The Cultural Complexity of Carbon

Green Transformations in Contemporary Society

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Introduction

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Introduction

Since the 1990s, carbon has emerged as a new social and cultural resource. In a variety of forms, ranging from government regulation of emissions, via the branding of services and goods as "carbon neutral," to the awareness of the climatic costs of individual consumption, carbon has gained prominence in the everyday lives of a diversity of actors across differences of class, profession, gender, age, nationality, technical capacity and much more. As a shorthand for greenhouse gas emissions, carbon has grown to become a data phenomenon that can no longer be accounted for solely within the technoscientific vocabulary of climate scientists, nor can it any longer be treated as merely an economic externality to human modes of production. A variety of new techniques and infrastructures have provided calculative and representational possibilities for governments, corporations, organizations and individuals interested professionally or personally in knowing their "carbon footprint" or in (global) comparisons of emissions. The possibilities engendered by calculative and informational spaces have set up carbon as a "metric of the human" (e.g. Whitington 2016) and as a datafied and informational object that can be transacted as credits or allowances for productive or consumptive action (e.g. Knox-Hayes 2013). Thus it has, in the words of geographer Gavin Bridge, fast become "a common denominator for thinking about the organization of social life in relation to the environment" (2010:821). As a new value form, carbon has entered individual and collective imaginaries across the globe. Yet, in this volume, we contend that the ways it has done so are by no means uniform.

While it is certainly pertinent to ask to what extent the metric of carbon contributes to the desired and intended goal of mitigating climate change through a global reduction of emissions, *a more pressing anthropological and social scientific question is to what extent this new status of carbon as a datafied object generates any change in human social and cultural practices*. In other words, what kinds of specific – intentional or unintentional – changes or "transformations" does carbon make in people's lives across different societal and cultural domains? This volume discusses the transformational role that "carbon" – both as a concept and as a distinct set of material forms and effects

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– has come to play in social and cultural life. It is about how carbon is made meaningful, and how its meanings are attached to ideals and values of social and cultural change but conversely also to cultural continuity.

This role of carbon as involved in cultural change is one that extends well beyond what in public and political discourse have come to be known in vague terms as "green transitions" or "green transformations" (e.g. Scoones et al. 2015), whose abstract end is frequently – but not always – accounted for in terms of reducing greenhouse gas (carbon) emissions. It is beyond the scope of this volume to go into discussions of the nuances of the political narratives of green transformations or transitions.[1] We are instead interested in what appears if we look beyond the corporate claims of being "carbon neutral" or reaching "net zero" emissions and beyond governmental claims of being on target to make promised reductions. Carbon emissions are rising across the globe, despite promises of green transformations and accounts of the formation of "green subjects" and "climate conscious consumers." For this reason, there is ample reason to look beyond the "value" of carbon in markets and in the economic calculations. This entails looking specifically at the role of carbon itself as an object, which can be identified almost anywhere and everywhere because of its physically – and increasingly culturally – pervasive nature (see Dalsgaard 2013; Ervine 2018). That is, while carbon is physically present in multiple forms and places, it is also a cultural resource that covers multiple meanings, both in terms of how humans are beginning to interpret their role vis-à-vis nature and the planet differently and in terms of what carbon as a concept or a value form affords in terms of actions and imaginaries under different social, cultural and infrastructural circumstances.

The questions addressed in this volume

The impact that carbon as a metric and as a value form has had – or has failed to have – in driving green transformations raises several interrelated questions. In this volume, we attend in particular to the following that relate to how carbon is socially or culturally important: To what extent does the knowledge of carbon affect the way that human beings relate to each other and to the climate and/or the environment – both individually and collectively? To what extent does the knowledge of carbon (as data or as information) allow for cultural identities to emerge as more or less "carbon counting" or "green" subjects? Does the recognition of carbon's role in climate change lead to an incremental adaptation of lifestyles or rather to cultural or existential transformations? Or is it met with socially organized denial (Norgaard 2011)? For carbon to have any actual agency in generating change, can we expect it to be visible in everyday life practices and decisions that affect how the lives of human beings are otherwise organized – politically, legally, religiously and economically, for example? Given the vastly different effects and experiences of climate change globally and the vastly different capacities and constraints in how individuals or collectivities respond to climate change (e.g. Roncoli et al. 2009), it is also

pertinent to ask how carbon is differentially valued in cultural terms. Carbon is truly a global phenomenon, but we do not assume that its meaning and value are understood and interpreted in similar ways across the world. But how, then, do different people relate to carbon in different ways?

These questions demand attention to how human beings encounter carbon in their daily lives, whether as a material object, as embedded in a variety of infrastructures, or as discourse – as something we "talk" about but cannot really touch or feel, except through the diverse practices that we associate with emissions. Since our encounters with carbon imply ways of valuing it, we also need to pay attention to culture, since what and how things are valued is inherently cultural. By focussing on culture and its role in social relations, we aim to contribute to social science discussions of climate change with a deeper understanding of carbon's role in contemporary society, but we also take the concept of culture more seriously than other volumes, which claim to address carbon or its related institutions as somehow "cultural," but either delimit their focus to institutions of green transitions in the Global North (Bulkeley, Paterson and Stripple 2016) or do not define their concept of culture (e.g. Knox-Hayes 2016).

In many anthropological definitions, culture is understood as a matter of how relationships, meanings and interpretations of reality are seen as similar or different from one another. Culture is how human actors categorize the world, which is not merely about the everyday lives of citizens, consumers, individuals or communities as bounded entities, but about the way these actors relate to one another and to each other's values and knowledge forms, including their mutual entanglements, complexities and contradictions. This includes how the meanings these actors generate relate in different ways to the cultural influences that stem from the scientific, political, economic or legal domains that in themselves are by no means homogeneous but nonetheless have a huge impact on climate change mitigation and the different valuations *of* but also *with* carbon. In this respect, the introduction presents the contributions to the volume and frames these through a focus on the diverse meanings ascribed to carbon in different cultural contexts. We also discuss how cultural meanings and social relations change or stay the same in the process of making carbon valuable across a variety of contexts. We claim that (a) carbon as an object can be treated as a fundamental part of contemporary culture and that (b) it lends itself to being studied as culture. That is, it can be studied by qualitative and ethnographic means.

To address carbon's transformational potential as a cultural artefact – that is, how it is implicated in culture change – it is necessary to discuss how carbon has emerged as valuable in a variety of different ways, but also how it has made old valuables valuable in new ways. For example, is the value of one's forest the same if under new carbon metric standards of value, trees can be sold not as wood but as carbon offsets? And how do people in Norway value oil when its importance has moved from that of being the enabler of welfare to a substance that, through its combustion, damages the welfare of the entire planet (Lautrup,

this volume)? This difference in part stems from how carbon means different things to different people in different contexts. For example, outside of the disciplinary perspectives of atmospheric chemistry and climate sciences, carbon exists in governance and policies (from international to municipal levels) and in financial circles and infrastructures (as credits, permits, etc.). Its existence in the latter allows market actors to invest and hope to make a profit while simultaneously believing that their work will positively impact the way that carbon – in the sense of greenhouse gas emissions – is reduced elsewhere. Yet, while these domains have played a critical role in transmitting ideas about how and why carbon could or should be valued to a diversity of other domains and publics, carbon's meanings cannot be confined to those ascribed to it in science, in policies or in market institutions. Our focus on culture addresses this "elsewhere," where carbon is much more than a greenhouse gas, a target in policy directives or a financial asset. Carbon exists in a plethora of other social and cultural contexts. For example, when carbon is identified in the form of "footprints," it becomes morally indicative of how people want or ought to live their lives (e.g. Paterson and Stripple 2012; Dalsgaard 2022). Carbon has furthermore become institutionalized in corporate or governmental accounts and inventories, but also in everyday practices associated with "low-carbon" living (e.g. Whitmarsh and O'Neill 2010; Lovell 2015). Even where carbon is "stored" in natural environments (e.g. forests, fields, etc.), these environments cannot solely be reduced to "carbon sinks." They are often intimately entangled with human agency relating to resources that are owned and managed by someone and for whom they carry specific meanings (e.g. Mahanty et al. 2012; Paladino and Fiske 2017; Bruckermann, this volume; Lounela, this volume). In this way, carbon – no matter where it is found or in what form it is identified – is entangled in social and cultural webs of significance.

In the remainder of this introduction, we first attend to carbon as a range of diverse phenomena in human lives and, second, to the way that it can be approached as culture. Then we present a discussion of its potential for generating or promoting change, before turning to the different contributions to this volume and how they provide unique perspectives on the topic of carbon. In sum, in the introduction, together with the volume as a whole, we demonstrate how paying attention to carbon as a cultural artefact allows for a more profound appreciation of when, how and why carbon enables (or sometimes disables) change.

How the social sciences have approached carbon: a multitude of phenomena

There are many starting points for an exploration of the meanings and values ascribed to carbon. The following pages outline four topics that in our reading have dominated the social science literature on carbon. These are (a) carbon's role in "the green transition," (b) carbon as a metric, (c) carbon as a material

object and (d) carbon in everyday life. There are multiple overlaps between them, and they must not be seen as mutually exclusive.

One starting point is, as mentioned above, how carbon is today regarded as central to what has variously been dubbed "the green transition" or "green transformation" of human societies. Calls for transitions to a "low-carbon economy" are evidently one of the key components of these imaginaries. The type of questions engendered when focussing on carbon's role in these processes lend themselves to exploration from the perspectives of political economy in a broad sense (Scoones et al. 2015). That is, how especially political scientists, geographers and economists have studied the ways that political and economic structures govern or are transformed in or by the economy of carbon. A central component of these perspectives is the study of the institutional processes behind the phenomenon of climate governance mechanisms and, in particular, carbon markets – both compliance and voluntary markets[2] (e.g. Helm and Hepburn 2009). Initial interest from economists followed the lines of market design in response to the implementation of the Kyoto Protocol's flexible mechanisms (e.g. Grubb 2003; Yamin 2005) and the making of the regulatory or compliance markets typically governed by states or international organizations. These concrete markets, such as the European Union's Emissions Trading Scheme, have received much attention (e.g. Bigger 2016; Wettestad and Guldbrandsen 2018), but the processes of establishing markets that failed to come into place have also been studied (Pearse 2018). From there, the more obvious political angles have become integrated into discussions of the formation of a new "carbon economy" (Bridge 2010; Newell et al. 2012) or "climate capitalism" (Newell and Paterson 2010). These include discussions of how a variety of actors – and especially markets – are deployed to govern climate change mitigation (e.g. Bulkeley and Newell 2010; Knox-Hayes 2016; Ahonen et al. 2022), how public sector institutions have adopted their own emission reduction goals or projects (e.g. Rice 2010; see also Knox 2020) and how the market designs, including cap setting, offsets and allocation of allowances, have spillover effects and social consequences, even in those cases where they manage to deliver the emission reductions they promise (e.g. Goodman and Boyd 2011; Ervine 2018).

Another potential starting point is attending to the capacity of carbon to be deployed as a metric. Some of the scholarship in this field focusses on how individual techniques of the self are promoted, while others have studied corporate climate accountability, which is facilitated by management and accounting concerns and practices. Much of the literature addresses the technical measures and procedures that define how carbon can be identified across different fields and how it is commoditized, priced and valued technically in different contexts (e.g. Bowen and Wittneben 2011; Yocum 2016; Ehrenstein and Muniesa 2013; Gifford 2020). Other contributions dive into the supporting practices and infrastructures of carbon metrics, from excel sheets and meeting notes to apps, digital repositories and devices that set up frameworks for participation and action (e.g. Marres 2011; Lippert 2015, 2018). The design of the

metrics, as well as their material concretization in infrastructures, has been demonstrated to be both influenced by corporate or technical "cultures" of accounting and accountability (e.g. Lovell and MacKenzie 2012) and by definitions of carbon that sometimes appear almost arbitrary but nevertheless come across as politically useful for accounting "proxies" for emissions (see Lippert 2018; Dalsgaard 2024). Rather than accepting their status as purely technical, critical social science scholarship has pointed out how the modes of standardization and definitions of what counts as emissions contain normative, political and disciplinary power (e.g. Gupta et al. 2012), and indeed carbon metrics are frequently thought of as facilitating government intervention and commoditization (see Knox 2020). Carbon metrics also impact the way that organizations and individuals relate to or even enact "the climate" as a datascape through accounting (Lippert 2015). More recent contributions to these discussions highlight the role played by corporate attempts to construct footprints, for example, through the scopes invented by the GHG Protocol (e.g. Walenta 2021). Analysis of carbon's function as a metric is especially inspired by science and technology studies and governmentality theory. Within these approaches, carbon is consequently seen to impact human social and cultural choices and to engender new "green" subject formations (e.g. Lovell and Liverman 2010; Paterson and Stripple 2010; Lövbrand and Stripple 2011).

A key component in the construction of carbon as a driver of subjectification is its commoditization as credits or allowances. This relies not only upon techniques of counting and accounting but also frequently upon the objectification of carbon into material and often physical forms that can be counted and accounted for. Due to the mechanisms of the Kyoto Protocol and the technical rendering of different greenhouse gases as commensurable (e.g. Mackenzie 2009; Dalsgaard 2013), carbon numbers (as credits or allowances) are made in a multitude of physical locations, infrastructures, technologies and techniques in the Global North as well as the South, where carbon is identified in, for example, land use changes such as agricultural production, biofuels, forest tenure and the management of carbon sinks (e.g. Leach and Scoones 2015; Paladino and Fiske 2017), and in practices related to energy saving such as improved cookstoves (e.g. Wang and Corson 2015) or electricity systems (e.g. Boyer 2019; Howe 2019; Sareen and Müller 2023). A recent concretization is the development of new "carbon capture" technologies and the subsequent infrastructures that allow concrete carbon dioxide to be circulated, stored or utilized (e.g. Günel 2016; Buck 2022). The focus on forests has been especially scrutinized by academics due to the attention that the ongoing negotiations over the REDD+ programme[3] – as well as its effects on forest and land tenure in the Global South – has received in international climate change debates (e.g. Corbera and Schroeder 2011; Murdiyaso et al. 2012; Pascoe 2018; Greenleaf 2020). In parallel, carbon numbers are also identified by those searching for credits to buy. They find them in devices for "everyday carbon accounting" (e.g. Marres 2011; Lövbrand and Stripple 2011; Gausset, this volume).

A final point of departure is then how carbon is identified in everyday life practices or discourse – not as a commoditized "object," but as something related to actions performed on a daily basis and to the semiotic and metaphorical references that inform and ascribe meaning to those actions. That is, how carbon is associated with specific norms and ways of living, acting or consuming (e.g. Lovell et al. 2009; Lindman et al. 2013), and how carbon is attached to the cultural meanings of things and actions at work or at home, for example. This includes the metaphorical use of carbon footprints or other linguistic "carbon compounds" to reflect upon climate impacts (e.g. Nerlich and Koteyko 2009; Girvan 2018), but also the anthropological attention given to the choice between different types of everyday practices of governance or consumption in response to deteriorating environmental conditions (e.g. Knox 2020) and how these practices differ across a variety of distinctions such as residential location, gender and age (e.g. Underwood and Fremstad 2018; Albert et al. 2020). Associations with specific ways of consuming are semiotic, but they are often also normative (e.g. Dalsgaard 2022), and one line of analysis pursued by only a few scholars has been the Bourdieu-inspired discussions of how carbon altogether relates to "green" forms of capital, status or social distinctions (e.g. Horton 2003; Lippert 2013).

Carbon as cultural

What the above approaches have in common is how they all attempt to answer how carbon has become "valuable." Whereas previously, it was evident how the value of carbon stemmed from its physical and chemical role as a component in fossil fuels that allowed societies to grow based on the consumption of energy (e.g. Mitchell 2011; Appel, Mason and Watts 2015; Di Muzio 2015), one can today make the more general observation that carbon has become valuable in its own right due to its climatically negative value as a key component in the production of greenhouse gases. The big question is how does this climatic value manifests itself in a diversity of social contexts? "Climate change" is itself valued differently by different individuals and collectivities. Even if victimhood and vulnerability can be debated (Hughes 2013), some social groups surely have the resources to adapt to – or even gain from – the subsequent sociomaterial changes, while others – the majority – seem positioned to lose (see Klein 2014; Singer et al. 2016). Climate change – and with it, carbon – thus translates easily into value in economic and material terms. Yet economic and material terms are also cultural terms. Livelihoods and the many different actions and objects associated with carbon emissions are all valued in relation to things other than "just" climate change and the costs implied in efforts to avert it. Economic value is but one of several cultural "values" against which something can be assessed as valuable, and the materialities that come to matter can themselves be defined as culturally constituted. An example frequently referred to by the anthropologist Marshall Sahlins was that no ape would be able to tell the difference between holy water and distilled

water because they are chemically identical (1999:400). Similar struggles over the valuation of carbon take place every day when corporations and consumers alike are asked to choose between emissions that, from some perspectives – such as that of business accounting – appear identical, but in terms of other social or cultural meanings are entirely different – not the least in the effects that are derived from this difference, which can be either of semiotic or of moral value, or most likely both. A perspective on culture inspired by Sahlins' work (e.g. 1976; 1999) would suggest that such differences in meaning can only be established with reference to culture as a primary and autonomous entity in relation to the materialist, utilitarian or "economistic" rationalities that have otherwise today come to dominate, especially through what Scoones, Newell and Leach (2015) refer to as the technocentric, marketized or state-led narratives of transformation. That is, there is much more to human existence and to what we value than that which can be explained by political or economic rationalities. Of course, there can be no anthropological text about culture without caveats. The culture concept (or concepts, since there is hardly any agreement on how to define culture) faced multiple critiques towards the end of the previous century (see Brightman 1995). However, it still exists, and it remains in operation in anthropology and beyond for those trying to find a way to address deeper patterns and inconsistencies in human meanings, processes, behaviours and practices.

Drawing upon a social anthropological perspective, we also emphasize how culture must be understood as emerging from practice as a relational concept rather than referring to essentialist characteristics (e.g. Strathern 1995). It is about the practice of making social and cultural distinctions between self and other, as much as it is about defining subject and object, nature and culture "good and bad" emissions or "good and bad" climate actors. No matter the right balance between (or rather integration of) these distinctions, a more nuanced understanding of *value* than that defined in economic terms is crucial if we are to understand the breadth of responses to climate change and the management of emissions. To approach the practical relationality of culture, here we take our cue from the anthropological critique of economic thinking presented by Sahlins (1976), but also from more recent attempts to revive an anthropological concept of value (Graeber 2001; Otto and Willerslev 2013). In particular, David Graeber's work on value provides a useful lens for how to address the contrast between different understandings of value, and how value is an innately cultural phenomenon, which in anthropological discussions interchangeably refers to economic value (related to markets, price, etc.), moral value (e.g. social norms) or semiotic value (related to linguistic usage within a structure of meaning). First, what is of value and how value is defined are closely interrelated to discussions of culture (see, e.g. Otto and Willerslev 2013). Second, the topic of carbon seems easily adaptable to Graeber's discussion of different anthropological approaches to value because of carbon's ephemeral nature in everyday life and because of the multiple ways that carbon is valued and regarded as valuable – from the spheres of science and markets

to norms and everyday practices. Relying on these sources of inspiration helps us frame the chapters of the present volume in relation to how carbon is identified and valued across such a wide variety of human relationships. Instead of seeing culture as a separate realm "exogenous" to either nature (climate) or the economy, inspiration from the thinking of Sahlins and Graeber points to how both these entities are fundamentally cultural.[4]

Graeber (2001) grounds his discussion and theorization of value in the creativity of human action and innovation (Otto 2024: 30; Graeber 2001: 259). As a self-proclaimed anarchist, Graeber's hope was to free human action to fulfil "its creative potential of imagining different values and a different society" (Otto 2024: 30). The 1997 Kyoto Protocol did indeed place carbon at the centre of such a transformative aspiration for imagining and creating a new type of value (if not necessarily a different global society), but this was an aspiration originally envisaged by policymakers and economists, who built upon ideals of neoliberal globalization and financialization when they allowed carbon in whatever forms it could take to be commodified and marketized (see Lohmann 2010). This is almost certainly not what Graeber had in mind, not the least in the wake of the great financial crisis and the prioritization of bailouts for finance (2013:235). Graeber's contribution to discussions of value is rather his emphasis on the need to assess the value of actions (or objects, one might add), not only in relation to what they are imagined to be at a specific abstract moment but also in relation to what they have the capacity to become or to generate in practice in different cultural settings (2001:254). From this perspective, carbon emissions become about *potential* – of what may or may not be realized. The role of counterfactuals in carbon accounting is a case in point (e.g. Lohmann 2011; Ehrenstein and Muniesa 2013). Calculating or just identifying carbon as a value form proposes a distinct view of a *future* to be attained, but often one that is unclear to a lot of the people involved in terms of what this might entail, which some of the contributions here also touch upon (see Bruckermann, Hougaard, Lautrup, Lounela and Schyberg, all in this volume). At other times, this valuation of carbon is about establishing a narrative that apportions present-day responsibility for the past (Lippert, this volume). Emphasizing how carbon is cultural in this way ties into the idea that culture is practice and how all the different sectors, organizations and institutions that deal with carbon are culturally constituted – and so in turn they constitute the value of carbon differently through their particular organizational forms, systems, performances and processes (cf. Best and Paterson 2010: 13f).

Culture change

If carbon plays an important social and cultural role in contemporary societies, it is pertinent to ask what forms of transformational potential it might hold. What forms of change is carbon seen to enable or generate through the different forms it takes? And what forms does it disable? In other words, how

can we approach the changes or continuities engendered by carbon as *cultural* change or continuity, with carbon as a new value form at the centre?

Putting carbon at the centre of discussions of change gives us an opportunity to see what happens when a new form of value is introduced or emerges in social and cultural life; it allows us to study the effects of enumerations and valuations that cut across a diversity of personal and organizational relationships in practice (cf. Dalsgaard 2013). The introduction of carbon as a financial asset and as a "unit," which individuals and collectivities can relate to and compare across their lives, is *meant* to generate change – albeit a change limited to distinct forms of production, consumption, governance and behaviour, which simultaneously is meant to ensure continuity by stabilizing the economic system and the climate in tandem. Few people would doubt that political and economic structures – including the making of new financial value forms – provide incentives, but how the changes in, for example, technologies, governance systems and markets impact culture and social practice in a way that not only changes extrinsic motivations but also changes norms, status forms and personal identities, or even how small-scale citizen-driven mobilizations can spread more broadly, remains an open question.

Policy initiatives oftentimes rely on technological changes that assume that we can achieve decarbonization without the need for people to change socially or culturally. Yet, there are also initiatives promoting small motivational interventions in individual attitudes and choices (Bulkeley, Paterson and Stripple 2016: 2). How sincere these are in generating norms for how a moral person – an individual – should reduce their climate impact has been profoundly debated. A significant body of Foucauldian-inspired theorization has anticipated the formation of green subjects based upon carbon accounting and other governmentality mechanisms (e.g. Paterson and Stripple 2010; Lövbrand and Stripple 2011). However, it is uncertain whether – or when – such mechanisms work. For example, Hannah Knox (2020: 93ff) has discussed how the city of Manchester discovered that, while theoretically possible, the implementation of consumption-focussed carbon footprinting turned out to be difficult to implement in practice. It was challenged both by the difficulty of tracing the minute details of how objects were made and by the ontological remapping and reconsideration of the roles of vast amounts of objects in social life. As with many of these consumption-based carbon footprint schemes, it is still uncertain the extent to which they can engender deeper cultural changes (either to the self or to collective norms and practices) or if they remain a form of lip service – a shallow "performance" of green identities (Horton 2003) or a discursive "simulation" (cf. Blühdorn 2007). Previous research by psychologists (among others) has pointed out that there is often a stark difference between the "intent" to make green changes and the actual climate impact of the actors in question (Moser and Kleinhückelkotten 2018). However, Quentin Gausset's research (this volume) demonstrates that the self may be configured communally through networks of neighbours and peers who motivate each other to first calculate emissions from their consumption and then subsequently

support each other in reducing them. Qualitative and ethnographic work has a role to play here by analysing these changes not as a matter of individual preferences for either adoption or resistance to a new value form, but as part of social relationships between Self and Other and as part of semiotic distinctions that are shared even if they are not necessarily agreed upon.

Two important aspects of change are how quickly it occurs and its degree or "depth." Sometimes change may appear slowly and be gradual, while at other times it is sudden and radical. Given the urgency of the climate crisis, it is pertinent to consider the levels of change brought about by carbon. Some have stressed the need for individual change in behaviour and consumption practices as a necessary ingredient in mitigation, while other voices have focussed on what some would call deeper changes in perceptions, motivations and sociocultural values, or even (infra-)structural, societal or global changes to capitalism. It is worth remembering that carbon, as a value form, is meant to engineer forms of change that carry specifications. It must be "sustainable," "neutral," "net zero" or "climate friendly." It must help human collectivities and individuals reduce the greenhouse gas emissions they are responsible for. Somewhat paradoxically, if change has to be sustainable or involve "neutrality," per definition it also involves a certain amount of continuity – something that also might not change by being retained, reproduced or renewed. As argued by Sahlins in *Islands of History* (1985), the dichotomies of history and structure and change and continuity do not exist in opposition to each other. Culture functions as "a *synthesis* of stability and change, past and present, diachrony and synchrony." (Best and Paterson 2010: 144, emphasis in original). In other words, Sahlins argues that all change departs from existing forms. It is for this reason that a conceptualization of culture is valuable to the study of carbon-generated value changes. The valuation of carbon as constituted by and spread through markets and financial institutions is conversely a result of, among other things, how patterns of "the economy," such as consumption, financialization and neoliberalism, are built upon culturally shaped economic assumptions (see Best and Paterson 2010) and how these in turn depend upon specific social and cultural assumptions that human beings are rational actors who, as consumers, act in their best economic interest (see Sahlins 1976; Gausset, this volume). Many of the carbon-reducing initiatives we encounter thus build on attempts to secure the continuity of these cultural forms against the pressure of the growing climate crisis, whether this means "re-stabilizing" the narrative of capitalism as progress (Ervine 2012) or using imaginative "technical adjustments" to avoid questioning capitalism's social, political and economic relations (Günel 2019; Hougaard, this volume).

Here we return to the question of where changes come from. Early research into "the carbon economy" indicates that the way carbon is objectified as valuable is a result of capitalism as a cultural order or "system" (see Newell et al. 2012), but this research does not fully address how the system is in turn affected by the different cultures it encounters. Existing research on carbon often focusses on what carbon "does" in changing the values of individuals and

collectivities in specific locations. But how is the value form itself transformed, and how is the dominant system of valuation transformed concurrently, if at all? For example, in the early days after the Kyoto Protocol and the Clean Development Mechanism, there were scandals such as when the production of hydrofluorocarbon (HFC) gasses in Chinese factories was enabled by selling carbon credits (e.g. MacKenzie 2009). In response, "the system" tried to correct itself, and subsequently, it has done so several times in the wake of resistance from, for example, critical journalists, scholars, buyers and indigenous groups. This has led to more elaborate verification mechanisms and standards that in turn have themselves become a set of commodities that "guarantee" the quality and value of carbon as a commodity (cf. Dalsgaard 2024). That is, despite the criticism, the deeper systemic capitalist structures and their approach to carbon have not changed.

Changes may develop from what in some contexts appear as new and external forces, as much as from existing (internal) dynamics. We will revisit this below, but first, it is necessary to stress that it would be naïve to separate these internal or external forces or dynamics into, on the one hand, carbon markets, scientists and experts, etc. as active (rational) agents behind systems and value forms that create changes through their governance of economic and political incentives, and, on the other hand, citizens, consumers or societies as passive recipients of such incentives for change that they may go along with or "resist," depending on their cultural predispositions. Such a separation would mean taking a superficial view of culture as made up of the elements that different collectivities or institutions "have" and can transfer to others, even if some meanings are "distorted" along the way. As mentioned already, culture can instead be seen as a relational and constantly developing set of positions and interpretations – as the meaningful distinctions people make in practice; distinctions that, to some degrees, are shared within social groups, corporations, networks or communities (cf. Sahlins 1985; Strathern 1995, 1997). In other words, if the value of carbon may be analysed as the result of human actors accepting or responding to external forces, this does not mean that the actors involved are passive and simply "receive" a value form. For example, carbon as a value form is rarely (and perhaps even "never") communicated solely in terms of a number (e.g. Lippert 2018), nor is it solely interpreted as such. Awareness of the climatic value of carbon, as much as how carbon works in economic and political institutions, has often been spread – albeit unevenly – throughout societies through communication via media and social networks. This communication has shaped people's cultural expectations around what is valuable about carbon and how (cf. Nerlich and Koteyko 2009; Brevini and Murdock 2015).

The contributions to this volume have something to say about this. For example, it is worth mentioning how the Dayak peatland dwellers in Central Kalimantan, Indonesia, have not grown carbon as a value form on their own. It has come to them through national peatland restoration projects promoted by government and international organizations in advance of any enumeration of their landscape's value as a carbon sink (Lounela, this volume). Also, the

Danish "carbon farmers" could be seen as responding to an externally promoted "configuration" of who and what they are when they physically spread carbon in the form of biochar on their fields (Hougaard, this volume). However, in both cases, a focus on this external origin would be to ignore the agency of the people in question as they react and respond in ways that stem from their own interests and prior experience. The peatland dwellers rely on their peatland channels for the sociality and material resources that can sustain their livelihoods. This impedes the wetland restoration needed to store carbon. The Danish carbon farmers are likewise interested in how new carbon forms can help them sustain a living. Yet this involves vying for a role in the Danish green transition that can be broader than just applying biochar to their fields. It also means choosing how to dispose of the farm-produced biomass that goes into making biochar in the first place, thus potentially expanding their agricultural production (and thus overall emissions) in the process. What the volume demonstrates is how the cultural reproduction of everyday life for Danish farmers, Indonesian peatland villagers and many others is, to various extents, transformed through carbon as a category of value, which leads to changing perceptions of forest, land, future and organizational forms. Speaking in terms of the changing semiotic meanings and conceptual value of carbon, carbon clearly takes on new value in all the contexts analysed in this volume. In some of these places, carbon has hardly been recognized on its own as a value form before, whereas in others it has been transformed from merely something that we breathe out to something that must be managed and contained. In other places, it may not be carbon as such that gains new value, but it is the land, the forest, the acts of consumption or the relations between people that are revalued and which have only recently become semiotically associated with carbon.

There is, in other words, nothing deterministic about the impact of external value forms (such as carbon) upon culture. Culture is an open-ended and unfinished repertoire that guides people's interpretations of value and life designs according to whatever aspirations any given individual or collectivity may pursue within the constraints of their surroundings. Sahlins emphasized how "different cultural orders have their own modes of historical action, consciousness, and determination – their own historical practice" (1985: 34). Cultural encounters between such orders would slowly transform while they interacted. While the culture of the neoliberal capitalist system (if it indeed is a system) may change at a different pace to that of communities that adopt carbon accounting or the commoditization of their natural resources into carbon credits, their various actions of consumption, resistance, adaptation, etc. nonetheless have an impact on what is sold and how the value of what is sold is established. As mentioned above, this gives rise to yet another set of "commodities" in the form of standards, methodologies, verifications and certifications that are necessary for carbon to be transformed into credits (cf. Dalsgaard 2024). These derive from the need to distinguish between that which can be counted as carbon and that which cannot; that which has a lot of climatic impact and that which has less of an impact. Where a standing forest – disregarding the multiple forms of life and

social relationships it contains or sustains – may in one instance be regarded as merely a repository for storing carbon, it may under other circumstances become interpreted as a potential credit, which can be sold as soon as someone puts forward the threat of felling trees there. The system we refer to as capitalism may change slowly through its own "cultural circuit" of reflexivity (Thrift 2005), but the value forms sustaining capitalism may change at a quicker pace based upon the cultural encounters between marketized "objects" (carbon credits) and the different agents and networks of producers and consumers involved. If we identify such different tempi and degrees of change and discuss their discrepancies and differences from a perspective of value, we might be tempted to argue that there is a hierarchy of values at stake, where the making of an actual impact (and accepting the personal or collective "sacrifice" that this might entail) is subsumed to expectations of social status, or what one, with Pierre Bourdieu (1986), might discuss as capital within a given social field or group (see also Graeber 2013).

Emphasizing these inequalities does not merely point out that there are powerful systemic, infrastructural and global barriers opposing any deeper cultural change. It also questions how much a semiotic reference to one single element (carbon) can do to generate change. That "talk" about carbon can do *something* is certain. There are good examples of how specific actors start to see their own role and position in the world differently, and that some actors see nature and the climate differently. The use of the term Anthropocene may thus imply a new and different view of the relationship between humankind and the climate, even if the term is not focussed specifically on carbon emissions. Yet the awareness, the reflexivity and the internalization of everything pertaining to climate change, including the responsibility, agency and value associated with carbon as a prime agent in these changes, are still unevenly distributed, as is all knowledge (e.g. Barth 2002). To be sure, carbon – as a concept and a value form – has proven effective in raising awareness and reflexivity over climate justice and responsibility in some publics. Yet, its logic of enumeration has also been accused of turning justice into a matter of calculation rather than an engagement with the political and democratic "work of figuring out how to live in the world" (Beuret 2017: 15). Enumeration of carbon cannot help us solve the climate crisis on its own. That is, the actions and practices that the enumeration affects have clearly not yet been transformative enough, given that global emissions are currently still rising.

The chapters

The contributions to this volume engage carbon from a range of perspectives touching upon critical policy studies, social psychology, science and technology studies, sociology and anthropology. Accordingly, they do not present a uniform approach to "culture," and in this introduction, we have therefore provided a reading of how culture emerges or is implied across this variety of perspectives on carbon.

Siddharth Sareen and Bérénice Girard present us with a perspective that complicates the technocratic assumptions often entailed in the implementation of policy. They follow how an American model for the decarbonization of electricity supplied to energy-poor households travels to Europe. They emphasize the specific challenges to this process and how the model transforms and is adapted to local regulatory and demographic realities and infrastructures in the European countries where it is adopted (France, Spain and Italy). Carbon is often implicitly valued in such processes, and it lurks as a key value form driving the justification for making changes towards new infrastructures of electricity. Their chapter thus specifically shows how policy-driven change is never straightforward, even when societal majorities subscribe to decarbonization as a value in itself. Yet it seems that policies do create space for different emerging ideas of what counts as emission reductions.

Quentin Gausset's chapter asks what kind of change is generated by the deployment of carbon footprint calculators among Danish "eco-communities." Such calculators frequently align themselves with sociopsychological theories of behavioural change stemming from individual motivation. Gausset argues that these calculators embody sometimes problematic assumptions about what forms of consumption can help reduce emissions. In addition, the practical valuation and enumeration of emissions from a host of consumption practices perform a difficult balancing act between the accuracy of what counts and the flexibility that is needed to accommodate a wide range of uses and lifestyles. In Gausset's research, commitments in a social community – sometimes supported by calculators as technologies of quantification – prove to be stronger in motivating people to change by creating a space for support and reflexivity. This easily dispels the often-held technocratic assumption that solely providing individuals with data and information about emissions is sufficient for their reduction.

Inge-Merethe Hougaard has followed experiments that encourage the use of "biochar" fertilizer produced through pyrolysis. Danish farmers have been invited to apply biochar to their fields, which allegedly both binds carbon and enhances crop growth. Hougaard points out how an implicit and largely technically derived configuration of farmers as mere "users" of biochar ignores the wider practices of "carbon farming" that the production and distribution of biochar entails. For example, farmers are also expected to provide manure as biomass input to produce biochar, but biomass is also needed for the making of biogas. The latter has been crucial for emission reductions by replacing coal in the Danish energy sector. Finally, the application of biochar as a new emission-reducing practice provides yet another arena where carbon must be valued through counting and accounting. With multiple and unclear distinctions between "producers" and "users," potential disagreement emerges over the ownership of an emission reduction and towards whose account it gets credited.

Katinka Schyberg's chapter visits debates about emission reductions within the Danish Church. The Church is officially a state-governed institution – informally described as a "well-ordered anarchy" – bound by a strong tradition

of independent and decentralized decision-making. This tradition, which has effectively kept the state from interfering in Church affairs, is challenged by carbon, which is a new phenomenon that a variety of Church actors now have to agree upon and situate both theoretically and practically within their organization. The chapter emphasizes how, on the one hand, efforts to calculate and display the Church's carbon footprint ended up uniting the Church against the odds and against further state intervention in terms of how the Church should engage in climate mitigation. On the other hand – and in seeming contrast to the first point – it also contributed to the preservation of both the decentralized structure of the Church and its ability to foster a heterogeneity of Christian ideas and political convictions.

Charlotte Bruckermann's chapter dives into the ways that carbon, in her case from China, is deployed to appropriate a diversity of cultural values. While carbon is introduced across China as a financially and economically quantified phenomenon, it is nonetheless challenged by the need to accommodate unforeseen externalities. As a result, carbon is technologically and bureaucratically coded with a broader "civilizing" force that stems from national ideologies of "ecological civilization." The tensions involved give rise to what Bruckermann refers to as relational frontlines between the economically oriented quantification and the qualitative values pursued by people in various positions. Here, Bruckermann centres on the case of rural afforestation workers, who do not uncritically accept a carbon-centred subjectivity when this is set against a state ideology anchored in a combination of neo-traditionalist and socialist values.

Anu Lounela takes the reader to Central Kalimantan, where Dayak villagers are engaged in damming the channels that crisscross the peatlands they inhabit. The purpose of this is to reverse the draining of the land both to reduce the risk of fires and to restore carbon in the landscape. The latter is expected to generate an income from the selling of carbon credits. However, the changes in the landscape are a source of local controversy because the raised water level impacts what can be grown in gardens and because the dams obstruct the channels' function as infrastructure for transportation and communication between dispersed villages and various sites for gardens, fishing, forestry or commercial timber production. Lounela argues that such restoration projects transform local social orders by commodifying the land as a "peat carbon frontier," and this "accumulation by restoration" generates conflicts between different value regimes as it impacts livelihoods and ownership of and access to land.

The chapter by Ingmar Lippert presents the reader with an experimental autoethnographic venture into an old lignite mining landscape in eastern Germany. The (previous) existence of carbon in the form of brown coal has transformed the land and the livelihoods of the local community through the forced movement (to some the destruction) of their village. Many traces remain of a troubled transformation, which is continually being re-interpreted in the light of changes in the present. This existence of the village in memories, in

what Lippert refers to as "ont*political" designations, comes out through different visual and material representations of past events at an archive as well as at the site of the vanished village itself. The narrative of carbon's implied presence interchangeably challenges and justifies the extractivist commitments that lead to contemporary identifications with the landscape as one touched by the value of carbon in the specific form of lignite.

Andy Lautrup's Norwegian interlocutors are struggling over the right narrative for carbon's changing role in the future of Norwegian society. Carbon is tied into a national narrative of "goodness," because the extraction of oil has enabled the building of a strong Norwegian welfare state, yet issues of climate justice and responsibility for emissions are generating fault lines between different parts of the population. Lautrup portrays this as a problem of how to identify but also ideologically construct the proper "scale" for addressing carbon and the discussions it engenders. These discussions draw upon claims about the alleged exceptionality of the Norwegian oil industry and the "purity" of its oil, but also about how coupled or decoupled the producer of oil (and the oil itself as a substance) is from the responsibility for its combustion and the resulting emissions. Oil extraction is promoted by the industry as generating wealth that ensures the common good of the national community, but an activist counter-narrative emphasizes how the coupling of oil and emissions relates to a localized and historical responsibility to end oil and gas production to retain a liveable planet.

Altogether, the contributions thus point to several themes that address how carbon can be interpreted. First, carbon has a distinct *scale-making* potential as a physical resource due to it being an eternal yet metamorphic substance, but also socially it may transcend a diversity of scales and ideals. These could be organizational or political fields, like that of the Danish People's Church. The Church is officially a state-governed institution, but there are distinct challenges to the ways that carbon can be configured in relation to its organizational and material settings and traditions that emphasize decentralized decisions and independence from the state (Schyberg). Another example can be found in the intergenerational spaces where climate change is portrayed as a struggle between younger, globally oriented people – for example, in Norway – pushing for changes that established and middle-aged adults find difficult or too radical to realize because they see oil wealth as the foundation for the welfare state (Lautrup). Carbon as a lens and value form here raises questions about intergenerational as well as international responsibility and justice beyond the immediate spatiotemporal sites where oil extraction takes place.

Second, carbon has also become part of the renewed attachments that social communities develop to *landscapes* – both physical and informational – reconfigured through carbon extraction or sequestration (e.g. through reforestation or land restoration). The ways that carbon resources are produced, extracted or conversely stored – whether in mines, forests, peatlands or agricultural fields (Bruckermann; Hougaard; Lippert; Lounela) – is part of an ongoing transformation of people's relationships to the places where they live, work, play, trade,

produce or consume. That carbon metrics become a central feature in territorialization or in place-making is not unique to rural settings or landscapes. It also appears in abstract value terms in areas re-imagined as pro-poor solar energy communities, but where top-down schemes meant to decarbonize energy consumption in these locations often require distinct adaptations to local geographies, demographics and legal realities (Sareen and Girard). Given the ubiquitous presence of carbon in life, land and energy forms, it is no surprise that it enters as well as transcends a diversity of cultural scales and relationships in both time and space.

Third, this capacity for ubiquity and transcendence can present challenges when one tries to understand the consequences of choosing one way of living with carbon over another – for those who indeed feel they have a choice – or for delivering the desired and frequently promised "ease" by which (especially) political or corporate actors imagine the transitions to societies with low emission livelihoods. At a more overarching level, such discussions touch upon the multiple *imaginations*, realities and even alienations that carbon sustains and changes (see Norgaard 2018) and how understandings of carbon are part of and informed by a diversity of calculative logics, quantifications, accounting measures and systems, which people adopt or adapt to in a variety of ways depending on factors such as sociocultural context or personal interest (e.g. Bruckermann; Gausset; Hougaard; Sareen and Girard). The disciplinary approaches of the natural sciences and economics have had a huge impact on how different individuals and collectivities identify carbon in different spheres of life, but the contributions here show through qualitative and mostly ethnographic studies that what we might refer to as the "recipients" of the numerical categories of carbon are actually configured in a variety of ways. For example, some small communities actively make sense of their own carbon footprints to change behaviours and lifestyles as "consumers" of carbon (Gausset), whereas others feel that they are configured more passively as mere "users" of carbon – here in the form of biochar – as a new resource that combines agricultural fertilization with decarbonization (Hougaard). The enumerative value of carbon does not determine nor does it always preclude a specific social level of engagement or agency.

Fourth, the different contributions thus together paint a picture of carbon as a cultural object with *a multiplicity of meanings* across scales, landscapes and imaginations. Such multiplicities are revealed through the contributors' pursuit of qualitative approaches that recognize the irreducible character of the cultural complexities that carbon gets entangled with. Such complexities can best be addressed through careful attention to how meanings are ascribed to carbon, what affects these meanings and how they shift under a variety of circumstances and contexts. The varied conceptual existences of carbon outlined in this volume are driven by social and culturally informed interpretations as much as they are sources for social and cultural life in turn (cf. Strathern 1997: 44). Having said that, we might sum up all of the above with the following overarching questions: how is carbon involved in cultural change? And

how does carbon, as a new cultural artefact, change existing norms and practices? In his contribution, Gausset addresses change directly as "behavioural change," but change in a more general form is present in the other chapters too, in terms of relating to changing landscapes of production or extraction (Hougaard, Lippert and Lounela) or in discussing how changing identities relate to the resources that sustain one's society (Hougaard and Lautrup) or one's community, whether material or spiritual (Gausset and Schyberg). The chapters also relate to changing energy infrastructures (Sareen) and to the forms of production or extraction related to carbon-intensive sectors such as agriculture or afforestation, processes which nonetheless are often still managed in ways that impinge upon everyday social lives (Hougaard and Bruckermann). Finally, a large part of the foreseen changes revolve around imaginaries and imaginations of different spatiotemporal scales (Lautrup and Bruckermann). Setting a clear vision for what kind of society is to be achieved within the parameters set out by, for example, the agreed-upon reductions specified in the 2015 Paris Agreement is frequently a starting point for the pursuit of change, but it also points to the tensions between visions of the change desired, ideas of how to realize this through interventions and what the practical effects of the intervening actions might be.

Concluding remarks

This introduction and the subsequent chapters demonstrate how important it is to see carbon as part of a cultural transformation, and in aggregate the contributions point to the diversity that a conception of culture change can cover. This may include a multiplicity of aspects such as changing behaviour, consumption and living (Gausset); inscribing memory into archives or landscapes (Lippert); the changing relations between land and livelihood (Lounela); the organizing of Church values (Schyberg); new configurations of professional identities (Hougaard); how a national identity may be facing change (Lautrup); the difference between (national state) ideology and (local) practice (Bruckermann); and the contrast between models and implementation in the roll-out of specific sociotechnical plans for the provision of low-cost and low-carbon electricity to energy-poor households (Sareen and Girard). To some, it may come as a surprise that technological interventions based on a culturally vague entity such as "carbon" come out as ambiguous as they do (see Sareen and Girard), but such diversity should not come as a surprise to a keen cultural analyst, especially not given the geographical spread of the contributions and the different circumstances at stake in each case.

The majority of the contributions engage in an ethnographic dialogue with other perspectives on how carbon appears (or disappears) in different contexts of social or cultural affairs. Retaining an ethnographic and qualitative perspective on what carbon "means" in different contexts is crucial if we are to understand the diverse outcomes of different policies (technocratic and bureaucratic) and transformations. Naturally, this perspective cannot stand alone.

No perspective can. However, to understand how the climate crisis presents an urgency, which to many societies appears unprecedented, this perspective is crucial, even if the sociocultural changes that may stem from climate change are still unknown. We can say for certain that carbon will remain a valuable element for many human cultures in the foreseeable future, but the ways in which it will transform or be transformed by these remains to be seen.

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Notes

1 In a volume discussing the politics of green transformations, Ian Scoones, Peter Newell and Melissa Leach (2015) point to four broad narratives of such transformations. Each narrative presents its own emphasis on and framing of both the problem and the solution. They are thus political in that they provide different perspectives on what is to be changed, and how this change is to occur. This is clear in how Scoones, Newell and Leach identify the narratives – technocentric, marketized, state-led and citizen-led – based upon who and what is ascribed the primary role and agency within each of them.
2 Compliance markets are regulated and aimed at helping industry achieve government-set targets for emission reductions, while voluntary markets are typically used by industry or other organizations to purchase emission reductions based on their own motivation.
3 Reduced Emissions from Deforestation and Forest Degradation – the + refers to the sustainable management, conservation and enhancement of forest carbon stocks (e.g. Paladino and Fiske 2017).
4 Emphasizing a symbolic and semiotic ordering of reality does not mean that materiality is a mere appendix to an instrumental or deterministic idea of culture. Although with varying emphasis on the semiotic and symbolic versus the affordances of materiality, both Sahlins (1985) and Graeber (2001) agree there is a practical constitution and reconstitution of value taking place in human speech and action.

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