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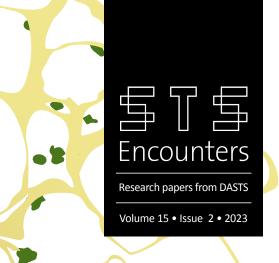This is an accessibility statement for the journal: STS Encounters.

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'The Sustainable State' of STS

Keynote at DASTS 2022

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Abstract

What is the role of science & technology studies (STS) in the collective search for a new 'constitutional vision' of the sustainable state, one that respects planetary ecological boundaries and enacts a 'great green transformation' of state, society, and its infrastructures? In this text – originating as a keynote presentation to the 2022 DASTS conference – I discuss, first, the kind of socio-technical imagination needed for STS research to navigate this contested knowledge-political terrain. Second, based on my co-authored book The Sustainable State ("Den bæredygtige stat"), I suggest four dimensions and collective research agendas that builds on and extends STS's contribution: new ecological citizenships, new civil society transition alliances, new institutions of ecological democracy, and new socio-ecological markets. In extending established and fostering new analytical proclivities in alliance with other select knowledge practices, STS research will be key, I claim, to this collective building-site, arguably the overarching challenge facing our more-than-human societies.

Keywords

Introduction

As Sheila Jasanoff has done more than most to demonstrate, socio-technical transitions towards sustainability constitute arguably *the* overarching challenge not only to the futures of our field of science and technology studies (STS), but of society writ large. My own humble starting point for today' talk is a book that I co-published in Danish roughly two years ago on this challenge, entitled "Den bæredygtige stat", *The Sustainable State*[1].

As STS-informed researchers, we study the plethora of (dis-) continuities in dominant and alternative socio-technical imaginaries, practices, infrastructures, and institutions set in train by a collective search for more sustainable futures. I have done so myself for 15 years, as have others present in today's audience. Spurred by intensified critical junctures in Danish climate politics, however, the time seemed ripe for an *additional* intervention.

As the title hints, *The Sustainable State* is less empirical inquiry and more 'constitutional vision' of sorts, to stay with Jasanoff's language. Our book paints in broad strokes, meant for public effect, cutting important corners along the way. Admittedly, it makes little explicit reference to STS research. And the fact that I co-authored it with a – former – critical sociologist is bound to cause suspicion here[2]. Indeed, one well-informed reviewer scolded the book for its decidedly 'non-STS-like' approach, which failed, according to this critic, to pay sufficient attention to the not-so-little practical tools of state-making.

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1   As noted in the abstract, this text originates as a keynote presentation to the DASTS conference at Aarhus University on June 2, 2022. Sheila Jasanoff gave the conference's other keynote presentation the following day. The text has been lightly edited, but the informal style of a talk has been maintained (as marked e.g. by the use of first-person pronouns). Similarly, references have been added as footnotes only in cases of direct quotes. Responses to apposite criticisms and suggestions by a journal reviewer has likewise been added in footnotes.

2   The co-author in question is Rasmus Willig, at the time of writing our book Associate Professor of Sociology at Roskilde University. Throughout this text, I invoke the collective 'we' when speaking about our book's propositions. It bears noting, however, that the ideas presented in this current text are my own.

Perhaps vainly, I do hope that a certain 'STS-aware' subtext did in fact shine through in our book. But I accept the overall charge, at least as concerns certain *versions* of STS. Still, it seems to me that *more* should be said about this gap. And hence the task I have given myself today: I want to use my ideas of what a sustainable state might be to ponder how STS is integral to any bringing-into-reality of such an object – so far little more than a speculative idea, a faint hope of sociologists, perhaps. Hence the brackets in my title: my mandate here is the STS scholar dissecting ideas whose ancestry lies mainly in 'proto-STS' worlds of the social sciences. *If* in the process of doing so, I lose track a bit of the brackets – overstepping my mandate to make certain proclamations on the future sustainable state-of-being of STS as a field – well, then such overflowing is perhaps not entirely unintentional

Ecological crises as constitutional moment (for STS)

The immediate backdrop to our book is well-known to us all. Amidst ongoing environmental crises, societies experience multiple critical junctures, controversies, lock-ins, and partial re-negotiations of socio-technical commitments. In Denmark – my parochial focus today and in our book – the strengthening of new climate activism, the 2019 'climate election', and the subsequent adoption of a climate law stipulating a 70% reduction in carbon emissions by 2030, relative to 1990 levels, arguably epitomize what Sheila Jasanoff might well call a 'constitutional moment' in state-society-technology-ecology relations.

Against this backdrop, we owe the concept and vision of a sustainable state mostly to the field of green political theory. Within this field, scholars have long researched and debated the prospects and limitations of actually-existing nation-states orchestrating forms of environmental betterment. A certain consensus exists that, while myriad environmental reforms have been enacted in characteristic geo-politically patterned ways since the 1970s, far-reaching challenges of climate and biodiversity suggests the existence of 'glass ceilings' on further sustainability reform. In this sense, the sustainable state is an inherently normative, future-oriented concept, and a partially existing object of study, at best.

In our book, we locate this challenge within a stylized narrative of changing state-society relations in Denmark in the post-war period. Specifically, we trace an arch of history that moves via the consolidation of the welfare state in the 1960s through the gradual emergence of a competition state since the 1990s – only to position the sustainable state as the so-far dimly visible future object of today's collective public search, in John Dewey's sense, for what in policy parlance is known as 'green transition'. While stylized, such a narrative has the advantage, I believe, of lending to the challenge of socio-technical transition towards sustainability a set of historical analogies that serve to scale out, as it were, the proportions of the struggles ahead. In the language of Robin Eckersley, an important contributor to green political theory of the sustainable state, it serves to move from an imaginary of piecemeal 'transitions' – an imaginary to which parts of STS is arguably still wedded – to an alternative imaginary of a 'great green transformation' of state, society, and its infrastructures.

This latter imaginary, indeed, is what legitimates the invocation of Jasanoff's constitutional moment for the purpose of my intervention today. Here, constitutional should be taken not only in the sense of entailing questions of large-scale legal-political change, co-constituted via shifting socio-technical imaginaries as collectively held commitments and justifications of science-backed projects. But also, of involving changes to citizenship, expertise, and democracy of a magnitude that warrants talk of a new *type* of state.

Our field of STS has, of course, long made pivotal contributions to the analysis of such epochal shifts and struggles, locally and globally. Indeed, proclamations to the effect that STS will be key to navigating and surviving what many now unhappily call the Anthropocene are not hard to come by. One might in fact venture that such proclamations have come to co-constitute today's STS field. In a recent interview,

for instance, STS pre-eminence Bruno Latour claims not only that the emergence of STS as an intellectual endeavour in the 1970s served to forecast the concurrent rise of environmentalism. More starkly, Latour claims that, and I quote, "with the ecological crisis and the Anthropocene, the whole world is becoming science studies"[3]. The hybridity of nature and culture is now the stuff of everyday knowledge, with STS fully co-extensive with attendant knowledge politics.

In a more profane tone, I recently myself made proclamations to similar effect, writing with Casper Bruun Jensen in the newest edition of the Danish-language STS introduction volume. Here, we argue that the most viable way for STS to inherit its own legacy of engagement with environmental problems is to extend such engagements into new practical knowledge alliances, cutting across the natural sciences, environmental humanities, speculative fiction, activism, and concerned publics. Such, we suggest, would be a *re-activated* STS, attuned to its own situated positionalities and epistemic-ethical stakes in contested Anthropocene landscapes across local-global scales. We offered the example of Amazon Forest fires as articulated within extended, power-inflected, unequal assemblages tied not only to the fate of indigenous peoples, but also to the destructive effects of Danish animal-industrial agriculture via the political economies and ecologies of global soy markets.

What to make of such an insight? In *The Sustainable State,* my co-author and I draw what to us seems a reasonable, practical-normative implication: Danish animal-industrial agriculture will need to be substantially reduced in years to come if this society is to honour its own green aspirations and remain within global climate justice reach. We do not belabour this point, beyond referencing so-called planetary ecological boundaries. Rather, we ask: what transformations in politics writ large might allow for such an alternative, socio-technical future to materialize? The task, for us, is both analytical and practical.

How to make STS sense of such a blatantly normative stance on very tangible, local, substantive matters of contested techno-scientific politics? How did we, as social scientists, end up in this quagmire of knowledge politics? Does STS offer reliable first aid?

Of course, the peculiar blend of sociology and (proto-)STS with Earth system science, ecological activism, heterodox economics, and normative political theory arguably at work in *The Sustainable State* is not entirely new or original in our field. As Casper Bruun Jensen once wrote in a review of Latour's *Politics of Nature*, it is precisely the mixing and blurring of kindred genres that make this book and, I might add, much of Latour's most recent writings on eco-politics both interesting and, to a degree, problematic[4].

Take *Down to Earth* as a case in point. To be sure, this book is more political treatise than STS inquiry; even as Latour's many years of the latter clearly condition the former. It is hard, I think, not to recognize core aspects of Latour's a-modern vision of human-nonhuman hybridity in how he now portrays 'the terrestrial' as a novel political attractor. In Latour's plot, this attractor is meant to reorient collective affects in an orthogonal move away from the unhappy capture of contemporary political passions in-between a modernist Globe and a traditionalist Local pole – to instead land back in the soil, back on Earth.

In my review of *Down to Earth*, as well as in other texts, I nevertheless register a certain ambivalence or hesitation towards the *style* of Latour's earthly politics. On the one hand, there is much to appreciate, I think, about a leading STS scholar turning his well-developed intellectual imagination towards the performative production of more terrestrial futures. On the other hand, however, we are left, I think, without much *concrete* bearing: the conceptual and normative intervention remains pitched at a quite general level, with little to suggest its situated entanglements. Put bluntly, when reading *Down to Earth* from my Danish positionality, I remained in doubt on whether 'the terrestrial' best captured people affiliated with the "Alternativet"

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3   Quoted from Fadhila Mazanderani & Bruno Latour (2018): 'The whole world is becoming science studies: Fadhila Mazanderani talks with Bruno Latour', Engaging Science, Technology, and Society 4, p.288. (DOI: https://doi.org/10.17351/ests2018.237).

4   The talk underlying the present text was given prior to Bruno Latour's premature death in October 2022. I hope the argument developed here may stand as tribute to his inestimable importance to STS work on eco-politics and beyond.

(*The Alternative*) green party – or, whether the category perhaps incorporates either the majority of Danes seriously concerned with climate change or, conversely, a not-yet-fully-articulated avant-garde of more-than-human caretakers.

In recent work, I contrast Latour's approach to the politics of Gaia, the new planetary ecological entanglement, to that of his mentor, Isabelle Stengers, as presented in her *In Catastrophic Times*. The main difference being, I believe, that Stengers consistently writes *from* the terrain, that is, from a position *internal* to the many struggles and alliances in knowledge politics entailed by this historically novel situation or event – an event predicated, as she puts it, on accepting the reality of Gaia. Beyond the slick theoretical guarantees that new materialists or eco-Marxists may avail themselves of, this is how Stengers writes, for instance, about the activist-science alliances and attendant democratization of knowledge at stake in European anti-GMO – genetically modified organism – struggles of the 1990s. I like to think, again perhaps rather vainly, that *The Sustainable State* borrows navigational advice, if not exactly genre or style of arguing, from Stengers' sketch of the terrain.

Engaging the knowledge politics and imagination of transition

What does this mean in practice? For one, it means that our book engages *actively* in the local knowledge politics of green transition, as set in-between Earth system science, formal expert policy advice, and activist interventions – together with an interdisciplinary researcher voice called the Climate and Transition Council, or KOR, that I co-author[5].

Put briefly, the substantive sense of un-sustainability that we assemble and justify in our book is one that takes so-called planetary ecological boundaries, part of Earth system science, as a starting point. Particularly for climate change, however, we seek then to *localize* this

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5   For information on KOR, visit https://www.klimaogomstillingsraadet.dk/english/.

approach with a view to global climate justice – entailing taking a critical look at the knowledge infrastructures of the United Nations Framework Convention on Climate Change, UNFCCC, and its local-national implications. This UN-backed carbon accounting framework, after all – including its anchoring in the boundary organization of the Intergovernmental Panel on Climate Change, IPCC – is what undergirds the Danish climate law's official target of a 70 percent carbon (equivalent) reduction by 2030. In national public discourse, this target is standardly portrayed as 'highly ambitious' and as substantiating widespread claims to Denmark being a 'frontrunner country' on climate and the environment.

By way of grounding our analyses within this contested landscape, however, we stipulate three interconnected critiques of this dominant narrative. First, and most obviously, we invoke the Danish Climate Council – the main institutional invention, we might say, when it comes the politics of expertise and expert advice in recent Danish climate policymaking. We do so to the effect that current socio-technical trajectories of policy and practice change in this country are not likely to be putting us on track for the official goal.

Second, and more controversially, we challenge the so-called territorial principle of the UNFCCC framework, according to which Danish society is only responsible for emissions occurring on its own, geo-political territory. Invoking instead the principle of consumption-based emissions accounting, such as we have worked on this in KOR among others, we suggest that average carbon footprints among Danish citizen-consumers entail an injunction of upping reduction ambitions to stay aligned to global climate justice.

Third, in reference to the planetary boundaries framework, we note that current-day ecological challenges require attending *simultaneously* to climate and biodiversity crises, in ways exceeding the silo-based approach of the Danish legal framework. This will be important not least when addressing the issue of animal-industrial agriculture which, as hinted, is arguably *the* key political-ecological lock-in for local un-sustainability.

Clearly, as STS researcher, I make no claim for any uniquely adequate expertise undergirding these situated judgments and critiques – beyond a certain level of interactional expertise attained through the practice of my interdisciplinary research. The very necessity of *making* such situated judgments, however, arguably speak to Latour's point that today, in a certain sense, all the world *is* indeed science studies. There is hardly a dispassionate Archimedean point from which to write about un-sustainability – only more-or-less well-grounded engagements with the politics of expertise. This, it seems to me, is a *first* and basic sense in which STS is integral to the forging of a sustainable state: we need all the STS tools we can muster to intelligently navigate these contested, future-laden terrains of the expert politics of un-sustainability. And we need to do so not just academically but *publicly*, I would add, since these issues are public problems if any – fundamentally, they are *in* the public terrain, not contained in the proverbial laboratory. This is one reason I co-founded the Climate and Transition Council, KOR, as an experiment in public-facing counter-expertise.

Having attained some bearing in the contested landscapes of expert politics, we are ready to face what is arguably an even more formidable challenge. This is the one I usually, when speaking publicly on *The Sustainable State,* call the challenge of sociological imagination. In honour of our field's achievements, however, I will opt today for a slight updating and call it the challenge of *socio-technical imagination*. Writing in the lineage of John Dewey's American pragmatism, coupled with European social theory, Charles Wright Mills in the late 1950s defined sociological imagination as the skilled ability to draw out the connections between personal challenges or "troubles", on the one hand, and the broad "public issues" or problems that define societal institutions and histories-in-the-making, on the other.

In the problematic realm of green transition writ large, I am convinced that a major blockage or crosscutting lock-in of its own right consists in an insufficient public capacity for sociological or socio-technical imagination. This incapacity, of course, is *itself* co-produced with the rather narrow, technocratic, and techno-fix-oriented dominant imaginaries espoused not only by expert bodies but also, more consequentially so, by those political-economic institutions in society that Mills called 'the power elite'. This term is still roughly adequate for the analytical task, I think, as being akin to what Stengers mockingly calls 'our guardians' or what Ulrich Beck termed the 'organized irresponsibility' of eco-politics.

Put bluntly, along such lines, it seems to me that the playing field of un-sustainability is nowadays sufficiently tilted to make the main game of STS, indeed of democracy-serving expertise writ large, one of cultivating *alternative* socio-technical imaginations[6]. Alternative, that is, to those dominant, core-business-friendly imaginaries according to which a meaningful green transition amounts to little more than intensified green-tech innovation, technology roll-out, and technocratic behavioural fixes. Perhaps ironically for our field – although of course fully conceptually consistent with our major research programs – the domain of socio-technical transitions towards sustainability seem to me to call out for more emphasis on the 'socio-' part or, better put, with alternative socio-ecological relations and imaginations. That, at least, is probably why our book on *The Sustainable State* ended up reverting more to socio-political vocabularies of civil society than to STS vocabularies proper.

Be that as it may, this also means that we have reached the point at which conceptual and practical gaps can start to be explored. Let me

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6   On this note, I fully concur with a point made by the journal reviewer to the effect that more critical (self-)reflection is warranted on the implications of my argument for how STS researchers may conceive their own role(s) as (counter-)experts in search of a sustainable state. By way of a short response, in my view the concern is less one of how we can maintain a healthy commitment to symmetrical analyses of environmental controversies; I think we possess fairly adequate tools for this, along the lines e.g. of Latour's argument in Reassembling the Social that 'reassembling politics' is what comes not before but after serious inquiry. Our concern, I believe, should rather be with political epistemology proper: to what democratic standards of expert and public scrutiny can and should STS-based – and other – proclamations on (un-)sustainability be held, amidst nowadays widely acknowledged conditions of expert disagreement, uncertainty, and oftentimes hidden value assumptions? Here, STS must engage more strongly with democratic political theory, I think, along the lines recently sketched e.g. in Zeynep Pamuk's Politics and Expertise in which the public staging of expert dissent is rightly appreciated for its democratic virtues – provided it is instituted through properly designed institutions.

emphasize that, in what follows, I intend for this exploration to be a two-way street, at once gesturing to what I take to be key but perhaps so-far underutilized STS tools – while also at times suggesting ways to productively expand the STS toolbox in coming years. And the exercise rests, to reiterate, on a *second* key sense in which STS is and will remain integral to the forging of any sustainable state: the sense, indeed, of the socio-technical as constituting a core premise for any meaningful engagement with future-laden green transition imaginations. If the hyphen in socio-technical was ever in doubt, the problematics of green transition usefully puts such doubts to rest. Once again, Latour is right, in a way – all the world is now socio-technical.

Enrolling STS on four dimensions of *The Sustainable State*

I want to spend the rest of this talk outlining the four dimensions of transformation that, according to the argument of *The Sustainable State*, may stand a chance of instituting an alternative pathway for state, society and its infrastructures, one deserving of the label 'sustainable'. This is where we get to the 'constitutional vision' part in earnest, in that I allow myself a considerable space for speculation – in what Stengers might call a hopeful mode, set in-between probabilities of foreseeable blockages and possibilities for change.

In classical parlance, we ourselves think of these four dimensions as mutually dependent *and* mutually necessary for a transformation towards a sustainable state to happen. We also think of them, in even more classical parlance, as cutting across civil society, market, and state institutions in characteristic ways, including in their material affordances. This just to say that, despite our title, we are trying to avoid the trap of state-centrism, even as we still maintain a focus on the considerable collective, binding, future-shaping powers of actually existing states, also at scales both below and above the national.

When speaking publicly, the four dimensions – prefigured briefly as new ecological citizenships, new civil society transition alliances, new institutions of ecological democracy, and new socio-ecological markets – simply represent our modest contribution to strengthening socio-technical imaginations as part of democratic debate. To reiterate, intervening at this level of public conversations was a main motivation for our book, even as it maintains accountable connections to social science including by way of peer review.

For the sake of today's event, however, I will be presenting the four dimensions rather in the mode of collective research agendas – and, to reiterate, as research agendas to which STS has been, is, and must be integral in the future, alongside other knowledges. Hence, I will try to explicate some of the hidden 'STS-aware' sub-text of these claims – even as I will *also* suggest how STS research might want to extend its own reach in the process. If the entire world is now science studies, after all, STS has a lot to encompass.[7]

First dimension: new ecological citizenships

I begin with what, following conversations mainly in green political theory, we call new eco-logical citizenships. This is a concept which, along with Emilio Luque and others working on the topic, we understand not exclusively in terms of institutionalized bundles of rights and duties – although these are important too, as we will see. Rather, we cast ecological citizenships more in interactional terms, as the patterning that emerges across a range of partly imaginary, partly

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7   The journal reviewer questioned the extent to which the four dimensions of proposals that follow pay sufficient attention to the hybridity of nature-society assemblages, despite what the invocation of Latour, Stengers, and wider STS suggests. I would agree that this question warrants a whole range of further inquiries and discussions. For now, my more modest justification is an analytical-performative one pertaining to the state of interdisciplinary conversations. To think the sustainable state properly, I argue, we as analysts need to assume and assert socio-technical-ecological hybridity as backdrop to the conversation. This is true not least when speaking, as I do below, on topics such as ecological citizenship where this cannot be taken for granted even at the level of the wider social sciences. Indeed, this situation is in large measure what warrants bringing STS more strongly into conversations on the sustainable state, and hence what motivates the present text as a first move. As noted, the attempt here is largely one of looking ahead and articulating a viable collective research agenda.

material locations and moments from where one speaks and acts 'as a citizen' concerned with environmental issues and possibilities of environmental care.

In this encompassing sense, the challenges of ecological citizenship are far-reaching indeed, entailing questions of knowledge, learning, material affordances, and capacities to be affected and affect others only partially or patchily covered, I think, in existing STS research. The main interlocution here, in my view, would be the work of Noortje Marres, whose inquiries into material participation and publics includes such ecologically relevant devices as eco-homes and energy meters. Indeed, Marres engages explicitly with literature on ecological citizenship, seeking to ground it better in the material settings that allow for environmental issue articulation. This interlocution across key STS concerns and wider socio-political inquiry makes her work a model for emulation in the research agenda articulated here.

Sociologically speaking, the material settings of ecological citizenships, and the kinds of collective engagement and learning they entail, cuts across myriad institutional and extra-institutional domains in patterned ways. And here, while key to future comparative inquiry, it seems to me that Marres' work by itself affords us only a patchy view of the many and mushrooming settings already acting as key locations for ecological citizenships in-the-making. Nor, indeed, does it contain much, I believe, in terms of imagining the further patterning across and strengthening of such locations and their eco-political affordances.

Our own book, of course, is constrained in other ways, yet tries to overview key but perhaps understudied domains. One such domain is formal educational settings. At this level, we attend in our book to the close historical ties, especially in a highly state-dominated context like the Danish, between state prerogatives of governmentality and educational-didactical frameworks, including via ideals of citizenship inculcated in schools and universities. Moving towards a sustainable state, we argue, entails a range of shifts in the governance and practicalities of educational institutions, to foster more locations from which to practice ecological citizenship. Here, existing STS research into

educational settings, practices, and devices may usefully be brought to bear to study resulting capacities for collective learning.

At the extra-institutional level, we gesture more vaguely to what we term practice-based transition communities as key sites of ecological citizenships in-the-making. These communities come in many organizational shapes, constituted through many different group styles, and articulating several different ways of linking local and global ecological concerns. This is something I have myself studied in the case of urban gardens, food collectives, grazing associations, and similar place-based interventions in the greenspaces of Danish cities. Here, I believe STS research can be fruitfully inter-articulated with a wider set of cultural and political sociology approaches, to do with styles of civic interaction and modes of environmental engagement, including at the level of bodily-material attachments.

In sum, inquiring into and unpacking further the concept of ecological citizenship in its constitutive dimensions and across an increasingly wide range of practical and material settings, institutional and extra-institutional, seems to me an important STS agenda in years to come. We need the material sensitivity of STS work on public engagement to enrich and be enriched by a wider set of collective inquiries into how civic interaction is spurring alternative forms of collective ecological learning – and to help us imagine how such locations can be multiplied and linked together to enable citizen capacities.

Second dimension: new civil society transition alliances

This brings me to the second dimension of our 'constitutional vision', where we turn attention to the more formal, organizational, and social movement-like aspects of civil society – to articulate the prospect of stronger, critical alliances for ambitious green transition. And to help us do this, we draw on the so-called sociology of critique, as articulated from within wider French pragmatic sociology. In particular, we invoke

Eve Chiapello's work on four critical grammars that have historically gained traction and institutional grounding in European societies, and which today – or so we argue – constitute key buildingblocks for green transition. As short-hands, Chiapello dub these the conservative, the social, the artistic, and the green critiques. Each can be thought of as discursive repertoires with enough internal family resemblance to be recognizable as legitimate sources for criticizing the ills of industrial-capitalist societies – while also each containing notions of how such critiques can be justified and 'tested' vis-à-vis assemblages of socio-material reality.

I will not expand on each of these critical repertoires. Suffice to say, for instance, that social critique historically finds its main institutional embodiment in the labour movement, and hence also in the contemporary landscape of unions as organizational vehicles for collective interest articulation. Conservative critique has an interesting ecological sub-history already, in that the very claim for nature conservation emerged in European history primarily among upper-middle-class groups of ideologically conservative leanings. Green critique, in turn, covers most of what we know as the environmental movement, itself of course an internally variegated set of claims and socio-material practices, tied together by commitments to ecological valuations.

Our argument, in brief, is that Chiapello's concepts nicely captures an otherwise disjunctive contemporary landscape of organizations, discourses, and practices that, in their distinctive ways, share the important trait of harbouring *reasons* for wishing to work towards the societal transformations of green transition. In other words, following the logic of alliance-building found in much social movement studies, we project the four sources of criticism as a matrix for incipient transformation-oriented movement alliances that may materialize under the right circumstances to put states and markets under pressure.

Again, without sketching the full critical matrix, one important off-shot here is what in movement and policy parlance is known as 'just transition' – essentially signalling, in Chiapello's terms, a strengthened alliance between green and social forms of critique. In our book, we point to the rather startling observation, we think, that even in a country

as wedded to principles of progressive taxation and redistribution as the Danish, green and social considerations are today routinely cast as antithetical by social-democratic power elites. Such work of policy blockage is most clearly evinced in carbon taxation debates.

Ideological lock-ins with material consequences of this kind bespeak the role of alternative, critical alliance-making. And while there is certainly interesting work in STS on social movements, such as via David Hess' concept of technology-oriented movements, it seems to me that pragmatic sociology provides a suitable vocabulary for bridging STS, social movement studies, and registers of valuation to good analytic and normative effect in this regard. Indeed, this might well be where those conflicting notions of materialism that STS has always had a stake in can finally cross-fertilize each other's claims.

Third dimension: new institutions of ecological democracy

Social movement alliances put pressure on states still reluctant to endorse ambitious green transition policies. Yet they do so under conditions of democratic debate, decisionmaking, and rule enforcement that *themselves* call out for alternative socio-technical-ecological imaginations, given how democracy-as-usual has tended towards un-sustainable arrangements[8]. As Kristin Asdal in particular has advocated forcefully within STS, our field needs to attend to how democracy gets carried out in practice, and how such practices change over time.

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8   This claim is admittedly shorthand for much wider and more complicated questions concerning the tensions and struggles with 'democracy' faced in and by contemporary societies like the Danish. The journal reviewer rightly pointed this out and suggested that this text's affirmative suggestions for democratic reform remain 'elusive'. While this may be true, perhaps unavoidably so, I do want to point out that much STS scholarship has articulated citizen assemblies of various shapes – as discussed below – as part of alleviating tensions between ideals of sustainability and democracyas-usual (tensions e.g. of short-termism, expert dependency, and lack of non-human representation). In an abstract sense, this also includes Bruno Latour's discussion of a new 'parliament of things'. Here as well, my proposed research agenda is meant to inherit and prolong such clearly STS-based articulations of nature-culture hybridity, while perhaps pushing at their socio-political parameters.

This means attending to the 'little' and sometimes not so little tools or technologies of government that enact not only domination, but sometimes also deliberation and involvement.

To be sure, and as our critic rightfully pointed out, our book on *The Sustainable State* is very far from a fully-fleshed-out notion, let alone research program, on the little and not-so-little tools this state will use to redirect socio-technical trajectories towards ambitious green transition. Hence the overall character of this talk as an invitation to think along on how STS, as a field, might best fulfil this immensely important task – one for which we cannot afford to sit back and wait for the political scientists to take it on.

Let me stick for now to two ideas, both presented in our book as forward-looking proposals. First, inspired in part by the growing international significance of civil climate lawsuits as vehicles for holding states accountable to civic and expert epistemologies of (un-)sustainability, we suggest that forms of green constitutionalism in the literal, legal sense will be important for transition. In Denmark, surprisingly little legal-green innovation seems to have happened since the time, 50 years ago, that Christopher Stone posed his canonical, still provocative question: should trees – and other nonhumans – have legal standing?

STS as a field is well placed, it seems to me, to undertake comparative inquiries into varieties of green constitutionalism emerging across world regions, as well as attendant struggles and elisions of domination, in ways that can help expand legal imagination and practice. Anthropologists such as Marisol de la Cadena are already undertaking those more-than-human ethnographies in places like Peru that allow for what Casper Bruun Jensen and myself, in our work on Gaia scenography in the Anthropocene, call experiments in conceptual variation and pragmatic efficacy. We should be taking these experiments, I think, also to local sites of struggle such as Amager Fælled ['Amager commons'] and Aarhus harbour.

Second, I have written elsewhere on the clear stakes of STS in what amounts to renewed investments in citizen assemblies and other devices of public deliberation in the climatic and wider environmental realm. After all, STS writ large practically co-invented these tools, only to see them partially co-opted by the powers that be. Nowadays, confronted with incipient democratic innovations like the Danish citizens' climate assembly, these well-rehearsed debates attain renewed pragmatic importance.

Elsewhere, I have expanded on one idea also at work in *The Sustainable State* that I find worth entertaining in this context: how would one equip a new sustainability chamber if put in place, based on sortition principles of citizen assemblies, as a second chamber authorized to check all law-making in the Danish parliament? What kinds of infrastructures of expertise, modes of accountability, legal checks and balances, not to mention representation of nonhumans, would this require? What would a viable pathway to such a serious democratic renewal be? I do not have the answers, obviously – but I do see the exploration of such questions as belonging now among the professional duties of our STS field.

Fourth dimension: new socio-ecological markets

Finally, it is hard to imagine meaningful interventions in green transition debates that do not, sooner or later, confront the question of markets. More specifically, this also means confronting questions of those interrelated and dominant institutions, imaginaries, practices, and epistemic hierarchies that uphold a continued societal commitment to extractive, investor-dominated, exponentially growing capitalist economies, despite how even mainstream economists call climate change the biggest market failure in history.

Put briefly, and conversely, heterodox economic theories of de- and post-growth, along with associated practical experiments in alternative material market frames and devices, seem to me an agenda highly ripe for deepened STS engagement. In our book, we assemble a patchwork of ideas and examples all pointing in this broad direction. These range from the way Copenhagen may follow Amsterdam in trying out so-called doughnut-economic principles, to the way the civic

initiative Andelsgaarde ['cooperative farms'] is reinventing traditions of the Danish cooperative movement as means to transition from animal-industrial to plant-based and more careful farming practices.

As for the other dimensions involved in forging a sustainable state, we need all the tools of STS to help interrogate such on-going changes and struggles over the proper means and aims of market-building. This time around, the work of Michel Callon suggests itself as a key site of interlocution. Callon's work, as you know, has informed a burgeoning literature on valuation devices and capitalization-as-assetization, that is, the turning of material and other entities into goods controlled, traded, and capitalized as a revenue stream. Indeed, we do well by recycling Callon's key question, posed in the context of carbon markets: how can markets be civilized? Or, as I would rephrase and relay this: how can they be made to work for rather than against real and just sustainabilities, locally and globally?

Reinventing cooperative forms of ownership, democratizing workplaces, and altering tools of economic decision-making to reflect socio-ecological values ahead of profit-making belongs to the ideas we put forward in *The Sustainable State*. Remember, these are speculative visions and suggestions, at best, clearly in need of being substantiated by in-depth, comparative, analytically grounded STS research on actually occurring experiments in market change. Conversely, however, it seems to me that STS writ large will need to let itself infect by more heterodox economic ideas than what is presently the case, if we are to collectively heed Callon's core question – analytically, normatively, and practically.

Rounding off: the sustainable state of STS?

Having now taken you on a tour through the building site that is *The Sustainable State*, and suggested ways that STS might help interrogate, speed up, alter, and otherwise instruct and impact on this collective construction work, let me try to take stock. And let me do so in ways that play once again on the scare-quotes of my title – at once framing

my mandate narrowly and humbly, while allowing it a bit of overflowing to the field at large.

On the one hand, I have argued – as a version of widespread narratives in our field – that STS is and will be crucial not only to learn about, but to any possible future forging, of an object deserving of that name, *The Sustainable State*. This is so, I suggest, for several interconnected reasons, to do with the rich histories and conceptual repertoires of our field. Not only is some 'proto-STS' grounding in the politics of expertise today a prerequisite for meaningful public navigation in controversies over (un-)sustainability; STS is also crucial for fostering socio-technical imaginations of more viable, alternative futures.

When it comes to the manifold specificities of what a socio-technical transition or transformation to sustainability entails, however, the picture, I think, is slightly more nuanced and slightly less celebratory. As I have pointed to key STS resources for informing what I take to be key questions and dimensions at stake in these processes – to do with new ecological citizenships, new civil society transition alliances, new institutions of ecological democracy, and new socio-ecological markets – I have *also* hinted at what I take to be hitherto underexplored possibilities for further pursuing and enriching these resources.

To attempt a final articulation, let us say that my argument here amounts to the following: to remain sustainable – in all the senses of this slippery term – it seems to me that STS must place itself not only in the landscape, but actively among and *in alliance with* other select knowledge practices. These knowledge practices stem from, and cut across, among other places Earth system science, ecological activism, heterodox economics, and normative political theory – to which should be added, not least, the speculative fictions needed to further feed our socio-technical imagination. This will mean fostering new analytical proclivities, as well as new styles of public engagement on the part of STS researchers, along with all the hard questions of inter-disciplinary and public accountability that follows.

Exactly what this re-activated STS will look like is for us to discover together.

Author bio

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