justice, the Berlin CAL involved a two-year-long planning and co-design process. The approach was multi-stage: First, the aim was to learn more about the motivations of engaged citizens. Second, to understand the lack of participation of underrepresented groups, for which three focus groups were held with students and young people, people with migrant history, and women and gendered minorities – all of whom face various barriers to participation in energy communities. All expressed concern around the rising cost of energy, and were able to share the specific ways in which the energy transition could be made more relevant to their lives, as we will further discuss in this article. Participants discussed the upcoming vote on Berlin's climate referendum and debated the need for climate neutrality. None of the participants articulated an interest to become politically active. A training session was organised for citizens in facilitator/gatekeeper positions, to help them develop strategies and competencies for overcoming barriers among various social groups.

The main aim of the CAL in *Città di Castello*, Italy, was to bring citizens together to discuss their energy usage and propose changes to the municipality for supporting a just and inclusive energy transition. The CAL was organised by a climate association and research team, in close collaboration with the department of social services at the Municipality of Città di Castello, the local branch of Caritas and the senior citizens' organisation UniTre. The partners facilitated the recruitment process, with an emphasis on people suffering from energy poverty, and benefiting from social services in relation to electricity and gas. This CAL had a strong focus on retirees and senior citizens.

The first two events were focused on energy usage in the home, everyday activities and shared imaginaries. Participants were encouraged to think about energy as part of their daily lives and how they relate to it. The third event focused on the transition from individual to collective action; and the last event was a town hall meeting, with the participation of the counsellors for social and environmental policies, the mayor, and regional officials from the waste and energy department. The event was widely promoted through the press and social media and helped to start a discourse around the role of the local government as facilitator for starting an energy community. During the public meeting, in addition to the CAL participants, numerous stakeholders and citizens intervened in the public debate and expressed their opinions. Notably, there was a heated inter-generational debate on the role of technology in the transition where people were able to voice their opinions. In the different forums, people went from expressing themselves using 'I' or the first person, to reflecting on more collective forms of change, using 'we'. Various partners are interested in replicating this CAL model, to raise awareness around energy poverty and to engage with school children.

The *Overhalla* CAL in Norway aimed to gain insights on the links between rural settings, energy usage and the built environment. The underlying idea was to understand how energy citizenship plays out in the local context, between home, work and leisure spaces; how these arenas are related to each other, and what this implies for reduced energy usage in rural areas. Important for the success of the Overhalla CAL was the close collaboration with local industry, which was based on the trust and knowledge developed over years of established relationship between one of the

researchers and a local industry representative. The team had a strong motivation for carrying out research that was truly participatory, representative and useful.

A total of eight activities took place between October 2021 and June 2023, involving: first, preparatory activities to scope problems and agree on common understanding and goals. Through dialogue with participants, the energy transition was framed as a community/place-development strategy, which resulted in much local engagement. All participants found ways to relate the energy transition to the specificities of the rural area in which they were living. Furthermore, young professionals and people with immigrant backgrounds became identified as target groups, the region needed to address a problem of depopulation. Second, a workshop with young professionals was conducted to learn more about these groups and their perspectives. Findings from the workshop were shared with participants to ensure reliability. Third, a home design workshop was arranged to discuss with young professionals ultra-compact housing as a smaller and more energy efficient alternative to prevalent solutions. Future scenarios of compact living were also developed together with participants. Debates took place on the value of smaller homes, in a context where large homes are the norm. Fourth, an ultra-compact housing example with high architectural quality was developed by the research team. The experience gained through this process was shared through a fifth stage: collaboration with local industry. A ready-to-fabricate tiny house building model was co-developed, specifically tailored to the needs and economic situation of young professionals. Representatives from different groups and community champions (from industry, health and care sector, education, agriculture and forestry services) were invited to be engaged in the process, which also involved a series of informal conversations to map local social engagement and leisure/social activities.

The *Geneva* CAL in Switzerland sought to experiment with new forms of collective engagement in the energy transition, through the co-production of local climate action plans. Five events were co-designed between the research team and local citizen collectives, and with some interactions with the municipalities in each town. Meetings to plan the CAL began in late 2021 and lasted several months, with events taking place from September 2022 to January 2023. One idea that was brought in by the research team was that any proposed initiatives must be based on collective action, not individual actions that people might engage in in their homes. At the first event, the participants brought in the idea that a respect for diversity is central to any climate action plan: that people may need their car or eat meat for whatever reason, and that these individual practices should not limit such people from being engaged in reflecting on broader changes that might be proposed (including slow mobility or reduced meat consumption).
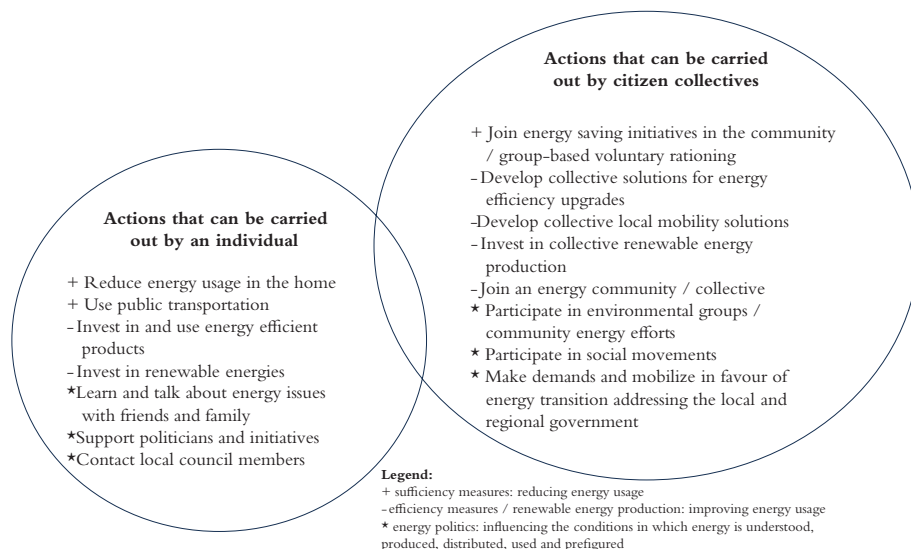
In one event, participants imagined the future through cartoons that represent people living in Geneva in an energy transition. This methodology was created by the scientists, with the intention including discussions around human needs and wellbeing in relation to energy efficiency but also sufficiency measures. At another event, experts were invited to give specific feedback on key questions, in a world café format. For the final event, the participants developed their plans for climate change and the energy transition, which involved 16 proposals organised around four themes: (1) citizen participation; (2) food consumption and production; (3) energy and (4) mobility. In addition, five cross-cutting themes were brought forward, such as the need for a multifunctional space for sustainable development projects, or the need for an

indicator for sustainable prosperity in the region. Participants were able to prioritise actions that were most relevant to them and negotiate with others what should figure in the final plan. A core group of citizens involved in the citizen collectives continue to meet and bring forward the ideas proposed in this action plan, with several ideas currently being implemented or planned. The culmination of all five events required the skills and competencies to reflect on what are priorities, and how ideas can be made actionable. An emphasis was placed on actions that can be taken directly by citizen collectives, with or without support from the mayor's offices. There has been interest from other regions in Geneva to replicate this example.

Engaging with dominant and emerging socio-technical imaginaries

From the first events to the last events and across all action labs, there was more attention placed on what work could be done collectively, by citizens, rather than what could be done privately, by individuals, as illustrated in Figure 3. In Geneva for example, citizens reflected specifically on what they themselves could organise as a group, with or without any support from the state. In Città di Castello, there was distrust towards what the government might achieve, and a focus on collective provisioning of energy. Sufficiency measures – or reductions in energy usage – were discussed in both spheres, as were initiatives that can be defined as 'political' in that they were based on imagining ways in which more structural dimensions of energy usage could be challenged. These are alternative socio-technical imaginaries about social change in an energy transition: they do not focus solely on efficiency nor on renewable energy production (both part of the dominant socio-technical imaginary to social change in an energy transition), but on how reductions in energy usage might be achieved, at an individual and collective level. They also consider how people might be further engaged in the politics of the energy transition, for example, by agreeing on reducing energy usage in the home as a priority.

Figure 3: Actions proposed by citizens, that can be carried out by individuals or by citizen collectives

Actions that can be carried out by an individual

+ Reduce energy usage in the home
+ Use public transportation
– Invest in and use energy efficient products
– Invest in renewable energies
★ Learn and talk about energy issues with friends and family
★ Support politicians and initiatives
★ Contact local council members

Actions that can be carried out by citizen collectives

+ Join energy saving initiatives in the community / group-based voluntary rationing
– Develop collective solutions for energy efficiency upgrades
– Develop collective local mobility solutions
– Invest in collective renewable energy production
– Join an energy community / collective
★ Participate in environmental groups / community energy efforts
★ Participate in social movements
★ Make demands and mobilize in favour of energy transition addressing the local and regional government

Legend:
+ sufficiency measures: reducing energy usage
– efficiency measures / renewable energy production: improving energy usage
★ energy politics: influencing the conditions in which energy is understood, produced, distributed, used and prefigured

Part of the commitments that citizens proposed were the active participation in the public sphere by prioritising actions aligned with energy transition policies, the ability to participate in energy communities, and the possibility to assess the convenience of collective purchasing. These all require skills and competencies, and the mastery of certain dispersed practices, such as planning, organising or vocalising.

What supports or hinders the dominant socio-technical imaginary

We now treat the dominant socio-technical imaginary, demonstrating how it is either supported or hindered in practice, based on an analysis of CAL data (Figure 4, column to the left).

Without much surprise, when it comes to upholding the dominant imaginary that technology is central to change, the energy transition is seen as a business opportunity for some. In the Overhalla CAL, where representatives of the private sector were key participants, industry representatives were willing to actively engage in the CAL to find business solutions that would also contribute to reducing emissions while actively engaging young people in the local workforce. Similarly, in the Geneva CAL, heating and renewable energy experts participated in an expert forum – where citizens could ask their questions – and the business opportunity to incite citizens to invest in more efficient and renewable energy usage was discussed. In Berlin, many citizens expressed their concern for the environment and emphasised the need for more ambitious climate action in the industry sector and less pressure on the individual households.

On the other hand, this dominant energy transition socio-technical imaginary was also widely contested by some participants, in Overhalla, Geneva and Berlin. In Germany, especially young participants emphasised the need for a new economic system that would support a sustainable lifestyle. In Overhalla, certain technical solutions were not seen as suitable for the rural context and not of interest to ordinary people. For instance, when it comes to one of the most popular ways to become an energy citizen in Overhalla and contribute to a more sustainable mobility system, namely, the purchase and use of electric vehicles (which is generously subsidised by the state), one of our citizen participants points out, after being asked about electric cars:

> Yes, some have bought electric cars. But you can't live in the mountains and drive an electric car. If you must drive over two mountains to get to Namsos' hospital, you cannot drive an electric car in minus 30 degrees. If you work at the hospital in Namsos, you can drive an electric car. Then you drive to the hospital, charge, drive home again in the afternoon and charge. Then it's fine. … Those working in home care, they drive electric cars, but if it's minus 20 they can't even use the heater. It's absolutely ridiculous. No way, drive diesel!

In some cases, the proposed solutions were important in terms of energy saving but did not register with participants as an energy-related measure, as they were not immediately relevant to their everyday lives. For example, in Overhalla, there was a relative lack of interest in the energy transition and micro-houses among certain citizen participants. However, the idea of a micro-house – proposed by the research team – gained traction when it was positioned as a home that could attract more

Figure 4: How dominant and emerging socio-technical imaginaries are supported or hindered

Dominant socio–technical imaginary:

Technology as central to the energy transition
+ Supported by industry, who see the transition as a business opportunity
+ Supported by citizens who can invest in certain technologies / renewable energies
- Contested by citizens, who do not see a fit with their needs (rural / urban divide; tenant / owner divide; age, gender and income considerations)
- Contested by research team, who do not see all technological solutions as sufficiently radical / effective

Emerging socio–technical imaginary:

Collective sufficiency measures (consuming less energy):
+ Supported by people who have contact with nature / rural communities
- Limited by existing infrastructures (inefficient buildings, lack of bike lanes, etc.)
- Limited by legal and institutional barriers (local regulations)
- Limited by prevailing norms and expectations (abundance, consumerism)

Collective political actions:
+ Supported by the ability to come together and organize collective solutions (action labs)
- Limited by the lack of space and time for such actions to play out
- Limited by a faith in 'others' (the State) for bringing about change
- Limited by the opportunities to change macro - level dynamics

young professionals to the area. Change went from being abstract, as something that is relevant to other people and happening elsewhere, to gaining a local relevance: the tiny house became an alternative to the big, isolated houses that were less financially attainable for young professionals.

Renewable energy production was also not immediately relevant to all CAL participants. While the notion of 'prosumers' was once a radical and emerging socio-technical imaginary, it is now very much stabilised through the Clean Energy for All Europeans package in 2019, or the Directive on common rules for the internal electricity market (EU 2019/944) – at least in certain countries. Yet engaging in the production of renewable energy is still seen as problematic, for several reasons. In some communities, such as the Geneva CAL, there is no understanding of how energy communities might emerge, most likely because energy is already distributed regionally, and the local energy provider has heavily invested in renewable energy production. There are very few energy communities in Switzerland, and none in the four communes where the CAL took place. The translation of the socio–technical imaginary of energy production from the EU to national levels is also difficult: for example, in the German CAL, the German government has been reluctant to create national legislation to enable energy sharing according to the Renewable Energy Directive (Article 22).[1] While citizen-owned energy generation is prevalent, with approximately 1,000 citizen energy communities operating photovoltaic (PV) and wind power plants, self-consumption remains restricted in Germany. Consequently, individuals invested in energy communities lack the motivation to align their consumption with the energy produced by their shared power plant.

Whether for renewable energy production, or for the implementation of efficiency or sufficiency measures, another hurdle pertains to owner–tenant relations, which was a key issue in both the Geneva and Berlin CAL. While collective actors such as cooperatives and communities do support the implementation of tenant models, the

process of investing in renewable energy as a tenant is highly bureaucratic. The more established socio-technical imaginary of renewable energy production by citizens cannot be acted upon, because of ownership issues. With much of the European population living in cities and urban areas, many of whom are tenants, the ability for such citizens to invest in renewable energy production is an untapped potential for radical change. In the Geneva CAL, many tenants also found that the call for energy sufficiency (reducing energy usage) was made more difficult when combined with a poorly insulated home (low energy efficiency building). Investments in the better isolation of buildings are out of the hands of tenants, and current debates in Geneva state legislation regarding the rate and scale of investments in building efficiency tend to privilege the owners, rather than renters.

Certain ideas or initiatives, discussed in the CALs, are seen as feasible and desirable by the citizens, but are not seen as radical enough by the research team. For example, in Berlin, PV Plug-in modules have experienced a great boost. Some are installed on garages, others on balconies and smaller rooftops. From a technical point of view, they do not lead to a radical shift to a renewable energy system: according to the German Federal Network Agency, around 260,000 PV Plug-in systems with an output of less than one kilowatt were registered as of January 2023. These systems generate a maximum of 170 gigawatt hours per year. That is around 0.03 per cent of Germany's current electricity consumption of 550 terawatt hours per year. In comparison, there are 2.2 million rooftop solar modules registered in Germany, making up 3.5 per cent of Germany's current electricity consumption. However, these systems are a door-opener for citizens to engage in the energy transition and interact with their energy usage in daily life. Similarly, in Geneva, one of the key priority areas was local food consumption – in addition to household energy usage and mobility. For the research team, local food provisioning is important, but so is the reduction of meat and dairy products, which was not discussed as much by the citizens. But nonetheless, talking about local food in relation to energy opens the door to considering other, more significant impact areas.

What supports or hinders emerging socio-technical imaginaries: sufficiency measures and collective political action

We now turn to the less dominant and potentially radical socio-technical imaginaries: one that is emerging around sufficiency measures (consuming less energy), and a second around political action (Figure 4, column to the right). When it comes to sufficiency measures, in the Geneva CAL, citizens drew from individual experiences to then reflect on more collective forms of change. For example, eating local and seasonal foods, reducing indoor temperatures, or switching from a car to a bike or public transport were all mentioned as viable ways forward in an energy transition. These individual actions were then discussed in relation to more collective forms of change: for example, hosting an event to promote local and seasonal foods, facilitating links between local producers and public school canteens, or engaging in a group effort to reduce carbon emissions, with a quota set per group of households, and negotiations made based on different needs (for example, the ability for one household to emit more, due to family overseas).

Certain sufficiency measures clearly came up against structural limits: for example, safe bike lanes are necessary if many more people are to switch from their car to a

bike, and car parking spaces would need to be less readily available, and yet such changes cannot come from citizens alone. They relate to how practices are prefigured by other practices, as was demonstrated with the case of doing laundry in Figure 1. Citizens could come together to put pressure on public institutions to create more bike lanes, which might prefigure more biking, but this requires more complexity, in the coordination of practices at different scales: in Switzerland, municipalities may have some jurisdiction over urban planning, but states (or cantons, to use the more accurate term) have jurisdiction over roads and bike lanes. Citizens would need to exert agency in a coordinated manner across these jurisdictions.

In Overhalla, the ultra-compact house was discussed with participants (local government, young professionals and local industry) as a smaller and more energy efficient alternative to prevalent housing solutions. Furthermore, a building model was developed for production. Participants had the opportunity to learn more and experiment with compact living as sufficiency practice. Similarly, the discussion in the Norway CAL after the research team introduced tiny houses helped to move the discussion from what the participants had and wanted to what they needed. This discussion revealed an excess that was not only seen as unnecessary but also undesirable, such as having a basement in a rented house that was unused and only contributed to a larger energy bill. The Berlin case showed that migrant citizens, who do not have the authority to vote, see joining an energy community or exploring collective practices associated with energy usage as a pathway to democratic engagement in their cities. As Turkish families reported receiving significant gifts for weddings and births, the idea of providing membership in an energy cooperative or an investment in a renewable energy power plant was seen as attractive on those occasions. Both examples demonstrate how imaginaries need to 'land' in local contexts to become more relevant.

In terms of collective, political action as a shared imaginary, the CALs all created spaces where different actors could come together to discuss ways forward in the energy transition. As such, they were spaces where new skills and competencies were developed, in relation to organising, debating, prioritising, proposing – facilitated to a large extent by the research team and the partners. In certain CALs, the need for dedicated space to continue such discussions was raised: for example, in Geneva, so many of the ideas and initiatives proposed – local food market, bike repair centre, and so on – would require space, as would the meeting of citizen collectives more generally. In Berlin, there was a wish to develop novel concepts for energy workshops fostering intercultural exchange. In Overhalla, the CAL served as an arena where the local industry, researchers and local young professionals could explore different housing solutions to match needs from industry, community and young professionals with their economic situations.

In some instances, citizens lack an understanding of how more complex system dynamics play out. In the Città di Castello CAL, for example, citizens tended to think of change in relation to individual action, and mostly believed that the local government should be ultimately responsible for change (although the CAL contributed significantly to more collective understandings of change). There were tensions between feelings of competence and incompetence in relation to the energy transition, as well as between taking responsibility and shifting responsibility to others – particularly to the state, which is seen as the main 'solution' provider, without a deeper understanding of the workings of the state. In contrast to this and in Overhalla, there

was a strong sense that the community had to find solutions for itself, and that there would be no 'outside' support. In Geneva, there was much faith in what could be organised at the level of citizen collectives, with the realisation that any such efforts need to liaise with, at the very least, the local government. Some citizens participating in the CAL did have this dual role, of being elected at the community or state level, and engaging in a citizen collective. They became important gatekeepers for then liaising with the local government in sharing the results of the CALs. There was also some reflection on how CAL participants were being trained to run as a local representative, in the future. In all cases, the ability to engage collectively in political actions around the energy transition was linked to discussions around the need to define solutions that would be viable for a diverse group of people, including displaced people, migrants or low-income groups. Inclusion and care were dominant themes, across all the CALs.

Conclusion and discussion

Through the analysis of four citizen action labs (CALs) in Europe, we aim to uncover how energy citizenship can be further supported. We begin by summarising key findings, their limits, and promising ways forward.

A place- and group-based approach

There is not one way of engaging in 'energy citizenship'. The energy transition must be localised: specific problems require specific solutions that account for contextual settings. But even more so, different people give meanings to the energy transition in different ways. Migrant groups in Berlin needed to consider investments in renewable energy production as aligned with gift-giving on special occasions, while young professionals in Overhalla needed to distinguish their housing needs from those of older generations. Furthermore, participants across all CALs agreed that diversity is central to a just energy transition.

This also presents a challenge for upscaling such efforts: the CALs worked with specific groups that were considered 'hard to reach'. Mixing diverse groups together, even in the same location, might have resulted in very different results. For example, the way affluent households in Switzerland understand 'sufficiency' may be over-consumption for less affluent groups in Switzerland or elsewhere. How to balance a place-based and group-based approach with the need to bring about societal change will be a challenge.

The importance of dispersed practices

There are practices that use energy, but there are also 'dispersed' practices that are central to energy citizenship as they might affect or indeed prefigure how energy is produced, distributed and used, and towards what aim. This study sheds light on the importance of dispersed practices and how CALs created spaces for experimenting with new skills, meanings and material arrangements, in relation to organising, planning, communicating, prioritising, among others.

People engaged in the CALs did become more aware of their influence, their constitutive role, and developed their own (new) ideas of how to 'do' energy

collectively, for example, by deciding to join an energy cooperative or organising a demonstration. People engaged in debates, asked questions, sought answers, arrived at agreements, developed joint action plans and, in some instances, implemented their ideas. In the Geneva example, CAL participants are, for the first time, running for local political office, suggesting that energy citizenship skills are transferable to other spaces (of power). But the CALs did not necessarily lead all participants to be more engaged in their communities, they remain protected spaces, bound in a certain space and time.

Supporting radical socio-technical imaginaries

Dispersed and integrated practices also involve meanings, shared teleoaffectivities or socio-technical imaginaries – the 'so what' of energy citizenship, or what goals and affects people can propose and bring forward. Imagining more collective forms of action and more measures oriented towards sufficiency was quite dominant in our data, and in sharp contrast to the emphasis on individual changes and efficiency measures that dominate the policy arena.

This is quite promising, as it means that spaces of deliberation – such as CALs – can allow diverse people to think and act collectively, and differently, whether by embracing tiny homes in Overhalla, or supporting local food production activities in Geneva. This also means that socio-technical imaginaries need to 'land' somewhere.

To summarise, it is necessary to further support place-based, dispersed practices, which include certain skills and competencies, such as planning, prioritising, communicating, among the many others that emerged through our empirical analyses of four CALs; but which also include meanings and teleoaffectivities associated with such practices. Goals and associated emotions around sufficiency and collective action must be further supported, but also made relevant in different settings and among varying social groups, to gain ground on the dominant socio-technical imaginaries of individual action and energy efficiency.

We conclude with some further reflections on the limits of collective action, which brings us back to the question of agency: there are many hindrances to what can be achieved by citizen collectives. Such groups must grapple with existing material arrangements (infrastructures, technologies) and institutional arrangements (rules, procedures, standards) that limit their capacity to act, and prefigure how energy is used in society. With increased complexity and the need to coordinate across different practices, involving diverse skills and (sometimes contrasting) teleoaffectivities, citizen collectives can face disappointment and a lack of motivation. Yet there are ways to coordinate across certain practices at the level of communities, that are perhaps less complex but can still prefigure to some extent how energy will be used in the home. We see promising results from the trans-disciplinary nature of the CALs, in that they combine different types of actors (researchers, citizens, associations, private sector, municipalities, and so on) and give more emphasis on the role of collective action at the scale of a community.

One way forward may be to render more visible the question of agency: who has the capacity to act; who is responsible for change; what can be coordinated or not, by whom, and in what way? More spaces for experimentation with 'energy citizenship' are necessary, ones that place an emphasis on the dispersed practice of *discernment*, to recognise what agency can be had at the level of a group of

citizens, and when agency is elsewhere – from the private to the public sector. While the social and technological processes of the past might have taken place behind the backs of people and over their heads, the current energy transition requires voluntary and conscious actions by many, if not most, people. A radical re-imagining of the role of diverse people in the energy transition is needed as a democratic project, but also for re-imagining the production, use and indeed usefulness of energy in society.

Note

[1] 'Energy communities' are mentioned and defined in both the RED II and the Internal Electricity Market Directive and so is the concept of 'energy sharing' within them. Both directives emphasise the consumer 'at the heart of the energy markets' defining them – individually or jointly – as 'Active Consumer' (IEMD) and as 'Renewable Self-consumer' (RED II).

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