

Theory and Practice of Urban Sustainability Transitions

Trivess Moore  
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Brendan James Gleeson *Editors*

# Urban Sustainability Transitions

Australian Cases- International  
Perspectives



# **Theory and Practice of Urban Sustainability Transitions**

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This book series Theory and Practice of Urban Sustainability Transitions is intended to explore the different dynamics, challenges, and breakthroughs in accelerating sustainability transitions in urban areas across the globe. We expect to find as much different and diverse stories, visions, experiments, and creative actors as there are cities: from metropolises to country towns, from inner city districts to suburbs, from developed to developing, from monocultural to diverse, and from hierarchical to egalitarian. But we also expect to find patterns in processes and dynamics of transitions across this diversity. Transition dynamics include locked-in regimes that are challenged by changing contexts, ecological stress and societal pressure for change as well as experiments and innovations in niches driven by entrepreneurial networks, and creative communities and proactive administrators. But also included are resistance by vested interests and sunken costs, uncertainties about the future amongst urban populations, political instabilities, and the erosion of social services and systems of provision. And finally there are the forming of transformative arenas, the development of coalitions for change across different actor groups, the diffusion and adoption of new practices, and exponential growth of sustainable technologies.

For this series we seek this middle ground: between urban and transition perspectives, between conceptual and empirical, and between structural and practical. We aim to develop this series to offer scholars state-of-the-art theoretical developments applied to the context of cities. Equally important is that we offer urban planners, professionals, and practitioners interested or engaged in strategic interventions to accelerate and guide urban sustainability transition frameworks for understanding and dealing with on-going developments, methods, and instruments.

This book series will lead to new insights into how cities address the sustainability challenges they face by not returning to old patterns but by searching for new and innovative methods and instruments that are based on shared principles of a transitions approach. Based on concrete experiences, state-of-the-art research, and ongoing practices, the series provides rich insights, concrete and inspiring cases as well as practical methods, tools, theories, and recommendations. The book series, informed by transition thinking as it was developed in the last decade in Europe, aims to describe, analyse, and support the quest of cities around the globe to accelerate and stimulate such a transition to sustainability.

To sum up, the book series aims to:

- Provide theory, case studies, and contextualized tools for the governance of urban transitions worldwide
- Provide a necessary and timely reflection on current practices of how Transition Management is and can be applied in urban contexts worldwide
- Further the theorizing and conceptual tools relating to an understanding of urban sustainability transitions
- Provide best practices of cities across countries and different kinds of cities as well as across policy domains in shaping their city's path towards sustainability

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# Urban Sustainability Transitions

Australian Cases- International Perspectives

 Springer

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# Foreword

It is an often-heard and well-known critique that early yet foundational work on sustainability transitions was characterized by poor spatial sensitivity and methodological nationalism. Similar to many other fields in social science, sustainability transitions has however witnessed a spatial turn over the past years, bringing questions to the table such as why do sustainability transitions unfold unevenly across space, how does spatial context matter for transition processes and how are sustainability transitions governed at and across different spatial scales?

Through its spatial turn, work in sustainability transitions has increasingly zoomed in on the role of cities in driving pathways for transformative change across a range of sectors such as energy, transport, food and housing. Moreover, in their endeavour to better understand urban contexts, transition researchers have encountered the work and insights stemming from urban studies and human geography and vice versa. As this book bears witness to, these encounters have led to fruitful transdisciplinary collaborations as well as mutual scrutiny and critique (bearing the potential to be equally, if not even more, fruitful).

Taking us on a journey down under, this book makes an original, rich and thoughtful contribution to a better understanding of the spatialities of sustainability transitions in at least two significant ways.

First of all, it helps to tease out some of the particularities of Australian urban sustainability transitions. Without becoming idiosyncratic, there are important wider insights to be gained from studying sustainability transitions in an Australian urban context, e.g. how local government and urban governance arrangements are going against the grain of a carbon regime that is largely produced and reproduced at national levels of decision- and policy-making, how urban transitions unfold in the face of weak and fragmented formal administrative power at the urban level or how urban sustainability transitions take place under the pressure of steep population growth and increasing urbanization. While focused on Australian urban sustainability transitions, many studies explicitly adopt an international comparative perspective, allowing them to not only argue that context matters but also to suggest how.

Secondly, the book adds substantial new food for thought to conceptualizing and theorizing urban sustainability transitions. In much of the literature interrogating the spatial aspects of sustainability transitions, a geographical perspective has simply been latched onto existing frameworks such as the multi-level perspective or strategic niche management. This book sets out to move beyond that as it provides an arena for urban and transition researchers to scrutinize existing wisdoms in respective fields. For example, insights and approaches from not only critical urban theory but also urban planning meet Transition Management, providing a fertile ground for new theorizing around urban sustainability transitions. This raises attention for questions and discussions that have remained under the radar such as how do transitions to low-carbon energy systems relate to social justice and socio-economic equity or how can niche experiments around resilience building by urban communities be scaled or diffused to make systemic impact?

Besides its academic merit, this book also makes a convincing case that sustainability transitions are needed to make Australian cities future-proof and provides inspiring examples of how this can be achieved in practice through interventions in urban planning, grassroots initiatives and technological innovation and diffusion.

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Professor Lars Coenen

# Series Foreword

This book series seeks to bring together the heads, hearts and hands of urban sustainability transitions across the globe. In all cities by now, citizens, civil servants, researchers, entrepreneurs and societal organizations are coming together to renew urban systems of energy, water management, housing, mobility, care and food. The Paris Agreement signifies the global political commitment to serious and deep decarbonization, but it also has placed the role of cities centre stage. While cities have always been places of experimentation and innovation, the challenge now is to radically transition our urban economies, infrastructures and socio-cultural regimes towards inclusive, just, sustainable and thriving urban communities. There is a shift therefore from places of innovation to laboratories for system innovation and transition. In this grand experiment at global urban scale, there is no one size fits all; sustainability needs to be reinvented over and over again in each neighbourhood, sector and community. At the same time, there is much to learn across experiments, locations, sectors and professions.

This specific volume brings a richness of ideas, examples and insights from Australia. It compiles years of thinking and experimentation in Australian cities by scholars, practitioners and policy-makers. It not only gives an exciting and inspiring insight into specific aspects and challenges Australian cities face but also offers a lot of concrete ways to understand, influence and accelerate urban sustainability transitions. Obviously issues that relate to water, urban sprawl and energy figure prominently. Like other modern cities, the dominant solutions are often technological, centralized and fossil based. This book describes how nonetheless alternatives are developing and gaining speed. These range from water-sensitive cities and radically new concepts for urban transformation to advancing renewable energies and dealing with incumbent actors seeking to frustrate transitions efforts.

This volume also offers diverse and thoughtful reflections upon the theory and practices of transitions. It adds to the growing literature on understanding transitions and their governance by developing new ideas around the role of space and agency in transitions, by taking a critical stance towards more pragmatic and managerial



approaches to transitions and by developing new ideas around such themes. This volume can therefore also be seen as evidence for the maturation of transition research in Australia. It puts the continent firmly on the transition map and reminds the world that there is yet even more to discover in and learn from Australia.

Rotterdam, The Netherlands

Derk Loorbach

# Preface

The move to cities and concerns about environmental sustainability are two of the defining trends shaping the twenty-first century. This book is the third in a series about urban transitions. It contributes to debates about purposive transitions to sustainable cities through an accessible but critical exploration of key changes in urban settings. Urban environments comprise a myriad of complex and imbricated environmental, social and governance challenges (e.g. climate change, population growth, equity, resource constraints, geopolitical power shifts and rapid innovation in technology and other areas). ‘Business-as-usual’ market-based responses or individual top-down government interventions are increasingly recognised as inadequate responses to enable sustainable cities. As a result, urban practitioners and scholars alike are concerned with driving purposive transitions to sustainable cities.

This volume provides an alternative perspective to that of the preceding book in this series by Loorbach et al. (2016). While Loorbach et al. geographically focus on European and Japanese cases with a particular interest in the application of the transition management approach, our volume explores Australian cases and their international implications with an interest in drawing in very different perspectives from urban studies.

This book is intended to take transition scholars on a tour of the city, via an introduction to perspectives from urban studies on urban change in an era dominated by neoliberal economics and climate change. It is equally intended to address urban scholars and introduce a burgeoning and lively literature of sociotechnical transitions, where there is ample scope for both empirical and theoretical insights. Perhaps most importantly of all, it is designed to introduce a broader audience to both genres and, through this, to provide different and distinctive perspectives on urban low carbon transitions, their challenges and prospects.

While we acknowledge the burgeoning literature on geographies of transitions, this book is distinctive in that it has one foot in urban studies and the other in transition studies – both in the sense of the authors’ backgrounds and the contents of their chapters. We have observed urban scholarship moving towards issues of transitions and transition studies increasingly engaging with urban considerations

(as demonstrated by the previous volume). This volume presents an overview of theory, concepts, approaches and practical examples informed by sustainability transitions thinking for urban practitioners and scholars who want to improve their understanding of the prospects and pathways for sustainable urban futures. The chapters in this volume contribute to the growing literature on city-scale transformative change that seeks to address a lack of consideration of spatial and urban governance dimensions in sustainability transitions studies.

Australia is representative of many OECD countries in terms of overall economic and institutional arrangements, yet it also has some unique attributes that serve to highlight issues for urban transitions internationally. Australia is a highly urbanised country with the metropolitan capitals accounting for large shares of their state populations. The five largest, state-capital cities dominate economically and demographically; however, because of a lack of metropolitan governments and a rather loose, 'distributed' system of municipal administration, the cities have little formal status in Australia's federal system. The Australian population is projected to grow by 48% (from 2016 level) over the next 30 years (Infrastructure Australia 2015) – putting pressure on where and how to accommodate this increase in the existing urban system. Australia is also very heavily dependent on fossil fuels for its energy and transport needs; however, state and some local governments have made strong commitments to transition to renewable energy. This context suggests that Australian cases can provide interesting test-tube perspectives on processes relevant to urban sustainability transitions worldwide.

Australia is also home to a growing community of transition researchers. Since early 2015, many of these researchers, scattered over the vast continent, have come together under the banner of ASTRA – the Australia-based Sustainability Transitions Researchers Alliance. This book, as you can see from the logo, is one of the early fruits of the collaborations in the ASTRA community. We will come back to the emergence and proliferation of Australia-based transition research in the concluding chapter.

This book is structured in four main parts. Part I, 'Introduction', contains three chapters providing further context for the Australian foci of the book and the ongoing conceptual and empirical challenges for understanding and pursuing urban transitions within the current transition framework and the notion of the urban age as one of planetary urbanisation. Part II, 'Governing Urban Transitions', includes four chapters relating how organisations and government policy are engaging (or not) with sustainability transitions to improve urban outcomes. Each chapter presents a different case study, respectively covering spatial planning (Chap. 4), organisational planning (Chap. 5), an extended interpretation of boundary organisations, looking at spatial as well as science-policy boundaries (Chap. 6) and exploring successful and unsuccessful government-supported niche development in Australia (Chap. 7). Part III, 'Specific Approaches to Urban Transitions', then explores urban sustainability transitions from the perspective of some of the key pillars for sustainable cities: water (Chap. 8), housing (Chap. 9) and decarbonising and relocalising the economy from below (Chap. 10). Part IV, 'Spatial Dimensions of Urban Transitions', includes

three chapters which explore a historical review of housing policy development for creating cities (Chap. 11) and changes to how we use cities through live/work co-location (Chap. 12) and urban mobilities (Chap. 13). In the final section, Part V, a concluding chapter provides comment on the central questions and dimensions forwarded in this book and draws out key implications for transitioning to a low carbon, sustainable urban future.

## **Part I: Introduction**

Chapter 1 by Horne builds upon the discussion and challenges of urban transitions presented throughout the previous volume (Loorbach et al. 2016). The chapter clearly identifies the requirement for a focus on urban transitions in the broader sustainability transitions field and how urban transitions research can inform the development of sustainability transitions theory and practice more broadly. It identifies continuing challenges for urban sustainability transitions. These include (1) multilevel governance challenges of transition management at the city scale where policy and regulation are invariably contested and conducted at multiple scales, (2) how to scale urban sustainability transitions in a post-neoliberal era of ‘splintered urbanism’, (3) how at the individual human interaction level spatial scales of transitions vary between cities and neighbourhoods and (4) how domestic-scale social practices interact with low carbon or sustainability transitions mechanisms. The chapter provides a detailed discussion of the different dynamics, challenges and mechanisms regarding purposive sustainability transitions within the urban context, building upon the insights articulated in the preceding book in the series. It also charts the benefits of mixed methods approaches in understanding transitions, including specifically the benefits of including household-level ethnographic investigations of social practices as ways of revealing how transitions in practice unfold in concert with transition mechanisms at the city scale. The Australian context for the book is further explored.

Building upon this, Chap. 2 by De Haan explores how concepts and frameworks used in the field of sustainability transitions do not have a spatial character and often do not address matters of place and scale at all. The chapter investigates challenges in pursuing purposive transitions in geographically defined settings working with sustainability transitions knowledge. De Haan argues that cities should be considered a nexus, as the collection of infrastructures and service provision systems, as well as a locus, the physical location and its sociohistorical identity where these systems reside or in relation to the broader systems (e.g. national or global) they are part of. A framework is proposed where urban transformative actors and the networks they form play a key role. Urban transitions processes are explained in terms of network dynamics with systemic consequences in the locus and the nexus aspect of cities.

In Chap. 3, Gleeson then explores the notion of the urban age as one of planetary urbanisation. Gleeson forwards that a two-stage transition is likely, the first stage

being a move away from carbon capitalism followed by the second stage which is a new political economic order. Focusing on the first stage, Gleeson explores the possibility of a painful realignment to lead us to a more sustainable future and discusses that there may be a need for a strong ‘guardian’ state to guide such a transition, discussing such a transition using potential future scenarios.

## **Part II: Governance of Urban Transitions**

Part II presents four chapters which look at different aspects of urban transitions governance. Morrissey et al. in Chap. 4 present a critical review of strategic spatial planning policy and outcomes at the city-region scale from Australia and Ireland since the early 2000s with a sociotechnical transitions framing. The chapter identifies a clear need for a new approach to strategic policy development with key sociotechnical transitions principles forwarded to reimagine and re-empower the practice of strategic spatial planning, better positioned to address future sustainability challenges. In Chap. 5, Bush et al. report on a case study investigating whether provision of targeted information on theories of sustainability transitions could strengthen organisational strategic planning and asks: if planning is informed by transition theories, would this assist and strengthen organisational visioning, ambition and confidence? The case study focuses on a community-based, not-for-profit organisation working on sustainable energy and climate change action in Melbourne, Australia. In addition to several key findings for applying sustainability transitions to organisations, the research demonstrates the potential impact of research-practice transdisciplinary partnerships in strategic planning but also continuing challenges around achieving this.

Following this, Moloney et al. (Chap. 6) discuss how regional ‘boundary organisations’ – those working across boundaries of multilevel governance and science-policy – might support innovation and enable transitions in public policy institutions and governance. The chapter reflects on insights gained from a collection of research projects working with different types of boundary organisations with interests in tackling climate change and promoting sustainability. The analysis shows how boundary organisations are contributing to improved local capacities and institutional shifts and outline factors enabling and limiting their potential in facilitating transitions towards sustainability under a changing climate. Rounding out this part of the book, Moore (Chap. 7) explores successful and unsuccessful niches in Australia through a strategic niche management framework. The chapter presents analysis and commentary of three recent government approaches to improving urban sustainability in Australia (two successful cases and one unsuccessful case): residential solar photovoltaics, ceiling insulation and exemplar high-density housing development. Each case contributes to a broader discussion about strategic niche management, including how the alignment with sociotechnical landscape dynamics leads to public sector actors having a greater chance at stimulating regime transformation.

### **Part III: Specific Approaches to Urban Transitions**

This part of the book explores different sectorial perspectives on the application of transitions in the urban. In Chap. 8, Brown et al. look at the development over the past decade or so of an innovative approach that strives to establish water sensitive cities to address issues of water shortages caused by increasing droughts and population growth. The approach explores the integration of urban water management with urban planning, making extensive use of green infrastructure solutions. This chapter illustrates the uptake trajectories of elements of this approach, particularly under the severe stresses of the Australian Millennium Drought in Melbourne. Newton (Chap. 9) then looks at how large cities in Australia, like Sydney and Melbourne, traditionally try to accommodate population growth by growing larger in surface area – from their fringes outwards into the greenfields. The chapter discusses an alternative approach aimed at sustainable redevelopment of greyfield precincts through transition management and specifically the use of transition arenas.

Alexander and Rutherford (Chap. 10) conclude this part by exploring the Transition Towns movement (TTM) and the role such an approach could have on broader urban transitions. Although the TTM does not use transition theories explicitly in their approach, they arrive at similar conclusions. This chapter discusses what the TTM approach consists of and how that aligns with ideas about purposeful urban transitions. The chapter touches on the differences, challenges and opportunities for the TTM in Australia and how such an approach could be scaled up to challenge the dominant building and urban regime. The approach is illustrated by means of a utopian vision.

### **Part IV: Spatial Dimensions of Urban Transitions**

In Chap. 11, Dalton explores the suburbs as a sociotechnical regime within Australian cities and explores the implications of the urban location of high-energy intensive household living within this regime. Dalton then discusses underlying ‘lock-in mechanisms’ producing and reproducing the suburbs and how this is destabilised and reconfiguring cities. The chapter concludes by drawing on a set of preconditions from the history of change in ‘lock-in mechanisms’ that should be considered in the development of transition to low carbon suburban suburbs and relates them to instruments in a policy framework. This is followed by Doyon (Chap. 12) who uses the example of live/work as a niche innovation within urban planning to develop a new framework for analysing the pathways of policy innovations within urban transitions. The research presents an embedded multiple-case study approach (Melbourne and Vancouver) with a theoretical replication design to explore contrasting results between different bounded systems. It is identified that rigid and top-down governance structures are less flexible and open to change,

political approaches to planning are less responsive and adaptive and strong political actors have the ability to either initiate or inhibit change.

Concluding this part, Dodson et al. (Chap. 13) explore the equity challenges of urban sustainability transitions, particularly regarding sustainable transport in Australian cities. The chapter draws on empirical work by the authors revealing that the advantages of certain sustainable transport options, e.g. electric vehicles, are disproportionately more enjoyed by wealthier households. They find that a transition towards a highly fuel-efficient vehicle fleet will have adverse socio-economic consequences for lower-income households who typically live in outer suburbs and are, for that reason, highly car dependent. The authors suggest that systemic reform rather than market-led efficiency improvements are required to avoid such adverse equity outcomes.

## Part V: Conclusions

The final chapter, Chap. 14, brings together the key contributions from the book and discusses their implications for future research and practice of urban sustainability transitions in Australia and internationally.

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Fjalar de Haan  
Ralph Horne  
Brendan James Gleeson

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# Part I

## Introduction

Part I introduces the book and explores ongoing challenges for urban transitions from a practical, policy, and theoretical perspective. Chapter 1 locates the book into the emerging urban transitions discourse and why Australia presents an interesting focus for urban transitions research to inform international urban transitions. Chapter 2 builds upon this by analysing the conceptual issues of transitions studies in dealing with matters of place and scale. It brings into the discussion the distinction between essentially and accidentally place-based transitions and the notions of locus and nexus as a way of framing transitions when place matters. Concluding this section, Chap. 3 presents a provocative chapter about what a future urban transition may look like, in the face of failing neoliberalism. These chapters build the narrative around current and future challenges with urban transitions and set the context for the following sections in the book.

# Chapter 1

## Urban Low Carbon Transitions: Housing and Urban Change

Ralph Horne

**Abstract** The central question for this chapter is: *how can urban and transitions perspectives assist understandings of low carbon housing and urban change?* Current ‘urban’ and ‘transitions’ perspectives are presented along with recent and current attempts to bring urban and spatial perspectives to transitions studies. Australia as a site for urban transitions studies is considered, and three aspects of low carbon housing and urban change are highlighted: policy settings and governance, spatial/urban dimensions and carbon and consumption context. Contributions of urban and transitions perspectives to understanding low carbon housing and urban change are explored through two case examples of low carbon housing and urban change in Australia: photovoltaic panels on domestic rooftops and broader retrofitting and renovation activity towards low carbon housing. Transitions perspectives include the multilevel perspective and Transition Management. While these vary, the focus here is that they can each provide useful insights when coupled with other perspectives of urban and social change. Power, space and consumption all feature in practices of urban low carbon transitions, and it is essential that further analytical tools are brought to bear in these domains. They offer a scale for the study of cultural projects where change is as likely to be associated with cultural or social change as by policy settings.

**Keywords** Housing • Households • Low carbon • Photovoltaics • Retrofit

### 1.1 Introduction

In parallel to the twenty-first-century rush to cities, there is also increasing attention to urban theory and policy. More people are living in, focusing on and arguing about cities. The Intergovernmental Panel on Climate Change (IPCC) now specifically includes urban issues (IPCC 2014); 2015 saw the adoption of explicit ‘urban’

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imperative in the Sustainable Development Goals; 2016 saw the third bi-decadal UN Habitat conference and the ‘New Urban Agenda’, adding to a myriad of calls for actions in, on and for cities.

As introduced in above this book is primarily about the juxtaposition of the discipline of urban studies, loosely defined, with the relatively (as yet) aspatial ideas of sociotechnical transitions originating in science and technology studies. The rise of urbanisation and interest in cities is occurring contemporaneously with attempts to respond to climate change and the environmental sustainability crisis. In this chapter, some of the key points of both disciplinary traditions are introduced.

The central question for this chapter is: *how can urban and transitions perspectives assist understandings of low carbon housing and urban change?* This question is tackled first by introducing current ‘urban’ and ‘transitions’ perspectives, respectively, and the recent and current attempts to bring an urban or spatial perspective to transitions studies. Then Australia as a site for urban transitions studies is considered, followed by the main section of the chapter where three aspects of low carbon housing and urban change are highlighted, as follows:

- Policy settings and governance
- Spatial/urban dimensions
- Carbon and consumption context

In highlighting these aspects, of course, others are diminished. These three are selected specifically in order to draw out contributions of urban and transitions perspectives to understanding low carbon housing and urban change. Two case examples of low carbon housing and urban change in Australia are then presented in order to illustrate how urban and transitions perspectives can contribute in different ways to our understanding of this phenomenon.

By transitions, I refer to purposive, sustained sociotechnical interventions in existing systems or ‘regimes’ (Geels 2002, 2010) designed to shift them out of the way or to transform them – in this case, leading to a new, ‘sustainable’ low carbon setting. There are significant variations between transitions perspectives that are outside the scope of this chapter. ‘Transition Management’ (Loorbach 2007) involves setting a specific agenda involving the bringing together of decision makers (both policy and business entrepreneurs) to set collective visions and strategies and to act on these. Elsewhere, the multilevel perspective (MLP) combines ideas from science and technology studies as well as policy and management, evolutionary economics and the sociology of innovation in a heuristic schema for understanding sociotechnical change (Geels et al. 2016).

The rapidly growing literature extends well beyond the expected urban/geography/planning and technology/policy/management traditions – themselves rich, diverse and dynamic. Concepts and methods clash and bump alongside and across each other in a sea of concern to understand and articulate meanings to concepts such as ‘prospects’, ‘purposive’ or ‘transitions’. Scholars of design, engineering, politics, sociology, anthropology and beyond have been drawn to comment on a set of overlapping topics, from questions of governance, sustainability and resilience to considerations of (to name a few) boundaries, practice, agency, materiality and culture.

## 1.2 Urban Transitions in Australia

Urban studies itself spans a range of disciplines and is expanding and in some aspects diversifying, just as cities themselves are. For some, the urban project has been celebrated as a competitive ‘triumph’ (Glaeser 2011; Bruggmann 2009, etc.). Cities are being variously labelled smart, resilient, sustainable and so on, yet this technological optimism is set against a backdrop of rapidly worsening inequality, resource scarcity and climate change. Although the rhetoric on social and policy change has grown over recent years, overwhelmingly the focus of urban decarbonisation plans is technology substitution (e.g. IPCC 2014). It seems market-based promotion of renewables and resource efficiency remains the great hope for cities. Such hope is set against that fact that much of the urban sustainability equation – such as energy grids – lie outside cities’ direct control.

Cities are more than material inventions; and they are more than clusters of people who choose to live in close proximity. They are characterised by geographic differentiation, where proximity is a key organising theme – what Storper and Scott (2016) call the *urban land nexus*. While there is no doubt that cities – in both the physical and social sense – shape us as much as we shape them, current urbanisation patterns are also clearly and increasingly obviously reflections of political–economic practices of globalisation and capital accumulation. Unsurprisingly, many urban scholars (e.g. Gleeson 2014) are therefore concerned with the extent to which cities can intervene in the neoliberal project or whether they are ultimately subordinate to it.

In this chapter, the starting point is the idea that cities are about people and the policy of proximity. This plays out in daily patterns of commutes, work and spatial–temporal rhythms. Cities can be seen as both locus and nexus (see Chap. 2), i.e. as a number of co-located elements or as a more coherent organism entity. Similarly, we can differentiate between phenomena that unfold *in* the city and those that help define and therefore are *of* the city. For example, the fact that photovoltaic (PV) panels start appearing on city rooftops does not mean they are *of* the city in an urban sense – a topic we return to later in this chapter.

Contemporary urban theory debates that are beyond the scope of this chapter variously advance post-colonial urbanism (e.g. Roy 2011; Robinson 2011), assemblage theory (e.g. Farías and Bender 2010; Marston et al. 2005) and planetary urbanisation (e.g. Lefebvre 1970; Brenner and Schmid 2015). Notwithstanding the implications for urban studies, whether about boundaries, hierarchies or distinctiveness arising from colonial or other historical experiences, the starting point for our investigation of cities facing urban low carbon transitions is that human agency and urban place theory matter. At the same time, ideas of distributed agency are also critical. No doubt, the complexities of urban place making and remaking can be understood through deep, detailed investigations of social practice, materially imbricated urban lives and ethnographic inspired explorations of the urban web of life. Thus, reflexive relations between technology, urban space, social life and political–economic forces are critical in understanding the urban (Guy et al. 2001).

### ***1.2.1 Transitions and the Urban Turn***

The origins of Transition Management point to an original understanding of the place of technology in society. The ontology is one of industry changes that relies upon introduction of adoption of technologies in novel ways and the imbrication of this innovation with social change, new knowledge about ‘how’ and new policy settings that, in some way or another, favour the emergences of the novel and the new to such an extent that, over time, the existing status quo is displaced or replaced or otherwise disappears in favour of a new regime.

Technology transitions require a set of institutional and social factors to be in place and often struggle through a period.

The MLP thus seeks to offer a simple explanation of dynamics of system obduracy and change of how seemingly ‘set’ regimes can be usurped and disappear. It has become a popular heuristic for explicitly separating out multiple ‘levels’ (regime, niche, landscape) to be accounted for in terms of policy, power and institutional alignments. The issue of governance is at the heart of the idea of purposive transitions; it is the very levers of policy and governance that are advocated as central features in the engine room of the transition.

This is not to overplay the role of government and certainty of success if such tools. As so many actors are involved and interests inevitably conflict and struggles ensue with unpredictable outcomes, ‘system innovations are characterized by emergent and nonlinear dynamics’ (Geels et al. 2016:2; O’Brien 2015).

This emergent yet growing genre of sociotechnical transitions research has been largely aspatial and silent on questions of cities, until recently (e.g. Coenen et al. 2012). As introduced in the foreword to this book, Transition Management is now engaging with the urban context (Loorbach et al. 2016; especially Chap. 1) and there is a rapidly growing regional and urban Transition Management and ‘geography of transitions’ literature (Hansen and Coenen 2015). This spatial turn parallels a longer-held concern by urban scholars about prospects for low carbon cities; notable contributions that consider proximity and geography of cities in this context include UK scholars Bulkeley, Guy and Marvin. We return to questions of how transitions might manifest in cities (or how cities might themselves transition) below.

## **1.3 Why Australian Cities?**

We advance three principal reasons for considering Australian cities as sites for urban transitions studies. Firstly, as introduced in above this book is the first collection of research and practice representing recent developments in the urban transitions field, broadly defined, in the Australian region and has merit on this basis. Second, there is the prospect of patterns of practice emerging that are regionally specific. In other words, it is *prima facie* logical to collect geographically proximal studies that involve specific spatial settings as we can expect links

between them – a topic we return to in the concluding chapter in this book. Thirdly, and more speculatively, Australian urban environments provide a focus for transitions researchers and practitioners and an international audience because of the particularities of their location, form and political, social and cultural context.

Australian cities are relatively spread apart geographically, so they offer reasonably contained ‘living laboratories’. They are low density, new world, westernised, yet geographically remote from their closest cousins in North America and Europe. Urbanisation is relatively advanced – Australia is one of the world’s most urbanised populations with more than 82% of the population living in cities. Moreover, Australia has been economically heavily fossil fuel dependent, with very high per capita emissions and an economy heavily based upon mining, including fossil fuels. It also has a complex political system in which climate change itself is contested at the federal level, while at the local level (at least in principal cities), it is generally understood and there are many hundreds of initiatives amongst local authorities and communities designed to adapt and mitigate climate change.

Yet, despite this complexity and contestation, there is some evidence that social and cultural settings are amenable to rapid shifts in uptake of new low carbon technologies and practices. Indeed, the domestic retrofit of solar-PV systems, from a few thousand in 2008 to some 1.5 million in 2016, is one of the most rapid ‘transitions’ of its type, and it continues apace across the 7.5 million detached dwellings in Australia, despite the wholesale removal of economic incentives and the increasing imposition of disincentives (see below and also Chap. 7 by Moore).

## 1.4 Three Questions

### 1.4.1 *Policy Settings: Who Is Steering and for Whom?*

In line with ideas of ecological modernisation (Mol and Spaargaren 2000), Transition Management holds that low carbon transitions can be delivered by capitalism, and, in advocating for this, it has tended to give primacy to the levers of government or, at least to large institutions, in instigating and convening transitions. Apart from questions about the uncertain future of capitalism and the capacity of the neoliberal project to deliver such change, the idea of Transition Management has been problematised, not least on the grounds that ‘regimes constitute the selection environments in which niche innovations fail or flourish, and which emphasise processes of alignment and path dependence’ (Shove and Walker 2010:472). Notwithstanding that Transition Management espouses the laudable aim of building coalitions of willing policy and business entrepreneurs and empowering civil society around shifting normal practice to low carbon alternatives, there is the problem that established interests and power relations are at stake. Moreover, ideas of co-design of long-term transitions can risk naivety, as revealed in a study of the micropolitics of transitioning in the Dutch transport sector (Avelino 2009).

Through detailed empirical work, Avelino investigates the ‘ironic situation in which policies that are designed to ‘empower’ people, in themselves require people to already be ‘empowered’ (ibid:369). Decision makers, business and government, tend to dominate the visioning and plan towards sustainability, while the weaker segments of society, who can be said to suffer the most from ‘unsustainability’, are excluded either explicitly or through the discourse, language and mode of engagement adopted. Thus, ‘in an era of ‘sustainability’ discourse, the first P of the people–planet–profit–balance is often forgotten as discussions submerge in quantitative squabbling over cost–benefit analysis and trade-offs between ecological and economic targets’ (ibid:388).

Although from different traditions and persuasions, both Geels (2010) and Shove and Walker (2010) would surely agree that the thorny question of governing of transitions and/or social practices needs attention, particularly the role of civil society and social movements and the multiple agents (human or nonhuman) involved (indirectly or directly) in the replication of ‘high carbon’ or the introduction of ‘low carbon’ ways in cities. While this debate has value in itself, for current purposes, the question arises about how considerations of power and governance confront low carbon transitions in/of cities.

Perhaps most obviously, when it comes to governance and power in cities, there are invariably considerations of multilevel governments and governance. Cities may have mayors with local powers, but invariably there are one or two other tiers of government above and perhaps even below, who also share or have other powers. This said, cities can operate directly with international institutional relationships, such as in the Cities for Climate Protection programme, bypassing and potentially progressing pro-climate action against the policy of the nation state, as in the case of Australia and the USA (Bulkeley and Betsill 2003). The spatial specificity of cities (with apologies to Lefevre and Latour) help illuminate the loci of power in transitions. This illumination, it must be said, is still a work in progress. As Castan Broto and Bulkeley (2013) point out, methods of data collection about low carbon experiments in cities tend to favour those with local capabilities and resources, which tend to be institutions in richer (northern/western) cities. Hence, it has largely overlooked the responses emerging outside formal contexts of decision-making and led by actors other than municipal governments and also initiatives in southern/developing cities.

While there are distinctions between them, a range of literatures highlight the importance of (a) networks in governing low carbon action and (b) the uncertainty of outcomes of such actions. This gives rise to the idea of low carbon experiments towards transition (Moloney and Horne 2015) drawing on governance experiments (Hoffman 2011), strategic niche management and grassroots innovations in sociotechnical regimes (Geels et al. 2011) and ideas of ‘urban laboratories’ (Evans and Karvonen 2014) in sociotechnical change (Castan Broto and Bulkeley 2013). Low carbon urban experiments might also be thought of at the whole-of-urban scale, such as in Fastenrath and Braun’s study of Freiburg (Fastenrath and Braun



2016). Such experiments can be led by city leaders, power brokers, institutions and governments, but they can also be led by civil society groups who are otherwise on the outside of city low carbon policymaking.

### ***1.4.2 Spatial/Urban Dimensions: Do Cities Transition or Do Transitions Inhabit Cities?***

As introduced above, the spatial turn is underway in sociotechnical transitions studies, and there is now an emerging literature on the geography of transitions. This attention to space emphasises diversity in, for example, urban low carbon transition processes arising from a ‘natural’ variety in institutional conditions, networks, actor strategies and resources across space (Coenen et al. 2012). It holds the possibility of being able to say *where* low carbon urban transitions might be, rather than describing them on more technical, abstract and aspatial terms. It creates space to consider place-specific relationships, such as the role of local interpersonal contact in understanding the co-evolution of knowledge, practice and institutional engagement. Here, we are reminded of the importance of proximity in general theories of capitalist production and consumption, as well as in urban studies (c.f. Storper and Scott 2016, discussion above).

While the MLP advances ideas of niches and the build-up of ‘local’ actors who then become ‘global’ in their outlook, this shift is seen as cognitive rather than spatial – yet, geography is surely important. What does the progress of a transition or niche look like in cities? Do we expect larger clusters of experiments or do they take on a different form? Van Doren et al. (Van Doren et al. 2016) differentiate between horizontal scaling up initiatives where ‘diffusion’ (Rogers 1995) occurs as a number of projects or initiatives replicate and spread out and vertical scaling up, where concepts, ideas, values and knowledge spread upwards (implying a vertical structure of governance) and/or otherwise become institutionalised, embedded in the mainstream, etc. (Bai et al. 2010). In any event, what Coenen et al. (2012) call ‘inter-localisation’ is actively constructed by low carbon innovators through socio-spatial struggles. Following those relationships and struggles reveals ways within which experiments might interrelate and ‘upscale’, in turn allowing improved understanding of relations between these experiments and the prospects for broader sociotechnical shifts.

While a spatial lens is a useful start, it does not address the question of whether (or to what extent), say, niche experiments might inhabit a city and gradually populate it spatially or the extent to which a city might act as an entity. This can be summarised as the ‘city transition as locus’ vs ‘city transition as nexus’ discussion, which will be taken up in more detail in Chap. 2. In the meantime, it is a valid question, we argue, for all studies of low carbon urban actions and experiments that are concerned with the prospects for wider urban transitions.

### ***1.4.3 Carbon and Consumption Context: Can a City Remove Its Own Bedrock?***

While this question is to some extent entangled with the two previous questions, it serves to emphasise further the challenges of low carbon governance. Carbon is urban bedrock; it is fossil fuels that have fuelled – literally and figuratively – the modern era of urbanisation. This is not to proclaim an inelastic or causal relationship between carbon emissions and urban growth, but rather to point out that the relationship has run deep, at least up to the present. The era of capital accumulation and rush to cities has been highly dependent upon an economic system of exchange where the environmental costs of fossil carbon-related (i.e. almost all) goods and services are ‘externalised’ or otherwise ignored. Cities have been built on the convenience of fossil fuels that have been extracted and utilised in such a way that the long-term global costs of doing so have been ignored. Cities are as such enabled through a tacitly agreed global environmental debt.

In this context, how does Transition Management translate to the specific, but somehow dispersed, idea of urban low carbon transitions, in cities where carbon consumption is quite literally ‘built in’ through combustion engine-based systems of private transport and through fossil-based grids of energy reticulation? While this question applies to some extent to transition studies more broadly than just in the context of the urban and to cities more broadly, there are particular reasons why the ‘bedrock’ concept applies to Australian cities (Horne and Fudge 2014). First, Australian cities are particularly high emission, low efficiency (in carbon per capita terms) by global standards. This has the effect of widening the gap between current trajectory and expected future trajectories. Second, the national economy is resolutely primary industry based, reliant upon cheap exports of fossil fuels. This has profound implications for national policy priorities and for the wealth of cities, which is based significantly upon providing financial and related services that are directly linked to fossil fuel extraction and export. Third, a succession of state governments since 2010, and federally since 2013, has made shifts of policy language away from climate change mitigation. The shifts range from outright climate change denial to a nuancing of policy settings towards adaptation or cost-benefit-based energy efficiency.

Of course, none of these settings are permanent, and there are a range of more progressive trends reconfiguring the economy, the policy rhetoric and the materiality and cultural practices of urban communities, as we shall see in the following examples. Moreover, in MLP language, there are landscape factors at play, with COP21 and the ongoing efforts towards international binding policy galvanisation around a 450 ppm CO<sub>2</sub> concentration maximum. In this scenario, global demand for coal will fall by 30% over the next two decades, giving way to a mix of energy efficiency and renewables. This scenario illustrates the exposure of the current Australian economy and urban configurations and perhaps explains why Australian cities are actively engaged in urban low carbon experiments, both locally and connected to international networks.

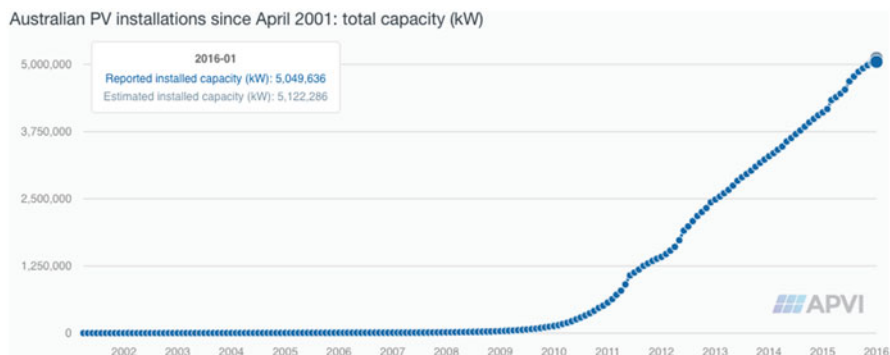
## 1.5 Domestic Perspectives: Two Case Examples

### 1.5.1 *The Great Australian Domestic PV Transition*

In striking contrast with its high fossil fuel dependency, Australia has managed a rapid shift in domestic PV from practically zero systems in 2007 to now (2016) having the highest proportion of households with PV systems on their roof of any country in the world. Over 15% of Australian households have solar panels on their roofs (some 1.5 million systems).

Initially, this may appear as a simple case of ecological modernisation in action using the tools of Transition Management. The ‘rational’ potential for domestic PV was apparent (Sivaraman and Horne 2013), and a set of federal and state market mechanisms were instituted to support the transition, with the result that a technical substitution was achieved, namely, the replacement of fossil-fuelled grid capacity with a distributed PV system owned by millions of householders.

However, there is more to the story. Firstly, the federal support via a generous Renewable Energy Certificates scheme was at least in part a rapid Keynesian response to the global financial crisis in 2008–2009, rather than a considered long-term strategy. Moreover, the rapid shift created genuine concern on the part of the private monopolies and large companies who have significant sunk assets in grid infrastructure. Following lobbying and a change of government, the subsidies were rolled back. States reigned in generous feed-in tariff arrangements, from 68c per kWh to 6c per kWh, against a typical fossil energy retail price of 25c per kWh. The closures and rollback of market mechanisms took place between May 2011 and September 2013. After this date, it was uneconomic under any ‘rational’ potential scenario for householders to invest. Yet, as shown in Fig. 1.1, PV installations have continued to the present with only minor ripples as the various schemes ended.



**Fig. 1.1** Solar PV installations in Australia since 2001 (Source: Australian PV Institute: <http://pv-map.apvi.org.au/analyses>)