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Investigating patterns of local climate governance: How low-carbon municipalities and intentional communities intervene in social practices

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Abstract

The local level has gained prominence in climate policy and governance in recent years as it is increasingly perceived as a privileged arena for policy experimentation and social and institutional innovation. However, the success of local climate governance in industrialized countries has been limited. One reason may be that local communities focus too much on strategies of technology-oriented ecological modernization and individual behavior change and too little on strategies that target unsustainable social practices and their embeddedness in complex socioeconomic patterns. In this paper we assess and compare the strategies of "low-carbon municipalities" (top-down initiatives) and those of "intentional communities" (bottom-up initiatives). We were interested to determine to what extent and in which ways each community type intervenes in social practices to curb carbon emissions and to explore the scope for further and deeper interventions on the local level. Using an analytical framework based on social practice theory we identify characteristic patterns of intervention for each community type. We find that low-carbon municipalities face difficulties in transforming carbon-intensive social practices. While offering some additional low-carbon choices, their ability to reduce carbon-intensive practices is very limited. Their focus on efficiency and individual choice shows little transformative potential. Intentional communities, by contrast, have more institutional and organizational options to intervene in the web of social practices. Finally, we explore to what extent low-carbon municipalities can learn from intentional communities and propose strategies of hybridization for policy innovation to combine the strengths of both models.

KEYWORDS
intentional communities, local climate governance, low-carbon municipalities, policy innovation, social practice theory

1 | INTRODUCTION

With the window for reaching the Paris climate goals fast closing (UNFCCC, 2015), awareness is growing that climate policy must go beyond the energy sector and address the very principles of how modern societies organize their patterns of consumption and production. Within this context, the local level has gained more prominence in climate policy and governance in recent years, both in academic and in policy domains (Bulkeley & Betsill, 2013; Lervik & Sutherland, 2017; Smedby & Quitzau, 2016). This is because the municipal, communal and local levels are perceived as privileged arenas for policy experimentation (Castán Broto & Bulkeley, 2013) and social and institutional innovation (Hargreaves, Hielscher, Seyfang, & Smith, 2013; Seyfang & Smith, 2007). The local level, it is assumed, has the potential to function as a "low carbon lab" (Heiskanen, Jalas, Rinkinen, & Tainio, 2015) and as an incubator and diffusion hotspot for successful innovations (Boyer, 2015). Literature in this domain has addressed both the top-down dimension of municipal and communal policy-making (Bulkeley & Kern, 2006; Peters, Fudge, & Sinclair, 2010) and the bottom-up dimension of grassroots innovation and community-based climate action (Boyer, 2016; Feola & Nunes, 2014; Seyfang, 2010) to various degrees.

In this paper, we aim to combine both dimensions by assessing the strategies of "low-carbon municipalities" (the top-down dimension of communal climate policy) and by asking to what extent these strategies could be advanced through learning from "intentional communities," such as ecovillages and eco-oriented cohousing projects (the bottom-up dimension of grassroots climate action). Low-carbon municipalities are municipalities that follow a self-proclaimed agenda of local climate change mitigation. They are "top-down" inasmuch as their voluntary low-carbon agenda is decided and pursued through the political and administrative structures of local government (which typically include a local council, a mayor and a municipal office). Most low-carbon municipalities are involved in international networks like the Climate Alliance[1] or the International Council for Local Environmental Initiatives (ICLEI)[2] (Bulkeley, 2010). Their role in climate change mitigation was internationally recognized early on (Beatley, 2014; United Nations Conference on Environment and Development, 1992). Intentional communities, by contrast, are founded and sustained by people who commit themselves to pursue a common purpose or intention, such as living in harmony with nature or living according to principles such as solidarity and grassroots democracy (Kunze, 2012). They are resident-led settlements or neighborhoods with shared property and commons, such as ecovillages and cohousing projects. According to the Global Ecovillage Network (GEN), there are around 10,000 ecovillages in existence worldwide.[3] Intentional communities can be understood as a community-based type of grassroots

innovation (Seyfang & Smith, 2007; Smith, Fressoli, & Thomas, 2014). The role of intentional communities as "best practice" cases for sustainable living is increasingly being acknowledged by some governments, who are beginning to encourage them to exchange their experiences with the wider public (WBGU, 2011).

Low-carbon municipalities typically use policy strategies that pertain to the paradigm of *ecological modernization* (EM) (Bulkeley, 2010; Smedby & Quitzau, 2016). EM is based on the assumption that "economic growth and the resolution of environmental problems can, in principle, be reconciled" (Christoff, 1996). As a sociopolitical strategy, it focuses on the development and diffusion of new technologies that enable clean production and consumption, with the aim to decouple economic output from resource inputs and emissions (Spaargaren & Mol, 1992). Ecoefficiency is the key principle behind this approach. Examples are low-emission (and electric) cars, photovoltaic panels, LED lighting or material recycling. On the local and municipal level, most efforts concentrate on the energy sector and concern energy efficiency measures (mostly in municipalities' own estate and operations), energy conservation and renewable energy generation. In addition, local policies address green building initiatives, green local government procurement standards, public–private partnerships with local businesses, public transportation policies and educational efforts to change individual behavior. However, recent research increasingly stresses that technology-based approaches and individual behavior-change strategies are insufficient to mitigate climate change and that much more comprehensive, structural changes to the ways in which societies function are required to achieve a massive reduction in energy and resource demand (Creutzig et al., 2016; Haberl, Fischer-Kowalski, Krausmann, Martinez-Alier, & Winiwarter, 2011).

By virtue of their shared ecological objectives and convictions, intentional communities tend to go much further in ecologically restructuring communal life. The focus of intervention is not on efficiency (i.e., doing more with the same input), but on actively reducing throughput of energy and resources, and thus on *sufficiency*. This is often achieved by making use of shared property and commons and by establishing common patterns of consumption and behavior in fields such as nutrition, transport and housing. Overall, intentional communities do not focus on individual behavior change, but aim at the sustainable redesign of communal life and thus of the ways social practices interlock. The ideological consensus of residents on ecological principles allows for the implementation of intervention strategies that are not limited to technological and individualistic approaches but are holistic in the sense of combining technological elements with collective behavioral change and a commitment to sufficiency principles in community governance.

These obvious differences between low-carbon municipalities and intentional communities are interesting in several respects with regard to communal low-carbon policy and governance. They suggest a difference in the transformative depth of low-carbon measures: while low-carbon municipalities seem to be locked into the efficiency paradigm, which does not necessarily achieve substantial decarbonization, the measures in intentional communities reach deeper into the fabric of communal life, transcending the efficiency perspective of ecological modernization toward a pronounced sufficiency perspective of "living better with less." This raises the important question as to what low-

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[1]Founded in 1990 in Germany, the Climate Alliance is the world's largest network of municipalities dedicated to climate protection and is particularly strong in Germany, Austria and the Netherlands. Today it comprises more than 1,700 municipalities from 26 European countries. http://climatealliance.org/nc/home.html

[2]http://www.iclei.org/

[3]https://ecovillage.org/global-ecovillage-network/gen/ (accessed 2 January 2018)

carbon municipalities could learn from intentional communities despite the different preconditions for policy implementation: which types of measures, policies, strategies or organizational structures could be emulated or adapted to the needs of low-carbon municipalities? Is there scope for experimentation in low-carbon municipalities that may help bridge the gap between them and their ecologically devoted counterparts? Can the transformative depth of low-carbon municipalities be enhanced by learning from intentional communities?

To broach these questions, this paper takes on the perspective of social practice theory. Social practice theory acknowledges that individual behavior is embedded in social and material structures, which makes individual behavior change very challenging (Shove, 2015). Taking social practices as the unit of analysis means shifting the attention away from technological components and individual choices and toward processes of coevolving technical, economic, social and cultural elements (Brand, 2010). We agree with social practice theorists that unsustainable patterns of human activity can be better understood (and changed) when conceived in terms of socially shared practices rather than aggregate individual choices (Hargreaves, 2011). We think that social practice theory can be particularly helpful when comparing the different strategies used by low-carbon municipalities and intentional communities, as it may reveal significant differences in transformative depth concerning the ways in which low-carbon interventions are conceived and designed. In this paper, we use practice-theoretical methods to analyze the climate-related policies of three low-carbon municipalities and three intentional communities (two of each in Austria, one in Germany) in the practice fields of food, housing and mobility. The systematic comparison results in a comprehensive matrix of measures and intervention strategies which allows for the identification of potential for mutual learning, translation and upscaling of intervention strategies with a higher transformative potential.

In the next section we introduce our theoretical approach and empirical method. Section 3 presents the empirical findings from our case studies. In Section 4, we discuss these findings with a view to policy implications and potential for translation and upscaling. Section 5 concludes.

2 | THEORY AND METHODS

2.1 | Intervening in social practices: A conceptual framework

Social practice theory constitutes a marked shift from the methodological individualism of the behavioral approach in that socially shared practices (such as cooking, driving, washing or shopping) rather than the individuals who perform them become the core unit of analysis. The individual is conceptualized as the "carrier" of historically evolved practices (Reckwitz, 2002) and not as the autonomous agent whose rational preferences determine its "behavior." Practices are social entities that are neither the product of totalizing social structures nor the product of rational individual choices. Instead, a practice is "a routinized type of behaviour, which consists of several elements, interconnected to one another" (Reckwitz, 2002). The literature

offers several different definitions of the elements of a practice (Gram-Hanssen, 2009). In this study, we adopt the widely used definition advocated by Shove, Pantzar, and Watson (2012), consisting of "meanings," "materials" and "competences". "Meanings refer to ideas, aspirations, values and symbolic meanings; competences to shared know-how and practical intelligibility; and materials are the physical stuff, such as technologies, objects and infrastructures" (Strengers & Maller, 2015).

These elements come together in everyday life, as individuals integrate them into the performance of everyday routines and thus reproduce a practice. According to a common distinction, a practice is a performance of a routine (practice-as-performance) and at the same time a pattern of these performances (practice-as-entity) (Shove et al., 2012). As an entity, the practice consists of the above elements. As a performance, the practice reproduces and actualizes the entity; without being continuously performed, the practice-as-entity dissolves and disappears. In being performed, the practice is entrenched and stabilized or altered and transformed to the extent that its elements are changed. The transformation or discontinuation of practices as well as the emergence of new practices is common and inevitable. The most interesting question, from an environmental governance point of view, however, is to what extent practices can be the object of purposive and strategic interventions.

There is little understanding to date about the potential of policy and governance to purposively and strategically transform social practices. Indeed, as Strengers and Maller (2015) concede, "social practice theorists have so far had relatively little to say about what it means to intervene in social life; how to go about effecting, steering or governing change; and if this is possible or desirable." In response to this shortcoming, Spurling, McMeekin, Shove, Southerton, and Welch (2013) have recently developed a conceptual framework for the analysis of interventions into social practices, which distinguishes between three types of intervening into social practices: "re-crafting practices," "substituting practices," and "changing how practices interlock."

"Re-crafting practices" is grounded in "reducing the resource intensity of existing practices through changing the elements of which they are composed" (Spurling & McMeekin, 2015). Interventions can include "the introduction of industry standards for products (that address material elements), the use of new technologies (e.g., ultra-low-emission vehicles), forms of training (e.g., the driving test) or social marketing and information campaigns". Thus, "re-crafting" intervenes in one or more elements of a practice without questioning the practice itself or the frequency of its performance. To re-craft the practice of driving, for example, can mean to equip a car with a more fuel-efficient technology, without challenging the practice of driving per se.

"Substituting practices" focuses on "discouraging current unsustainable practices and replacing them with existing or new alternatives" (such as replacing driving with cycling). The challenge here is one of changing the ways in which particular "needs" or "wants" are met, by identifying pairings of potentially "substitutable" practices—a resource-intensive one and a more sustainable counterpart—and by intervening to "change the balance of competition between them" (Spurling & McMeekin, 2015). In other words, the "need" or "want" in question is still not being negotiated, but the mode in which it is satisfied is changed from an unsustainable to a more

sustainable one. For instance, the "need" to commute to work is not being challenged, but the means of transportation is being substituted—from driving to taking public transport, cycling or walking. To this generic definition we want to add a specification: our empirical findings (below) show that this type of intervention is often performed in an incomplete or partial manner in that the "sustainable" alternative is supported or encouraged without actively discouraging or inhibiting the "unsustainable" practice. We call this incomplete substitutional intervention "growing a practice," while its opposite (inhibiting the unsustainable practice without fostering the sustainable alternative) would be "shrinking a practice." A complete substitutional intervention, according to the definition of Spurling and McMeekin (2015) above, would always involve both sides of the equation—growing the desired practice and shrinking the undesirable one. "Growing" alone, as will become apparent below, often leads to unsatisfactory results in terms of climate protection, for example, when cycling is encouraged as a leisure activity without, at the same time, taking measures to discourage driving private cars.

'Changing how practices interlock,' finally, focusses on bundles or regular patterns of practices and tries to re-articulate them in such a way as to make the performance of certain unsustainable practices obsolete. As Spurling and McMeekin (2015) put it: "Rather than viewing current practices […] as given (as we have in 'recrafting' and 'substituting' practices), here we speculate about how policy makers might intervene in the wider system of practices that produces the need [for certain unsustainable practices]. We bring the negotiability of need […] to the foreground." For example, rather than focussing on mobility practices in their own right, the focus shifts to disentangling or disrupting the pattern of practices that generates the need for mobility in the first place, such as "how households are provisioned, where children go to school, and how work and leisure are organised" (Spurling & McMeekin, 2015).

This conceptual framework has explicitly been developed because social practices are considered "a better target of intervention for sustainability policy than 'behaviour,' 'choice' or technical innovation alone" (Spurling et al., 2013). However, to the best of our knowledge, there are only a handful of studies that have made use of this framework to examine empirically existing low-carbon activities and measures (Macrorie, Foulds, & Hargreaves, 2015; Schäfer et al., 2018). In this paper, we build on this framework to examine the ways in which low-carbon measures in different types of communities (low-carbon municipalities and intentional communities) succeed to intervene in social practices and to analyze the potential for enhancing the transformative depth of such interventions in low-carbon municipalities.

2.2 | Cases and empirical methods

We investigate the climate-related policies of three low-carbon communities and three intentional communities in the practice fields of food, housing and mobility (Table 1). Low-carbon communities are municipalities that follow a self-proclaimed agenda of local climate change mitigation. The population of low-carbon communities (of the type under study, which is typical for Germany and Austria) usually does not differ significantly from that of other municipalities (e.g., in terms of election results). However, there usually exists an active core of engaged citizens or politicians—so-called policy entrepreneurs (Krause, 2011)—who at some point amass enough support in their municipal council for the municipality to become a member of an environmental network (such as the Climate Alliance) or to set a nonbinding agenda for local decarbonization. In some cases, resourceful local politicians simply make use of existing (national) funding schemes for municipal climate measures, thus using local climate protection as a

TABLE 1 Overview of initiatives

Initiative	Description	Country/start
Low-carbon communities		
Kaindorf *Climate-Alliance member*	The ecoregion comprises three municipalities (pop. 6,200 inhabitants). It is organized as a nonprofit association, with municipalities and a large number of citizens as members. It aims at establishing a circular regional economy and at becoming self-sufficient in renewable energy supplies. Activities focus on energy efficiency, housing, mobility and sustainable agriculture.	Austria/2007
Laxenburg *Climate-Alliance member*	The municipality Laxenburg (pop. 2,900) decided in 2003 to become a low-carbon municipality. Projects have addressed the following areas: sustainable education, mobility, provision on information to sustainable energy, energy efficiency, renewable energy, etc.	Austria/2003
Beeskow *National Climate Initiative*	The climate region Beeskow consists of several municipalities (the largest being the town of Beeskow) with a total population of 38,500 inhabitants and was created in 2012. Projects have addressed the following areas: renewable energy, mobility, sustainable education, etc.	Germany/2012
Intentional communities		
Sieben Linden	Sieben Linden is an ecovillage where 100 adults and 40 children have settled over the years, focusing on closed energy and resource cycles and building houses with natural and regional resources such as straw, clay and timber. Common facilities consist of kitchen, dining room, educational center, horticultural areas, etc.	Germany/1997
Lebensraum	Lebensraum (living space) is a cohousing project that consists of 32 clustered ecologically constructed homes in which, currently, 83 people live. Common facilities consist of kitchen, dining room, laundry, playground and outdoor meeting areas.	Austria/2001
Pomali	Cohousing Pomali is a new-built community comprising 29 housing units with around 80 inhabitants of all ages. The goal is to be a sustainable ecosettlement that allows for communal and individual flourishing of its inhabitants, with an emphasis on the communal experience and an openness to spirituality. For legal reasons, the settlement is owned by a cooperatively owned limited liability corporation.	Austria/2013

means of attracting additional resources for local development (which, in turn, may lead to the emergence of groups of policy entrepreneurs actively carrying forward the climate agenda).

The three low-carbon municipalities under study are quite different in terms of their points of departure and histories, but face very similar difficulties in transforming social practices. Ökoregion Kaindorf, for example, has, from the start, been driven by a very dedicated group of policy entrepreneurs, who gradually pushed the local councils of Kaindorf and its neighboring villages to adopt their visions for sustainable local development and climate governance. The center of activities and political coordination in the Ökoregion Kaindorf is a private association (*Verein*) of engaged citizens and not the council. In Laxenburg, by contrast, the civic support for the low-carbon agenda is much weaker and depends on just a few individuals who carry the climate agenda forward as the mayor had the town join the Climate Alliance in 2003. In Beeskow, finally, a local climate agenda was established as a result of successful citizen protests against the erection of a carbon capture and storage testing facility. Following the withdrawal of these plans, the mayor decided to redirect the protesters' energies into a positive agenda for climate protection and applied for national funding for the establishment of a local low-carbon development plan.[4] Since then, however, civic support for the town's low-carbon agenda has been very limited.

Intentional communities, by contrast, are founded and sustained by people who commit themselves to pursue a common purpose or intention. The intentional communities we investigate are ecovillages and sustainability-oriented co-housing projects. According to a definition of the GEN from 2012, an ecovillage "is an intentional, traditional or urban community that is consciously designed through locally owned, participatory processes in all four dimensions of sustainability (social, culture, ecology and economy) to regenerate their social and natural environments" (Global Ecovillage Network, 2012). Ecologically oriented co-housing refers to communal housing projects (urban or rural) along the principles of extensive participatory planning and governance structures and on an architecture and infrastructure which promote community life and exert low environmental pressures. Of the three intentional communities covered in this study, the two Austrian ones (Pomali and Lebensraum Gänserndorf) are sustainability-oriented co-housing projects, whereas the German initiative (Sieben Linden) is an ecovillage. Despite their differences, the three intentional communities are similar in terms of their intentional, purposive and voluntary character, which necessarily leads to organizational structures and decision-making instruments that aim at comprehensive collective rules that regulate many aspects of community life and individual behavior.

We allowed for some internal heterogeneity within types of communities as we assumed that these differences (e.g., level of civic support within low-carbon municipalities; co-housing vs. ecovillage) are of

little significance as compared to the categorical differences between top-down municipalities and bottom-up intentional communities. Our findings in the next section show that this assumption was correct: the strategies of intervention into social practices are type-specific not case-specific.

The empirical methods used in this paper are mainly qualitative, but contain semiquantitative elements, in that the intervention patterns have been identified by assigning each measure to deductively constructed categories and counting the frequency of measures in each category. The first strand of research involved six in-depth case studies (Table 1), sampled across the two countries, to provide a diversity of activities, governance structure, infrastructural arrangements and pioneer/follow up initiatives. The case studies comprised site visits and in-depth face-to-face interviews with up to three informants per initiative (such as founders and people involved in the area of mobility, food and shelter/energy), supplemented by document analysis of self-published material such as websites and promotional materials and academic reports.

To deepen our knowledge of the initiatives, we organized one half-day workshop with each initiative (six in total). Four to six participants from each initiative attended the workshops. The aim was to discuss initial findings derived from the interviews and document analysis with participants. We investigated the historical development of these initiatives and their activities, including important events and experiences, measures implemented and related social practices in the area of mobility, food and housing.

Based on the evidence gathered in this process, we created a detailed list of measures and activities ("interventions") implemented in each initiative in the three practice fields and coded each item according to the analytical categories derived from the "intervention-in-practice" framework outlined above. We included all measures that were reported in official and internal documents or by community members in workshops and interviews, regardless of when they were implemented (i.e., our analysis covers the entire life span of the initiatives under study). We distinguished between types of intervention that lead to a recrafting of practices, to their substitution or to changes in the way practices interlock. We analyzed into which "practice element" policy measures intervene (meaning, competences or material). We ordered the interventions according to their "degree of compulsion," that is, whether they are informational, optional or compulsory. Finally, we recorded whether interventions involve a degree of "communalization," that is, if they lead to a joint performance of practices by multiple individuals (thus reducing performances of practices) or if ownership of material elements is shared (thus reducing material elements).

In this paper, we define interventions broadly to designate all measures decided and enacted on communal or municipal level that target practices and their elements with the aim of reducing local (or locally caused) carbon emissions (cf. Spurling & McMeekin, 2015). Examples for low-carbon municipalities include a decision by a municipal council to build a bicycle lane; a decision to subsidize e-mobility; a decision by a council to promote organic and locally sourced food through a food fair; or a decision to invest in the thermal insulation of the municipal estate. Examples for intentional communities include the design and architecture of the village to provide for communal buildings for eating, cooking, meeting, socializing and leisure activities;

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[4]In Germany, municipalities can apply for funding for their climate protection measures through the "National Climate Initiative (NKI)" of the Federal Environment Ministry. The support program has initiated and promoted numerous projects since 2008 that contribute to the reduction of greenhouse gas emissions. It covers climate protection activities from the development of long-term strategies to specific support and investment support measures. Furthermore, the program offers financial support for personnel costs of climate protection managers. https://www.klimaschutz.de/en/national-climate-initiative

TABLE 2 Overview of typical climate protection measures as employed by intentional communities and low-carbon municipalities

| Type of initiative/consumption category	Typical climate protection measures	Description
Intentional community		
Housing	Hot water from renewable sources Green power	Solar panels to generate hot water Standard contract for all residents with a green power supplier
Food	Communal kitchen with vegan food Food supply from Community Supported Agriculture (CSA)	Flat payment for vegan food independent of whether consumed or not; implies collective food purchases (lower mobility demand) Local food storage is stocked up by CSA project
Mobility	Car-free mobility E-bike sharing	Voluntary car-free living Trips to train station with e-bikes in joint ownership
Low-carbon municipality		
Housing	Local heating system with wood chips	Local area heating network with biomass power plant
Food	Subsidizing local grocery shop Healthy school snack	To allow for short-distance shopping (even in walking or cycling distance) the local grocery shop was subsidized Teaching lessons on healthy snacks (veggies and fruits) with the appeal to bring along daily healthy snacks
Mobility	Building additional bicycle lanes Fuel-saving training	Building and extending the local bicycle path network Municipalities offer fuel-saving training for free to improve drivers' competencies in this regard

decisions to ban or restrict cars in the village; provisions that common meals are vegetarian or vegan; or decisions to source food from community-supported agriculture (Table 2).

3 | FINDINGS: IDENTIFYING PATTERNS OF INTERVENTIONS IN SOCIAL PRACTICES

In this section, we identify the patterns of intervention resulting from our coding of various measures and activities by low-carbon initiatives. These patterns help us understand the ways and extent to which local climate governance measures intervene in social practices (or fail to do so). The term "pattern" here refers to common tendencies, differences and regularities of the typical features of interventions in both low-carbon municipalities and intentional communities. Figure 1 provides a visual account of the patterns on the most aggregated level.

Table 3 summarises the pattern discovered. In short it can be described as follows: key intervention types of low-carbon municipalities are re-crafting (technical reduction of carbon emission intensity) and offers to grow low-carbon practices, without at the same time shrinking carbon-intensive ones. In addition, low-carbon communities invest considerable effort in changing citizens' attitudes through raising awareness and through marketing campaigns. In contrast, intentional communities put a strong emphasis on substituting practices, with a focus not only on growing low-carbon alternatives but also on shrinking carbon-intensive practices where possible. Interlocking plays a more important role in intentional communities than in low-carbon municipalities. Measures to change inhabitants' attitudes are integrated into the structure of the community and therefore are not discernible as a separate category. While low-carbon municipalities offer information and optional practices, intentional communities provide offers for alternative practices in combination with obligatory
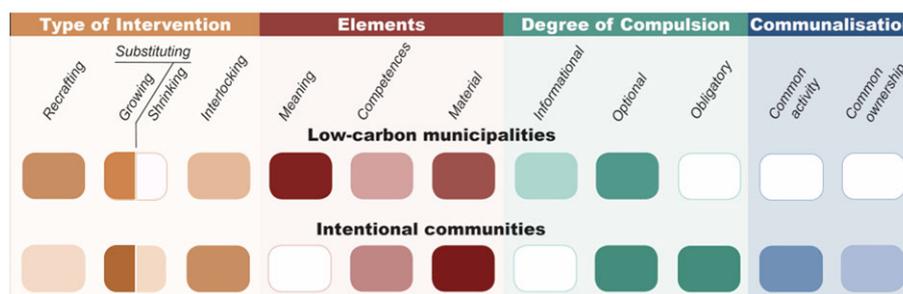
FIGURE 1 Overview of interventions in social practices by low-carbon initiatives (dark areas indicate strong implementation, while light areas indicate little attention) [Colour figure can be viewed at wileyonlinelibrary.com]

TABLE 3 Condensed and simplified pattern of intervention in the two initiative-types

	Low-carbon municipalities	Intentional communities
Focus of intervention	*Partial* substitution (growing without shrinking); recrafting	*Complete* substitution (growing and shrinking); interlocking
Predominant means	Informational and optional measures (offers to individuals)	Optional and compulsory measures; collective binding decisions
Targeted elements	Meaning (awareness-raising, education); material (recrafting)	Material (substituting); competences
Approach	Individual choice; technological change	Communalization; sociocultural change
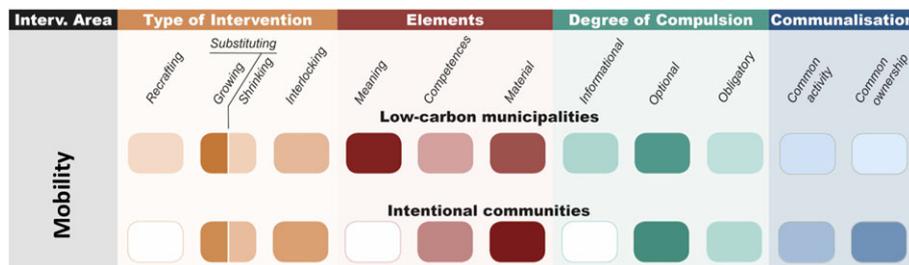
FIGURE 2 Intervention area mobility: interventions in social practices regarding type of intervention; dominant elements addressed; degree of compulsion and communalization for low-carbon municipalities and intentional communities (dark areas indicate strong implementation, while light areas indicate little attention) [Colour figure can be viewed at wileyonlinelibrary.com]

approaches. Finally, shared ownership or joint use of material elements are core strategies of intentional communities, but do not play a visible role in low-carbon municipalities.

In a next step, this general pattern is now disaggregated into the three intervention areas and discussed comparatively in further detail.

3.1 | Mobility

Low-carbon municipalities focus on *substitutive* measures that stimulate the *growing* of low-carbon practices such as promoting cycling and investing in cycling lanes and bike racks, but without *shrinking* the carbon-intensive ones. That is, new cycle lanes are built without reducing road surface for driving or parking spaces for cars. Most measures are *optional* or *informative* as they offer a low-carbon alternative and provide incentives (e.g., subsidies for e-bikes) or information on how to use it. A visual account of the intervention pattern in mobility is provided in Figure 2.

Overall, low-carbon communities face considerable difficulties when intervening in mobility. In Beeskow, while the population has decreased in numbers, the number of registered cars has increased in the same period (Hielscher & Schäfer, 2016). The transportation issue is perceived as a notoriously difficult one in all low-carbon communities, mainly because of the communities' rural structures, which seem to create a stubborn "need" for automobility, due to a structural dispersal of different functions of everyday life such as housing, work and leisure. Officials refer to the problem of political competences being spread across several levels of scale, from local to regional and national. Many transportation issues are dealt with on the regional or national levels (e.g., planning and funding of public transport), with very little scope left to the local level.

In intentional communities, by comparison, the pattern of intervention looks different. Importantly, intentional communities do not engage in *recrafting* mobility practices, as their aim is to eliminate unsustainable practices. As a consequence, *substitutive* interventions dominate with a stronger emphasis on *shrinking* carbon-intensive practices, which makes the *growing* of sustainable alternatives an almost automatic consequence. For example, communities are planned and zoned in a way that automobility is restricted to the fringes of the ecovillage and "allowed" only for trips to other places. Alternatives such as car-sharing, car-pooling and e-bike sharing are offered with the conseuqnce that car ownership is far below the average for rural villages. Nevertheless, all intentional communities report

persistent problems with reducing automobility to commute to workplaces or schools, for similar reasons as those in low-carbon municipalities: rural structures and low population density mean poor public transport while distances are often too great to be cycled. In devising innovative solutions to these problems, intentional communities sometimes encounter legal conflicts as with private shuttle service to the nearest train station, which was made economically unfeasible by the Commerce and Industry Regulation Act for transport businesses in Austria, which demands, among pther things, special training for drivers, concessions and special equipment.

In both types of communities, several cases exist where measures were implemented which change the ways practices *interlock*. In intentional communities this is an intended standard repertoire promoted by sufficient communal space in the settlements for joint leisure time, communal eating, joint shopping and so on. However, these interlocking interventions also occur in low-carbon municipalities to some extent. Examples include the maintenance of a small grocery store in the center of Laxenburg, the communal purchase and refurbishment of an old cinema-café in the town center of Beeskow, the creation of a local swimming pond, and the subsidizing of inner-city development and zoning provisions limiting the establishment of new suburban shopping malls. All these measures reduce the need for carbon-intensive mobility. Originally, many of these *interlocking* activities had other than climate-related primary objectives, such as reviving the urban centers or offering additional leisure options. Therein, however, lies the largely untapped potential of "interlocking" as a climate strategy, as will be further elaborated upon below.

3.2 | Housing

A visual account of the intervention pattern in housing is provided in Figure 3. Low-carbon municipalities tend to focus on "implementing measures in their own estate rather than in the community" (Bulkeley, 2010; see also Betsill & Bulkeley, 2007). This is confirmed here as well, exemplified by recrafting (mainly thermal insulation, the installation of biomass heating and solar panels) and again by interventions aiming to grow low-carbon behavior (mainly information campaigns for low-energy housing and energy saving behavior). It is important to note that in most cases these measures do not affect the social practices of the inhabitants and there is little political ambition to change them. Measures aiming to shrink energy-intensive behavior at home typically are of informative and noncommittal character. The reasons for this
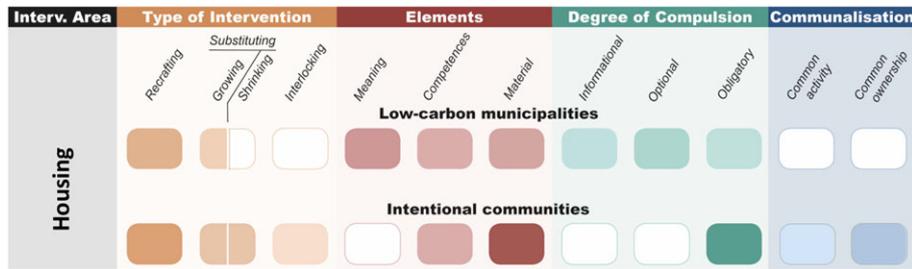
FIGURE 3 Intervention area housing: interventions in social practices regarding type of intervention; dominant elements addressed; degree of compulsion and communalization for low-carbon municipalities and intentional communities (dark areas indicate strong implementation, while light areas indicate little attention) [Colour figure can be viewed at wileyonlinelibrary.com]

reluctance relate to premonitions that such policies would be perceived by many citizens as paternalistic and choice-restricting. Finally, the communalization of built environments (for living, cooking and eating) for purposes of energy saving is absent as a strategy in low-carbon communities.

Intentional communities, in contrast, show a different pattern, with recrafting, substituting and interlocking interventions being more balanced. *Recrafting* measures include the switch to green electricity and biomass heating or the installation of a rain water cycle for laundering, toilets and irrigation, a compost toilet system and building houses with local resources; all these measures are directly affecting the material elements of practices, with the concomitant need sometimes to establish respective competences for handling compost toilets or biomass heating. *Substitutive* measures in the field of housing are rare also in intentional communities, and mainly regard measures such as the substitution of collective for individual laundering, dining or leisure activities. To live in a passive house also requires inhabitants to substitute (rather than recraft) some practices relating to heating and ventilation. Finally, a common way to change how practices *interlock* in the field of housing is to build and use community buildings for as many activities as possible, from leisure to cooking, laundering and working. This is being reflected in the relatively high level of communalization of activities (which may not be socially accepted in a typical low-carbon municipality). In that way, the heating of private homes and spaces is reduced and resource efficiency is improved. Another example of a rule that effectively reduces private energy consumption is the restriction in one community of land per person to be built on, which leads to dense and energy-efficient building structures. Hence, while interlocking is a key measure in intentional communities,

interlocking measures are conspicuously missing in all three low-carbon communities studied.

3.3 | Nutrition

Figure 4 provides a visual account of the intervention pattern in nutrition. The dominant intervention type in low-carbon municipalities is *recrafting* the element "meaning." In other words, municipalities focus on environmental education in schools and kindergartens and on awareness-raising activities for adults. Activities include the promotion of restaurants that focus on regionally sourced food, a sustainable food fair or a "hiking for delicacies" day. These activities, which typically take place only once or twice a year, are *recrafting* interventions as they aim to make people use more sustainable ingredients for their regular dishes, without requiring them to engage in new practices. In addition, however, a few *substituting* activities were registered as well: for example, the attempt in Laxenburg to promote home-made or collectively prepared snacks for school breaks instead of the usual ready-made snacks from the supermarket or the campaign to drink bottled tap water (from refillable bottles) at school, instead of buying bottled water every day. These are arguably interventions that require engagement in new practices. Overall, however, activities of low-carbon municipalities to intervene in the food-related practices of citizens are sparse. All activities are at a very low level of *compulsion*, offering information or sensual or esthetic stimulants. Interestingly, we recorded hardly any *interlocking* activities, for example the establishment or encouragement of sustainable workplace canteens to foster collective (organic and low-meat) meals, which would reduce food waste and the carbon footprint of food consumed (cf. Spurling et al., 2013).
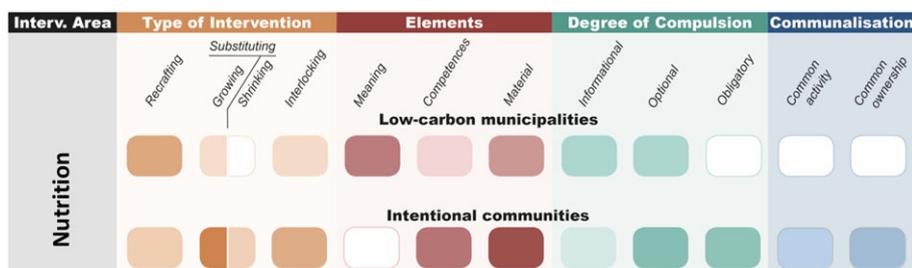
FIGURE 4 Intervention area nutrition: interventions in social practices regarding type of intervention; dominant elements addressed; degree of compulsion and communalization for low-carbon municipalities and intentional communities (dark areas indicate strong implementation, while light areas indicate little attention) [Colour figure can be viewed at wileyonlinelibrary.com]

In intentional communities, by comparison, the focus is on substituting and interlocking interventions. The area of nutrition seems to be central to the identity and purpose of these communities and therefore constitutes a vibrant field of activity. Substitutive interventions include communal food production, preparation and consumption (to various degrees of formalization and obligation), the encouragement of vegetarian food consumption and the (partial) self-sufficiency in certain types of fruit, vegetables and eggs. In Sieben Linden, for example, it is compulsory for all inhabitants to pay for three vegan meals per day served in the local canteen, even if they do not consume them. Thus, there is a strong incentive to have vegetarian or vegan meals and to make use of the resource-efficient collective provision of food in the canteen. Further activities include the organization of courses on how to preserve food, the use of damaged but edible produce, the establishment of a food-coop for external supplies or the implementation of organic agriculture with a minimal use of machinery. All of these interventions involve the introduction, growth and institutional nurturing of alternative practices rather than the recrafting of mainstream ones. This is particularly so when they involve the *collectivization* of food provision activities. With many of these activities, the boundary between substitution and interlocking is crossed. The establishment of communal agriculture, food-coops and organized cooking for the collective makes other practices (shopping in the supermarket, food transport from far away, individual cooking and eating) at least partially obsolete.

4 | DISCUSSION AND CONCLUSION

In this paper we chose the perspective of social practice theory to analyze different ways of intervening in carbon-intensive activities on the communal level. Social practice theory provides a more comprehensive and therefore realistic lens than the methodological individualism normally applied to analyze "behavior," in that it acknowledges the temporal, spatial, material and ideational structures that condition and constrain individual behavior. For example, an information campaign to raise awareness for the advantages of cycling to work may have limited success as long as the distances between homes and workplaces are too far to be cycled, roads are unsafe for cyclists and the temporal structure of everyday life is too tight to allow for low-energy means of transport. Calls to indulge in a more climate-friendly diet may have limited effect if there is too little regional and organic choice on offer, if meat remains too cheap to be avoided and if supermarkets are located in commercial zones outside of villages that can be reached by car only. To intervene in social practices means to change the rules of the game, rather than to cheer on players to try harder. In a world whose sociotechnical structures are geared toward a high-energy, high-carbon performance at all levels, "trying harder" to emit less carbon is bound to be frustrated by external constraints. Changing the rules of the game, then, seems a challenging but more promising way forward.

Our practice–theoretical analysis shows that low-carbon municipalities have limited success in intervening in carbon-intensive practices. They tend either to recraft the material elements of practices, that is, to make practices more efficient without challenging their status as a "need" in the first place, or to offer alternatives without providing the structural conditions for these alternatives to be taken up on a significant scale. In other words, low-carbon communities "grow" alternative low-carbon practices without "shrinking" the carbon-intensive practices. Furthermore, they barely rely on communalization as a strategy to reduce the performance of practices and their material impact. Finally, when low-carbon communities change the ways in which social practices interlock (e.g., by revitalizing town centers), they do this for other reasons than low-carbon development, which leaves large emission reduction potentials untapped. Overall, the strategy of low-carbon communities seems to be to perform better within existing rules rather than to change the rules of the game that are geared toward high-carbon performance.

Unsurprisingly, intentional communities follow the opposite approach in most respects. They are all about changing and collectively defining the rules of the game to enable a lifestyle that is more in line with ecological boundaries. For example, their interventions aim both at growing (desirable) and at shrinking (undesirable) practices, so the process of substitution is more complete; they consciously use strategies of "interlocking" that make unsustainable practices obsolete or reduce their frequency; their interventions tend to be more binding in that they are built into the material infrastructure and leave less choice to behave in an unsustainable way; and they trust on communalization (of both ownership and activities) as a main strategy to reduce the performance of certain unsustainable practices. Their focus is less on persuading the individual than on changing the structures within which the individual lives.

The main reason for the stark differences in the strategic approaches of low-carbon municipalities and intentional communities is that it is "sociopolitically unpalatable," as Hobson (2013) puts it, in a representational political setting for municipalities to intervene in the everyday life of citizens in a way that actively reduces choice or "shrinks" unsustainable but popular behaviors, without being able to rely on a strong political consensus or shared values. Municipalities therefore opt for measures that apply new technologies without intervening into individual behavior or that offer alternative forms of behavior as an additional "choice."

Intentional communities, by contrast, do not experience the same constraints in terms of legitimization requirements. Their inhabitants joined the community precisely because of their ambition to radically transform communal and everyday life toward a sustainable mode of living. Here, the "low-carbon transition" is part of the communal identity and as such forms part of a political and moral consensus. This opens up the space for constant internal (sometimes heated) debate, decision-making, implementation and reflection on the particular ways in which the communal aims and intentions are realized, while the aims themselves no longer require legitimization.

In terms of the top-down/bottom-up distinction of our analysis, the following pattern emerges: while top-down initiatives (e.g., low-carbon municipalities) have a potentially wide horizontal reach as they encompass large populations, and they have a limited transformative depth as legitimization requirements restrict them to relatively "shallow" measures. In turn, bottom-up initiatives (e.g., intentional communities) have a limited horizontal reach as only a small number of people are interested in living in an intentional community, but their measures
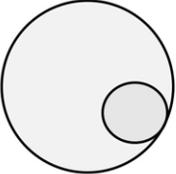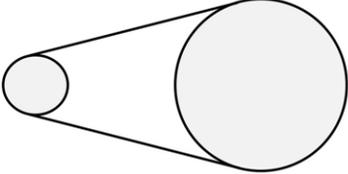
FIGURE 5 Possible strategies for increasing the transformative depth of interventions in low-carbon municipalities through learning from intentional communities [Colour figure can be viewed at wileyonlinelibrary.com]

have a much greater depth owing to a lack of basic legitimization requirements and due to collective decision-making devices. This raises the question of how these complementary strengths can be combined to promote a low-carbon society. More precisely, how can the transformative depth of low-carbon communities be increased without straining the legitimization resources of local policy-makers, and, in support of this, how can the implementation depth of intentional communities be made fruitful for low-carbon municipalities without intentional communities having to give up their radical nature as pioneers and laboratories of change?

In discussions with workshop participants from all initiatives under study the following general strategies emerged as potential ways forward (Figure 5):

4.1 | Hybridization/embedding

The idea behind hybridization is to create institutional, social and spatial links between intentional communities and low-carbon communities that may lead to a partial integration of the former into the latter. The result would be hybrid patterns of activities, infrastructures and ideas that are shared by members of both intentional and low-carbon communities. For example, low-carbon municipalities could invite intentional communities to settle in vacant infrastructure or in new development areas at low cost and to help revitalize and further decarbonize the community in the long run. This strategy, which could be called *embedding*, could be particularly promising in structurally disadvantages areas characterized by depopulation, inexpensive land and vacant buildings, areas looking for ways to attract new inhabitants. The *embedded* intentional communities could, in turn, offer some of their socioecological innovations to "regular" inhabitants of the municipality, such as the community kitchen and dining hall, community gardening, car-pooling, ecological building techniques and some leisure activities. In addition, certain forms of institutional learning could be initiated, where the active members of both types of communities exchange knowledge and experiences in their respective efforts to create sustainable communities. This could lead to more strategic and deliberate measures to change the ways in which social practices interlock. Embedded intentional communities could have a vital role regarding the mediation and

organization of new practices for other interested inhabitants. If such attractive alternatives become visible, shrinking measures can be legitimized much easily. This would facilitate a "thick translation" of social niche innovations to the mainstream level as proposed by Smedby and Quitzau (2016). It would be naive, however, to assume that such hybridization would necessarily increase the willingness of "regular" citizens to dramatically change their ways of life toward a more sufficiency-oriented mode of living, but, on the one hand, it should not be ruled out, and on the other, citizens might be interested in partially changing their practices. National-level policies could support the hybridization strategy by incentivizing or subsidizing the embedding of intentional communities in regular (low-carbon) municipalities.

4.2 | Conveyor-belt/scaling-up

On a national level, policies could be designed that create an institutionalized way of knowledge transfer and, more importantly, scale up successful measures by intentional communities (grassroots innovations) to be emulated by interested municipalities. Committees consisting of local politicians, experts and community activists could skim and evaluate experiences and innovations for their potential to be "normalized" and translated into regular municipal contexts. The idea behind the conveyor-belt principle is to have an institutionalized (automated) procedure by which successful innovations and new practices are lifted from the experimental niches of intentional communities to the mainstream of municipal life. First steps in this direction are being undertaken by the German Federal Ministry for the Environment (BMUB), which has funded several projects aiming at transferring best practices made in ecovillages to surrounding municipalities or neighborhoods in cities.[5]

Both approaches (hybridization on the local level and conveyor-belt institutions on the national level) can or should be combined and could contribute to what Smith and Stirling (2018) call "innovation democracy," that is, an institutionalized nexus between grassroots innovation on the one hand and the larger society on the other. In the absence of any such strategies to increase both the transformative

[5]http://www.gelebte-nachhaltigkeit.de/home/home/index.htm

depth of low-carbon municipalities and the horizontal reach of intentional communities, both types will remain isolated and will continue to have limited impact in terms of a socioecological transformation of society at large.

The analytical lens of practice theory helps to understand that future governance must focus on ways to change the rules of the game, and not on improving the performance of individual players within existing rules. Intentional communities are an important resource to inspire and guide such governance efforts. On their own, however, they remain relatively isolated and somewhat obscure niches that are attractive only for a small share of the population as they require a strong ideological determination to subject one's individual lifestyle to principles of ecological sustainability and communal self-governance. Low-carbon communities, by contrast, remain locked into a growth-based, high-carbon socioeconomic structure which leaves little room for a transition toward a sufficiency-oriented, strong form of sustainability. We thus recommend that future research on local and urban climate governance should put an emphasis on the institutionalization of the principle of hybridization, and scaling-up through the conveyor-belt mechanism. Rather than looking at grassroots innovation and climate governance in isolation, research is needed that explores how innovation (bottom-up) and collective decision (top-down) can be interlaced in such a way that the transformative depth of successful intentional communities is extended horizontally and thus "normalized" to some extent in an iterative cycle to move forward the low-carbon transition on the local level.

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REFERENCES

Beatley, T. (2014). Planning for sustainability in European cities: A review of practices in leading cities. In S. M. Wheeler, & T. Beatley (Eds.), *The sustainable urban development reader* (3rd ed.) (pp. 249–258). London, UK: Routledge.

Betsill, M., & Bulkeley, H. (2007). Looking back and thinking ahead: A decade of cities and climate change research. *Local Environment*, 12(5), 447–456. https://doi.org/10.1080/13549830701659683

Boyer, R. H. W. (2015). Grassroots innovation for urban sustainability: Comparing the diffusion pathways of three ecovillage projects. *Environment and Planning A*, 47(2), 320–337. https://doi.org/10.1068/a140250p

Boyer, R. H. W. (2016). Achieving one-planet living through transitions in social practice: A case study of Dancing Rabbit Ecovillage. *Sustainability: Science, Practice and Policy*, 12(1), 47–59. https://doi.org/10.1080/15487733.2016.11908153

Brand, K.-W. (2010). Social practices and sustainable consumption: Benefits and limitations of a new theoretical approach. In M. Gross, & H. Heinrichs (Eds.), *Environmental sociology* (pp. 217–235). Dordrecht, the Netherlands: Springer Netherlands.

Bulkeley, H. (2010). Cities and the governing of climate change. *Annual Review of Environment and Resources*, 35(1), 229–253. https://doi.org/10.1146/annurev-environ-072809-101747

Bulkeley, H., & Betsill, M. M. (2013). Revisiting the urban politics of climate change. *Environmental Politics*, 22(1), 136–154. https://doi.org/10.1080/09644016.2013.755797

Bulkeley, H., & Kern, K. (2006). Local government and the governing of climate change in Germany and the UK. *Urban Studies*, 43(12), 2237–2259. https://doi.org/10.1080/00420980600936491

Castán Broto, V., & Bulkeley, H. (2013). A survey of urban climate change experiments in 100 cities. *Global Environmental Change: Human and Policy Dimensions*, 23(1), 92–102. https://doi.org/10.1016/j.gloenvcha.2012.07.005. PubMed: 23805029

Christoff, P. (1996). Ecological modernisation, ecological modernities. *Environmental Politics*, 5(3), 476–500. https://doi.org/10.1080/09644019608414283

Creutzig, F., Fernandez, B., Haberl, H., Khosla, R., Mulugetta, Y., & Seto, K. C. (2016). Beyond technology: Demand-side solutions for climate change mitigation. *Annual Review of Environment and Resources*, 41(1), 173–198. https://doi.org/10.1146/annurev-environ-110615-085428

Feola, G., & Nunes, R. (2014). Success and failure of grassroots innovations for addressing climate change: The case of the Transition Movement. *Global Environmental Change*, 24, 232–250. https://doi.org/10.1016/j.gloenvcha.2013.11.011

Global Ecovillage Network (2012). What is an ecovillage? Retrieved from https://ecovillage.org/projects/what-is-an-ecovillage/.

Gram-Hanssen, K. (2009). Standby consumption in households analyzed with a practice theory approach. *Journal of Industrial Ecology*, 14(1), 150–165. https://doi.org/10.1111/j.1530-9290.2009.00194.x

Haberl, H., Fischer-Kowalski, M., Krausmann, F., Martinez-Alier, J., & Winiwarter, V. (2011). A socio-metabolic transition towards sustainability? Challenges for another Great Transformation. *Sustainable Development*, 19(1), 1–14. https://doi.org/10.1002/sd.410

Hargreaves, T. (2011). Practiceing behaviour change: Applying social practice theory to pro-environmental behaviour change. *Journal of Consumer Culture*, 11(1), 79–99. https://doi.org/10.1177/1469540510390500

Hargreaves, T., Hielscher, S., Seyfang, G., & Smith, A. (2013). Grassroots innovations in community energy: The role of intermediaries in niche development. *Global Environmental Change*, 23(5), 868–880. https://doi.org/10.1016/j.gloenvcha.2013.02.008

Heiskanen, E., Jalas, M., Rinkinen, J., & Tainio, P. (2015). The local community as a 'low-carbon lab': Promises and perils. *Environmental Innovation and Societal Transitions*, 14, 149–164. https://doi.org/10.1016/j.eist.2014.08.001

Hielscher, S., & Schäfer, M. (2016). *Fallstudienbericht COSIMA: Entwicklung der Klimaschutzinitiativen—Region Beeskow*. Case report. Available online: http://oin.at/_publikationen/PublikationenNEU/Forschungsberichte/Fallstudienbericht_Beeskow.pdf. Accessed on 30 March 2018.

Hobson, K. (2013). 'Weak' or 'Strong' Sustainable Consumption? Efficiency, degrowth, and the 10 year framework of programmes. *Environment and Planning C: Government and Policy*, 31(6), 1082–1098. https://doi.org/10.1068/c12279

Krause, R. M. (2011). Symbolic or substantive policy? Measuring the extent of local commitment to climate protection. *Environment and Planning C: Government and Policy*, 29(1), 46–62. https://doi.org/10.1068/c09185

Kunze, I. (2012). Social innovations for communal and ecological living. Lessons from sustainability research and observations in intentional communities. *Communal Societies*, 32, 50–67.

Lervik, M., & Sutherland, C. (2017). Local climate governance in the Global South: The case of eThekwini Municipality and the Responsible Accommodation Campaign. *Environmental Policy and Governance*, 27(4), 325–335. https://doi.org/10.1002/eet.1757

Macrorie, R., Foulds, C., & Hargreaves, T. (2015). Governing and governed by practices: Exploring interventions in low-carbon housing policy and practice. In Y. Strengers, & C. Maller (Eds.), *Social practices, intervention and sustainability: Beyond behaviour change* (pp. 95–111). London, UK: Routledge.

Peters, M., Fudge, S., & Sinclair, P. (2010). Mobilising community action towards a low-carbon future: Opportunities and challenges for local government in the UK. *Energy Policy*, 38(12), 7596–7603. https://doi.org/10.1016/j.enpol.2010.01.044

Reckwitz, A. (2002). Toward a theory of social practices: A development in culturalist theorizing. *European Journal of Social Theory*, 5(2), 243–263. https://doi.org/10.1177/13684310222225432

Schäfer, M., Hielscher, S., Haas, W., Hausknost, D., Kunze, I., Leitner, M., & Mandl, S. (2018). Facilitating low-carbon living? A comparison of intervention measures in different community-based initiatives. *Sustainability*, 10(4), 1047.

Seyfang, G. (2010). Community action for sustainable housing: Building a low-carbon future. *Energy Policy*, 38(12), 7624–7633. https://doi.org/10.1016/j.enpol.2009.10.027

Seyfang, G., & Smith, A. (2007). Grassroots innovations for sustainable development: Towards a new research and policy agenda. *Environmental Politics*, 16(4), 584–603. https://doi.org/10.1080/09644010701419121

Shove, E. (2015). Linking low-carbon policy and social practice. In Y. Strengers, & C. Maller (Eds.), *Social practices, intervention and sustainability: Beyond behaviour change* (pp. 63–77). London, UK: Routledge.

Shove, E., Pantzar, M., & Watson, M. (2012). *The dynamics of social practice: Everyday life and how it changes*. Los Angeles, CA: SAGE.

Smedby, N., & Quitzau, M.-B. (2016). Municipal governance and sustainability: The role of local governments in promoting transitions. *Environmental Policy and Governance*, 26(5), 323–336. https://doi.org/10.1002/eet.1708

Smith, A., Fressoli, M., & Thomas, H. (2014). Grassroots innovation movements: Challenges and contributions. *Journal of Cleaner Production*, 63, 114–124. https://doi.org/10.1016/j.jclepro.2012.12.025

Smith, A., & Stirling, A. (2018). Innovation, sustainability and democracy: An analysis of grassroots contributions. *Journal of Self-Governance*

and Management Economics, 6(1), 64. https://doi.org/10.22381/JSME6120183

Spaargaren, G., & Mol, A. P. J. (1992). Sociology, environment, and modernity: Ecological modernization as a theory of social change. *Society and Natural Resources*, 5(4), 323–344. https://doi.org/10.1080/08941929209380797

Spurling, N., & McMeekin, A. (2015). Interventions in practices: Sustainable mobility policies in England. In Y. Strengers, & C. Maller (Eds.), *Social practices, intervention and sustainability: Beyond behaviour change* (pp. 78–94). London, UK: Routledge.

Spurling, N., McMeekin, A., Shove, E., Southerton, D., & Welch, D. (2013). *Interventions in practice: re-framing policy approaches to consumer behaviour*. Sustainable Practices Research Group Report. Available online at: http://www.sprg.ac.uk/uploads/sprg-report-sept-2013.pdf. Accessed on 23 April, 2018.

Strengers, Y., & Maller, C. (2015). Introduction: Social pratcices, intervention and sustainability: Beyond behaviour change. In Y. Strengers, & C. Maller (Eds.), *Social practices, intervention and sustainability: Beyond behaviour change* (pp. 1–12). London, UK: Routledge.

UNFCCC (2015). *Adoption of the Paris Agreement: Report No. FCCC/CP/2015/L.9/Rev.1*.

United Nations Conference on Environment and Development (1992). *Agenda*. (p. 21). A Programme of Action for Sustainable Development. New York, NY: UN.

WBGU. (2011). Welt im Wandel: Gesellschaftsvertrag für eine Große Transformation. Hauptgutachten, 2., veränd. Aufl. Wiss. Berlin, Germany: Beirat der Bundesregierung Globale Umweltveränderungen (WBGU).