Sustainability here and now

The governance of urban transformation in Oslo and Addis Ababa

Jakob Grandin

Thesis for the degree of Philosophiae Doctor (PhD)
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Abstract

To act on climate, we need to establish its relevance for decisions here and now. Climate change has traditionally been constructed as a global problem concerning the long-term future. Relational thinking in geography has articulated the local and regional levels of climate governance, hence foregrounding the practices through which the climate is situated in concrete local and organisational contexts. However, in time climate change has largely remained an abstract issue concerning the far future. Moreover, dominant approaches to sustainability transition and transformation generally treat societal systems as bounded and coherent, which blurs the role of geographical interconnectivity and local agency.

Examining the main research question "How do local actors make climate change actionable here and now?", this thesis develops an analytical framework to assess the practices of local actors to make climate change actionable locally and in the present. Based on multi-sited qualitative fieldwork examining sustainable mobility projects and strategic climate governance in Oslo, Norway, and Addis Ababa, Ethiopia, it shows that succeeding with climate governance depends on (a) the ability of situated actors to translate spatially and temporally distant ideas and resources to make them immediately relevant, and (b) the capacity of local actors to align and coordinate initiatives, institutions and resources, thereby cohering and routinising transformation.

In this thesis, this work is conceptualised as the *relational mobilisation* of transformation. Rather than the top-down implementation of global agreements and solutions, this perspective highlights the locally situated but spatially interconnected work involved in mobilising and translating transformation across and within contexts and scales: both in articulating, aligning, and negotiating pathways and in sustaining them over time. As such, the perspective of relational mobilisation brings analytical attention to the practices through which sustainability might be made relevant here and now.

This thesis consists of five papers. The first paper reviews relational perspectives on urbanisation in light of the Paris Agreement, identifying opportunities for rapid transformation in the spheres of governance, infrastructure, and everyday life. The next four papers develop the perspective of transformation as relational mobilisation in four dimensions, respectively focusing on the role of relations across places (Paper 2), within geographical contexts (Paper 3), across time horizons (Paper 4) and within the emerging present (Paper 5). Therefore, a core contribution of this thesis is to systematically bring together spatial and temporal dimensions in the analysis of the geographies of sustainability transformation.

This thesis provides the following conclusions: *First*, that articulating local responsibility requires active efforts of translation of distant ideas and resources in space as well as in time. *Second*, that situated actors accomplish sustainability transformations through active efforts of cohering in and across fragmented urban domains. *Third*, that spatial and temporal relationality is actively produced through local work which is grounded in particular places and material settings.

By examining the relational footwork of transformation – namely the practices through which the distant is made present and sustainability pathways are cohered – this thesis shows that sustainability interventions will always be contextual and pragmatic. As pathways to sustainability are developed with increasing urgency, this perspective may both open up new spaces for agency and intervention and allow for critical assessment of proposed policies and solutions.

Sammendrag på norsk

For at det skal være mulig å handle opp mot klimaendringer, må problemet ses som relevant for beslutningene som tas her og nå. Tradisjonelt sett har klimaendringer blitt rammet in som et globalt problem i fjern fremtid. I samfunnsgeografien har den relasjonelle tenkingen artikulert klimapolitikken på lokalt og regionalt nivå og slik løftet frem og kontekstualisert politiske praksiser som lokalt og organisatorisk situerte. Når det gjelder tidsaspektet, derimot, er klimaendringer fremdeles rammet inn som et abstrakt spørsmål i en fjern fremtid. Videre har toneangivende retninger innen forskningen på bærekraftsomstilling generelt ansett sosiale systemer som avgrensede og sammenhengende, noe som utvisker betydningen av geografiske relasjoner og lokalt handlingsrom.

Denne avhandlingen tar for seg forskningsspørsmålet: «Hvordan gjør lokale aktører det mulig å agere opp mot klimaendringer her og nå?» Den utvikler et analytisk rammeverk for å analysere lokale aktørers praktiske arbeid med å handle lokalt og i nåtid. Gjennom flerlokalisert, kvalitativt feltarbeid som undersøker bærekraftig mobilitet og klimaplanlegging i Oslo, Norge og Addis Abeba, Etiopia, viser avhandlingen at vellykket klimapolitikk avhenger av (a) aktørenes evne til å oversette ideer og ressurser som er fjerne i tid og rom til umiddelbart relevante handlingspunkter, og (b) lokale aktørers kapasitet til å koordinere initiativ, institusjoner, og ressurser og dermed skape sammenheng og kontinuitet i omstillingsinitiativer.

I avhandlingen konseptualiseres dette arbeidet som relasjonell mobilisering av omstilling. Fremfor å implementere globale løsninger og avtaler ovenfra og ned, fremhever dette perspektivet lokalt forankrede praksiser som mobiliserer og oversetter endring mellom og innenfor steder og skalaer ved å artikulere, skape sammenheng mellom, og forhandle omstillingsveier og holde dem ved like over tid. Slik setter avhandlingen analytisk fokus på praksisene som kan gjøre bærekraft relevant her og nå.

Avhandlingen består av fem artikler. Den første artikkelen tar for seg relasjonelle perspektiver på urbanisering i lys av Parisavtalen og identifiserer muligheter for raske

endringer i styresett, infrastruktur, og hverdagsliv. De neste fire artiklene utvikler perspektivet på endring som relasjonell mobilisering i fire dimensjoner, med fokus på relasjonelle forhold mellom steder (artikkel 2), innenfor geografiske kontekster (artikkel 3), mellom tidshorisonter (artikkel 4) og innenfor den tilblivende nåtid (artikkel 5). Et viktig forskningsbidrag i denne avhandlingen er således å systematisk knytte sammen romlige og tidsmessige dimensjoner i analysen av bærekraftsomstillingens geografi.

Avhandlingen når følgende konklusjoner: For det første at artikulering av lokalt ansvar krever aktivt arbeid for å oversette fjerntliggende ideer og ressurser i både tid og rom. For det andre at aktører lykkes med bærekraftsendring gjennom aktivt arbeid for å skape sammenhenger mellom tiltak innenfor og mellom fragmenterte bylandskap. For det tredje at relasjonalitet i tid og rom skapes aktivt gjennom lokalt arbeid forankret i bestemte steder og materielle kontekster.

Ved å analysere omstillingens relasjonelle fotarbeid – nemlig praksisene som aktualiserer det fremtidige i nåtiden og skaper sammenheng i bærekraftsløsninger – viser avhandlingen at bærekraftsinitiativer alltid vil være kontekstuelle og pragmatiske. Når bærekraftsinitiativer utvikles med en økende forståelse av at det haster, kan dette perspektivet både åpne opp nye handlingsrom og muliggjøre kritisk analyse av foreslåtte løsninger og politikk.

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In a thesis interested in the relational work of transformation, it is with gratitude that I acknowledge some of the most important relationships that made this project possible.

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Scientific environment

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Table of contents

List of papers

This thesis is based on the following papers, which are referred to in the text by their respective number:

1. Grandin, Haarstad, Kjærås & Bouzarovski (2018). The politics of rapid urban transformation. Published in *Current Opinion in Environmental Sustainability*, vol. 31. (Grandin 40%, Haarstad 20%, Kjærås 20%, Bouzarovski 20%.)

2. Grandin & Haarstad (2021). Transformation as relational mobilisation: the networked geography of Addis Ababa's sustainable transport interventions. Published in *Environment and Planning D: Society and Space*. (Grandin 80%, Haarstad 20%.)

3. Grandin (submitted manuscript). Cohering transformations: The politics of sustainable mobility in Addis Ababa (submitted to *Political Geography*).

4. Grandin (submitted manuscript). Rendering the future governable: navigating temporality and uncertainty in Oslo's climate transformation (submitted to *Environment and Planning A: Economy and Space*).

5. Grandin & Sareen (2020). What sticks? Ephemerality, permanence and local transition pathways. Published in *Environmental Innovation and Societal Transitions*. (Grandin 65%, Sareen 35%.)

1. Introduction: Climate change and the future that cannot begin

> You cannot grip the world and shape it as a material thing. You can only influence its development if you recognize and respect it as a thing of the spirit.
>
> Dag Hammarskjöld (1953)

Like so many people in my generation, I spent years of my life struggling with global climate politics. At the now infamous COP15 climate summit in Copenhagen 2009, we had our declarations and slogans ready. In the spirit of the times, these were framed around aggregate goals focusing on global atmospheric carbon dioxide concentrations. We were young but not particularly naïve: of course, we were painfully aware that our agency and strategic ability was limited. But at the time, we did not reflect on the fact that our wings were clipped because climate change itself was constructed in a way that made it very difficult to influence. Climate change was for most of us a distant, long-term problem, governed by abstract global mechanisms that we could not grasp. We were separated "from climate change in both the articulation of the problem and its proposed solutions" (Head and Gibson, 2012: 700). Climate change as a problem was situated over there and in the far future; it was not here and not now.

The framing of climate change as a global problem, calling for multilateral agreements and global solutions "which are then 'cascaded' down through national, and implicitly, subnational arenas of governance" (Bulkeley, 2005: 879) probably reached its culmination right then at the Copenhagen summit. Subsequent months of society-wide post-Copenhagen depression and soul searching spurred a reconfiguration of political strategies which also led to a reframing of climate change itself (Bulkeley, 2016). Now the landscape of climate politics is much more loosely assembled; the global solution to climate change is to be found in a proliferation of local, experimental, and loosely coordinated initiatives (Biermann et al., 2017). The Paris Agreement provides a clear goal and direction, but voluntary commitments – for instance from "frontrunner"

countries, cities, and corporations – play an increasingly important role when it comes to the actual work of reducing greenhouse gas emissions (Acuto and Leffel, 2021; Biermann et al., 2017; Gordon and Johnson, 2018; Oels, 2005).

In this new landscape of urban sustainability transformation, the current approach is to let a thousand flowers bloom. Underneath the aggregated global pathways there seems to have been a rich undergrowth of local agency all along. Here, cities have worked deliberately to establish themselves as central actors who can play a proactive role in climate action through concerted networking, political lobbying, and mobilisation of best practice across cities (Acuto et al., 2021; Acuto and Leffel, 2021; Nguyen et al., 2020). There is inevitable leakage in such a constellation of climate governance. And so far, the sum of these loosely connected initiatives is far from accomplishing the global reductions in greenhouse gas emissions needed to avoid dangerous climate change. But underpinning these initiatives lies another interpretation of the whereabouts of political agency. Climate change has become a matter of local politics; both the problem and its solutions are closer to us.

However, in *time*, climate change remains a diffuse and long-term problem that largely does not concern us right now. In spite of all the climate emergency declarations, we are stuck with the sense that the "future cannot begin" (Luhmann, 1976), the claustrophobic feeling that we are stuck in "an indefinite present without exit" (Hu, 2018). Substantive climate action is continuously pushed further into the future through economic discounting, technological imaginaries, or deliberate politics of delay (Emmerling et al., 2019; Lamb et al., 2020; Markusson et al., 2018). Meeting climate targets are increasingly dependent on the future large scale deployment of speculative technologies, undermining the scope of responsibility and agency in the present (Anderson and Peters, 2016; McLaren and Markusson, 2020).

For the future to be able to begin, then, it needs to be rendered relevant locally and in the present. The purpose of this thesis is therefore to examine how climate change can be made actionable here and now. In other words, we need to establish the relationship between the local and the global and the present and the future. Here, Luhmann (1976:

146) has pointed to the practices involved in order to "transform in a highly selective way distant temporal relevances into present social ones." This ambition to articulate how the future might become relevant in the present (Anderson, 2010; Wangel, 2011), links to broader efforts within geography to establish the local responsibility for global change which have asserted that local "places are also the moments through which the global is constituted, invented, coordinated, produced" (Massey, 2004: 11). We can now see traces of this rescaling of climate change in space and time as local governments work to re-articulate climate change as a problem situated within the grasp their planning horizons (Sareen et al., 2021). However, such rescaling to establish the relevance of a problem here and now is never straight-forward; as Hulme (2007: 6) notes, "[c]limate change knowledge and meaning travels uncomfortably across scales and needs constant re-interpretation as it is applied in different spatial contexts."

In this thesis, I term this work the *relational mobilisation* of transformation. Rather than the top-down implementation of global agreements and solutions, this perspective foregrounds the locally situated but spatially interconnected work involved in mobilising and translating transformation across and within contexts and scales: both in articulating, aligning, and negotiating pathways and in sustaining them over time. As such, this perspective articulates how sustainability might be made relevant here and now. It also highlights how these initiatives are underpinned by relationality and mobility as ideas and resources are mobilised from one context to another – or when problems in the future are mobilised to influence decisions in the present (Anderson, 2010; Luhmann, 1976; Peck and Theodore, 2015; Urry, 2004; Wangel, 2011). This indicates that the political dynamics of implementing rapid climate action is a far more complicated issue than the technical and economic models suggest. The mobility perspective highlights that transformation can never be a mere transfer of temporally and spatially distant "relevances," but will always involve an active act of translation which draws on particular practices and is embedded with meaning (Cresswell, 2010).

This approach resonates with the process ontology of assemblage thinking, which describes a relational world which is continuously in the making and only loosely held together (Anderson et al., 2012; Haarstad and Wanvik, 2017; Li, 2007b; McGuirk and

Dowling, 2020). With its focus on the practices involved in translating distant problems to issues of more immediate relevance, the approach taken in this thesis also connects to governmentality perspectives which discuss the rationalities and practices through which climate change is (selectively) rendered legible and governable (Miller and Rose, 2008; Oels, 2005; Stripple and Bulkeley, 2013). These literatures have, in their own specific ways, highlighted the political dynamics implicated in the governance of climate transformation in urban domains that are far from uniform and coherent, but rather fragmented, contested, and mutually constituted. Nevertheless, I miss a more explicit engagement with the relational footwork of transformation through which these actors and resources are aligned and sustainability interventions made possible.

The analysis of the empirical cases in this thesis – Addis Ababa, Ethiopia and Oslo, Norway – show how local actors are continuously engaged in acts of translation in order to make geographically distant ideas and resources relevant locally, and to establish the immediate relevance of long-term issues. To act on climate, we need to establish its relevance for decisions here and now.

1.1 Purpose and research questions

This thesis seeks to interrogate the practices through which climate change can be translated from a global, long-term issue to a more immediate and locally situated concern. As a part of the project *European cities as actors in climate and energy transformation*, it analyses the emerging networked urban governance arrangements through which responsibility for climate change is articulated locally. The papers in this thesis provide partial examinations of how these situated actors work to accomplish local climate governance here and now, drawing on empirical evidence from Addis Ababa and Oslo. As such, this thesis contributes to the understanding of how cities work together to mobilise sustainability transformations. These issues are examined from the perspective of networks and mobile policies, opening up for an analysis of the local strategies to cohere and routinise urban transformation and the practices through

which the relevance of future climate change might be established in the present. The main research question is:

- How do local actors make climate change actionable here and now?

In order to answer this research question, the papers in this thesis examine the following questions relating to the work of local transformation:

- How do situated actors mobilise resources from elsewhere?
- How are actors and resources aligned and coordinated locally?
- How are different time scales translated to establish the relevance of future problems in the present?
- How are local transition initiatives sustained in time?

These questions concern, respectively, the role of relationality and mobility across cities, within cities and in time. This thesis draws on theoretical concepts of temporality and relational spatiality to investigate these questions through a distended case study approach (Peck and Theodore, 2012) which examines transformations through the "circulations and connections which shape cities" and "engage with urban outcomes through tracing their genesis by means of specific connections, influences, actions, compositions, alliances, experiences, across the full array of possible elements of urban life" (Robinson, 2016: 5, 15). Drawing on empirical evidence from fieldwork in Oslo, Norway and Addis Ababa, Ethiopia, it examines the relational politics in play as sustainability interventions are developed, negotiated, and implemented. Through interviews with local actors, participant observation at conferences and webinars, and analysis of key policy documents, it analyses the practices through which sustainability is made relevant locally and in the present.

While different in terms of population, social structure, and financial resources, the two empirical cases of Oslo and Addis Ababa are connected thematically: both cities are seen as frontrunners in climate action in their respective regions and collaborate internationally through the C40 Cities network to deploy rapid and disruptive urban climate policies. Both cities are also involved in the implementation of keystone

climate interventions in the urban mobility sector and experiment with different ways of organising governance to enable coherent and rapid sustainability and climate action. Furthermore, both cities draw significant resources and political capital from similar climate interventions elsewhere and are thus engaged in comparable processes of translating these ideas to local material circumstances.

In this thesis, I conceptualise this work of constituting and sustaining urban transformation pathways as *relational mobilisation* in space and time. The concept of relational mobilisation encompasses two core dimensions: On the one hand, it points to how transformations are mobilised *across* places and time horizons, highlighting the practices of translation through which geographically or temporally distant ideas or resources are made relevant locally and in the present. On the other, it brings attention to how transformations are cohered and sustained *within* a geographical context and in the present, surfacing the practices through which actors, initiatives, and resources are aligned and coordinated.

The purpose of this thesis is twofold: First, it aims to contribute with empirical case studies of how urban sustainability interventions are implemented in practice. Second, it develops analytical tools which can be deployed to examine the spatial and temporal dimensions of urban sustainability interventions. While the reading of urban transformation across the different contexts of Addis Ababa and Oslo serves the purpose of empirically examining the spatial relationality of urban climate and sustainability intervention, it also opens up the practice of "thinking with elsewhere" (Robinson, 2016, 2017), which may allow for the destabilisation of existing theory and the building of new theory which is grounded across contexts.

As such, a core contribution of this thesis within the larger project, *European cities as actors in climate and energy transformation*, is to develop an integrated framework which brings together spatial and temporal dimensions in the analysis of the geography of sustainability transformation. This perspective – transformation as relational mobilisation – brings attention to the relational work of translating, mobilising, and holding together transformation pathways. As such, it allows for critical examination

of the rationalities, technologies, and practices through which sustainability is rendered relevant here and now, and with what implications. This thesis contributes to the sustainability transitions and transformations literature by analysing the practices through which transformations are mobilised across interconnected contexts and aligned and sustained within locally fragmented settings. Furthermore, it adds empirical cases to the discussion within the policy mobilities literature on how urban actors work with elsewhere to accomplish local goals.

1.2 Summary of papers

The papers in this thesis examine how climate change is made relevant here and now. Figure 1 presents an overview of the core contribution of each paper, building on the dimensions of *space* (here) and *time* (now) and whether the focus is on mobilisation and translation *across* contexts and time horizons or *within* a context or time.

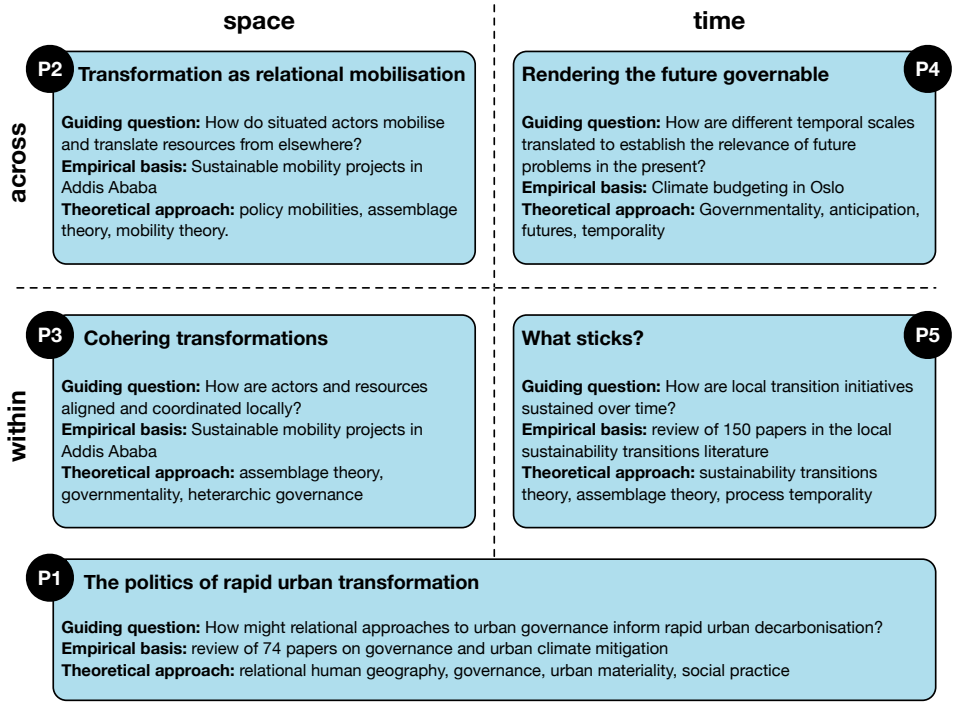

Figure 1: Overview of papers

Paper 1: The politics of rapid urban transformation

Paper 1 maps the social complexities and politics of urban sustainability transformations. We assess the potential of rapid implementation of urban climate interventions to catalyse the transitions and transformations needed to meet the aspirational 1.5°C of the Paris Agreement. We find that empirical studies of rapid urban decarbonisation are in short supply. In consequence, urban transformation pathways to meet the 1.5°C target have largely been evaluated based on modelling and integrated assessment which frame urban mitigation options in economic and technical terms. As a result, the social and political barriers to rapid urban transformation are often overlooked. This way of framing the problem also means that the opportunities for rapid transformation in a city's political and social dimensions become obscured. In order to address this gap, we review the broader urban (climate) governance literature with the aim of articulating the relationship between techno-economic interventions and urban social and political dynamics.

We highlight three analytical dimensions to interrogate these dynamics, namely the politics of governance, the politics of infrastructure, and the politics of everyday life. These dimensions emphasise the shifting and political nature of urban governance arrangements and the complex interplay between the built urban environment and everyday life, as well as the potential of urban citizens to both accelerate and resist urban climate transformation. Moreover, we draw attention to the contested, fragmented, and temporary nature of urban sustainability interventions. Our analysis finds a tension between the often incremental, unstable, and geographically dispersed work of urban sustainability governance and the consistence suggested by the climate abatement pathways of techno-economic modelling. We conclude by sketching out a research agenda for empirical engagement with the temporality and spatiality of rapid urban transformation.

Paper 2: Transformation as relational mobilisation

Paper 2 examines how transformations are mobilised in space across geographical contexts and outlines an initial formulation of 'transformation as relational mobilisation' which is further developed in the subsequent papers. In this paper, we

address the geography of urban sustainability transformation, drawing on an empirical study of the planning of a Bus Rapid Transit system (BRT) in Addis Ababa, Ethiopia. To do so, we first review the spatial imaginaries implicated in common conceptual approaches to sustainability transitions and transformation, particularly the multi-level perspective (MLP) and socioecological systems approaches (SES). While these two literatures have distinct conceptual histories, we find that they have in common what we understand as a "systemic" understanding of societal change. Here, sustainability transitions and transformations are understood to play out in relatively bounded systems which are coherent, territorially stable, and nested in a scalar hierarchy. In contrast, our empirical examinations, based on analysis of evidence from 29 interviews with key sustainable mobility practitioners in Addis Ababa – as well as webinars, conferences, and document analysis – find the geography of urban sustainability transformation to be spatially interconnected, fragmented, and only loosely coordinated.

Building on assemblage theory and the policy mobilities literature, we therefore proceed to develop a conceptual approach that makes it possible to analyse the interconnected geographies through which sustainability transformations are mobilised in a way that highlights the dimensions of interconnected settings, mobile relations, and contextualised agency. This perspective brings attention to the local work involved in mobilising ideas and resources from multiple 'elsewheres' to engender local transformation. As such, the paper contributes to the policy mobilities literature by emphasising the creative work involved in assembling transformations through working with elsewhere, rather than the predominant focus on practices of neoliberalisation. Furthermore, it draws on the mobilities literature to examine the constitution of relational space by articulating how spatial relations are produced through mobile practices, dependent on locally grounded resources.

Paper 3: Cohering transformations

Paper 3 addresses how transformations are aligned and coordinated within local contexts. In this paper, I pick up on the themes of fragmentation in the constitution of local transformation pathways suggested in Papers 1 and 2. I analyse the politics of

implementing sustainable mobility projects in Addis Ababa, Ethiopia, based on evidence from 26 interviews with practitioners in addition to analysis of key policy documents and empirical data derived from participation in webinars and conferences. Responding to the widespread concern amongst Addis Ababa urban practitioners that the implementation of sustainable mobility is constrained by institutional and material fragmentation, I trace the concrete strategies through which urban governance constellations pertaining to sustainable mobility are aligned, coordinated, and held together in practice. I find that these attempts depend on a diversity of informal and formal strategies. The empirical analysis foregrounds four categories of such strategies: interpersonal, institutional, material, and informational.

Drawing on assemblage theory and Foucault's notion of *dispositif*, I argue that successful urban sustainability governance relies on the capacity of urban actors to *cohere* urban transformation. This perspective brings attention to the politics involved in the process where urban governance arrangements are negotiated through local and inter-local networks, as well as how policies are materialised in the built environment and potentially aligned with the patterns of everyday lives of urban residents.

Paper 4: Rendering the future governable

Paper 4 articulates how climate change might be translated and rendered actionable across different time horizons. While considerable scholarly and political efforts have gone into asserting the local and regional dimensions of global climate change, it has largely remained an abstract and long-term problem in time. This paper examines the practices through which climate change is rendered governable in the present, drawing on an empirical case study of the climate budgeting approach pioneered by the city of Oslo, Norway. Climate budgeting integrates planning for climate mitigation in the annual economic budget cycle. As such, it also contributes to reframing climate change from a long-term issue to a more immediate concern which affects decisions in the present. This paper starts from Oslo's claim that "we count carbon dioxide as we count money." Based on interviews with key actors as well as evidence from webinars, conferences, and technical reports, I examine what this means in practice. The analysis draws on theories on temporality and governmentality in order to assess the

rationalities and technologies springing from and informing the quantification and calculation of measures in proactive climate action.

The analysis finds that climate budgeting appears to be successful in translating the temporalities of climate action to align with the annual temporal cycles of municipal planning. However, this depends on a selective rendering which emphasises climate interventions which are relatively easy to quantify, while other measures, such as those focusing on indirect emissions, receive less attention. I find that this is related to considerations about the legitimacy of the approach and the management of uncertainty.

Paper 5: What sticks?

Paper 5 elaborates on the theme of temporality in sustainability transformations, this time attending to the concrete strategies through which local actors attempt to overcome fragmentation and seek to sustain local sustainability initiatives over time. Through a review of 150 key papers in the literature on local sustainability initiatives, we find that a shared characteristic of these ventures is their temporary, even ephemeral, nature. Local actors hence constantly highlight their difficulties in sustaining local sustainability initiatives. Furthermore, the impermanent and iterative nature of such initiatives makes it difficult to assess their cumulative and long-term impact. Hence, there is a need to examine the temporal aspects of sustainability transformations, particularly the relationship between ephemerality and permanence. We find that the multilevel perspective (MLP), also reviewed in Paper 2, is ill equipped to capture this dynamic. While the MLP does contribute to a strong temporal dimension in the assessment of sustainability initiatives, its temporal categories emphasise the obduracy of incumbent regimes. Therefore, the temporal dimension of local sustainability initiatives tends to be treated as external context rather than an inherent constitutive part which has implications for its design and outcomes.

In this paper, we articulate the *situated* temporal dynamics of sustainability transformations by approaching continuity from the perspective of a process ontology that conceptualises permanence as a dynamic and continuously produced effect of

repetition, translation, and reinvention. We propose a temporal typology to assess the relationship between obduracy and ephemerality in local transitions. In this reading, the transformative potential of a local sustainability intervention depends on its ability to influence a longer sequence of events, for instance by catalysing change, by revamping and reorienting transition pathways, or by routinising initiatives to secure their longevity. Our review identifies the local agency involved in maintaining transition initiatives over time through structural, relational, and material strategies – in other words the diverse ways in which local actors work to make their initiatives relevant over time.

1.3 Structure of this framing introduction

The rest of the framing introduction of this thesis proceeds as follows. First, I discuss sustainability transitions and transformation, tracing the role of cities in climate action through a relational and mobile understanding of society (chapter 2). I then articulate transformation as the work of relational mobilisation (chapter 3). Four dimensions of relational mobilisation are outlined, namely between places, within places and between time horizons, and within the emerging present. In chapter 4 I describe my study areas and discuss my methodological approach, examining how methodological procedures might be adapted to work in the study of relational and spatially distended processes. Finally, I summarise and discuss the main conclusions from this thesis (chapter 5).

2. Sustainability transformations and the mobile constitution of society

In this thesis, I seek to understand how local actors work to make sustainability relevant here and now: how they relate to other places and time horizons when mobilising transformation. In order understand this, I have engaged the empirical material from the field in dialogue with theoretical perspectives from the literatures on urban governance, sustainability transformations, assemblage theory, mobility, temporality, and governmentality. In this section, I assess theoretical perspectives on sustainability transitions and transformations literature (chapter 2.1) and the emerging role of cities as actors in climate and energy transformation (chapter 2.2). I then proceed to discuss the implications of these ideas for how we conceptualise urban transformation, which I – following Söderström et al. (2013) – understand as the "mobile constitution of society" (chapter 2.3). I emphasise three implications of the mobile constitution of society, namely society as formation, relations as mobile, and practices of rescaling. These theoretical discussions form the basis of my conceptual framework – transformation as relational mobilisation – which will be introduced in chapter 3.

2.1 Sustainability transition and transformation

Increasing concern about emerging social and environmental crises has spurred an intense debate about what a sustainable society might look like and how to get there. In these debates, it has been noted that sustainable development itself is an inherently contradictory and contested concept (Hopwood et al., 2005; Sachs, 2015), open to many different interpretations and prone to be co-opted by the agendas of incumbent actors. Different perspectives on sustainability diverge along several dimensions: they disagree in their assessment of the scale, magnitude, and depth of change needed to accomplish sustainable development; they are underpinned by divergent value systems; and they make differing judgements about which key actors, institutions, and mechanisms that should drive the sustainability transformation (Leach et al., 2010, 2012). The scholarly debates on these issues have crystallised into the literatures on sustainability *transitions* and sustainability *transformations*. While these two

literatures are interconnected in practice, it is helpful to discuss them separately before examining how they compare in their explication of the work involved in engendering sustainability interventions.

The sustainability *transitions* literature (Geels and Schot, 2007; Köhler et al., 2019; Markard et al., 2012) has examined transitions to sustainability with an analytical focus on the evolution of socio-technical systems. The most prominent approach to assess these dynamics has been the multi-level perspective (MLP), articulated by Geels (2002, 2011) and colleagues. From this perspective, radical sustainability innovations are expected to occur in relatively protected niches which might then affect larger socio-technical regimes and landscapes. In spite of the use of spatial metaphors such as niches and landscapes, these three dimensions of niches, regimes and landscapes in effect come to represent increasing degrees of structuration: the MLP allows for assessment of the dynamics between stability and change as actors work to develop and institutionalise sustainability interventions. However, as we argue in Paper 5, in practice, these spatial metaphors also correlate with the geographical scope of the analytical focus where niches are generally understood as local, while regimes and landscapes are understood as institutional structures at the national or global level. Research in the sustainability transitions tradition tend to focus on the ability of niche actors to instigate regime change, and there is a lively interest in the role of experimentation (Bai et al., 2010; Castán Broto and Bulkeley, 2013; Karvonen and van Heur, 2013), grassroots innovation (Feola and Nunes, 2014; Ornetzeder and Rohracher, 2013; Smith et al., 2014) and urban living labs (Bulkeley et al., 2017; Kronsell and Mukhtar-Landgren, 2018; Voytenko et al., 2016).

The multi-level perspective has subsequently been modified to accommodate, among other things, the role of power (Avelino, 2017), politics (Meadowcroft, 2011) and geography (Coenen et al., 2012; Hansen and Coenen, 2015) in sustainability transitions. Of particular relevance for the argument of this thesis, such contributions have brought to light how multiple co-existing niches might be interconnected across geographical settings (Affolderbach and Schulz, 2016; Loorbach et al., 2020; Sengers and Raven, 2015). This literature has emphasised the role of spatial diversity of

institutions, strategies, and resources across geographical contexts as well as the translocal nature of transitions, and highlighted the role of local institutional embeddedness as well as interactions across scales (Coenen et al., 2012; Hansen and Coenen, 2015; McCormick et al., 2013). However, Hansen and Coenen (2015) found that most contributions pertaining to the geography of sustainability transitions still focus on the local niche-level; while they add spatial sensitivity to existing frameworks, they seldom provide alternative frameworks for analysing spatial transition dynamics. Furthermore, such studies tend to emphasise the role of technical innovation and its relatively controlled implementation.

The sustainability *transformations* literature is in contrast a more diverse, pluralistic, and incoherent body of research. While drawing on a multitude of theoretical approaches and ethical concerns, this literature tends to argue that current sustainability problems are symptoms of how society is organised at present (Hopwood et al., 2005). Hence, sustainability is not achieved through the implementation of technical solutions but through deeper, structural change which challenges individual world-views, societal power relationships, and relations with the more-than-human-world (O'Brien, 2018; Pelling, 2011; Pelling et al., 2014; Stirling, 2014). In other words, accomplishing sustainability transformations takes both innovation (Leach et al., 2012), social struggle (Frantzeskaki et al., 2017), transformative learning, and personal growth (O'Brien, 2012). As such, and in contrast to the "controlled" transition, transformations are understood to be "unruly" and characterised by uncertain knowledge and a diversity of actors who all have their own particular framing of what the problem is and of its possible solutions (Stirling, 2014). One dominant stream of transformations research has borrowed analytical concepts from ecology to explain how systems disintegrate and are reorganised over time in the adaptive cycle of resilience theory (Folke et al., 2010; Olsson et al., 2014). Other approaches have considered the difference between technocentric, marketized, state-led, and citizen-led transformation initiatives (Scoones et al., 2015), perhaps overlooking the role of cities in an increasingly polycentric environment of sustainability governance.

However, when it comes to analysing the active work of rendering sustainability relevant here and now, these perspectives are limited in how they approach both the spatial and the temporal dimensions of urban sustainability initiatives. In Paper 2, we review how the sustainability transitions and transformations literature approach space and scale. We find that they have in common a "systemic approach" (Scoones et al., 2020) which – as we discuss in Paper 2 – treats systems as bounded, stable, and as part of a nested scalar hierarchy. Accordingly, they often emphasise *systemic* capacities for transformation and tend to downplay connections to elsewhere. As such, both transition and transformation perspectives on sustainability intervention have "tended to diminish the role of individual agency, [and to] downplay the complexity of politics, power and asymmetries in human-environment dynamics" (Scoones et al., 2020: 67). Correspondingly, in Paper 5, we find that the temporal dimensions of how sustainability efforts are sustained over time are poorly accommodated by the sustainability transitions literature since it has treated continuity as structures that are analytically placed outside of the initiative. Hence, there is a need to explicate the process temporality and the situated strategies through which local actors work to sustain their initiatives over time.

While this thesis speaks to both of these literatures, the word "transformation" is predominantly used to signal the deeper political and structural dimensions of sustainability intervention (Hopwood et al., 2005; O'Brien, 2012; Stirling, 2011). This terminology is aligned with the language used in Papers 1–4. Sustainability interventions are referred to as "transition" initiatives in those instances where I relate directly to the sustainability transitions literature, as in Paper 5.

2.2 Cities as actors in climate and energy transformation

The world's cities are now firmly established as key players in the social and environmental transformations needed to avoid dangerous climate change and realise sustainable development (Acuto et al., 2021; Erickson and Tempest, 2014). More than 50 percent of the world's population now lives in cities, and the world is rapidly urbanising. The urban population is projected to increase by 2.5 billion between 2018

and 2050 (UN DESA, 2019), and 90 percent of this population growth is expected to take place in African and Asian cities which are also about to make large investments in infrastructure to meet basic needs (Nagendra et al., 2018). The nature of this urban growth and investment in infrastructure is critical for whether global climate mitigation and adaptation goals will be met (Creutzig et al., 2016). Urban areas are already today driving more than 70 percent of world's energy demand, and account for 80 percent of the global Gross Domestic Product (Global Commission on the Economy and Climate, 2014). Significant climate mitigation potential is identified in compact and well-connected urban development, measures which are largely seen to also make cities more attractive and liveable (Global Commission on the Economy and Climate, 2014). Keystone climate mitigation policies in urban planning, mobility, and resource management can be found by skimming through one of the many policy catalogues provided by international city networks (McKinsey and C40 Cities, 2017).

This rise of cities as climate actors is not the least a result of a concerted effort by the cities themselves of voluntary commitments and international lobbying. Through Local Agenda 21 strategies, urban governments have pursued the localisation of the global sustainable development agenda which was promoted by the Brundtland Commission and the Rio Earth Summit of 1992 and predicated on the balancing of social, economic, and environmental concerns. Such efforts articulated the role of cities as sites of response and emphasised municipal sustainability measures drawing on local partnerships and dialogue between citizens, local organisations, and businesses (Aall, 2000; Hodson and Marvin, 2017). More recently, cities worldwide have adopted climate targets which are far more ambitious than those of their national governments or in multilateral climate agreements (C40 Cities and Arup, 2016). They have also articulated how they find themselves at the frontlines of climate change, emphasising that urban administrations will increasingly need to deal with (and pay for) the wildfires, floods, and storms resulting from unsustainable development (Bartlett and Satterthwaite, 2016). As succinctly summarized by Los Angeles Mayor Eric Garcetti (2019) at the C40 World Mayor's Summit: "We feel it in our lungs and in our lives … and we feel it in our budgets as well as we increasingly spend to respond to this climate emergency."

At the same time, urban governments have rarely had a seat at the table in the air-conditioned conference venues in which international climate and sustainability agreements are negotiated (Acuto, 2016). The United Nations Framework Convention on Climate Change (UNFCCC), the United Nations Sustainable Development Goals and New Urban Agenda of UN-HABITAT are all part of the multilateral system of nation states where cities have no formal say. But cities have increasingly established their presence in these fora through side events, collaborative conferences, and by pursuing voluntary commitments and reviews (Acuto et al., 2021) in line with the bottom-up nature of the Paris Agreement. This emerging landscape of global governance through "goal-setting", purport Biermann and colleagues (2017: 27), "starts with aspirations that are not necessarily integrated into, or aligned with, existing institutional arrangements." Cities, then, are seen to have the capacity and political will to move both faster and better towards sustainability than the nation states that they are embedded in.

However, below the rhetoric of can-do and how "cities will get the job done" (C40 Cities and Arup, 2016) remains the fact that cities are highly complex, unequal, and contested domains. Relational accounts of cities highlight that relations, dependencies, and lines of engagement with elsewhere are part of what a city is (Massey, 2007): the local is spatially distended (Robinson, 2013). Tonkiss' (2013) reading of city design foregrounds how the city is produced through the integration of different social, spatial, and material forms in a process permeated by conflicting interests. Therefore, urban material infrastructure and urban governance arrangements are never complete, but inconsistent, incoherent, and often out of reach of formal actors. Indeed, Tonkiss (2013:6f) contends that "most city-making happens under the radar of official designs" as "human contexts change faster than urban forms" – the city is just as much the result of informality and the unintended consequences of design as it is the product of the active interventions of conventional urban actors such as planners, architects, and engineers. Therefore, urban sustainability interventions may be both mobilised and resisted by urban residents, something which in turn may affect their transformative potential (Castán Broto, 2015; Ornetzeder and Rohracher, 2013). Urban sustainability

endeavours unfold in "highly uneven and deeply unjust urban landscapes" (Swyngedouw and Heynen, 2003: 898), which is why it is necessary to ask who pays and who gains from a given transformation (Harvey, 1996). Such inequalities are corroborated by the political nature of infrastructure, where 'splintered infrastructures' (Graham and Marvin, 2001) and urban forms (Winner, 1980) result in the materialisation of urban inequalities.

Urban governance arrangements have also shifted from managerial approaches building on direct authority to softer modes of entrepreneurial governance (Harvey, 1989). The organisation of urban governance is itself political and often contested (Myers, 2011). Therefore, while urban sustainability interventions are often framed as technical solutions, they are nevertheless inherently political. Here there is often a gap between the rhetoric of good governance and everyday realities as "modern forms of rule by postcolonial states rely on justifications (or public discourses) for their actions that may be progressive at the level of formal rhetoric but deeply unjust in terms of the systematic and routine exploitation of the urban poor" (Pieterse, 2008: 68).

In terms of the localisation of climate action in cities, governance organised around networks and experiments have been particularly influential. Scholarship on networked urban governance has highlighted the increasing role that formal urban climate networks (Acuto and Leffel, 2021; Nguyen et al., 2020) as well as informal circuits of knowledge in mobilising rapid climate action. As Davidson et al. (2019: 3541) observe, the purpose of such networking is "not just for soft exchanges but for tangible policy and material outcomes." Networking may also lead to less transparent decision-making and shifting power dynamics as businesses and philanthropic organisations such as Bloomberg Philanthropies and the Rockefeller Foundation gain an increasingly important role in funding and facilitating urban networks (Davidson et al., 2019).

Connected to these networked governance trends is an increasing interest in urban experimentation. Cities are here increasingly seen as the local laboratories in which these "policies that work" (Peck and Theodore, 2015) can be developed, tested, and demonstrated. Here, experimental governance through e.g. "urban living labs"

highlights how more or less formalised partnerships between municipalities, academia, business, and civil society organisations can lead to the development of experimental sustainability interventions (Bulkeley et al., 2014, 2017; Kronsell and Mukhtar-Landgren, 2018; Voytenko et al., 2016). While these interventions usually are incremental, dispersed, pluralist, and temporary in nature – the implications of which I discuss at length in Papers 2, 3 and 5 – the overall ambition is that these solutions will then be scaled or mobilised in order to affect larger scales of governance (Bouzarovski and Haarstad, 2018; Geels, 2002). Therefore, local sustainability experiments are often conceptualised as "niches" that are embedded in the regimes and landscapes of the multi-level perspective (Coenen et al., 2012; Geels, 2011; Geels and Raven, 2006). However, the ability of local sustainability experiments to transform the larger governance regime remains uncertain (Williams, 2016).

To understand contemporary urban transformation, we therefore need to move beyond the common understanding assessed in chapter 2.2 that sustainability transitions and transformations concern coherent and hierarchically organised bounded systems. In the next chapter, I will assess how theoretical perspectives drawing on a process ontology and bringing to the fore the relationality of societal phenomena might contribute to our understanding of urban sustainability transformation. I refer to these perspectives as "the mobile constitution of society" (Söderström et al., 2013).

2.3 The mobile constitution of society

The perspectives on urbanism and urban governance outlined in chapter 2.2 foreground how urban transformation in one place is relationally interconnected with other places, and that the local scale itself is contested and incoherent. In this thesis, I articulate a need for a theory of sustainability transformations which is attuned to the practices through which sustainability interventions are mobilised, translated, rescaled, and routinised across contested spatial domains, and which is able to discern local implications.

The conceptual approach to sustainability transformations which I develop in Papers 2–5 – in short, "transformation as relational mobilisation" – responds to this challenge

by building on the relational and mobile approaches to place, space, and scale within human geography which have articulated the local agency – and, accordingly, responsibility – for global change. By emphasising movement and flows, these approaches shed light on what Söderström and colleagues have dubbed "the mobile constitution of society" (Söderström et al., 2012, 2013).

This line of explication of the process-based and relational nature of the constitution of society allows for analysing the active work involved in assembling, aligning, rescaling, negotiating, and sustaining transformation pathways locally and in the present.

To assess how sustainability is made relevant here and now, I first need to articulate the nature of the "here" and the "now", and how they relate to other spatial and temporal dimensions. To do so, I will first examine (a) how society might be theorised as formation, (b) relations as mobile, and (c) rescaling as a practice. This discussion is then used to develop the perspective of "transformation as relational mobilisation" which follows in chapter 2.4.

2.3.1 Society as formation

When articulating the here and now of sustainability transformations, the arguments of this thesis have drawn on processual readings of the nature of both space (Massey, 2005) and time (Dewey, 1916; Mead, 1932). Here, both space and time are seen as continuously in-the-making, never as a complete, static, or bounded entities. In other words, society is constituted by formation (rather than stability): what the pragmatist philosophers described as the "emerging present" (Dewey, 1916; Mead, 1932). As Massey (2005) has emphasised, such formation depends on the continuous making and remaking of spatial relations. Conceptualising space and time as formation is important for sustainability transformations research because it brings attention to the work implicated in creating and sustaining social orders.

In this thesis, I have drawn on assemblage thinking to develop an analytical approach which is attuned to the process-based nature of society. The articulation of assemblage theory within human geography has drawn on relational constructions of space, place,

and scale as well as the philosophy of Deleuze, Guattari, and DeLanda to assess the process-based nature of social phenomena. An assemblage is here understood as a more or less temporary constellation, and assemblage theory highlights both the emergent capacities of the assemblage itself, its relationally, and the relative autonomy of its constituent parts (Anderson et al., 2012; Dovey, 2012). A key feature of assemblage thinking is its focus on process and the active work it takes to hold these temporary constellations together. Assemblage as *agencement* (Phillips, 2006) opens up a process ontology that emphasises *formation* rather than *form* (Anderson et al., 2012; Haarstad and Wanvik, 2017; McFarlane, 2011a, 2011b). Theorising structures and social relations as assemblages accordingly highlights their instability and temporary nature. Hence, they "require different kinds of labor and are more or less vulnerable to collapse, or to reassembling in different forms" (McFarlane, 2009: 562). Indeed, as Moss (2016: 268) observes in his historical study of Berlin's water infrastructure, there is "considerable movement beneath the apparent stability." These perspectives have been particularly important for the arguments in Paper 5, which theorises continuity in local sustainability initiatives from the perspective of ephemerality and instability.

Such assemblages are understood to be multi-scalar, geographically dispersed, ontologically diverse, and constituted by a plurality of relations in the sense that they tie together component parts which may be both human and non-human (McFarlane, 2009). Furthermore, interlinkages between different assemblages mean that "[d]ramatic changes in one assemblage can destabilize other assemblages to which it is attached" (Haarstad and Wanvik, 2017: 9). Importantly, these components "do not necessarily cohere into seamless organic wholes" (Anderson et al., 2012: 172) – assemblage thinking thus emphasises the active work involved in aligning component parts in order to maintain apparent stability. Accordingly, assemblage theory makes visible the ruptures, instabilities, and capacities for change in seemingly inert social orders (Haarstad and Wanvik, 2017). In Paper 3, I build on this idea in order to explicate the situated strategies used to cohere actors and resources in order to enable urban sustainability transformation.

Jacobs (2012a: 908) insists that "we have to make our choices about what we wish to see when we see repetition." Assemblage thinkers tend to see such repetition as the result of translation and recursive operations of power rather than as the outcome of processes or structures that are elevated to an ontological status themselves (Jacobs, 2012b; Robinson, 2016; Van Assche et al., 2014). In other words, "'emergence' deals ... with structures, processes and theories that produce themselves out of their own contingency" (Pottage, 1998: 3). By approaching obduracy as internal (as opposed to an external structure) this perspective serves to foreground the active work by embedded actors it takes to sustain urban sustainability interventions in order to make them stick. In Paper 5, I discuss the implications of this perspective for how continuity and the transformative potential of local sustainability initiatives are conceptualised, examining the active strategies involved in catalysing, revamping, and routinising local sustainability.

This links to the relative autonomy granted by assemblage thinkers to the component parts of an assemblage: assemblage theory acknowledges the agency of parts *and* wholes. It may therefore help us transcend both micro-reductionism (i.e. that atomistic parts are understood to have autonomous agency independent of each other) and macro-reductionism (that the behaviour of the parts are determined by larger structures) (DeLanda, 2016). Similar to Massey's (2004) "geographies of responsibility", assemblage thinking may illuminate how structures and the "global" are performed by practices situated in local power relationships and, conversely, how the emergent properties of these structures also constrain the agency of local actors. Paper 2 builds on this argument in order to develop an approach to urban transformation which is able to accommodate both local heterogeneity and interlocal relations. As McFarlane (2009: 562) observes:

> Sites in translocal assemblages have more depth than the notion of 'node' or 'point' suggests – as connoted by network – in terms of their histories, the labour required to produce them, and their inevitable capacity to exceed the connections between other groups or places in the movement.

Viewing urban transformation through an assemblage lens, then, means interpreting them as a continuous process of formation that involves geographically dispersed

actors and component parts that operate at different scales. The work that goes into urban climate and energy transformations is therefore navigational rather than directional. However, with its focus on contingency, agency, and the performativity of structure, assemblage approaches also risk blurring power relationships and over-emphasising the agency of local actors. The scope of agency may be constrained by structures in the political economy, institutions, or infrastructures, even if these structures may be co-produced by these same actors: structural constraints which assemblage theory on its own is ill equipped to explain. Therefore, as Brenner and others (Brenner et al., 2011; Tonkiss, 2011; Wachsmuth et al., 2011) contend, assemblage thinking might work best when complemented by theories and analytical categories derived from elsewhere. In my thesis, I have combined assemblage thinking with governmentality approaches, urban theory, and mobility theory to explicate the situated practices involved in rendering climate change relevant here and now. I will now discuss these ideas, focusing on relationality, mobility, and practices of translation across scales.

2.3.2 Relations as mobile

The relational constitution of society is almost taken for granted in contemporary human geography scholarship, to the extent that the nature and quality of these relations are rarely probed. Here, Harvey's (1973, 1994) distinction between absolute, relative, and relational space points to three distinct ways in which spatial relations might be considered. In absolute space, sociospatial relations are understood as natural laws resulting in particular spatial patterns. Relative notions still admit space and time's independent existence, but they "change depending upon the nature of matter, its density and character" (Harvey, 1994: 129). Conversely, in Harvey's relative view, "each process produces its own space and time" (Harvey, 1994: 129). Hence, space is "contained *in* objects in the sense that an object can be said to exist only insofar as it contains and represent within itself relationships to other objects" (Harvey, 1973: 13). Subsequent accounts have built on this understanding of space as being produced by relationships, emphasising that this implies "the existence of plurality" and that space is "always under construction" (Massey, 2004: 9). Allen's (2004) notion of topological

space here emphasises that this leads to continuously shifting proximities and distances as different types of relations are made and remade.

In order to critically examine the relationality of sustainability transformations, however, we need to analytically consider the ways in which relations are made present in the particular times and places of sustainability interventions. For Massey (1994), spatial relations are made present through telecommunications, film, financial transactions, ships, and lorries but also through newspaper stands, posters, and food, creating a global sense of place. Similarly, Urry (2004: 28) employs Latour's notion of "circulating entities" to discuss how relations to elsewhere are made present through mobility:

> There are many such circulating entities that bring about relationality both within and between societies at multiple and varied *distances*. ... There are multiple forms of 'imagined presence' through traveling objects, moving people, and moving images that carry connections across, and into, multiple other social spaces.

In other words, spatial relations need to be *mobilised* to be made present. More than simple connections between one place and another, relations are in themselves constituted and maintained by physical, virtual, and imaginative mobility (Sheller and Urry, 2006; Söderström et al., 2013; Urry, 2004). A relational conceptualisation of society therefore by extension implies that society is comprised of mobility, highlighting "how society is constituted by different forms of mobility: policies, urban forms, people, institutions, and technologies" (Söderström et al., 2013: 2).

A mobility perspective points to the qualities of relational space. In consequence, we need to consider how places, societies, and sustainability interventions are shaped by the qualities of mobility and travel involved in maintaining the relations that constitute them. Urry (2004: 28) observes that "very different mobilities [are] central to making and maintaining complex connections in a 'networked society'." One type of mobility, perhaps most widely discussed, is the corporeal movement of people from one place to another that allows for co-present face-to-face encounters. Other types of mobility involve virtual and communicative travel that affords person-to-person exchange through information and communication technologies in real time or through

messages, the movement of physical objects, as well as imaginative travel through images and ideas (Urry, 2004). These disparate modes of mobility and travel have implications for the quality of the relations that are mobilised in a transformation initiative.

A key insight from the "mobilities turn" in social science (Sheller and Urry, 2006) is that the very act of travelling changes the people, objects, and ideas involved (see Kronlid and Grandin, 2014). They will not be exactly the same at arrival as when they were when they departed. As Cresswell (2010) emphasises, mobilities consist not only of movement but of meanings and practices. Mobilities are moreover shaped by the particular paths taken, the velocities, rhythms, and scales involved, various competences and forms of regulation (Söderström et al., 2013). There is therefore a need to scrutinise the conditions at departure, what happens in transit and at arrival; in other words, how the mobile people, objects, and ideas that constitute relations are shaped by different modes of travel and how they are structured. And through all this, people and ideas change, and objects are put to new use.

Examining sociospatial relations through a mobilities lens, then, points to the active work implicated in producing relational space. Indeed, for Massey (2004: 9), relations are "necessarily embedded material practices which have to be carried out." Such practices depend contextually embedded resources and are grounded in material contexts; as such they are both uneven and full of friction (Cresswell, 2010; Nikolaeva et al., 2018; Temenos et al., 2017). Hence, mobility is also intertwined with immobility (Cresswell, 2012), movement of people is highly regulated and access to infrastructure for corporeal, virtual, and communicative travel is unevenly distributed. Here, examining relations as mobile sheds light on the practices that produce relational space, and how this space will necessarily be uneven due to local material circumstances. In Paper 2, we discuss the implications of this uneven access to physical, virtual, and imaginative mobility for sustainability mobility interventions in Addis Ababa.

Drawing on this assessment of how the nature or relational space might be considered through a mobilities lens which emphasises practices, material groundedness, and

change, I will now turn to discuss mobility across spatial and temporal scales, focusing on practices of rescaling.

2.3.3 Rescaling as a practice

The development of cities as key actors in sustainability transformation links to broader trends in the reconfiguration of global environmental governance. This discussion has considered the implications of constructing climate change as a global problem and addressed the question of how responsibility for climate change might be rendered locally relevant. For instance, Hulme (2007: 5) has outlined how the construction of climate change as a global and geophysical problem is underpinned by "expectations of improving 'predictions' and to a problem-solution policy framing which claims both global reach and universal authority". However, this framing also serves to dis-embed climate change from its local grounding, thereby draining it from the local cultural meanings of climate and weather: it has "universalised the idea of climate, detached it from its cultural settings and failed to read the ways in which the knowledge claims emerging from climate science change meaning as they travel" (Hulme, 2007: 9).

The global framing of climate change is mirrored in how attempts at climate governance have been organised. As Bulkeley (2005: 879) has argued, "the scope of global environmental governance is confined to an imagined global scale, either in terms of the nature of the problems to be governed or in terms of the institutional solutions, which are considered appropriate." As such, climate change has been understood as a global problem, calling for global solutions that might trickle down to national and local spheres of governance. For Bulkeley (2005: 879),

> [t]his naturalization of the 'global' as the arena in which designated global environmental problems take place effectively serves to disembody the causes and consequences of such problems, and their construction as such, from practices and politics taking place at a multitude of sites and scales of governance.

This has spurred extensive efforts to assert the regional and local scales of climate governance. Drawing on a broader debate within human geography (and beyond), this literature has articulated how global change is grounded in local – often contested – practices (Freeman, 2001; Haarstad, 2014; Massey, 2004). Thus, it has highlighted the

interrelations between local agency and global change, and accordingly how allegedly "local" politics are implicated in broader global forces (Cox, 1998; Haarstad and Fløysand, 2007). These arguments have been particularly important for Papers 1 and 2, which aim to articulate the strategic role of local places in working with elsewhere to influence global trends. As Massey (2004: 11) contends, this might also open the possibility for local politics that alter the very nature of the global:

> For places are also the moments through which the global is constituted, invented, coordinated, produced. They are 'agents' in globalisation. .... [T]his fact of the inevitably local production of the global means that there is potentially some purchase through 'local' politics on wider global mechanisms. Not merely defending the local against the global, but seeking to alter the very mechanisms of the global itself.

The scalar construction of climate change as a global problem in space finds its parallel in the construction of climate change as a far-future concern in time, the implications of which I discuss at length in Paper 4 where I argue that this has made climate change difficult to grasp in the present. As Luhmann (1976) has noted, "the future cannot begin"; it is a horizon which is always moving away from us. This allows for the commodification and colonisation of the future by the present, for instance through futures trading and the creation of ecological (or economic) debt to be repaid by future generations (Adam and Groves, 2007).

Indeed, Adam and Groves (2007) warn against the ways in which possible future worlds actively fade away as the future is being polluted and colonised by practices in the present. Therefore, the "timeprint" – understood as "the temporal reach of actions" (Adam and Groves, 2007) – of decisions in the present has massively expanded due to increasingly narrow timeframes of current economic and political decision-making and the longer time scales through which pollution is materialised into global environmental change (Adam, 1995). This has led to a "problematic relation whereby current future-making extends far beyond any capacity to match our concern and responsibility to the temporal reach of our actions" (Adam and Groves, 2007: 203). This notion of "timeprint," then, implies that the future is being produced and constrained in and by the present, foregrounding a responsibility for the future in the

present similar to Massey's (2004) argument that local places have responsibility for the global change that they are active agents in.

Therefore, the accomplishment of climate governance depends on continuous efforts to rescale both the object of governance and the governance practices themselves. Bulkeley (2005: 875) asserts that "governing the environment involves both political processes of scaling and rescaling the objects and agents of governance, as well as attempts to create new, networked, arenas of governance." However, this rescaling of climate knowledge and governance is not always straightforward but calls for constant reinterpretation (Hulme, 2007).

Here, as I suggest in Paper 4, governmentality approaches may be applied to examine the practices of translation through which climate change is rendered relevant at different scales of governance (Bulkeley, 2016; Käkönen et al., 2014; Lövbrand et al., 2009; Lövbrand and Stripple, 2011; Oels, 2005; Stripple and Bulkeley, 2013). In other words, "climate must be represented, depicted and ordered before it can be governed" (Stripple and Bulkeley, 2013: 11). Such a rendering is always selective, dependent as it is on particular ways that organisations are able to "see" climate change and hence structure their interventions (Scott, 1998).

Here Miller and Rose (2008) point to how different "rationalities of government" and "technologies of government" implies a range of bodies of knowledge, ways of thinking as well as instruments, tools, and materials which are involved in translating a domain into something which is open for political deliberation. The relationship between these rationalities and technologies of government lead to particular regimes of governance which have their own modes of seeing a problem and specific preferred solutions (Oels, 2005). As such, these climate governance regimes have implications for which policy options that are preferred or available, for instance whether extension of state powers or market-based solutions is the preferred mode of intervention. These approaches may also marginalise more critical discourses where climate change has been framed in terms of problems inherent in the capitalist system (Bäckstrand and Lövbrand, 2006). As such, practices of rescaling climate change in space and time – to

render it into a problem which is relevant here and now – also mean that climate change is reduced and framed in particular ways.

In other words, there is no "natural" spatial or temporal scale in which climate operates or should be governed. Explicating the practices of rescaling hence highlights how the climate needs to be actively translated in order to be understood and made relevant at different scales. Governmentality perspectives here provide a way to assess how the rationalities, technologies, and actors involved in such translation also frame climate change and its solutions in particular ways.

This chapter has discussed three implications of conceptualising society in terms of relationality and mobility, namely (a) that society is a process of continuous formation, (b) that spatial relationality is grounded in mobile practices, and (c) how establishing the responsibility locally and in the present depends on the active translation of spatially and temporally distant relevances. I will now examine how these perspectives can inform theories of transformation. This examination constitutes an elaboration of the theoretical framework informing this thesis – transformation as relational mobilisation – which will be introduced in the following chapter.

3. Transformation as relational mobilisation

The perspective of transformation as relational mobilisation aims to capture the local work involved in making sustainability actionable here and now. It draws on assemblage thinking, mobility theory, and governmentality approaches, discussed in chapter 2, to articulate the implications of the spatially distended, locally heterogenous, and temporally fragmented nature of societal change. This conceptual approach to urban transformation was initially developed and introduced in Paper 2, with a predominant focus on the interplay between relationships to elsewhere and the local institutional and material context in engendering urban transformation. In this chapter, the relational mobilisation approach is developed further in order to encompass the dimensions of how transformations are aligned and coordinated within particular contexts (as explicated in Paper 3), how transformations depend on the translation across different time horizons (developed in Paper 4), and how continuity is accomplished internally in local sustainability initiatives (articulated in Paper 5).

As such, the perspective of relational mobilisation developed in this thesis foregrounds the mobile practices involved in creating relations across and within places in order to align and sustain urban transformation pathways. It also highlights how mobility itself always implies change, highlighting the practices through which concepts are translated across temporal and spatial scales and how ideas change when they are mobilised from one place to another. I will now go on to articulate the four dimensions of relational mobilisation, namely the mobile relationality across places, within places and in time. This conceptual framework is summarised in Figure 2.

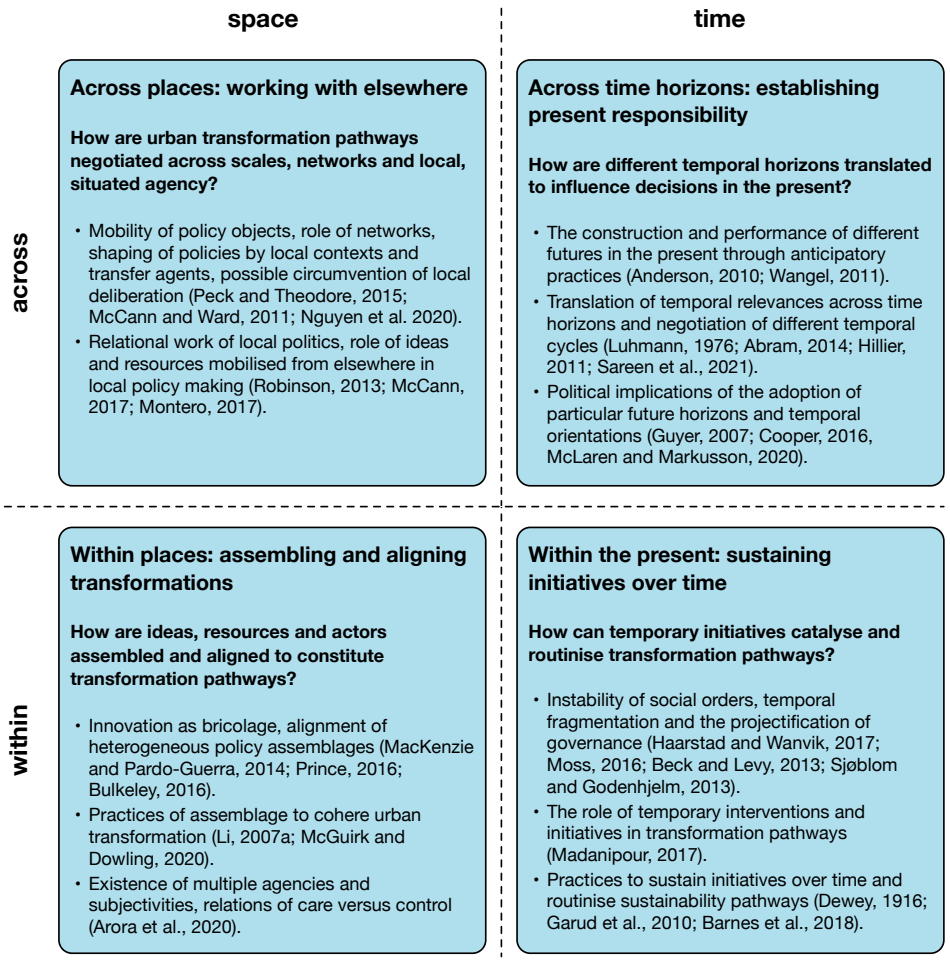

Figure 2: Transformation as relational mobilisation in space and time

3.1 Across places: working with elsewhere

The first dimension of transformation as relational mobilisation considers how ideas and resources are mobilised across space. In Paper 2, we explicate the ways in which situated actors work to make elsewhere locally present in order to accomplish urban sustainability interventions. We here point to how urban transformation pathways are negotiated across scales, networks, and local, contextualised agency. This approach draws on the policy mobilities literature which has examined policy making as a relational process that involves influences from multiple elsewheres.

The work of mobilising policy through relations with elsewhere can be assessed from the perspective of the policies themselves or from the point of view of the local settings in which they are implemented. The first view asserts the role of the mobile policies and their associated networks and transfer agents: in other words, how policies "arrive in" particular geographical contexts. These studies have expressed how policies and technologies "mutate" as they move from one context to another (Peck, 2011; Peck and Theodore, 2010). Rather than mere diffusion or transfer of policies, then, policies are significantly translated and altered when on the move. They are shaped and influenced both by the ideologies and agendas of the international networks and by the local urban contexts in which policies are implemented (McCann and Ward, 2011; Peck and Theodore, 2015).

The second perspective on policy mobility points to the relational work of local politics, in other words, how local actors "work with elsewhere to produce distinctive (particular) outcomes" (Robinson, 2013: 5), thereby "arriving at" certain policies. Hence, also the allegedly "local" work of sustainability transformation in a particular city is in no way a purely local affair but draws on relations and resources mobilised from elsewhere. These relations may be formal or informal, material or immaterial, and more or less ephemeral: policies may be mobilised from elsewhere "through forgotten conversations at meetings, long-distant reading of publications or reports, unpredictable friendship, and collegial networks, as well as formal or informal associations in which taken-for-granted understandings might be confirmed" (Robinson, 2013: 9). In the context of situated policy making, these relations and resources might serve the functions as both building blocks and ideas for local interventions (McCann, 2017), but also as "argumentative resources" to push for certain political choices (Kennedy, 2016; Montero, 2017; Temenos and McCann, 2012) or to just to create a shared understanding of the situation (Grandin, 2018).

Examining how policies are developed relationally brings attention to the variety of actors that participate in or are relevant for the assemblage of urban transformation, and how they influence the process and outcomes of planning, including, in additional to municipal authorities, consultants and private sector planning organisations,

technocrats, think tanks, civil society organisations, and development agencies (Davoudi and Pendlebury, 2010; Gustavsson et al., 2009; Prince, 2012, 2016; Smith et al., 2014). Since these actors may be nodes in multiple networks, they may also play the role of policy transfer agents, facilitating horizontal and vertical connections that bring elements, ideas, and resources from elsewhere into the local process of assembling policies. However, they may also reinforce "post-political trends", emphasising the import of "fast policy" solutions "that work" and that gain their legitimacy from their international appeal rather than local political deliberation (Peck and Theodore 2015). It has also been argued that consultants provide policy makers with "political" solutions that are packaged as "neutral" (Raco, 2015).

While admitting that the mobilisation of policy templates from elsewhere may result in "completely circumventing local deliberation, debate, and consensus building" (Peck and Theodore, 2015: 135), this literature has also pointed to the rich and nuanced contextualised agencies in play when policies are assembled and aligned with particular urban material and political contexts (Temenos and McCann, 2012). For instance, Nguyen, Davidson, and Coenen (2020: 1), drawing on the case of the C40 Cities network, found that "C40 encourages variation in local climate experiments and the generation of new and innovative solutions in member cities." They also note the role played by the network in providing institutional support for climate projects in member cities. However, policy mobilities scholarship nevertheless largely emphasises the role of mobile policy in perpetuating neoliberal trends (McCann, 2017), with notable exceptions focusing on the mobilisation of alternative policies (Kjærås, 2021; McCann, 2008).

3.2 Within places: assembling and aligning transformations

The second dimension of transformation as relational mobilisation brings to the surface the active work involved in assembling, aligning, and holding together ideas, resources, and actors in order to constitute transformation pathways. From the standpoint of urban governance, assemblage perspectives have highlighted how urban policies are "assembled", what Prince (2016) terms as "[a]ssembling policy from parts of

elsewhere." As Peck & Theodore (2015: xvi) note, this is a "stubbornly localized, context-specific process". This observation links to notions of "policy assemblages" (Bulkeley, 2016; Finlayson, 2011; Li, 2007a) and the conceptualisation of innovation as bricolage (MacKenzie and Pardo-Guerra, 2014).

Policy assemblages are here understood as a "collection of heterogeneous, often incommensurate elements, that come together for a period of time, sometimes quite fleeting, to produce a policy construct that, through micro political processes ... may become the core of an official policy" (Greenhalgh 2008, quoted in Finlayson 2011:550). Approaching innovation as bricolage implies that it involves "the creative, ad hoc re-use of existing resources (ideas and other cultural resources as well as artefacts), not the mechanical implementation of a grand plan nor simply logical deduction from existing scientific theory" (MacKenzie and Pardo-Guerra, 2014: 157). Accordingly, urban policy and planning can be understood as a process of constant repetition, where "each instance is a singularity, emergent from an array of interconnected practices, ideas and relationships, and not an example of an already given global process" (Jacobs, 2006, 2012a; Robinson, 2016: 14). The ideas that are mobilized may just as well be local as "from elsewhere." This dynamic between "local and extralocal resources" (Temenos and McCann, 2012) as they are assembled is therefore key to understanding the work of developing and implementing policy (Robinson, 2013; Rutland and Aylett, 2008).

As I show in Paper 3, by foregrounding the plurality of subjectivities, agencies, actors, and visions implicated in negotiating sustainability pathways, this perspective implies that sustainability transformations cannot be controlled through the implementation of policy templates or technologies. Rather, transformations will always be unpredictable and have unanticipated effects, hence in spite of "concerted and systematic attempts, control cannot be fully realised" (Arora et al., 2020: 251). Therefore, accomplishing sustainability interventions depend on the work of shaping socio-technical assemblages through relations of care. Here, "the relations through which caring engages with others are more horizontal than the presumptively vertical and deterministic relations of control" (Arora et al., 2020: 250). While not necessarily egalitarian, such work is

dependent on softer registers of power than mere domination and control. Hence, from a networked perspective, the "power to" do things is not a zero-sum game but actively created by aligning different actors and resources (Allen, 2010).

Paper 3 develops an analytical framework to examine the concrete, situated practices striving to align and coordinate disparate activities, projects, policies and actors in urban transformation, thereby *cohering* transformations through both formal and informal means (cf. Jessop, 1998 on heterarchic governance). Li (2007a: 264) refers to this work as "practices of assemblage," understood as the "the hard work required to draw heterogeneous elements together, forge connections between them and sustain these connections in the face of tension". Similarly, McGuirk and Dowling (2020: 2) draw on the Foucauldian notion of *dispositif* to theorise governance as the ability to generate order across a "set of diverse, loosely connected efforts enacted through both material and social means and not necessarily connected to a singular overarching plan, central logic or centralised steering capacity." However, cohering a constellation of governance also implies dissonance and that some issues may remain unresolved. Indeed, for Li (2007a), "[f]uzzyness, adjustment and compromise are critical to holding assemblages together."

3.3 Across time horizons: establishing present responsibility

The third dimension of transformation as relational mobilisation concerns how different future time horizons are mobilised to influence decisions in the present. While I have noted that Luhmann describe the future as a horizon that can never be reached, it nevertheless "contributes to the definition of the situation" (Luhmann, 1976: 140). Hence, there is a need to clarify the ways in which the different interrelated temporalities of climate change might be rendered relevant in the present. For Luhmann (1976:146), this points to the work involved to "transform in a highly selective way distant temporal relevances into present social ones."

As a long-term problem, the management of climate change has called for foresight, modelling, and the management of uncertainty. From this perspective, the future is not

given, but actively constructed and performed in the present through various anticipatory practices (Anderson, 2010; Wangel, 2011) such as performance, imagination, and calculation. As I argue in Paper 4, such mobilisation of particular futures to influence decisions in the present is an activity of translation through which the meaning of these futures might also change.

As they give direction to decisions in the present, the nature of these constructed futures is significant. As Guyer (2007: 411) warns, "different temporal philosophies are ideologically marked." Here, Guyer (2007) traces an "evacuation of the near future" in favour of a "narrow presentism" on the one hand and a focus on the abstract time horizons of the far future on the other. Both undermine responsibility and agency in the present. In contrast, for Guyer (2007: 409) the near future is a domain where deliberate responsibility for future concerns is possible, since it is,

> the reach of thought and imagination, of planning and hoping, of tracing out mutual influences, of engaging in struggles for specific goals, in short, of the process of implicating oneself in the ongoing life of the social and material world that used to be encompassed under an expansively inclusive concept of 'reasoning'.

Guyer's argument resonates with how climate change mitigation is predominantly constructed as a far future concern. The STS literature on climate governance has demonstrated how the co-evolution of climate targets and technological imaginaries have served to reduce climate change to a technical problem which can be continuously pushed further into the future (McLaren and Markusson, 2020). Here, present benefits are systematically emphasised at the expense of future concerns through practices of economic discounting in cost-benefit analysis, thus "lower[ing] the mitigation effort of current generations at the expenses of future ones" (Emmerling et al., 2019: 2). The models assessing climate mitigation options increasingly rely on the future large-scale deployment of speculative technologies to create "negative emissions" in order for climate targets to be met in the future in spite of little progress in the present (McLaren and Markusson, 2020). This may lead to "mitigation deterrence" which further undermines present responsibility for the future (Markusson et al., 2018).

Similarly, climate change is also increasingly being governed as events in the present, as the crises and emergencies resulting from heat waves, floods, droughts, tropical storms, forest fires, and forced migration. When the future folds into the present as emergencies, it does so, as Cooper (2016: 119) argues, "from a future without chronological continuity with the past". This way of organising climate change in time also has its distinct political logic: when society is governed through temporary scenes of catastrophe, political responses easily become repressive and may reproduce and intensify societal inequalities (Anderson, 2015). Action hence becomes refashioned as the "postponement of the future", resulting in "obscure new kind of time: an indefinite present without exit" (Hu, 2018: 96, 111).

As I discuss in Paper 4, rendering climate change governable as a near future concern in turn implies the creation of a different set of temporal relations. Within an urban governance perspective, the implication of this would be that climate action would be situated within the temporalities of planning (Abram, 2014; Sareen et al., 2021). As Abram (2014) argues, near future time horizons are still widely related to at a municipal level where planners are well versed in negotiating multiple time horizons at once (Hillier, 2008, 2011). Accordingly, for Abram (2014: 136), "[m]unicipal organization is a constant balancing of temporal cycles and of managing the progression through interlocking activities, and of meeting successive deadlines." Municipal planners hence need to negotiate a "continuously evolving context, with trade-offs between requisite time to build sufficient knowledge, fast-approaching project deadlines, and the timing of parallel synergistic processes" (Sareen et al. 2021: 1). For instance, in Norway, the electoral cycle of four years and the annual budget cycle play a prominent role in temporally organising municipal activities.

3.4 Within the present: sustaining initiatives over time

The fourth dimension of transformation as relational mobilisation pertains to the relational work involved in sustaining local initiatives in time. Here, assemblage thinking has emphasised the process-based and unstable nature of social orders, that permanence is continuously performed through sequences of repetition (Haarstad and

Wanvik, 2017; Jacobs, 2006; Moss, 2014, 2016; Van Assche et al., 2014). This also links to a general sense of temporal fragmentation and reduction of the immediate present (Beck and Levy, 2013; Guyer, 2007; Jameson, 2002). As Harvey (1990: 427) contends, the modernist problematic is characterised by "the search for universal truths in a world characterized by (spatial) fragmentation, (temporal) ephemerality and creative destruction." There is therefore a need to explicate the situated practices in which local initiatives are sustained in the emerging present.

In Paper 5 we address this need by developing an analytical framework to assess the role of temporary interventions in instigating and constituting local transition pathways. Here, the sustainability transitions literature has shed light on a number of challenges that local actors face in maintaining continuity of their initiatives over time. This includes the project-based nature of many initiatives (Munck af Rosenschöld and Wolf, 2016; Sjöblom and Godenhjelm, 2009), changing political objectives (Amundsen et al., 2018), uncertain autonomy and mandate for local actors (Geels and Schot, 2007; Hawkey et al., 2013), lack of continuity in memory and knowledge (Grabher, 2004), as well as various financial barriers including the increasingly projectified nature of funding (Borgström et al., 2016; Ehnert et al., 2018). In this context, the literature on "temporary urbanism" provides useful insights into what roles temporary interventions may play in shaping longer development pathways. This literature has emphasised that temporary interventions can be interpreted as focusing on shallow solutions to structural problems, political opportunism, and as a precarious response to neoliberal trends. At the same time, they may also be a transformative instrument which creates "spaces of questioning, experimenting and innovating" (Bishop and Williams, 2012; Madanipour, 2017; Mehrotra et al., 2017). As such, temporary interventions may play significant roles also when their lifespan is short, including instigating and revamping pathways for transition and transformation.

At the same time, local actors may also pursue a number of relational, structural and material strategies to sustain their initiatives in time, hence routinising sustainability transitions. In other words, this points to practices through which situated actors negotiate the internal process temporality in order to sustain their initiatives in the

emerging present. This links to the "institutional work" of realigning the goals and structures of existing institutions or of creating new ones (Barnes et al., 2018; Fuenfschilling and Truffer, 2016; Thelen, 2009). Similarly, the literature on path dependency and path creation explicates how specific constructions of the past are selectively mobilised to the present in order to establish or negotiate lock-ins (Garud et al., 2010; Pierson, 2004).

As we show in Paper 5, this is a highly dynamic process, and routinising local sustainability interventions always depends on repetition with variation. As Dewey (1916: 1–2) points out, living things "maintain themselves by renewal" and the "continuity of the life process is not dependent upon the prolongation of the existence of any one individual"; therefore the "[r]eproduction of other forms of life goes on in continuous sequence." Routinising local sustainability initiatives depends on the capacity of situated actors to shape such sequences. Durability can therefore both be understood as an attempt to overcome temporal fragmentation through the pursuit of more long-term funding or embedment networks and structures. However, local actors may also pursue a more dynamic approach to continuity, which implies continuous iteration and reinvention of initiatives where experiences and resources can be translated to retain their relevance in a succession of projects or initiatives.

These four different dimensions of transformation as relational mobilisation – across space, within places and across time horizons and within the present – foreground the active work through which ideas, actors and resources are translated and aligned in order to accomplish sustainability interventions. Examining the practice of sustainability transformation in each of these four dimensions also has methodological implications, which I will now proceed to discuss.

4. Study areas, field work and methodology

Conducted within the umbrella of a larger research project – the "European cities as actors in climate and energy transformation" project led by Håvard Haarstad and funded by the Trond Mohn Foundation – my research has examined the role of cities and networks in advancing climate and energy transformation. The overarching project within which this thesis forms a part sought to understand "why and how particular urban sustainability ideas catch on, why certain cities adopt sustainable policies and initiatives, and how abstract policy ideas are translated to the context of specific cities" (Haarstad, 2015). The project has examined these issues through case studies focusing on smart cities, compact city policies, and – in my own case – sustainable mobility and climate governance. I joined the project when it started mid-2016. Within the overall relational approach to urban outcomes underpinning the project, I was free to select my own empirical cases, design my methodological approach, and identify theoretical perspectives. My empirical points of entry have been fieldwork in the cities of Addis Ababa and Oslo, both of which are pursuing ambitious climate and sustainability initiatives. These cities are indirectly connected by their joint participation in the C40 Cities network, a global alliance of large cities which work to accelerate climate efforts through mutual learning, policy work, and lobbying.

In this chapter, I outline my methodological approach and procedures for data production, contextualise my sites for fieldwork, and discuss the analysis and generalisation of my results. My methodological approach has been guided by my theoretical ambition to empirically capture the spatial as well as the temporal dimensions of urban transformation discussed in chapter 3 – in other words, how urban actors work to make spatially and temporally distant resources and ideas relevant in the present and how they work to cohere and sustain their initiatives. This calls for a methodological approach which is sensitive both to spatial interconnectedness across contexts and heterogeneity within a particular place. Therefore, I have operationalised my methodological approach as a "distended case study" which aims to connect the "places of policy invention not only with spaces of circulation and centers of translation, but also with the prosaic netherworlds of policy implementation" (Peck and

Theodore, 2012: 24). My empirical evidence is drawn from fieldwork in Addis Ababa (2018–2019) and Oslo (2016–2019) and consists of interviews, participation at webinars and conferences as well as document analysis (see chapter 4.3 for details).

By conducting research at multiple sites at once, my methodological approach is designed to accommodate the relational constitution of society articulated in the relational mobilisation approach to sustainability transformations in three important ways. First, it foregrounds the local production of global phenomena (Burawoy, 2001; Marcus, 1995; Massey, 2004). Hence, the local is not a mere ethnographic case to illustrate grand narratives of global change (Acker, 2004; Freeman, 2001). Rather, the global is itself understood as a result of local politics. Second, by accommodating relations to elsewhere, it aims to capture how the local is "also a product of relations which spread out way beyond it" (Massey, 2004: 6), in other words the multi-sitedness of endogenous processes (Robinson, 2013). Third, by grounding the research in the study of particular sites of urban intervention and policy making, it aims to capture space as the "sphere ... of coexisting heterogeneity" (Massey, 2005), with all the inequalities, power relationships, and political contestation this implies.

The methodological approach of the "European cities as actors…" project has evolved over time. While the project was initially strongly grounded in the "follow the policy" approach of the policy mobilities literature (McCann and Ward, 2012; Peck and Theodore, 2012; Robinson, 2015; Wood, 2016), this original focus on certain policies and the influence of particular networks in local policy-making was reframed during the course of the project period. In our research group discussions, we increasingly found ourselves questioning the power of networks and mobile policies to directly affect local urban outcomes. Instead, we became more interested in how multiple elsewheres are made present locally through the active work of situated urban actors. Accordingly, rather than looking at the policies themselves and how they might "arrive in" particular urban settings, we shifted our focus to how urban actors "arrive at" particular policies. This approach considers how circulating policies can help us explore how "elsewhere makes cities, and *how cities work with elsewhere to produce distinctive (particular) outcomes*" (Robinson, 2013: 5).

The chapter proceeds as follows. First, I introduce my study areas and discuss my fieldwork procedures in Addis Ababa and Oslo. I then outline the distended case study approach and my methods for validating my findings. Finally, I discuss my approach for analysis and generalisation of my results.

4.1 Study areas and fieldwork

My empirical cases were selected on the basis of my interest in the governance of ambitious and rapid urban sustainability initiatives. Here, Oslo was identified as a study area within the first months of the project, based on their stringent near-term climate targets, sustainable mobility projects, and experimentation with climate governance tools. To explicate the relational dimension of mutual learning, I also wanted to examine one city network. Here a number of candidates were considered, including Eurocities, the Carbon Neutral Cities Alliance and ICLEI, before the C40 Cities network was selected based on their global scope, sectoral programmes, and their *Deadline 2020* initiative which focused on rapid and near-term urban climate mitigation in all member cities. Similarly, several cities were considered as a secondary case – including Warsaw, Vilnius, Copenhagen, and Gothenburg – based on their direct connections to initiatives in Oslo. About a year into the project, Addis Ababa was chosen based on their internationally recognised sustainable mobility projects as well as Ethiopia's status as a front-runner in sustainable development. Like Oslo, Addis Ababa pursued ambitious climate goals and was actively involved in the C40 Cities Deadline 2020 project. It also allowed for the supplementation of the research project with a case study from outside Europe.

At this time, the overall focus of my PhD project had also changed from the direct mobility of a policy from one context to another, to the more loose and indirect relations between cities that are mobilised when cities "arrive at" different sustainability interventions. Therefore, my final selection of cases was based on the aim to empirically examine both the spatial relationality and the temporal dimensions of urban sustainability governance. Here, the case of sustainable mobility interventions

in Addis Ababa provided a useful point of departure for examining the relationality of urban transformation, and it had many similarities to Oslo: both cities have developed their ambitious sustainability interventions in constant dialogue with elsewhere. Through the case of Oslo's climate budgets, I was able to more explicitly analyse the temporal dimensions of climate governance which were harder to capture empirically through the Addis Ababa case.

Hence, while Oslo and Addis Ababa differ in terms of population, history, and economic resources, they do share comparable climate and sustainability ambitions. However, my purpose was never to directly compare these two cases or trace connections between them, but to use them as a means to think urban climate transformation *through* multiple settings in order to develop an analytical understanding of urban sustainability transformations which is grounded across contexts (Robinson, 2016; 2017).

My three empirical points of entry, namely Addis Ababa, Oslo, and the C40 Cities network will now be introduced in turn.

4.1.1 Addis Ababa

Addis Ababa, the capital of Ethiopia and a main African diplomatic hub as the seat of the African Union, is currently undergoing intense growth and development (Angelil and Hebel, 2016). With a population growth of almost four percent per annum, Addis Ababa is one of the most rapidly growing cities in Africa, and the population estimated to be at 3.6 million 2013, is expected to double to 9.8 million by 2037 (World Bank and GFDRR, 2015). As Ethiopia's capital, Addis Ababa has also been shaped by the shifting priorities of different political regimes, including urban restructuring during the brief Italian occupation (1936–1941), Haile Selassie's (1930–1974) imperial modernity, the utilitarian architecture of the DERG regime (1974–1991), and the developmentalist programme of the Ethiopian People's Revolutionary Democratic Front (1991–2019) (Terrefe, 2020; Weldeghebrael, 2020).

Currently, the development in Addis Ababa is integral to the high-modern visions of Ethiopia's developmental state to become a middle-middle income, climate neutral, and resilient economy by 2025. Therefore, Addis Ababa's urban development is also shaped by its role as a key arena in which the aspirations of modern Ethiopia are showcased and materialised (Weldeghebrael, 2020). This has resulted in inner-city redevelopment projects such as slum clearance and high-rise buildings, ambitious public housing projects, and high-profile public transport projects, often framed as symbols of modernity. This has led to a critique of 'dubaification' (Angelil and Hebel, 2016) of the city, where hallmark office and residential buildings are replacing the low-rise buildings in the city centre. Much of the population growth is planned to be channelled to new large-scale prefab condominium housing developments at the fringes of the city, which are also meant to alleviate the shortage of affordable housing.

Figure 3: Low public transport capacity has led to long waiting times; the majority of total passenger trips are covered by a privately operated network of 12-seater minibuses (photograph by the author).

Currently, public transport is only able to meet a fraction of mobility demand (covering 46 percent of trips in the city in 2012), and private cars are also relatively unimportant at a modal share of less than nine percent in 2012 (Addis Ababa City Planning Project Office, 2016). This has resulted in long waiting times for public transport and a high proportion of non-motorized transport (at a modal share of 45 percent) in an urban environment which is prone to traffic accidents. The majority of total passenger trips in the city are covered by a network of privately operated network of 12-seater minibuses, while larger buses (mainly operated by the public companies Anbessa and Sheger) cover a smaller proportion of trips.

Actors in Addis Ababa have in recent years pursued a transport-oriented development strategy and initiated a number of projects to alleviate the transportation deficit and improve road safety. These projects have often been developed in partnership between different municipal authorities in Addis Ababa, international donor agencies, consultancies, and non-governmental organisations. A light-rail transport (LRT) was inaugurated in 2015, financed and constructed by different Chinese actors who, as in many other African cities, play an important role in shaping Addis Ababa's trajectory of urbanisation (van Noorloos and Kloosterboer, 2018). Operated by the federal Ethiopian Railways Corporation, the light-rail transit was generally regarded to be poorly integrated in the city (Nallet, 2018). Insights from the light-rail transit project subsequently fed into the development of a bus rapid transit system, with financial and technical support from French consultancies and international NGOs. Furthermore, Addis Ababa has developed a non-motorised transport strategy together with the Institute for Transportation and Development Policy (ITDP) and a Road safety strategy supported by Bloomberg Philanthropies. The aim of these projects has not primarily been to replace cars, but to ensure efficient connectivity in the city, reduce commuting times, and accommodate the rising transport demand in an efficient and climate friendly way. These efforts are also linked to the development of a climate action plan, supported by the C40 Cities network.

Figure 4: The light-rail transit was widely considered to be poorly integrated in the city (photograph by the author).

I arrived in Addis Ababa for the first time in July-August 2018. This was right after prime minister Abiy Ahmad had been elected to office; there was a general atmosphere of hope and optimism in the city. Subsequent research visits to Addis Ababa were conducted in November-December 2018 and in September 2019. As part of my research, I became an affiliated researcher at the Department of Geography and Environmental Studies at Addis Ababa University's lush Sidist Kilo campus. A final research visit, meant to coincide with a stay as guest researcher at Addis Ababa University, was scheduled for April-June 2020, but had to be cancelled due to the COVID-19 pandemic. At about the same time, the political climate in Ethiopia rapidly changed due to the conflict in the Tigray region.

My initial interest was the role of the C40-network in developing the climate action plan, and the light-rail transit system which had been acclaimed as a landmark achievement in international media. My first step in my fieldwork was to review media

articles relating to the light-rail transit, the climate action plan, and other sustainable mobility initiatives. Through this review, I identified my first informants: project officials at the municipal transport authorities and embedded network advisers for the C40 network. In order to gain a contextual understanding of the key issues in Addis Ababa's urban development, I also interviewed academics and urbanists. Additional informants were subsequently identified through snowballing, based on recommendations from the initial interviewees.

After my first research visit, I decided to shift my focus from the light-rail transit to the development of the bus rapid transit system. This was both because I, after several attempts, had not been able to gain proper access to actors involved in the light-rail transit project and because the bus-rapid transit project was more clearly embedded in the municipality. Furthermore, I later broadened my focus to include the domains of non-motorised transport and traffic safety, areas which were organisationally and thematically very close to the bus rapid transit project.

The implementation of large-scale public transport projects are often contested ventures, and in Addis Ababa this particularly related to how the shift towards more large scale public transport affected people involved in the operation of the present system of 12-seater minibuses. Such resistance was openly referred to by my informants at various municipal agencies, and also admitted in public statements at conferences. In order to get a fuller picture of the political dynamics of sustainable mobility projects, I therefore also planned to interview minibus operators and other potential critics of the projects. However, since my final round of fieldwork in 2020 had to be cancelled due to the COVID-19 pandemic, I was not able to pursue this angle. While these underlying conflicts remain merely an implicit theme in my papers, they have affected this thesis. For one, they led me to shift the focus of Paper 3 from a direct examination of political dynamics and potential conflicting interests in the implementation of sustainable mobility projects to local strategies by urban actors to align and coordinate their projects.

Figure 5: Informal street parking at dedicated bus lanes was regarded to constrain the efficient flow of traffic (photograph by the author).

In Addis Ababa, a total of 27 interviews were conducted with 21 informants, at a venue chosen by the informants. Evidence from these interviews were primarily used in Papers 2 and 3. The interviews were predominantly conducted in the offices of the informants, although some interviews were made at cafés or hotel lobbies. Interviews were scheduled through email or telephone, and consent was obtained orally prior to each interview. Informants were interviewed in their official capacity as public servants at municipal authorities, development agencies, and NGOs. While they primarily represented their respective authorities and organisations, they were generally open to reflect also on challenges in their projects. The interviews were conducted in English on the informants' request, and no interpreter was needed. Initially, I strived to record the interviews and transcribe them verbatim. However, I soon found it more conductive to abstain from recording the interview and take notes instead – partly due to the advice from my informants who noted that they were able to speak more freely when they were not recorded. In those cases, the notes were finalised each evening after the

interviews. Through this continuous cycle of notetaking and reflection, a preliminary analysis of emergent themes was performed, and interview questions for upcoming interviews subsequently identified.

The interviews were supplemented by physical and virtual participation in seminars and conferences as well as analysis of reports, strategies, and planning documents pertaining to sustainable mobility in Addis Ababa. These documents included plans and strategies on transportation, non-motorized transport and traffic safety, technical documentation for mobility projects, and evaluation reports. The documents were often provided by my informants, while others could be identified and accessed online.

4.1.2 Oslo

Oslo, the capital of Norway, has solidified its position as a frontrunner in urban climate action. With a population relatively stable at approximately 650 000 inhabitants (C40 Cities, 2022b), the city's territorial greenhouse gas emissions were 1.3 million tons of carbon dioxide equivalents in 2018 (Oslo Kommune, 2020). In 2016, the city council adopted the goal to cut territorial greenhouse gas emissions by 50 percent by 2020 and 95 percent by 2030 with a 1990 baseline (Oslo Kommune, 2020).[1] The interim 2020 goal has since been revised to cut emissions by 53 percent by 2023, while the 2030 goal remains unchanged. Oslo has since 2015 been governed by a 'red-green' coalition led by the Labour Party together with the Green Party and the Socialist Left. This coalition has maintained a high profile in climate issues.

In order to meet its climate targets – among the most ambitious globally – Oslo has launched several initiatives mainly targeting the three most important sectors, namely transport, energy, and buildings and resource use (including waste management). Among the more prominent initiatives are the development of a car free city centre (see Grandin, 2018), an ambitious rollout of bicycling infrastructure, and a pilot project on fossil free construction sites. To meet its greenhouse gas reduction commitment in the waste sector, the municipality is dependent on the implementation of a carbon capture and storage (CCS) system at the Klemetsrud waste processing plant. In order to

1 The baseline year was later changed to 2009 due to the availability of statistical time series.

coordinate and monitor the climate mitigation efforts, Oslo has introduced the "climate budget" (discussed in Paper 4), a governance tool which operationalises the municipal climate targets by integrating the climate action plan with the financial budget process. The climate budget establishes a maximum emissions volume for each year, and identifies and quantifies measures and instruments needed to stay within this emissions cap. The planning, approval, and reporting cycle of the climate budget – which is a chapter in the financial budget – follows that of the financial budget of the city.

Oslo has deliberately chosen an international approach to climate mitigation. As a city which is "small and big at the same time" and with considerable financial resources (Johansen, 2019), city officials highlight the potential of developing solutions for sustainable urban development which can be rapidly mobilised elsewhere. As such, Oslo has gained the status of an "Innovator City" within the C40 Cities network, although it is relatively small compared to the other "megacity" network members. Oslo's climate initiatives have prominently showcased at international conferences and events such as the Cities IPCC 2018 conference in Edmonton and the C40 Cities Mayor's Summit in Copenhagen 2019. Oslo was also the 2019 European Green Capital (Sareen and Grandin, 2019) and regularly shares experiences at international and national workshops, webinars, and conferences, and leads the C40 Clean Construction Forum (C40 Cities, 2022c). In 2020, the C40 Cities network opened a local office in Oslo, recognising the scalability of Oslo's climate efforts (C40 Cities, 2020).

In Oslo, my initial interest was mobility projects and particularly the relational politics implicated in the negotiation of the car free city centre project (framed as *Bilfritt byliv*, i.e. car free city life). Similar to my approach in Addis Ababa, my first step was to review media articles relating to Oslo's climate initiatives and the car free city centre project, through which I was also able to identify key informants. Additional informants were identified through participation in a public hearing for the car free city centre project early in the project period (November 2016). When selecting informants, my aim was to get a comprehensive view of the car free city centre project from the perspective of different stakeholders, including the relevant municipal authorities of

course but also business associations and youth groups. As for Addis Ababa, informants were interviewed in their official capacity, predominantly in their offices.

Figure 6: Implementation of temporary measures and use of street furniture to create a car free city centre through the "Bilfritt byliv" project (photograph by the author).

My focus subsequently shifted to the climate budgets, as this initiative gained increasing national and international attention. Furthermore, I saw the climate budgeting as an interesting venue through which to examine the temporality of rapid decarbonisation and municipal climate action. However, although the focus shifted, I was still able to build on my contextual understanding derived from interviews focusing on the car free city centre initiative. For my investigation of the climate budgets, additional interviews were conducted with key informants involved in the development and international mobilisation of the project. In total, 7 interviews were conducted in Oslo.

For Oslo, significant empirical evidence was also derived from virtual and in-person participation in webinars, conferences, and public hearings. This included two public

hearings on the implementation of the car free city centre, and also a seminar on car free city centres in European cities organised in Brussels by ICLEI and Oslo's international office. For the climate budgets (Paper 4), this included participation in a number of webinars organised to share information and experiences about the project nationally and internationally. These webinars – organised among others by the C40 network, the Norwegian Environment Agency, the Tekna union – provided an account of the technical aspects of the climate budgets and functioned as a venue for generous sharing of experiences about challenges and opportunities in the implementation of the tool. Additionally, virtually following sessions at the Edmonton CitiesIPCC conference (2018) and the Copenhagen C40 Mayor's Summit (2019) provided additional context and reflections about how Oslo's climate initiatives are packaged, communicated, and received internationally.

Finally, analysis of reports, plans, strategies, and technical documentation pertaining to the climate budgets provided important empirical evidence for Paper 4. Climate budgeting in particular, is a technical exercise which generates and is based on a significant amount of publicly available written documentation. This includes the actual climate budget chapters, the technical documentation provided by the Oslo Climate Agency which outlines the key considerations and assumptions underpinning the tool itself, a climate budgeting manual, and various technical reports commissioned by external consultancies and research centres.

4.1.3 C40 Cities Climate Change Leadership Group

Addis Ababa and Oslo are brought together by the C40 Cities Climate Change Leadership group in which both cities participate actively. The C40 Cities network was founded in 2005 at the initiative of London then-mayor Ken Livingstone with the purpose to bring together the world's megacities in reducing greenhouse gas emissions, focusing on ambitious near-term climate targets. Since then, the C40 Cities network has increasingly included sectoral networks for mutual learning, lobbying efforts in order to establish cities as key climate actors, and local advisory functions. The activities of the network are funded by various philanthropies and international donor agencies (C40 Cities, 2022a).

At the 2016 Mayor's summit, C40 Cities launched the *Deadline 2020* report which outlines strategies for how cities can mobilise rapid action and bend the emissions curve by 2020 in order to avoid carbon lock-in (C40 Cities and Arup, 2016). Together with the *Focused Acceleration* report released a year later (McKinsey and C40 Cities, 2017), it outlines rapid decarbonisation pathways for urban planning, transit, energy, buildings, and waste. As part of the Deadline 2020 project, C40 Cities also launched an initiative where each member city was to develop a "Paris compliant" climate action plan (CAP). As part of this initiative, cities were invited to apply for a resident C40 adviser that would support and coordinate the process of developing a CAP for the city. In those cases, the CAP follows a standardized process – the C40 Cities Climate Action Planning Framework – allowing cities to exchange experiences throughout the development of the plan (C40 Cities, 2022d). Addis Ababa was among the cities that applied and were awarded a resident C40 adviser, while Oslo determined that they already had the necessary capacity.

My initial interest in the C40 Cities network was directed towards their role in advancing rapid decarbonisation through policy work, mutual learning, and the mobilisation of certain high-impact policies from one city to another. Here, I was particularly curious to learn about the types of transactions, learning, and exchange of ideas and experiences that take place at the network activities. As I shifted my methodological approach from a focus on inter-city networks *themselves* to an interest in how cities "arrive at" particular policy assemblages, my emphasis changed to how the networks are used (or not used) by local urban actors to achieve particular goals.

In total, I conducted five interviews (three of which overlapped with the Addis Ababa case) with three people working at C40 Cities. This empirical evidence was used in Paper 2. These interviewees were identified on the basis of their involvement in the Deadline 2020 project, C40 sub-networks focusing on mobility and the climate action planning project. Two of the interviews were conducted through video conference, while the remaining three, with a C40 resident adviser in Addis Ababa, were conducted in-person. Detailed notes were taken during each interview. In addition, participation

in webinars and conferences as well as the review of key reports from the C40 network provided important contextual information.

4.2 "Arriving at" local sustainability transformations: a distended case study

These three cases are methodologically connected through the approach of a "distended case study". Case studies – the intensive study of a place, process, event, or individual over a period of time – allows for the study of phenomena within their contexts, and are therefore particularly appropriate in instances where the boundaries between the researched phenomenon and contextual factors are porous or difficult to articulate (Creswell, 2007). Depending on the purpose of the research, a case study may be more or less open in its design, allowing for both the testing of theories and the development of new theoretical perspectives through explorative approaches.

An important consideration concerns the deliberations through which the case may be bounded. In recent years, there has been a vibrant methodological debate on whether case studies can be designed in a way that accommodates the relational nature of social phenomena. Feminist geographers have brought to the surface how the local is overwhelmingly imagined as both a "product of the global" and as a passive "victim" invaded by global processes (Massey, 2004). This has led to a proliferation of studies which approach the local as an empirical example to illustrate grand theories of global change (Acker, 2004). A possible remedy is to study the locally distended production of the global. Here "global ethnographies" and multi-sited methods have been proposed to capture processes which are distributed across multiple localities and contexts (Burawoy, 1998; Marcus, 1995). Within geography, the policy mobilities field has been particularly engaged in similar methodological innovation (Peck and Theodore, 2012; Robinson, 2013; Wood, 2016).

By operationalising my research as a distended case study, then, I have aimed to move beyond the simplistic approach of illustrating grand theories with local case studies. Instead, I have attempted to demystify the global trends themselves by bringing to the forefront the active production of global change. As Burawoy (2001: 149–150) notes,

such attempts can draw on the fact that global processes are locally grounded, hence foregrounding the contested and contingent nature of the production of the global:

> [N]ot only the experience of globalization but also the very *production of globalization* can be properly the subject of ethnography. What we understand to be 'global' is itself constituted within the local; it emanates from very specific agencies, institutions and organizations whose processes can be observed first-hand. ... In demystifying the supranational agency, they also begin to recognize its limitations. These are not the all powerful behemoths that carve up the vulnerable as they will. Their policies do not result from a seamless conspiracy of global elites ... From the vantage point of its production, globalization appears more contingent and less inexorable than it does from the standpoint of its experience or reception.

However, examining the geographically distended production of global phenomena might come at the expense of empirical depth. Indeed, ethnographic approaches such as those suggested by Burawoy and Marcus, building on extended local embeddedness, may seem a far cry from the often high-flying academic practices of contemporary geographers. There is a risk, as Burawoy (2001: 148) warns, that this study of globalisation by "[j]et-setting academic cosmopolites" may lead to the loss of ethnographic depth: detailed and situated ethnography might be "replaced by tourism" as the researcher is "tripping around from site to site." There will therefore always be trade-offs between the need for depth and local embeddedness on the one hand, and the need to accommodate for the distended and mobile nature of social phenomena on the other (Peck and Theodore, 2012).

In my own research, I have attempted to accomplish this balance between dwelling and mobility, embeddedness and distendedness, by taking as my point of departure specific local sustainability interventions instead of focusing on the genealogy of mobile policies themselves. This approach resonates with Robinson's (2013, 2015) discussion about how cities "arrive at" certain policies and how they accordingly "work with elsewhere to produce distinctive (particular) outcomes" (Robinson, 2013: 5). This approach was articulated in conversations within my research group as well as my initial empirical findings from my research in Oslo and Addis Ababa 2016–2018. Here, I have worked from the proposition that networks and mobile policies on their own – while important – may not be the *primary* determinants of the transformation pathways

pursued in the respective cities. Rather, an important theme that emerged early on in my first empirical ventures was how both the networks and general references to elsewhere are pragmatically used by locally situated urban actors when negotiating various projects and initiatives. For instance, in an early analysis of Oslo's (then young) "car free city life" initiative (published as a book chapter which is not included in the thesis), I found that the project was negotiated and enabled at the intersection of local political dynamics, institutional histories, and translocal connections (Grandin, 2018). Rather than a top-down implementation of policy templates procured through networks, then, translocal connections and references to elsewhere seemed to be mobilised by local actors both as inspiration and as arguments to enable or contest particular ways of framing and implementing the project. This insight was further corroborated in my research on Addis Ababa's sustainable mobility interventions, where, as I show in Paper 2, local agencies and histories together with translocal actors were, again, central in the assembling of Addis Ababa's bus rapid transit project.

The "arriving at" perspective on global circulating policies brings to the surface the situated local agencies in developing, assembling, and mobilising policy in continuous dialogue with multiple elsewheres. Building on this approach, I have started with a particular local project and then traced the relationships and translocal connections through which this project has been inspired, enabled, and negotiated. By grounding my empirical analysis in particular settings, I respond to what Wood (2016) contends might be a limitation of approaches focusing on following a particular policy, namely that exchanges between different actors rarely leads to direct uptake but that the development and implementation of policy imply much longer and complicated trajectories. As such, my core interest was "how policies-from-elsewhere are put to work by local actors, and how they are translated, contextualized, and embedded" (Peck and Theodore, 2012: 25). This is important because, as Mosse (2004: 640) warns, "practices of development are in fact concealed rather than produced by policy" which implies that "instead of policy producing practice, practices produce policy, in the sense that actors in development devote their energies to maintaining coherent representations regardless of events". Through the "arriving at" perspective on urban

transformation, then, my aim was to combine analysis of detailed empirical material on the local context with an approach that traces their dependencies on connections to elsewhere. As such, my methodological approach was designed to accommodate both the multisitedness of endogenous processes and the heterogeneity and possible incoherence of urban sustainability initiatives.

In practice, the operationalisation of a distended case study may or may not call for multisited research. For instance, Marcus (1995: 98) articulates the need for multisited research in the study of contemporary local phenomena since "single-sited research can no longer be easily located in a world system perspective," therefore proposing a "mobile ethnography" which "takes unexpected trajectories in tracing a cultural formation across and within multiple sites of activity that destabilize the distinction, for example, between lifeworld and system". The policy mobilities field retains this methodological emphasis on movement, but also underscores the need for local embeddedness in order to capture the experiences and ongoing processes in the "downstream" sites of implementation of mobile policies (Peck and Theodore 2012). Indeed, Wood (2016: 393) goes as far as to argue that "[i]t is not so much that policies-in-motion demand mobile methods but rather we need to develop a sensibility that caters to the ephemeral, ethereal and experiential aspects of this movement," highlighting the need for local situatedness. In my methodological approach, empirical emphasis was put on local situatedness in Addis Ababa and Oslo in order to accommodate local complexities. From these places, I traced connections to elsewhere which led to methodological (physical and virtual) travel to other locations.

This section has discussed how my methodological procedures to examine transformation as relational mobilisation has drawn on the distended case study approach, which aims to move from notions of local case studies as empirical examples to illustrate grand theories of global change to situated analysis of the contested local production of global change. This approach leads to an inevitable balancing act between spatial distendedness and local embeddedness, which in this case has been negotiated through the "arriving at" approach which attends to the practices through which local actors work with elsewhere to accomplish particular aims. I will now

proceed to discuss the procedures employed for data production and validation of research results in this distended field.

4.3 Procedures for mobile data production

In line with the case study approach, this thesis has drawn on evidence from a variety of different types of sources – mainly interviews, participation in conferences and webinars, and document analysis – both in order to create a comprehensive account of the processes in play and to allow for triangulation and validation of the results. This section will discuss how these different sources supplement each other in the context of a distended case study which necessitates methodological mobility. A central challenge when it comes to the study of distended, multi-sited phenomena, is that "it is not always possible to 'be there', when in the study of global policy networks there is a constant imperative to also 'be' somewhere else" (Peck and Theodore, 2012: 25). This links to Burawoy's (2001) warning that multisited research may lead to the researcher becoming a mere tourist who jumps from site to site, resulting in the loss of situational groundedness of the results. Another concern is the fact that following international policy easily becomes a carbon intensive research practice involving frequent international air travel (Gärdebo et al., 2017). At my research centre, the Centre for Climate and Energy Transformation at the University of Bergen, we have taken this concern seriously in the development of a "low carbon carbon travel policy" which calls for continuous reflection about our research practices (CET, 2022).

Therefore, my methodological approach has drawn on the fact that methodological presence may be accomplished in different ways. As Urry (2004: 28) notes, an "imagined presence" can be achieved through "travelling objects, moving people, and moving images that carry connections across, and into, multiple other social spaces." Importantly, presence does not necessarily need to be the result of physical mobility, resulting in co-present face-to-face encounters. Person-to-person exchange may also be afforded by virtual travel through real time communications technologies or through asynchronous messaging, and presence can be established through the movement of objects or the imaginative travel resulting from accessing images and ideas from

elsewhere (Urry, 2004). Accordingly, my research has built on physical travel to different localities (Oslo, Addis Ababa, Brussels, New York), allowing for in-person communication, observation, and engagement. But this physical mobility has been significantly supplemented by virtual and imaginative travel, through Skype interviews, webinars, the long-distance watching of conference recordings and reading of reports, strategies, and policy documents from elsewhere.

These different varieties of mobility, of course, have their own particular qualities which shape the encounters and consequently the type of research evidence produced. As I discuss in Paper 2, they are also dependent on locally grounded and sedentary resources and are therefore both political and unevenly distributed, meaning that some contexts may not be accessible through certain modes of mobility. This underscores the need for appropriate strategies for validation and triangulation of results, where evidence derived from different types of mobility and presence are placed in dialogue with each other.

This thesis has built on (a) semi-structured interviews, (b) participation in conferences, seminars, and webinars, and (c) document analysis (see chapter 3.1 for a discussion of how these methods were integrated in the fieldwork). These sources of evidence were selected based on access and the aim to get a comprehensive view of the different actors and stakeholders involved in the different sustainability interventions studied. They are schematically outlined in Table 1.

Table 1

Overview of data sources

	Addis Ababa	Oslo	C40
Interviews	24 interviews with 21 city officials, planners, consultants, and officials from development agencies and civil society.	7 interviews with 8 planners and city officials.	5 interviews with 3 officials and advisors.
Meetings, conferences, and webinars	3 conferences and meetings (2 virtual and 1 in-person) focusing on transport policies and urban development.	14 webinars and conferences focusing on strategic climate planning, climate budgeting, and international exchange of best practice.	4 webinars and conferences focusing on the role of cities in climate action, climate planning, and exchange of best practice.
Documents, technical reports	Technical documentation; master plan and sectoral strategy documents; grey literature on bus rapid transit development. (Full references available in Papers 2 and 3.)	Climate Action Plan; Climate Budget documents (2016-2022); Climate budget manuals and technical documentation; (Full references available in Paper 5).	Focused Acceleration Deadline 2020 Assessment reports by reviewers (Full references available in Papers 2 and 3).
Media	Media articles in *Addis Fortune* and other English language newspapers about sustainable mobility, light rail transit and bus rapid transit projects.	Media articles in Norwegian newspapers about the car free city life project, climate budgets and climate planning.	

Semi-structured interviews: A total of 36 interviews were conducted. Most of these interviews were one-on-one, while some where group interviews; some informants were interviewed more than once (see Table 2 for a detailed overview). The interviews were conducted either in English or in a Scandinavian language, at a place chosen by the informant. This was most often in their office, although some interviews were conducted at cafés or in hotel lobbies. While some interviews were recorded, I found that the conversation flowed better when I took notes instead. In those cases, these notes were typed out directly after the interview. The interviews followed themes

specified in a semi-structured interview guide, and this guide was updated prior to each interview based on preliminary analysis of previous evidence. They were generally between 25 and 60 minutes in length. Consent was obtained orally before each interview.

Table 2

List of interviews and meetings

Role	Organisation	Type	Date
Levende Oslo	Project office, Oslo Municipality	Interview	Feb 2017
Official	Project office, Oslo Municipality	Interview	Feb 2017
Official and planner	PBE, Oslo Municipality	Interview	Feb 2017
Youth representative	Local NGO	Interview	Feb 2017
Official	Local business association	Interview	Feb 2017
Network coordinator	C40 Cities	Interview	May 2018
Official	C40 Cities	Interview	May 2018
Researcher	Addis Ababa University	Meeting	Aug 2018
Official	Transport Authority, Addis Ababa	Interview	Aug 2018, Sep 2019
Project manager	TPMO, Addis Ababa	Interview	Aug 2018, Dec 2018
City Adviser	C40 Cities	Interview	Aug 2018, Dec 2018, Sep 2019
Official	International NGO	Interview	Dec 2018, Sep 2019
Officer	International Development Agency	Interview	Dec 2018
Special Advisor	Oslo municipality	Interview	May 2019
Advisor	Oslo municipality	Interview	Jun 2019
Official	Traffic Safety and Management Team, Addis Ababa	Interview	Sep 2019
Researcher	EiABC, Addis Ababa University	meeting	Sep 2019
Architect	Local NGO	meeting	Sep 2019
Officer	International Development Agency	Interview	Sep 2019
Two officials	International NGO	Interview	Sep 2019
Official	AA Resilience Project Office	Interview	Sep 2019
Planner	Addis Ababa Planning Commission	Interview	Sep 2019
Planner	Addis Ababa Planning Commission	Interview	Sep 2019
Official	Addis Ababa Transport Bureau	Interview	Sep 2019
Consultant	Addis Ababa Transport Bureau	Interview	Sep 2019
Official	Addis Ababa Transport Bureau	Interview	Sep 2019
Official	Traffic Management Authority	Interview	Sep 2019
Officer	Addis Ababa Environmental Protection Agency	Interview	Sep 2019
Officer	Sheger bus company	Interview	Sep 2019
Official	Addis Ababa Transport Bureau	Interview	Sep 2019

Interviews might become scripted, especially when conducted with persuasive policy professionals who are susceptible to sell their policies (Peck and Theodore 2012). At the same time, interviews are a "relational process that exposes not just the achievements of the adopting locality but also the experimentation and failure associated with policy circulation", and are a means of "probing beneath the socio-political exterior of the decision-making process" (Wood, 2016: 397). In my own experience, informants were generally honest and willing to go beyond the prepared scripts and stories about policies and their implementation, and the interviews hence provided important insights about the policy process and how challenges were negotiated. Evidence from semi-structured interviews was particularly important in the Addis Ababa case (Papers 2 and 3).

Conferences, seminars, webinars, and public hearings: Evidence was drawn from virtual and in-person observation of 20 events (5 conferences, 8 webinars, 5 seminars and 2 municipal public hearings), either through direct physical attendance, live participation in online events, and, in some instances, through watching of recordings of previous events (see Table 3 for a detailed overview). Detailed notes were taken during the events, and when possible, relevant parts of the events were transcribed verbatim based on event recordings. Through these events I was able to get access to the scripted, official statements by politicians and high-level officials which I would otherwise not have had access to. While interviews might in this case have provided additional nuances, these actors might not be prone to move away from their standard talking points in any case. For instance, in Oslo, presentations of the climate budget generally followed the same talking points. At webinars and panel discussions, I usually found the atmosphere to be honest and curious, providing access to reflections on technical details regarding policy implementation and contextual differences. At live events, informal conversations at coffee breaks provided additional contextualisation. Data from events were particularly important for the Oslo case (Paper 4).

Table 3

List of conferences, seminars, webinars, and public hearings

Title/theme	Organiser	Type	Place	Attendance	Date
Open meeting about the car free city centre (“Bilfritt byliv”)	Oslo municipality	Public hearing	Oslo	Physical	Oct 2016
How to create car-free and attractive city centres	ICLEI and City of Oslo	Seminar	Brussels	Physical	May 2017
Cities of the future	Litteratur-huset	Seminar	Bergen	Physical	Aug 2017
Climate budgets for municipalities	Norwegian Environment Agency	Webinar	Online	Virtual	Mar 2018
CitiesIPCC Cities and Climate Change Science Conference	IPCC	Conference	Edmon-ton	Virtual	Mar 2018
Open hearing about the car free city centre (“Bilfritt byliv”)	Oslo municipality	Public hearing	Oslo	Physical	Apr 2018
A better climate for cities	European Commission	Webinar	Brussels	Virtual	May 2018
Oslo's Climate Budget [Part I]: The Mayor's voice	C40	Webinar	Online	Virtual	May 2018
Oslo's Climate Budget [Part II]: Technical drill	C40	Webinar	Online	Virtual	Jun 2018
High-level Political Forum on SDGs SDG11 review	UN DESA	Conference	New York	Physical & virtual	Jul 2018
Planning a sustainable city through Carbon Budgets	Covenant of Mayors	Webinar	Virtual	Virtual	Sep 2018
Developing Urban Futures	LSE Cities	Conference	Addis Ababa	Virtual	Nov 2018
Transforming Transportation 2019	World Bank	Seminar	Washin-gton, DC	Virtual	Jan 2019
Eurocities mobility forum	Eurocities	Conference	Virtual	Virtual	Mar 2019
Breakfast seminar on climate accounting	Tekna union	Webinar	Virtual	Virtual	May 2019
Count with CO2	Climate Agency, City of Oslo	Seminar	Arendal	Physical	Aug 2019
Meeting on Addis Ababa Structure Plan	Urban Center	Seminar	Addis Ababa	Physical	Sep 2019
C40 World Mayor's Summit	C40	Conference	Copen-hagen	Virtual	Oct 2019
Municipal Climate Budgets	Tekna union	Webinar	Virtual	Virtual	Sep 2020
The road to climate budgets	Oslo municipality	Webinar	Virtual	Virtual	Jan 2021

Document analysis of strategies, plans, reports, and technical documentation: Key documents pertaining to strategic climate planning and sustainable mobility in Addis Ababa, Oslo, and at the C40 network were analysed. These documents were either identified by myself, based on my knowledge of the field, or provided to me by my informants. These sources provided overall contextual information of the different initiatives, for instance how they relate to the goals of overall municipal or national plans and strategies. They also provided technical details about the particular initiatives, and the key arguments made for moving initiatives in certain directions. While analysing documents, it is important to keep in mind that the documents do not represent a factual reality but are a means for communication – it is therefore important to keep their author, purpose, and intended audience in mind (Flick, 2009). The documents were analysed thematically, and they were important for both the Oslo and the Addis Ababa cases (Papers 2–4).

A key constraint in my empirical material is its predominant focus on formal actors and processes. This means that I have not been able to capture more dissenting perspectives pertaining to the implementation of projects. For instance, officials in Addis Ababa often alluded to the fact that the implementation of large-scale public transport projects were met with considerable resistance as they displaced other modes such as the 12-seater minibus taxis. At hearings in Oslo, I was able to record dissenting perspectives on Oslo's car free city centre project. I was not able to get similar perspectives in Addis Ababa. This also links to my own background and positionality as a researcher in my different empirical contexts. While I have no familiar connection to neither Oslo nor Addis Ababa, Oslo is closer to me linguistically and culturally due to my own background from Sweden; I was able to follow meetings and access documents in Norwegian, but not in Amharic. My plan was to identify and record dissenting voices (for instance minibus operators) based on my role as guest researcher at Addis Ababa University where I would have been able to recruit interpreters. Since this research stay and last round of fieldwork had to be cancelled as a result of the COVID-19 pandemic, I was not able to pursue this as planned.

Traditionally, depth, and methodological saturation is accomplished through prolonged engagement in the field. However, in research of spatially distended processes, the field is itself distended. Since these processes "are, in effect, boundless, methodological 'saturation' is practically unattainable" (Peck and Theodore, 2012: 25). Accordingly, since the time that can be spent "dwelling" in each of the individual research sites is limited, there is a risk that the researcher takes what is said, observed, or read at face value. Indeed, ensuring sufficient strategies for fact checking and contextualisation of results may therefore be all the more important in the carefully choreographed settings of the circulation of global policy models where the researcher constantly runs the risk of becoming a "'network dopester' not least when extended amounts of time are spent in the company of charismatic cosmopolitans and global policy entrepreneurs" (Peck and Theodore, 2012: 25). By using multiple sources, I was able to triangulate claims and cross-check statements from interviews both with other informants and with evidence from events and documents. I was also able to follow up on details from webinars at interviews with key informants.

4.4 Analysis: grounding conclusions

Any study of urban transformation needs to navigate between the Scylla of an allegedly common urban logic and the Charybdis of radical particularity (Tonkiss, 2013). While the former leaves little room for agency as the local is overdetermined by "global forces," the latter impedes comparative analysis of how urban climate and energy transformations are initiated, sustained, constrained, and mobilised across space. In my own attempt to find this balance, I have aimed to stay close to my empirical material and let it speak for itself, while continuously engaging the material in dialogue with previous research and theoretical ventures. This resonates with the overall inductive approach common to qualitative research, where, in Creswell's (2007: 38) words, "researchers build their patterns, categories, and themes from the 'bottom-up', by organizing the data into increasingly more abstract units of information".

My own fieldwork and analysis build on an iterative structure based on multiple rounds of data collection, coding, and analysis. Evidence from interviews, observations, and

documents were continuously analysed in order to identify core themes, tentative conclusions and emerging knowledge gaps. Based on this tentative analysis, new interview questions were formulated to cross-check information, address knowledge gaps, or explore new threads of association. Here, I strived to allow for themes and patterns to emerge through a dialogue between theory and the empirical material itself. In practice, this meant that I started with themes derived from theory before the final round of analysis started, but that my reading of the empirical material was open enough for new codes and themes to emerge. As such, it connects to Burawoy's (1998) extended case study method, which builds on dialogue between data, theory, research participants, and observer:

> Reflexive science starts out from dialogue, virtual or real, between observer and participants, embeds such dialogue within a second dialogue between local processes and extralocal forces that in turn can only be comprehended through a dialogue of theory with itself. Objectivity is not measured by procedures that assure an accurate mapping of the world but by the growth of knowledge; that is the imaginative and parsimonious reconstruction of theory to accommodate anomalies.

The extended case method employed in this research hence extends the tradition of "analytical" generalisation within case study research, importantly with the purpose to also challenge and destabilise existing theories of the world by including new voices in the debate. Here the purpose is not to search for patterns across cases (a procedure through which cases become instances of a theory) but to "trac[e] the source of small difference to external forces" and "make each case work in its connection to other cases" (Burawoy, 1998: 19).

Therefore, my purpose was not to compare and contrast my two empirical contexts of Addis Ababa and Oslo, but to make use of these cases to think through how we might understand transformation across and between cities. Here, I also drew on the practice of "thinking with elsewhere" suggested by Robinson's (2016) approach to relational comparison which may also disturb the taken for granted. Here, even relatively weak conceptual and empirical connections and associations may both serve to decentre existing theoretical knowledge and contribute to the generation of new theory: "an analysis which might in time become rich with the joys of new words and disturbed

conventions" (Robinson, 2017: 648). This approach to "theory-building" across different contexts which are all rich in themselves is "necessarily incomplete, and commonly modest in its engagement across diversity" (Robinson, 2017: 653). Indeed, Marcus (1995) suggests that the dimension of the "global" may itself become such an analytical venture, as the researcher establishes connections between different sites and processes through analysis. Here, the "global is an emergent dimension of arguing about the connection among sites in a multi-sited ethnography" as the researcher "constructs aspects of the system itself through the associations and connections it suggests among sites" (Marcus, 1995: 99, 96). This is important, since, as Nagendra and colleagues (2018) note, the theoretical perspectives in global urban sustainability research – including neoliberalisation, environmental justice, and informality – are generally first developed from scholarship from the global north and only then applied to instances from the global south.

My analytical approach, then, has been based on dialogue: drawing on insights derived from placing theory and empirical evidence from Addis Ababa and Oslo in conversation with each other. This thinking across contexts, however, does not mean that comparison has been pursued in order to search for general patterns or logics, nor in order to identify one case as more "different" than another. Rather, this approach has strived for a "re-reading for difference" (Gibson-Graham, 2008), possibly destabilising entrenched conceptualisations of urban sustainability transitions and transformations in order for new – necessarily tentative and incomplete – theories and understandings to emerge. I will now proceed to discuss these conclusions.

5. Discussion and conclusions

> For we live not in a settled and finished world, but in one which is going on, and where our main task is prospective, and where retrospect – and all knowledge as distinct from thought is retrospect – is of value in the solidity, security, and fertility it affords our dealings with the future.
>
> John Dewey, *Democracy and Education* (1916)

This thesis has examined the practices through which responsibility for climate change is established locally and in the present. It has discussed this as the practice of relational mobilisation. Each of the papers have assessed different dimensions of transformation as relational mobilisation and provided their own partial conclusions. In this chapter, I will provide synthesised conclusions and discuss the theoretical implications of my results.

The purpose of this thesis has been to find out how local actors make sustainability actionable here and now. The papers in this thesis point to how the local politics of sustainability transformations depends on relational work by situated actors. They share as their point of departure the observation that society is constituted by mobility, that instability and change is the rule, and that obduracy and permanence therefore is a performed effect resulting from continuous work in aligning actors and resources and creating continuity. They draw the implications of these perspectives in how sustainability transformations are conceptualised, studied – and, perhaps, put to practice. The perspective of "transformation as relational mobilisation" developed in this thesis brings together the temporal and spatial dimensions of sustainability transformations by pointing to four dimensions of such relational work to make distant issues matter here and now.

Since sustainability challenges such as climate change travel uneasily between spatial scales and time horizons (Hulme, 2007), this work implies continuous translation and reframing of problems in order to (re)articulate their local relevance in the present, summarised by Luhmann's (1976: 146) selective transformation of "distant temporal

relevances to present social ones." The lens of mobilisation used in this thesis implies both that relational space is constituted by mobility and that local transformations necessarily build on the selective mobilisation of ideas, resources, and actors both within and across geographical contexts. As such, it foregrounds the practices, meanings, and materiality implicated in this relational mobilisation. Furthermore, it points to the situated relational strategies pursued to sustain initiatives in time, creating a form of continuity which is often both mobile and ever-changing.

My research questions presented in chapter 1 investigate how sustainability transformations can be made possible through the active work of establishing relations in space and time. I will discuss them in turn.

5.1 Relationality across geographical contexts

The first research question concerns spatial relationality across contexts: *How do situated actors mobilise resources from elsewhere?* This question is addressed in all five papers in this thesis. Both in Addis Ababa and Oslo, local actors work deliberately through relations with elsewhere to accomplish their objectives. However, as discussed in Paper 2, this is not a simple matter of transferring, or even translating, policies from elsewhere to fit in a local context. In the case of Addis Ababa's bus rapid transit, the project was dependent on funding and expertise mobilised from extra-local sources. But relations to elsewhere also played other, softer, roles: as inspiration, as a source of arguments for different political choices, and to create a common understanding of what the system might imply. In Oslo, the climate budgeting methodology discussed in Paper 4 drew heavily on national and international interest to establish its legitimacy and was embedded in national networks of exchange and mutual learning. Furthermore, in both contexts, mobile ideas and resources had to be aligned with the longer local institutional and material histories of the cities.

Hence, the papers have articulated the constructive and strategic agency at play in working with elsewhere to mobilise sustainability transformations. Papers 2 and 3 outline how the agency in mobilising urban sustainability transformations was always

contextual, but this does not necessarily mean that it was local. Particularly in the Addis Ababa case, where the project was also dependent on financial resources from elsewhere, funding agencies, consultancies, and NGOs were able to assert significant influence over the project even though it was locally coordinated through the municipal transport authorities. But importantly, rather than one network (such as C40) determining the particular pathways of transformation chosen, these efforts depended on a more diverse web of relations with multiple cities, networks, consultancies and civil society organisations, all of which were strategically mobilised in order to accomplish local objectives. Similarly, Paper 5 outlines how the establishment of relations to elsewhere and embedment in networks is a common strategy to ensure the longevity of initiatives.

Furthermore, these results nuance the warnings from the policy mobilities field that mobile policies might circumvent local political deliberation (Peck and Theodore, 2015). My results in Papers 2–4 point to the fact that there is still a significant degree of deliberation, negotiation, resistance, and contest in the design and implementation of the interventions. This brings to the surface the plurality of goals and visions in play in the work of mobilising urban sustainability transformation.

5.2 Relationality within geographical contexts

The second research question concerns spatial relationality within contexts: *How are actors and resources aligned and coordinated locally?* This question is considered in Papers 2–4 which show how sustainability interventions in both Oslo and Addis Ababa were dependent on the participation of a multitude of actors across different urban domains. As discussed at length in Paper 3, these results suggest that the accomplishment of urban climate governance depends on the capacity of actors to do the relational work of bringing together, aligning, and coordinating their disparate activities, thereby *cohering* urban transformation through both informal relationships and the establishment of formal institutions.

As discussed in Paper 4, one of the key functions of Oslo's Climate Budget was its ability to mobilise cross-departmental collaboration in the city's climate mitigation efforts. Similarly, in the case of sustainable mobility interventions in Addis Ababa discussed in Papers 2 and 3, realising these projects was seen to be dependent on the alignment of the goals, resources, and activities of a range of different municipal authorities as well as national and transnational actors. The work of cohering these efforts depended on institutional innovations such as integrated project offices and coordination committees. But much of it was accomplished through more informal means, as officials leveraged their private networks to accomplish alignment and coordination across actors, projects, and initiatives.

This perspective brings attention to how local sustainability transformations are shaped by institutional and material fragmentation. As Papers 2–4 show, they are far from unfolding in coherent systems. Rather, they are continuously negotiated through continuous efforts to align the activities and objectives of a disparate constellation of sometimes overlapping, sometimes conflicting local and translocal actors. As such, the perspective of transformation developed in this thesis foregrounds not only the uneven power relationships implicated in the mobilisation of sustainability transformation, but also how the modalities of power at play are not necessarily domination, but rather the ability to assert power *with* (Allen, 2010) other actors through the relational mobilisation of resources.

5.3 Relationality across time scales

The third research question concerns relationality across time scales: *How are different time scales translated to establish the relevance of future problems in the present?* This question is mainly discussed in Paper 4, which demonstrates how situated actors depend on their capacity to continuously create relations with (particular constructions of) the future in order to make climate change governable. This points to the question of how climate change is rendered relevant in the present. As I show in Paper 4, this is often an intricate process which depends on a range of different actors and technologies

that construct particular futures, assert their relevance for the present, and align long-term problems with the more immediate temporal cycles of decision making. As such, this perspective foregrounds the process temporality in play as situated actors actively mobilise images of the future into the present.

The example of climate budgets in Oslo discussed in Paper 4 illustrates how efforts to make climate change governable depend on their translation from an issue concerning the far future (or the immediate present) to the near-term future horizons of municipal planning (cf. Abram, 2014; Guyer, 2007). This is accomplished by integrating climate planning in the regular economic budget cycle of the city. This work implies the negotiation of multiple time horizons and constructions of the future.

However, the technologies and practices through which climate is rendered immediately relevant also lead to particular framings of climate change. I have noted that constructions of climate change travel uneasily across spatial and temporal scales (Hulme, 2007). Paper 4 correspondingly shows how the work of converting constructions of climate change from a distant problem to a near term issue implies a work of selective translation where only some aspects of climate change are rendered immediately relevant. In the case of Oslo's climate budgets, we have seen how these efforts build on particular rationalities and technologies of power which in turn shape which aspects of climate change are rendered relevant in the present. These framings of climate change also imply certain types of intervention, while others might not be as well aligned with that mode of governing. Hence, some aspects of climate change may travel more easily across scales than others, and this depends on the actors, technologies, and rationalities involved in these acts of translation.

5.4 Relationality within the present

The fourth research question concerns relationality within time: *How are local transition initiatives sustained in time?* This question is mainly discussed in Paper 5 which explicates how the capacity of local actors to instigate sustainability transitions depend on their ability to navigate the short-term, even ephemeral, nature of their

initiatives. This points to questions pertaining to how local transition initiatives are sustained in time, but also what roles time-bound interventions might play in shaping a longer sequence of events. As Paper 5 shows, local actors often explicitly relate to the temporary nature of their initiatives and reflect on how this affects their strategy and how they may accomplish continuity within and across initiatives.

Paper 5 outlines how temporary initiatives are increasingly the norm. Local actors often experience difficulties in sustaining local transition initiatives which tend to be designed as temporary and project-based interventions. In order to secure the longevity of their activities, local actors therefore need to align their initiatives with larger-scale agendas, formalise their organisations, or standardise their activities. Hence, continuity in these initiatives is dynamically performed rather than the result of an external structure. This also points to the constantly changing nature of local initiatives as they are continuously translated and reinvented, which is also shaped by the rationalities of funding agencies as project-based initiatives seek additional funding.

However, as discussed in Paper 5, this can also lead to a loss of the radical potential and context specific nature of the initiative. Therefore, actors might pursue a more dynamic approach to continuity in which they continuously reinvent themselves and where experiences and resources are "composted" to work in new settings (cf. Aiken, 2017). This points to the need for a more nuanced interpretation of what we mean by continuity in local transition initiatives, moving away from notions of stability to conceptualisations in terms of repetition through dynamic sequence of events (cf. Jacobs, 2006).

5.5 Articulating responsibility here and now

This brings me to the main research question: *How do local actors make climate change actionable here and now?* This thesis has approached the main question from the perspective of relational mobilisation in space and time. Each of the papers emphasise the active work of translation and alignment needed to establish the present relevance of ideas and resources from other places or time horizons. The perspective

of relational mobilisation therefore challenges our understanding not only of sustainability transformations but also of urban dynamics and how relational space is constituted. I will now discuss these main conclusions in turn:

First, articulating local responsibility takes active efforts of translation of distant problems, ideas, and resources both in space and time. Papers 2–5 show that the articulation of responsibility here and now always depends on a selective mobilisation of concepts which may travel uneasily across spatial and temporal scales. This adds a temporal dimension to Massey's (2004) argument about the responsibility of the local as an active agent in global change. Papers 4 and 5 show that a similar argument can be made with regards to time: the present is actively implicated in the future. In other words, there are temporalities of responsibility just as there are geographies of responsibility. Furthermore, as discussed in Papers 2–4, the articulation of responsibility locally and in the present depends on active work by situated actors in translating and aligning a problem previously conceived as distant in time and space into something immediately relevant. Hence, such efforts will always be partial and shaped by the existing logics and structures of governance. Local responsibility for global change does not just exist; it needs to be continuously articulated and re-articulated in the present.

Second, situated actors accomplish sustainability transformations through active efforts of cohering in and across fragmented urban domains. Papers 2, 3, and 4 emphasise that transformations depend on the relational work of aligning and coordinating the activities of disparate agents across uneven and only loosely constituted (inter)local domains. This surfaces the multiple goals and visions that need to be negotiated and at least partially aligned as urban sustainability pathways are constituted. As Paper 3 shows, dissonance and contestation will always be implicated in the constitution of local transformation. This shifts our perspective on sustainability transformations from that of sociotechnical *control* to that of relational *care* (cf. Arora et al., 2020): rather than controlling systems, the work of transformation consists of the relational work of aligning, shaping, and holding together socio-technical assemblages.

Furthermore, as outlined in Papers 2 and 3, this brings attention to the strategic and constructive situated agency involved in assembling transformation pathways.

Third, spatial and temporal relationality is actively produced through local work which is grounded in particular places and material settings. Papers 2 and 4 demonstrate how both spatial and temporal relations are constituted by mobility and depend on the active *mobilisation* of ideas and resources from elsewhere. This is significant for relational ventures in human geography, where the concept of relationality is often taken for granted and poorly defined. Paper 2 shows how attending to the mobilities through which relations are constituted hence serves to articulate the situated practices which produce relational space, and how these practices are in turn dependent on local material settings. As exemplified by the uneven access to virtual and physical mobility experienced by the Addis Ababa policy-makers discussed in Paper 2, this opens up for analysis of the uneven production of relational space. The papers in this thesis also highlight the different *qualities* of relationality that are produced, ranging from those constituted of virtual mobility and videoconferencing, the long-distance reading of documents, to those constituted by physical mobility (cf. Urry, 2004). As such, relational space never implies a perfect signal, a mere transfer from one setting to another; there is a qualitative and transformative aspect to relational space which implies that we change through the relationships we create with others and with elsewhere.

In short, this thesis finds that the accomplishment of climate governance depends on (a) the ability of situated actors to translate spatially and temporally distant ideas and resources to make them immediately relevant, and (b) the capacity of local actors to align and coordinate initiatives, institutions, and resources, thereby cohering and routinising transformation. It has also shown how assessment of the local work of sustainability governance calls for consideration of both the spatial and temporal dimensions of transformation. By bringing to the surface the relational footwork of transformation – namely the practices through which distant relevances are translated and sustainability pathways are cohered – it points to the fact that sustainability interventions will always be contextual and pragmatically constituted. As pathways to

sustainability are developed with increasing urgency, this perspective may both open up new spaces for agency and intervention and allow for critical assessment of proposed policies and solutions.

The task of engendering sustainable societies may be prospective, but it takes place locally and in a world which is still going on. Might the future ever again be more than "a faded song" – in the words of T. S. Eliot – of "wistful regret for those who are not yet here to regret"? If so, that depends on our capacity to articulate present responsibility for the future: to make sustainability relevant here and now.

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Current Opinion in Environmental Sustainability

The politics of rapid urban transformation

Jakob Grandin[1], Håvard Haarstad[1], Kristin Kjærås[1] and Stefan Bouzarovski[1,2]

This paper addresses the potential for urban change in relation to rapid transitions and the 1.5 °C target. Interventions to achieve rapid urban transformation are typically framed in technical and economic terms. This means that the social and political conditions for rapid urban transformations may be overlooked. We address this gap by highlighting recent insights from sociology, human geography and urban studies that consider how the transformative potential of technical interventions is conditioned by social and political dynamics. The paper highlights three dimensions of such dynamics — the politics of governance, infrastructure and everyday practice — and proposes six areas where the understanding of the politics of rapid urban transformation can be improved.

Addresses
[1] SpaceLab, Department of Geography, University of Bergen, Norway
[2] School of Environment, Education and Development, University of Manchester, UK

Corresponding author: Grandin, Jakob (jakob.grandin@uib.no)

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Introduction: urban transformation and the 1.5 °C target

The Paris Agreement's aspirational goal to limit global warming to 1.5 °C will require rapid and deep reductions in greenhouse gas emissions [1]. Urban challenges must be considered in any such mitigation pathway [2], because of the relationship between urbanization, environmental degradation, land-use change and consumption [3], and the significant emission reduction potential in compact and well-planned urban development [4–7]. The political agency of urban governments — often based on experimental governance arrangements, cross-sectorial partnerships, and international networks — is now considered to play a decisive role in meeting global temperature targets [8•,9,10,11•,12••].

The empirical literature on rapid urban decarbonization is scarce, and it follows that modelling and integrated assessment have to date been the dominant approaches to gauge urban 1.5 °C pathways. These approaches assess mitigation options in urban infrastructure, transport, buildings, and waste, and typically frame barriers and opportunities for transition in technical and economic terms [1,2,13]. They often assume price mechanisms to be the key driver of change, and the most rapid pathway to transition is accordingly regarded to be economic investment in technologies and infrastructure [14]. However, it is also recognized that the results from these scenarios 'say little about political or social feasibility' of the mitigation options [15]. Even economically attractive mitigation strategies may therefore remain unexploited unless appropriate governance frameworks are in place [16•,17].

At the same time, a number of ongoing developments in the literature discuss the political and social conditions for urban transition and transformation. In contrast to scenarios framing change in technical and economic terms, these perspectives tend to describe urban change in terms similar to how Pelling *et al.* [18] describe *transformation*; a 'reorientation of development pathway towards social justice and sustainable development', which involves fundamental change at multiple levels, including institutions, behaviours, values, and technologies. Such transformations are inherently political, leading to unequal outcomes and struggles over different transformation pathways [19,20,21•,22].

In this article, we critically discuss what such perspectives on urban change tell us about the political conditions for rapid urban transformation. We review research from sociology, human geography, and urban studies that emphasizes how technical interventions are always conditioned by social and political dynamics. We label these contributions *relational* perspectives on urban transformation, as they consider the role of social, political and material relationships in shaping cities [23–27]. Three dimensions of these dynamics are discussed: governance, infrastructure, and everyday life.

The social and political dynamics of urban transformation

Relational perspectives on cities and urban governance see cities as created and changed through the various types of relationships that constitute them — socially, politically, and materially [24–27]. They underscore

aspects of urban development that the technocratic discourse often hides from view. In so doing, they highlight all those complexities and contingencies that determine how technical interventions or economic incentives actually work — and do *not* work — in the contexts in which they are implemented.

For example, relational perspectives emphasize the role of informality and unintended consequences of design [25], the contingency of how urban change unfolds [11•,28,29], and see urban development as unfolding in 'contradictory and uneven processes' [30]. Research in low-income settings further highlights the unevenness and informality of urban change. In those settings, large parts of the city may be out of the bounds of formal means of governance [31]. However, informal practices shape the development of high-income and low-income cities alike — albeit in different ways [25,32]. Formal arrangements and contracts often depend on informal networks to be effective, and both state and private actors may operate 'informally to bypass formal regulations' [32].

Relational perspectives also look at how urban development is structured by the political economy of urban development, such as financial interests, housing markets, intercity competition, and entrepreneurial forms of governance [21•,33,34]. Moreover, a preoccupation with questions of politics, power and 'dissensus' is common throughout this work, which mirrors a rising interest in the underpinnings of political power across social science more broadly [31,35,36].

Urban studies has also explored how material forces and non-human agency are conditioning urban life [10,25,29]. The flexible relationship between everyday practices and urban infrastructure results in unequal patterns of urban energy demand and well-being [37••]. For instance, highly uneven urban mobility — often structured along social, gendered and ethnic lines [38,39] — indicates that a given urban structure accommodates multiple patterns of everyday life and energy consumption. Furthermore, relational perspectives on urban change understand urban change as occurring *between* cities (as opposed to simply *in* them). They highlight the interactions between cities, how 'policies that work' are quickly mobilized from one place to another [40••,41], and the role of local work in translating policies that worked elsewhere [42•,43••].

In other words, this literature considers a wide range of contingent and contextual factors that, arguably, constitute the fundamental processes shaping urban development. Within this broad range of contributions, we take a focused look at how three key political dimensions of urban change — governance, infrastructure, and everyday life — may enable and constrain rapid transformation in line with the 1.5 °C target.

The politics of governance

The rise of city-scale actions as a key dimension of the global climate change agenda has led to an increasing interest in how urban governance arrangements may adequately facilitate urban climate transformations. Scholarship pertaining to urban climate governance highlights the operation of climate mitigation activities across multiple scales, institutions and places [8•,9,10]. Emphasizing the politics of governance highlights how innovations are emerging not just in the *content* of politics, but also in their *form*.

Cities are increasingly seen as laboratories to demonstrate and test new policies and technologies. 'Urban living labs' have become popular methods for operationalizing collaboration between various actors, such as municipal actors, businesses, civil society organizations, and academia [8•,44,45]. Urban climate change governance is therefore understood through the lens of experimentation — as driven by practical and tentative intervention in concrete urban contexts. This research often underscores the pluralist, incremental and dispersed nature of urban interventions [8•,12••,44]. This may undermine more transformative and systemic interventions that involve greater risk [12••]. An assessment of urban sustainability experiments in Asia emphasized that policy change was often a trigger for successful experiments, and that local governments were a key actor [17]. The example of Durban has highlighted the role of individual champions (e.g. mayors, politicians, civil servants, NGOs and business) in mobilizing these changes [12••,46].

Scholarship also examines the role of networked governance arrangements, including formal urban climate networks (e.g. ICLEI and C40) and informal circuits of knowledge [12••,40••,41,47,48]. These studies show that policies and technologies are not simply 'transferred' from one urban context to another; they are typically translated and altered [40••,41,47] and the institutionalization of policies depends on significant political efforts at the local level [42•,43••,49]. The ability of local interventions to travel across wider policy contexts and geographical settings is closely dependent on the underlying political and institutional context [40••,50], as well as vertical linkages to state and national levels of governance [17]. While urban research overwhelmingly has looked to the influence of policy models from the global North, there is an increased interest in South-South policy learning [51], as well as comparative gestures of research that break with established North-South divides altogether [52].

Experimental and networked urban climate governance may expedite local collaboration and enable rapid mobilization of policies, technologies, resources and experiences. However, their transformative potential in other places or scales may be limited by the fact that transition experiments are grounded in specific historical and

geographical contexts [50,53•]. Recent scholarship has also showed how these new urban climate governance arrangements are constrained by power and accountability issues [8•,20,21•]. In low-income settings, the limitations from financial, institutional and implementation capacity constraints are also significant [54,55]. Off-the-shelf policy solutions can be used to accelerate change, but relying on such borrowed policies may also have the effect of 'completely circumventing local deliberation, debate, and consensus building' [40••]. The search for co-benefits between different sectors may also conceal trade-offs and conflicts of interest [21•], and displace the heterogeneity of interests that shape cities [56]. Transformation initiatives may also fail to reach their anticipated mitigation targets as they are adapted to suit a particular ideological context or appropriated by powerful actors [33].

The politics of infrastructure

Material elements of cities — transport infrastructure, buildings, and the way these are geographically distributed — mediate urban resource flows, and hence critically determine patterns of urban energy use [57,58•]. Correspondingly, prominent policy and research contributions have argued that investment in low-carbon infrastructure has a range of economic and social co-benefits, such as improved mobility of people and goods, lowered pollution, better health, and lowered cost of public service provision [13,59]. Visions of 'smart cities' see urban infrastructures as made more energy efficient through the use of IT-based network technologies and software [60]. However, drawing on experiences in Durban, Bangalore and Dar es Salaam, researchers observe that lack of necessary infrastructure for basic public services takes focus away from both adaptation and decarbonization activities [12••,46]. At the same, there is a significant potential for mitigation as new infrastructures for energy and mobility are deployed in these areas.

Recent work on urban energy transitions shows that transforming urban infrastructure involves more than simply implementing new technologies or investing in a public transportation project. It is at least as much a social, cultural and political challenge [61,62]. Urban infrastructure impact energy through the way it is embedded in daily practices, cultures, discourses and institutions in their particular contexts [20]. Spurred on by science and technology studies (STS) and assemblage thinking, urban scholars emphasize the interrelations between the material and the social. This means that change in urban infrastructure is mediated by an assemblage of technologies, institutions, practices and interests [63]. In low and high-income settings alike, the governance of urban infrastructure is becoming increasingly complex and fragmented as networked services are deregulated and privatized, potentially limiting the power of local governments [31,32,57].

A relational understanding of infrastructure opens up our view of urban infrastructures to possibilities for rapid change. For instance, the study by Moss [64] of water infrastructure in 20th century Berlin highlights that while urban infrastructure may appear stable, it takes significant effort to maintain that stability. In other words, the perceived stability is predicated on continued investment, protection and control. Moreover, a relational perspective on infrastructure can remove us from the view that urban transformation is predicated on cutting-edge technology, and instead help us recognize that what is novel and transformative depends on interactions between the social and the material in particular contexts. As Schwanen suggests, little attention has been paid to urban mobility innovations where technology plays a limited role, such as bike and car sharing schemes. Nevertheless, low-tech solutions might, within the proper context, contribute to reconfiguring elements of socio-technical systems in important and radical ways [65].

The politics of everyday life

A significant proportion of emissions result from the interaction between the materiality of the built environment and the everyday lives of urban residents [37••]. Urban energy transformations have therefore been considered to be contingent on various interventions in the everyday lives of urban residents, predominantly focusing on mobility choices and individual natural resource use [20]. There has been an increasing scholarly interest in how everyday life in cities is being governed and controlled through 'smart' appliances, and the smart city agenda [60,66,67]. However, social practice approaches have shown how information-based campaigns focusing on individual attitudes and behaviour are likely to fail, and that the success of policies depends on how they interplay with peoples' everyday lives [37••,68,69•]. This approach aims to show how governments have a hand in structuring options and possibilities of people. Thereby it emphasizes how governments 'sustain unsustainable economic institutions and ways of life' and highlights the need for policies that erode unsustainable structures [68]. For instance, a modal shift from private cars to public transport and cycling is conditional on how they can be integrated in the temporal and spatial rhythms of everyday practice. This implies that such shifts may call for policies that target the structural societal factors that produce a fragmented (or 'splintered') urban spatiality (for instance school choices and housing markets) [69•].

There are both constraints and opportunities for rapid transformation in the politics of everyday life. On the one hand, urban residents may resist and contest interventions in urban energy consumption. For instance, Castán Broto [70] shows how energy efficiency retrofits in social housing projects in Ljubljana, Slovenia failed to reach their aspired goals on reduced energy use, as tenants contested various practices prescribed by the authorities, for example keeping the windows shut. Similarly, many urban flagship projects may be targeted at affluent parts of

the population that often have higher emissions from travel and consumption than other areas [33,39]. Unintended social impacts of policies may also undermine their climate mitigation potential, for instance, by urban densification initiatives inadvertently leading to increased commuting distances [71].

Yet scholars also point to important potentials for transformation in the politics of everyday lives, as active citizens and grassroots innovation can be critical for adopting new technologies and creating pressure for a larger transition [72]. In the case of Freiburg, for example a close association between activists and citizens working on alternative energy was important in its eventual energy transition [73].

The politics of everyday life has also been widely discussed as it relates to informal settlements, which lack many basic services that are taken for granted in other parts of a city. Here, informal strategies have been essential not only to secure subsistence in times of increasing material deprivation [31], but also for climate change adaptation, for example by protecting houses in flood prone areas with used tyres [12••]. The mitigation potential of informal activities is however uncertain.

Implications for understandings of rapid urban transformation

Few or no studies within the urban governance literature have made a direct connection between urban transformations and pathways to the 1.5 °C target. Yet there is ample work that can inform our understanding of the conditions for rapid urban change in line with radical climate mitigation. The research we have highlighted here emphasizes that framing urban change in economic and technical terms is unlikely to work without attention to political, material and lived aspects of urban life. On the other hand, it also highlights the potentials for rapid transformation. As we summarize in Table 1, the extant

Table 1

Three dimensions of urban political dynamics and their relation to rapid urban transformation

	Opportunities and constraints to rapid transformation	Implications for equity and justice
Politics of governance	- Resources, policies, technologies and experiences can rapidly be mobilized between cities, but need for translation to new urban contexts [40••,41,42•,43••,47,49]. Historical and geographical contingency of transition experiments may limit their 'scalability' [50,53•]. - Collaborative governance arrangements are an opportunity to align interests and mobilize actors in urban transformation [8•,44,45]. - Previously transformative policies may lose potential when they are adapted to suit particular ideological contexts [33,40••]. The autonomy of cities to pursue radical policies independently from the global economy and national and international scales of governance may be limited [74].	- Local political process may be circumvented by the mobilization of policies from elsewhere [40••]. - Stakeholder-based and strategic governance reinforce uneven participation, and overlook policy trade-offs [21•,45,56]. - Predominant focus on process and procedures may obscure unequal outcomes of policies [21•]. - Urban transformation initiatives may be appropriated by powerful interests [33]. - Significant financial, institutional and implementation capacity constraints, particularly in low-income settings [54,55].
Politics of infrastructure	- Delays and inertia in urban infrastructure may constrain rapid transformation [2]. However, it takes work to maintain that stability, indicating opportunities for rapid transformation if efforts are redirected [64]. - There is a transformative potential in how the material interacts with the social. Old infrastructures may be used in new, more sustainable ways, possibly augmented by 'smart' technologies. - There may be opportunities to rapidly reconfigure socio-technical systems in radical ways, often through relatively low-tech solutions [65].	- 'Splintered' access to urban infrastructural services highlights the uneven urban landscapes in which rapid transformations unfold [57,58•]. - In low-income settings, a lack of necessary infrastructure for basic public services may take focus away from adaptation and decarbonization [12••,46]. - Unequal access to services may be reinforced through energy transitions, exacerbating, for example, vulnerability and energy poverty [20,58•]. - Governance of urban infrastructure is increasingly complex and fragmented as networked services are deregulated [20,31,57].
Politics of everyday life	- Success of policies depends on how they interplay with everyday life [37••,68]. Shifts in urban behaviour may depend on radical social policies that target uneven urban spatiality [37••,69•]. - The climate mitigation impact of sustainability initiatives, for example, energy efficiency retrofits, may fail to reach their potential if they are contested and resisted by local residents [70]. - Active citizens and grassroots innovation may be critical for adopting green technologies and create pressure for a larger transition [72,73]. - Informal adaptation strategies in informal settlements [12••]. Mitigation potential of informal activities uncertain.	- Since patterns of everyday practice are uneven, attempts to regulate everyday life will have impacts on justice, and may both reinforce and mitigate structural inequalities. - Policies may have unintended social impacts that undermine their mitigation potential (e.g. urban densification may lead to increased commuting distances) [59]. - Urban sustainability flagship projects often target affluent populations, and consumption emissions from these areas may be significantly higher than from other parts in the city [29].

literature on urban climate governance provides insights that are useful for the design of rapid urban transformation pathways.

However, the review also reveals knowledge gaps that need to be filled in order to bridge socio-political conditions and rapid urban change. By way of concluding the review, we identify six such gaps:

1. There is a knowledge gap concerning the relationship between incremental adjustment and transformation [18]. The ability of urban niche experiments to catalyse the transformation of the larger development regime has not been properly documented [12••,53•]. At the same time, studies highlight the need for radical social policies to facilitate changes in everyday practice [69•], or urban consumption patterns [33]. The autonomy of cities to pursue radical policies independently from prevailing governance ideologies as well as national and international levels must therefore be further examined [74].
2. There is a gap between the contested, fragmented and temporary nature of many urban governance arrangements on the one hand, and the coherent climate abatement pathways called for by different temperature targets on the other. It thus becomes necessary to reconcile the heterogeneity of urban governance with the relative uniformity of rapid transformation pathways.
3. A gap exists between the predominant research focus on process and governance procedures on the one hand, and the uncertainty of the outcomes of such initiatives in terms of climate mitigation, social justice and institutionalized transformation pathways on the other [cf. 21].
4. A gap arises from the way policies and technological solutions are designed with universal aspirations, while the actual outcomes of these technologies and policies depend on the particular contexts in which they are embedded. A technology that is considered commonplace in one city may be radical in another. This is compounded by the fact that policies and technologies are translated as they are mobilized from one institutional and ideological context to another [40••,47,53•].
5. A gap results from the fact that around half of the global urban population lives in low-income and middle-income countries (a number that is rising quickly), while research on urban decarbonization predominantly examines high income settings.
6. Finally, there is a gap between the rapid transformation that is called for and the scope of empirical work that can inform such transformations. It is critical to complement scenarios and models with empirical studies that engage with the temporality of rapid social and political change. As several cities worldwide have now adopted ambitious mitigation goals (albeit only exceptionally in line with 1.5 °C), there should presently be ample opportunities for such studies.

Conflict of interest statement

None.

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Transformation as relational mobilisation: The networked geography of Addis Ababa's sustainable transport interventions

Jakob Grandin and Håvard Haarstad
University of Bergen, Norway

Abstract
Literatures on sustainability transition and transformation increasingly emphasise the role of spatiality and local agency. This paper argues that relational thinking has much more to offer this debate than presently acknowledged, particularly in revealing the geographical interconnections between dispersed nodes of action and innovation. We use relationality to show the interconnections at work in exchanging and negotiating sustainability interventions between cities and across scales. Using the mass transit planning process in Addis Ababa as a point of entry, we trace how the city's transformation is negotiated at the intersection of local agency, the Ethiopian national political setting and international networks. A host of actors from different scales come together as transformation is assembled by aligning extensive local experience with elements mobilised from elsewhere. This *relational mobilisation* perspective arguably infuses hope into the debate, because it opens new ways of identifying seemingly insignificant actions and actors elsewhere and recognising them as potential drivers of change.

Keywords
Networks, Addis Ababa, mobility, sustainability transformations, urban governance, climate change

Introduction

The need for rapid and deep societal transformation to respond to climate change has spurred a vibrant academic debate on conditions, contexts and pathways for

Corresponding author:
Department of Geography and Centre for Climate and Energy Transformation, University of Bergen, Postboks 7802, 5020 Bergen, Norway.
Email: jakob.grandin@uib.no

transformation. In recent years, new actors have emerged as global climate governance has been rescaled and local-level actions have become more prominent (Bulkeley, 2016). Cities such as Oslo, Addis Ababa and New York are currently pursuing climate goals that are considerably more ambitious than those of their national governments or global commitments. Recent scholarship traces the emergence of new climate governance arrangements that build on voluntary climate action through loosely co-ordinated public, private and civic initiatives (Biermann et al., 2017; Castán Broto and Bulkeley, 2013; Marvin et al., 2018). These efforts have exposed a rich undergrowth of local agency that was previously concealed in national and multilateral accounts of climate governance.

However, this literature has less to say about the relational dynamics of how transformations are mobilised across space. The key questions are essentially spatial: Where does innovation take place? How is change mobilised to other places or scales, and by whom? How do particular interventions interact with local contexts, and how are they materialised through longer-term change?

In the literature, there tends to be a divide between gradual transitions driven by innovation (Geels, 2011; Köhler et al., 2019), and more pluralistic and unruly transformations (O'Brien, 2012; Olsson et al., 2014; Pelling et al., 2014; Scoones et al., 2015). These two perspectives have their own distinct conceptual histories and are only partly in conversation with each other. However, both perspectives have in common that they often build on what Scoones et al. (2020) refer to as 'systemic approaches' – typically multi-level transitions theory (MLP) and socio-ecological systems perspectives – that consider systems as relatively bounded, territorially stable and nested in a scalar hierarchy. Accordingly, the understanding of local transition and transformation initiatives is centred around a vocabulary emphasising local innovation and experimentation. However, when it comes to examining the actual *work* of transformation, systems approaches, by focusing on the system as a whole, 'have tended to diminish the role of individual agency, downplay the complexity of politics, power and asymmetries in human-environment dynamics' (Scoones et al., 2020: 67).

In this paper, we draw on the case of sustainable mobility in Addis Ababa to show how a closer engagement with relational thinking can help unpack the spatial dynamics of transformation. When actors in Addis Ababa engage with sustainable development, transformative interventions – here understood as directed actions to achieve urban change – rarely emerge from niches or within bounded systems. Instead, they are mobilised by innovations, technologies and interventions that are exchanged and translated *between* cities, facilitated by formal networks such as C40 Cities and the professional and personal networks of policy makers, planners, consultants and activists on a trans-urban scale. These urban transformation efforts are also shaped by different contexts on the ground, uneven power relations and the fact that some people and places are more connected than others (Bouzarovski and Haarstad, 2018; Grandin et al., 2018). Therefore, we need a theory of transformation that is more attuned to the relational, networked and scalar nature of contemporary processes of social change.

We aim to advance an understanding of transformation that reveals how transformations are mobilised as relational rather than as bounded endeavours. Our approach highlights the interconnections between geographically dispersed nodes of innovation and shows how local sustainability interventions are interconnected with 'multiple elsewheres' that shape and condition the opportunities for local change. This argument builds on the ongoing discussion on spatiality and geography in the sustainability transitions literature (Affolderbach and Schulz, 2016; Bridge et al., 2013; Sengers and Raven, 2015; Temenos et al., 2017). Indeed, Loorbach et al. (2020) argue that transformative innovations are locally rooted as well as globally connected. Explicating the nature of the relations and networks that

foster these global connections would however benefit from closer engagement with key ideas from human geography (see Binz et al., 2020).

Therefore, rather than spatialising systemic approaches to transition and transformation, we argue that we should *start* from the idea of relational spatiality (Massey, 2005) to foster a distinctly geographical approach. In discussing transformation as relational mobilisation, this paper draws on work that conceptualises the flow of ideas, people and matter across space and how those flows interact with local contexts – particularly the policy mobilities literature (e.g. McCann and Ward, 2011; Peck and Theodore, 2015; Robinson, 2013; Wood, 2014). But it also builds on work on mobility (Cresswell, 2010) and assemblage (Anderson et al., 2012). We advance that literature by mobilising its insights to help explain relational sustainability transformation. This means that we are less interested in how policy mobilities serve as conduits of neoliberalisation and depoliticisation (e.g. McCann, 2017; Peck and Theodore, 2015), and instead highlight the constructive, strategic and contextual agency involved in mobilising, translating and negotiating ideas and resources from elsewhere.

We conceptualise transformation as a process whereby local innovation and intervention is interconnected with multiple places and scales. Understanding transformation as relational mobilisation means bringing insights from relational thinking into discussions on transitions and transformation to a much greater degree than is currently done. 'Relational mobilisation' hence emphasises both the relational and mobile constitution of social phenomena (Massey, 2007; Söderström et al., 2013) and the local work involved in mobilising and aligning local and non-local resources and actors (cf. Cox, 1998). Our approach thus contributes to the thinking on how transformations are negotiated in local contexts that are interconnected with multiple geographically dispersed nodes of innovation through mobile practices.

The paper proceeds as follows. We start by assessing how spatiality and agency are understood in common approaches to transition and transformation. This is followed by a discussion of relational and mobile conceptualisations of change. After outlining our methodological approach, we apply these insights to examine the development of mass transit and climate planning in Addis Ababa. We interpret this work as a *relational mobilisation* which involves municipal agencies as well as international networks such as C40 Cities. We highlight how the three dimensions of transformation as relational mobilisation—namely interconnected settings, mobile relations and contextualised agency—come into play as urban transformation pathways are negotiated. Discussion and conclusions follow.

Spatialising transformation

It is widely recognised that the climate challenge requires drastic action (IPCC, 2018; McKinsey and C40 Cities, 2017; United Nations, 2015). Social science responses to this challenge have been predominantly framed within the sustainability *transitions* tradition and various approaches to sustainability *transformations*. Transitions research has often examined technical transitions in electricity, transport and urban sectors, and the literature highlights interactions between niche innovations and larger (often national) institutional structures that are slower to change (Geels, 2011; Grandin and Sareen, 2020; Köhler et al., 2019). In contrast, transformations are understood as a 'fundamental change to the functioning of systems' that may open 'new areas of policy response' (Pelling et al., 2014) and the transformations literature emphasises both the role of local agency and the unruly and political character of sustainability transformations from a range of theoretical points of departure (O'Brien, 2012; Scoones et al., 2015; Westley et al., 2011).

While grounded in distinct traditions, the transitions and transformation debates have in common that their analysis is often framed from within a systems approach that draws on systems thinking to identify interconnections between social, economic and technical systems (Scoones et al., 2020); this approach underscores that it is the systems and not the individuals that are unsustainable (Shove et al., 2015; Urry, 2004a). For instance, in the transitions literature, the 'unit of analysis is [. . .] primarily situated at the 'meso'-level of socio-technical systems' (Köhler et al., 2019: 2). This approach highlights how societies and technological systems co-evolve, and how technological and institutional path dependencies lead to inertia that makes change difficult (Geels, 2004). From a sustainability transformations perspective, the socio-ecological systems approach draws on resilience theory to emphasise how social systems are interconnected with the ecological and planetary systems on which they are dependent. Scholarship in this tradition aims to assess the integrated effects of different policies and transformations and 'is crucial to prevent undesirable and unintended outcomes of initiatives to move toward sustainability' (Olsson et al., 2014: 5).

Systems approaches to sustainability can, as Olsson et al. (2014) cogently argue, give important guidance when policies are designed and their effects are assessed. However, when it comes to examining the actual *work* of transformation, the systems approaches prevalent in both the sustainability transitions and the transformations literature would benefit from further engagement with the spatial dynamics of social change. There are several areas where spatial and relational perspectives are starting to nuance and advance this theoretical landscape. We will highlight here three such areas.

First, systems approaches have tended to consider systems in transformation as *geographically bounded*, demarcated by political boundaries or the properties inherent in the system itself. The multi-level perspective has traditionally examined transitions that are nationally bounded, but with an empirical focus on the local level of protected niches where the innovation that instigates larger transition is understood to take place (Geels, 2011). As an indication of this, this literature accordingly has a profusion of concepts around local innovation, experimentation, urban living labs and incubators – protected spaces for innovation (Marvin et al., 2018).

However, this bounded spatiality has been challenged by a growing geographical literature on sustainability transitions, which emphasises spatial diversity, geographical unevenness as well as the translocal nature of transitions (e.g. Coenen et al., 2012). This is mirrored in the urban governance literature, which understands cities to be produced by the circulation of policy ideas, finance and people and emphasises relations and mobility (Castán Broto, 2017; Massey, 2007; McCann and Ward, 2011; Söderström et al., 2013). Here, the role of collaboration, learning and exchange *between* cities – hence the importance of connections between *different* systems – is underscored. To a degree, these perspectives are brought into the transitions literature. For instance, Sengers and Raven (2015) conceptualise a 'spatialised' niche model which highlights the role of translocal connections between multiple co-existing niches (see also Affolderbach and Schulz, 2016). This mirrors similar endeavours by Loorbach et al. (2020) to explicate the translocal character of transformative innovation. These efforts contribute to a more porous and spatially nuanced understanding of how transitions and transformations unfold.

A second area where spatial thinking has advanced transformations work is in understandings of systems. Often systems studied are understood to be relatively *coherent,*

complete and territorially stable entities. Both the MLP and socio-ecological systems approaches allow for the evolution, disintegration and reintegration of systems over time. However, this is understood to take place predominantly *within* the system; in other words, it occurs in the ways in which national institutional structures evolve (see Grandin and Sareen, 2020), or how relations between different components in a socio-ecological system are continuously made and remade as the system reorganises itself and occasionally shifts to a new regime (Holling, 2001; Olsson et al., 2014). The analytical emphasis is placed on *systemic* capacities in order to uncover both systemic barriers to change – for instance 'traps', or feedback loops that maintain undesirable trajectories – and tipping points that may unlock rapid transformation (e.g. Westley et al., 2011).

In contrast, geographers have pointed out that this interest in aggregate and systemic outcomes creates blindspots (Cote and Nightingale, 2012). The climate governance literature, drawing significantly on spatial thinking, paints a landscape that is fragmented, inherently contradictory and only loosely co-ordinated (Biermann et al., 2017; Castán Broto and Bulkeley, 2013; Marvin et al., 2018). For instance, conceptualising cities as 'systems' may obscure the fact that neither urban governance arrangements nor infrastructure have ever been complete or coherent (Simone and Pieterse, 2017). This unevenness, as political ecologists are quick to point out, means that transitions and transformations will always be political (Meadowcroft, 2011), contested (Castán Broto, 2015) and driven by trade-offs and compromise (Fenton, 2016).

The third area where spatial thinking has advanced transformations work is in highlighting *scale* and *scaling*. In systems approaches, scale is generally understood in terms of a nested hierarchy (Gibson et al., 2000), where 'lower' scales of smaller geographical reach are contained within 'higher' scales of larger spatial extent; transformations are regarded as dependent on interaction between these scales. For instance, resilience thinking assumes that systems operate in a 'panarchy', where smaller and faster systems are contained within larger and slower systems (Holling, 2001). Similarly, in MLP, scales are largely metaphorical and geographically non-specific, but nevertheless conceptualised as levels of phenomena that are relatively hierarchical. As in resilience approaches, change in 'higher scales' – regimes and landscapes – is assumed to be more structurally constrained than in the smaller niches (Affolderbach and Schulz, 2016).

In contrast, geography's relational approaches to scale posit that scales are socially produced and mutually constituted – the 'local' and the 'global' are not distinct levels but 'deeply interconnected as part of a continuum of social existence and praxis' (Herod, 2011: xv). This perspective unveils how global systemic effects are actively produced by local-level practices and decisions, and emphasises local agency and responsibility with regard to problems on other scales (Massey, 2007). Similarly, work on social movements has underlined how even place-based movements are dependent on cross-scalar relationships for various types of resources, inspiration and support (Haarstad and Fløysand, 2007) – what Cox (1998) termed 'spaces of engagement'. We argue that this relational perspective on scale allows a better understanding of how localised transformation processes are interconnected with larger processes, governance structures and networks (Bouzarovski and Haarstad, 2018).

In short, spatial thinking has both challenged and advanced mainstream work on transitions and transformation in several ways. We build on this work, but at the same time, our approach is different. Rather than spatialising MLP or resilience approaches, we take relational spatiality as the point of departure in order to foster a distinctly spatial approach to transformation. In the following section, we outline the key conceptual underpinnings of what we term *relational mobilisation*.

The relationality of urban transformation

Relational thinking helps conceptualise the interconnected geographies through which transformation – quite literally – *takes place*. The 'relational turn' in human geography understands places to be constituted by more or less distended social, political and material relationships, as opposed to characterising them according to some 'essential' properties (Anderson et al., 2012; Haarstad and Wanvik, 2017). Massey (2005, 2007), one of the main advocates of relational thinking in geography, thought of space as continuously produced through relations and highlighted difference, multiplicity and agency. Massey's contributions have had a major impact on geographical theory, but relatively less impact on debates on work in sustainability transitions and transformations where geographers have often relied on frameworks imported from adjacent fields (Bridge et al., 2013; Hansen and Coenen, 2015).

The relational turn bears a family resemblance to wider trends in social theory. First, it shares clear affinities with assemblage thinking, which understand phenomena to be loosely connected and temporary gatherings of human and non-human component parts, brought together across different places and scales of governance (Anderson et al., 2012; Haarstad and Wanvik, 2017; McFarlane, 2011). Second, relationality is a key component in thinking around decentring and decolonialising common Eurocentric interpretations of the geographies of transition and transformation (Bridge, 2018; Nagendra et al., 2018; Simone and Pieterse, 2017), emphasising spatial interdependence and multiple nodes of innovation. Third, relational thinking also underpins the 'mobilities turn', highlighting how society is constituted by different forms of (inherently uneven) mobility of people, ideas, practices and technologies (Cresswell, 2010; Sheller and Urry, 2006; Söderström et al., 2013).

The policy mobilities literature has brought these insights into the discussion of policy making and implementation, emphasising the actors, artefacts and pathways involved in the mobilisation and translation of particular policies from one setting to another (McCann and Ward, 2011; Peck and Theodore, 2015). It has also stressed the local agency involved, as local administrations assemble policies from local parts as well as inspiration and resources from other places (Bulkeley, 2016; Robinson, 2011). Common to these currents of scholarship is the insight that places, people and institutions are intricately shaped and constituted by relationships with 'multiple elsewheres'.

One such mobile policy, increasingly scrutinised by policy mobilities scholars, is bus rapid transit (BRT), a bus-based mass transit system with dedicated bus lanes, pre-boarding fare collection and advanced fleet management. Initiated in Curitiba, Brazil in the 1970s, BRT has been celebrated as a policy innovation from the Global South that has received international acclaim (Wood, 2015a). It has its own standards and manuals (ITDP, 2017) and is promoted internationally as a potent climate solution (McKinsey and C40 Cities, 2017). The critical research literature has unpacked how the 'process of exchange between cities is asymmetrical, uneven and incredibly partisan' and shaped by local political priorities (Wood, 2015a: 1071). For instance, study tours are both an opportunity for 'experiential learning' and a way to develop local political coalitions (Montero, 2016). The implementation of a BRT system involves the bundling of a number of different sometimes conflicting policies into a 'policy package' (Filipe and Macário, 2013). Wood (2015b) has shown that BRT adoption is highly dependent on local context and has in many places been subject to slow political deliberation rather than 'fast policy' transfer. Policy learning has furthermore concentrated on a small subset of hallmark cities with large-scale systems, while learning opportunities from other places are deliberately disregarded (Wood, 2015a; see also Schwanen, 2018); this selective learning has been reinforced by international networks

(Wood, 2015a). However, while BRT systems are generally pursued as large-scale projects that benefit large private companies at the expense of informal actors, they may also challenge neoliberalisation by placing mobility in the public sphere and increasing opportunities for collective action (Paget-Seekins, 2015).

Transformation as relational mobilisation

We draw on the three currents of scholarship discussed above – namely assemblage thinking, decentring social theory and the 'mobilities turn' – to conceptualise the interconnected geographies through which transformation is mobilised: what we refer to here as transformation as *relational mobilisation*. In other words, we are bringing insights from the relationality and mobility debates to bear on the transitions and transformations debates. This way we can account for both the way in which resources, policies and technologies are assembled *between* cities and the contextual processes of local negotiation and material change. In doing so, we are further conceptualising the role of strategic local agency in mobilising ideas from elsewhere. We will highlight three dimensions of transformation as relational mobilisation, namely (a) interconnected settings, (b) mobile relations and (c) contextualised agency.

Interconnected settings: Learning and exchange does not happen in a sequential chain of innovation and implementation from one city to another, but in multiple interconnected nodes of concomitant innovation. The interconnections between cities create spheres of innovation that are implicated in both trans-local and local (urban) spaces at the same time. New connections between places are generated through exercises like benchmarking and the identification and the promotion of best practices (Larner and Le Heron, 2002), thereby producing 'global spaces of emulation and competition' (McCann, 2008: 6). A bicycle planner in London and a bicycle planner in Malmö are engaged in the same interconnected sphere through networks, discourses and mobile policies concerned with project generation, funding opportunities and best practices on bicycle planning. Housing planners in the same cities may be equally well connected, but through very different networks and discourses. Consequently, when urban plans are developed, policy ideas circulate leading to 'remarkably similar analyses, conclusions, and policy ambitions' across cities (Robinson, 2011:15). This creates a complex spatial constitution where urban transformation is partially connected to many different (and potentially competing) trans-urban networks at the same time (cf. Massey, 2005). Hence, the continuous engagement with kindred initiatives elsewhere is an integral part of the local work of transformation. In turn, we need to examine the complex interconnected settings through which urban transformations are mobilised.

Mobile relations: Connections between transformation initiatives in different settings are created and maintained by different forms of mobility and travel. This creates what Urry (2004b: 28) describes as an '"imagined presence" through travelling objects, moving people, and moving images that carry connections across, and into, multiple other social spaces'. These mobilities, argues McCann (2008: 6), 'facilitate the production of a particular form of relational knowledge in and through which policy actors understand themselves and their cities' policies to be tied up in wider circuits of knowledge'. A planner from Stockholm may meet a city official from Portland face-to-face in a study trip, and they may subsequently share ideas in webinars or chat groups. Such connections are often facilitated by intermediaries—international city networks, consultants, donors, and public sector institutions such as the European Union—that are often involved in several similar initiatives at once and maintain connections between different nodes of innovation. As policy mobility

research has made clear, such agency is not neutral (Bulkeley, 2006). By framing best practices, transfer agents themselves shape the policies and technologies that are mobilised (McCann, 2008; Peck and Theodore, 2015; Prince, 2016).

A critical insight here is that the process or act of becoming mobile is political. Mobilities are grounded in particular material contexts, full of friction and inherently uneven: some people and things are highly mobile while others stay inert (Cresswell, 2010; Nikolaeva et al., 2019). Both physical and virtual mobility is differently constrained by borders, immigration regulations, the price of airplane tickets and access material infrastructure such as a reliable internet connection. This affects the type of ideas (and whose interpretation of them) that are able to travel to different settings to take part in urban transformation initiatives. Viewing relations through the lens of mobility, then, underscores the variegated meanings and practices involved in the uneven social production of relational space (Cresswell, 2010; Robinson, 2011). In turn, we need to assess how cross-spatial relationality and mobility are created, structured and distributed.

Contextualised agency: While relational and mobile, urban transformations are also stubbornly local affairs. They depend on local agency, political deliberation and negotiating particular material configurations (Peck and Theodore, 2015). Local actors may draw on resources and ideas from elsewhere (cf. Cox, 1998) in their work of 'assembling' transformations (Bulkeley, 2016). However, the local contexts are not simply surfaces on which mobile policy processes play out – they should also be recognised as arenas for proactive and strategic agency. Mobile ideas interplay with deeper institutional and personal policy histories (Borén and Young, 2012). Actors at the local level are often active in pulling these ideas together, combining them and reconfiguring them in creative and strategic ways (Haarstad and Wathne, 2019; Robinson, 2013; Wood, 2014) and may draw on experiences from other cities as argumentative resources to support particular policy pathways (Kennedy, 2016). At the same time, implementing these ideas in the built urban environment is not without dissonance – the local material context and political resistance may create considerable barriers to the enactment of particular sustainability policies (Castán Broto, 2015). In turn, we need to investigate how local contexts reconfigure urban transformation pathways.

In our framework, these three dimensions of transformation – interconnected settings, mobile relations and contextualised agency – constitute relational mobilisation. After a brief outline of our methodological approach, we will use the lens of relational mobilisation to discuss the ongoing efforts in Addis Ababa to develop sustainable transport and create a strategic climate action plan (CAP).

Methodology: Tracing the genesis of Addis Ababa's transformation

The empirical basis for this paper is fieldwork conducted under the auspices of a larger research project that examines the role of collaboration between cities in climate and energy transformation. Our methodological approach seeks to examine transformations through the 'circulations and connections which shape cities' and 'engage with urban outcomes through tracing their genesis by means of specific connections, influences, actions, compositions, alliances [and] experiences' (Robinson, 2016: 15). This is similar to Peck and Theodore's (2012: 24) notion of a 'distended case study', although we empirically centre our investigation in one particular city – Addis Ababa.

The case study draws on in-depth interviews, analysis of policy documents and ethnographic work at multiple locations. A total of 29 semi-structured interviews were conducted in person or through Skype with practitioners involved in mobility and climate policies in

Addis Ababa. Within Addis Ababa, this included officials at different municipal authorities as well as representatives from funding agencies, NGOs and consultancies. Among these, the C40 Climate Leadership Group was identified as particularly relevant due to their close engagement with both climate and transport projects in Addis Ababa. Interviews with representatives from the C40 Cities network headquarters were therefore conducted to learn about how the network sees its role in supporting collaboration between cities. Informants were identified through strategic sampling, which was later expanded through snowball sampling. The interviews covered themes such as the development and implementation of climate and mobility policies, how these policies interplay with the local institutional and material context, and the role of collaboration with other cities and organisations. Interviews were supplemented with participation at seminars, conferences and webinars related to urban transportation and climate policies. Finally, prolonged engagement with the material systems on the ground in Addis Ababa provided a nuanced understanding of the material, social, political and cultural contexts of transformation. Interview transcripts and field notes were analysed thematically, identifying themes concerning policy development, the role of international and local collaboration, and the role of the local context.

The networked geography of Addis Ababa's transformation

Addis Ababa, the capital of Ethiopia and the seat of the African Union, is undergoing rapid change brought about by population growth, new housing projects and urban renewal programmes (Angelil and Hebel, 2016). The population, estimated at 3.6 million in 2013, is expected to double to 9.8 million in 2037 (World Bank and GFDRR, 2015). To meet the changing transportation demand, Addis Ababa pursues a transit-oriented development strategy and a number of high-profile public transport initiatives (AACPPO, 2017). These projects combine social, environment and climate goals linked to the development of a CAP.

These initiatives have distinctly local dynamics: they are shaped by particular regulatory structures and material conditions specific to Addis Ababa. Their primary aim is not to replace cars (private ownership of cars is still low) but to ensure efficient connectivity in the city, reduce commuting times and accommodate rising transport demand (AACPPO, 2016). However, wider relationships are also in play. As for many cities (see Nikolaeva et al., 2019), different forms of scarcity underpin Addis Ababa's mobility strategies, including that of mobility services, road space, emissions space and hard currency. A keystone project is the development of a BRT system, an initiative that has brought together a number of local, national and international actors over the years.

Addis Ababa's urban initiatives are also shaped by national priorities and are embedded in the international agendas related to sustainable development, resilience and climate change, supported by active participation in the climate-oriented C40 Cities network as well as the resilience-focused 100 Resilient Cities network. Both networks have advisers in Addis Ababa who consult on different parts of the planning process. Through such networks, study tours and policy advice from friendship cities, experiences from elsewhere are continuously channelled into the projects. At the same time, the projects draw on the municipality's historical expertise in constructing and operating bus-based public transport.

Hence, Addis Ababa's sustainable mobility interventions bring together actors at multiple locations and scales. The BRT project is placed under the Addis Ababa Road and Transport Bureau, and involves the Transport Authority (which manages public transport), the City Roads Authority (which constructs and maintains roads), the Transport Management Authority (which allocates road space), the municipal express bus operator Sheger (which will eventually operate the BRT system) as well as the Addis Ababa City Planning Project

Office.[1] The work is led by a BRT project management unit placed at the Transport Programs Management Office (TPMO, see below), which also coordinates with consultants and funders. International organisations such as World Resources Institute (WRI) and Institute for Transport Development Policy (ITDP), Lyon Town Planning Agency (LTPA) and the C40 Cities network have provided direct input to various stages of the project. The project moreover depends on funding from the French development agency AFD.

Examining Addis Ababa's ongoing processes of change through the lens of relational mobilisation thus involves empirically accounting for both local dynamics and the way in which change is mobilised in networks. In the following sections, we will discuss Addis Ababa's urban transformation in light of the relational, networked and scalar nature of contemporary processes of social change.

Interconnected settings

We do not know exactly when the idea of constructing a BRT system in Addis Ababa first arose, but its origins date at least from the early 2000s. City officials may have brought the idea with them from one of their study tours, or it may have travelled with one of the parachuted experts and consultants who visit the city from time to time. As one official noted, 'there are a lot of experts coming and going as advisers to the city, so maybe . . . they brought the idea of BRT' (July 2018, personal communication). Creating high-capacity mass transit corridors along an east–west axis was in any case one of the priorities in the implementation of Addis Ababa's revised 2002–2010 master plan (Egis Rail and LTPA, 2010).

From the outset, the project has been built on international exchange. The first BRT feasibility study was conducted in 2010 by consultants from the French LTPA, Addis Ababa officials and the engineering firm Egis Rail (Egis Rail and LTPA, 2010). They identified and prioritised seven BRT corridors in the city. This was the culmination of a longer partnership in urban development between Lyon and Addis Ababa who became friendship cities in 1999. This was followed by intensive exchange, supported by the French development agency AFD, with a particular focus on the development of high-capacity bus corridors. The metropolitan area of Lyon, home to 1.7 million inhabitants, had involved the LTPA since 2005 to assess the potential of a transport-oriented urban development strategy channelling on urban growth to public transport hubs (Berger, 2010). In 2008, Addis Ababa city officials visited Lyon to discuss the implementation of mass transit projects, focusing on BRT and light rail (Egis Rail and LTPA, 2010).

Addis Ababa proceeded to organise and secure funding for the project, which brought new non-local actors onboard. The BRT project was placed at the TPMO, a special office formed to initiate, support and co-ordinate transport-related projects across authorities in Addis Ababa. They continued to work on the 'B2' corridor, a 16-km stretch connecting Wingate in the north to the new housing areas in the South. In subsequent years, a number of designs and revisions for this BRT corridor were commissioned. In 2015, AFD committed to an 85 million Euro soft loan to fund the project, which in turn led to further revisions. The new funders both called for revisions in the BRT corridor design and funded the engagement of external experts to review the technical designs provided by French consultancy firm Safege SAS and Ethiopian consultants Hammda Engineering (Endeshaw, 2016). When engaging in the project, AFD sees itself not only as a funder, but also as a mediator that can draw on experiences from similar projects in other cities:

> We have similar experiences around the world. The fact that we have this transport team- . . . based in Paris AFD headquarters—that's a very good asset for us. Because it is really

> easy to compare, to discuss with colleagues, in order to advise the client. (AFD official, December 2018, personal communication)

International exchange was also facilitated by participation in international networks. By 2013, Addis Ababa's mass transit agenda had become increasingly connected to the international climate agenda. With enthusiastic support from then-Mayor (and former Minister of Transport) Deriba Kuma, Addis Ababa was among the first African cities to join the C40 network. Central to C40's official narrative is the role of continuous exchange and mutual learning between cities in the pursuit of 'large-scale, replicable projects' to curb climate emissions (Chikoko, 2013). This may enable a more rapid transformation; for instance, several cities committing to the same goals may create market signals that can accelerate innovation and support later transformation efforts (C40 officials, June 2018, personal communication). C40's Deputy Executive Director Kevin Austin highlighted that this may also decrease risk, reduce costs and spur action:

> And also, it can help reduce the transaction cost. It is very, very costly to be the first but if you've got support and help or you've got groups of people working together you can sort of all be the first, or be the second. And it allows action to happen more quickly because you've got more resources, more thought, and you've also de-risked it. (Kevin Austin, May 2018, seminar at European Commission)

Through the C40 network, Addis Ababa officials connected with climate initiatives in other cities around the world. They were particularly involved in activities relating to solid waste management and transport (Ramboll, 2016), and Addis Ababa hosted a workshop for C40's transport-oriented development network in 2015. At the same time, Addis Ababa's sustainable urban development efforts gained increasing international recognition. Addis Ababa was shortlisted for the 2016 Guangzhou International Award for Urban Innovation for work on sustainable transport and won the C40 Award of the same year for its newly opened light-rail transit system.

Consequently, the design of the BRT corridor could draw on experiences from other cities. As part of the C40 Award, Addis Ababa received a resident C40 adviser who worked alongside municipal authorities on the BRT project for two years. The resident adviser supported stakeholder engagement workshops, assisted in modelling the climate change mitigation potential of BRT corridors and contributed to a branding and communications strategy. C40, together with WRI, also supported a study tour to India, where city officials visited BRT systems in four Indian cities. The importance of learning from other cities' experiences with different aspects of the BRT system – from corridor design to integrated fare and ticketing systems – is emphasised by city officials as they could 'take ideas from working systems and [try] to incorporate them in our design' (Addis Ababa officials, December 2018 and September 2019, personal communication). An official involved in Addis Ababa's BRT project also reflected on the value of learning both from failures and success stories through study trips:

> [We] have seen failed BRTs and successful ones. So, you also understand the reason why it failed. We don't want to make the same mistakes . . . Because basically some of the issues that are not addressed there [in Dar es Salaam] are costing them. So now we are trying to address it here from the beginning, before we start the operation. (July 2018, personal communication)

In later years, international collaboration in Addis Ababa has also focused on climate planning at a strategic level. Since 2018, a new C40 adviser has been stationed at the

Addis Ababa Environment Protection Authority to facilitate the development of a strategic CAP. The CAP follows a standardised framework established by C40 Cities (2018) and is aligned with similar processes in other African cities. The C40 adviser is frequently in contact with his counterparts in other African cities, and knowledge and experience from different cities is shared at workshops and through digital tools (August 2018, personal communication).

Addis Ababa's urban transformation is hence implicated in a broader geography of urban change through participation in networks, friendship city agreements and exchanges facilitated by funding agencies. Addis Ababa authorities emphasise the importance of this continuous learning and exchange across cities, what we referred to as *interconnected settings*, for achieving local goals. At the same time, this gives external actors the power to influence projects in significant ways. We now proceed to examine how the relations between these different settings are produced and maintained.

Mobile relations

Urban planning in Addis Ababa has built on international collaboration for a long time, and these relations are maintained by people that travel, communicate and exchange experiences. The importance of bringing people together to build personal relationships is emphasised repeatedly in the official C40 narrative. C40 Deputy Executive Director Kevin Austin noted that when city officials meet and create friendships to the extent that they 'send birthday cards', they are more likely to help each other:

> And the critical thing here is trusting relationships, that the little groups that we have of maybe 20 or 30 cities, they get to know each other. They go on workshops once a year where they meet in person. . . . [They get] to know people to the extent that when they get back home they send birthday cards . . . And as they become friends, they are much more willing to help, because they really want their friend to deliver what is needed for their city. (Kevin Austin, May 2018, seminar at European Commission)

Creating spaces where trusting relationships can be formed is regarded as essential for enabling mutual learning. A C40 official described the workshops in the C40 network as 'closed door safe places' where city representatives can step back, reflect and share not only success stories but also difficulties and failures. In these settings, trust is regarded as important for sharing proposals that are not ready to be shared in public (C40 network manager, June 2018, personal communication).

The importance of meeting face-to-face for collaboration and exchange is recognised by Addis Ababa officials. An assessment of C40's impact in Addis Ababa by the consultancy firm Ramboll (2016: 9) concluded that 'workshops clearly offer the most useful interaction method, permitting participants to understand and discuss solutions and foster good quality knowledge sharing', noting that this type of face-to-face interaction is more difficult to achieve in other forms of (virtual) communication. As an official involved in Addis Ababa's BRT project observed, travelling to visit particular cities in person to experience transformation initiatives on the ground can be significant in mobilising political support for an initiative:

> It doesn't simply come, you know, the support. Because they believe in it, they believe in the system. They have seen some systems working in other countries, and [were impressed by] how they did it. (Addis Ababa official, August 2018, personal communication)

However, maintaining relations between physical meetings remains an issue. A C40 official noted that '[t]he workshops are a great place to take a step back. But it is easy to get lost when you get back to your day-to-day job' (June 2018, personal communication; paraphrased from detailed notes). Similarly, the Ramboll (2016: 11) assessment noted that 'while C40 provided useful learning experiences, the capacity to implement the solutions in Addis and the necessary knowledge was sometimes lacking'. The C40 network uses webinars and one-to-one calls between cities to maintain relations (C40 official, June 2018, personal communication). While these encounters do not have the quality of face-to-face meetings, they can still be significant. For instance, after a group of C40 advisers met at an intensive training event, they maintained contact through virtual means. According to the Addis Ababa adviser:

> Now we can talk personally. We use Viber and WhatsApp and interact through those apps. Whenever I have questions, I can send for someone to brief me on those issues. It is a good opportunity to get knowledge from different cities. It helps me to think in a bigger way and makes my job here easier. (August 2018, personal communication; paraphrased from detailed interview notes)

However, the ability to connect with other places is affected by material conditions on the ground. For Addis Ababa officials, participation in webinars was often constrained by poor internet connection speeds, time differences or workload. They therefore often found themselves reading summaries of discussions rather than directly participating in webinars; the C40 city adviser became an important node through whom information and experience was relayed. An official working on public transport in Addis Ababa noted that:

> [The C40 adviser] pointed me to some webinars that I'm participating in. I don't participate directly due to connection issues and the time difference—if it is scheduled according to Latin American time it is not possible to participate from here. But I get the summaries of the discussions. (August 2018, personal communication; paraphrased from detailed interview notes)

Consequently, in important ways, the geography of Addis Ababa's transformation is produced by mobility. Officials may travel abroad to forge trusting relationships, or quickly exchange information in webinars or chat groups. The quality of these relationships is influenced by the different forms of mobility involved in sustaining them. We have referred to these as *mobile relations*. However, these relations are also grounded in particular local material settings that shape people's access to mobility, producing spatial unevenness. Next, we investigate how actors navigate these local contexts when mobilising transformative policies.

Contextualised agency

While officials in the Addis Ababa transport administration mobilise insights from other cities, they also build on local experience. The BRT project depends on funding and expertise from elsewhere, and officials involved in the project also report lack of previous experience in building BRT systems as one of their main challenges (December 2018 and September 2019, personal communication). At the same time, they highlight that bus-based public transit is not at all new to Addis Ababa; in fact, the municipality has operated the Anbessa public buses since 1945. In 2015, a new municipal company, Sheger city buses, was founded to provide an express bus service and to eventually operate the BRT.

An official involved in the project notes that the ability to build on local experience was an important factor in the decision to go for a BRT system:

> BRT is basically bus-based operation, which resembles the operation of LRT [light rail transit]... We are quite familiar with bus-based transportation. That gives us an advantage in terms of operation and maintenance. We have more than 70 years of experience, even as an... operator. So that contributed a lot to going for BRT instead of other modes. (August 2018, personal communication)

The actual implementation of a BRT in Addis Ababa is consequently a stubbornly contextual affair. Officials observe that Addis Ababa's history of spontaneous (and not planned) growth has led to a poor and often narrow road network which is easily congested (Traffic Management Agency, September 2019, personal communication). The design and construction of a BRT lane hence inevitably runs into right of way issues, and certain road segments will need to be widened which leads to resettlement issues, delays and resistance. As one official noted: 'In Cairo for instance, they have a lot of road space..., in our case it is a challenge just to find road space' (Transport Bureau, September 2019, personal communication, paraphrased from detailed notes). As the BRT system moves towards operation, officials also anticipate that poor availability of hard currency may lead to delays in procuring spare parts and high down time of the rolling stock (Sheger buses, September 2019, personal communication).

The local institutional and organisational context is also emphasised. An official at the French development agency AFD noted that while the management of BRTs is similar across cities, the actual implementation of the project is a unique process (December 2018, personal communication). The project management unit at the TPMO coordinates with consultants, funding agencies and a range of municipal authorities involved in disparate parts of the project. Experts from different parts of the municipality also provide regular feedback on the BRT designs provided by consultants. Here, international best practice manuals are deployed to make the B2 BRT 'corridor a clear example for other corridors to come' by 'incorporat[ing] contemporary thinking in terms of complete street design [and] designing streets that are safe for pedestrians' (Addis Ababa official, December 2018, personal communication).

Experience from elsewhere is again mobilised: this time through support from ITDP, the international NGO specialised in BRT systems that has consulted with numerous cities in Africa. Its input was regarded as of 'really great help in providing these high-level concepts' to the project team (Addis Ababa official, December 2018, personal communication). At the same time, however, institutional fragmentation, the limited knowledge of BRT systems within the Addis Ababa transport administration and the consequent reliance on external partners to review design proposals are underscored as obstacles which lead to project delays (Addis Ababa official, September 2019, personal communication).

Officials also have to keep up with rapid urban development. The designs and plans for the Addis Ababa BRT project have been revised several times to accommodate rising public transport demand, which in turn has led to delays in the project. An Addis Ababa Transport Bureau official noted that it is important that the elements of the BRT system, such as stations and pedestrian crossings, 'are precisely the right size', which is difficult to achieve when the city is changing rapidly (September 2019, personal communication, paraphrased from detailed notes). Another official noted that it is 'challenging for the public transport sector to provide for this continually growing public transport demand' (December 2018, personal communication). The BRT is therefore understood to be a medium-term solution

that can (at least partially) meet current transport demand until more high-density transport options are economically available.

The 'local' scale in the development of mass transit in Addis Ababa is closely related to national priorities. Ethiopia's national Growth and Transformation Plan has the goal of making Ethiopia a middle-income, climate-neutral and resilient economy by 2025. A key component of this plan is a modernisation strategy based on investments in large-scale infrastructure such as hydropower dams and railroads. By the time of the 2010 BRT feasibility study (Egis Rail and LTPA, 2010), the newly founded Ethiopian Railways Corporation had proposed the creation of an LRT system. Funded, constructed and initially operated by various Chinese enterprises, the system, consisting of two lines (34 km in total), was hailed as sub-Saharan Africa's first LRT system when it opened in 2015.

While Addis Ababa's public transport system is managed by the Addis Ababa Transport Authority, the LRT is administrated directly by the national Ethiopian Railways Corporation. Hence, actors and priorities on several scales directly shape Addis Ababa's urban development; co-ordinating these actors can sometimes be a challenge. However, insights from the LRT project are continuously mobilised into the planning and design of the BRT corridors. A common critique of the LRT project is that it was poorly integrated into the city (Addis Ababa official, August 2018, personal communication). In the design of the BRT corridors, care is taken to avoid the same mistakes: for instance, by ensuring a safe crossing environment for pedestrians.

Thus, the implementation of new mass transit systems is situated in particular material and organisational settings that are continuously changing. The agencies that shape this system are always contextual, but not only 'local'. A multitude of actors working at different scales come together as Addis Ababa's BRT system is assembled by aligning extensive local experience with elements mobilised from elsewhere.

Discussion and conclusions

This paper contributes to the ongoing efforts to conceptualise and analyse the *work* involved in engendering deliberate sustainability transformations (cf. O'Brien, 2012). Our distinct contribution in this debate has been to develop a perspective on *transformation as relational mobilisation*. It is motivated by our efforts to account for the interconnected and cross-scalar character of processes and agencies that we encounter through our own research on urban change. It draws on the literature on mobility and relational space to examine how transformations are negotiated both within and across multiple, geographically dispersed settings that are interconnected through mobile practices. Bringing this into the understanding of transformation highlights the interconnectedness of events in various places and across different scales, and the vibrant contextuality of sites of innovation that actively shape transformation outcomes. As such, it may serve to nuance predominant perspectives on transition and transformation – typically building on multi-level transitions theory and resilience approaches – which, we have argued, tend to understand systems or niches as relatively bounded or isolated.

Transformation as relational *mobilisation* alludes to the work involved in mobilising: in bringing together and aligning disparate resources and actors. It also takes seriously the idea that mobility is not only about movement, but concerns practices and meanings as well (Cresswell, 2010). Accordingly, we need to account for the qualitative dimensions of being mobile across space, the ways in which people and ideas are changed by the very act of travel, so that (as T. S. Eliot observes), 'You are not the same people who left that station/ Or who will arrive at any terminus'.

These ideas have been highlighted to some extent by the recent interest in policy mobility, which underscores how policies mutate as they are picked up and mobilised from one place to another. But they are not properly brought to bear on the sustainability transitions and transformations literature. Framing transformation as relational mobilisation draws on these insights, but puts them to use to examine the political potential and spatial dynamics of deliberate sustainability transformations: how mobile ideas are translated, negotiated and mobilised to achieve local objectives. This means that while the policy mobilities literature has had a predominant interest in unpacking and critiquing the role that mobile policies play in various forms of neoliberalisation, we are instead emphasising the constructive and strategic agency that go into mobilising sustainability transformations.

Our empirical analysis of the ongoing urban sustainability transformation in Addis Ababa has illustrated the need to think relationally about transformation: that we are hardly dealing with bounded, coherent or hierarchical entities. Using its BRT planning process as a point of entry, we have shown how it has been negotiated at the intersection of international networks with on-site embeddedness, local agency and the Ethiopian political setting. We underlined three relational spatial processes to describe what is occurring.

First, we highlighted the dimension of *interconnected settings*. Concurrent iteration and learning between multiple dispersed settings are central to Addis Ababa's ongoing climate and mass transit initiatives. This suggests that rather than a simple adoption of ideas from elsewhere, change is mobilised between multiple interconnected nodes of concomitant innovation. Our findings reinforce the observation made elsewhere (Wood, 2015a) that while BRT is celebrated as an example of South–South policy transfer, the actual mobilisation of a BRT policy bundle is a more spatially complex affair that involves a plethora of actors, many of whom are based in the Global North. Second, we pointed to the importance of accounting for *mobile relations* – the variety of connections between places and actors that produce an uneven relational space. By emphasising how these relations are constituted by mobility, we uncover material conditions that may enable or constrain participation in relational endeavours. The relational geography of Addis Ababa's urban transformation is not only about different 'transfer agents' and ideas arriving in new settings, but also about the human relationships that hold networks together. Finally, we showed how *contextualised agency* plays a distinct role in urban transformation. Addis Ababa's climate and mass transit projects are shaped by and assembled from distinctly local histories of public transport as well as national development agendas and ideas from elsewhere. Ultimately, then, transformations are stubbornly local affairs. Therefore, as policy mobilities scholars have been quick to observe, localities are not simply surfaces on which mobile policy processes play out – they are also arenas for proactive and strategic agency.

Thus, thinking of transformation as relational mobilisation is essentially about making use of a rich intellectual tradition to make sense of and achieve sustainable transformation. With all the talk of local action, living labs, incubators and niches – both in policy-making and in academic arenas – relational thinking can show how these are interconnected and mutually constituted. For sustainability transformations, the relationality of transformation processes also adds an element of *hope*. It opens new ways of seeing seemingly insignificant actions and actors elsewhere and recognising them as potential drivers of change. Moreover, it shows that transformative change does not necessarily depend on overcoming bounded systemic structures – they can also work through the mobilisation of partial and incomplete changes across 'multiple elsewheres'.

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ORCID iD

Jakob Grandin https://orcid.org/0000-0003-2290-7837

Note

1. The transport authorities in Addis Ababa were reorganised in mid-2019. The TPMO was dissolved into the Transport Bureau and ceased to be a separate office. Furthermore, the Addis Ababa City Roads Authority and the municipal bus companies were placed directly under the Mayor's office.

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Jakob Grandin is a PhD Fellow at the Department of Geography and the Centre for Climate and Energy Transformation at the University of Bergen. His research focuses on how cities work together to pursue ambitious, deep and rapid climate and sustainability projects with empirical cases in Ethiopia and Norway. As part of this, his research critically examines the role of networks and local government in the changing geographies of sustainability governance. He is currently examining how time is governed in urban climate initiatives, emphasising the role of temporality, anticipation and routinisation.

Håvard Haarstad is Professor at the Department of Geography and Director at the Centre for Climate and Energy Transformation, University of Bergen. He has researched and published widely on sustainability and social change, particularly in relation to urban transformations. He is interested in how mobile ideas and policies interact with local contexts to shape the way cities are becoming sustainable. In a more general sense, his work is concerned with bringing insights from human geography into an interdisciplinary debate on sustainable transformation.

Paper 3

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Paper 5

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Original Research Paper

What sticks? Ephemerality, permanence and local transition pathways

Jakob Grandin*, Siddharth Sareen

Department of Geography and Centre for Climate and Energy Transformation, University of Bergen, Postboks 7802, N-5020 Bergen, Norway

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ABSTRACT

Climate change is increasingly governed through local configurations that are characterised by voluntary action, weak institutions and uncoordinated efforts. The impermanent and iterative nature of such initiatives makes it difficult to determine their enduring and potentially transformative impact. This review systematises how the sustainability transitions field has approached temporary initiatives. It finds broad agreement on the difficulty of sustaining local transitions, but little analytical engagement with how temporary initiatives shape transition pathways over time. The review therefore proposes a typology of temporal dimensions to help assess the dynamics between ephemerality and permanence in local transitions. By mapping the recent empirical sustainability transitions literature along these dimensions, ephemerality is found to be ubiquitous in local initiatives–there is a lot happening that does not endure but serves other functions. Actors deploy a range of local strategies directed at either formalising initiatives or retaining relevance by reinventing themselves, thus routinising sustainability transitions.

1. Introduction

Traditionally, climate change has been understood as a global problem requiring global solutions and long-term thinking. Recently, the climate challenge has been reframed as entailing action within more immediate time frames, foregrounding the temporal dimensions of rapid and deep societal transitions (Anderson and Bows, 2011; Delina and Sovacool, 2018; Rockström et al., 2017; Sovacool and Geels, 2016). Increasing attention is also being directed at the role of climate governance arrangements at local and regional levels (Bulkeley, 2016; Castán Broto and Bulkeley, 2013a; Evans and Karvonen, 2014; Feola and Nunes, 2014; Ornetzeder and Rohracher, 2013). These arrangements are often characterised by voluntary action, weak institutions, non-binding commitments and uncoordinated efforts (Biermann et al., 2017). Scholarship emphasises the role of loosely coordinated groups of public, private and civic actors in mobilising low-carbon transitions through collaboration, experimentation (e.g., urban living labs) and grassroots innovation at the sub-city scale (Grandin et al., 2018; Seyfang and Smith, 2007; Voytenko et al., 2016).

Such a framing of climate governance opens up the possibility of local agency and contextualised solutions. But the highly localised, and often explicitly impermanent and iterative, nature of such initiatives complicates assessment of their impact (is it cumulative and lasting?), and of their potential to instigate large-scale transitions (Castán Broto and Bulkeley, 2013b; Feola and Nunes, 2014; Williams, 2016). Vigorous academic debate on the geographies of urban sustainability transformation (Bridge et al., 2013; Hansen and Coenen, 2015; Truffer et al., 2015) highlights how local transition initiatives are embedded in and constitutive of other scales (Bulkeley, 2005), and how they propagate spatially through actor networks (Affolderbach and Schulz, 2016; Haarstad,

* Corresponding author.
E-mail addresses: jakob.grandin@uib.no (J. Grandin), Siddharth.Sareen@uib.no (S. Sareen).

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2016). Such assessment uncovers a complex spatiality of transformation through which ideas and initiatives change as they are mobilised from one setting and scale to others (Bouzarovski and Haarstad, 2018; Bridge, 2018). The local and experimental sustainability governance discourse can be productively combined with discussions on the role of temporary interventions in the urban fabric. This latter discourse understands 'ephemeral urbanism' as both a precarious response to neoliberal trends and a transformative instrument that creates "spaces of questioning, experimenting and innovating" (Madanipour, 2017, p. 5; Bishop and Williams, 2012; Mehrotra et al., 2017). We argue that foregrounding the temporal aspect of local transitions is essential towards unpacking their durability: understanding how local transitions unfold over time can help identify what sticks. We use the term 'what sticks' to refer to change processes that are durable or 'sticky' so that actors are able to institutionalise them. While stickiness has been used in relation to the staticity of institutions in fields such as economic geography, we mobilise the metaphor to emphasise the temporal characteristics of any given institutionalisation process.

The transitions literature is already deeply concerned with temporality, tracing as it does how transition initiatives play out over time in a process towards increasing levels of structuration and institutionalisation (Geels, 2011; Raven et al., 2012). In recent years, the explication of the temporal dynamics of transitions has been advanced through the examination of longer historical transition pathways (Arapostathis and Pearson, 2019; Schot and Kanger, 2018) as well as through attempts to uncover instabilities and opportunities for rapid transitions of incumbent systems (Geels, 2018; Haarstad and Wanvik, 2016; Sovacool and Geels, 2016). Nonetheless, the time-bound, even ephemeral, character of local transition initiatives has seldom been examined closely. Yet, local transition initiatives are often explicitly experimental, impermanent and iterative (Castán Broto and Bulkeley, 2013b; Feola and Nunes, 2014), and can be understood as "a snapshot of how low carbon cities could evolve in the coming decades" to "test a range of new technical, regulatory and institutional configurations as well as social practices which are integral to delivering this goal" (Williams, 2016, p. 80). Our concern is thus distinct from previous efforts: we examine the role of *temporary* interventions in local transitions and their effects over time. This highlights the need to look at the dynamics of (im)permanence, or in other words, at what makes certain initiatives stick and how are they made durable over time. To assess the cumulative, lasting and possibly transformative impact of local transition initiatives, we therefore need to consider how these 'snapshots of transition' are positioned within longer sequences of events, and whether and how such sequences are structured to create durability. As Lockwood (2015, p. 86) notes, "successful transformations not only require instigation, but also have to be politically sustained over long periods".

The dominance of shallow temporal frames— which Pierson (2004, p. 2) refers to as the "snapshot" view of political life— has been noted in the social sciences more broadly. There is, however, no dearth of promising approaches. Recent decades have witnessed a number of creative engagements that investigate the temporal aspects of social change (Adam, 1995, 1990; May and Thrift, 2001; Pierson, 2004); how time is socially organised within organisations (Whipp et al., 2002); the relationship between permanence and fluidity (Madanipour, 2017; Moss, 2016); and the processual nature of social change (Abbott, 2001; Bidart et al., 2012). These contributions highlight how permanence is itself dynamic and continuously performed, and shed light on the work that structures the temporal patterns of the disparate events that engender obduracy and permanence. Furthermore, they assess how particular events may influence ensuing sequences, and hence lead to substantive change (Garud et al., 2010; Madanipour, 2017).

This paper addresses the temporal dynamics of local transition initiatives. Based on a review of 150 papers in the empirical literature on local sustainability transitions, we systematise how the transitions field has approached the ephemeral aspects of temporality. While there is broad agreement on the difficulty of sustaining local transition initiatives, we find little analytical engagement with the relationship between temporary initiatives and their effects over time. We therefore introduce analytical categories that pertain to the dynamics between ephemerality and permanence. These can support further efforts to assess the substantive, enduring and transformative impact of local and temporary sustainability initiatives—in other words, to understand what makes local transitions stick.

The paper proceeds as follows. After an assessment of how temporality has been approached conceptually in the transitions literature (Section 2), we discuss how theories of time and temporality can enrich analysis of how temporary and ephemeral aspects of transition initiatives catalyse, revamp and routinise transition pathways (Section 3). This leads into a review of the recent empirical literature on local sustainability transitions. It provides a temporally-oriented assessment of the strategies that local actors pursue to stabilise temporary and experimental interventions, by driving institutional change (structural strategies), adaptively instituting social practices and new accountability mechanisms (relational strategies), and materialising them into the built environment (material strategies) (Section 4). The conclusion highlights the temporal dynamics of how actors, processes and resources across scales are brought into alignment to mobilise sticky local transition pathways (Section 5).

2. The ephemerality and permanence of local transitions

The proliferation of local, experimental and small-scale urban sustainability initiatives can be productively understood within the context of a more general trend of "ephemeral urbanism" (Bishop and Williams, 2012; Madanipour, 2017; Mehrotra et al., 2017). The temporary use of urban space and short-term interventions—ranging from street art, fairs and pop-up shops to squatting, temporary housing solutions and the Occupy movement—is playing an increasingly important role in how cities are formed and managed. These developments relate to neoliberal trends – including entrepreneurial governance and the privatisation of urban space – that involve rapidly changing urban geographies within and between cities. Rapid urban transformation creates economic and social voids that need to be filled. These give rise to increasing calls for flexibility in everything from employment arrangements to how urban space is used and structured. This is mirrored in the development of more experimental and flexible urban governance arrangements (Castán Broto and Bulkeley, 2013a). Hence, ephemeral urbanism has been associated with engendering precarious social conditions, economic opportunism and shallow solutions to structural problems. Such trends relate to what is more broadly seen as a general

acceleration of life in late capitalism (Wajcman, 2015) and to increasing interest in fast policy solutions to contemporary challenges (Peck and Theodore, 2015). Nevertheless, their transformative potential has not gone unnoticed. Madanipour (2017) observes that the temporary use of urban space provides an opportunity to critique and disrupt the structures of the status quo, and that it fashions arenas to innovate and experiment with alternative ideas and practices. Ephemeral urbanism may thus also open up for a broader range of actors and stakeholders, e.g., civil society organisations, to participate in shaping urban space.

Many of the opportunities and constraints of ephemeral urbanism are clearly recognisable in the literature on local urban sustainability initiatives. These disparate initiatives and projects involve a multitude of different actors—such as grassroots community groups, municipal planners and officials, enterprises and academics—who are often engaged in various partnerships with each other. These initiatives are also embedded in multilevel governance arrangements (Castán Broto et al., 2015), often closely connected to policies, institutions and resources at other scales (Sotarauta and Kautonen, 2007), and frequently networked with like-minded initiatives in other localities (Affolderbach and Schulz, 2016; Feola and Nunes, 2014; Haarstad, 2016). The types of activities are equally broad. They range from grassroots innovation in the energy sector to experimentation with alternative currencies, and from urban living laboratories to formal urban planning and municipal action stirred by national policies such as Germany's Energiewende. Here, social innovation, including innovation in governance structures (Warbroek and Hoppe, 2017) and the transformation of social practices (Freytag et al., 2014), is often just as important as material interventions and new technologies.

Irrespective of whether local transitions are initiated by grassroots groups or formal municipal actors, they often have in common that they are relatively financially constrained, have modest human resources (Kasa et al., 2018), and feature restricted and uncertain autonomy and mandates (Geels and Schot, 2007; Hawkey et al., 2013). Hence, scholarship highlights the challenges associated with maintaining continuity, and in sustaining, over time, activities that usually emerge as ephemeral, disruptive or otherwise ad hoc. Commonly cited obstacles include the project-based nature of many activities (Munck af Rosenschöld and Wolf, 2016; Sjöblom and Godenhjelm, 2009), the lack of continuity in embodied memory and the fragmented, unconsolidated nature of knowledge management (Grabher, 2004), financial barriers and the 'projectification of funding' (Borgström et al., 2016; Ehnert et al., 2018), changing objectives and personnel attrition due to, e.g., electoral cycles (Amundsen et al., 2018), and the lack of requisite locally held expertise (Sareen et al., 2018).

Yet, extant theoretical approaches have rarely been employed to analyse actors' efforts to sustain local initiatives and make them stick. Scholarship on local sustainability initiatives leans heavily on the multilevel perspective (Geels, 2002), wherein sustainability transitions are regarded as triggered in relatively protected niches that are nested in and influence a hierarchy of socio-technical regimes (comprising organisational standards, routines and habits) and larger structuring landscapes (comprising values, norms and structures). With its ensconcing concepts of regimes and landscapes, the multi-level perspective contributes a strong temporal dimension to the understanding of sustainability transitions. Drawing on Giddens' (1984) structuration theory, it posits regimes as endogenous structures that are continuously enacted (Geels, 2011), while landscapes represent the exogenous environment (Raven et al., 2012). Both are slow to change and hence become carriers of continuity. In effect, while the multilevel perspective offers what is essentially a processual approach to transitions, the temporal categories employed tend to emphasise inertia and the obduracy of incumbent regimes (see Haarstad and Wanvik, 2016); these create obstacles to the change efforts of niche actors (e.g., Nagorny-Koring and Nochta, 2018). There is increasing scholarly interest in unmaking this structural bind in order to open up pathways for change (Bridge, 2018; Geels, 2018; Shove, 2012).

Within this overarching framework, much local transitions research resonates with a common spatial scalar ontology. This ontology features a correlation between fast and ephemeral processes at spatial scales low in the hierarchy, and slower processes at higher spatial scales (cf. Geels, 2002; Gibson et al., 2000; Holling, 2001; Raven et al., 2012). In such a rendering, continuity is conceptually located not in the local, but within larger (e.g., regional and national) structures. For instance, in the multilevel perspective, processes in niches typically have a duration of up to ten years, while regimes last for decades, and landscapes represent the longue durée (Raven et al., 2012). Niches, regimes and landscapes are understood to exist at all spatial scales, but it is typically changes at the national or regional – rather than local – spatial scale that signify structural change (Hansen and Coenen, 2015; Sareen and Haarstad, 2018; Haarstad and Wanvik, 2016). The temporal dimension of often temporary local sustainability initiatives—with their ephemerality, urgency, uncertainties, emergence, contingencies, tensions and contestation—is predominantly treated as context, as background information: a backdrop to what is studied rather than an inherent, dynamic and constitutive part. There is little conceptual emphasis on the temporal dimensions of how transition efforts may be sustained *locally* (but see Barnes et al., 2018; Fuenfschilling et al., 2018; Fuenfschilling and Truffer, 2014; Garud and Gehman, 2012).

Enabling such a conceptual switch, argue Moss et al. (2015, p. 1551), requires a move away from regarding obduracy and institutional structure as a passive receptacle in which local sustainability transitions unfold, and towards an appreciation of institutions as "a constitutive component of socio-technical systems and their adaptation". Barnes et al. (2018) similarly observe that the literature on institutions in sustainability transitions privileges a national focus while according less attention to local institutionalisation processes. Fuenfschilling and Truffer (2014) likewise suggest that structural levels can be understood as degrees of institutionalisation to identify differentiated effects and agency across actors under transition. In order to apprehend the often messy "practice of navigating local governance to reconfigure urban selection environments" (Barnes et al., 2018, p. 70), the authors point out the need for an 'insider' ontology, one that can highlight the embedded agency of local actors in shaping and creating institutional structures. This is not to gainsay structural frameworks, which serve an important function that has been particularly influential in generating accounts of sectoral political economy, explicating power dynamics and tracing multi-scalar connections (Svensson and Nikoleris, 2018). Indeed, Fuenfschilling and Truffer (2014) posit that attention to institutional logics can help characterise and juxtapose structural elements in terms of their systemic relations to each other. We suggest that extending this relational line of approach is apt for a focus on the temporality of local sustainability initiatives.

Such treatment can alter the way scholars interpret the strategies that local actors employ over time to sustain their efforts under transition. Garud and Gehman (2012) point out that relational perspectives emphasise how emergent networks are reconfigured, while durational perspectives highlight intertemporal differences. Yet, a recent stock-taking piece on the state-of-the-art of sustainability transitions research in this journal (Köhler et al., 2019, p. 16) holds that "our understanding of how such stability is produced and of the junctures and openings within the urban fabric that enable transitions to occur is relatively limited." This concludes the eighth of nine thematic subsections on transitions research, namely on transition geographies. This subsection comes closest to attending to local sustainability initiatives with its focus on spaces, scales and places, yet without explicitly foregrounding their temporality. It draws heavily on an extensive review of transition geographies research by Hansen and Coenen (2015), wherein the significance of time finds mention but is subdued as a factor, whereas key place-specific factors and the importance of relationality are highlighted.

The next section addresses the above literature gap. It draws from conceptualisation of temporality within human geography and processual analysis in order to introduce a temporal typology that can capture the local relationship between largely temporary sustainability interventions and more substantive change in the longer term. It categorises the temporal dimensions of particular practices through which actors at the local scale: disrupt the status quo to instigate transformative change (catalyse); innovate towards and adapt to new opportunities (revamp); and create self-reinforcing pathways as local transitions proceed apace (routinise).

3. Shaping the temporality of local transitions

To properly examine the dynamics of transitions, we need to attend to how local (niche) actors catalyse and negotiate transition pathways. As Köhler et al. (2019, p. 4) observe with regard to the active agency involved in the structuration of sustainability transitions, "interactions between niches and regimes occur on multiple dimensions (e.g. markets, regulations, cultural meanings, technologies) and are enacted by interpretive actors that fight, negotiate, search, learn, and build coalitions as they navigate transitions". In the context of local transitions, the activities of these actors are predominantly of a short-term, project-based nature. In other words, niche actors have to deploy a range of strategies to sustain both themselves and their transitions for quite some time before their innovations are (possibly) structured into regimes. These strategies need to attend explicitly to the ephemeral character of local transition initiatives.

To examine these strategies, we suggest a temporal typology that is informed by recent work on the geographies of sustainability transitions, which highlights their relational character (Bridge, 2018; Haarstad and Wanvik, 2016; Hansen and Coenen, 2015). Much of this work within human geography is underpinned by process ontologies that emphasise plurality, motion and the ephemeral (or at least dynamic) nature of human arrangements (Haarstad and Wanvik, 2016; Jacobs, 2006; Massey, 2005). From this perspective, structures are performed through the recursive repetition of particular events (Van Assche et al., 2014), as opposed to being 'outside' and contextual factors. The spatial and material implications are made clear in Jacobs' (2006) study of the global proliferation of the modernist residential high block. Jacobs emphasises that while these buildings may look alike at the surface and hence generate a 'global effect' of modernity, there is continuous translation and iteration at work to adapt them to particular social, cultural and political conditions. Rather than global logics or processes, she proposes persistent repetition, iteration and translation in specific local contexts, invariably involving some degree of variation, as the key driver of urban transformation.

This has implications for our manner of relating to the temporality of transition. While accounts of transition have traditionally emphasised stability, inertia and permanence (Hodson and Marvin, 2010; Rutherford and Coutard, 2014), approaches have begun to apprehend the role of ruptures, unpredictability and instability in society's relationship with carbon (Haarstad and Wanvik, 2016). Even in cases of surface continuity, there may be "considerable movement beneath the apparent stability" (Moss, 2016, p. 268). In this reading, then, continuity is the performed effect of a structured sequence of events, where an event's impact depends on both its specific characteristics as well as its position in a longer sequence of events (Madanipour, 2017; Pierson, 2004; Whipp et al., 2002). Wit Hedaa and Törnroos (2002, p. 36), "[s]eemingly similar events are differentiated by their position in time and space and through their loadedness". In other words, timing matters.

This moves past static construal to a notion of durability as reliant on continuous repetition, translation and reinvention. Likewise, Jacobs' (2006) conception of a multitude of disparate local activities producing a 'global effect' is useful for conceptualising temporal durability as an 'effect of permanence'. The idea of durability as performative repetition with variation invokes Deleuze and Guattari's refrain: "Each time the refrain is picked up, it is articulated anew, yet it still remains recognisably the same repetitive series" (Brown and Capdevila, 1999, p. 37). The 'temporal logic' of local transitions, then, is actively performed as situated actors translate, negotiate, maintain and routinise transition initiatives by aligning a sequence of events (see Hoffman and Loeber, 2016).

To examine the potential of local transition initiatives to contribute to substantive transformation, we hence need to understand how distinct interventions are situated as moments in a longer sequence of events. Here we find it productive to channel key insights from the long-running tradition of temporal enquiry within processual analysis (e.g. Abbott, 2001). Specifically, Bidart et al. (2012) derive an analytical framework that offers four concepts to theorise temporal processes: context, driving forces, turning points and sequences. We customise this as a basis to foreground three dimensions of a temporal spectrum along which temporary interventions constitute part of a longer sequence of events.

For Bidart et al. (2012, p. 746), to apply context as a lens is "to analyse phenomena that are evolving in a context defined *a priori* as 'the whole of elements present in a given situation'." Driving forces refer to "a principle generating the movement of the ingredients and of their configurations over time" (Bidart et al., 2012, p. 748). Turning points are "intense rearrangement of the ingredients associated with an event, triggering a crisis and the emergence of an alternative and leading the process to change orientation" (Bidart et al., 2012, p. 749). Sequences concern "temporal segments of a process that link together a specific set of ingredients" (Bidart et al., 2012, p. 747).

We translate these concepts into ones that are customised with a view to enable operationalisation for research on the temporality of local sustainability initiatives. To us, 'context' seems unhelpful, as it is an aspect of the system description as a whole. It is as such too ubiquitous as a concept at par with the other three, which are features of processes. Hence, we propose an operationalisation of driving forces, turning points and sequences into three temporal dimensions of local transitions.

'Driving forces' in local sustainability initiatives are distinguishable as a departure from business-as-usual that crop up within the status quo and reassemble it in a different configuration over time. While consistent with the above definition, our operationalisation places emphasis on the ability of such occurrences to *catalyse* transitions. Events that are temporary, ad hoc, one-off and pop-up can instigate new urban transition pathways by disrupting the status quo and proposing alternative visions of desirable low-carbon futures. Temporary urban interventions can alter future event sequences by questioning the status quo of event sequences and highlighting alternatives, thereby engendering a state of instability to disrupt routines and birth new perspectives (Madanipour, 2017). Local actions can "undermine associations and beliefs, undermine compliance within institutions or delegitimize institutions by, for instance, questioning moral foundations" (Barnes et al., 2018, p. 70). Catalysis can span the overlapping domains of political jurisdictions, markets and practices (Bernstein and Hoffmann, 2018).

Next, 'turning points' in local sustainability initiatives refer to distinct inflections that engender new possibilities and processes. Here, we customise this as the ability to *revamp* transitions. Time-bound interventions can create arenas for innovation and experimentation with alternative, revamped practices. Path dependency (Arthur, 1989; Lockwood, 2015; North, 1991; Pierson, 2004) and path creation (Garud et al., 2010) scholars underscore how relatively small adjustments can leverage self-reinforcing mechanisms and thereby substantially impact future change trajectories. Path dependency work highlights emergent situational lock-in that constrains the scope of future action (Unruh, 2000), while path creation scholarship emphasises the structuring of societal options through the cultivation of self-reinforcing mechanisms and the strategic mobilisation of versions of the past that favour specific visions of the future (Garud et al., 2010). Niche actors can work with some degree of independence from the structural constraints of a regime by exerting innovative power where new resources can be developed (Avelino, 2017). Through such revamping, local transition initiatives can be integrated into change pathways for further institutionalisation and materialisation (cf. Lockwood, 2015).

Last, 'sequences' in local sustainability initiatives concern processes that amalgamate in ways that accomplish a semblance of continuity. Sequentiality does not equate transitions with linear processes, but rather identifies specific trends that display such characteristics. We operationalise this as the ability to *routinise* transitions. The chains of repetition that constitute durability can easily break due to a "precarious fragility of alternatives" (Hodson and Marvin, 2016, p. 1214). To stick, local transition initiatives wrestle with how to maintain durability through routinisation. Routinisation is hence related to Avelino' (2017) idea of transformative power which is the "capacity of actors to develop new structures and institutions" in "niche-regimes". Such interventions can nurture new social practices with potential to endure (Shove et al., 2012). They can be sustained through the 'institutional work' of creating new institutions or realigning the goals and structures of existing ones (Barnes et al., 2018; Fuenfschilling and Truffer, 2016; Thelen, 2009). Such institutional change is not merely structural, but spans relational changes in discourses and configurations of power and ownership (Moss et al., 2015). Planning and monitoring procedures levied to in-build accountability can shore up legitimacy (Kraft and Wolf, 2018). Local interventions can be further reinforced through spatial and socio-material commitments, e.g. decentralised renewable energy capacity installation.

While these three dimensions articulate the temporal spectrum, locating specific iterations of local transitions within any of them requires disaggregating these iterations into one of several strategies that capture the type of transition that these local interventions constitute. Following Sareen and Haarstad (2018), transitions comprise structural, relational and material changes; hence we parse the temporal strategies of local sustainability initiatives in terms of structural (pertaining to institutions and authority), relational (pertaining to adaptive social practices and forms of legitimation such as metrics and indicators), and material (pertaining to the built environment and the agency of infrastructure) types.

To recap, we have posited durability as the effect of recursive repetition with variation, and highlighted three dimensions in which temporary events shape subsequent sequences of events: they catalyse, revamp and routinise. We have categorised local transitions into three types of strategies: structural, relational and material. In the next section, we draw on extant scholarship to tabulate a matrix of local transition strategies across our temporal dimensions. On this basis, we discuss the temporal dimensions of the strategies deployed by actors in local urban transitions to shape durable trajectories of change.

4. Local strategies to make transitions stick

To map the temporal dimensions of the various strategies actors deploy in local transitions, we conducted an illustrative literature review of the empirical literature on local sustainability transitions. Relevant articles were identified through three queries in the Web of Science database: (a) "municipal* sustainab* OR climate", (b) "grassroots innovation sustainab*", and (c) "experiment climate OR sustainab*". We supplemented this selection based on familiarity with thematic scholarship and by following up key citations. In total, the review included 150 articles. These were coded within the qualitative data analysis application NVivo, employing a scheme that combined the temporal dimensions (catalyse, revamp and routinise) and strategies (structural, relational and material) discussed in Section 3.[1] The strategies were summarised in a table and then grouped and consolidated under descriptive headings through iterative rounds of analysis, first independently by each author, and subsequently in consultation.

Our review of local sustainability transitions scholarship shows that, in spite of the oft-noted difficulty of sustaining local transition initiatives (Geels and Deuten, 2006; Hargreaves et al., 2013; Seyfang and Smith, 2007), a temporal lens that attends to their

[1] A fourth category, reflexive strategies, emerged while coding, but was subsequently consolidated with relational strategies.

Table 1
Strategies towards sticky local low-carbon transitions across temporal dimensions.

Temporal dimensions/ Strategies	Catalyse Open up a space for new ideas and modes of local action.	Revamp Innovation to reconfigure, reinforce or reorient transition pathways.	Routinise Secure longevity of activities and overcome the fragmented and fleeting nature of initiatives.
Structural	Reframe governance structures to make them more inclusive and enable institutional entrepreneurship (Aylett, 2013; Wolfram, 2018). Reconfigure existing institutions and shift resource allocation, policy-making protocols and organisational culture (Burch, 2010; Bernstein and Hoffmann, 2018). Create temporary work constellations, e.g., labs, and enable experimental action (Ramos-Mejía and Balanzo, 2018; Schmidt et al., 2014). Catalyse local action through other scales (Bulkeley et al., 2014; Moss et al., 2015).	Coordinate cross-sectorally for alternative solutions, e.g., in workshops that bring together actors from different departments to sketch cross-cutting solutions (Hrelja et al., 2015). Establish new circuits of exchange to foster innovation, e.g., through private-public partnerships (Bulkeley et al., 2014; Hatzl et al., 2016). Shift organisational forms: propagate associations and citizen cooperatives that reflect the aims and values of local initiatives (Hatzl et al., 2016).	Formalise organisations for civil society initiatives or associate with existing legal entities and existing communities of practice (Feola and Nunes, 2014; Ornetzeder and Rohracher, 2013; White and Stirling, 2013). Align transitions initiatives with municipal or national agendas (Kasa et al., 2012). Strategise for long-term funding and clarify legal structures (White and Stirling, 2013; Ehnert et al., 2018; Martin et al., 2015). Commercialise community initiatives (Bailey et al., 2010; Hargreaves et al., 2013).
Relational	Induce innovation seedbeds in everyday life (Korjonen-Kuusipuro et al., 2017). Connect diverse actors, cultivate openness and capitalise on epistemological and ontological variation (Longhurst, 2015; White and Stirling, 2013). Disrupt prevailing norms (Bernstein and Hoffmann, 2018; Boyer, 2018). Develop common visions and shared objectives (Amundsen et al., 2018; Bradbury and Middlemiss, 2015; McCormick et al., 2013; Seyfang and Haxeltine, 2012; Wolfram, 2017). Learn from elsewhere (Johannessen and Hahn, 2013).	Drive innovation through everyday practices (Korjonen-Kuusipuro et al., 2017). Reframe activities and explore radical ideas (Bailey et al., 2010; Korjonen-Kuusipuro et al., 2017). Enable social learning (Korjonen-Kuusipuro et al., 2017; Shey and Belis, 2013). Identify socially just alternatives (Smith et al., 2014; Westskog et al., 2017). Translate experiences across settings (Hildén et al., 2017) and identifying alternative solutions through reading into unsustainable initiatives (Ramos-Mejía and Balanzo, 2018).	Build community support for low-carbon lifestyle endeavours (Aiken, 2017; Ramos-Mejía and Balanzo, 2018; Seyfang and Haxeltine, 2012). Build non-partisan political support and ensure continuity through social networks (Hrelja et al., 2015; Bernstein and Hoffmann, 2018; Bulkeley et al., 2014). Standardise activities and stabilise pathways with global knowledge (Geels and Deuten, 2006; Hargreaves et al., 2013; Matschoss and Heiskanen, 2017; Ornetzeder and Rohracher, 2013). Develop skills and embody knowledge of practices (Korjonen-Kuusipuro et al., 2017; Pellicer-Sifres et al., 2018). Ensure iterative learning (Feola and Nunes, 2014).
Material	Circumvent obduracy through experiments (Bulkeley et al., 2014). Demonstrate viable alternatives (Seyfang, 2010; Bulkeley et al., 2014).	Experiment with how new grassroots sustainability technologies can support new practices (Korjonen-Kuusipuro et al., 2017; Seyfang and Haxeltine, 2012). Innovate in current voids (Bulkeley et al., 2014).	Maintain and repair material initiatives (Castán Broto and Bulkeley, 2013b). Build community through practical activities (Aiken, 2017; Seyfang, 2010).

ephemerality is rarely explicitly foregrounded. However, as we will see, the literature on local sustainability transitions does in fact feature good implicit coverage of this temporality of local transitions, hence shedding light on how situated actors navigate the dynamics of ephemerality and permanence in transitions. The various strategies employed by local transition actors across the three temporal dimensions are summarised in Table 1.

As Table 1 shows, durability or stickiness is not an inherent property of particular local transition initiatives. On the contrary, local transition actors proactively and strategically perform and embed durability by routinising transition activities in social and institutional practice. However, it is important to note that routinisation is rarely the objective at the outset; rather, it emerges as an orienting destination, the outcome of other dimensions that are ephemeral, transitory and cumulative. Temporary local initiatives also play other important roles: as catalysts of change, as a means of innovation, or as interventions that revamp marginalised properties of existing development trajectories. As local sustainability initiatives go, there is thus a lot happening that does not endure, but rather serves other functions, such as catalysing change.

4.1. Catalysis

A number of examples in the empirical sustainability transitions literature foreground how local actors catalyse transition through temporary measures: interventions that critique the status quo, challenge unsustainable entrenched practices, disrupt prevalent norms and orchestrate new configurations of actors, and hence open up space for new ideas and modes of local action.

Actors engage various *structural* strategies to catalyse action. For instance, by reframing governance arrangements, creating more inclusive formal and informal networks and involving a broad range of actors, transition initiatives can reframe “what is governed, how and by whom”, hence unlocking new forms of collective action which may “prepare and enable more fundamental shifts” (Wolfram, 2018; see also Korjonen-Kuusipuro et al., 2017 and Martiskainen, 2017). Similarly, capacity for alternative action can be fostered locally by reconfiguring existing institutions and shifting resource allocation, policy-making protocols and organisational

culture (Burch, 2010; Bernstein and Hoffmann, 2018). By creating "temporary settings and work constellations", such as labs, local transition actors can innovate and implement ideas quite independently from their parent organisations' institutional context (Schmidt et al., 2014, p. 244).

Such temporary constellations also allow for cross-pollination (Schmidt et al., 2014), a key *relational* strategy for local transition initiatives. Collaboration amongst a plurality of actors on a project basis allows initiatives to capitalise on epistemological and ontological variation and creates space for radical thinking (Longhurst, 2015), although individual positions may become re-entrenched as soon as funding dries up (White and Stirling, 2013). Here, experimental action can be seen as research endeavours that provide evidence of unsustainable technologies and social practices, as well as possible solutions (Ramos-Mejía and Balanzo, 2018). Temporary initiatives may also disrupt prevailing norms that entrench fossil fuel dependence (Bernstein and Hoffmann, 2018) and allow individuals to reorient their understanding of key issues (Boyer, 2018). A number of studies emphasise the importance of developing common visions in order to identify synergies amongst diverse actors (Amundsen et al., 2018; McCormick et al., 2013; Wolfram, 2017). Mobilising inspiration from successful initiatives elsewhere may also contribute to conditions for change (Johannessen and Hahn, 2013).

Temporary *material* interventions (e.g., grassroots innovations) can be used to demonstrate viable alternatives that are both low-carbon and require low investment, as Seyfang (2010) discusses in the case of (semi-)temporary dwellings. Furthermore, experimental practices may be used to expand the political space and circumvent the obduracy of existing regimes (Bulkeley et al., 2014). Yet, temporary sustainability initiatives may not only catalyse change, but also create spaces of experimentation and innovation in order to revamp and reconfigure transition pathways.

4.2. Revamping, reconfiguration and innovation

Local actors revamp initiatives that have fallen into disuse by tapping into their dormant properties, innovating, reconfiguring and consequently reinforcing or reorienting transition pathways. *Structurally,* local transition actors may attempt to drive sustainable innovation by coordinating across sectors, as in the case of Sundsvall, where planners and officers from different municipal departments met in workshops to sketch alternative solutions to "tricky" problems (Hrelja et al., 2015). They may also shift to organisational forms that reflect the aims and values of local initiatives, such as citizen cooperatives (Hatzl et al., 2016), or to foster innovation through public-private partnerships (Bulkeley et al., 2014).

Different *relational* strategies are also prominent as local actors revamp transition pathways. Scholarship underscores the important role of social learning between actors in such temporary constellations, which allows for actors to explore radical ideas. Here, transition actors may champion a cultural shift towards openness and diversity in order to support innovation, and employ techniques such as daydreaming to unlock exploration of marginalised, unusual ideas (Korjonen-Kuusipuro et al., 2017; see also Shey and Belis, 2013) and cultivate shared objectives through hands-on approaches (Bradbury and Middlemiss, 2015; Seyfang and Haxeltine, 2012). The literature also highlights continuous exchange and translation of ideas across settings as a key part of the local innovation process (Ornetzeder and Rohracher, 2013; Hildén et al., 2017). Local transition actors may also read into unsustainable initiatives elsewhere in order to identify alternative solutions (Ramos-Mejía and Balanzo, 2018). While grassroots actors may strive for wide dissemination of their solutions for sustainability, they are usually mindful that mainstream appropriation may undermine their critical edge. As Smith et al. (2014, p. 122) observe, the tension between entrepreneurialism and social justice can be "an important source of reflexivity in development" as grassroots innovations are crafted.

Materially, local transition actors may innovate in current voids and produce new regimes in parallel with current socio-technical systems, in order to fill gaps in the latter and reorient them (Bulkeley et al., 2014). Korjonen-Kuusipuro et al. (2017) highlight the close interplay between everyday practice and technological innovation in grassroots energy solutions, where everyday practices serve as cultural drivers in energy innovation and new technologies may in turn support new consumption practices.

Fleeting activities and constellations hence play important performative roles in local transitions by creating a discursive and geographical space for change (catalysis) and driving local innovation, experimentation and reconfiguration (revamping). Yet, both catalysis and revamping are ultimately ephemeral. They bring raw potential to the fore, they organise and align agency, but unless they are stabilised into routines, they risk being reabsorbed into nimbly adjusted business-as-usual flows. Hence, local transition actors pursue a range of strategies to routinise their initiatives in order to render them durable and channel them into substantive low-carbon transitions that stick.

4.3. Routinisation

Actors seek to routinise their initiatives and overcome the fragmentation and fleeting nature of constellations through formalisation, standardisation, normalisation and networking. *Structurally*, civil society initiatives often strive to formalise their activities by creating legal entities, and many initiatives pursue long-term funding strategies through commercialisation and project consortia (Bailey et al., 2010; Hargreaves et al., 2013; White and Stirling, 2013). For instance, Ornetzeder and Rohracher (2013) find the institutionalisation of grassroots innovation initiatives, such as cooperatives, important for strengthening both the commitment of participants and the ability to secure further funding. Similarly, the Transition Network encourages transition initiatives to formalise their organisations. Feola and Nunes (2014) find that successful initiatives tend to have a more formal organisational structure, including a steering group. At the same time, increasing formalisation may come at the cost of bureaucratisation and be difficult to align with the needs of volunteers (White and Stirling, 2013), and the commercialisation of initiatives risks excluding those who are not able to pay (Martin et al., 2015). Municipal actors strive to align initiatives with municipal or national agendas to ensure longevity (Feola and Nunes, 2014; Hodson and Marvin, 2012; Kasa et al., 2012). Amundsen et al. (2018, p. 24) highlight that it is "more likely for local institutions to be influential if

the values they hold are in line with those prioritised by higher level governance actors".

Local transition actors also pursue various *relational* strategies to routinise their endeavours. Civil society actors may mobilise community support to normalise low-carbon social practices and lifestyles (Seyfang and Haxeltine, 2012), and municipal actors draw on non-partisan political support and leverage social networks to create continuity (Amundsen et al., 2018; Hrelja et al., 2015). The sharing, codification and standardisation of knowledge is often central here. Actors cultivate shared visions (Bernstein and Hoffmann, 2018; Fenton et al., 2015), standardise activities (Hatzl et al., 2016; Ornetzeder and Rohracher, 2013) and abstract and aggregate local learning into global knowledge through toolkits and handbooks (Geels and Deuten, 2006; Hargreaves et al., 2013; Matschoss and Heiskanen, 2017; Westskog et al., 2017). However, the context-specific, evolving and diverse nature of local transition projects may limit the relevance of the abstracted, generic lessons of manuals and toolkits (Hargreaves et al., 2013; Hatzl et al., 2016).

Finally, local actors pursue *material* strategies to visibilize alternatives (Seyfang, 2010), demonstrate technologies for sustainability (Bulkeley et al., 2014), and push infrastructural planning towards low-carbon solutions (Amundsen et al., 2018). The literature also underscores the role of practical activities for building community (Aiken, 2017; Seyfang, 2010).

4.4. Continuity as a dynamic sequence of activities

As evident from the above, the empirical transitions literature has outlined how local actors seek durability through embedment in networks and structures that align interests and set up political constellations for long-term transition agendas. Yet, this pursuit of continuity may come at the cost of bureaucratisation, exclusion, and the erosion of the diverse and context-specific nature of local transition initiatives. It is therefore worth underscoring that many local transition actors interpret durability in a more dynamic way. Here, local transition initiatives often build on a sequence of projects and organisations that feed into each other to constitute a transition pathway (Madanipour, 2017). This conception of continuity as dynamic is prominent in the Transition Movement. Here, communities are seen as temporary and initiatives are encouraged to "design their own demise from the outset", enabling the composting of social energies and skills that can flow into new initiatives (Aiken, 2017). Similarly, they build on an understanding of the iterative nature of learning, which goes through cycles where "old knowledge and ways of learning are discarded in favour of new approaches or recombined with new ideas or processes" (Feola and Nunes, 2014, p. 247). Here, even material durability can be understood as dynamic and iterative, since material initiatives require continuous repair and maintenance, activities that involve elements of remaking and renewal (Castán Broto and Bulkeley, 2013a). As per this approach, then, transition initiatives continuously reinvent themselves, drawing on an iterative and dynamic connotation of temporality. Through continuous routinisation, durability is performed as an effect of a sequence of continuous repetition and (re)translation of temporal fragments in the form of projects, organisations, communities, practices and knowledge.

Highlighting the embedded agency of local actors in catalysing, revamping and routinising transition initiatives can hence aid empirical study of local sustainability strategies. From disruption, birth and contestation (catalysis), through 'practice work', regeneration and experimentation (revamping), to 'institutional work', imbrication and embedment (routinisation), local initiatives display distinct characteristics upon charting their diverse strategies along a temporal register. Some initiatives and constellations are quite ephemeral and open up space for experimentation and change, while others sustain themselves over time. Moreover, the three types of strategies—structural, relational and material—help distinguish between instances where, say, routinisation is happening within institutions (structural) as opposed to actor-networks (relational), or as infrastructural layering (material). Such distinctions are important in order to better apprehend the actual nature of temporary local sustainability initiatives, as well as ones that begin to crystallise. Whether actors are catalysing or revamping structural, relational or material change has vital implications for the initiatives they adopt; identifying these strategies can enable better analytical purchase over the characteristics of a given transition. It is such insight that can help us understand what makes certain initiatives stick.

Spatial and temporal dimensions of sustainability transitions are deeply intertwined. Embedding local efforts in layered or polycentric governance arrangements, forming networks with initiatives in other locations, and continuous exchange and mutual learning thus comprise integral components of durability. A temporal lens can help unpack deeper layers of meaning that underlie local initiatives, revealing situated efforts to catalyse, revamp and routinise sustainability transitions. Our proposed temporal typology hence provides a means to discuss how initiatives unfold over time. It moreover constitutes a generative analytical point of entry for fine-grained insights into how and why local initiatives evolve in specific ways, in a recursive relationship with the systemic changes they help enact.

5. What sticks?

In line with the need for rapid and deep transformations to sustainability, there is an urgency associated with the temporal dimension in transition studies. Yet, by and large, extant scholarship on sustainability transitions conceptually locates durability and inertia as external to local transition efforts. This places temporal emphasis on the obduracy of incumbent regimes. Our review of the literature on local and municipal scales evidences a need to articulate the situated temporal dynamics that are integral to how sustainability transitions are mobilised and practiced. We have therefore proposed an analytical vocabulary to capture the temporality of sustainability transitions at the local scale. It highlights the process temporality that is internal to local initiatives under transition, and foregrounds the structural, relational and material strategies that actors deploy locally to catalyse, revamp and routinise transitions.

In interrogating what sticks and why, part of our contribution is to highlight ephemerality as ubiquitous when mapping initiatives at the local scale—there is a lot happening that does not endure but serves other functions. A temporal typology that enables us to systemically explicate this tendency can serve an important corrective function in keeping discourse about transitions accurate. Locating action along the temporal dimensions of catalysis, revamping and routinisation is an important move away from stand-alone case analysis towards the contextualised treatment of local initiatives along the temporal scale.

Our perspective also foregrounds the dynamic nature of durability as the result of a structured sequence of repetition with variation. It follows that the stickiness of local transition pathways is a situated and relational process, not an essential property that inheres in particular innovations or interventions. This highlights the agency of local actors as they routinise sustainability initiatives by adaptively reworking their own oeuvre and by formalising and normalising initiatives. Such an analytical take also explicates how the obduracy of incumbent regimes is continuously performed; it thus foregrounds possibilities for targeted analysis of strategies to unmake such regimes.

As sustainability transitions scholarship increases its emphasis on the roles that local actors play, explicating how seemingly disparate and loosely coordinated initiatives are interconnected in time and space becomes important. There is an order to things that comes into sharp relief when we employ a temporal lens to unpack what constitutes durability. Future research can productively deploy the temporal vocabulary articulated above, and explore how to combine insights from complementary spatial and temporal conceptualisations. This is vital in order to address how strategies for sustainability transitions perform spatiotemporal change through unfolding local initiatives.

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