GOVERNING LOW CARBON AND INCLUSIVE TRANSITIONS IN THE CITY:

A CASE STUDY OF NOTTINGHAM, UK

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ABSTRACT

This thesis critically examines the extent to which low carbon and equitable transitions are being achieved within urban areas in advanced economies. It draws on Nottingham as a single case study of a pioneering transition city in the UK context, with strong ambitions to become the UK's first carbon neutral city by 2028. Nottingham is a compelling example for examining what can be achieved in practice by an English unitary authority, and what constraints are experienced by local actors that inhibit urban sustainable trajectories.

Using a qualitative research design, I examine the key governing actors involved and their agency, the barriers and tensions encountered in their pursuits, and the approaches and pathways undertaken for progressing low carbon and equitable urban transitions. This thesis critically engages with academic ideas and political debate on sustainable transitions. Specifically, I use a multi-scalar perspective to investigate the actors involved in low carbon transitions, and by doing so, I draw upon multiple theories and perspectives to examine the governance of sustainable transitions (e.g. Avelino & Wittmayer, 2016; Geels, 2005; Kern & Alber, 2009). Whilst analysing urban transition processes particularly in the context of neoliberal austerity (e.g. Hodson & Marvin, 2015; Peck, 2012), I constructively engage with literature surrounding just transitions, and the ways in which sustainable pathways are also inclusive and equitable, focusing on the concepts of energy and transport justice (e.g. Jenkins *et al.* 2017; McCauley & Heffron, 2018; Mullen & Marsden, 2016). In this research I turn to the concepts of path-dependency, path creation and lock-in to analyse the approaches and pathways taken by urban actors for implementing low carbon and inclusive transitions, and to further explain past, present and future sustainable urban trajectories (e.g. MacKinnon *et al.* 2019; Unruh, 2000).

Beginning with a multi-level policy analysis, I reflect that climate change targets are weak, inconsistent and have omitted attention to social equity issues. As a result, low carbon and just transitions are insufficiently addressed in international policy, which in turn has constrained implementing national and local level climate change policy. From a national level, there are inconsistent and disruptive policy environments which are hindering low carbon urban just transitions, and I draw upon the context of national austerity, ambivalence of inclusive climate change policy and ineffective regulation. Barriers are also emerging because of local level contestation and demonstrate the more context-specific and spatial nature of urban transitions. Finally, I attend to the Nottingham example to reveal how agency and political capacity are particularly influenced by the type and size of local authority and actors in power. Lastly, I argue that the municipal ownership of energy and transport systems in the city has been imperative for political capacity to enact low carbon and just urban transitions.

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AUTHOR'S DECLARATION

I hereby declare that, except where explicit reference is made to the contributions of others, this dissertation is the result of my own work and has not been submitted for any other degree at the University of Glasgow or any other institution.

Signature: ……

Printed name: Katherine Helen Sugar

ABBREVIATIONS AND ACRONYMS

BEIS	Department for Business, Energy and Industrial Strategy
C2ES	Centre for Climate and Energy Solutions
CAZs	Clean Air Zones
CCC	Committee on Climate Change
CO^2	Carbon Dioxide
COP	Conference of Parties
DCLG	Department for Communities and Local Government
DfT	Department for Transport
DNO	Distribution Network Operator
DTI	Department for Trade and Industry
ECO	Energy Company Obligation
EIA	Environmental Impact Assessment
EROI	Energy Return On Investment
ESCo	Energy Service Company
ESRC	Economic and Social Research Council
EU	European Union
EV	Electric Vehicle
IEA	International Energy Agency
IMD	Index of Multiple Deprivation
IPCC	Intergovernmental Panel on Climate Change
ITUC	International Trade Union Conference
LEP	Local Enterprise Partnerships
LGA	Local Government Association
LGiU	Local Government Information Unit
LSOAs	Lower Super Output Areas
MaP	Multi-Actor Perspective
MDG	Millenium Development Goals
MLP	Multi-level Perspective of Socio-Technical Transitions
MtCO2e	Metric tons of carbon dioxide equivalent
NASA	National Aeronautics and Space Administration
NCH	Nottingham City Homes
NCT	Nottingham City Transport
NDCs	Nationally Determined Contributions
NLGN	New Local Governance Network
NO_x	Nitrous Oxides
OECD	Organisation for Economic Cooperation and Development
Ofgem	Office of Gas and Electricity Markets
ONS	Office for National Statistics
PM	Particulate matter
RDA	Regional Development Agency
SDGs	Sustainable Development Goals
SMEs	Small-medium enterprises
UCLG	United Cities and Local Governments
UK	United Kingdom
ULEV	Ultra Low Emission Vehicles
UN	United Nations
UNFCCC	United Nations Framework Convention on Climate Change
UNSD	United Nations Sustainable Development
UNSDG	United Nations Sustainable Development Group

WHO	World Health Organisation
WPL	Workplace Parking Levy
[…]	Indicates text removed
[ ]	Indicates text added

CHAPTER 1

INTRODUCTION

1.0. INTRODUCTION

The climate emergency is undoubtedly the single greatest global threat of the twenty-first century, and the shift to a decarbonised and equitable energy system has been subject to much debate across academic and political arenas. Particularly within recent years, there has been a spatial turn in transitions thinking which, in part, has led to an increased focus on the role of cities in implementing sustainable trajectories; primarily because of the high energy consumption, population growth and economic activity within urban areas, and the political (municipal) level which is closest to many citizens (e.g. Bridge *et al.* 2013; Bulkeley *et al.* 2014). In conjunction with this, the governance of sustainable urban transitions has attracted attention to investigating the plurality of actors involved in the implementation of low carbon societies (e.g. Becker *et al.* 2015; Rutherford & Coutard, 2014). Due to the pressing need to shift to more sustainable forms of living, the main purpose of this thesis is to critically examine the ways in which low carbon and equitable transitions are being achieved and constrained within urban areas in advanced economies.

This thesis is concerned with investigating contemporary sustainable and inclusive transitions in urban areas in practice. To achieve this, I examine the key governing actors involved and their agency, the barriers and tensions encountered in their pursuits, and the approaches and pathways undertaken for progressing low carbon and equitable urban transitions. In particular, I contribute to key academic and policy debates surrounding the multi-level governance of sustainable transitions and the array of actors involved in these processes across different scales (e.g. Avelino & Wittmayer, 2016; Geels, 2005; Hodson & Marvin, 2012). Additionally, I examine the processes involved, and especially pay attention to the role of lock-in, path creation and path-dependency in influencing cities' sustainable trajectories (e.g. MacKinnon *et al.* 2019; Unruh, 2000).

In this research I engage constructively with academic discourse on sustainable urban transitions by using Nottingham as a single case study to investigate the pursuit of low

carbon and equitable urban transitions in the United Kingdom (UK). As a pioneering transition city with strong ambitions to become the UK's first carbon neutral city by 2028, Nottingham is a compelling example for examining what can be achieved in practice by an English unitary authority and what constraints are experienced that inhibit urban sustainable trajectories. Notably, I offer new insights for understanding the political capacity and agency of local government actors in low carbon and sustainable transitions, particularly in the context of current conjunctures such as national austerity (e.g. Hannon & Bolton, 2015; Hodson & Marvin, 2015; Peck, 2012) and ambivalence to inclusive climate change policy (e.g. Fankhauser *et al.* 2018; Gillard, 2016; Lockwood, 2013).

This chapter offers an introduction to the thesis as a whole and is divided into four sections. In the first section I provide a background to the research context by introducing the global climate emergency, the synergistic relationship between climate change and inequalities, and the governance of urban low carbon and equitable transitions, particularly in the UK. In the second section I outline the research aim and objectives, and in the third section I present the main contributions of this research. Finally, I outline the structure of the thesis by presenting a summary of each of the seven chapters that comprise this thesis.

1.1. RESEARCH CONTEXT

1.1.1. Declaring a Global Climate Emergency

As of December 2020, global atmospheric carbon dioxide levels measured 415 parts per million, the highest recordings in human history (NASA, 2020). The scientific evidence of climate change is overwhelming – the source of these emissions is undoubtedly a result of anthropogenic activity, particularly since the latter half of the 18th century following the Industrial Revolution and the continuous large-scale burning of fossil fuels, such as coal, oil and gas. The rise of emissions and subsequent increase in global temperature pose significant environmental, social and economic challenges, many of which have already had, and continue to have, long-lasting and devastating global impacts, such as rising sea levels, irreversible changes in ocean currents, the hydrological cycle and fragile ecosystems, and more extreme weather events (UN, 2020).

Nevertheless, despite the abundant supporting scientific evidence validating the causes of climate change and its impacts on present and future generations, global emissions have

continued unabated (IEA, 2020a). Limiting global warming to (a conservative estimate of) 1.5 degrees Celsius above pre-industrial levels would reduce the challenging impacts on ecological systems, human health and well-being. There is an urgency to do this, with the Intergovernmental Panel on Climate Change (IPCC) stating that global warming must be limited by 2030 to avoid irreversible and catastrophic damage affecting people, ecosystems, and livelihoods all around the world (IPCC, 2018).

Tackling such unprecedented levels of atmospheric greenhouse gases is indeed a formidable task, although not insurmountable. Put simply, it involves a dramatic and spatial restructuring of social, political, technical and institutional systems that sustain everyday life, such as energy, mobility, water and waste (Bulkeley *et al.* 2014). This includes a large-scale reorganisation of the ways in which societies produce and consume energy, and a shift to incorporate more efficient, carbon-saving technologies and non-fossil fuel energy sources such as renewable energy systems, which do not have detrimental implications for present and future generations. Such long-term shifts are commonly known as sustainable transitions[1]. This thesis is positioned to examine more closely the large-scale transitions to more sustainable shifts of energy systems at the urban level.

1.1.2. The Nexus Between Climate Change and Inequalities

The global landscape is deeply unequal, with a rising trend in social and economic inequality for more than 70 per cent of the world's population (UN, 2020). Human-induced climate change involves the production of injustices which are socially and spatially uneven, and such injustices disproportionately affect the poorest and most vulnerable groups which have contributed the least to the issue (Bickerstaff *et al.* 2013). This is because the nature of inequality results in an increased exposure of vulnerable and disadvantaged groups to climate hazards and their ability to cope with pressures (UN, 2020). The World Bank (2020) estimates that climate impacts will perpetuate the existing global humanitarian crisis by pushing an additional 100 million people into poverty by 2030.

In conjunction with a transition to low carbon practices, the persistent and rising levels of social inequality on international, national and local levels which are exacerbated by climate change has raised the importance of social justice dimensions and the need for a

[1] I use this term interchangeably with 'low carbon' transitions, 'decarbonised' transitions, and sustainable 'trajectories'.

transformation that is inclusive, equitable and ethical. The concept of a 'Just Transition' originated alongside the environmental justice movement and trade union groups in North America during the 1980s in a response to protect jobs in vulnerable, carbon-intensive industries (Holifield *et al.* 2017; Newell & Mulvaney, 2013). Even though today there is no universally-accepted definition of a 'just transition'[2], social inequality and climate change are becoming increasingly recognised not only as two separate issues, but instead are intertwined and need to be addressed simultaneously to benefit all members of society (e.g. McCauley & Heffron, 2018). The current global pandemic of Covid-19[3] and its detrimental effects on humanity reinforces the critical sense of a need to tackle inequalities as part of a broader social-ecological understanding. A low carbon future must therefore not produce nor exacerbate inequalities, but instead should address these inequalities in order to progress a truly sustainable society, and hence is an important consideration underpinning this thesis.

1.1.3. Multi-Scalar Governance and Sustainable Urban Transitions

The transition to a decarbonised and just society is not simply confined to technical changes, but also requires political and institutional changes and is therefore undeniably a governance issue which is entangled with contestation and disagreement (e.g. Castan Broto & Bulkeley, 2013). Governance not only comprises state actors who have a key role in enabling low carbon transitions, but equally involves cooperation with non-state actors, for example non-governmental organisations, civil society and private enterprises; all of which have powerful competing interests at stake (e.g. Khan, 2013; Rutherford & Coutard, 2014). The collaboration of these actors across international, national and local scales, commonly referred to as multi-scalar or multi-level governance, is paramount for achieving decarbonisation. The signing of the legally-binding Paris Agreement (Conference of Parties [COP21]) in December 2015 – a commitment to limit global warming to well below 2 degrees Celsius above pre-industrial levels – was considered a pivotal moment for the international governance of climate change.

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[2] For the purposes of this research, I use the term 'just transition' interchangeably with inclusive, fair and equitable transitions.

[3] 'Covid-19' refers to the infectious coronavirus disease which has resulted in 2.1 million deaths globally as of January 2021 (WHO, 2021). The effects of this disease (generally and specifically to this research) are discussed in more detail in Chapter 3 Methodology and in the findings (Chapters 4, 5 and 6).

Particularly within recent years, cities[4] have become a focal point for governing low carbon and equitable transitions. Urban areas are home to more than half of the world's population and consequently account for 60 to 80 per cent of global energy consumption and 75 per cent of carbon emissions (Bulkeley, 2015; UN, 2020). By 2050, it is projected that more than two-thirds of the world's population will live in urban areas, putting even greater pressure on existing urban areas and services.

The current fossil-fuel based system that powers the world at large is at present economically, technically, socially, and geographically embedded (or 'locked-in') within society and its practices. This has resulted in an entanglement of corporate power with climate change which has been driven by free market-based logics within neoliberal ideology and policy (e.g. Ciplet & Timmons Roberts, 2017; Klein, 2014; Leitner *et al*. 2007). The fact that governments continue to allocate subsidies to fossil fuel industries, with a one-third increase since 2014 to more than $400 billion in 2019, despite the compelling evidence of climate change aptly illustrates this entanglement and incumbent embeddedness (IEA, 2020a; Klein, 2014). Such governance must in turn overcome this incumbent system which is particularly challenging in the context of actors with forceful and competing political and economic interests which operate on large profit margins and would suffer economically from such shifts (Rosenbloom *et al.* 2019; Unruh, 2000).

In parallel with this, the dominant political response to the 2008 financial crisis sparked a range of austerity measures and cuts to public spending which in turn have made, and continue to make, it increasingly challenging for governments and businesses alike to argue for such large-scale transformations, leading to a lock-in of existing technologies (Bigger & Millington, 2019; Peck, 2012). The financial implications of impacts are difficult to calculate, and many impacts such as the loss of human lives and biodiversity loss are problematic to value and monetise, which can further reinforce and entrench neoliberal logics and the marginalisation of social and environmental issues (Featherstone, 2013). However, by 2030, it is projected that climate change could cost the global economy $70-$100 billion annually (The World Bank, 2011). Therefore, in order to mitigate climate change impacts, current mainstream business models and forms of organisation need to be

[4] The concept of the 'city' is contested and I discuss my conceptualisation of the 'city' in more detail in Chapter 2. For the purposes of clarity, I use the term 'city' interchangeably with 'urban' and 'municipality'.

reconfigured and replaced to incorporate a massive reallocation of capital for sustainable systems, which have long-term perspectives that ensure social, environmental and economic benefits are achieved in a low carbon economy[5] (Fankhauser & Jotzo, 2017).

Consequently, it is increasingly acknowledged that all levels of government, particularly at the municipal level, are key actors in contributing to emissions reductions and have a central responsibility in tackling climate change (Bulkeley *et al.* 2013). In this context, municipal state and non-state actors (e.g. third sector, private sector, and civil society) have a fundamental 'agency' (broadly defined as one's ability to think, act, manage and intervene in a given process and situation[6]) in mitigating climate change, through their individual and collective capacity (Gibbs & Krueger, 2005). This is already demonstrated by the recent and growing number of cities across the world declaring climate emergencies and subsequently adopting new climate policies and mandating for further political action (Climate Emergency Declaration, 2020). In many cases, cities are actively going against the status quo of their national governments by declaring a climate crisis and moving towards sustainability governance and 'green growth' agendas, particularly during challenges of austerity (Featherstone *et al.* 2012; Gibbs & Lintz, 2016). The demonstration of cities is an apt illustration of recent local government climate activism, for example in the USA following President Trump's announcement to withdraw from the Paris Agreement in 2017, and in the UK in 2019 (Climate Emergency Declaration, 2020; Watts, 2017). This is in parallel with the cohort of citizens who are engaged in climate activism, particularly since 2019, such as Extinction Rebellion and Global Youth Strike movements, for example, Fridays for Future (Fisher, 2019).

The role of cities, and the governance and management of climate change occurring on a city-level is therefore a vital consideration in leading post-carbon transitions. The main purpose of this thesis is to examine the ways in which low carbon and equitable transitions

[5] The 'low carbon economy' can be considered as a narrower conceptualisation of the 'green' economy which has a general motivation to encourage growth in income and employment whilst also addressing concerns over enhanced global warming, climatic change and sea level rise (Gibbs & O'Neill, 2015). It is acknowledged that there are multiple and fluid discourses of the green economy, e.g. see overview provided by O'Neill & Gibbs (2016) and Krueger *et al.* (2017), however for the purposes of this thesis, these terms are used interchangeably.

[6] Agency is a concept which has been subject to much debate, particularly in social theory (e.g. Chouniard, 2008). It is understood here as concerning who makes decisions and on behalf of whom, and encompasses interventions which can be both in a passive and active manner.

are being addressed across sectors in urban areas by governing actors, and explores their agency in this pursuit, particularly in the context of neoliberal austerity.

1.1.4. Urban Low Carbon and Inclusive Transitions in the UK

Like many developed countries, the UK has made initial efforts to tackle climate change and social inequality on a national level. Whilst there has been a notable decline in greenhouse gas emissions (e.g. between 1990-2017, greenhouse gas emissions fell by 43%), the shift to a decarbonised society on a national level has been challenging due to competing and changing political objectives and subsequent inconsistent approach (Jennings *et al.* 2019).

Nottingham has been chosen for this thesis because it represents one of the most important examples of low carbon transitions in a city in contemporary Britain. Located in the East Midlands of the UK, Nottingham is an exemplar of a medium-sized city with prevailing social issues and it is not unique in this regard. While there have been improvements since 2007 and 2010, the city has persistently high levels of deprivation. According to the Indices of Multiple Deprivation (IMD), Nottingham ranks 11th out of the 317 districts in England, and approximately one third of Lower Super Output Areas in the city are in the worst 10 per cent nationally (Nottingham Insight, 2019a). This is concerning for the city in terms of overall well-being, but also in terms of environmental sustainability with poor levels of air quality, and an established 5.9 per cent of adult mortality (equivalent to 127 deaths) being due to exposure to human-made air pollution in the city in 2014. Access to low-cost heating and sustainable transport is therefore paramount to Nottingham since it has high levels of fuel poverty[7] (14.6 per cent) and low levels of car ownership, with 56.3 per cent of all households having at least one car in 2011 compared to 74.2 per cent in England (Nottingham Insight, 2019a).

City actors in Nottingham recognise these environmental and social challenges and as such have made laudable attempts at managing a low carbon and equitable transition within recent years. In January 2020, Nottingham City Council made headlines in the UK by committing to becoming the first carbon neutral city in the UK by 2028 (Nottingham City Council, 2020a; Ogden, 2019). Not only is this target ambitious and commendable, but it is also

[7] Similar to the concepts of energy poverty and energy vulnerability which capture problems of energy inaccessibility, fuel poverty (as per definitions used in England) refers to households as fuel poor if required energy costs are higher than that of the nationwide median, whilst pushing them below the official poverty line (Bouzarovski & Petrova, 2015, p.15).

distinctive in the UK by setting the city apart from others in terms of their climate goals. The purpose of this thesis is to develop a comprehensive understanding of the initiatives taken by an array of actors to address these inequalities whilst also progressing low carbon transitions, using the case study of Nottingham.

This thesis critically engages with political and academic debate on sustainable transitions. Specifically, I use a multi-scalar perspective to investigate the actors involved in low carbon transitions, and in doing so, I draw upon multiple theories and perspectives to examine the ways in which sustainable transitions are governed on local, national and international scales (e.g. Avelino & Wittmayer, 2016; Geels, 2005; Kern & Alber, 2009). Whilst analysing urban transition processes particularly in the context of neoliberal austerity (e.g. Hodson & Marvin, 2015; Peck, 2012), I critically engage with the notion of 'just transitions', and the ways in which sustainable pathways are also inclusive and equitable, focusing on the concepts of energy and transport justice (e.g. Jenkins *et al.* 2017; McCauley & Heffron, 2018; Mullen & Marsden, 2016). In this research I turn to the concepts of path-dependency, path creation and lock-in to analyse the approaches and pathways taken by urban actors for implementing low carbon and inclusive transitions, and to further explain past, present and future sustainable urban trajectories (e.g. MacKinnon *et al.* 2019; Unruh, 2000).

1.2. RESEARCH AIM AND OBJECTIVES

The aim of this thesis is to investigate the governance of low carbon and equitable transitions within cities in advanced economies. To achieve this overarching aim, I seek to answer the following four broad research objectives:

1. To identify the key governing actors (state and non-state actors) engaging with low carbon and equitable urban transitions.

2. To investigate the main tensions and barriers which are encountered by multiple actors in the pursuit of low carbon and equitable urban transitions.

3. To explore the key factors (e.g. initiatives, measures, conditions) in Nottingham that have helped in the implementation of low carbon and just transitions 'in practice'.

4. To examine the key policies on local, national and international levels which are progressing and hindering low carbon and equitable urban transitions.

For the methodology of this thesis, I use Nottingham as a case study to investigate low carbon and equitable urban transitions in practice. I examine the strategies across the city as a whole, and therefore use an integrated approach (which includes the sectors of energy supply, housing and transport) which in turn challenges the often-siloed policy and governing arrangements that separates energy supply from demand and urban form from buildings and transport (Moloney & Horne, 2014). This research consists of an intensive qualitative study investigating the four research objectives through conducting 35 semi-structured interviews with stakeholders within and out-with the city. These actors are largely made up of sustainability advocates, or those working within the field of sustainable transitions on local and national levels. In addition, this is supported and triangulated by documentary sources, observational research and site-specific visits.

1.3. THESIS CONTRIBUTION

Given the urgency of mitigating the dangerous impacts of climate change, the production of this thesis is timely and significant. Through focussing on the aforementioned research aims and objectives, this research brings together wide-ranging discussions of sustainable urban transitions in advanced economies. Broadly, this thesis makes a number of valuable and original theoretical, empirical and critical policy contributions by exploring the governance of low carbon and equitable transitions in practice. In doing so, this research situates itself (but is not restricted to) the sub-fields of energy studies, sustainable transitions studies, development studies and urban studies, and is interdisciplinary in nature to complement the multiple disciplines across which low carbon and equitable transitions can be understood, such as engineering studies, geography, and business studies.

This thesis responds to the urgency of climate change and adds to existing literature by providing a comprehensive understanding of low carbon transitions, particularly in urban areas, by answering critical questions of climate policy and governance. This is achieved by using in-depth qualitative methods to offer rich findings from a valid empirical urban case study, Nottingham in the UK. To date, the case study of Nottingham has been under-researched. Therefore, through a critical assessment of Nottingham's decarbonisation strategy, the empirical contribution of this research is novel by generating new knowledge

of equitable urban transitions in a medium-sized city in the UK, in contrast to the commonly studied 'premium world cities' which have received most attention within urban sustainability research (Hodson & Marvin, 2010).

This research takes a critical approach to existing theoretical and conceptual frameworks and assumptions to highlight key literary contributions and identify gaps and limitations. In particular, it contributes to discussions surrounding issues of governance and transition pathways. Importantly, I explore sustainable transitions by including social justice dimensions, and include a focus on actors and their agency to offer new insights into low carbon and equitable urban transitions and the tensions and barriers encountered in practice. As such, I operationalise a multi-scalar governance perspective and in turn move on from certain weaknesses of existing frameworks e.g. Multi-actor Perspective (Avelino & Wittmayer, 2016) and Multi-Level Perspective of socio-technical transitions (Geels, 2005). By engaging with perspectives of lock-in, materiality, path creation and ownership, I interrogate the approaches and pathways to a decarbonised and equitable transitions. From my conclusions in Chapter 7, I enhance urban transition understandings and make a distinctive contribution to sustainable and just transitions research by bringing these literatures together in a particular urban sustainability transition context in a UK setting. Through the culmination of these concepts and avenues of research, I conceptualise sustainable transitions as embedded in a model of decarbonisation, but which are also importantly shaped, constrained and contested by political, economic and social processes, and which seek to transform current patterns of social inequality and exclusion. In addition, this thesis is particularly valuable by examining urban transitions across sectors in a single integrated city case study. By adopting a cross-sectoral approach, this research offers a holistic view of urban sustainability since empirical studies, to date, are often restricted to examining one specific sector or domain (e.g. De Laurentis, 2012; Durrant *et al.* 2018; Hodson & Marvin, 2012).

1.4. THESIS STRUCTURE

This thesis is comprised of seven chapters, each serving a contribution to achieving the overall aim and objectives of this research. In this introductory chapter, I have provided a background to the research context, that is, the governance of low carbon and just urban transitions. In addition, I have briefly set out the key theoretical debates that I engage with.

I then follow this with an introduction to the research aims and objectives, methodological approach, thesis contributions and thesis structure.

In Chapter 2, I set out the conceptual framework underpinning this research by identifying key literary contributions and theoretical frameworks for understanding sustainable transitions, in addition to existing gaps and limitations within these which this research aims to fulfil. I have structured this chapter by critically discussing the four main themes in turn that comprise the conceptual framework: multi-level governance in sustainable transitions; cities in sustainable transitions; justice and inclusion in sustainable transitions; and approaches and pathways in sustainable transitions. I discuss the core concepts, each of which contribute to my conceptual framing and which I use to interrogate the empirical material of this research, and in doing so draw upon a wide range of academic literature.

In Chapter 3, I detail the methodology of this thesis and set out the underpinning research philosophy which is predominantly from a pragmatic and interpretivist standpoint that seeks to understand the practice of sustainable urban trajectories through agents' understandings and actions on the ground. It is pragmatic and interpretivist with the aim of understanding sustainable urban trajectories in practice by using combined methods. In this chapter, I introduce the rationale for the qualitative methodology through a single case study strategy using the city of Nottingham, and explain the different methods of data collection, such as interviews, secondary data sources and observational research and site-specific visits. This is followed by a discussion of how I coded and analysed research using a grounded theory approach. In the next section, I consider the research ethics in addition to researcher subjectivity, positionality and reflectivity. Finally, I critically reflect upon the research design by providing an account of conducting research of sustainable transitions in practice.

In Chapter 4, I provide the first empirical chapter for this research and utilise a multi-level perspective to discuss policy surrounding low carbon and equitable transitions, which also allows me to provide material as a contextual backdrop to the subsequent chapters. First, I offer an overview of developments in international policymaking, where I discuss in turn the uneven localisation of Sustainable Development Goals, weakness of legally-binding targets, and belated attention to justice elements. Second, I examine the national governance of climate change policy in the UK, then discuss the unsupportive and uncoordinated nature of this policy environment for achieving key targets, the lack of ambitious targets, and implicit reference to justice dimensions. Third, after providing a background to local government

policymaking in the UK, I focus in on Nottingham and examine the uneven climate policy between Nottingham's local authorities, unequal climate policy within Nottinghamshire County Councils, and piecemeal reference to justice dimensions. I conclude that across multiple-levels (that is, international, national and local) climate policy, there is a weakness of targets and subsequent uneven and fragmented policy whilst having inadequate attention to justice.

In Chapter 5, I present the second empirical chapter of this study and detail the ways in which sustainable transitions have been progressed in Nottingham. In this chapter, I first consider the type of local authority and subsequent political capacity of the local authority which is aiding Nottingham. Second, I examine the agency of local government actors for progressing sustainable urban transitions. Third, I pay attention to the role of path creation for governing urban trajectories in the Nottingham context. Finally, I explore the ways in which ownership has impacted local government capacity for shaping decarbonised and equitable transitions. Using a cross-sectoral approach, I identify initiatives and schemes which have been delivered on-the-ground, and which can be considered as facilitating low carbon and just transitions at the urban scale through municipal governance, leading to the provision of low carbon and affordable energy and transport. I conclude that from Nottingham's case: firstly, the type of local authority of urban areas influences political capacity to enact transitions; secondly, agency is highly contingent upon individual and collective local government actors; thirdly, path creation, lock-in and self-reinforcement has had a significant role in the implementation of low carbon urban equitable trajectories; and finally, municipal ownership of Nottingham's assets has been imperative for political capacity and implementation of sustainable transitions.

In Chapter 6, I provide the final empirical chapter for this research by focussing on the barriers which are experienced in practice when implementing low carbon and equitable transitions in Nottingham. Using a multi-actor and multi-level perspective, I first consider the barriers experienced by multiple actors that are arising from a national level which I contend are as a result of national austerity, ineffective regulation and government intervention, lack of direction and uncertainty, and government ineffectiveness in addressing social inequality. Next, I consider the barriers arising at the local level which are experienced by a host of actors and which impede effective urban governance. These obstacles are considered to be multi-faceted, that is, economic, political and cultural, due to competing prioritisations within the local council, problematic multi-actor engagement; and

behavioural change barriers. I conclude that agency and capacity of urban level actors can appropriately be categorised by firstly, national level barriers, which are predominantly economic, political, institutional and socio-economic, and dramatically impede urban actors at the local scale; and secondly local level barriers, which are more context-specific and highlight the localised day-to-day barriers experienced, such as economic, political, socio-cultural and behavioural change barriers.

In Chapter 7**,** I offer a concluding chapter to this thesis by providing a summary and synthesis of the main research findings and the ways in which the research questions have been answered. Furthermore, I provide some final reflections on the implications this research may have for policymaking regarding sustainable urban transitions.

In this chapter, I have introduced the thesis as a whole by providing a background to the research context of the global climate emergency, the synergistic relationship between climate change and inequalities, and the governance of urban low carbon and equitable transitions, particularly in the UK. I have outlined the research aim and objectives, the main contributions of this research, and the thesis structure. This chapter has presented the background context which is important for understanding sustainable inclusive transitions, as detailed in the next chapter.

CHAPTER 2

UNDERSTANDING SUSTAINABLE INCLUSIVE URBAN TRANSITIONS

2.0. INTRODUCTION

Sustainable transitions are above all an inherently political challenge and there has been a growth of debate surrounding who is responsible for their implementation, where sustainable transitions should occur, in what ways they should be equitable and inclusive, and the ways in which they should be delivered (e.g. Bulkeley *et al.* 2013; Haarstad, 2016; Hodson & Marvin, 2010). Such discourse has developed into a burgeoning field of research which argues for a more thorough examination of the governance of sustainable and equitable transitions and actor agency, the spatial dimensions of transitions, and the approaches and pathways used to achieve sustainable urban trajectories.

This chapter details the overarching theoretical and conceptual themes for understanding low carbon and equitable urban transitions. In doing so, I establish the theoretical and conceptual framing which informs this thesis, and the ways in which it is useful for considering the empirical findings outlined in Chapters 4, 5 and 6. More specifically, I critically engage with debates on the multi-scalar governance of sustainable trajectories, urban transitions, discourse regarding the inclusivity of transitions, and approaches and pathways in practice. This is through a critical analysis of current sustainable transitions literature and the aforementioned themes which are helpful for understanding the Nottingham case study.

This chapter is divided into five parts; I begin with introducing multi-level governance in sustainable transitions (the first core theme of this research). This has been subject to debate and within recent years there has been a shift to incorporate the different jurisdictional boundaries, the multiple levels of institutions, and the plurality of actors involved in sustainable transitions into theoretical frameworks (such as the Multi-Level Perspective of Socio-Technical Transitions by Geels (2005) and Multi-Actor Perspective by Avelino and Wittmayer (2016)). Despite the merits of these theoretical frameworks, they are limited in

their approaches to actors and agency, and therefore I provide a closer consideration of the conceptual themes of actors (such as state, non-state and network governance) alongside the concepts of agency and capacity.

In the next section, I draw attention to the scale of transitions and consider arguments of where and at what scale sustainable transitions should occur (the second core theme of this research). In doing so, I highlight the 'city' as a space which has become a focus for managing sustainable transitions, ranging from informal and restrictive governance to strategic and purposive action by municipal actors in particular. By conceptualising the city as an inter-related, fluid and complex assemblage rather than a nested and bounded political territory, I emphasise the changeable nature of cities and the governance of municipal actors within this space (e.g. Bulkeley *et al.* 2013). I reflect upon economic measures imposed from the national level, such as austerity, and reiterate the importance of maintaining a multi-scalar approach to urban transitions. In view of this, I examine the concept of austerity urbanism and its effect on sustainable trajectories in the contemporary setting.

Following this, I explore justice and inclusion in sustainable transitions (the third core research theme). In this section, I argue the ways in which sustainable urban transitions can be equitable and facilitate more inclusive processes, particularly during times of growing socio-economic inequality more broadly. The consideration of justice and inclusion has been largely omitted from mainstream theoretical frameworks for sustainable transitions (e.g. Hodson & Marvin, 2012). In light of this, I examine the conceptual frameworks for advancing understandings of justice in sustainable transitions, such as energy justice and transport justice, and the ways in which they are constructive for analysing low carbon urban trajectories.

In the fourth section, I focus on the processes and implementation of sustainable transitions in practice (the fourth core research theme). I examine the ways in which their trajectories can be supported or constrained by urban materiality, that is, the reciprocal and complex relationship between human and non-human agents. The main considerations which are useful for understanding these processes are the concepts of path-dependency, lock-in and path creation, which highlight the temporal aspects of agency and the place-based legacies of complex infrastructural systems on managing present and future sustainable urban transitions (e.g. Coe & Jordhus-Lier, 2010; MacKinnon *et al.* 2019).

Finally, I offer a conclusion that by considering national austerity as a contextual backdrop, the examination of governance and urban actors is fundamental for considering sustainable and just transitions at the urban scale, which are exposed to elements of lock-in, path-dependency and path creation and in turn can impede their progress.

2.1. MULTI-LEVEL GOVERNANCE IN SUSTAINABLE TRANSITIONS

The notion of climate change governance is broadly understood to be the range of actors (state and non-state) and forms (such as regulatory standards and carbon pricing) involved in climate change mitigation and adaptation (Meadowcroft, 2009). It is a key theme in sustainable transitions literature, yet remains highly contested with numerous meanings and implications through a variety of academic disciplines. To date, progress for the mitigation of climate change is considered to be insufficient on a global scale. With this in mind, scholars have drawn attention to novel, more integrated, progressive and effective governance[8] approaches to address present-day climate policy and action (Cole, 2015; Jordan *et al.* 2015*)*.

The notion of 'multi-level governance' is particularly significant in examining sustainable transitions and is therefore the first key theme of this research, as shown in **Figure 2.1**. The concept of multi-level governance (originally utilised in the context of the European Union [EU] to highlight multiple decision-making levels) has recently been drawn upon by scholars to examine sustainable transitions (Hickman *et al.* 2011). Broadly speaking, there are two types of multi-level governance which are adopted for sustainable transition thinking (Gustavsson *et al.* 2009).

The first type of multi-level governance is associated with government as the central governing authority and differentiates between administrative units (structuration levels) and

[8] Assessing the 'effectiveness' of climate governance has been subject to a proliferation of debate of the normative ideals of 'good' governance (e.g. Castan Broto & Westman, 2020; Dzebo, 2019; Mitchell, 2008). For the purposes of this thesis, the effectiveness of climate governance is generally understood as the extent to which initiatives, outputs and outcomes have contributed to reaching objectives, commonly referred to as goal attainment. This can be influenced by factors such as the behaviour of actors and their interests, the policies and performance of an initiative, the shaping of a system of rules and rule-making and the extent of orchestration, good process management and institutionalisation (Bulkeley *et al.* 2014; Dzebo, 2019).

is interested in the interaction between these levels. Such a view is considered 'state-centric' and useful for investigating state action, particularly the interaction and coordination between these levels, such as 'vertical' processes (which are structured by formal jurisdictions and hierarchical set of governance institutions), and 'horizontal' processes (which function between departments or institutions) (Haarstad, 2016).

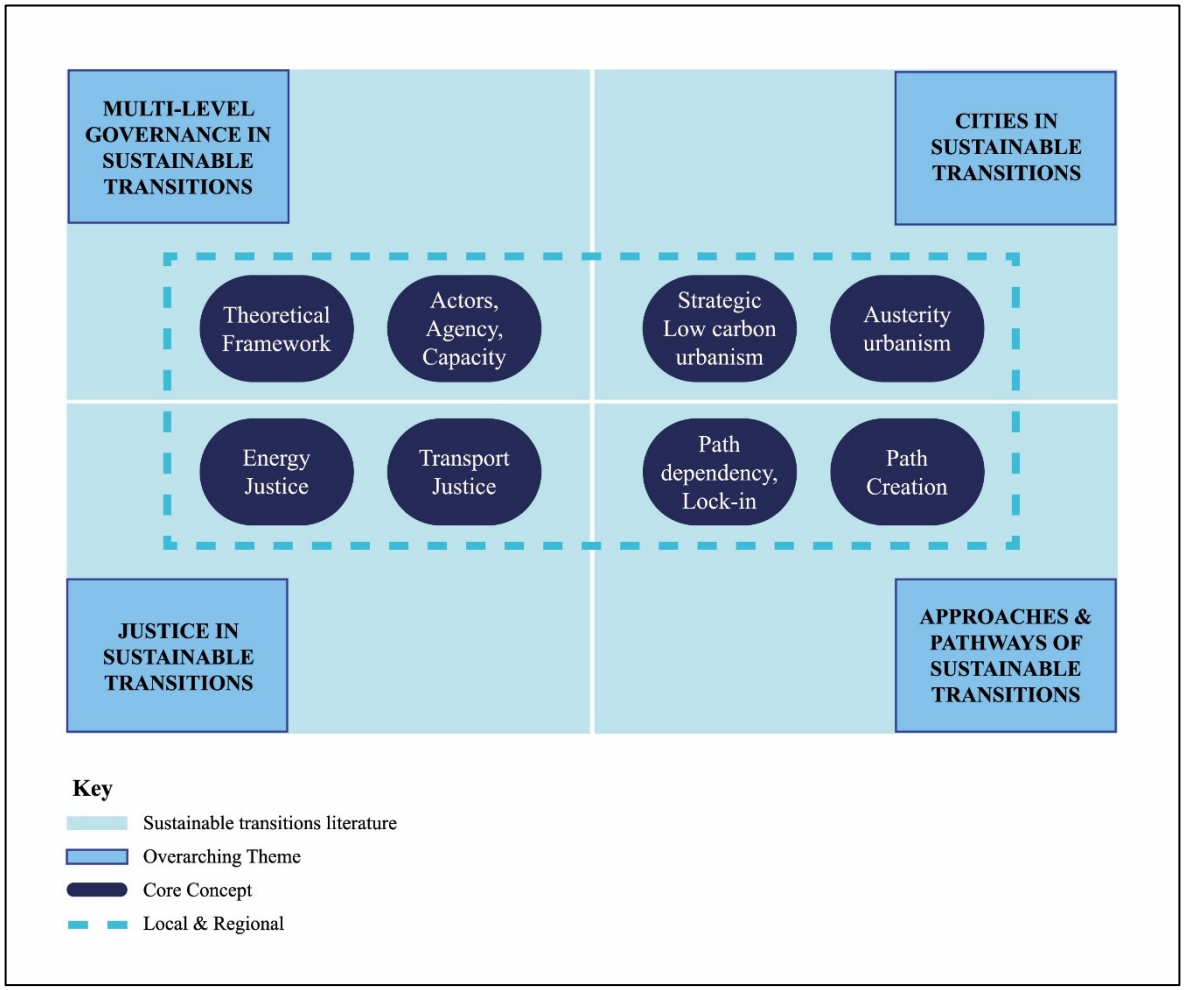

Figure 2.1: Conceptual Framework

The second type of multi-level governance is a result of recent discourse that has emerged surrounding 'new' modes of governance arrangements, which are less hierarchical, less linear and less formal. Instead, such arrangements are dominated by networks between private and public actors across levels of social organisation (Gustavvson *et al.* 2009). In contrast to mainstream classical approaches that focus primarily on the interaction between

nation-states, this 'new' governance approach takes into consideration and gives importance to the diversity of actors, such as sub and non-state actors, which co-ordinate over and across various scales (Emelianoff, 2014; Hickman *et al.* 2017). These concepts are therefore important by highlighting a more nuanced and relational geography to governance, and emphasise that configurations are produced through the relationships which actors engage and negotiate from different contexts which they are embedded within (Bouzarovski & Haarstad, 2018). Importantly, the politics of scale is not fundamentally about scale itself, but scalar politics are instead constructed out of the wider processes and institutionalised practices, that are themselves differentially scaled and therefore subject to contestation between various social actors, movements and organisations. This continuous renegotiation and reterritorialization means that discourse, contentious politics and power are central to these processes (Bouzarovski & Haarstad, 2018; MacKinnon, 2001; Massey, 2007). In other words, the concept of scale is a helpful analytical tool for considering the level at which negotiations take place, for whom decisions are made, and the territories across which agency is being sought (Coe & Jordhus-Lier, 2010).

Consequently, scholars (e.g. Avelino & Wittmayer, 2016; Geels, 2005) have sought to theorise the governance of sustainable transitions, and incorporate the different jurisdictional boundaries, the multiple levels of institutions and plurality of actors into theoretical frameworks. This has resulted in several different theoretical frameworks across multiple disciplines and it is not within the scope of this thesis to discuss each and every theoretical framework in turn[9]. Rather, there are two theoretical frameworks which I find particularly insightful for this research, the Multi-Level Perspective of Socio-Technical Systems and Multi-actor Perspective, as considered next.

2.1.1. Theoretical Frameworks of Sustainable Transitions

The Multi-Level Perspective of socio-technical transitions (MLP) is a well-established sustainable transitions framework that is particularly noteworthy. Firstly, this framework emphasises energy systems as complex arrangements of socio-technical systems which are comprised of, and co-produced by social and technical elements, which include technical systems, technology and materials, political and legal institutions, processes of design and

[9] Markard *et al*. (2012) provide a useful overview of additional sustainable transition theoretical and conceptual frameworks which include Strategic Niche Management (e.g. Rip & Kemp, 1998), Transition Management (e.g. Rotmans *et al.* 2001) and Technological Innovation Systems (e.g. Bergek *et al.* 2008; Hekkert *et al*. 2007).

social arrangements. Secondly, it seeks to conceptualise the overall dynamic of socio-technical transitions through applying three different 'levels': technological niche (micro-level), the socio-technical regime (meso-level), and the socio-technical landscape (macro-level) (Geels, 2005), as shown in **Figure 2.2**. Through applying these concepts and levels, the non-linear process of transitions is highlighted and subsequently placed into a hierarchy.

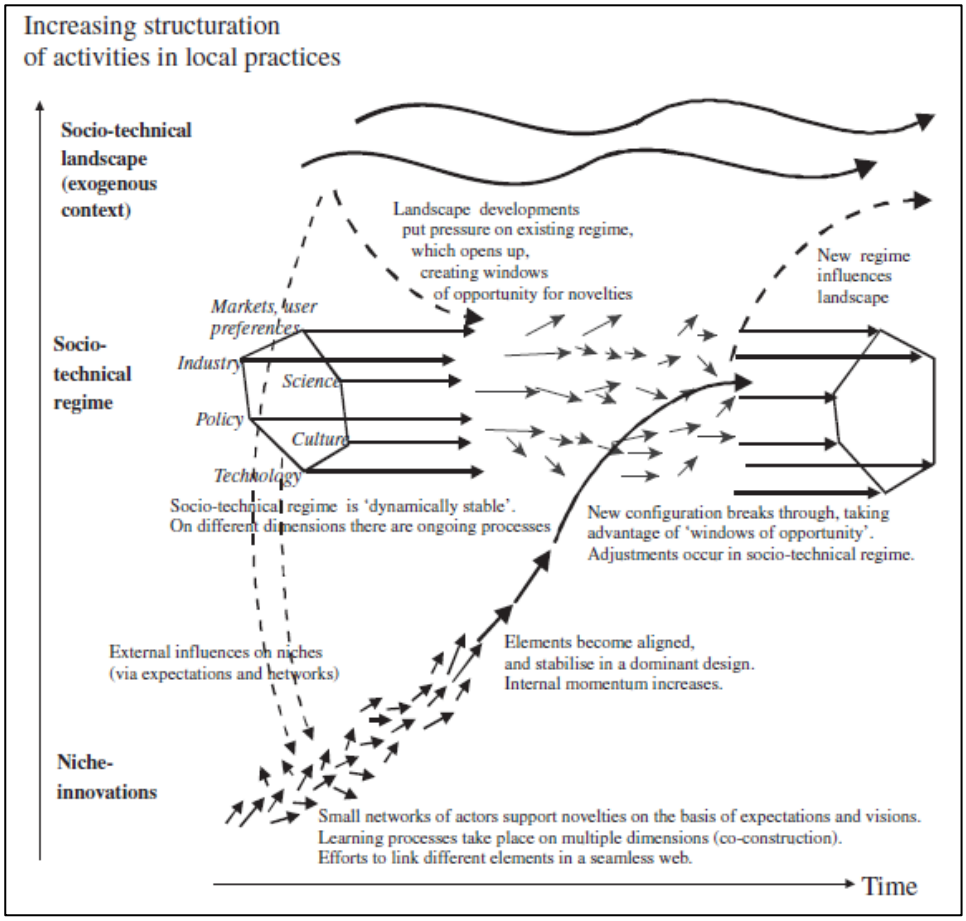

Figure 2.2: Multi-Level Perspective on socio-technical transitions (Geels, 2012, p.474).

To expand, the technological niche (micro) level is considered to comprise a space in which radical innovations or experimentation can develop (Markard *et al.* 2012). These places are considered to be less subject to market and regulation influences, dominant institutions and the status quo. As such, it allows for learning processes and social networks to evolve to support processes of innovation and radical alternatives (Gaziulusoy & Twomey, 2015; Whitmarsh, 2012). Pressures at the niche level gain momentum overtime and eventually compete with established technologies, build legitimacy for alternative environmental narratives (Castan Broto & Westman, 2020) and subsequently become intertwined within

the regime and cause transitions to occur. According to Pesch (2015) and Geels and Schot (2007), human agency is most recognisable at the niche level than at any other level due to the level of influence it has (such as articulation of expectations and visions). This in turn has stimulated notions that niches (i.e. the space in which radical innovations or experimentation can develop) are regarded as the most probable way for stimulating transitions (Fudge *et al.* 2016; Pesch, 2015).

The socio-technical regime is a level forming the dominant structure for which a technology is embedded, and which subsequently operates current practices, routines, rules, interests and belief systems (Geels & Schot, 2007). This (meso) level is a critical dimension in the development of the MLP theory, through acting as both an inhibiting factor reducing variety and deviations during the early stages of a transition, or acting as an enabling factor (Lawhon & Murphy, 2012).

The landscape level is determined by the macro-level political, economic, cultural, environmental and social developments that take place in the context of the transition, by exerting pressure or stimulating transitions through creating windows of opportunity for novelties on existing regimes, thereby contributing to the socio-technical transition theory (Geels & Schot, 2007). According to Fischer and Newig (2016), actors at the landscape level are contentious, since such macro-level developments are not attributed to individuals directly, but rather external factors as a whole. Broadly speaking, relationships between actors, structures and working practices become more aggregated towards higher levels, which also have slower dynamics (Hecher *et al.* 2016). The influence of changes at the landscape level on actors' role is therefore an important factor to consider.

As a framework, the MLP has several merits and is valuable for this research because of: first, the emphasis on non-linearity of transitions; second, its incorporation of society which is lacking in some other frameworks, such as Technological Innovation Systems (Bergek *et al*. 2008; Carlsson & Stankiewiecz, 1991); and third, the landscape level within the framework allows for contingencies such as external shocks to be considered (Geels & Schot, 2007). As such, the MLP has proved to be valuable for empirical studies of low carbon urban transitions.

For example, Whitmarsh (2012) investigates the functionality of the MLP to transport and sustainability transitions literature and commends the framework to be favourable for

stakeholder analysis, particularly since the MLP differentiates regime and niche actors who may behave differently. Whitmarsh *et al.* (2009) note in their research on mobility that niche actors were critical in reframing problems, ensured that alternatives to the status quo were considered within analysis and decision-making, and favoured modal shift and demand management policies. On the other hand, regime actors preferred technological innovation, and therefore these differences which can provide impetus to change the system, is a key insight.

Moloney and Horne (2015) agree that the MLP is a useful framework for understanding socio-technical transitions, but add that it is most useful when it is supplemented with ideas of social change and governance processes, including the role of intermediaries (the role of intermediaries is discussed in greater detail in Section 2.1.3). Through assessing multi-level governance in Australia, Moloney and Horne (2015) find that low carbon urban transitions are characterised through ad-hoc, divergent actions, rather than a coherent multi-level governance approach. They assert that multi-spatial governance is emerging in a nascent form via coalitions of organisations and actors, which in turn are helping to drive changes at both the niche and regime scales through energy infrastructure projects and urban retrofitting (p.2450).

Finally, Fudge *et al.* (2016) employ the MLP during their study of energy governance of local authorities in the UK. Whilst they consider that their empirical results demonstrate a more complex relationship between niche and regime level than what is represented by the MLP, local authorities mostly act as regime actors in transitions, meaning that some local authorities have challenged the dominant regime and become more active players in energy governance. Fudge *et al.* (2016) found that there are possibilities for local institutions to act as catalysts in sustainable transitions and develop as niches in certain areas, however barriers exist at the regime level for influencing energy agendas, for example, the lack of political influence and clear guidelines at the national government level, which is a particular issue in the contemporary UK context. These studies therefore highlight the multiple and varied agency of actors at niche and regime levels, and the ability of local institutions to progress transitions, thus clearly having a valuable contribution for understanding governance.

However, the MLP has been critiqued as having a lack of attention to the role of agency with regard to different actors or social groups (Fischer & Newig, 2016; Pesch, 2015; Smith *et al*. 2010; Whitmarsh, 2012). Moreover, the focus on the rules governing the regime, and not

who creates and benefits from these decisions, reinforces the notion that socio-political aspects of the MLP are particularly narrow (Lawhon & Murphy, 2012), and the wider exclusion of justice persists (as noted in Section 2.3.1). Klitkou *et al.* (2015) criticise the framework in its approach to carbon lock-in (a concept used to describe the process of carbon-intensive, fossil fuel-based technological systems persisting over time, and discussed further in Section 2.4.3). Klitkou *et al.* (2015) argue that the MLP does not provide sufficient explanation of the specific mechanisms through which lock-ins become manifested, such as institutional or technological lock-in.

A further criticism is that too much emphasis is placed on technological niches as the principal factor for regime change (Berkhout *et al.* in Elzen *et al*. 2004). Additionally, Foxon (2011, p.2261) commends the model for providing 'many useful insights, [but] it tends to neglect economic variables that can significantly influence transitions and which are central to policy analyses'. Foxon (2011) therefore advocates for a co-evolutionary framework to be incorporated which would seek to account for both mutual stability and dynamic interactions between systems.

The MLP theory is further critiqued for having a simplistic sense of scale, place and space. This can limit understandings of sustainable transitions and the conflicts and tensions experienced by the economic, institutional, social and cultural territories in which sustainable transitions pathways are embedded and manipulated (Coenen & Truffer, 2012; Gibbs & O'Neill, 2014; Smith *et al.* 2005; Smith *et al.* 2010). In addition, the language that is used in the MLP such as niche, regime and landscape can lead to issues with operationalising these key concepts and applying them empirically, especially when thinking of scale (e.g. Bouzarovski & Haarstad, 2018). In response to these critiques, Geels and Schot (2007) attempt to refine their model and consequently it has been evolving over recent years. Therefore, whilst this framework has been developed to aid the understanding of a wide range of historical and hypothetical transitions (Bolton & Foxon, 2010; Hoppe *et al*. 2016), the broad nature of this framework and lack of aforementioned themes are restrictive.

Furthermore, Avelino and Wittmayer (2016) have developed the Multi-actor Perspective (MaP) to address the research gap for a systematic understanding of actors in transition processes. In this framework, the authors usefully clarify distinctions and levels of aggregations of actor categorisations of both individuals and organisations. In doing so, actors are based on general characters and logics of sectors (i.e. formal vs informal, public

vs private, and profit vs. non-profit), as shown below in **Figure 2.3, Figure 2.4** and **Figure 2.5**.

Particularly for this thesis, this heuristic framework is valuable by distinguishing the role of actors and their sectors, thereby addressing the complex and various range of actors into a clear and comprehensible framework. Despite the advantages of this framework, it can be argued that it oversimplifies the complex relationship between these actors by having a too rigid structure and is therefore limited in its approach for representing inter-actor dynamics. In light of this, it is important to examine the agency and capacity of actors more closely, as described next.

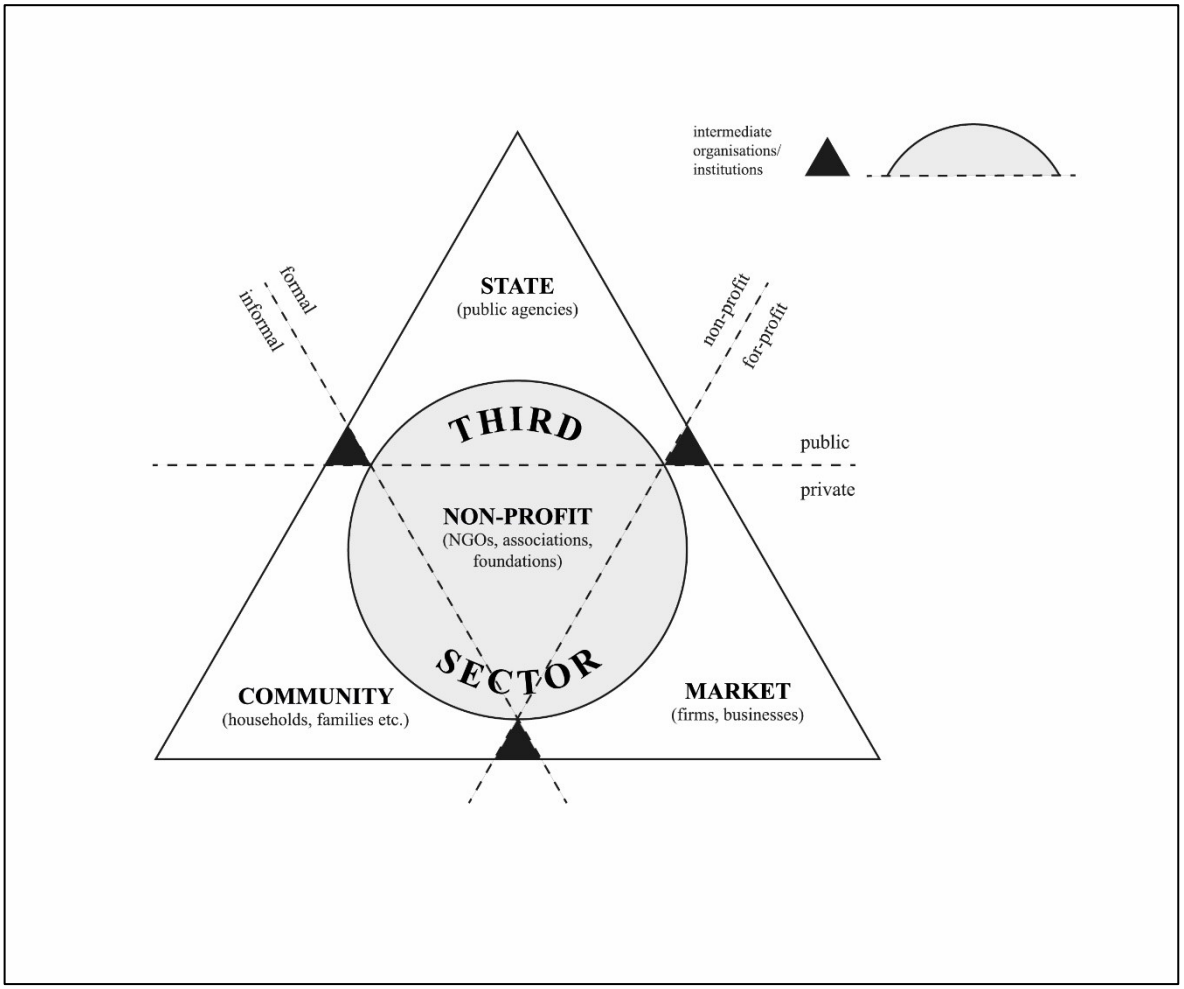

Figure 2.3: Multi-actor Perspective: level of sectors (Avelino & Wittmayer, 2016, p.636).

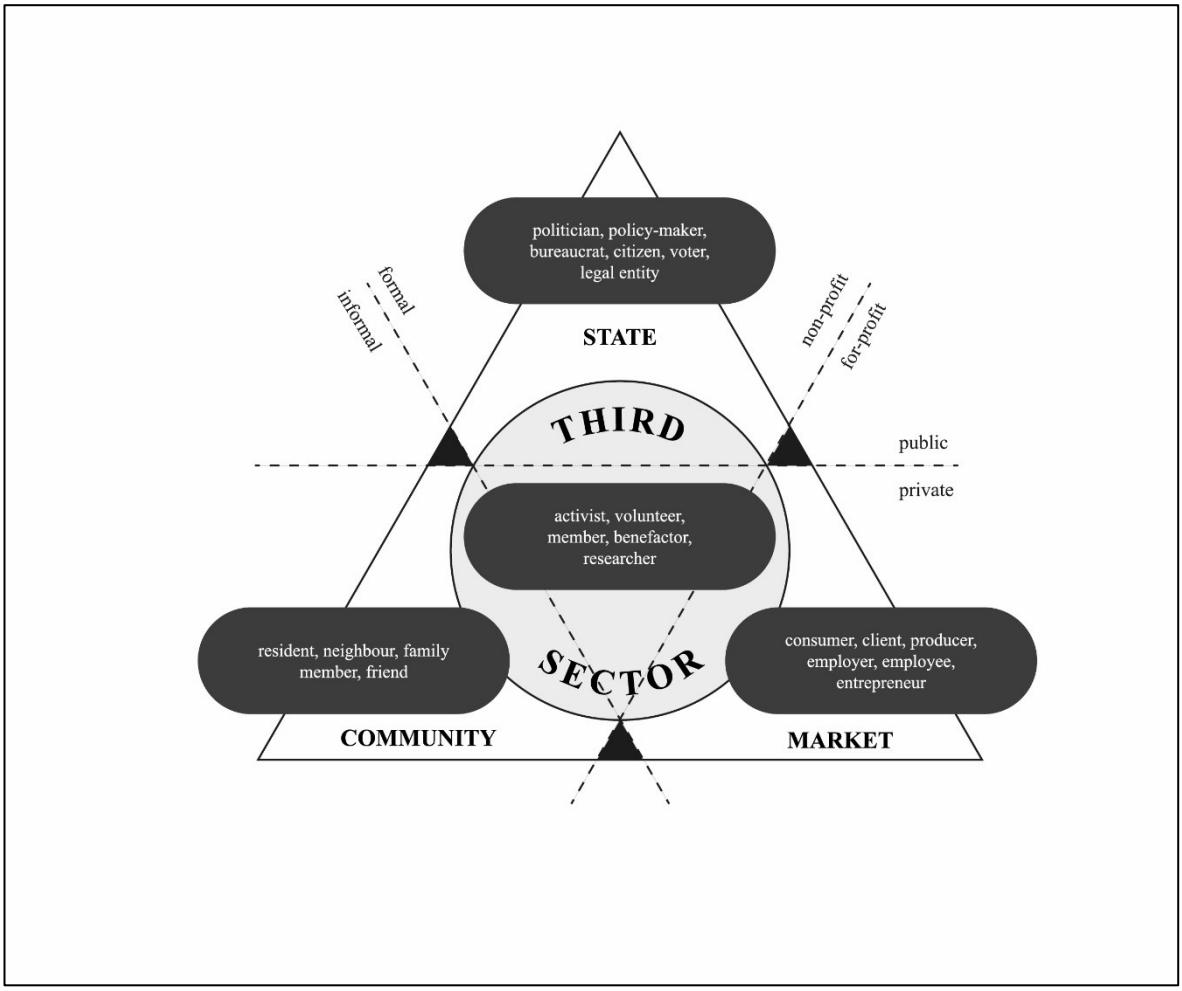

Figure 2.4: Multi-actor Perspective: level of individual actors (Avelino & Wittmayer, 2016, p.637).

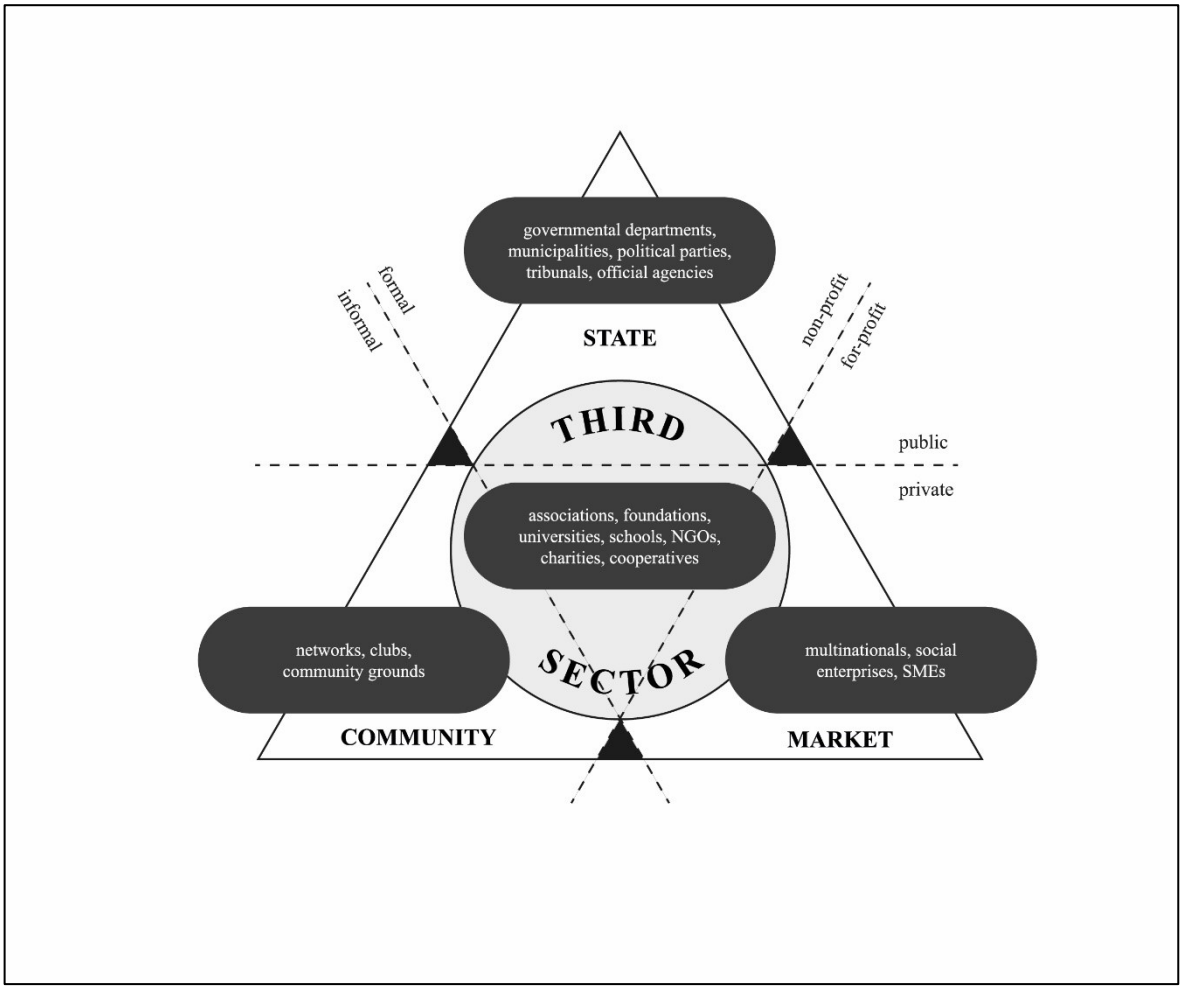

Figure 2.5: Multi-actor Perspective: levels of organisation (Avelino & Wittmayer, 2016, p.638).

2.1.2. Actors, Agency and Capacity

Whilst there are a number of theoretical frameworks which develop a whole-systems understanding of sustainable transitions, the role of actors has received insufficient attention within dominant concepts and frameworks (Pesch, 2015). As such, scholars (e.g. Avelino & Wittmayer, 2016; Geels, 2005) have utilised the multi-level approach to emphasise the multiplicity of actors governing transitions.

There are numerous studies which focus on the types of actors (i.e. the individuals and collectives as participants in attempts to prevent, sustain, or generate change) and their agency (i.e. their behaviour) in isolation (Fischer & Newig, 2016). For the benefit of understanding the governance of sustainable transitions at the urban level, this can be

broadly categorised into three separate types: state actors, non-state actors, and networks and intermediaries, as examined in turn next.

STATE ACTORS

State actors can be categorised into those at various political levels, such as national, regional and local. The latter, i.e. local municipalities, have become a popular subject of analysis at the city scale and are widely recognised to have a key role in sustainable transitions (e.g. Bulkeley & Kern, 2006; Busch & McCormick, 2014). There is an established collection of studies which take into account local government roles in sustainable transitions and are therefore valuable for this research and the understanding of state agency and capacity.

For example, local governments are considered to work as 'nodes' in the wider system of climate governance (e.g. Franzen, 2013). Recent work by Kern and Alber (2009) and Nagorny-Koring (2019) has usefully categorised climate mitigation activities enacted by municipalities into different modes: self-governing; governing through enabling; governing by provision; governing by authority (Kern & Alber, 2009); governing by numbers; governing by experiments and governing by diffusion (Nagorny-Koring, 2019). Such an analytical tool is helpful particularly for conducting comparisons between local governments and assessing their roles within climate governance.

As well as identifying the practice of municipalities, the investigation of policy is an important component for identifying local government's implementation of climate mitigation strategies. A recent international survey by Castan Broto and Bulkeley (2013) contends that urban actors are the most active participants in carbon governance with relation to experimenting with new policy responses, in comparison to national or international actors. Such findings demonstrate that a new urban energy governance is evident in some case studies at the local level, both through policy implementation and more practical forms of governance (Rutherford & Jaglin, 2015).

Whilst such contributions are useful for understanding transitions, the existing categories of actors (e.g. 'frontrunners', 'champions', 'policy entrepreneurs', 'green entrepreneurs') are diverse. Although there has been a focus on developing typologies as opposed to investigating their transformation roles (O'Neill & Gibbs, 2016), there are to date no universally-recognised classifications of actors within the sustainable transitions literature, which therefore remains problematic for future conceptualisations of urban low carbon

transitions. Furthermore, it is observed that local governments are heavily dependent on other levels of government, e.g. regional or national actors, and it is therefore important to include the investigation of these roles, in other words, using a multi-scalar lens.

Interestingly, Franzen (2013) reflects that the hierarchy of jurisdictions are bound to geographical space, therefore cities are inhibited to take action outside their municipal areas. Such findings are significant for investigating urban low carbon transitions. First, this reinforces the importance of a multi-level governance approach to avoid a static image of agency and the neglect of other actors' involvement in sustainable urban transitions, whilst second, this emphasises the ways in which political levels can impact on actor capacity for sustainable transitions. In addition, Coe and Jordhus-Lier (2010) importantly assert that agency not only refers to collective action, but also refers to individual action, which can be closely related and shaped by the spaces and scales that actors inhabit in an uneven and culturally differentiated world. This fluid, varied agency of actors across multi-scalar levels is therefore related to and contested because of the broader and differentially scaled processes and institutionalised practices of such actors (MacKinnon, 2010), which is critical for understanding the governance of low carbon and equitable transitions.

The empirical studies of actors and their agency at national levels is scarce within urban low carbon transitions[10] (Fischer & Newig, 2016; Willis, 2017), with the focus predominantly on policy documents and plans with regard to national level implementation. An interesting contribution of this type of policy analysis is the study of visions and priorities which are 'translated' through national policy and Hodson and Marvin (2010, 2012) examine whether this is in fact adopted and responded to on a city-level. Hodson and Marvin (2010, 2012) make useful contributions in terms of identifying national priorities around energy and climate change, by reflecting upon the messy politics of urban responses and the dominance of national and economic priorities for decarbonisation transitions in Manchester. Cochrane (2019) reinforces the tensions between wider visions and more localised ambitions whilst discussing investments in transport infrastructure and affordable housing in the UK, and highlights the ways in which governing processes and existing local government boundaries are being reworked and redefined. Clearly, whilst these kinds of agency are on different

[10] Although it is acknowledged that this may be difficult for empirical research due to the nature and feasibility of speaking with national politicians.

political levels, they nonetheless can influence local actor agency and alter governance and subsequent urban transition pathways.

Furthermore, while some progress has been made researching multi-level actors and their agency at the urban level, there remains confusion and diverging conceptions regarding the respective roles of national and local governments in terms of what leadership and regulation in the energy field should be, and how they should be coordinated. Notably, even when local agency has been created and provisions have been made to give local authorities capacity for shaping urban low carbon transitions, there are often dimensions on a national level (e.g. grid constraints, policy, funding constraints) which simply cannot be surpassed without the involvement and cooperation of national actors (Jaglin, 2013).

It is important therefore to reconnect or re-embed notions of agency into wider spatial and scalar considerations, that is, the economic, political and societal systems which surround actors (Coe & Jordhus-Lier, 2010; Meadowcroft, 2011). This point is echoed by Amundsen *et al*. (2010) who demonstrate in their study of municipalities in Norway that a key barrier to climate change adaptation is the relationship between local and national governments. They argue for a framework whereby national government 'gives a clear role to municipalities through setting goals, creating regulations, and financing adaptation processes for the local governments to implement' *(*p.286). In addition, Fuchs and Hinderer (2014) take a critical stance and argue that sustainable energy transitions are not following a master-plan nor coordinated from a national level because existing plans do not state how and by whom and with what technologies renewable energy goals should be achieved. Instead, 'upper political levels […] pose severe constraints for the implementation of local transition initiatives' (p.4). Such critiques are significant by highlighting the lack of capacity and support which limit delivering a multi-level approach in practice (Jaglin, 2003 in Rutherford & Coutard 2014). These contributions reiterate two important points. Firstly, it is important to consider the extent to which national governments are enabling or hindering low carbon transitions at urban scales, and the role of policy and strategy for delivering sustainable transitions. Second, attention should be given to the ways in which the agency of state actors across different political scales can be constrained. It is therefore valuable to consider the agency of non-state actors, as described next.

NON-STATE ACTORS

Non-state actors (also used interchangeably with 'civil society') is not solely limited to individual, household and community-level organisations, but has become a term used to describe a wide array of non-governmental and not-for-profit organisations (commonly known as 'third sector organisations'). Third sector organisations are generally separate entities to government and private bodies. They are interesting on the whole since they have a close proximity to citizens and offer unique opportunities for promoting behavioural change, policymaking and the potential to innovate. As such, there are a growing number of studies of the role of non-state actors in urban low carbon transitions (e.g. Buchs *et al.* 2012; Hall *et al.* 2015; Nasiritousi, 2016).

A particularly valuable study for this research is that completed by Buchs *et al.* (2012) which provides a review of the role of third sector organisations with regard to pro-environmental behavioural change. Whilst acknowledging that behaviour change is difficult to observe and measure, the study does find evidence of positive changes in citizens' day-to-day activities, for example recycling or energy-saving activities. Buchs (2014) develops this notion by comparing and contrasting the effects of direct and indirect involvement of environmental third sector organisations, particularly since a body of literature suggests that informal, voluntary behavioural change (as encouraged by environmental organisations) is potentially more effective long-term than changes that follow from formal government intervention (p.1003). Using the case study of the UK, Buchs (2014) confirms that direct forms of engagement with the public are effective in carbon-reducing behaviours. However, carbon-reducing behaviours are not simply associated with the involvement of environmental organisations, but were also strongly correlated with indicators of social disadvantage e.g. low education, income and employment status. This is notable by illustrating that environmental organisations are engaging with those citizens who are sufficiently able to participate in high-carbon activities initially therefore raises a justice dimension as well. Nevertheless, this demonstrates that third sector organisations are fulfilling a necessary role by engaging with citizens at the local level to promote environmental behavioural change, though it is worth noting that different third sector organisations do this on different terms.

In addition to the consideration of third sector organisations, the private sector (also referred to as market actors) is another significant actor to consider in sustainable transitions. The dichotomous divide between the public and private is a crucial ordering device in social life

which has been subject to much debate surrounding governance (Pattberg & Stripple, 2008). This is particularly in response to the neoliberalisation of governance (i.e. the 'hollowing out' of the state in environmental protection), such as the privatisation of water and energy in many developed countries (Reed & Bruyneel, 2010). Such liberalisation and privatisation to date has left the energy market dominated by large multinational private corporations, which has led to the presence of incumbent actors and oligopolies, for example the 'Big Six'[11] energy companies in the UK which supply circa 95 per cent of domestic and 80 per cent of commercial consumers (Hall *et al.* 2015; Lockwood, 2013). This strong market-oriented approach to energy was advocated for the perceived possibilities of broader improvements of services, greater investment in infrastructure assets, increased research and development, greater economic efficiency and lower energy prices, and socially optimal outcomes (Bolton & Foxon, 2015; Pond, 2006).

However, the private sector's involvement in the energy market and the legacy of privatisation on delivering sustainable transitions today is subject to much criticism. Chiefly, it is argued that energy privatisation has resulted in a lack of investment and research, development and innovation, and was orientated around profit-driven motives of a narrow set of financial and vested interests which consequently pushed costs onto consumers, increasing fuel poverty (Pollitt, 2012). Furthermore, Hall *et al*. (2015) criticise private energy companies and the inability of consumers to comment on how surplus profits are reinvested, which evokes justice considerations. They refer to this anti-democratic organisation as a 'carbon web', meaning 'the set of legal, cultural, financial and government institutions that enable them and prevent democratic control' (Hall *et al.* 2015, p.4) thereby linking in to discourse of lock-in, dependency and power relations (as discussed further in Section 2.5).

Such studies not only highlight the importance of identifying the role of non-state, private actors in present-day sustainable transitions, but the ways in which past activity can influence future trajectories. Yet, the studies of private actors in energy transitions are generally in their infancy (Castan Broto & Westman, 2020). Whilst they shed light on the financial significance of private actors, they do not break away from the neoliberal framing of debates, nor investigate other roles of private actors, nor additional dimensions of their

[11] The 'Big Six' are the UK's largest energy suppliers which include Scottish and Southern Electric (SSE), EDF Energy, British Gas, E.ON UK, Scottish Power and RWE Npower.

agency (e.g. increased knowledge, skills, innovation), therefore revealing a substantial gap within low carbon transitions literature. The combination of state and non-state actors is an alternative form of governance for sustainable transitions, as described next.

NETWORKS AND INTERMEDIARIES

In the context of energy transitions, network governance can be understood as:

> a shift from traditional hierarchical governance where the state is the regulator, to looser forms of governance, where private actors such as businesses and NGOs, increasingly participate in policymaking (Khan, 2013, p.134).

Network governance is often comprised of social exchanges and characterised by common aspirations. As such, it can be viewed as an example of a 'new' form of governance arrangement and configuration that is witnessed within sustainable transitions, whilst also relates to the different ways of considering the geographies through which governance operates.

A particularly prominent example of network governance and 'new' forms of governance in the energy sector is the role of Energy Service Companies (ESCo). Using a UK perspective, Hannon and Bolton (2015) discuss the collaboration of local authorities, private sector and third sector organisations in the energy sector in the emerging form of ESCos, which are organisations which provide customers with energy services and relate to the physical benefit, utility or good that consumers derive from energy (Hannon & Bolton, 2015). Crucially, ESCos are heralded for having strong environmental, economic and social well-being dimensions to their development (e.g. reducing the effects of fuel poverty) since the nature of some ESCo energy networks (e.g. combined heat and power) is often more energy efficient and low carbon than conventional market-led energy supply from private companies that exist in the UK.

Notably, local authorities have been commended for pursuing an active governance in the ESCo network arrangement, and as such has engaged scholars to consider sustainability transitions from a governance perspective. Hannon and Bolton (2015) usefully highlight that there are three common forms of networks which have emerged within ESCo models, that is, 1) Local Authority-owned 'arm's length' model (an example is shown in **Figure 2.6**); 2) Private sector-owned concession agreement model; and 3) Community-owned and run model.

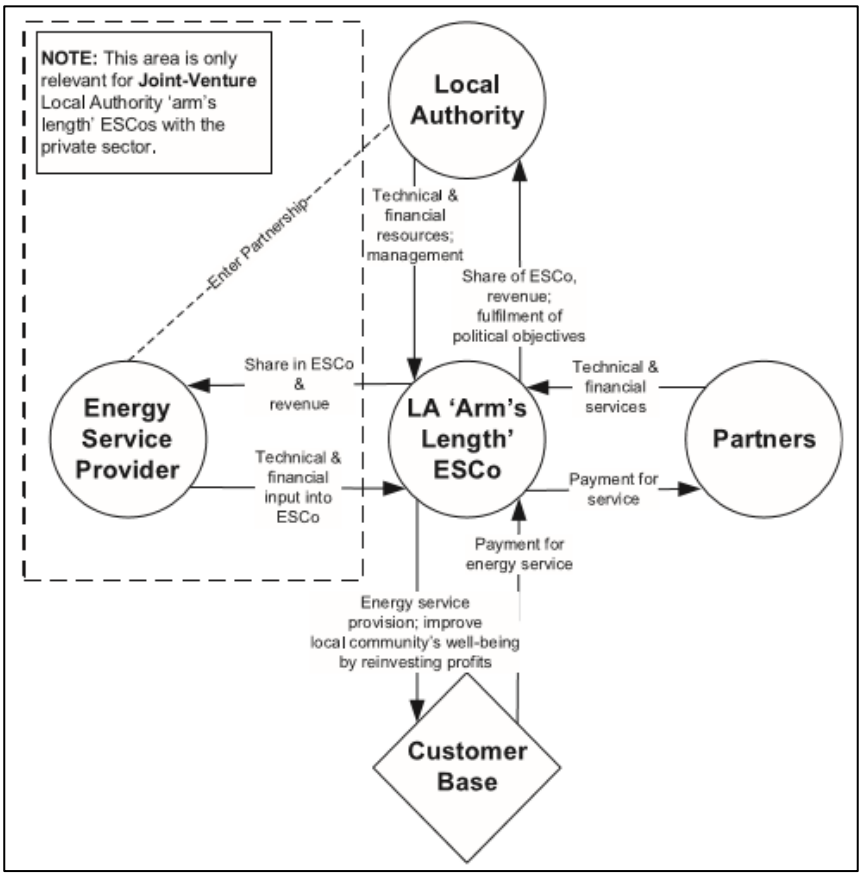

Figure 2.6: Local authority 'arm's length' Energy Service Company (Hannon & Bolton, 2015, p.203).

Cumbers (2012 in Cumbers & Hanna 2019, p.3) evaluates the effectiveness of various forms of non-private (state and non-state) collective ownership in terms of tackling climate change, decision making, and social and ecological justice principles, as shown in **Table 2.1**. Whilst there are merits and limitations for each of these models (these discussions are out-with the scope of this thesis), they are generally merited by stakeholders for predominantly sharing risk and allowing for strategic and coordinated control across actors with different priorities and structures. Although this is not investigated within this study, the authors comment on the contribution of network arrangements such as ESCos in meeting urban sustainable transition targets. Crucially, Yildiz *et al.* (2015) use the example of energy co-operatives to illustrate their role in renewable energy projects, and emphasise the variable ownership structures in place, in that they can be completely owned by communities (and additional crowd-funding investors) and/or developed in co-ownership with private or public sectors.

Objective	*Form of ownership*	*Rating*
Commanding heights Securing public control of the economy's strategic sectors	FSO	++
	RSO	+
	PSO	+
	LMO	+
	PC	=
	CC	-
	EO	-
Local community control Achieving greater local community control over decision-making	FSO	-
	RSO	+
	PSO	-
	LMO	++
	PC	+
	CC	+
	EO	+
Distributional justice Achieving distributional justice (equal and fair provision across a national/regional territory)	FSO	++
	RSO	+
	PSO	+
	LMO	+
	PC	-
	CC	+
	EO	-
Environmental sustainability Achieving environmental sustainability and tackling climate change	FSO	++
	RSO	++
	PSO	+
	LMO	++
	PC	=
	CC	=
	EO	=
Enhance participation/class justice Developing great participation in decision-making	FSO	=
	RSO	+
	PSO	=
	LMO	+
	PC	++
	CC	++
	EO	++

Key: FSO (Full state ownership); RSO (regional state ownership); PSO (partial state ownership); LMO (local/municipal state ownership); PC (producer competitive); CC (consumer competitive); EO (employee ownership)

+ positive effect; - negative effect; = neutral

Table 2.1: Evaluating effectiveness of public ownership forms (Cumbers, 2012, p.165).

In addition, 'intermediaries' have emerged as a line of empirical enquiry for low carbon transitions. As defined by Hodson *et al*. (2013), these are similar to networks in that they are comprised of:

> a wide variety of organisations that includes government or semi-government energy agencies working at different scales of governances, non-governmental organisations, agencies sponsored by utilities, ESCos etc. (p.1404).

Intermediaries are involved in a diverse range of services such as: energy advice centres; consultancy; energy audits; project initiation, management, financing and coordination; training; education; and network-building (p.1405). As such, the agency of intermediaries is varied by the relational work that they undertake, which is fundamentally shaped, contested and negotiated by the wider socio and political relations and contexts (Van Veelen, 2019).

The role of intermediaries has been closely examined with relation to socio-technical transitions and niche development (e.g. Bird & Barnes, 2014; Bush *et al.* 2017). On a national level application, Bush *et al.* (2017) apply the notion of intermediaries to district heating in the UK and assert that intermediaries facilitate knowledge sharing and have the capacity to build wider networks and systems which support innovations. Using a multi-level approach, Bush *et al.* (2017) find that national intermediaries can be separated into those that work solely with local authorities and those which work with other actors, such as hospital or university energy managers, demonstrating a wide range of governing partners, as shown in **Figure 2.7**.

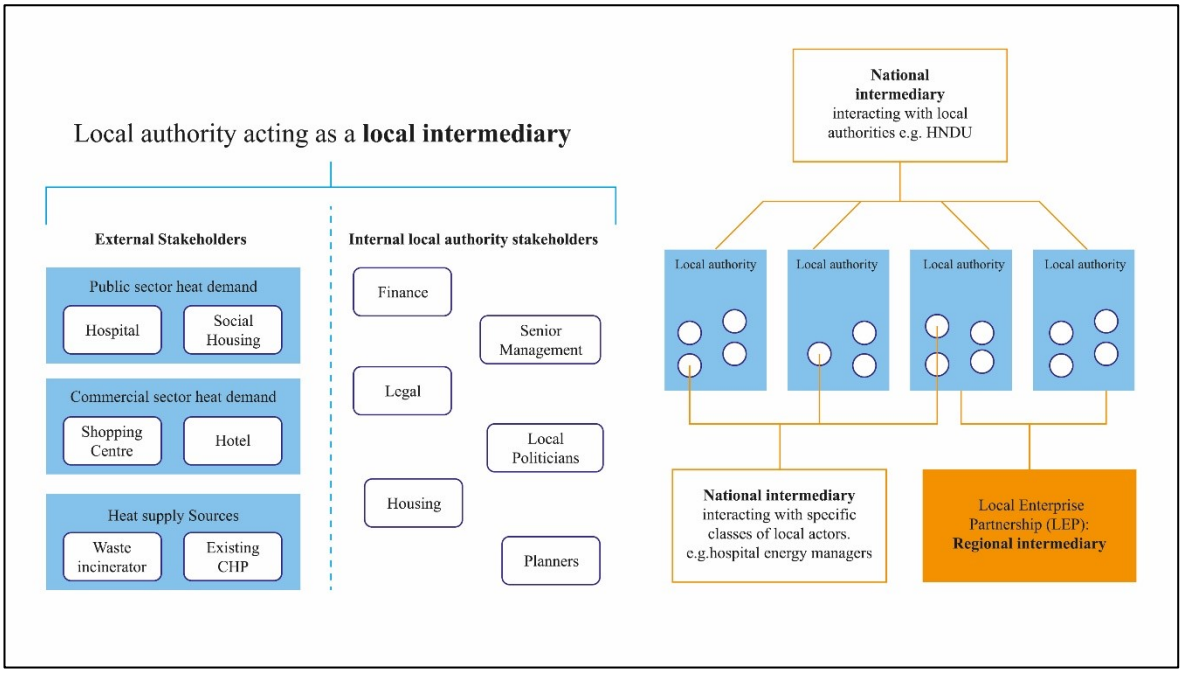

Figure 2.7: Illustration of local, regional and national intermediary relationships (Bush *et al.* 2017, p.143).

Furthermore, Bird and Barnes (2014) consider the role of intermediaries in community energy and the role intermediary organisations have in scaling-up community activity, again demonstrating the agency of intermediaries in sustainable trajectories more broadly. The

authors produce a useful typology of the roles of intermediaries in niche development, to niche internal processes and within transition processes, as replicated in **Table 2.2** below.

Role of intermediaries in niche development (e.g. Hargreaves et al. 2013)	***Intermediary roles as contributors to niche internal processes (Kivimaa, 2014)***	***Role of systemic intermediaries in transition processes (Van Lente et al. 2003)***
Aggregation of knowledge from diverse sources	*Articulation of expectations and visions:* • Articulation of needs, expectations and requirements • Strategy development • Acceleration of the application and commercialisation of new technologies • Advancement of sustainability aims	*Articulation of options and demand:* • Demand articulation and strategy development
Creation of institutional infrastructure *Coordination and framing action* *Brokering and managing partnerships*	*Building social networks:* • Creation and facilitation of new networks • Gatekeeping and brokering • Configuring and aligning interests • Managing financial resources – finding potential funding and funding activities • Identification and management of human resource needs (skills) *Learning processes:* • Knowledge gathering, processing, generation and combination • Technology assessment and evaluation • Prototyping and piloting • Investments in new businesses • Communication and dissemination of knowledge • Education and training • Provision of advice and support • Creating conditions for learning by doing and using	*Alignment of actors and possibilities:* • Identifying, mobilising and involving relevant actors • Organising discourse, alignment, consensus • Management of complex, long-term innovative projects *Support of learning processes:* • Create conditions for learning by doing, using interacting and searching • Feed actors with tailor-made (strategic) information

Table 2.2: Roles of intermediaries in niche development (Bird & Barnes, 2014, p.210).

Using the case study of Bristol, Bird and Barnes (2014) add to this debate by asserting that intermediaries have a crucial role not only at a niche level but also at a policy level, which

includes the development of shared projects, and facilitate the sharing of wider benefits across local areas through increased participation. As they stress (2014, p.218*)* 'Intermediaries …[represent] community energy beyond those already involved, providing a focal point of access for new entrants […] and being a conduit through which outside actors can engage'. This is a significant finding which suggests a more central agency for coalitions that go beyond state and non-state individuals by representing a collective of individuals seeking community energy.

Critically, it is argued that such intermediary organisations are seeking to develop capacity at the urban scale to mobilise energy transitions and consequently play a role in ordering and defining relationships, which is particularly vital due to the number of actors and diverging interests (Hodson *et al.* 2013). Whilst intermediaries are variable between each other, they can be generally characterised: for example, through their mediating functions between production and consumption; between different priorities (e.g. different funding and social interests); and between different levels (e.g. city and SMEs, or household and local government). As such, Hodson *et al.* (2013) present a typology of the mode of urban energy intermediation which mediate between alternating priorities, responses and scales, as shown in **Figure 2.8**.

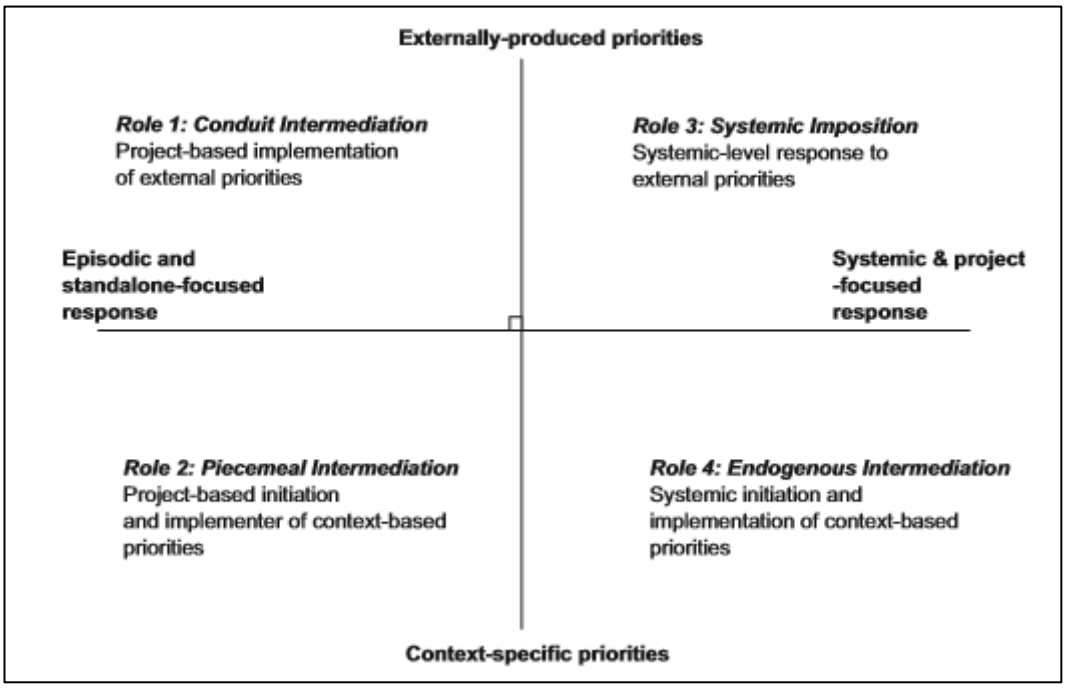

Figure 2.8: Conceptualising four modes of urban energy intermediation (Hodson *et al.* 2013, p.1410).

Using the case studies of London and Manchester, they support their typology to compare and illustrate the role of intermediaries in cities, as summarised in **Table 2.3** below. The authors assert that such a comparison highlights not only:

> differential capacity and capability to act, but also a lack of integration of these different intermediary functions both within London and Manchester; a lack of integration which was relatively more apparent in Greater Manchester (Hodson *et al.* 2013 p.1420).

This study therefore usefully draws attention to the disparities of roles of intermediaries and other actors between cities, in addition to their uneven impact within cities. As aforementioned, the roles of multiple actors across geographical space is an important and emerging field that is essential to consider for this research, as discussed next.

London	*Intermediary function*	*Manchester*
High	Strategic overview of system change	Low
National exemplar – high degree of autonomy	Interrelationships across scales of governance	Test-bed: dependent on centre
High	Embedded capacity to act	Low
Social Learning	Operationalisation and translation	One-off projects

Table 2.3: Comparing intermediaries in London and Manchester (Hodson *et al.* 2013, p.1419).

2.2. CITIES AND SUSTAINABLE TRANSITIONS

Unpacking the multiple ways of understanding multi-level governance has raised important considerations of the specific roles of various actors and their individual and collective agency in sustainable trajectories. Yet, arguments remain of the absence of space and place in theoretical frameworks (Coenen & Truffer, 2012; Smith *et al.* 2010) and the absence of cities in the MLP theory (Hodson & Marvin, 2010). Echoing these arguments, scholars (e.g. Bridge *et al.* 2013; Calvert, 2016; Coenen *et al.* 2010; Truffer *et al.* 2015) vitally highlight a need to take a spatial turn and examine low carbon and inclusive energy transitions as a geographical process, which is fundamentally subject to reconfigurations of current social and economic patterns and activity.

It is important to use a spatial and contextual lens to consider not only who is responsible for governing, but at what scales and where sustainable transitions should occur, and to highlight the constellations of relations that impact on particular localities. As such, there have been a growing number of studies which examine energy transitions at local and regional levels (e.g. Hansen & Coenen, 2015; Mattes *et al.* 2015; Rutherford & Coutard, 2014). The municipal (urban) level is widely considered to be the most appropriate scale at which governance of low carbon transitions should be enacted, therefore the city in transitions is the second theme of this research.

The importance of cities in transitions is primarily for two reasons: first, due to high energy consumption and population growth, urban areas are recognised to have an increased urgency for change (Fuenfschilling *et al.* 2019); and second, due to recent urbanisation which is expected to increase globally, it is at this political (municipal) level which is closest to many citizens. As a result, there have been a proliferation of studies specifically examining low carbon transitions at the urban scale and the governance processes which

occur (e.g. Bulkeley & Kern, 2006; Busch & McCormick, 2014; Kern & Alber, 2009). However, it is important to understand how cities are conceptualised in sustainable transitions and the ways in which external shocks at the national level (such as austerity measures) can impact sustainable urban trajectories. Therefore, together the notion of multi-level governance and a scalar lens reiterate the importance of avoiding one scale of politics, and the importance of not constructing the local in isolation, but instead the connections across geographical divisions (Featherstone *et al.* 2020), as explored next.

2.2.1. Conceptualising the 'City' in Sustainable Transitions

The notion of 'the city' and 'the urban' is particularly problematic for researchers, since their very complexity, function and inherent changeability has varied throughout history, and continues to vary significantly across the world (Robinson, 2015). As **Table 2.4** highlights, cities are frequently conceptualised from having certain characteristics, for example population size and density, and the morphological aspects of the city, such as the form or structure of land use or built environment, which can help delineate urban areas for example by use of satellite imagery (Seto *et al.* 2017). The prevailing activities and functions occurring within urban areas also impact the classification of cities, for example the emergence of 'world cities' which are urban areas that are becoming global in character and considered to be political, financial, technical and cultural centres (Clark & Moonen, 2016). These are referred to as the city's 'functional boundaries', which can become blurred according to connections or interactions such as economic activity, commuting zones or per capita income (Seto *et al.* 2017). Furthermore, cities are often conceptualised as a political and administrative boundary or territory, representing one set of political actors, such as the local authority within the local authority's administrative boundaries (Bulkeley *et al.* 2013; Seto *et al.* 2017).

Characteristics	*Description*
Geographic proximity	Cities as places where spatial distances are smaller as compared to regions or countries (Boschma, 2005; Coenen *et al.* 2012; Raven *et al.* 2012)
Multiscalar interaction	Cities as being nested in and constituting of different spatial scales and networks. Scales as actively constructed and interacted with, in ways which support actors in achieving their goals (Coenen *et al.* 2012; Nevens *et al.* 2012; Coenen and Truffer, 2012).
Multidomain interaction	Cities as places where changes in different domains (e.g. energy, mobility, social care) come together and interact (Nevens *et al*. 2013).
Personal proximity	Cities as living environments in which people have personal, emotional and social stakes, including socially embedded relations and a level of trust (Related to the concept of social proximity by Boschma, 2005).
Institutional proximity	Cities share formal and informal institutions, including laws and rules as well as cultural norms and habits (Boschma, 2005).

Table 2.4: Characteristics of the urban context (Wittmayer & Loorbach, 2016, p. X in Loorbach *et al.* 2016).

Whilst these conceptualisations offer understandings of the city from a geographical and political perspective, they are rather limited for sustainable transitions research. More recent conceptualisations of the city have shifted beyond the notion that cities are 'self-enclosed political [territories] within a nested hierarchy of geographical arenas contained within each other like so many Russian dolls' (Brenner *et al.* 2003, p.1. in Bulkeley *et al.* 2013). Taking into account the multi-level and multi-actor governance of cities, the city can be considered as more inter-related, interwoven and complex, particularly because of globalisation, whereby the increased flow of information, capital and people has resulted in cities becoming more globally connected (Bulkeley *et al.* 2013; Loorbach *et al.* 2016). This has implications for considering multi-level governance, and consequently, there has been a shift in considering the 'urban' and its actors as 'nodes' in a wider system of climate governance across space, with differing forms of governing agency amongst local, regional and national governments within sustainable transitions (Gibbs & Lintz, 2016; Gibbs & O'Neill, 2017).

Moreover, social relations in urban areas are bound up and entwined in social roles and responsibilities, complex power structures, social interests, conflicts and tensions of all citizens which may in turn affect sustainable transitions in urban areas (Bridge *et al.* 2013; Coenen & Truffer, 2012). As a result, a particularly noteworthy conceptualisation is the city as an (urban) assemblage of infrastructures, economies, politics, and communities (Bulkeley *et al.* 2013; McFarlane, 2011). This idea therefore moves beyond the notion of the city with nested boundaries within bounded cartographic locations and units, and instead takes into account a broader spatial perspective to include a city's wider biological, geophysical,

economic, political and cultural connections, which aligns with the consideration of governance in more networked ways.

As such, multiple and diverse networks for human and non-human actants are included within assemblages (Gailing & Moss, 2016) and both energy transitions and urban areas shape each other in co-evolutionary processes. Whilst there have been critiques with regard to the use of the term 'assemblage' within urban studies (Brenner *et al.* 2011), it nonetheless highlights: the complexity and fluidity of cities as a space and place which are shaped by human and non-human actants; historical contexts; and the presence of unequal structures of power, capital, discourse and groups (McFarlane, 2011). Therefore, these multiple conceptualisations of the city as a fluid, inter-related and complex area are essential for considering sustainable urban transitions, by emphasising the transient nature which is open to contestation and manipulation over time by a multitude of actors, all of whom have varying and complex processes and institutionalised practices operating over different scales (MacKinnon, 2010).

2.2.2. The Role of the City in Sustainable Transitions

The examination of cities in transitions has contributed to multi-level governance understandings of socio-technical systems, and Geels (2011, in Bulkeley *et al.* 2011) argues that cities can have three roles in technological transitions at the national scale. The first role is that cities and city governments can be viewed as primary actors; the second idea is that cities act as seedbeds and sites for innovations and early phases of transitions; and the third notion is that cities have a limited role in radical transitions, but are instead more focused on transformations of existing systems. Such understandings of cities having a role in low carbon transitions are useful by firstly, reiterating the degree of agency from actors. Secondly, this brings forth questions of the extent to which city actors are collectively able to strategically manage, reshape and change trajectories (Castan Broto, 2017; Fuenfschilling *et al.* 2019; Naess & Vogel, 2012). Thirdly, this opens up debate that cities not only have agency in sustainable transitions but that this can be variable, and therefore there can be a degree of diversity between urban sites (Gibbs & Lintz, 2016). Hodson and Marvin (2010, 2012) emphasise the more strategic and purposive orientation of cities mitigating against climate change, and pose questions of the capacity of cities to shape or be shaped by transitions.

An example of this is ‘municipal voluntarism’ and ‘strategic, low carbon urbanism’ as deemed by Bulkeley (2013 in Stewart *et al.* 2013). To expand, municipal voluntarism refers to voluntary (and potentially informal) activities of local authorities as a means of building capacity to address low carbon transitions, in comparison to strategic urbanism, which refers to the role of more formal city networks for governing climate change e.g. transnational municipal networks such as C40 Cities, Global Covenant of Mayors and Climate Alliance (Bulkeley *et al.* 2014; Hakelberg, 2014; Pattberg & Stripple, 2008).

Importantly, whilst the concepts refer to an active engagement in urban climate governance and a nascent form of urban politics, again this is variable due to the diverse actors within the city and their capacity, and also influenced by the historical organisation of infrastructure provision, which may differ between cities (Bulkeley 2013 in Stewart *et al.* 2013; Hodson & Marvin, 2013). As previously noted, cities do not act in a vacuum but are subject to external forces (e.g. regulations, markets, and wider political constraints, all of which are also internally differentiated). A multi-level understanding stresses that the engagement of cities in sustainable transitions can be implicated by national level measures, as discussed next.

2.2.3. Austerity Urbanism

Since the aftermath of the global financial crisis of 2008, national governments worldwide have implemented a series of austerity programmes in measures argued to balance country deficits. These fiscal measures have been particularly prominent in the UK from having a particularly centralised fiscal arrangement and also a longer history of neoliberal policies in comparison to other European countries. These neoliberal ideologies are part of a broader domination over political and economic thinking, with aims to reduce the role of government and prioritise private sector actors in the regulation and governance of both the economy and society (Harvey, 2007). This has led to debate surrounding the governance of cities under conditions of economic cuts and austerity, commonly termed as ‘austerity urbanism’ (Peck, 2012) and ‘austerity localism’ (Hodson *et al.* 2016).

Such concepts are particularly important for this research, since it takes into consideration the role of national economic measures on the agency of local government actors in particular, and the ways in which this can lead to new forms of urban politics – again, bringing in the concept of multi-level governance. It takes into account neoliberalism - a

policy agenda driven by Margaret Thatcher in 1980s which limited the role of the state and favoured supply-side innovation and competitiveness, decentralisation, devolution, deregulation and privatisation of industry, land and public service (Leitner *et al.* 2007). Crucially, it considers the role of neoliberalism and dominant pro-market logics, and how these processes shape urban areas and governance especially (Whitehead, 2013). Such an approach which takes into consideration the relations between space and politics is explored by Massey (2005) in her discussion of conjunctures, and she reinforces that crises (such as the 2008 global economic crisis) are themselves politicised, navigated, articulated and narrated in different contexts. Austerity can therefore be considered as a political and economic conjuncture, and using this understanding Peck (2017) appropriately draws attention to the spatialities through which conjunctural politics are constituted, stressing the locatedness of conjunctural politics and projects of 'conjunctural urbanism' (Featherstone & Karaliotas, 2018; Peck, 2017). This concept is also useful in terms of research methodology, as highlighted in Chapter 3.

With this austerity in mind, and in conjunction with concerns of environment impacts on urban areas, urban governments have been increasingly positioning themselves as centres and destinations for new forms of 'green economy' investment (Gibbs & O'Neill, 2014). With regard to implementing low carbon transitions at the city level, the concept of austerity urbanism and the ways in which austerity urbanism can impact municipal capacity for sustainable transitions is therefore a key consideration. North *et al.* (2017) notably apply the concept of austerity urbanism and consider climate policy using the case study of Liverpool, asserting that in the context of austerity, cities are indeed considering climate policy, amidst conflicting pressures. The authors argue that perspectives for climate policy were driven by the growth agenda, but not necessarily because they were 'neoliberal' in content *per se*, but because they were more persuasive and considered 'sensible' by economic development managers. Using this example, North *et al.* (2017) argue the importance of not presumptively dismissing inaction as neoliberal, again reiterating the diverse agency of actors and what 'the sensible' looks like in various and changing contexts. Furthermore, since this is an evident example of the multi-faceted and contested nature of decision-making in practice, these arguments reinforce the need to take a more nuanced approach when investigating low carbon transitions and the agency of actors in particular.

Additionally, Hodson *et al*. (2016) demonstrate that under pressures of austerity and constrained capacity, local authorities in Greater Manchester are working with other non-

state actors, such as volunteer groups to build local green infrastructure (also deemed as 'green entrepreneurship' e.g. Gibbs & O'Neill, 2017; Mazzucato, 2015). Importantly, these studies highlight that there is a need for a more detailed engagement of austerity urbanism and the impacts this has on municipal governance of low carbon transitions. This also again raises the significance of multi-level analysis of urban governance, and the role of multiple actors at different scales across urban areas; all of which this research seeks to achieve. As noted by Hastings *et al.* (2017), austerity urbanism has been observed to disproportionately impact economically and socially marginalised groups in England, and therefore introduces the next key theme of justice and inclusion when considering urban governance of low carbon transitions, as explored next.

2.3. JUSTICE AND INCLUSION IN SUSTAINABLE TRANSITIONS

Energy systems have a vital role in structuring socio-economic and socio-ecological relations, and the pursuit of a decarbonised and sustainable society within recent years has encouraged scholars and decision-makers alike to engage with energy matters, such as what energy is used for, what values and moral principles ought to guide energy decisions, and arguably most importantly, who benefits and loses (Islar *et al.* 2017). It is important to recognise that in an era of growing social and economic inequality, sustainable transitions must be inclusive and equitable to avoid perpetuating an unsustainable cycle, which as noted above will take significant political will and pressure, particularly in the context of austerity.

Justice and inclusion in sustainable transitions are therefore a vital consideration which has been omitted in much of mainstream sustainable transition discourse, and is therefore the third key theme of this research. This is particularly important in the context of urban transitions, with much of the attention on climate inequalities being focussed across countries, rather than within-country (Islam & Winkel, 2017). The supporting concepts of energy justice and transport justice at the urban level are useful, yet there is a surprising lack of empirical application of these concepts, particularly with regard to transport justice. Moreover, there are limited, if any, empirical applications which integrate energy and transport justice within urban sustainable transition studies, which this research seeks to develop, as described next.

2.3.1. Omissions of Justice

As aforementioned, from analysing the leading sustainable transitions theoretical frameworks (e.g. the MLP and MaP), it is evident that whilst there are some merits to these frameworks, the notions of justice and inclusivity are absent (Hodson & Marvin, 2013). This is a particular drawback for advancing sustainable transition understanding, since energy and its associated technologies and infrastructure have a vital role in structuring socio-economic and socio-ecological relations. To illustrate, the focus on technological processes and artefacts has led to a neglect of social and political relationships and a limited attention to justice. Furthermore, the themes of agency and power are key aspects involved in decision-making and implementation, yet are absent within these frameworks, thereby limiting the multi-actor dimension of sustainable transitions and subsequent justice implications. Additionally, the neglect of justice dimensions is acknowledged at the urban level, with studies showing that social justice remains peripheral, with cities not making social and environmental justice an important part of their agendas (e.g. Bulkeley *et al.* 2014; Castan Broto & Bulkeley, 2013; McKendry, 2015).

This omission of justice is witnessed more generally in studies of sustainable transitions, which can be arguably related to the broader marginalisation of justice within climate change politics on the whole. Swyngedouw (2009) makes an interesting contribution to understanding the absence of justice within the broader climate change agenda by arguing that climate policy is made to fit comfortably with the status quo, which is dominated by a neoliberal agenda, globalisation and competition. As such, he argues that urban sustainability strategies are as a result characterised by technocratic, weak and vague commitments that do not challenge the underlying neoliberalisation agenda nor allow for more radical visions of socio-economic futures, such as 'de-growth' approaches[12] (North *et al.* 2017). Instead, Swyngedouw (2009) argues that they are of a 'post-political' consensus, in that they are handled in a way that is considered 'sensible' by urban elites who want to preserve consumer capitalism, unsustainable levels of consumption and existing power relations. Therefore, in the face of 'sensible' and 'sustainable' climate policy commitments,

[12] 'De-growth' is understood here as a concept and movement which broadly critiques the global capital system which causes human exploitation and environmental destruction. As such, it encourages a shift in thinking about the economy, which are not growth-orientated or measured by GDP by instead focuses on wealth redistribution, alternative models of business organisations (e.g. cooperatives and not-for-profit strategies) and the need to live within Earth's fragile ecosystem boundaries (Krueger *et al.* 2017).

it is argued that in fact an unsustainable approach is unfolding in reality (Bluhdorn, 2015 in North *et al.* 2017).

Whilst not definitively rejecting Swyngedouw's (2009) 'post-political' notion of climate policy, scholars (e.g. Beveridge & Koch, 2017; Chatterton *et al.* 2013; McKendry, 2015; North *et al.* 2017) suggest that the 'post-political' argument is limited by oversimplifying and understating the complex structures within urban politics by ignoring the role of other actors, for example grassroots activists, who are constructing alternatives to the neoliberal agenda. Instead, they rightly assert that because of these other actors' roles, political contestation has a key part to play in formulating climate policy, rather than solely neoliberal rationale.

Such reflections on Swyngedouw's arguments are useful to consider for this research and the understanding of multi-level governance because they highlight the need to be attentive to the rationale behind decision-making, the complex political contestation involved in pursuing equitable low carbon urban transitions, and the abundance of actors involved in these processes. Furthermore, because of the omission of justice in the sustainable transitions' literature, there are a number of novel and emerging concepts which can assist in distinguishing urban climate justice concerns from wider environmental concerns, such as concepts of energy justice and mobility justice, as discussed next.

2.3.2. Understandings of Justice in Energy and Transport Systems

In light of discussions of the 'energy trilemma' which concerns environmental sustainability, energy equity and energy security, the concept of 'energy justice' has gained prominence within sustainable transitions literature (Fuller & McCauley, 2016). Encompassing issues of social, economic and environmental equity, within and between past, present and future generations, energy justice broadly has the aim to provide all individuals, across all areas, with safe, affordable and sustainable energy (Fuller & McCauley, 2016). It is a term which has strands for wider 'energy democracy', which seeks for a more just, democratic and sustainable energy system (e.g. Becker & Naumann, 2017; Burke & Stephens, 2017; Hess, 2018).

This is built on the influential concept of 'carbon democracy' as coined by Mitchell (2009) with regard to the limited democracy of oil in comparison to that of coal. The lack of democracy attributed to oil is considered to be due to: the oil energy network being more

dispersed geographically and therefore less vulnerable to strikes in comparison to that of coal; the subsequent weakening powers of local forces and growth of expertise of production to offices of managers and engineers; and the growing economic and political power of major oil companies from the relations that were formed out of the flows of energy.

The concept of energy justice is particularly valuable in sustainable transition understanding, as pointed out by Healy and Barry (2017, p.451-452):

> Without an energy justice dimension, decarbonization strategies run the risk of 'locking in' patterns of exploitation and dispossession that characterize the current global political economy, even while seeking to overcome carbon 'lock-in'.

Energy justice, which has emerged primarily from a social science research agenda, therefore shares the same basic philosophy as climate justice and environmental justice, however it is distinctive in that its attention is on both production and consumption of energy systems specifically as well as energy policy (Jenkins *et al.* 2017; Pesch *et al.* 2017). As such, energy justice can be beneficial in certain cases as whilst energy systems and wider climate justice concerns can be co-constitutive, the concept of energy justice allows a greater emphasis on energy systems and justice dimensions, rather than wider urban climate justice concerns as a whole.

Given the lack of justice and equity dimensions in predominant sustainable transition frameworks, energy justice frameworks have emerged within the literature (e.g. Heffron & McCauley, 2017; Heffron *et al.* 2015; Sovacool & Dworkin, 2015). McCauley *et al.* (2013) and Newell and Mulvaney (2013) utilise the three tenets of justice from social justice theory (distributive, procedural and recognition as outlined **Table 2.5**) to develop the 'Energy Justice Framework'. Whilst the relationship between energy and justice is certainly multi-faceted, this three-pillar approach allows for energy policy and whole energy systems to be analysed more thoroughly, since without a multi-pronged approach, energy policy often deals with only one element of the energy system and therefore can detriment its overall effectiveness (McCauley *et al.* 2013).

Tenets	*Evaluative*	*Normative*
Distributional	Where are the injustices?	How should we solve them?
Recognition	Who is ignored?	How should we recognise?
Procedural	Is there fair process?	Which new processes?

Table 2.5: The evaluative and normative contributions of energy justice (Jenkins *et al.* 2017, p.175).

Heffron and McCauley (2017) valuably propose a fourth and underdeveloped tenet, restorative justice. Restorative justice seeks to repair and rectify the injustices which have occurred to individuals, communities or nature, which in turn can allow prevention measures to take place and more practical measures to be explored. The restorative justice dimension added by Heffron and McCauley (2017) therefore enhances the temporal aspects of justice, and the need to examine the past and the future to ensure all injustices have been considered when implementing low carbon transitions.

In addition, Sovacool and Dworkin (2015) build on this framework and develop the notion of energy justice as a decision-making and policy tool. They highlight eight aspects in their framework which should be considered for making more informed decisions: availability; affordability; due process; good governance; sustainability; intra-generational equity; inter-generational equity; and responsibility (as shown in **Figure 2.9**).

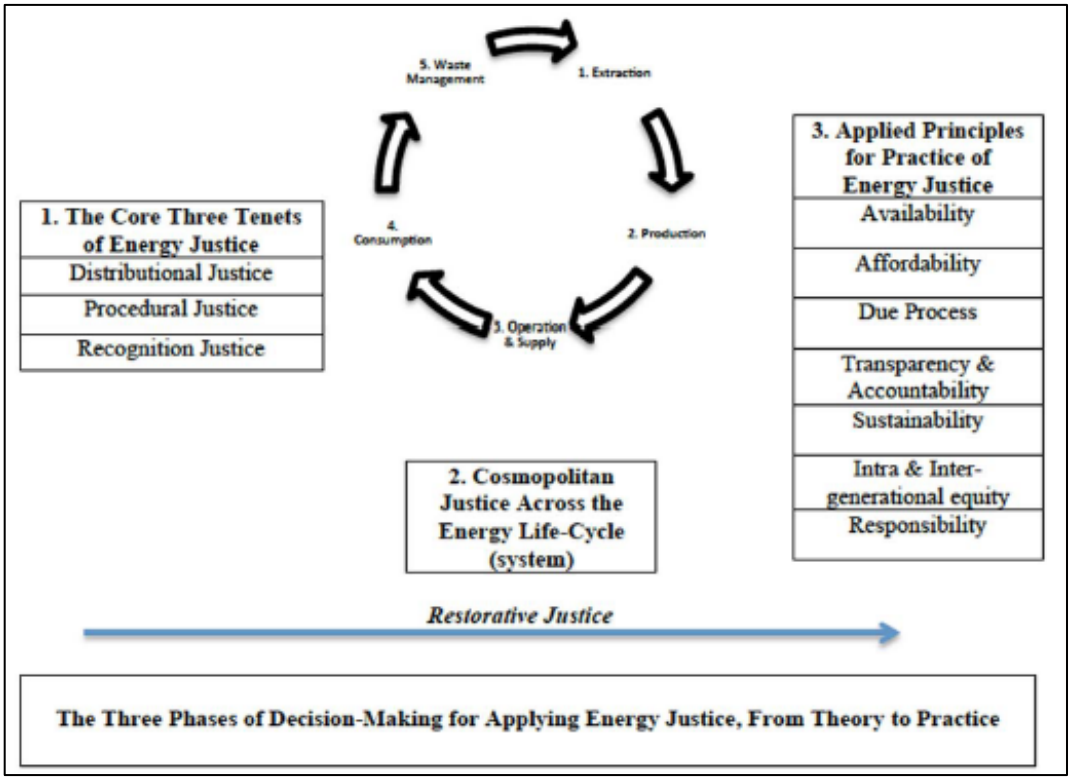

Figure 2.9: The Energy Justice conceptual framework (Heffron & McCauley, 2017, p.660).

Whilst these frameworks are particularly important for examining energy injustices, scholars (e.g. Heffron & McCauley, 2017; Jenkins *et al.* 2017) reflect upon some noteworthy limitations of the concept. For example, despite the proliferation of these frameworks in the literature, they have not been widely applied out-with this, and Heffron and McCauley (2017) suggest that energy justice needs to be more targeted and have a more direct link with policy in order to aid decision-making. Furthermore, in parallel with this critique, Jenkins *et al.* (2017) offer valuable contributions to advance the application and study of energy justice with relation to policymaking. Firstly, the authors acknowledge that within present energy justice debates there is a lack of dialogue between national contexts and how countries might learn from one another. Secondly, they acknowledge the way in which energy policy is often detached from wider legal and regulatory UK policy. The authors therefore reiterate calls for multi-level analysis and for a greater consideration between national contexts and legal and regulatory contexts. Thirdly, Jenkins *et al.* (2017) recognise that few studies investigate the comparability and contrast of different production and consumption patterns, and whether there are justice implications from one source to another, and therefore propose for the consideration of source-specific implications of energy types (for instance oil and gas

extraction) as well as the energy type's role as part of a diverse energy mix. In addition, they raise an important critique that much of the literature on energy justice engages with spatial explanations of change of uneven transitions, neglecting the aspect of time. They therefore advocate for greater attention to be paid to the contested spatial and temporal processes of transitions when considering energy justice, thereby having an influential contribution for this research.

Transport, like energy, is another example of a large and vast socio-technical system which is critical to society (Hopkins & Higham, 2016). Yet whilst it is a key energy service, it is also a major source of air pollution, accounting for nearly a quarter of total worldwide carbon emissions (Hickman *et al.* 2011). There is overwhelming evidence of the negative effects that transport systems have on the environment, and this has been well-established within the literature. Not only does this have detrimental impact to the environment, exposure to poor air and noise quality can cause adverse health implications including premature death and long-term health problems (Kingham *et al.* 2007). Transport is therefore a vital component for achieving reduction targets. However, energy use and emissions reduction within the transport sector is proving to be difficult to achieve due to: the high dependency fuelled by carbon-based travel and the subsequent lock-in this has created; the lack of political will; public support; and (perceived) high restructuring costs (Banister, 2011; Gossling, 2016).

The relationship link between transport and injustice has been well-established within the literature and can be traced to the 1970s whereby physical mobility was considered a major contributor to social, economic and racial inequality in the USA (Lucas *et al.* 2016). Lucas (2012) investigates the extent to which social disadvantage and travel disadvantage can exacerbate social exclusion (as shown in **Figure 2.10**), with reference to the UK and Australia. Despite the recognised link between transport and injustice, the discussion of justice, transport and climate change collectively has been surprisingly neglected, and there is a need to integrate 'transport justice' in discussions of 'sustainable mobility paradigm' (Gossling, 2016).

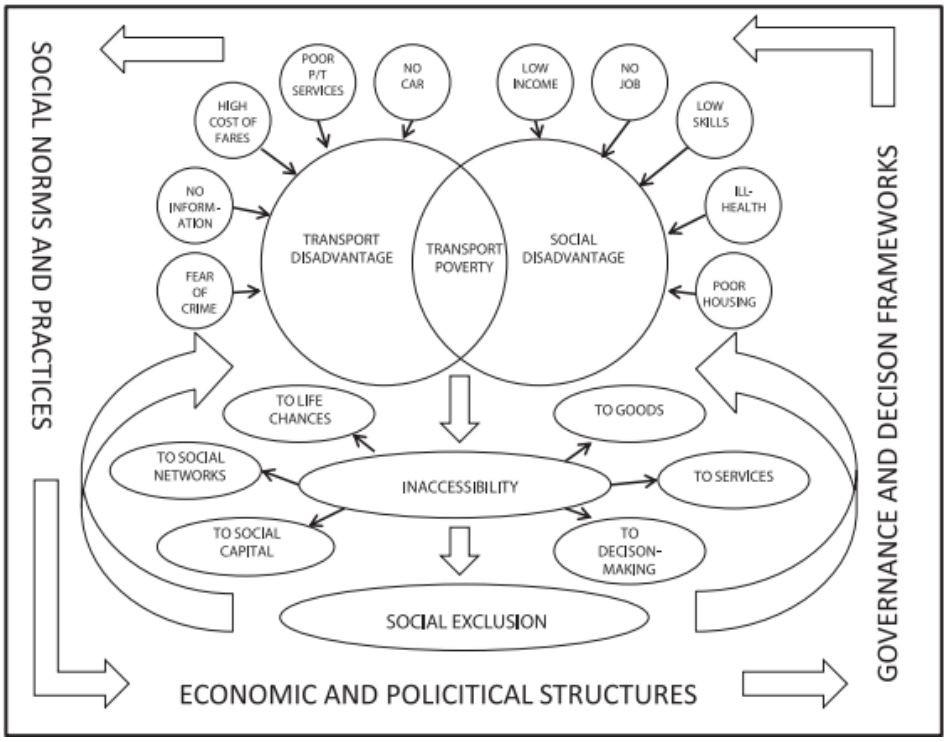

Figure 2.10: The relationship between transport disadvantage, social disadvantage and social exclusion (Lucas, 2012, p.107).

Similar to injustices experienced through the provision of low carbon energy technologies, the novel concept of 'transport justice' (which is often used interchangeably with 'mobility justice') contends that low carbon transport must address justice concerns associated with accessibility, availability and affordability of transport (Mullen & Marsden, 2016). Although the terminology 'mobility justice' is not cited specifically, this concept is recognised internationally and addressed in the Sustainable Development Goal 11, which states:

> By 2030, provide access to safe, affordable, accessible and sustainable transport systems for all, improving road safety, notably by expanding public transport, with special attention to the needs of those in vulnerable situations, women, children, persons with disabilities and older persons (UN, 2020).

Furthermore, transport was not explicitly included in the COP 21 Paris Agreement, and therefore this confirms the disconnection and detachment between the decarbonisation of transport and justice dimensions in policymaking (Hopkins & Higham, 2016). The conceptualisation of mobility justice has therefore arisen from social theory to include the consequences and distribution of burdens and risks on minority and vulnerable groups, as well as general (in)accessibility; income; and social participation (in terms of inclusion/exclusion and equal opportunities) (Gossling, 2016).

It is perhaps unusual that given the data on transport emissions, the concept of low carbon mobility justice has received very little attention within academic debate, with much of the discussion dominated by energy use in the domestic space. As a result, transport justice within low carbon contexts has a significantly underdeveloped conceptual and theoretical framework, for example with few applications to the three tenets of justice (distribution, recognition, procedure) as per energy justice. Nevertheless, given the prominence of energy and transport systems in cities, these concepts are beneficial to apply within urban areas and this study, as examined next.

2.3.3. Urban Energy Justice

There has generally been a lack of application of energy justice from a city scale, and to reiterate, this is likely because within transition analyses, scholars have often overlooked where transitions take place, and the spatial configurations and dynamics of the networks within which transitions evolve (Coenen & Truffer, 2012). As such, examinations of energy justice have only focused on inequalities between social groups (Bouzarovski & Simcock, 2017).

In response to this, there has been a rise of scholars who examine energy systems using a spatial approach, so called 'energy geography' (Becker & Naumann, 2017). For example, Bouzarovski and Simcock (2017) draw upon the concept of 'spatial justice' and relate this to inequity and inequality, recognising that fuel poverty can differ geographically between countries, for example in the EU. Importantly, this study reveals that the spatially uneven exposure to fuel poverty (that is, where households are required to spend in excess 10 per cent of their household income on heat) is driven by deeper socio-material inequalities, i.e. landscape variations that include both material and non-material elements, such as climatic differences or housing variations, in and between countries. Furthermore, energy justice concerns have geographical and spatial factors in that there are specific sites of extraction, refining, storage, combustion, transportation, consumption and waste disposal which may be detrimental to certain communities (Finley-Brook & Holloman, 2016).

Another spatial dimension of energy justice is that there are disparities of energy injustices and inequalities within countries, such as based on geographical area, and the uneven nature of energy inequality can be extended to include the disparities between rural and urban populations and within cities themselves. However, it is contested amongst scholars which

area (between urban and rural) is more negatively affected (Healy & Clinch, 2004; Roberts *et al.* 2015). For example, using the UK as a case study, Roberts *et al.* (2015) argue that whilst urban fuel poverty is on average more persistent than rural fuel poverty, rural areas are more vulnerable to energy price shocks. The authors claim this is due to living in rented accommodation, which is less flexible than in urban areas, in that the rental market in rural areas is more transient and of a thinner nature and therefore decreases the incentive of landlords to improve energy efficiency (Roberts *et al.* 2015). On the other hand, an opposing argument is made by Bouzarovski and Simcock (2017), who emphasise that in urban areas:

> There has been a growing vulnerability of 'transient' groups living in private-rented or multiple-occupancy homes with poor energy efficiency, with the greatest concentrations in large cities where housing is less affordable (p.5).

These debates are still on-going, and these studies reveal an important causal relationship of various forms of home-ownership and energy injustices, and the prevalence of fuel poverty within urban areas.

An additional pattern illustrating uneven energy injustices is the correlation between energy vulnerability, economic inequalities and wider material inequalities. It is acknowledged that certain populations are often at greater risk of energy injustices, such as populations with existing health problems and disabilities, older population and minority groups, who are more likely to have lower-income and higher energy bills, due to the greater use of energy for their physical and mental health requirements. For example, according to Wealthy (2018), the average UK household spends £1,214 a year on energy, whereas 27 per cent (4.1 million households) with a disabled person spend more than £1,500, with 790,000 households spending over £2,500 a year on energy. This is appropriately termed the 'vicious circle of vulnerability', which can often lead to a stigmatisation of certain groups, which can be exacerbated in 'area-based' energy efficiency schemes (Bouzarovski & Simcock, 2017). This can cause neighbourhoods and their residents to become stigmatised, which may lead to suggestions that energy vulnerability is somehow internal to and the fault of the neighbourhood itself (Bouzarovski & Simcock, 2017), and therefore links to the broader processes of territorial stigmatisation. Again, this can result in an additional vicious circle whereby policies are not addressing injustices adequately, support is not sufficiently provided, and those who are struggling may not reach for help for fear of being stigmatised as 'poor' or 'incapable' (Bouzarovski & Simcock, 2017, p.6). Furthermore, this reiterates the prevalence of contestation between multiple actors at the urban level, and the ways in

which low carbon experiments can indeed create new tensions and unforeseeable, unintentional consequences (Castan Broto, 2012).

Similarly, uneven accessibility to services in themselves (such as networked infrastructures) within cities can also lead to forms of spatial inequality. One term to characterise spatial inequality within cities is 'splintering urbanism' deemed by Graham and Marvin (2001), whereby network infrastructures are not accessible for certain groups and regions. This importantly reinforces the increasing gap between areas which are networked and those which are significantly under-networked, leading to a 'poverty of connections' (Graham & Marvin, 2001, p.288 in Harrison & Popke, 2011).

Many cities have sought to alleviate fuel poverty, reduce emissions and pursue a green growth agenda, and scholars (e.g. Hodson & Marvin, 2012) demonstrate the differences between ad-hoc and piecemeal activity and strategic and systematic approaches. De Laurentis (2012) uses the city case studies of Greater Manchester and Cardiff in the UK to investigate and compare lessons and practices, governance and development in urban retrofitting measures in a climate of austerity. Their findings indicate that whilst the cities seem to follow a common rhetoric of sustainability and economic growth, their retrofit responses are indeed very different, reinforcing the differing governing processes across cities. For example, within Greater Manchester, the author discovered an overarching emphasis on economic dimensions to attract investment and retrofit programmes were from a dominant technological approach, being delivered by business and elite politicians and aimed at raising funding from private and public sector. As such, they were considered to be predominantly top-down and less inclusive. In Cardiff, the drivers for implementation were more spread across economic, social and environmental dimensions, which had a focus on vulnerable communities and households and clear efforts to establish links with community groups and existing organisations. Such a study is therefore significant for this research by emphasising the different visions, priorities and processes that various actors across multiple levels have in pursuing low carbon just urban transitions across cities (Heffron *et al.* 2015). As aforementioned, a justice lens is important for considering other low carbon sectors, such as transport, as considered next.

2.3.4. Urban Transport Justice

Similar to energy justice, the analysis of transport justice at the urban level has been largely piecemeal within sustainable transitions literature. Some local governments at the city scale have sought to engage in the reduction of carbon emissions in the transport sector, such as demand management (pricing, parking and access control, congestion charging, car free city centres); investing in public transport; priority for walking and cycling; and the concentration of urban development around accessible public transport (Banister, 2011).

Yet, there is considerable variation between cities and these initiatives are generally in their infancy. Moreover, studies relating to transport justice highlight the higher prevalence in cities, and according to Kilroy (2007, p.10): 'between 8 and 16 percent of urban households' income is typically spent on transport, but this can rise to more than 25 percent for the poorest households in very large cities'. Whilst this is a notable finding, the application of an array of actors and their agency across cities regarding low carbon and just transport has also been neglected. Scholars (e.g. Gossling, 2016; Kingham *et al.* 2007; Mullen & Marsden, 2016) have attempted to address the lacuna of justice implications in low carbon urban transport, yet this is a largely underdeveloped field of study. Gossling (2016) makes a notable addition to sustainable transitions theory by conceptualising urban transport injustices within three dimensions, i.e. exposure, space and time. This conceptualisation raises important points of the multiple and intersecting dimensions which can affect urban transport justice, and which may vary substantially within contested, unequal cities and further exacerbate inequalities.

Importantly, there is a recognised correlation between socio-economic inequalities and transport. Using the city of Bradford in the UK, Mueller *et al.* (2018) found that residents of lower socio-economic positions had the highest risk for adverse exposure and premature health, specifically 10 per cent of mortality in Bradford is attributable to breaching urban air and noise pollution exposure levels. Of this population, more ethnically-diverse neighbourhoods were more adversely affected, and were therefore increasingly susceptible to experiencing negative health outcomes. These findings clearly reiterate the well-documented social injustices resulting from exposure to air pollution, and are therefore useful to note for examining justice in urban low carbon transitions. Yet, it would be interesting to examine the mobility of these affected neighbourhoods themselves, as these findings may support observations made by Cook and Swyngedouw (2012) who highlight that lower-income neighbourhoods in cities are most affected by noise, pollution and

transport whilst also having fewer or more unequal mobility opportunities and existing health inequalities (Mueller *et al.* 2018).

In response to tackling transport pollution, the expansion of powered low emission vehicles is a policy approach followed by many countries. Mullen and Marsden (2016) draw upon mobility justice in low carbon energy transitions, using the example of electric vehicles in the UK. The authors note the substantial cost implications which can disproportionately affect lower income or minority groups within society. In addition, this is notable particularly within urban areas, whereby low carbon emission zones in cities which set fees for high polluting vehicles (e.g. London) can have unintended justice implications by disproportionately affecting lower income groups who may not have access to, or own, a better environmentally performing (and thereby more expensive) vehicle (Mullen & Marsden, 2016).

The networked infrastructure of energy and transport is therefore particularly significant to consider in low carbon urban transitions. The studies above highlight that the concepts of energy justice and transport justice can be successfully applied for investigating injustices, particularly by drawing attention to the impact of low carbon schemes for vulnerable and low-income groups. From using a spatial lens, it is clear that inequality and exclusion is prevalent within certain geographical areas and neighbourhoods, i.e. between cities and within cities. These concepts seek to avoid exacerbating existing injustices or creating new injustices from decarbonisation initiatives, and can be particularly useful for identifying whether certain governance approaches or actors are promoting, hindering or sustaining justice dimensions in low carbon urban transitions. However, there is a lack of empirical application of these concepts, particularly with regard to transport justice. Moreover, there are limited, if any, empirical applications which combine energy and transport justice within urban sustainable transition studies, which this research seeks to develop. Above all, it is important to consider how justice and low carbon urban transitions are implemented in practice, as discussed next.

2.4. APPROACHES AND PATHWAYS IN SUSTAINABLE TRANSITIONS

The transition to a more sustainable and inclusive urban future will require large-scale technological shifts and societal changes. These challenges whilst not insurmountable are

indeed formidable, and require substantial coordination of multiple levels of actors across different scales over time. The very nature of urban transitions involves a large-scale restructuring of infrastructure, therefore sustainable urban transitions not only should include a consideration of the actors involved, but the ways in which existing and future infrastructure can influence trajectories.

It is important therefore to consider the ways in which low carbon and equitable urban transitions are achieved in practice, and therefore approaches and pathways in sustainable transitions is the fourth key theme of this research. The concept of urban materiality is particularly beneficial for understanding the interconnected relationship between objects within cities (which can also be conceptualised as an urban assemblage of infrastructures, economies, politics and communities), in addition to the role of lock-in and path creation for understanding the place-based and temporal legacies of systems, as examined next.

2.4.1. Urban Materiality in Sustainable Transitions

Within sustainable transitions literature, the notion of materiality (i.e. the physical things, objects, artefacts and structures) has been increasingly drawn upon when considering sustainable transitions, due to the relations between people and objects, and the multiple ways in which things are mobilised, experienced, used and understood (Rutherford, 2014), The concept of materiality places emphasis on the social meanings, power relations, personal bonds and connections, which can be bound up or into artefacts and the wider built environment. It is closely related to the notion of the city as an urban assemblage of infrastructures, economies, politics, and communities (Bulkeley *et al.* 2013; McFarlane, 2011) and as such is significant for this research.

Such connections are particularly important for transitions thinking since these connections can affect the ways in which various actors can construct, govern and manipulate transitions in reality (Rutherford, 2014). Moreover, the notion of materiality recognises that whilst those living in areas have a socially-induced influence on the surrounding materials, those materials also have a significant impact on those populations, underlining that there is a reciprocal relationship between both human and non-human artefacts. Furthermore, it is important to acknowledge that whilst materiality is present within objects, it is also present between objects (Latham & McCormack, 2004), and can therefore be viewed as

simultaneously interwoven with, and independent from, human intent (Jayne & Ward, 2016).

Given the complex, intertwining and changing metabolic flows, practices and connections within cities (including between the infrastructure and built environment and those that interact with it), there has been a growth of literature assessing materiality and sustainable transitions in the context of urban areas. In light of urban energy transitions, Rutherford (2014) applies the notion of materiality to the case study of Stockholm and highlights the centrality of urban materiality to low carbon futures. This work demonstrates through this case study that climate mitigation is involved with materialities of energy policy, for example everyday objects such as heating bills, or technical infrastructure such as roads. The study emphasises the fluidity and dynamic nature of materiality, highlighting that the connections between infrastructures and objects (rather than the infrastructures and objects *per se*) can be manipulated through multiple arrangements, groups and interests. Using the case study of smart cities in Australia, Bulkeley *et al*. (2016) echo that a city's materiality can actively shape the politics of the smart grid, whilst also shaping the future of the grid in the city and its reworking of the energy system. These arguments enhance understanding of the ways in which infrastructure can influence governance of urban transitions, and *vice versa*.

Despite the value of considering materiality within transitions, there has been significant debate that the notion has been under-conceptualised. Using the example of the oil industry, Bridge (2008) draws attention to the materiality of production networks and the influence that materiality exerts on industrial organisations (De Laurentis *et al.* 2017). The study highlights that production networks are territorially embedded at different points along production chains, and therefore the materiality of the extractive sector is implicated on the location relative to market chains, the dependency on natural production, and the existing infrastructure (Bridge, 2008; De Laurentis *et al.* 2017). Therefore, spatial aspects such as territoriality are stressed within urban materiality debates and enhance understanding of the embeddedness of certain systems, again relating back to the spatial lens of 'energy geography'. This can be applied in the urban context and can help explain the differences in trajectories between cities.

In addition, Latham and McCormack (2004) introduce the notion of materiality to the case of automobiles and argue that whilst it is important to consider the reworking of physical

space automobiles have in urban areas, the materiality of automobility includes: 'particular structures of [perceived and actual] feelings, relationships, moral imperatives and dilemmas' (p.712). This highlights that people have strong emotional and personal investments in these spaces which can affect their agency (Coe & Jordhus-Lier, 2010). Such inter-relations with people are therefore hybrid and fluid, whereby humans and non-human agents 'constantly interact and remake the living conditions in urban worlds' (Schliephake, 2015, p.6). These considerations stress the social aspects of transitions and reinforce the reciprocal and complex relationship between both human and non-human agents. Furthermore, the notion of materiality highlights the role of infrastructure and its embeddedness on a spatial scale and natural resources, and the impacts on sustainable transitions. The concepts of lock-in, path-dependency and path creation build on these considerations, as discussed next.

2.4.2. Lock-in and Path-Dependency

Given the scale and socio-technical nature of sustainable transitions, the theoretical concepts of lock-in and path-dependency are particularly appropriate for discussing transition processes to sustainability. The concept of carbon lock-in, as first coined by Unruh (2000, 2002) is with reference to the process of carbon-intensive, fossil fuel-based technological systems persisting over time. From a technological and economic perspective, this process is related to increasing returns to scale. As argued by Arthur (1994, in Foxon, 2002), the reasons for lock-in are predominantly due to existing large technological systems, such as electricity generation or transport systems, having significant 'sunk' costs from earlier investments.

Such a positive feedback of increasing returns to adoption of a selected technology causes firms to become reluctant to invest in more sustainable alternatives (Foxon, 2002; Klitkou *et al.* 2015), even when the alternative system presents fewer environmental externalities. As a result, carbon-intensive industries become path-dependent, which leads to lower-carbon alternatives systemically becoming excluded and locked-out, leading to technological lock-in of the existing technology (Erickson *et al*. 2015; Unruh, 2000, 2002), as shown in **Figure 2.11**.

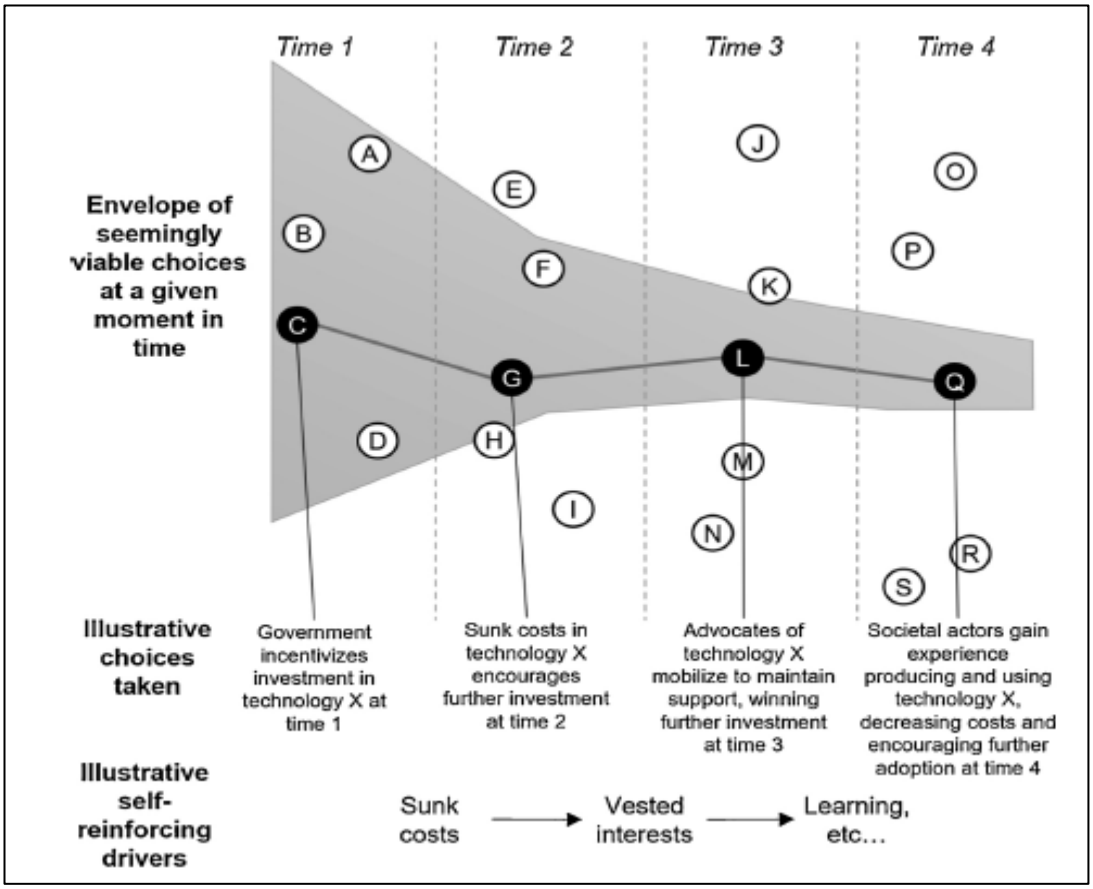

Figure 2.11: Schematic representation of a path-dependent process (Rosenbloom *et al.* 2019, p.171).

In economic terms, this is also known as the 'energy return on investment' (EROI), which refers to the ratio between the energy delivered of a particular fuel to society, and the energy invested in the capture and delivery of this energy (Hall *et al.* 2014). In addition, the institutional systems that govern technological systems are a key factor in the lock-in concept and should not be understood as a set of discrete technological artefacts (Foxon, 2002; Klitkou *et al.* 2015). Rather, as highlighted in the concept of a Techno-Institutional Complex by Unruh (2000), these technological systems are embedded 'in a powerful conditioning social context of both private and public institutions' (p.818), and there is therefore a distinct social nature to carbon lock-in. Persistent market and policy failures compounded by the lack of changes by society and government can exacerbate these conditions, which in turn lead to such circumstances which cause policy inertia towards the mitigation of global climate change. Foxon (2002) points out that institutional lock-in acts to reinforce the lock-in of current carbon-intensive technological systems and therefore is distinguishable from technological lock-in. Although distinguishable, it is important to note here that the concept

of carbon lock-in reinforces the co-evolutionary processes of technology and institutions of carbon-based energy systems.

Hassink (2005) importantly adds that the concept of political lock-in is similar to institutional lock-in and is described as the combined effect of institutional actors, such as governments, incumbent enterprises and trade unions which seek to defend the status quo. Furthermore, it is vital to recognise the concept of regional lock-in when considering sustainable transitions at the city scale. This concept builds on three forms of lock-in (functional, cognitive and political), and is described as a set of 'interrelated lock-ins that manifest themselves at the regional level, but are influenced and affected by both intra-regional and extra-regional factors' (Hassink, in Boschma and Martin, 2010, p.452).

Notably, lock-in (and the various forms it comprises) and path-dependency not only reinforce the importance of using a multi-level governance analysis, but emphasise a high degree of place-dependence, as geographically concentrated clusters becoming inward-looking and insular systems, which form strong linkages and support and trap them within clusters. Again, this is important for sustainable urban transition understanding as it reinforces the strong relationship of urban materiality and its effects on actor agency, which can in turn affect wider governance and the overall pattern of sustainable trajectories (Coe & Jordhus-Lier, 2010).

2.4.3. Path Creation

The notion of path creation is particularly influential for understanding sustainable urban transitions; however, it is a concept which has been under-theorised in comparison to the complementary notions of lock-in and path-dependency (Dawley *et al.* 2015; MacKinnon *et al.* 2019). The concept of path creation can be considered as a route for overcoming lock-in and blockages of incumbent actors and technologies; moving towards new alternative paths and facilitate trajectories to low carbon energy systems which can therefore give way to new forms of actor agency and governance (e.g. Fischer & Newig, 2016; Simmie, 2012).

MacKinnon *et al.* (2019) make a distinct contribution to transition understanding by developing a multi-dimensional and systematic theoretical framework of path creation, emphasising that the process of path creation is dependent on five key elements: institutional elements; key economic, social and institutional actors; market construction; regional and extra regional assets; and mechanisms of path creation (as shown in **Figure 2.12**).

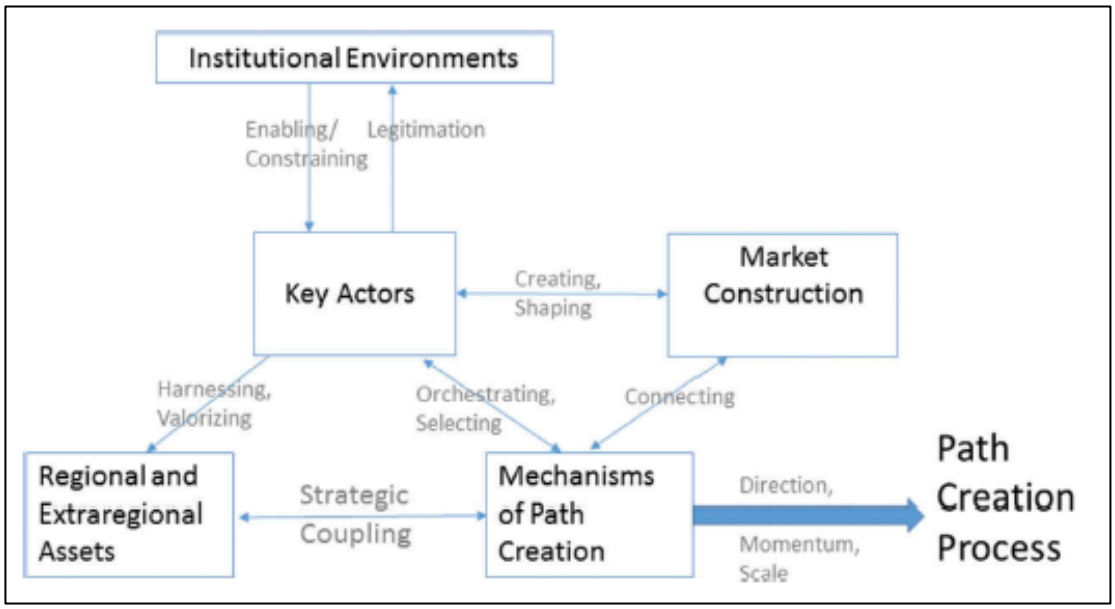

Figure 2.12: Integrative Framework of Path Creation (MacKinnon *et al.* 2019, p.9).

Using a multi-scalar approach to renewable energy technology in the UK, Essletzbichler (2012) importantly reinforces the notion that path creation is a geographically-localised process which can mobilise heterogenous and local actors around 'regional' energy visions which can improve implementation of renewable energy systems. As such, the place-specific legacies and conditions causing path creation are emphasised.

Furthermore, scholars (e.g. MacKinnon *et al.* 2019; Steen, 2016) have contributed to this concept by stressing the role of casual relations, processes and mechanisms, actors and their agency through time and across space. For example, Pearson (2016) combines this concept and an actor perspective by providing a valuable study of the role of incumbent actors in creating new trajectories for decarbonisation, emphasising the importance of history and incumbency for transition thinking. Despite incumbent technologies and firms having constraining influences on low carbon transitions (as a result of unwilling behaviours, technological capabilities, culture, or structure), there may also be positive opportunities whereby incumbents may embrace new technologies and systems through innovation, reconfiguration and recombination (Pearson, 2016). Again, such a focus on actors is crucial for considering sustainable transitions at the urban area, however to date there are limited studies specifically drawing together path creation in an urban sustainability context, which this research seeks to contribute to.

2.5. CONCLUSION

In this chapter, I have set out the four overarching core themes which are valuable for considering sustainable urban transitions: firstly, the governance of sustainable transitions; secondly, cities in low carbon transitions; thirdly, justice dimensions in sustainable urban transitions; and fourth, approaches and pathways in sustainable urban just transitions. Through a critical review of the literature across disciplines (e.g. geography, engineering and business studies), I have discussed the merits and drawbacks of these themes and associated concepts. These avenues of research and culmination of themes are particularly useful for applying to the Nottingham city context, and this thesis seeks to develop understanding in these areas.

First, multi-level governance is particularly pertinent for sustainable transition thinking by incorporating the multiple roles of actors across different levels and political jurisdictions, and is therefore introduced as the first theme of this research. Through a multi-level perspective of socio-technical transitions, the non-linearity of transitions is emphasised, in addition to the role of society and contingencies such as external shocks. However, this framework is limited for urban sustainability transitions, primarily through having a narrow view of socio-political aspects, and therefore a simplistic view of agency. In addition, mechanisms impacting transitions such as lock-in and co-evolutionary processes are overlooked, as well as a limited sense of scale, place and space. I strengthen theoretical understandings of multi-level urban governance by focusing upon actors, their agency and capacity in more detail, such as the roles of state and non-state actors, and network governance and intermediaries on sustainable transitions and make a valuable contribution to this field of research through the application of Nottingham.

Second, the role of space and geographical context in sustainable transitions is highlighted as an important consideration and therefore comprises the second theme of this research, that is, cities in sustainable transitions. Here I have examined the ways in which the conceptualisation of the 'city' has altered within transitions literature, and how this can be useful in the Nottingham context – principally by considering the multiple conceptualisations of the city as inter-related, interwoven and complex, with governing actors being key 'nodes' in a wider system of climate governance. As such, I emphasise the role of the city in sustainable transitions, with notions that the city and local governments can range from having an informal, voluntary role in low carbon transitions, to having a more strategic and purposive role. Considering governance at the city level, I take into

account the role of ‘external shocks’ at the national level (such as austerity) on governance of sustainable urban transitions. The argument developed here therefore is that the shape and dynamics of urban areas are influenced by such contexts. I have introduced the concept of austerity urbanism in sustainable transitions as a valuable concept for this research and use the empirical findings of this research to contribute to these understandings.

Third, I note that justice and inclusion are paramount considerations within sustainable transitions thinking and introduce this as the third theme of this research. There is a significant gap in this field, particularly from theoretical perspectives whereby justice has been largely omitted from predominant theoretical frameworks (e.g. MLP). In this chapter, I attended to the importance of making justice a core theme of low carbon transition thinking, and therefore place justice dimensions at the forefront of this research. Through conceptual understandings of justice in energy and transport systems, I have argued that both energy justice and transport justice contribute to understanding by highlighting the importance of multi-level governance for inclusive processes. However, these concepts are generally in their infancy when applied at an urban level and have not been used in conjunction with one another in empirical applications, thereby presenting a gap in the literature. I contribute to the addressing of this gap through using a cross-sectoral approach across energy and transport to consider justice dimensions in urban sustainable transitions.

Finally, the approaches and pathways in sustainable transitions are fundamental at the urban scale and I therefore presented this as the fourth theme of this research. In particular, I emphasise the value of the concept of materiality and urban assemblages for understanding socio-technical systems. Complex infrastructure systems, such as energy and transport, are bound not only in the wider environment, by also within and between social connections, which can affect the ways in which various actors construct, govern and manipulate transitions on the ground. Furthermore, I contend that the concepts of lock-in, path-dependency and path creation are beneficial when examining factors enabling or hindering progression, and include multiple dimensions that can affect these processes, such as institutional, economic, social, political and environmental factors. In addition to multi-actor and multi-level perspectives, these concepts stress that the agency of actors and the place-based and temporal legacies of systems are a vital component when analysing urban sustainability transitions, and this thesis therefore seeks to enhance understanding in this field.

The four overarching themes of this research that I use as a conceptual framework have allowed me to develop my own perspective on these approaches and utilise these as a

theoretical basis. I address the gap of actor agency in low carbon transitions by providing this as a central theoretical focus of my thesis. I place emphasis on multi-scalar governance regimes, and relate this back specifically to local actor agency for sustainable transitions at the urban level (Bulkeley & Kern, 2006). In doing so, I argue that both individual and collective agency and political capacity is important at the local level for low carbon and inclusive trajectories. I draw much needed attention to the role of the city as a space and place for governing low carbon and inclusive transitions, and embed the city context within the wider national and international governance arena to better understand the processes of urban transitions in practice and how climate change governance is enacted and constraint on multiple levels. I argue that the city has a fundamental role in low carbon and inclusive transitions, and advance current debate by arguing that the structure and size of local authorities has a significant influence on enacting low carbon inclusive transitions (particularly in terms of responsibilities and statutory duties), and that local policy contexts are shaped by national and international levels (Gibbs & O'Neill, 2017). Importantly, I add to the growing body of literature on the role of external shocks on transitions and place emphasis on the role of austerity in local and national governance to highlight that new patterns of governance are being shaped at the urban level to overcome barriers (Hodson *et al.* 2016; Peck, 2012).

Crucially, I focus on the approaches and pathways taken by key governing actors and underline the importance of path creation, lock-in and path-dependency as concepts for further exploring past, past and future low carbon trajectories (Mackinnon *et al.* 2019). I argue that the use of these concepts helps new understandings of agency and governance - that is, past agency has a clear part to play in shaping contemporary transitions, both in providing constraints and opportunities, as shown in the Nottingham example. In addition, the notion of justice is integrated throughout my research (Jenkins *et al.* 2017; Mullen & Marsden, 2016). I directly reflect upon energy and transport justice to demonstrate the ways in which inclusive transitions can be integrated and achieved across sectors within the city, and add to current debate through this integrated application. The Nottingham case study has successfully allowed me to integrate these different theories which I develop as a theoretical basis. In doing so, I contribute to current debate on low carbon and inclusive transitions, both in terms of theoretical and conceptual terms with support of my empirical findings. In the next chapter I provide a more detailed examination of the research methodology and Nottingham case study.

CHAPTER 3

RESEARCHING LOW CARBON AND EQUITABLE URBAN TRANSITIONS

3.0. INTRODUCTION

The topic of sustainable transitions is one which transcends many disciplines, and this research is deliberately interdisciplinary to complement the varying social, political, environmental and technical dimensions of low carbon and just urban trajectories. In the first two chapters of this thesis, I have set up the leading arguments in sustainable transitions thinking and the subsequent conceptual and theoretical underpinnings of this research.

Whilst the interdisciplinary nature of this research will allow access to a range of perspectives, this poses a challenge from a methodological standpoint however, in that different disciplines utilise various approaches for research on sustainable transitions. There is no one preferred method for researching sustainability (Franklin & Blyton, 2011) which reinforces the need for careful methodological reflections. In addition, the application of this research from a multi-level perspective raises questions of how certain levels, scales and governing actors are understood across multiple disciplines, and the distinctive epistemologies behind these understandings. As such, methods for analysing sustainable transitions must be sufficient to capture not only micro-level and meso-level practices (for example, individual and community level), but also macro-level perspectives for comprehensively understanding policy and systems (Murto *et al.* 2020).

In this chapter, I set out the methodological approaches which were involved during this research which investigated low carbon and equitable transitions in Nottingham. This chapter is divided into seven parts, and in the first section, I consider the research philosophy underpinning this study. This is closely aligned to pragmatic and interpretivist approaches, which are suitable for an in-depth interdisciplinary study and allowed for a combined methods approach for understanding sustainable urban trajectories in practice. In addition, rather than using one single theoretical framework or model, I applied a conceptual approach which is built on predominant themes and concepts emerging from the literature (as

highlighted in the previous chapter). This is because the complex and interwoven social, political and technical aspects of transition are arguably best framed within a diverse and pluralistic set of understandings.

In the second section of the chapter, I examine the research strategy used for this research. The use of a case study method has been a particularly fruitful avenue for researching urban sustainable transitions, and in this section, I discuss the adoption of this method in further detail, and subsequent rationale for the choice of a single case study, Nottingham in the UK.

Following on from this, I detail the research design by focusing on the qualitative approach taken in this study and the research aim and objectives. Three research methods were used for data collection, that is: interviews; secondary data documentary analysis; and observational research and site-specific visits and therefore I incorporated a multi-methods approach. I discuss the rationale behind these choices, and the ways in which I conducted data collection in practice.

In the fourth section, I discuss the research analysis and the ways in which data was coded using predominant themes and concepts in the literature and analysed using a grounded theory approach. In addition, I set out how triangulating data with a multi-methods approach has strengthened data analysis.

In the fifth section, I consider the research ethics by providing details of ethical considerations in research practice, which in this instance is particularly important in terms of researching governance and just transitions using qualitative and mixed-methods. In addition, I consider ethics with relation to my own subjectivity, positionality and reflectivity, as well as the ethics of the study itself.

In the sixth section, I provide a critical reflection of the research design, which includes the methodological challenges during research practice, by drawing upon the obstacles encountered whilst conducting interviews in particular. Finally, I provide a conclusion of the carefully considered and distinctive methodology which has been utilised specifically to incorporate and give sensitivity to the multi-faceted nature of studying low carbon and equitable urban transitions in practice.

3.1. RESEARCH PHILOSOPHY

Although there has been a substantial growth of empirical research on sustainable transitions from a variety of disciplines, this can pose a dilemma from a methodological perspective, since different disciplines have certain methodological approaches and understandings which are dependent on the specific research being conducted and particular assumptions made. For example, the study of sustainable transitions has become increasingly interdisciplinary and ranges from those with perspectives from sociology (e.g. Geels, 2005; Hess, 2014); geography (e.g. Bridge *et al*. 2013; Calvert, 2016; Coenen *et al.,* 2012; Hansen & Coenen, 2015); political science (e.g. Bulkeley & Kern, 2005; Rutherford & Jaglin, 2015), economics and policy (e.g. Bolton & Foxon, 2012); engineering and systems management (e.g. Barton *et al.* 2018); and business (e.g. Burger & Luke, 2017).

With such diverse methodologies, there are various and distinctive underlying assumptions, ontologies and epistemologies, which in turn result in different interpretations and insights (Zolfagharian *et al*. 2019). Studying the complex phenomena of sustainable transitions from a predominantly social science perspective therefore prescribes ontological considerations (which detail assumptions about the nature of reality) and epistemological considerations (which include the status of knowledge claims about that reality) (Moon & Blackman, 2014). Epistemology and ontology are therefore particularly significant in research, since they are critical in shaping the ways in which researchers frame and guide their research in their attempts to discover knowledge. Consequently, it is important to reflect considerably upon epistemological and ontological orientations in an informed and transparent manner to further validate and legitimate research, as discussed next.

3.1.1. Epistemological and Ontological Position

This research is interdisciplinary in nature, by encompassing social, economic, and ecological dimensions. There are four predominant paradigms (i.e. set of key beliefs and assumptions that affect method selection) that are identified within transition studies: positivist, critical realist, interpretivist and pragmatist (Zolfagharian *et al.* 2019). This research is not suitably placed within one specific epistemological and ontological stance, as attempts to do this would be considered restrictive and inappropriate for this research. Instead, the hybrid and multidimensional character of climate change should embrace methodological diversity and epistemological and ontological incommensurability (Popke,

2016). As such, the qualitative and multi-faceted nature of this research lends itself well to two particular philosophical stances which are most closely aligned to this research, that is, pragmatism and interpretivism, which are therefore discussed in turn.

In pragmatic approaches, there is a general acceptance that there are single or multiple realities which are open to empirical inquiry (Kaushik & Walsh, 2019). A major underpinning of pragmatism is that knowledge and reality are based on beliefs and habits which are socially constructed in an ongoing iterative fashion rather than in a more abstract sense, and therefore it highlights the role of differing individual experiences. Pragmatism accepts that views, ideas and positions are better judged based on their practical consequences (Hartz-Karp & Marinova, 2017). This is particularly beneficial to this study on sustainable transitions, since sustainable transition research is dependent on evidence of practical and implemented shifts towards a sustainable path, governed by multiple actors at differing scales. Decisions regarding methodology are based on the usefulness in addressing particular research questions posed, rather than the extent to which they fit within a specific research philosophy (Denscombe, 2014).

Furthermore, pragmatism as a philosophical approach allows the researcher to be cautious and self-conscious about positionality and the conduct of research (Ritchie *et al.* 2014). Therefore, the emphasis on positionality and conduct of research is important in the context of sustainable transitions due to the highly political nature of the topic, in addition to the complex, external and independent process of sustainable transitions with relation to the researcher (Zolfagharian *et al*. 2019). Whilst there are criticisms that pragmatism may indicate a certain lack of principles or philosophy, commonly referred to as 'anything goes' (Denscombe, 2014; Ritchie *et al.* 2014), the urgency of climate change at the urban level is complementary to pragmatic approaches, which are often value-driven and emphasise problem-solving. As such, pragmatism is orientated towards solving practical problems on the ground and complementary as a method for more practically-minded researchers (Kaushik & Walsh, 2019; Zolfagharian *et al*. 2019) (as reinforced in Section 3.5).

Additionally, this research can be most closely associated with interpretivism, which can allow for the study of many versions of a specific, rich and complex situation (Hartz-Karp & Marinova, 2017). According to Zolfagharian e*t al.* (2019), interpretivist transition research is distinctive by highlighting transitions as socially constructed through language and culture. The study of governance strategies is a particular theme of this research, and since

low carbon and equitable governance will be dependent on a multitude of actors, an interpretivist approach allows for the interpretation and understanding of a situation which may be viewed differently by multiple stakeholders due to their varying and subjective beliefs, understandings, interests, experiences, expectations, motivations and actions. Furthermore, interpretivism is complementary to the urban nature of this study and to claims that experiences of people are context-bound, and cannot be free from location and time or the mind of the human actor (Flick, 2018).

Interpretivist approaches allow for the adoption of more personal and flexible research strategies (such as the focus on narratives, stories, perceptions and interpretations of actors) to encompass the richness and complexity of sustainable transitions (Zolfagharian *et al.* 2019) and is therefore complementary to the qualitative data collection methods as reflected in the research design. Similar to pragmatism, the interpretivist approach to research emphasises that the values of researchers and participants can become an integral component of research and therefore this approach is useful as it requires a high degree of reflexivity (as I discuss in more detail in Section 3.5**).**

3.1.2. Conceptual Framework

As aforementioned, sustainable transitions are a particularly complex phenomenon which have spurred interest across a multitude of disciplines and perspectives. It is beyond the scope of this chapter to define each and every conceptual approach within these disciplines. However Loorbach *et al.* (2017) highlight that sustainable transitions research can be generally categorised into three approaches, that is: socio-technical; socio-institutional; and socio-ecological. Since this research does not try to place itself within one restrictive approach, it rather is best considered to be underpinned by both socio-technical and socio-institutional approaches.

Socio-technical regimes are rooted in science and technology studies and are primarily concerned with the socio-technical regimes that have emerged around dominant technologies, which are the subject of transitions (Loorbach *et al.* 2017). This approach takes a particular emphasis on the role of innovation in understanding the dynamics of transitions processes, such as path-dependency, lock-in and disruption (as examined in Chapter 2). Such perspectives are useful to this research by highlighting the innovation of low carbon technologies, and the dynamics of transition processes which may sustain or inhibit their

progression in practice, such as path-dependency and lock-in and materiality. In contrast, socio-institutional approaches place an increased prominence on the cultures, structure and practices surrounding sustainable transitions. Therefore, whilst technologies have an important role, significance is placed on the inherently political nature of transitions, and how incumbent powers, actors and motivations can affect change. This particular aspect is well-placed to aid the conceptualisation of governance of low carbon and equitable transitions. Furthermore, socio-institutional approaches often focus on specific sectors or geographical areas that face problems, and therefore lend well to the multi-level perspectives of this research at the urban scale (Loorbach *et al.* 2017).

As highlighted in Chapter 2, this research is informed by a combination of themes which are prevalent in the literature: (i) Multi-Level Governance of sustainable transitions; (ii) Justice in sustainable transitions; (iii) Cities in sustainable transitions; and (iv) Approaches and pathways in sustainable transitions, as shown in **Figure 2.1**. Within each of these four themes, there are useful core concepts that I draw upon. I therefore utilised a conceptual framing which is based upon a synthesis of relevant core concepts and themes in order to examine the low carbon transition of the energy, transport and infrastructure sectors in cities. A summary of this conceptualisation is provided in **Table 3.1**.

Using a conceptual framework combined with themes and concepts is preferable over the use of one underlying theoretical framework. This is because the established sustainable transition frameworks, such as MLP is limited from having underdeveloped concepts (e.g. the roles of actors and politics), or themes which are omitted entirely (e.g. justice), as stated in the previous chapter. Therefore, due to these limitations, relying on only one dominant theoretical framework of sustainable transitions theory would be problematic for this research methodology. Furthermore, it is observed that these frameworks remain rather abstract, passive and therefore difficult to use from a policy perspective, possibly as a result of the academic arenas in which these frameworks have been formulated. It is hoped that this research will provide 'real-world' empirical material which can in turn be accessible to both academics and policymakers. Therefore, I reflect upon these theoretical frameworks where appropriate, however this research is largely underpinned instead by a conceptual framing which is based upon a synthesis of relevant core concepts and themes which are prevalent in the literature in order to examine the low carbon transition of the energy, transport and infrastructure sectors in cities. The conceptual framing has been specifically considered to complement the research strategy, and *vice versa*, as discussed next.

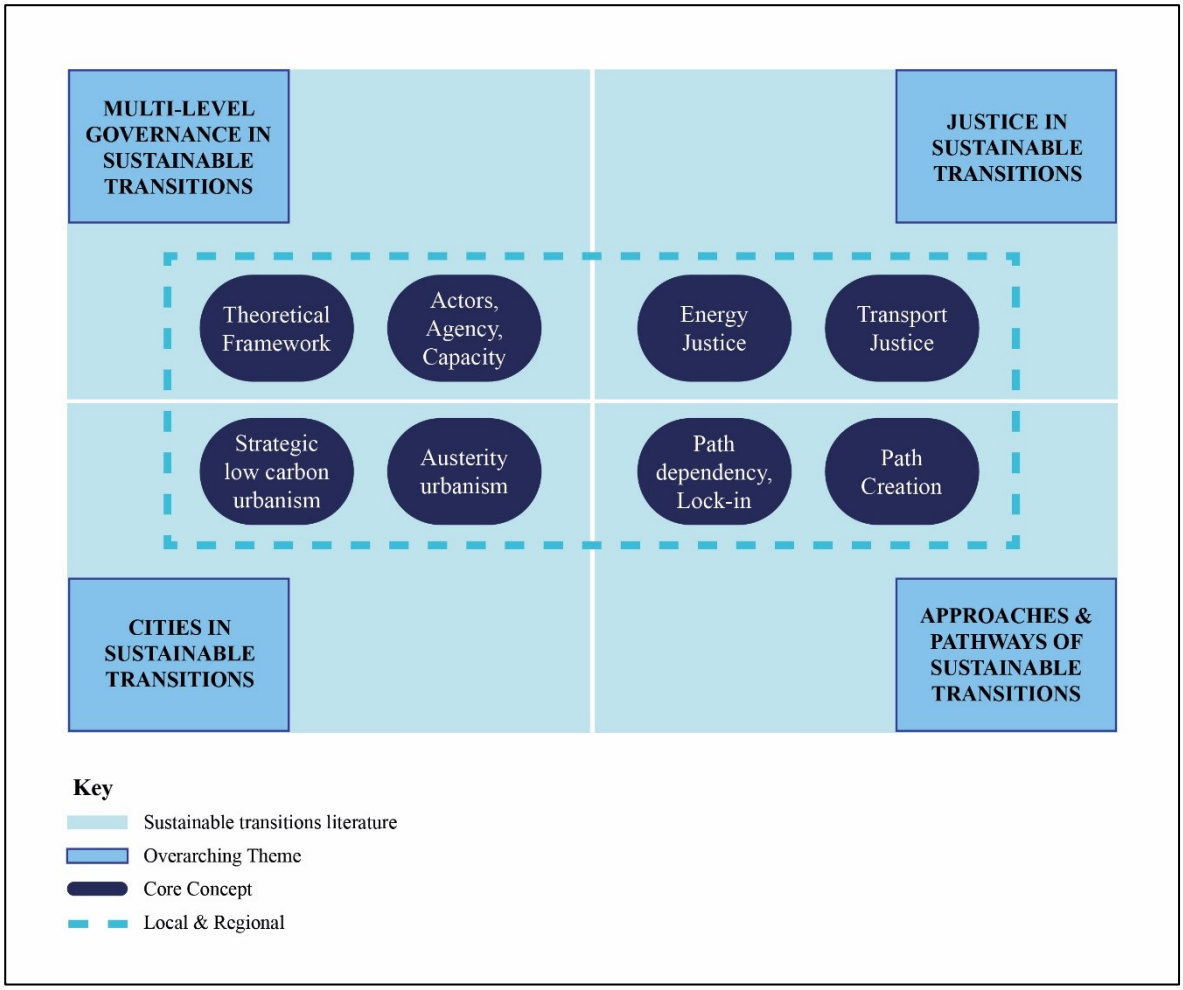

Figure 2.1: Conceptual Framework

Multi-level governance in sustainable transitions	Conceptualisation of '*governance*': i.e. multiple and diverse actors *across* scales (rather than traditional hierarchical, linear, state-centric process); Subject to wider processes and institutionalised practices therefore continuously *contested and renegotiated*.
	Benefits and limitations of established theoretical frameworks: (e.g. MLP, MaP) Emphasis on 'levels' and processes within transitions e.g. niche (micro), regime (meso), landscape (macro); Limited attention to the role of actors, agency and lock-in, simplistic sense of scale, place and space.
	Role of *actors* (state/non-state) and *networks/intermediaries* i.e. 'New' and emerging forms of climate governance; Combination of actors using different models of ownership and implementation (e.g. ESCo)
	Role of *agency* and *capacity* Varying and fluid between scales and levels, influenced by individuals and collectives Emphasis on wider *spatial and scalar considerations* (e.g. economic, political and societal systems)
Cities and sustainable transitions	Conceptualisation of the '*city*': i.e. the city as interwoven, inter-related and complex (rather than nested and bounded areas). Emphasis on city as '*assemblage*' shaped by wider and unequal biological, geophysical, political and cultural processes.
	Role of the city in climate governance ranging from informal and voluntary engagement (e.g. municipal voluntarism), to strategic and purposive (e.g. low carbon urbanism).
	Role of *external shocks and forces* at the national level on urban governance (e.g. neoliberalism, austerity urbanism)
Justice and inclusion in sustainable transitions	Conceptualisations of '*justice*' i.e. emphasis on incorporating a justice/inclusion lens within sustainable transitions; Notion of 'just' transitions, however omissions of justice largely within mainstream climate change politics
	Underdeveloped theoretical frameworks for understanding justice in energy and transport studies (e.g. energy justice framework, mobility justice) Emphasis on *contested spatial and temporal* processes of transitions
Approaches and pathways in sustainable transitions	Complex infrastructure systems and concepts of *materiality* (e.g. transport and energy) are bound not only in wider environment, but also *within and between social connections*; Emphasis on changing social meanings, power relations, personal bonds and connections which can influence decision-making on the ground.
	Understandings of differing forms of *lock-in* and *path-dependency;* Emphasis on strong relationship of urban materiality and multi-level actor agency; Emphasis on place-based and temporal legacies of systems which can hinder transitions.
	Influential yet under-theorised notion of *path-creation* i.e. route for overcoming lock-in and blockages, can give way to new forms of actor agency and governance; Emphasis on *place-based and temporal legacies* of systems which can influence transitions; Focus on actors and positive opportunities which are created through innovation, reconfiguration and recombination.

Table 3.1: Summary of key conceptualisations for developing research framework

3.2. RESEARCH STRATEGY

As set out in Chapter 1, the aim of this thesis is to investigate the governance of low carbon and equitable transitions in cities in advanced economies. In order to achieve this overarching aim, I seek to understand which actors are involved in sustainable urban transitions, the approaches taken in practice, and the ways in which the implementation strategies undertaken are just and equitable.

In light of this aim, I reiterate in Chapter 2 that it is important to be attuned to four major components: firstly the governance of sustainable urban transitions and the agency and capacity of multiple actors; secondly the multiple level and scales at which governance operates across space and urban areas more specifically; thirdly, the justice dimensions to ensure that certain groups (e.g. vulnerable, elderly and minority groups) are not disproportionately impacted; and finally, the approaches and pathways underpinning transitions.

The use of an intensive case study such as Nottingham lends itself well in comparison to a more extensive approach. This is because it allows for a rich, qualitative investigation which encompasses the complex and multi-faceted nature of sustainable urban transitions, and more specifically the multiple dynamics that are at play, including the tensions, barriers and governing actors. I further consider the use of a case study method and provide a rationale behind the Nottingham case, as explored next.

3.2.1. Case Study Method

Whilst there is no one preferred method for researching sustainability, case studies are the most frequently adopted research strategy for urban researchers (Maginn *et al.* 2008; Zolfagharian *et al.* 2019). Crucially, case studies allow the ability to explore and investigate complex real-life phenomenon through using detailed contextual analysis of events or conditions and their relationships (Yin, 2014). This is appropriate given the complex and rich nature of sustainable transitions and the plethora of actors engaging across multiple scales. Furthermore, according to Yin (2014), case studies are suitable when the studied phenomenon is complex and not clearly or sufficiently theorised, and are particularly fitting when a degree of flexibility of research design is required. Maginn *et al.* (2008) highlight a particular strength of the way in which case studies allow the use of multiple research methods and different perspectives, which contribute to the depth and richness of data that can be obtained. Furthermore, because of its versatility, a variety of transition studies utilise case study methods across scales, ranging from those at the national level to those at the community level.

There are several categories of case study research, namely exploratory, descriptive and explanatory, as shown in **Figure 3.1** (although it should be noted that on many occasions these types cannot truly be isolated within research). In particular, the explanatory and

descriptive nature of case studies is useful for this study, in line with studies such as Scanu and Cloutier (2015). This is because it seeks to determine the extent to which low carbon and inclusive transitions have been achieved in practice, and given the complex and multi-faceted nature of sustainable transitions that is suitable for intensive case study approaches.

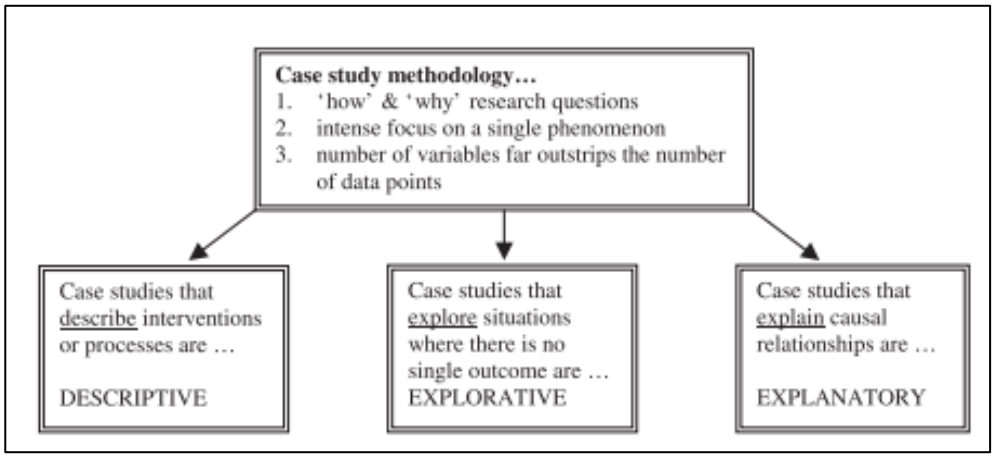

Figure 3.1: Types of case study methodology (Fisher & Ziviani, 2004, p.186).

Particularly in an era of urbanisation and globalisation, the comparative case study approach has been praised within recent years (e.g. McFarlane, 2011; Robinson, 2015) and there has been an increase in comparative case study approaches in transitions research and urban studies alike. The case study method has developed into a comparative method, whereby multiple cases are studied or independent cases are conducted in a number of cities, employing similar methods and research questions. Whilst cities are recognised as unique and idiosyncratic in character, the comparison of cities (also known as 'comparative urbanism') is considered as the systematic study of similarity and difference among urban processes rather than in cities *per se* (Nijman, 2007). Generally, such studies address the extent and manner of similarity and difference using descriptive and explanatory questions. As McFarlane (2011) highlights, there is no general rule to the number of case studies compared, and constraints such as time and research funding can to some extent dictate this decision-making.

I initially planned a comparative study for this research to compare different approaches for low carbon and equitable transitions from two different case study contexts (e.g. Lemon *et al.* 2015; Scanu and Cloutier, 2015). It was important to conduct an initial 'scoping' review

to select countries which had made strides in the field of low carbon trajectories. Although criticisms remain that transition studies are lacking in their application of non-OECD countries (Kohler *et al.* 2019; Markard *et al.* 2012), I carefully considered areas in advanced economies, i.e. those in North America and Europe, due to their engagement, progression and advancement in low carbon and inclusive transitions (in contrast to non-OECD countries which might have existing, more prominent financial and governance issues more generally).

As highlighted, the topic of sustainability and a just transition is an issue which is widely debated and subject to much interpretation and perspectives, and there is generally no universal acceptance of one definition or indeed what such transitions look like, nor the ways in which sustainable and equitable transitions should be achieved, nor where or at what scale this is appropriately achieved. Therefore, in line with other studies (e.g. Levin-Keitel *et al.* 2018), it was favourable from a practical and research perspective to conduct data collection within an English-speaking country to minimise misinterpretation and miscommunication on an existing complex and controversial topic.

In addition to Nottingham, the city of Seattle in the United States also presented an appropriate and interesting case of low carbon and equitable urban transitions, again by providing rich examples of cross-sectoral decarbonised and just transitions. However, after careful reflection and initial scoping, a single intensive case study methodology was considered the most applicable for this research, which is in keeping with methodologies in transitions research (Kohler *et al.* 2019).

The reasoning behind a single case study is two-fold: first, the site-specific focus of this research, i.e. the urban area, and the multi-faceted nature of transitions and its corresponding social, economic and political contexts required a method that allowed for a deeper analysis of complex phenomena which given time-restrictions and capacity would not have been as thorough as with two separate and international case studies (Durrant *et al.* 2018). Second, in December 2016 I experienced significant health setbacks after the diagnosis of a chronic neuro-muscular condition which resulted in a four month leave of absence, continuous lifestyle adjustments and on-going medical treatment. During this time, I reflected upon the future of this research, the need for on-going medical treatment and what would be suitable logistically factoring these elements in. Since I was already familiar with the Nottingham and UK context, and considering the geographical proximity to the research area from

Glasgow, Nottingham was the most appropriate single case study and therefore I took this forward for investigation, as I expand upon next.

3.2.2. Rationale for Nottingham Case Study

I identified the UK as a suitable context for this research since it has committed to targeting greenhouse gas emissions and therefore appears to have a dynamic sustainable trajectory. However, this engagement has been fluid and incoherent given changing governments which has resulted in varying political will and national government support within recent years (as elaborated in Chapter 4). Such contexts are useful for examining sustainable trajectories across both local and national levels. It presented the opportunity to assess theoretical frameworks such as the MLP and concepts such as multi-level governance, lock-in and path-dependency, and to develop these understandings from an empirical application. In addition, neoliberal austerity within the UK is an interesting contextual background which allowed for a greater investigation of the constraints and barriers of implementation pathways encountered by actors and their subsequent governing agency and capacity in low carbon and equitable urban transitions. Furthermore, from living in the UK and working and studying in the sustainable energy sector, I had a strong foundation with the context, which was beneficial for understanding low carbon transitions from a UK perspective. In addition, this was advantageous given the funding and time restrictions, and therefore suited in terms of practical purposes.

The chosen case study for this research was the city of Nottingham, which is located in the East Midlands and was selected as a result of many careful reflections. Through an online scoping exercise which I used to identify potential urban areas to investigate, I discovered that Nottingham has made particular progress within recent years in the field of sustainable transitions. A notable example of this is the city's ambitious climate change goals, with the most recent announcement in 2020 'to make the city the first carbon neutral city in the UK by 2028' (Nottingham City Council, 2020a). This overt commitment to decarbonisation was therefore distinguishable, and this rationale echoes that of Durrant *et al.* (2019) who utilise the case study of Brighton and Hove in the UK due to being an example of a 'front runner in the UK context when it comes to political commitment to the environment and therefore a suitable 'most likely' case where some [transition] acceleration may be expected' (p.1543).

Nottingham's intention complemented the integrated approach of this study, with the emergence of low carbon initiatives across transport, housing and energy sectors. This therefore allowed for a more holistic view of sustainable transitions at the urban scale in comparison to a focus on a single domain (Durrant *et al*. 2018). The relevance of Nottingham to the research topic was therefore anticipated to be fruitful and rich for research, and even more so since a preliminary literature review revealed that the city had received limited academic attention in terms of low carbon and equitable transitions[13]. This is in contrast to the commonly studied 'premium world cities' which have received most attention within urban sustainability research (Hodson & Marvin, 2010). This notable gap of application in the literature was a fundamental justification for empirical research, and further reinforces the valuable contribution of this thesis to novel and in-depth empirical research in the academic field.

In conjunction with suitable examples of low carbon projects on the ground, I determined the case study in terms of the timing and funding restrictions of this research simultaneously with practical considerations. Nottingham's location in the UK was beneficial since this was within accessible travelling distance from the University of Glasgow and in the same time-zone which aided data collection purposes (for example during interviewing). The size of the city was appropriate for the scale of this research, with Nottingham being classified as a mid-sized city and with a population of circa. 300,000 inhabitants, and therefore contributed to the gap in literature which focuses predominantly on larger metropolitan cities and neglected mid-sized and smaller cities and town (Kern, 2019). Furthermore, Nottingham was ranked 11th most deprived out of 317 districts in England in the 2019 Indices of Multiple Deprivation, an increase from 8th in 2015 (Nottingham Insight, 2019a). In tandem with this, 30 per cent of the city's Lower Super Output Areas (LSOAs) fall amongst the 10 per cent most deprived in England, as shown in **Figure 3.2**. Nottingham has a higher than average rate of people with a limiting long-term disability or illness (Nottingham Insight, 2019a). Therefore, the persistence and exacerbation of inequality was particularly important for researching justice dimensions in low carbon transitions. Furthermore, as reflected upon in

[13] At the time of writing, examples of noteworthy empirical studies related to low carbon transitions in Nottingham are by (but not limited to): Lemon *et al.* (2015) who provide a comparative analysis of three Midlands locations (Leicester, Nottingham and Coventry) to explore the complex relationship between national and local level policy; Dale *et al.* (2017) who provide an empirical evaluation of the Workplace Parking Levy on local traffic congestion in Nottingham; Preston *et al*. (2020) who discuss practical lessons from Nottingham's REMOURBAN scheme to examine citizen engagement in low carbon smart cities.

more detail in Section 3.5.2, this choice was also influenced by my positionality and personal commitment to investigate and challenge such inequalities.

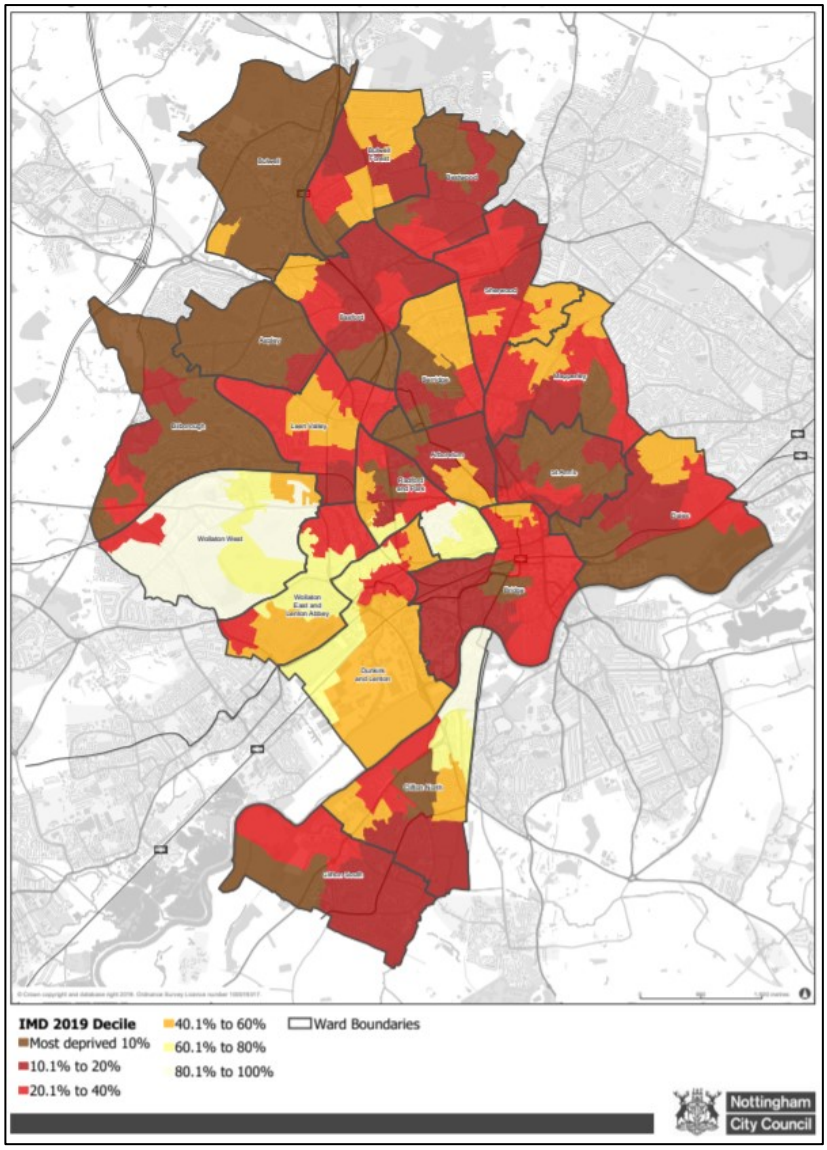

Figure 3.2: Nottingham City 2019 Indices of Multiple Deprivation (Nottingham Insight, 2019a).

3.3. QUALITATIVE RESEARCH DESIGN

As set out in Chapter 1, the research aims and objectives for this thesis seek to develop a comprehensive understanding of low carbon and inclusive governance at the city level. This thesis is particularly focused on the social and political, as well as the material, economic and technical dimensions of low carbon transitions through a multi-scalar governance

approach, that is, through identifying the governance and agency of multiple actors across various scales. This thesis makes a distinct contribution by engaging with these multiple dimensions of low carbon transitions, and the ways in which they articulate with multi-level governance.

As highlighted by Zolfagharian *et al.* (2019), transition researchers have three general options with regard to research method, that is, qualitative research, quantitative research, and mixed-methods research (a combination of qualitative and quantitative). In keeping with the majority of empirical work on sustainable transitions (McCauley *et al.* 2018; Wolfram, 2016), a qualitative, mixed-methods approach was considered the most suitable for this study. The specific focus on actors and their agency, on all scales, and the ways in which equitable transition trajectories are constructed and/or contested can be researched through different narrative data sources. The in-depth nature of the data collection process and the fluid and flexible research design complemented by qualitative research ensured that the rich, complex and nuanced topic of low carbon and equitable transitions at the urban level was appropriately understood. Furthermore, a mixed-methods approach allowed for data to be triangulated, which helped legitimate and validate research (as discussed in Section 3.4).

Additionally, sustainable transitions research can be categorised into different methodologies with respect to time and transition trajectory processes. Zolfagharian *et al.* (2019) highlight that there are two predominant types of research design within transition research, longitudinal and cross-sectional research design. The former, longitudinal, is the most commonly used as a research methodology and involves a study over an extended period of time, in comparison to cross-sectional studies which investigate a variable at a particular point in time. However, due to the time constraints of a PhD, this fieldwork does not simply fit into either of these categories since this research was conducted over a 4-year period in total between 2016-2020.

The consideration of urban low carbon and equitable transitions additionally raises temporal dimensions, in other words, the timing of change of the transition itself. Transitions are understood as complex and having multiple processes. Transitions are accepted as long-term processes which can take years to unfold (as per lock-in and path-dependency), but also that they are altered in the shorter-term by co-evolutionary and multi-actor processes which have a varying degree of change and stability (Kohler *et al.* 2019; Kuzemko *et al*. 2016).

As shown by the research objectives, it was important to consider the role of multiple actors in governing low carbon and equitable transitions, i.e. actor agency. In addition, it was important to understand the timing and wider relations of collective and individual agency, such as the dynamics of actor agency in relation to the wider political and social contexts, since changing roles and role relations can be an indication of changes in shared values, norms and beliefs (Coe & Jordhus-Lier, 2010; Wittmayer *et al.* 2017).

Due to the political nature of sustainable transitions, certain factors which are subject to alterations over time, such as local and national government policies, were a key consideration and it was necessary to look also to the wider climate policy context to help provide a detailed overview of transition pathways. In relation to this, Massey (2005) introduces a spatial and political dimension to examining wider contexts or 'conjunctures' (i.e. the state of affairs or events occurring on a national and international level) and appropriately asserts that there is a need to recognise the uneven geographies of conjunctures (such as the 2008 global economic crisis), and the different ways in which this can be politicised, narrated and articulated across space (Featherstone & Karaliotas, 2018). Peck (2017) follows this thinking and stresses the need for a 'conjunctural approach' to urban analysis and methodologies, also termed 'conjunctural urbanism'. He argues that such an approach 'explicitly problematises the relative positioning of cities' (Peck, 2017, p.8) in relation to contexts of multi-scalar relations, uneven development and wider economic and political contexts. Using this approach in the example of neoliberal urbanism can open up a space for the construction of explanation between urban areas and is sensitive to issues of contextual, positional and situational specificity, rather than viewing neoliberal urbanism as global in trend, uniform across space and ubiquitous (Peck, 2017, p.9). This is a particularly important aspect for this research which places emphasis on the wider economic and political context (e.g. austerity urbanism) and the effect this has had on urban low carbon governance and the way it is politicised and contested between actors and across space. Given this approach, I have also reflected on the challenges of conducting research during the current wider political and economic conjuncture and how this can impact on data collection and analysis, as described in Section 3.7.

With specific reference to Nottingham, whilst the study intended to study Nottingham's recent pursuits towards low carbon and equitable transitions (the term 'recent' was open to interpretation but was largely understood as within the last 20 years), it was vital to not be restrictive when considering time periods in order to gain a comprehensive understanding of

the ways in which past processes may have influenced present trajectories. Therefore, a cautionary approach was taken in this study's design to include both historical transitions and future trajectories within the past 80 years. The research design therefore encompassed this timeframe within the research aims and objectives, which I set out next.

3.3.1. Research Aims and Objectives

As highlighted in Chapter 1, the overall aim of this research was to investigate the governance of urban low carbon and equitable transitions in an advanced economy, and this remained unchanged during the entire research process. I identified this aim through conducting a thorough literature review and paying close attention to research gaps, as described in Chapter 2. I investigated the research objectives (as outlined on page 8) using three qualitative methods: interviews, secondary data sources, and observational research and site visits, as detailed next.

3.3.2. Interviews

I collected data during the period of June 2017 to September 2019 and interviews were one of the main sources of data collection for this research. I chose this form of data collection as an approach due to the social and political nature of sustainable transitions and the need to access in-depth opinions, views and perceptions of low carbon and inclusive transitions in the city. I pursued face-to-face interviews as the primary data collection method for this research, and where this was not appropriate or possible, I conducted online and telephone interviews. Due to the nature of this research, this type of method allowed me to access personal, in-depth material and accommodated for a far more wide-ranging discussion than a questionnaire would permit (Flowerdew & Martin, 2005). The choice of interviews over ethnography was primarily because of the positionality of the researcher (that is, myself) in relation to the study, as interviewing does not rely on researcher-led observations (as discussed in greater detail in Section 3.5.1). As such, interviews were beneficial to help analysis and an 'outsider' perspective allowed for an overarching view of potentially conflicting views across different actors (Durrant *et al*. 2018; Murto *et al.* 2020).

In total, I conducted 35 interviews with a wide range of stakeholders within and out-with the city. Interviewees were determined by their position in relation to the research project, and was largely made up of sustainability advocates, or those working within the field of sustainable transitions. Securing a diverse range of actors and networks at different

geographical scales was crucial to examine a range of perspectives and the socio-spatial relations and dynamics within different scales at the urban level (Coenen *et al.* 2012; Hodson & Marvin, 2010). Similar to other qualitative research investigating low carbon transitions on the national level (e.g. Willis, 2017), interviews were generally not conducted with those who were known to explicitly oppose transition strategies or those who publicly did not accept the scientific consensus of climate change. This is because firstly, this individual positionality was difficult to identify; and secondly, most of those working within the field of sustainable transitions had an active interest in the environment and low carbon futures. The participants consisted of state actors within local and national government, and non-state actors comprising of third sector organisations and private sector organisations, shown in **Table 3.2** (a breakdown of the number of individuals interviewed per organisation/entity is found in **Appendix A**).

Actor type		***Organisation/Entity***
'State' Actors	National Gov (n=2)	Department for Energy, Business, Industrial Strategy Office for Low Emission Vehicles
	Local Gov (n=5)	Doncaster Council/Great North Energy Green Party Nottingham City Council Nottingham City Homes Nottinghamshire County Council
'Non-State' Actors	Third Sector (n=12)	Anonymous Charity APSE Energy Campaign for Better Transport Nottingham Global Justice Nottingham Great North Energy Meadows Ozone Energy Services (MOZES) National Energy Action Nottingham Energy Partnership Pedals Robin Hood Energy St Ann's Advice Centre The Big Wheel
	Private Sector (n=3)	LEVEL Municipal Western Power Distribution

Table 3.2: List of organisations by actor type (in alphabetical order)

It was also vital to secure interviews with individuals across sectors such as transport, energy and housing to ensure a cross-sectoral approach was being applied to the research, displayed

in **Table 3.3** (a breakdown of the number of individuals interviewed per sector is found in **Appendix A**). The employment position of interviewees varied significantly to allow a range of positions and opinions to be collected, for example, from those working more directly with members of the public (such as fuel poverty officers), to those who had responsibility for initiatives (such as project officers), to those who were senior in strategy and development (for example heads of department).

Sector	***Organisation/Entity***
Energy (n=11)	APSE Energy (Not-for-Profit) Department for Energy, Business, Industrial Strategy (UK Government department) Energy and Carbon Management (Nottinghamshire County Council) Energy Services (Nottingham City Council) Global Justice Nottingham (Not-for-Profit) Great North Energy (Doncaster Council) Meadows Ozone Energy Services (Charity/Not-for-Profit) Municipia (Private Consultancy) Nottingham Energy Partnership (Not-for-Profit) Robin Hood Energy (Nottingham City Council/Not-for-Profit) WPD (Private Distribution Network Operator) Green Party*
Transport (n=10)	Anonymous Charity (Charity) Campaign for Better Transport (Charity) Cycle City (Nottingham City Council) Electric buses (Nottingham City Council) Go Ultra Low (Nottingham City Council) LEVEL (Private Consultancy) Nottingham Electric Trams (Nottingham City Council) Office for Low Emission Vehicles (UK Government department) Pedals (Charity) The Big Wheel (Charity) Workplace Parking Levy (Nottingham City Council)
Housing (n=6)	Energy Services/REMOURBAN (Nottingham City Council) Fuel Poverty (Nottingham City Homes) National Energy Action (Charity) St Ann's Advice Centre (Charity) Strategic Housing Assets (Nottingham City Council) Sustainable Energy (Nottingham City Homes)

**It is noted here that the Green Party covers all sectors, i.e. energy, housing, and transport but for the basis of simplicity has been included as the energy sector since this was referred to most frequently by the interviewee.*

Table 3.3: List of entities/interviewees by sector (in alphabetical order)

I independently recruited interviewees by initially emailing the organisation or interviewees directly, after sourcing their contact details on web pages and online documents. Gatekeepers are individuals within organisations who have (or can withhold) access or power to required candidates for research (Flowerdew & Martin, 2005). Similarly, the snowballing effect is a process in which one contact eases recruitment of another through association within similar fields for research. This in turn can help ease recruitment of prospective interviewees and allow the gaining of information and range of perspectives. As such, I used gatekeeping and snowballing as tactics frequently to recruit interviewees (the importance of which I reflect upon in Section 3.6).

The location of interviews was an important methodological consideration, particularly as interview sites can produce 'micro-geographies' of spatial relations and meaning (Elwood & Martin, 2004). By its nature, the interview site may reflect relationships of the researcher with the participant, the participant with the site, and the site within a wider socio-cultural, power context which might affect both researcher and the participant (Edwards & Holland, 2013). The site of each interview was determined by the interviewee in every case and face-to-face meetings were held in public places to facilitate a more relaxed conversation and was appropriate regarding safety precautions. In the event of telephone and email conversations, I conducted interviews from home to allow for privacy and a quiet setting.

The style of each interview was informal, in-depth and semi-structured based on open-ended questions around predominant themes which emerged from pre-read literature and research, as shown in **Appendix B**. This choice of structure allowed fluidity and flexibility of the conversation as opposed to structured interviewing techniques. Each interview varied in content and design depending on the participants' role, background, function and knowledge. I recorded the data on a Dictaphone and took additional notes, where permissible. The length of interviews also varied, but generally lasted between 1 – 1.5 hours in duration per interview.

3.3.3. Secondary Data Sources

A second important source of data collection was in the form of desk-based documentary analysis, which consisted of primarily online documentary sources. This included those produced formally and published by the national government and local authorities in order to investigate approaches to low carbon transitions, for example policy and strategy

documents. Since environmental policy can encompass a broader and overlapping range of themes and sector-specific areas (such as biodiversity, agriculture, water quality, waste, and historical environment), I restricted my analysis of environment policy and strategy analysis to that relating to low carbon to include transport, buildings, and renewable energy supply.

Documents and website blogs from private sector organisations and third sector organisations such as non-governmental organisations and charities were another vital source of data for this study through permitting a data source which encompassed in many cases more critical and personal perspectives. Additionally, I used newspaper articles and academic literature to support data collection.

I collected quantitative data, such as census data and sustainability ranking studies where appropriate, however this consisted a less substantial part of research. The data used in this study was utilised for contextual analysis and qualitative comparisons by abstracting those elements within the documents which were important and most relevant to the research aims.

3.3.4. Observational Research and Site-Specific Visits

Due to the technical nature of low carbon transitions in the city, site-specific visits comprised a third method of data collection, and I conducted a select number of interviews with key stakeholders during this time, as shown in **Table 3.4** below.

Participation Type	*Event/Activity*	*Date*
Attendance	Nottingham Go Ultra Low FestEVal	June 2018
Interview and Site Visit	Remourban Housing Project	July 2018
Interview and Test-Ride	Electric Bike and New Cycle Infrastructure	July 2018
Test-Ride	Electric Tram Infrastructure	July 2018
Attendance	National Energy Action Conference on Fuel Poverty	Sept 2018

Table 3.4: Observational Research and Site-Specific Visits (in chronological order)

I conducted observational research during these events, which essentially placed people and observations at the centre of the research. Such an approach allowed for elements of immersive and 'lived' research, and events to be viewed through the perspective of those being studied and their environments (Plows, 2008). This aided data collection through

providing a deeper analysis of social processes of a given situation, which helped to identify fluid, complex and shifting issues and guide better understanding (Plows, 2008). During this time, I reflected and wrote down thoughts and observations in a field workbook. The degree of observations during 'attendance' and 'site-visit' were mainly passive, though where needed I initiated conversation with other participants and made my role as a researcher explicit.

During 'test-rides', the role of observation was more active by using the infrastructure as a public citizen. Essentially, this involved borrowing an electric bike from Nottingham City Council for approximately 2 hours and being guided on the newly constructed and segregated cycle paths around the city by a member of the City Council transport team. During this time, I observed aspects such as the quality of the paths, ease of access including signage, and general concurrence with other road users such as cars. There was a discussion throughout this period and I asked questions to further understand the decision-making processes of segregated cycle paths. Furthermore, electric bicycles are a potential solution for transport decarbonisation and a fairly novel initiative in the UK, and this therefore was my first-time experience using one. As such, I made personal reflections on their ease of use (which was generally positive), yet there appear to be justice implications due to cost (as I reflect upon in Chapter 6). I arranged site-visits and test rides of infrastructure through gatekeepers, either initiated by myself or through the gatekeeper themselves.

I gained access for attending the Go Ultra Low FestEVal and National Fuel Poverty Annual Conference by emailing the host organisers (Nottingham City Council and National Energy Action, respectively) and secured a delegate place. The Go Ultra Low FestEVal was a free two-day event held in the Old Market Square in Nottingham city centre to introduce members of the public to electric vehicles. This included a display of electric vehicles and a series of talks by advocates of electric vehicles and the shifts to decarbonised transportation, as shown in the programme flyer in **Appendix C**. The National Energy Agency Fuel Poverty Annual Conference was held in Nottingham over 2.5 days, and included a series of talks from various state and non-state actors, a programme of which is included in **Appendix D**. During the breaks and lunch-time, I was able to network with other delegates who worked specifically in the field of fuel poverty, and again made my role as a researcher explicit. I reflected upon my observations where appropriate in the findings chapters.

3.4. RESEARCH ANALYSIS

The use of interviews was the main source of data collection and constituted the most time-consuming element of this research, although this was enhanced by secondary data collection and observational research and site-specific visits. This mixed-methods approach was important for triangulating data as a research method, which allowed me to collect data from different sources and at various times to facilitate for rich, in-depth and rigorous research to be gained from the multiple sources available.

I recorded interviews (where permissible) for ease of data collection, and then transcribed audio recordings onto a computer. I collated and inputted the transcript data into a specialist qualitative research computer software 'Nvivo' where I subsequently coded the data to discover predominant and emerging themes. I divided these primary themes into more specific sub-themes to aid in-depth analysis and to help identify overlapping connections and contradictions throughout the transcripts (such as those relating to multi-scalar governance, justice, and transition barriers, as shown in **Appendix E**). Such a technique allowed for appropriate discourse analysis to be conducted and provided flexibility and focus to answer the specific research questions. I applied a theoretical approach during thematic analysis, whereby I consulted thematic connections further with existing academic literature and correlated these (e.g. Eckersley, 2017; Loorbach *et al.* 2017; Zolfagharian *et al.* 2019).

With regard to the analysis of data collected from secondary data, as aforementioned in Section 3.3, I restricted my analysis of environment policy and strategy analysis to that relating to low carbon to include transport, buildings, and renewable energy supply. I identified online documents using online searches, e.g. government policy documents, news websites, blogs, and inputted the relevant documents into NVivo. As per my analysis of the interview data, I subsequently coded the data using predominant and emerging themes, and again divided these primary themes into sub-categories to allow a closer analysis of the information. Similarly, I used my own observational notes which were transcribed into an MS Word document and coded this within NVivo in a similar fashion. Using these different data sources, I grouped findings and themes together or set them alongside those which I believed were to be related in order to identify emerging themes, viewpoints or focuses (Blaxter *et al.* 2001; Eckersley, 2017). Again, I consulted the findings with the conceptual framework to reveal conclusions as summarised and synthesised in Chapter 7.

Prior to data collection, it was acknowledged that data collection and analysis occur simultaneously and that the data collected throughout the research process may impact further data collection, for example by introducing preliminary themes and using findings from previous observations to guide the next observations (Merriam, 2009). As such, a 'grounded theory' approach was useful in data analysis as this enabled for data collection and analysis to be a continual, iterative process (in comparison to one which remained static). This allowed for new themes, concepts and phenomena to emerge from the data which can help enable theory to be formulated (Mills *et al.* 2010; Strauss & Corbin, 1998).

After the majority of interviews had been completed and transcribed, it became evident that the predominant themes, issues and empirical data were being repeated by most individuals. As such I had reached a stage when I was not identifying any 'new' emerging themes. This stage of research collection is commonly known as theoretical saturation. It is worth noting that a researcher can never be certain that theoretical saturation has been achieved (MacQuarrie, in Mills *et al*. 2010), and therefore my decision to conclude data collection (apart from the very occasional contact for clarification or follow-up purposes) was taken carefully to ensure this was not done too hastily nor that data collection was being unnecessarily prolonged. Furthermore, given the length of time conducting empirical research (approximately 2.5 years), and the number of different participants interviewed (totalling 35), this demonstrated a sufficient range of perspectives and viewpoints for the study. The qualitative nature of data collection and analysis required an important consideration of ethical implications of this research, as described next.

3.5. ETHICS IN SUSTAINABLE TRANSITIONS RESEARCH

Researching sustainable transitions at the urban level is undoubtedly a complex issue, due to the multi-faceted nature of socio-technological systems, and the competing and intricate socio-political views and interests of a range of actors across sectors. These complex socio-technical systems are not static, and investigating transitions involves past, present and future considerations across the urban area. As such, the complexity of sustainability transitions raises multiple important ethical considerations.

3.5.1. Researcher Subjectivity, Positionality and Reflectivity

Prior to data collection, I conducted a self-assessment to ensure that I had reflected upon all ethical considerations, and ethical approval was granted for this research by the University of Glasgow in April 2017 (**Appendix F**). No sensitive or vulnerable groups which required specific ethical approval were used in this research. I informed all participants about the research in an accurate and comprehensive manner and that their participation in research was entirely optional before data collection started (**Appendix G**). Before collection, I received full written consent from each participant permitting the use of the data, and in addition to this, the process of data recording was optional (**Appendix H)**. In cases where interviews were collected by phone or email, I received written consent electronically. Post-interview, I duly thanked participants for their time and participation by email and in person where applicable.

I anonymised all interviewees randomly during and post data collection by giving them a number from 1-35 following 'P' (denoting Participant). The anonymisation of individuals was vital for preventing respondent bias and to allow for personal views to be candidly shared which may have been of a sensitive or political nature, or one which conflicted with the overall representation of the participants' organisation. I have not disclosed the interviewees roles in case there was only one role of that nature in the organisation (which can often be the case especially in smaller organisations or businesses). However, I sought permission to include organisation names (except one organisation which wished to remain anonymous). The choice to include organisation names was considered particularly important due to the socio-political nature of this research, the context of this research, and to help understand views and perceptions from certain actors or sectors.

The researcher is an important part of the research process by shaping the ways in which the study is framed and guided, and the ways in which data is interpreted, understood and presented. It is important to state that research was undertaken from my personal values to drive societal change towards a more sustainable and inclusive society, yet every attempt was made to remain critical and open to different perspectives from a research standpoint and reflexivity was constantly maintained during the research process. As such, my positionality as a researcher is undoubtedly pro-environmental with a willingness to encourage the solving of problems in practice. For that reason, I rigorously considered the

ethical significance of my individual and personal actions before, during and after data collection to ensure the authenticity of views raised from the empirical research.

Whilst there were benefits of commonality through there being no significant cultural differences between myself and the researched groups (Davies *et al.* 2002), I conducted myself and my behaviour in adherence to the University of Glasgow's Ethical Committee guidelines, Economic and Social Research Council's (ESRC) Framework for Research Ethics and British Psychological Society's Code of Conduct, and for my own personal desire to conduct research effectively and professionally.

Positionality affects every phase of the research process, as the researcher is the medium through which questions are constructed and designed, to the ways in which data and knowledge is collected, interpreted, analysed and presented (Coghlan & Brydon-Miller, 2014). As highlighted in Section 3.1, research philosophy was mainly from a pragmatic and interpretivist standpoint, which places emphasis on the socially-constructed nature of transitions and subsequent differing experiences of those involved in turn. This included the way in which questions were presented to ensure they were not unethical, aggressive, underhand or discomforting, and sensitivity was given to the rights, beliefs and cultural context of participants and researched information (Cloke *et al*. 2004).

Social justice, equity and power relations are particular themes of this research, and so the focus on justice dimensions in transitions is important to consider from an ethical standpoint. On the one hand, it is important to consider the ways in which justice in transitions is perceived, articulated and enacted at the urban level by multiple actors, and on the other hand, the ways in which justice in transitions is perceived by the researcher. As such, it was crucial to ensure that I handled these discussions in an ethical way, i.e. with sensitivity, delicacy and in an appropriate manner. I gave the interviewee time to share their opinions and reinforced that their participation was voluntary, anonymous, and could be withdrawn at any time without judgement.

Davies *et al.* (2002) further emphasise that researchers should critically examine how they may influence the research process, and in doing so rigorously question interpretations to ensure that the evidence is not being 'conveniently' used to reinforce existing values. Thus, during post data-collection stages, I transcribed interviews verbatim as to not compensate the reliability or integrity of the research. Moreover, when using a case study method for

research, I took caution by transcribing quotes verbatim throughout the thesis to ensure accuracy. In addition, I maintained a critical distance during interviews to allow the interviewee space to express their personal opinions and conducted several thesis edits and proof-readings to ensure that I had not made over-generalisations and to ensure that claims were presented soundly (Kantor & Savitch, 2008; Yin, 2014).

The multi-level governance approach applied in this research brings to light the different responsibilities, agency and capacities of individual and collective actors in governing climate change. The nature of transitions requires changing embedded infrastructures and patterns of behaviour, which within sustainability thinking are considered to be 'morally right' decisions in the context of climate change and the anticipated and unanticipated consequences that current practices pose on present and future generations (Robertson, 2017). Therefore, the idea of what is 'morally right' decision-making presented a particularly ethical consideration for this research, since it is dependent on individuals, their perceptions and values (i.e. micro-ethics), which can be conditional on personal and collective learning, experiences and social relations (Kibert *et al*. 2018; Miller, 2014). Whilst individual decisions and perceptions are important for sustainability ethics, the very notion of 'sustainability' is a vision not simply of private benefit, but rather of common good, and therefore the ethics of sustainability from collectives, organisations and societies (i.e. macro-ethics) is pertinent. As such, when discussions arose around sustainable transitions, ethical values and decision-making, I delicately sought clarification as to how the interviewee (or organisation) understood the concept of 'sustainable transitions'[14].

Due to the particularly political nature of sustainable transitions, seeking a wide range of opinions and perspectives was vital for this research, in order to understand the barriers in progressing sustainable trajectories from a city-level. I was constantly aware of the position of the individuals and organisations who participated in research, that is, whether their position was pro-environmental from a third sector organisation, or whether they were bound as civil servants to remain politically neutral, or whether perhaps there were conflicts of interests from work or personal opinions.

[14] Due to the scope of this research, it was not possible to examine the environmental ethics of each interviewee in detail. See an interesting empirical study by Pineda Pinto (2020) who examined the environmental ethics in the perception of urban planners using the case study of four city councils in Australia. The study provides insight into how environmental ethics can inform urban planning, and that in this case, perceptions of urban planners were mainly driven by an anthropocentric rather than a non-anthropocentric environmental ethic.

To overcome the dynamics of differing political parties in the research, I adopted an additional technique during interviews that was particularly successful from a researcher perspective. My general approach with each interview was to attend them with a 'fresh' perspective (although it is acknowledged that over time this can be unrealistic and problematic, as highlighted by Corbin Dwyer and Buckle (2009) with regard to 'insider-outsider' relations in qualitative research). Nevertheless, from a practical, researcher perspective, I decided not to disclose too much information or knowledge about the participant and their background which successfully allowed the interviewee space to discuss their thoughts and opinions to an 'outside' perspective. Coincidentally it provided me a critical distance to ensure biases were not given. As such, I did not frame political questions antagonistically with a particular political party in question, however, I exercised a critical perspective in research analysis. Chapters 4, 5 and 6 are illustrative of the overall success of this research design, yet it is nonetheless important to critically reflect upon this, as discussed next.

3.6. RESEARCH DESIGN REFLECTIONS

A prior engagement and knowledge of sustainable transitions and the UK context was indispensable for this research, which at times was complex and required a particularly comprehensive understanding. Generally, the research design for this study proved effective, and the flexibility of this was particularly applicable given my on-going health situation. The number of interviews conducted achieved expectations and in-depth empirical data was collected. This was subsequently analysed, and the rich findings of this research are demonstrated in Chapters 4, 5 and 6. However, it is important to reflect upon the methodological challenges, of which there were five notable obstacles experienced, particularly during interviews.

First, during interview questioning, it was important to strike a balance of gaining trust and building rapport with participants on one hand, and gaining information and data on the other hand. For example, I made all efforts to genuinely conduct interviews in a pleasant, friendly and sensitive manner; yet, participants often digressed from the topic at hand. Whilst this can often be productive for the analytical process, for example by providing contextual cues and revealing important knowledge, feelings and concerns (e.g. DiCicco-Bloom & Crabtree, 2006; Riessman, 2012), this was also challenging and misleading in terms of seeking definitive answers and using the time allocated most effectively. I commonly rectified this

by practising patience and understanding, and relating back to the interview questions which in practice required a certain degree of flexibility, judgement and tact.

Second, it became increasingly difficult during interviews to investigate the barriers to transitions, and upon reflection, I underestimated this before data collection. As previously highlighted, this could have been as a result of a general hesitation to be critical because of the interviewee's position within their organisation. A good example of this is with regard to questioning civil servants within the national government. Although members of the public have the legal right to access information through the Freedom of Information Act, Environmental Information Regulations and Data Protection Act (Nottingham City Council, 2020b), and the national government has a statutory duty to fulfil this, the sharing of personal views and opinions publicly contradicts the Civil Service Code and could jeopardise the interviewees position. Furthermore, most participants remained neutral or positive about Nottingham's experience, and at times were uncritical of certain aspects. Whilst this neutrality and positivity has been duly represented in the research findings, I deliberately sought and explicitly framed more critical perspectives in order to avoid research bias. I further negotiated this lack of criticality by triangulating this with other interviews and documentary sources.

Third, in practice it was difficult to engage with certain actors within one particular organisation (which cannot be disclosed in light of anonymity), and the reasons for this remain ultimately unknown. This conflicted with ethical considerations, which included being mindful not to coerce nor pressure individuals or organisations into participating in research after multiple elements of contact were attempted. Ultimately, I overcame this blockage through the use of a gatekeeper, in this instance an individual in a senior position, which was critical for securing an interview and gaining access to in-depth information.

Fourth, whilst there were a range of actors engaged across the sectors of housing, energy and transport, in practice these sectors were not so clearly defined, and housing and energy were often discussed concurrently. As such, the definition of these sectors did in-fact prove messier than expected, and led to an imbalance of actors across sectors, as highlighted in **Table 3.2** and **Table 3.3**. It is therefore acknowledged that at times in the empirical chapters (Chapters 4, 5 and 6) there may be an overuse of one sector over another, though examples are used where appropriate based on their suitability of the arguments made.

Fifth, although every measure has been taken to remain as flexible as possible and mitigate against foreseeable problems, there are nonetheless three noteworthy points which posed a challenge from a research perspective in the current conjuncture (i.e. wider global context). The first is at the time of writing the global community experienced a world-wide pandemic from December 2019. As of January 2021, the infectious coronavirus disease termed 'Covid-19' has resulted in the infection of approximately 100 million people globally and over 100,000 deaths in the UK alone (WHO, 2021). Many countries including the UK underwent (and are still undergoing) a series of unprecedented quarantine and 'lockdown' measures to prevent the spreading of the virus. Though the lockdown measures did not affect data collection directly since this was already completed by this period, this context is important for a number of reasons; namely, it is a significant reminder of the impact of sudden, global threats to communities on local, national and international scales. This presents a significant future challenge for city actors pursuing low carbon and equitable trajectories considering the socio-economic impacts of the pandemic (as detailed in the empirical chapters). What is more, it is interesting to note that since the outbreak of the Covid-19 pandemic, Nottingham has consistently recorded one of the highest infection rates in England (BBC, 2020). This is alongside other northern parts of England such as Greater Manchester, Lancashire, South Yorkshire and Newcastle which have witnessed 'hotspots' in local areas and have resulted in a series of local lockdowns in the north. Whilst there is no single answer for this trend, there is a possibility that this is due to the existing socio-economic demographics in northern England which have made people located there particularly vulnerable to the virus, in addition to the higher levels of deprivation, serious health conditions and other issues such as overcrowded housing. Again, this reveals an important context for this research by highlighting the different and uneven effects of the pandemic on different geographic regions in the UK which can underscore existing equity dimensions. This also indicates the consequences this can have on local governance of low carbon and just transitions in terms of the potential political side-lining and overshadowing of climate change, the associated austerity measures as a result of the pandemic, and the future pressures that will follow as a result of this (e.g. Hepburn *et al.* 2020; Woodcock, 2020).

The second uncontrollable condition is the evolving and unpredictable international and national political conjuncture. During the writing of this research, there were a number of events which made environmental politics ambiguous at various points in the research. This included the future of the UK's environmental policy, given changes on the national level

after the UK's referendum of European Union membership in 2016 which resulted in the UK's general population voting to leave the EU (Brexit) and the UK-wide general elections in 2017 and 2019 which resulted in a Conservative Party majority. In addition, given the USA's political strength in the global arena, the USA election in November 2020 which resulted in the (narrow) election of Democratic candidate Joe Biden poses significant questions for the future of environmental policy. On the one hand, the Democratic Party are viewed as more engaged with decarbonisation and environmental justice, and Joe Biden has committed to re-entering the Paris Agreement, for the US energy sector to go carbon-free by 2035 and net-zero emissions by 2050 (Astor, 2020; JoeBiden, 2020). However, the 2020 election resulted in an almost-even split of Congress between the Republican and Democratic Party and therefore there may be contestation in pursing green initiatives (Astor, 2020; Tollefson, 2020).

Another noteworthy circumstance in 2018 was the increased international youth climate demonstrations following Greta Thunberg 'Friday for Climate', which arguably placed climate change in the political spotlight like never before. Whilst this is a positive development, again such evolving and unpredictable conditions make it increasingly difficult from a research perspective to predict the pathways for low carbon and just transitions.

The third shifting circumstance is that of Robin Hood Energy, which changed ownership structure during the last phases of writing up period. Prior to September 2020, Robin Hood Energy was a municipally-owned energy supply company that was set up in 2013 in a response to alleviate fuel poverty in the city. However due to debt this became privatised and sold off to Centrica (which also owns British Gas) (Centrica, 2020). This highlights the difficulties of conducting and writing research in a fluid and ever-changing environment since research up until this point had been focussed around the municipal ownership of this ESCo. It appropriately reveals the sensitive and unpredictable nature of energy markets, in particular smaller energy suppliers and those owned by local authorities which have made attempts and subsequently failed to gain traction in disrupting the energy market for low carbon and equitable urban transitions. Nevertheless, the privatisation of Robin Hood Energy has not made a significant change to the core research arguments and it is still an undeniably good example of an initiative pursuing urban low carbon and equitable transitions and has therefore remained in this research (and discussed in more detail in Chapters 5 and 6).

3.7. CONCLUSION

Whilst there has been a substantial growth of empirical research of sustainable transitions from a variety of disciplines, this can pose a significant challenge from a methodological perspective, since different disciplines have certain methodological applications which are based on their suitability for the chosen research. As such, this has led to a distinctive methodology which is underpinned by various approaches and perspectives to research low carbon and equitable transitions in practice.

In this chapter, I have set out that the research philosophy of this study is one which does not place itself within one particular and restrictive epistemological nor ontological stance, although the notions of pragmatism and interpretivism are considered closely related to the research philosophy which I adopted to answer the research aims. In terms of the conceptual approach, since there are limitations of using one particular and restrictive theoretical framework, I have drawn upon multiple frameworks, themes and core concepts which are prevalent in sustainable transitions literature and allowed me to develop a more comprehensive understanding.

The research strategy used in this research is a case study method, which I considered the most appropriate for this study. I identified the case study of Nottingham in the UK as a strong and valuable city example to analyse low carbon and equitable transitions which was advantageous for providing in-depth and rich findings, and in terms of practically conducting research in the field.

The research methods were qualitative to enable me to develop an in-depth and nuanced understanding of low carbon and inclusive urban governance. I considered this the most effective type of data collection, due to the complex social and political nature of sustainable urban transitions. In line with this, I took a conjunctural approach by giving weight to the broader context of transitions, which opened a space for the construction of explanation between urban areas and considered issues of contextual, positional and situational specificity, rather than viewing certain contexts (such as the global financial crisis or austerity urbanism) as global in trend, uniform across space and ubiquitous. I collected data primarily using semi-structured, in-depth interviews with a range of state and non-state actors. I supplemented data collection by using documentary analysis of core formal and informal documents, and observational research and site visits. Importantly, using these

three main sources of research methods allowed me to analyse data using themes. I subsequently triangulated data to enhance validity and legitimacy.

It is important to disclose that research was undertaken from my personal values to drive societal change towards a more sustainable and inclusive society. As such, the position of myself as the researcher is pro-environmental with a willingness to encourage the solving of problems in practice. Due to the particularly qualitative nature of this research, I have duly reflected upon the ethical considerations and recognise the implications of my own positionality, interpretation and interaction with participants throughout the research duration.

Finally, I have outlined the methodological challenges and demonstrated the difficulties encountered when conducting research of low carbon and equitable urban transitions in practice. For example, this ranged from the challenge of negotiating interview discussion and gaining more critical perspectives, to conducting research in a changing, evolving and unpredictable global context and political conjuncture such as Covid-19 and political elections. Despite these challenges, I have effectively conducted empirical investigations and produced in-depth and rich findings, as demonstrated next in Chapters 4, 5 and 6. By way of introduction, the next chapter sets out the policy environment for low carbon equitable urban transitions across international, national and local scales.

CHAPTER 4

MULTI-LEVEL POLICY FOR LOW CARBON EQUITABLE URBAN TRANSITIONS

4.0. INTRODUCTION

To achieve critical reductions in global carbon emissions and prevent the catastrophic effects of climate change in cities, the governance of decarbonised and equitable transitions must be coordinated by a multitude of actors across various scales (international, national and local levels). Across these scales, climate change governance can be implemented by a variety of approaches and measures, such as via policy, strategic plans, treaties and regulation; new intergovernmental or interagency institutions; in addition to economic instruments, such as subsidies and tax incentives. These approaches and measures have their own distinct function and are a key intervention for enabling sustainable transitions (Pettibone, 2015). Importantly, the implementation and stabilisation of policies are subjected to external factors, such as institutional, political, social, technological, economic, legal and temporal pressures, which can in turn affect governance and are therefore crucial to consider (Knox-Hayes, 2012).

Through a multi-level perspective, I critically address international, national and local climate policy in turn, and set out the governance and policy context shaping Nottingham's efforts towards low carbon and equitable transitions. This chapter is divided into four sections. In the first section of the chapter, I argue that despite climate change being on the global agenda since 1992, greenhouse gas emissions have risen significantly on a global scale, regardless of multilateral emission reduction agreements, and as such have important implications for low carbon transitions at national and local levels. Through identifying the major policy approaches of climate governance on an international level, it is apparent that despite progress, there have been setbacks which include firstly, the uneven localisation of Sustainable Development Goals; secondly, the weakness of legally-binding targets (e.g. Paris Agreement); and thirdly, a belated emphasis on justice elements in low carbon transitions (e.g. by way of the Silesia Declaration).

In the second section, I situate Nottingham's governance for low carbon and just transitions within the national political context, arguing that whilst the UK Government has made some progress in decarbonising its economy, the change in government since 2010 has resulted in a shift in climate change policy. This has become marked by economic austerity and inadequate progress for meeting climate change commitments, with the unlikelihood of the UK meeting its international climate change commitments (such as the Paris Agreement of limiting global warming to well below 1.5 degrees Celsius), nor its own targets (for example as laid out in the fifth carbon budget targets 2028-2032) (Emden & Murphy, 2019). As such, I demonstrate that despite stated commitments, the UK's national low carbon and just transition is compromised through its current climate policy which is marked by: firstly, unsupportive policy for achieving climate change targets; secondly, the lack of ambitious targets; and thirdly, implicit reference to justice dimensions.

In the third section, I consider the central policies governing environmental transitions at the city-level. Since the urban area of Nottingham is governed by two local authorities, I examine both Nottingham City Council's and Nottinghamshire County Council's climate policies in turn. Efforts to drive low carbon and inclusive transitions at the city level are contingent upon having suitable and ambitious visions, policies, directions and measures in place. However, there is a stark contrast between visions, approaches and measures taken by the two councils, which is exacerbated by the lack of supportive climate change policy at the national level. I contend that this has resulted in a local environment of firstly, uneven climate policy between Nottingham's local authorities; secondly, unequal climate policy within Nottinghamshire County Councils; and thirdly, piecemeal references to justice dimensions in Nottingham City Council policies.

Finally, I offer a conclusion arguing that on both international and national levels, there is evidence of weak climate change targets; fragmented and uneven climate policy; and inadequate attention to justice elements. As a result, this is being reflected in local level policy, which is implicating the progression of low carbon and just transitions in Nottingham.

4.1. INTERNATIONAL GOVERNANCE FOR LOW CARBON AND EQUITABLE TRANSITIONS

The governance of climate change on an international level is a formidable task and undoubtedly the biggest global challenge to date, particularly in terms of policy and international cooperation (Vogler, 2007). Although other institutions of state and non-state actors have also emerged at multiple scales, the creation of the United Nations Framework Convention on Climate Change (UNFCCC) remains the main international forum for climate change governance. In total, 195 countries have joined the agreement (known as the Convention) which recognises that coordinated action is necessary over four key areas: 1) mitigating greenhouse gas emissions; 2) adapting to climate change; 3) reporting of national emissions; and 4) financing of climate action in developing countries (UNFCCC, 2020). Most importantly, the Convention commits the Parties into holding a continuing series of annual conferences, known as Conference of Parties (COP). Recent discourse has sought to re-evaluate the UNFCCC as a climate change governing body, and instead of considering the UNFCCC as an authority that attempts to govern climate change in its entirety, the UNFCCC is more recently reconceptualised to have a more coordinating role in a diverse landscape of climate governance (e.g. Betsill *et al.* 2015).

Whilst there has been limited success in emission reductions from some developed countries, greenhouse gas emissions have risen significantly on a global scale, despite multilateral emission reduction agreements dating back to the Kyoto Protocol in 1997 (Bulkeley & Kern, 2005; Routledge *et al.* 2018). Such increases during this time reinforce the way that political will to tackle climate change is being generally eroded, rather than built. In 2018, the IPCC stated that urgent and unprecedented changes are needed to reach climate targets and to keep temperatures between 1.5 degrees Celsius and 2 degrees Celsius; with predictions that should these targets not be achieved within 12 years, the anthropogenic-induced damages made to the planet and its ecosystem will be irreversible (IPCC, 2018). In light of these enduring warnings and given the lengthy period that climate mitigation has been on the global agenda, it is important to identify and critique key international governance measures which are currently in place and the consequences for implementing low carbon and inclusive transitions, as explored in the next section.

4.1.1. Uneven Localisation of Sustainable Development Goals

Adopted in 2015 by 193 countries, the 2030 Agenda for Sustainable Development was created to implement a global partnership to end poverty in all its forms, envisaging 'a world of universal respect for human rights and human dignity, the rule of law, justice, equality and non-discrimination' (UNSDG, 2020). Most notably, this vision is led by the development of 17 Sustainable Development Goals (SDGs) which superceded the Millennium Development Goals[15] (MDGs).

The 2030 Agenda for Sustainable Development is of particular significance for low carbon and just transitions since this can be considered as the first international agreement which identified the need for social, economic and environmental action. Specifically, there are seven SDGs which are of particular importance for urban low carbon and just transitions which include (but are not limited to): eradication of poverty (Goal 1); gender equality (Goal 5); affordable and clean energy (Goal 7); the importance of job creation and economic growth (Goal 8); the need for reduced inequalities (Goal 10); sustainable cities and communities (Goal 11); and the need for climate action (Goal 13) (UN, 2020).

This agreement is a recent advancement for low carbon and just transitions in the urban area, since most SDGs directly relate to key notions of addressing climate change, reducing inequalities and promoting sustainable communities. However, it is worth noting that both the MDGs and SDGs have received much criticism (e.g. Langford, 2016, Liverman, 2018; Winkler & Williams, 2017). The effectiveness of this agreement for international governance of climate change is questionable, namely because it is not legally-binding and therefore does not hold governments to account, and it is contradictory in nature by advocating the pursuit of continued and unsustainable economic growth (e.g. Hickel, 2015). Furthermore, the localisation of the SDGs is fundamental to enact such desired goals and the application of the SDGs by national and local governments worldwide is extremely variable and uneven (UCLG, 2019).

The variable pattern of localisation of the SDGs is experienced in the UK at a national level, with the SDGs being explicitly referred to by a UK Government report in 2017, which stated:

[15] The United Nations Millennium Development Goals were 8 goals that committed 189 UN Member States to combat poverty, hunger, disease, illiteracy, gender discrimination and environmental degradation by the year 2015.

‘The UK is committed to the delivery of the Sustainable Development Goals… by ensuring that the Goals are fully embedded in planned activity of each Government department’ (UK Government, 2019b). This suggests that the SDGs have been utilised for guidance by the national government, and this is reiterated in the UK Government’s Voluntary National Review which was published and presented at the UN High Level Political Forum in July 2019 (UK Government, 2019b). There is a lack of data critically analysing the evidence of the UK delivering on their commitments, and therefore the effectiveness of the SDGs for achieving the desired outcomes are yet to be determined.

It is also noteworthy that the SDGs are referred to unequally at the local level. For example, the Local Government Association (2019) note that councils such as Bristol, Kent, Coventry and Derby have explicitly referred to the SDGs. They are referred to by Nottingham City Council within the 2028 Carbon Neutral Charter (2020a, p.23):

> The Council will work with partners to understand Nottingham’s own contribution to planetary boundaries, and the relationships in turn to Sustainable Development Goals from these boundaries and the aims and objectives in this charter, to understand how we get to a more sustainable good quality of life for all citizens.

Specifically, the City Council focuses on five of the SDGs which include: Clean Energy (Goal 7); Innovation and Infrastructure (Goal 9); Sustainable Cities and Communities (Goal 11); Responsible Consumption (12); and Life on Land (Goal 15). However, despite reference to the SDGs, this is not uniform across the City Council’s strategy. Furthermore, it is unclear as to why reference to goals regarding reduced inequality (e.g. Goals 1 and 10) are not made explicitly.

In contrast, the SDGs are not explicitly referred to by Nottinghamshire County Council. This echoes arguments that the SDGs are considered as an overarching framework, and not an implementation plan and therefore need to be translated into national and local contexts (LGA, 2019). This raises two key points: firstly, the issue of the lack of engagement by certain councils, which can be compromised by financial constraints on councils, a lack of devolved powers, challenges with monitoring and implementation, and a lack of awareness of the Agenda 2030 (LGA, 2019; UN, 2016). Secondly, despite the production of a roadmap for local policymakers in the Toolbox for Localising the SDGs (UN, 2016), this raises the broader issue surrounding the complexity of disseminating international environmental agreements comprehensively and equally from international to local levels.

4.1.2. Weakness of Legally-Binding Targets

Building on the 2030 Agenda of Sustainable Development and SDGs, the Paris Agreement is the first legally-binding international treaty and therefore can be considered as a landmark moment in climate change action. Signed in 2015 by 195 Parties of the UNFCCC at the Paris Climate Conference of the Parties (COP 21), this agreement sets out a global action plan to avoid dangerous climate change by limiting global warming to well below 2 degrees Celsius above pre-industrial levels and pursue efforts to limit it to 1.5 degrees Celsius (UNFCCC, 2020). To date, 185 out of 195 countries have ratified the agreement and have agreed nationally determined contributions (NDCs) to achieve long-term goals.

The Paris Agreement laudably aims to cut global average temperatures through an unprecedented universal agreement. The agreement is based on voluntary pledges for NDCs (which on the one hand are arguably the only realistic way forward from being bottom-up). However, there is ambiguity over decreasing emissions by excluding aviation and shipping emissions, and the agreement is critiqued to lack clarity on specific targets to ensure collectively-agreed outcomes (Bodansky, 2016; Routledge *et al*. 2018). As Clemencon (2016, p.18) highlights:

> The agreement defines no emissions peak year, no specific emissions reduction timeline, and no concrete plans to phases out of fossil fuel subsidies, to stop construction of new coal-fired power plants, and to substantially and transparently increase financial support to developing countries.

In spite of opposition by USA states, cities and other non-state actors in coalitions such as 'We are Still In' (Watts, 2017), the formal withdrawal[16] of the USA from the Agreement led by President Trump on 4 November 2020[17] is significant as it demonstrates the fragility of the Agreement and the conflicts of maintaining a consensus on international climate governance with opposing national and subnational views (C2ES, 2019). This also

[16] During the writing of this research, in November 2020 President Joe Biden from the Democratic Party was elected and committed to re-joining the Paris Agreement on the first day of his presidency, thereby reversing President Trump's withdrawal.

[17] President Trump has been a vocal climate denier on the political arena. Although the withdrawal was in 2020, President Trump verbally announced his intention to withdrawal in June 2017 as according to the rules of the Agreement withdrawal takes a nearly four-year process to complete.

underlines the importance of locating climate politics within the broader dynamics of the wider political conjuncture.

Furthermore, similarly to the SDGs, the application of the Paris Agreement at the local and national level is variable. For instance, the UK as a member of the UNFCCC has ratified the agreement as part of a joint agreement by EU member states and the Paris Agreement can therefore be considered significant for holding the UK and wider EU accountable for targets in a global setting (CCC, 2019b; CCC, 2019c). Yet, it is important to acknowledge that the Paris Agreement is not directly referred to in policy at the local level, e.g. by Nottingham City Council nor Nottinghamshire County Council. This reinforces the disconnect between national and local level dissemination of international environmental policy, and suggests the lack of delivery of these pledges by UK agencies.

The latest COP 25 held in Madrid in December 2019 further highlights the way that despite efforts to finalise Article 6[18] of the Paris Agreement, climate negotiations failed firstly, to deliver settled agreements on international carbon markets; and secondly, there was no consensus on the need to create more ambitious targets, particularly from high-polluting countries such as China and India (Kizzier, 2019; Sengupta, 2019). Again, the ending of this summit with a lack of resolutions and ambitious targets emphasizes the difficulties of governing international climate negotiations, due to the wide range of stakeholders and the multiple and competing interests at hand. This also raises concerns of the implications such failures have at the local level, such as the continued lack of ambitious targets and political will against climate change.

4.1.3. Belated Attention to 'Justice' Elements

Although the concept of a 'just transition' emerged in the US labour movement of the 1980s (Newell & Mulvaney, 2013), references to justice elements in climate change policy have been very limited and ad-hoc on the whole. The 2015 Paris Agreement is significant by clearly recognising the imperatives of a just transition in formal international climate agreements. Although there were discussions of the just transition agenda in the COP 16 meeting in 2010 held in Cancun (Jenkins, 2019), the just transition features in the preambles of the Paris Agreement, stating that Parties: 'should take into account the imperatives of a

[18] Article 6 of the Paris Agreement on climate changes sets the rules on how countries can reduce their emissions using international carbon markets (World Resources Institute, 2020).

just transition of the workforce and the creation of decent work and quality jobs in accordance with nationally defined development priorities' (2015, p.2). However, criticisms remain that it lacks clarity, vision and ambition, and the idea of a just transition receives no substantial mandate in this agreement, again echoing broader climate justice arguments of the marginalisation of social justice issues in climate change debate (e.g. Clemencon, 2016; Jenkins, 2019).

The Solidarity and Just Transition Silesia Declaration in 2018 can be considered as a pivotal moment for progressing low carbon and just urban transitions. Importantly, this formal endorsement signifies the need to embed just transitions into national and international policy frameworks for climate change, economic development and social inclusion (Robins, 2018), and has been commended as an enabling element of good NDC implementation and important for securing international political and public support (Ministry of the Environment, 2018).

However, only 25 per cent of UNFCCC parties formally endorsed the Silesia Declaration, illustrating the varying commitment of the international community for taking into account just transitions when preparing and implementing their new NDCs, national adaptation plans and national long-term greenhouse gas emission development strategies (ITUC, 2018; Jenkins, 2019). The lack of formal endorsement is illustrative of the wider lack of political will on an international level, and suggests superficial and tokenistic action by governments.

In its role as a Party to the UNFCCC, the UK was one of 53 countries which signed the Silesia Declaration on a just transition, and therefore has demonstrated its commitment to the aims of a just transition. Though, the effectiveness of this Declaration for practically implementing low carbon and just transitions in urban areas remains undetermined given its infancy (Robins *et al.* 2019a, 2019b). Put simply, the core argument here is that the implicit reference to just transitions in international climate policy, alongside weak targets and uneven localisation of international policy, has impacted the articulation of this in national contexts, as explored next.

4.2. NATIONAL GOVERNANCE OF CLIMATE CHANGE POLICY IN THE UK

Policymaking and governance are very variable across the UK which in turn has a considerable effect on national climate change governance. Such a variability in environmental policymaking can be attributed to two main factors: firstly, the devolution of powers and responsibilities; and secondly, the changing national political climate within recent years.

With regard to the first point, the devolution of powers and responsibilities in the UK to Scotland, Wales and Northern Ireland has resulted in the creation of devolved administrations, that is the Northern Ireland Assembly (set up in 1998), and the Scottish Parliament and the National Assembly for Wales (both of which were created in 1999). This devolution can be considered as one reason resulting in variable policymaking and governance which has, and is continually, shaped by different political cultures and priorities in the devolved nations.

The devolution of powers and responsibilities is complex, asymmetric and very much an on-going process in the current political climate (e.g. there are on-going calls for Scottish Independence which resulted in a referendum in 2014[19]). Devolution of responsibilities and powers has provided devolved administrations greater fiscal and political autonomy (LGA, 2020a, 2020b). However, there remain policy areas which are reserved to central government and are therefore contested.

With specific reference to this research and low carbon equitable urban transitions, there is full devolution of environment, food and rural affairs; transport; and housing, communities and local government to all devolved administrations; yet, there is partial devolution of

[19] The result of this referendum was that Scotland should remain as part of the United Kingdom. Yet, it is possible that there may be another Independence Referendum given the dominance of remain votes cast in Scotland regarding the EU referendum.

energy only in Northern Ireland, probably because Northern Ireland remains geographically separate to Great Britain[20] (as shown in **Figure 4.1)**.

Figure 4.1: Devolution of Powers between Scotland, Wales and Northern Ireland (Institute for Government, 2019, p.8).

[20] However, it is worth noting that Northern Ireland and its devolved governance over energy has been subject to intense scrutiny in recent years (e.g. Muinzer, 2017). This is particularly with reference to Northern Ireland's Renewable Heat Incentive, commonly referred to as the 'Cash-for-Ash' scandal, which resulted in the exploitation of the scheme which incentivised businesses through repayments in the form of fuel subsidies to switch from fossil-fuelled heating to renewable energy boilers (e.g. wood pellets), and in turn costing the taxpayer approximately £490 million.

In terms of implementing low carbon and equitable transitions, this variability is significant because despite a national aspiration to reduce greenhouse gas emission levels, this is conditioned and complicated by the uneven, complex and differentiated nature surrounding energy and environmental policymaking of Devolved Administrations[21] (Muinzer & Ellis, 2017). Another dimension of devolution is the extent of fiscal decentralisation, with the UK's devolved parliaments having limited revenue-raising powers (MacKinnon, 2015). As a result, the UK has the most centralised government of the G7[22] countries, with the UK having only 5 per cent of revenue raised locally, followed by France which is 13 per cent in comparison (Booth, 2015), as highlighted in **Figure 4.2** and **Table 4.1**.

[21] A perhaps obvious but worthwhile point to make here is that because of devolution, the devolved administrations and legislatures in Northern Ireland, Scotland and Wales run on different electoral cycles and this therefore demonstrates additional nuances of politics and climate change governance from a national-level perspective (Institute for Government, 2021).

[22] Set up in 1975, the G7 countries (Canada, France, Germany, Italy, Japan, UK and US) is an informal forum which aims to bring together the world's leading industrial nations, and complements the role of the G20 which is regarded as the premier forum for international economic cooperation (European Commission, 2020).

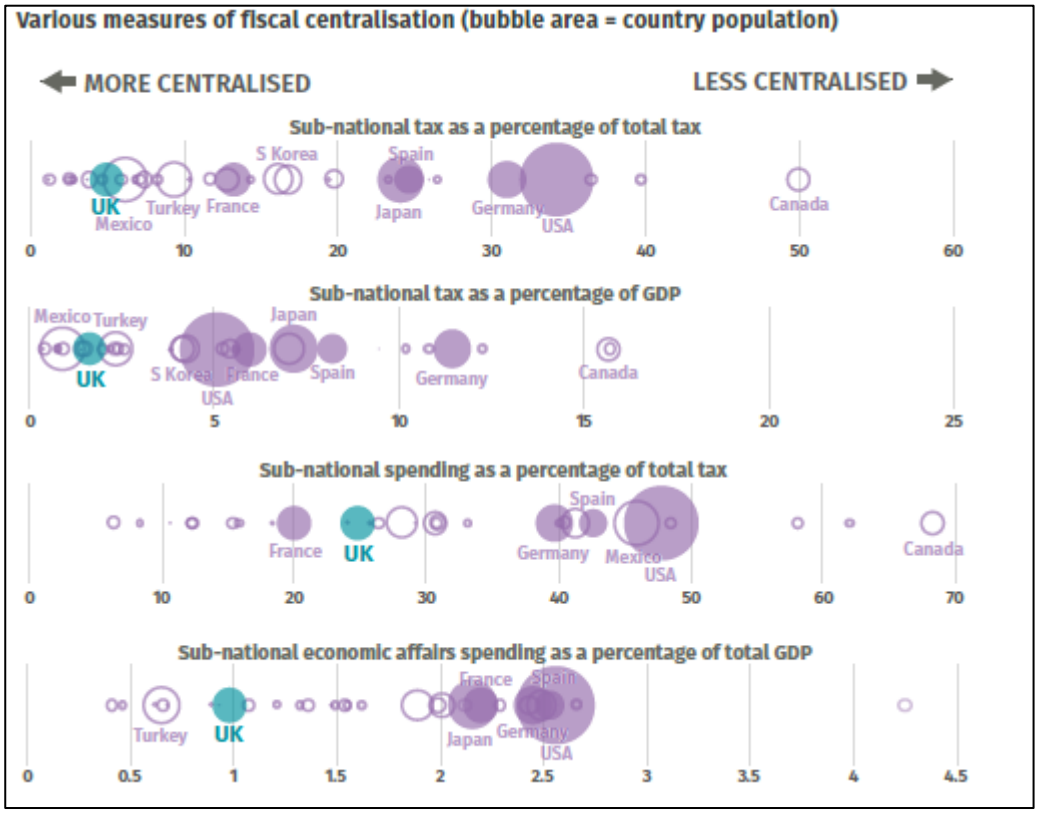

Figure 4.2: Fiscal centralisation of UK in comparison to comparable nations (Raikes *et al.* 2019, p.23).

Country	*Percentage of tax revenue raised at sub-national level 2013*	*Percentage of expenditure at sub-national level 2013*	*Percentage of expenditure at sub-national level 1890*
UK	5	25	43
France	13	21	22
Italy	16	28	25
Japan	25	—	—
Germany	29	39	—
US	37	48	62
Canada	50	67	—

Figures for 2013 from OECD Fiscal Decentralisation Database; figures for 1890 from Bastable (1895) – there are some potential inaccuracies in the figure for France and there may be different definitions used.

Table 4.1: Percentage of tax revenue and government spending at sub-national level (Booth, 2015, p.19).

Unlike other advanced economy countries, such as the USA and Germany, the UK does not have a federal system of government. Instead, there is a fragmented and patchwork landscape of regional governance in the UK. Between 1997 and 2010, the Labour Government set up

Regional Development Agencies (RDAs) which acquired a number of responsibilities and powers. However, from 2011, the Conservative-Liberal Democrat Coalition Government (referred hereinafter as the Coalition Government) set out a decentralisation strategy by way of the Localism Act to grant local governments in England more rights, powers and freedoms, as well as additional devolution to Scotland, Wales and Northern Ireland. Alongside this, RDAs were abolished, with the Coalition Government granting local governments the power and autonomy to form Local Enterprise Partnerships (LEPs) (DCLG, 2011).

Such dismantling has been subject to criticism, particularly with regard to the limited decentralisation of powers (for example, the inability to increase local taxes) and the scaling-back of climate change action. For example, RDAs had clear responsibilities for regional action on climate change, in comparison to LEPs which have an exclusive aim at securing local growth, with partnerships of local authorities and private sector actors (Scott, 2011). Consequently, this has led to less LEP engagement with low carbon objectives, potentially because climate change adaptation is seen as having less of a role in driving economic growth than development of the renewables sector (Brisley *et al.* 2012). As such, calls have been made for a greater 'regional' governance to low carbon and just transitions, which would allow for better coordinated strategies across political levels and sectors (e.g. Dannevig & Aall, 2015; Gibbs & O'Neill, 2017; Hanssen *et al.* 2013; Truffer & Coenen, 2012).

Within recent years, there has been an on-going attempt of devolution to urban areas from central government, with the introduction of the Cities and Local Government Devolution Act 2016, which superceded the Localism Act. As highlighted by the Department for Communities and Local Government (2011, p.4):

> The Government is committed to passing new powers and freedoms to town halls. We think that power should be exercised at the lowest practical level - close to the people who are affected by decisions, rather than distant from them. Local authorities can do their job best when they have genuine freedom to respond to what local people want, not what they are told to do by central government. In challenging financial times, this freedom is more important than ever, enabling local authorities to innovate and deliver better value for taxpayers' money.

Despite the rhetoric of localism, austerity measures introduced by the Coalition Government since 2010 has had significant implications for devolved governments and their subsequent local governments by means of reduced budgets (Lowndes & Gardner, 2016; Scott, 2011).

Paradoxically, most municipalities have had to scale back their existing functions, rather than carry out new activities (Eckersley, 2016). This specific mobilisation of localism, termed 'austerity localism', is a deliberate practice of 'roll-back' neoliberalism to enable the deregulation, dismantling and downsizing of the public sector (Featherstone *et al.* 2012; Peck & Tickell, 2002). The devolution of powers to local authorities is very much a politically salient issue, as demonstrated by on-going devolution deals for devolved administrations and urban areas in England, e.g. Greater Manchester (LGA, 2020a). As a result of this devolution and decentralisation, national policy areas associated with low carbon and just transitions (e.g. transport, land and housing, and finance) are extremely varied, complex, and evolving across the UK. Essentially, devolution provides for a limited and carefully circumscribed degree of self-governance which has resulted in a differentiated and uneven approach to low carbon and equitable transitions across the UK. Again, such a diverse arrangement of power and responsibility across England (and the wider UK) highlights the complex, multi-faceted and variegated nature of governing decarbonised and equitable transitions in urban areas, such as Nottingham.

With regard to the second point, the UK's climate policy consensus is extremely varied which is also due to the varying political shades of central government within recent years, i.e. Labour administration (1997-2010), Coalition Government (2010-2015) and Conservative Government (2015 to present). The issue of climate change had risen rapidly in political salience in the UK prior to the general election in 2010, and the UK Renewable Energy Strategy, Energy White Paper and The Low Carbon Transition Plan were key climate change policies produced in 2009 under a Labour government (Gillard, 2016). However, after the 2010 general election, these clean energy policies were subsequently scrapped and replaced, alongside green energy subsidies and the abolition of the Department for Climate Change in 2015 by the Conservative Government (Rosenbloom *et al.* 2019). According to Gillard (2016), 2010-2015 marked a period of climate change dissensus, alongside national economic policy practice which involved the switch from investment to austerity politics (discussed more in Chapter 6). This subsequently resulted in fiscal reductions and ultimately threatened the validity of climate change policies as an effective means for public spending (Berry, 2016). As a result, there has been an increase in climate policy scepticism and restraint in the UK which has undermined climate change policy progress, as highlighted next.

4.2.1. Unsupportive and Discordant Policy for Achieving Climate Change Targets

The creation of the Climate Change Act was a pivotal moment in the UK's history by institutionalising climate change as a political issue and embedding commitments to reducing greenhouse gas emissions (Gillard, 2017). Created in 2008, this Act set a legally-binding target of 80 per cent reductions in emissions from 1990 to 2050. To achieve such targets outlined, five-year carbon budgets have been established, and to date have legislated periods 2008-12 (first carbon budget), 2013-17 (second carbon budget); 2018-22 (third carbon budget) and 2023-2027 (fourth carbon budget).

The introduction of legally-binding emission targets has undoubtedly helped to drive successful policy action to some extent, with emissions from the power sector falling by 59 per cent between 2008 and 2017, and renewable energy generation increasing from 6.1 per cent to 28.7 per cent over the same period (Emden & Murphy, 2019). As such, the first carbon budget has been met, with emissions in 2014 being 36 per cent below 1990 levels. This Act is significant since it demonstrates evidence of a national government setting a legal duty to meet an annual carbon budget, the UK Government being the first in the world.

Despite a degree of success, the next proposed phases, i.e. the fourth and fifth carbon budgets which cover the periods 2023-2027 and 2028-2032 respectively, have received criticism and it is predicted that the UK is currently on track to exceed emission targets. For example, the Committee on Climate Change, an independent non-departmental public body formed under the Climate Change Act, estimates that between 2017 and 2030, emissions intensity will need to be reduced by a further 61-81 per cent in the power sector (CCC, 2018a). Put another way, emissions for the fourth carbon budget are capped at 1,950 MtCO2e (52 per cent below 1990 levels), but it is recommended that fifth carbon budget emissions are set at 1,765MtC02e, equating to 57 per cent below 1990 levels. Also, it is argued that the carbon budgets will not be met due to: low-cost, low-risk options not being supported by Government; ineffective regulation and enforcement; unstable political climate; and short-termism (CCC, 2018a). As such, there is a contradiction in policy conditions and supporting mechanisms outlined by national government, and the extent to which such targets can be achieved (which are findings presented in Chapter 6).

This raises the question therefore of the transformative effects of the Climate Change Act, the commitment of the UK withstanding time in achieving climate change targets, and the extent to which political commitments can be dismantled by subsequent political parties (Fankhauser *et al.* 2018; Lockwood, 2013). As highlighted by Lockwood (2013), whilst the Act may have appeared to lock-in commitments to reduce emissions through legal means, this did not guarantee the effects of positive political path creation nor lock-in. As such, it can be argued that there is a need for reforming the Act, making it compatible with the Paris Agreement, Brexit, and to strengthen safeguards against political backsliding (Fankhauser *et al.* 2018).

The Clean Growth Strategy which was produced in 2017 has been lauded for its ambitious targets and commitment of funding for example in energy efficiency, low carbon heat technologies, and research and development. Yet, there has been significant criticism of the strategy document, the most significant that the policies outlined are still short of meeting the fifth carbon budget's 57 per cent targets (e.g. CCC, 2017; Friends of the Earth, 2017). Unlike the Clean Growth Strategy's 2011 predecessor The Carbon Plan, the evolution of a strategy as opposed to a plan demonstrates that this document is more tentative and less fully informed. An apt example is that the Strategy refers to the use of 'flexibilities' that can be used if carbon budgets are not met, i.e. surplus from earlier budget periods, or buying international emission offsets to make up differences (Hickman *et al.* 2017). Although in some views the use of flexibilities might be used as a fail-safe plan to achieve targets, the use of flexibilities received significant scrutiny, with the Committee on Climate Change (2017) highlighting that targets should be delivered without accounting flexibilities or reliance on international carbon credits. The Strategy's central focus of clean growth, and the shift away from a dedicated carbon plan, suggests maintaining the status quo in economic terms, which is contested as unsustainable, for example by de-growth advocates (e.g. Jackson, 2011; Klein, 2014; Ward *et al*. 2016). Thus, the creation of the Climate Change Act alongside current policies such as the Clean Growth Strategy are contradictory and the extent to which the UK is providing favourable policy conditions to meet climate change commitments is ambivalent (Amundsen *et al.* 2010).

The unsupportive policy conditions are also echoed in the Road to Zero Strategy which was published in 2018 and is dedicated to tackling transport emissions. It declares the ambition to increase ultra-low emission cars on UK roads by 50 to 70 per cent by 2030. There is also the ambition to end the sale of new conventional petrol and diesel cars and vans by 2040

(excluding the Scottish Government which has a devolved transport sector and brought forward this ambition for 2030). On the one hand, this strategy has been praised for financial support for ultra-low emission vehicles (which is defined as any car or van that emits 75g/km CO_2 or less[23], commonly known as ULEVs) and for new measures to tackle emissions from heavy goods vehicles which had not been recognised in policy previous to this. Furthermore, there are also commitments to improve availability of charging infrastructure, particularly within new builds and in new lamp posts for on-street parking (CCC, 2018a, 2018b). On the other hand, this strategy has received criticisms due to: the dominance of free markets for combatting climate change; the reliance primarily on the private industry; and the lack of support and incentives from the national government to increase ULEV ownership (CCC, 2018b). Given the current Conservative leadership during the time of this policy, the focus on free market is in keeping with that of neoliberalism as a dominant policy paradigm, and again brings forth debates on the extent of free market policies in combatting climate change (Featherstone, 2013; Klein, 2014; Whitehead, 2013). Furthermore, the goal of 2040 has also been scrutinised as having a lack of policy in place for legally-binding minimum-range electric vehicles, and instead adopts a voluntary approach to meeting its suggested targets (Kumar, 2018). This raises the question of the role of the state in pursuing low carbon and equitable transitions, and the extent to which incentives and regulations, e.g. zero-emission vehicles mandates such as those completed by China and California, should be provided in order to achieve desirable environmental change (Kumar, 2018; Steer, 2018).

An additional example is that of fuel duty which central government announced in November 2018 would remain frozen for the 9th year. Though this scheme has been praised for providing economic savings for motorists, it has been highly contested by environmentalists. The freezing of fuel tax has had unintended environmental consequences, for example, since the first fuel duty freeze in 2011 the volume of traffic has grown by 4 per cent, resulting in an additional 4.5 million tonnes of CO^2 (Begg & Haigh, 2018). In addition, this scheme costs the Treasury approximately £9 billion a year (£46 billion since 2011), which could help finance low carbon transport measures, as stated by one of the interviewees:

> "In terms of the air qualities perspective, they [central government] certainly could do more in terms of fuel duty. At the moment, fuel duty is set up in a way that

[23] It is acknowledged that this definition is likely to change as technology advances, with vehicles requiring lower tailpipe CO_2 emissions and increased zero emission ranges.

> encourages use of diesel. But, we know that central government has given priorities to stop production of internal combustion engine by 2040 …[Instead]… we could have things like scrappage schemes to take older vehicles off the road, that's something we've been lobbying for. We could have further incentives for people to buy electric vehicles" (Interview with P12, Nottingham City Council).

As such, counter-productive policies and lack of strategic direction at the national level are frustrating low carbon trajectories particularly at the urban level, which is a barrier expanded upon in Chapter 6.

4.2.2. Lack of Ambitious Targets

Complementary to the Road to Zero Strategy (2018) and Clean Growth Strategy (2017), the Clean Air Strategy published in 2019 sets out the national government's aims to tackle the UK's air pollution. The UK's air pollution strategy has been particularly contentious, with the UK failing to reduce emissions from 2010. There has also been legal action against the UK Government (for example by Client Earth and the European Commission) for failures to tackle nitrous oxide pollution (Friends of the Earth, 2018; The Lancet Respiratory Medicine, 2019). Likewise, these failures to meet targets demonstrate a degree of tokenism regarding commitments to the Climate Change Act. Although the Clean Air Strategy maintains the goal to end Internal Combustion Engine vehicle sales from 2040, this has been criticised as being too weak in comparison to other European countries, for example Norway which has a target by 2025, and the Netherlands, Germany and Scotland having targets for 2030.

Furthermore, as highlighted by Friends of the Earth (2018), the introduction of Clean Air Zones (CAZs) is a step in the right direction, with 5 charging CAZs being planned in cities, including Nottingham. However, whilst these CAZs can reduce air pollution in cities, the implementation of each CAZ was not expected until 2020 and no CAZs included cars, with only Birmingham and Leeds including Low Goods Vehicles[24]. Furthermore, out of 82 local authorities (of which 75 have illegal levels of nitrous oxide air pollution in 2017), only 33 local authorities are required to produce a Local Action Plan (Friends of the Earth, 2018). This is because of the variable structure of local authorities, responsibilities and powers (as described later in this chapter in Section 4.3, and in Chapter 5). The Clean Air Strategy states

[24] During the time of writing, CAZs were further postponed by all UK cities due to Covid-19 pandemic (Carrington, 2020).

that new powers would be given to local authorities; however, it fails to provide detail on these powers and when they would be implemented. Therefore, although the Clean Air Strategy has been remarked for its targets more generally, the criticisms echo that of other strategies of the lack of ambition and insufficient detail provided for meeting such targets.

4.2.3. Implicit Reference to Social Equity Dimensions

Although there is no universally accepted definition of a 'just transition', there are a handful of governments worldwide (e.g. Canada, Germany, Scotland and Spain) which have explicitly incorporated the just transition into their climate strategies (Robins *et al.* 2019a). However, there is no formal nor explicit definition, idea or focus of a 'just' or 'equitable' transition regarding UK climate policy (Robins *et al.* 2019b). This is problematic for policymaking because when there is no clear definition or vision of a just transition, there is a lack of national consensus for progressing and implementing a shared vision. There is no explicit mention of just transitions nor associated policy measures within the Clean Growth Strategy (Raikes *et al.* 2019a), and the framing of emission reductions in terms of economic growth demonstrates a strong economic perspective to low carbon transitions, thereby ignoring the social dimensions.

Nevertheless, there is acknowledgement of the need for decentralised decision-making, with reference to local areas as best places to drive emissions reductions. As such, this increase in local responsibility can be viewed as having elements of justice, but this is implicit. Moreover, there is reference to job creation as workers move to the low carbon energy sector, however this is not supported by concerted efforts to make necessary powers or levers available at a national, regional nor local levels (Emden & Murphy, 2019).

Regarding low carbon and equitable transitions in the UK's urban areas specifically, the polluted air quality of cities and towns is a key focus of the Road to Zero strategy. Although just transitions are not explicitly mentioned, there is reference to justice implications, pollution and health within the document: 'We know that the effects of poor air quality are felt disproportionately by the most vulnerable groups in society and that the public are concerned' *(*2018, p.28). As such, there is a clear recognition of the social and environmental implications of pollution in cities from national government. However, a frequent critique of electric vehicles (EVs) and just transitions which is not addressed in the strategy is the high cost of EVs particularly for vulnerable communities, which can reinforce exclusion and

elitism in national planning (Sovacool *et al.* 2019), in addition to associations of environmental politics and actions as a middle-higher class concern. Consequently, there is an overall lack of justice dimensions in national climate change policy, and areas where there are justice elements, this is contradictory and ambiguous by not specifying the ways in which just transitions will be achieved.

A useful policy to illustrate this is within the energy sector and tackling fuel poverty through the Energy Company Obligation (ECO3), a national scheme that delivers energy efficiency and heating measures to homes in Great Britain. Whilst there have been criticisms made formally by charities such as Energy Savings Trust (2017) and National Energy Agency (2018), the following quote from a third sector organisation illustrates the way in which this can affect urban residents, in Nottingham and beyond:

> "One massive issue with ECO is the need for customers to pay a top-up fee, so they might get so much [money] in terms of grant funding, but they need to make a contribution themselves. Often that can be a few hundred [or] sometimes a thousand pounds, and often people that the grant is aimed at are not in the position to come up with that sort of money in one go, and so they fall through the net. They could access the funding if they could provide the funds themselves, but they can't, and so they benefit in no way at all." (Interview with P24, NEA).

As shown, ineffective fuel poverty policies from the national level are of no benefit to the urban level if they are exacerbating inequality and do not help those citizens who require it the most (Emden *et al.* 2018; Middlemiss & Gillard, 2015). These national level constraints which require a contribution from those who cannot afford it in turn affects the local agency to tackle fuel poverty, that is, the agency of energy consumers and local actors alike. Furthermore, ECO fails to target fuel-poor consumers appropriately by only being available to 20 per cent of households in fuel poverty, and it is particularly unequal in the way it distributes funding, since rural consumers only received measures worth £3.5 million, despite paying over £70 million in bill levies over two years (Emden *et al.* 2018). As previously highlighted, the ECO scheme is contraindicated by the policies made for this scheme, which results in a retention of old legacy approaches and is ultimately untenable for delivering its primary objective to tackle fuel poverty. Put another way, the core argument here is that the contradictory climate policies at the national level can impact those policies and local actor agency at the local level, as explored next.

4.3. LOCAL GOVERNMENT AND CLIMATE CHANGE POLICY IN NOTTINGHAM

As contended, policymaking and national governance is complex in England due to a complicated and unequal distribution of power and responsibilities. This pattern is maintained at the local level, with England containing differing types of local government. To elaborate, the UK has a complex and evolving political system made up of different local authority structures across four countries: England, Wales, Scotland and Northern Ireland. Local government is a devolved issue since 1997 in Scotland and Wales, and 1998 in Northern Ireland (UK Government, 2019a). Presently, there are 343 local authorities in England which are a mixture of two types of local government structure: a two-tier system and a one-tier system (also known as single-tier) as shown in **Table 4.2.**

Structure of local authority	***Type of local authority***	***Number in UK***
Two-tier	County councils	26
	District councils	192
Single tier	Unitary authorities	55
	Metropolitan districts	36
	London borough	32
	City of London	1
	Isles of Scilly	1
	Total	**343**

Table 4.2: Local government structure in England (Adapted from UK Government, 2019a).

The one-tier system of local government includes unitary authorities, London boroughs and metropolitan boroughs, many of which were established during the 1990s under the Local Government Act 1992. There are 55 unitary authorities in England and these are predominantly located in cities, large towns and urban areas (with a few exceptions to this). Chiefly, unitary authorities are responsible for providing all local services, such as education, highways, social care, housing, planning applications and transport planning (UK Gov, 2019a).

Contrastingly, the two-tier system of local government includes county councils and district councils, and this is the structure that is in operation in most of England. The number of county councils' totals 26 in England and each county council is responsible in their county for approximately 80 per cent of the services in these areas: education, highways, transport planning, passenger transport, social care, libraries, waste disposal and strategic planning (LGiU, 2020). The county is subsequently divided into several districts or boroughs which are responsible for smaller, more local services, such as housing, leisure and recreation, environmental health, waste collection, planning applications and local taxation collections. In total, there are 192 district councils in operation in England (UK Gov, 2019a). A summary of the differing distribution of powers amongst local authorities in the UK is shown in **Table 4.3**.

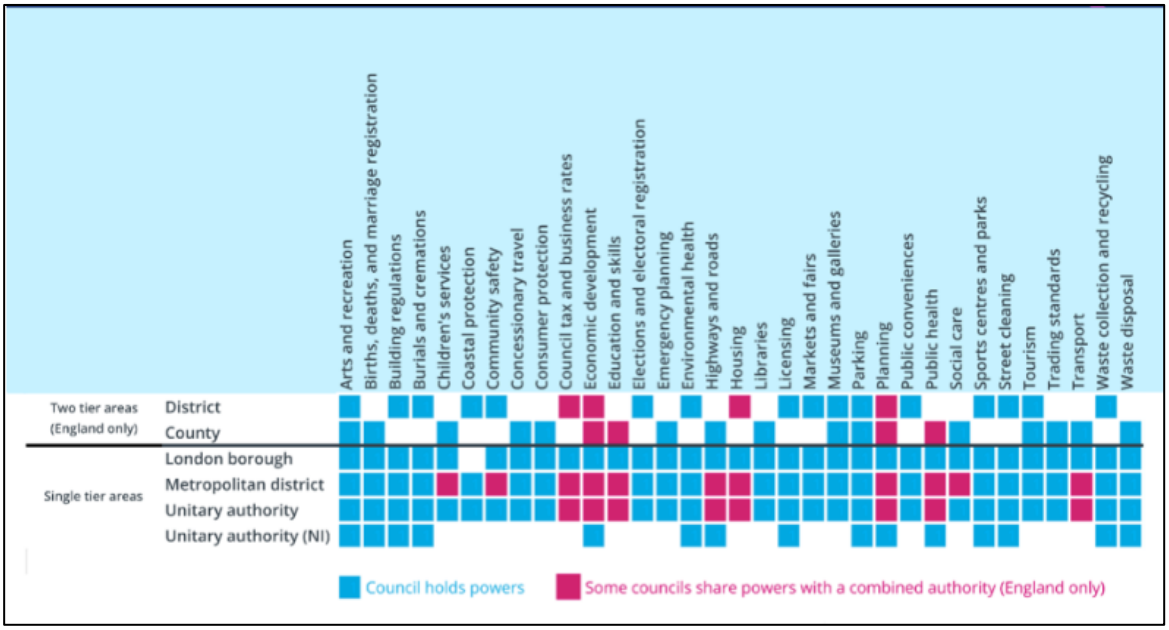

Table 4.3: Distribution of powers among local authorities in the UK by council type (Institute for Government, 2019).

The urban area of Nottingham is an interesting example for low carbon and equitable transitions since the urban conurbation is governed by two local authorities, Nottingham City Council, and Nottinghamshire County Council. Nottingham City Council has been a unitary authority since 1998, before which it was a non-metropolitan district. In comparison, Nottinghamshire County Council is a two-tier authority, and made up of seven district and borough councils, as shown in **Figure 4.3**.

Figure 4.3: Map of Nottinghamshire District Councils (Nottinghamshire County Council, 2012).

The division and examination of environmental policies for both City and County councils is therefore necessary to cover Nottingham's urban conurbation. Through the Nottingham example, the complex and uneven governance of urban climate transitions is demonstrated by: inconsistent and variable policies for emissions reductions between local level councils; a lack of overarching policy and strategy at the County Council; and piecemeal reference to justice dimensions, as examined next.

4.3.1. Uneven Climate Policy between Nottingham's Local Authorities

Climate change policies between Nottingham City Council and Nottinghamshire County Council reveal a stark difference in responses, engagement and policy to climate change (and the impact of statutory duties on policymaking for different types of local authorities is further reflected upon in Chapter 6, Section 6.1.2). It is apparent that a low carbon and just transition is core to the overall vision of Nottingham City Council, with a commitment to 'become the first carbon neutral city in the country, reaching this target by 2028' (Nottingham City Council, 2020a). The 2020-2028 Draft Plan Carbon Neutral Nottingham builds on the Nottingham 2028 Carbon Neutral Charter by setting objectives to achieve this carbon neutral ambition across sectors such as transport, the built environment, energy generation, waste and water and consumption. There is also a strong focus on reducing inequality across the city (as discussed in more detail in Section 4.3.5).

This strategy is continued in Nottingham City Council's Energy Strategy 2010-2020, a comprehensive framework for cutting emissions, maintaining energy security, maximising economic opportunities and protecting the most vulnerable in the city. The City Council has set ambitious targets in the strategy, which include 20 per cent of the city's own energy generated from low or zero carbon sources by 2020 and a 26 per cent reduction in CO_2 emissions by 2020. According to the Council, it is on track to achieve both these targets (Climate Emergency Declaration, 2020). More recently, the City Council has declared a climate emergency, alongside other councils within the UK, in addition to its strategy for carbon neutrality by 2028.

Nottingham City Council's vision for a low carbon transition is also echoed in the City Council's transport policies. The Local Transport Plan 2016-2026 is a key document outlining the Council's strategy regarding transport, and it is aligned with the overall strategic direction and vision of the Council, as stated in the Sustainable Community Strategy, indicated in **Table 4.4**. In this plan, the provision of a low carbon and resilient transport system is pronounced, with clear reference to climate change, aligning with the national targets to reduce emissions. Additionally, Nottingham City Council has a separate policy regarding its cycling infrastructure, as per the Cycle City Strategy and Action Plan 2017-2021. This Strategy is in line with national government objectives to double the number of trips made by bike by 2025, and Nottingham City Council aims to have 10 per cent of journeys to work to be made by bike by 2025.

One Nottingham Sustainable Community Strategy	*Local Transport Plan Strategic Objectives for Transport*
Develop Nottingham's international standing for science and innovation, sports and culture Raise aspirations	Deliver a world-class sustainable transport system which supports a thriving economy and enables growth
Be environmentally sustainable	Create a low carbon transport system and a resilient transport network
Ensure that all children and young people thrive and achieve Tackle poverty and deprivation by getting more local people into good jobs Achieve fairness and quality of opportunity	Improve access to key services, employment and training including creation of local employment and training opportunities
Transform Nottingham's neighbourhoods	Improve the quality of citizens' lives and transform Nottingham's neighbourhoods
Reduce crime, the fear of crime, substance misuse and anti-social behaviour Improve health and wellbeing	Support citizens to live safe, independent and active healthy lifestyle

Table 4.4: Local Transport Plan strategic objectives (Nottingham City Council, 2016a, p.28)

In contrast to Nottingham City Council, Nottinghamshire County Council policy and strategy for enabling emissions reductions and tackling social inequality is very limited. To date, there is no overarching strategy on environmental targets, climate change, nor emission reduction targets. The lack of strategy and policy is somewhat surprising yet illustrative of the lack of mandate and vision for climate policy from the national level, and the consequences and variability this can have on the governance of low carbon and equitable transitions at the local level. This can be attributed to the political administrations of both Nottingham City Council and Nottingham County Council, with the former having a Labour-majority and the latter a Conservative-majority[25], which in turn can affect actor agency implementing low carbon urban transitions (as I discuss in more detail in Chapter 5). Central to this is a point raised by Bulkeley and Kern (2004) that the greater the support that exists from climate protection within a city's leadership, the more rapidly it can become established as a key objective in policy. This lack of engagement therefore demonstrates the negligence that can occur at local level to combatting climate change.

However, as introduced in Chapter 3, during the time of research there has been significant political pressure through recent environmental activism, for example Extinction Rebellion

[25] It is important to note here that local authorities in England have local elections on different cycles. For example: Nottinghamshire County Council has a whole council election in 2017, 2021, and every 4th year; Nottinghamshire County District Councils have whole council elections in 2019, 2023, and every 4th year; Nottingham City Council has a whole council election in 2019, 2023, and every 4th year (UK Government, 2019e).

and youth climate strikes in more than 100 towns and cities across the UK, including Nottingham (Nottingham Post, 2019a; Taylor, 2019). According to one respondent, Nottinghamshire County Council are revisiting their climate protection policy as a consequence of this mounting political pressure (Interview with P18, Nottinghamshire County Council). This appropriately demonstrates the effectiveness of recent environmental activism on county council actors and the progression of climate change policymaking, reinforcing that confrontational collective action (in this case youth climate activism and other grassroots struggles) remain a critical force that can bring the state into a space of engagement and negotiation (Routledge *et al.* 2018).

The lack of a coherent and properly integrated structure of local government and regional layer of government witnessed in other countries, such as Germany and the Netherlands, is a hindrance to the agency and ability of local actors to undertake strategic planning on climate change (e.g. Hoppe & Miedema, 2020; Spath & Rohracher, 2010). It is evident that Nottingham City Council attempts to do this, but neither has the political power nor geographical scope to develop a full city-region policy with neighbouring authorities, since this is not within their remit. The recent production of the Air Quality Strategy 2020-2030 for Nottingham and Nottinghamshire is an exception to this which overtly recognises the need and importance of working towards a strategic vision to improve air quality across Nottingham (Air Quality Strategy, 2020, p.3) Yet, the overall lack of strategic working is exacerbated by the difference in local authority structure of the County Council and City Council and prevents a more integrated climate strategy across both local authority areas (as discussed in greater detail in Chapter 6).

4.3.2. Unequal Climate Policy within Nottinghamshire County Councils

As a result of a fragmented climate arena between both Nottingham's local authorities, there is subsequently no aligned vision nor ambition for Nottinghamshire County Council. This has resulted in a complex and uneven policy arena for low carbon and equitable transitions by the individual district and borough councils present in Nottinghamshire. Ensuring alignment of strategy is difficult from a County Council perspective:

> "Aligning doesn't really happen by design – it's up to individual councils, and in Nottinghamshire there is no structure nor agreement to work collaboratively on setting and addressing net zero targets. There is talk about working together on carbon zero ambitions – districts have desire and commitment but little capacity to develop strategies" (Interview with P18, Nottinghamshire County Council).

As alluded to, there is no mandate for Nottinghamshire County Council to set targets, and whilst districts might have a desire to set such targets, there is little by way of capacity to enable this process (as I attend to in more detail in Chapter 6). Consequently, there is a very uneven policy arena for climate change and just transitions across Nottinghamshire County, which reinforces that despite municipalities appearing homogenous, they have a multi-faceted nature and are made up of departments and officials with diverging interests, objectives and cultures (Rutherford & Jaglin, 2015). To illustrate with an example, Rushcliffe Borough Council is a Conservative-controlled area located in the south of Nottinghamshire and has the most prominent policy regarding low carbon transitions. To date, Rushcliffe is the only district council which has a dedicated environmental strategy by way of: Climate Change Strategy 2013-2020; Climate Change Action Plan 2014-2020; Air Quality Action Plan 2010; Environmental Policy 2017; and Housing Delivery Plan 2016-2021. The reasons why Rushcliffe has a more comprehensive environmental policy and strategy in comparison to other Nottinghamshire district councils is ambiguous, however this could be due to the local demographics of the area and the presence of Green Party councillors, as stated: "Rushcliffe I think is the only local council with Green Councillors and historically has a vocal, green, highly-educated electorate in certain wards" (Interview with P18, Nottinghamshire County Council).

This is in comparison to the other 6 districts in Nottinghamshire County, which "may be more influenced by issues of regenerating former coalfield communities, re-shaping an industrial economy after the decline of textiles, coal, manufacturing, industries" (Interview with P18, Nottinghamshire County Council). Rushcliffe Borough Council has had consistency of political control, whereas other districts have had more change within recent years, and therefore climate commitments have more political continuity (which impacts actor agency, as argued in Chapter 5). Moreover, it is also speculated that the policy and strategy is more comprehensive by Rushcliffe as they take more care with how they are presented, by "making good of what they are doing and maintaining their website" (Interview with P18, Nottinghamshire County Council). Therefore, it could be argued that Rushcliffe Borough Council is more conscious and purposive as a council as to how they appear externally and for ensuring suitable policy is in place.

The unevenness of climate change policy across Nottinghamshire is also reinforced in variations of climate emergency declarations across Nottingham and Nottinghamshire. This variation is highlighted by **Table 4.5**, which demonstrates that at the time of writing:

commitments have been made by 4 councils (Nottingham City Council; Mansfield District Council; Broxtowe Borough Council; Gedling Borough Council); and 2 councils have not officially declared a climate emergency (Nottinghamshire County Council; Bassetlaw District Council). **Table 4.5** also reveals that the ambitions for achieving in-house and area-wide carbon neutral targets is highly variable, with some councils setting in-house targets (e.g. Nottingham City Council, Broxtowe Borough Council; and Rushcliffe Borough Council) and others not (e.g. Ashfield District Council). Rushcliffe Borough Council and Newark and Sherwood District Council are an exception here with having set an in-house carbon neutral target, but not area-wide targets. Not only are there differences of targets being set overall, but also the year in which these targets are aimed to be achieved is also variable, e.g. ranging from targets by year 2027 to 2040. This variability across the Nottingham urban conurbation thereby reinforces the complexities of governance of climate change at local governance levels, not only on a county scale, but on a broader country-wide scale which could hinder governance towards low carbon and equitable transitions.

Local Authority	*Date*	*Official Climate Emergency Declaration*	*In-house carbon neutral target*	*Area-wider carbon neutral target*
Nottingham City Council	21/01/19	Commitment made	2028	2028
Mansfield District Council	05/03/19	Commitment made	2040	2040
Rushcliffe Borough Council	07/03/19	Partial commitment made	2030	No target
Nottinghamshire County Council	16/05/19	None	No target	No target
Bassetlaw District Council	27/06/19	None	No target	No target
Newark and Sherwood District Council	16/07/19	Partial commitment made	2035	No target
Broxtowe Borough Council	17/07/19	Commitment made	2027	2030
Ashfield District Council	16/09/19	Emergency declared	No target	No target
Gedling Borough Council	20/11/19	Commitment made	2030	2030

Table 4.5: Declaration of Climate Emergencies in Nottingham (in chronological order) (Adapted from unpublished internal council document, received 18/09/2019; Climate Emergency UK, accessed 23/02/2021).

Moreover, the variation in commitments within environmental policy and strategy across Nottinghamshire could also be due to the existence of the Local Plan (2014) which was produced by Nottingham City Council, Gedling Borough Council and Broxtowe Borough Council, and is an aligned set of policies and core strategy on how the Greater Nottingham region can develop between 2011-2026. The area in focus of the Local Plan is defined as 'Greater Nottingham' which is made up of the administrative areas of Nottingham City

Council, Broxtowe, Gedling, and Rushcliffe Councils, and the Hucknall part of Ashfield Council (all of which are located in Nottinghamshire County Council), and Erewash Borough Council (which is part of the neighbouring Derbyshire County Council), as shown in **Figure 4.4**.

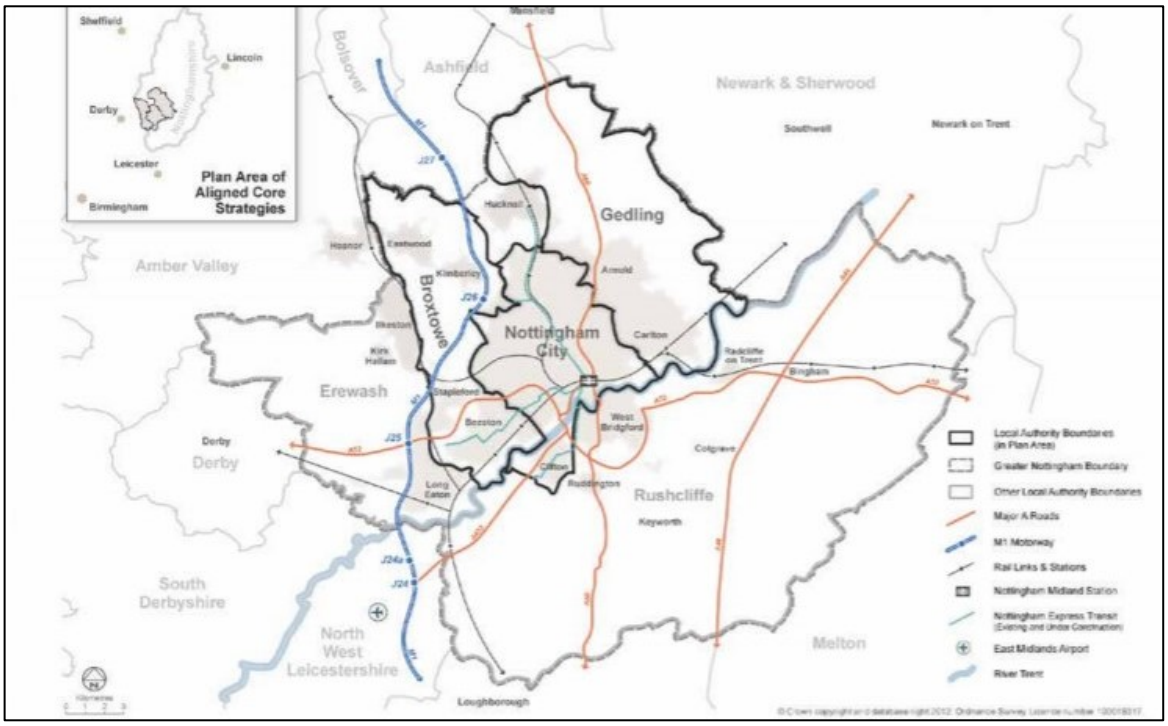

Figure 4.4: Map of Greater Nottingham area (Nottinghamshire County Council, 2011, p.4).

Importantly, the Local Plan (Nottinghamshire County Council, 2014) is a significant policy in terms of implementing low carbon and equitable transitions in Nottingham. For example, the delivery strategy for sustainable growth highlights the importance for sustainable design and adaptation, reducing CO_2 emissions, and decentralised energy generation (Nottinghamshire County Council, 2010, p.38-39). Furthermore, aspects of an inclusive transition are highlighted, for example, by managing travel demand and the need to address accessibility deficiencies (Nottinghamshire County Council, 2010, p.101-102). Whilst partnership working across Nottinghamshire is encouraged to address the main urban area of Nottingham, the exclusion of some district councils which make up Nottinghamshire County Council, such as Ashfield, Newark and Sherwood, Mansfield and Bassetlaw councils can be disadvantageous for implementing low carbon and equitable transitions. This is

because the exclusion of certain councils out-with the Local Plan can potentially result in uneven development, with some councils having unequal access to resources, guidance and support for implementing decarbonisation and equitable strategies. Whilst it is acknowledged that these areas might not fall within the urban conurbation, this nonetheless raises the important issue of ensuring uniform climate governance across the Nottingham region. Again, this local governance context clearly impinges on the ability of Nottingham City Council and Nottinghamshire County Council to develop a fully integrated city-region strategy across its urban area.

4.3.3. Piecemeal 'Justice' Dimensions in Nottingham City Council Policies

Like many urban areas in the UK, Nottingham is a city with prevailing social issues. While there have been improvements since 2007 and 2010, the city has persistently high levels of deprivation, and according to the Indices of Multiple Deprivation (IMD), Nottingham ranks 8th out of the 326 districts in England. According to the Index of Multiple Deprivation, approximately one third of Lower Super Output Areas in the city are in the worst 10 per cent nationally, as shown in **Figure 3.2** (Nottingham Insight, 2019a). Furthermore, out of the seven separate 'domains' used in the IMD, Nottingham performs worst in Health and Disability. This is concerning for the city in terms of overall well-being, but also in terms of environmental sustainability, since the city has poor levels of air quality with an established 5.9 per cent of adult mortality (equivalent to 127 deaths) being due to exposure to human-made particular air pollution in the city in 2014 (5.6 per cent of adult mortality i.e. equivalent to 410 deaths in Nottinghamshire County).

Nottingham's population has a lower-than-average employment rate (62.4 per cent) compared with the national average for England (75.3 per cent), and it is noted that this is still high when accounting for the high student population in Nottingham (73.5 per cent compared to 80 per cent in England). Correlating with this, the city has a higher-than-average benefit claimant population at 4.2 per cent, compared to the national average of 2.9 per cent. The city also performs poorly in terms of education attainment, and Nottingham has a high level of people aged 16-64 with no qualifications (12.9 per cent) compared with the national average (7.6 per cent). Full-time employment income in 2018 is one of the lowest in the UK, and there are notably high levels of child poverty, with 41,700 city children living in households of unemployed adults, or where income is eligible for tax credit support, i.e. 60.5

per cent (in comparison to 39.3 per cent in England). Nottingham is a city with high levels of fuel poverty (14.6 per cent) and low levels of car ownership, with 56.3 per cent of all households having at least one car in 2011 compared to 74.2 per cent in England (Nottingham Insight, 2019a), therefore access to low-cost heating and sustainable transport is paramount. The number of food banks have increased significantly over the last few years, totalling 14 in 2018 in comparison to 2 in 2012 (Interview with P14, St Ann's Advice Centre), demonstrating the unfortunate realities of increasing urban poverty.

Taking the aforementioned social inequalities into consideration is therefore imperative for governing low carbon trajectories at the urban level. On the whole, whilst Nottingham City Council has a coherent climate policy and strategy, references to justice dimensions are fragmented across the City Council's climate policy in comparison. For example, the just transition plays a key part within the City Council's energy strategy, with aims to reduce fuel poverty, which is one of the top five priorities for Nottingham City Council (Nottingham City Council, 2019). This is further reinforced by the recent production of Nottingham City Council's Fuel Poverty Strategy 2018-2025, which makes it one of the first UK councils to produce a fuel poverty strategy, and this therefore echoes the City Council's commitment on a strategic level to combat this issue. The Strategy therefore commits to '[eliminating] E, F and G EPC-rated homes occupied by fuel poor households by 2025, where practicable, in line with national objectives' (Nottingham City Council, 2018c, p.5). The Council aims to achieve this through three avenues: maximising household income, reducing energy bills, and improving energy efficiency. Similarly, in the Local Transport Plan (2016-2026) there is a focus on delivering a world-class sustainable transport system which provides social inclusion to key services, employment and training, and a transport system which is comprehensive in coverage; frequent, reliable and fast; high quality, safe and accessible; easy to understand and use; affordable; and integrated (including park and ride).

Although the City Council can be commended for having a dedicated fuel poverty strategy and aligning targets with national objectives, the aim 'where practicable' is ambiguous, and there are no breakdown or interim targets in place. Therefore, the measurability and accountability of progress for achieving fuel poverty reduction is indeed questionable. In contrast, the City Council's Cycle City Strategy and Action Plan 2017-2021 has no mention of tackling inequality dimensions with relation to cycling (with the exclusion of providing free bike rides). This is somewhat surprising since accessibility and social inclusion are a key feature in the Local Transport Plan (2016-2026), and therefore suggests a lack of

continuity and the presence of political silos when developing low carbon and just policies (Hirsch, 2018; Robins *et al.* 2018).

Furthermore, Nottingham City Council is the first UK council to trial ULEV owners in shared priority bus and cycle lanes on a major traffic corridor e.g. Daleside Road/A612 in 2018. This is an initiative which has been adopted in other parts of the UK such as Milton Keynes and Derby (Transport Nottingham, 2021) and non-compliant vehicles found driving in the lane are issued with penalties. While this can have benefits for urban air quality by encouraging the uptake of low carbon vehicles and increasing public awareness of air quality, this evokes justice considerations. For example, it can be argued that since ULEVs are more expensive to own than older, more polluting vehicles, lower-income groups will be disproportionately affected as they are not given priority on the roads. As stated by one interviewee:

> "Essentially, what it means is that the wealthy businessmen with their top salaries and their swanky new, top-of-the-range electric vehicles get to by-pass the morning traffic, whilst us regular workers who are on low to medium salaries have to sit in traffic congestion especially during peak hours because we don't have that luxury [of the electric vehicle] and that exemption. That doesn't seem fair." (Interview with Anonymous).

Therefore, attempts by the City Council to facilitate a just transition within the transport sector are fragmented and implicit, and the efforts to promote a systemic behavioural change are questionable (e.g. through sustained EV use) (Sovacool *et al.* 2019).

4.4. CONCLUSION

The development of effective policies and supporting mechanisms across international, national and local levels is fundamental for addressing low carbon and equitable transitions in cities, and it is important to understand these policies are subject to temporal, social and political pressures. Through examining governance approaches by way of policies and strategic plans across international, national and local levels, in this chapter I have demonstrated that there are two overarching factors that are thwarting transitions: firstly, I have argued that there is a weakness of climate targets and subsequent fragmented and dissonant climate policy across all levels; and secondly, I have contended that there is inadequate attention to justice elements across all scales.

Related to the first point, on an international scale, I have noted that even though climate change has been on the global agenda for decades, it was not until the 2015 Paris Agreement that marked the first treaty which became legally-binding. Despite this Treaty, international governance of climate change is thwarted from this Agreement since the pledges are voluntary and the agreement lacks clarity on targets, measurements and accountability (e.g. Clemencon, 2016; Routledge *et al.* 2018). The failing of COP25 to create more ambitious targets further exemplifies the complex governance of international climate negotiations and the fragility of existing agreements. Similarly, the 2030 Agenda for Sustainable Development has provided a framework which incorporates targets for low carbon and inclusive environments. Yet, these goals are limited by being voluntary and contradictory in nature by advocating the pursuit of continued and unsustainable economic growth (e.g. Hickel, 2015; Liverman, 2018). I have emphasised that the articulation of SDGs is uneven across local and national levels, and therefore the localisation of the SDGs is limited.

On a national level, there are laudable attempts to transition to a low carbon and just society e.g. 2008 Climate Change Act. However, I contend that the changing political parties in power in the UK has resulted in varying political support of climate change commitments, with differing governments having varied priorities, particularly since 2010 where there has been a decreased willingness and commitment for climate change policy strategies (Gillard, 2017). This is reflected in the lack of ambitious targets in current UK policy, particularly regarding air quality and carbon emissions. Furthermore, there has been an evident reversal in clean energy policy since 2010 under Conservative neoliberal austerity policies. While there are targets to encourage emissions reductions such as via ULEVs, I have noted that this current policy is centred around clean growth and reliant on private forms and is lacking in support and incentives from national government (e.g. Hickman *et al.* 2017). I have argued that the complex division of powers and responsibilities across the UK, and England in particular, is illustrative of the patchwork nature of devolution and subsequent uneven approaches to low carbon transitions.

On a local level, I have demonstrated that climate change commitments are variegated between and within local authorities, displaying a weak consensus and inconsistent approach across local government. For example, Nottingham City Council has set some of the most ambitious targets for combatting greenhouse gas emissions from a UK council, and the policy and strategy reflect these ambitions by applying across multiple sectors, such as housing, energy and transport. However, this is in contrast to its neighbouring local authority

Nottinghamshire County Council which also covers the urban conurbation, however has very limited policy and strategy for emissions reductions and tackling social inequality. There is also an unequal climate policy within Nottinghamshire County Council, with vast inconsistencies between district and borough councils in their approaches to combatting climate change and social inequalities. This further illustrates the lack of mandate surrounding climate policy in the UK and demonstrates the very fragmented and uneven political strategies of two neighbouring councils when addressing low carbon and just transitions. I contend that this is attributed to the structure of local authorities across the UK. Again, I have argued that this local governance context clearly impinges on the ability of both councils to develop a fully integrated city-region strategy across its urban conurbation. This suggests that despite legal commitments, current climate commitments are continuously exposed to political resistance and political inertia on international, national and local levels, which can in turn disrupt transition pathways.

Related to the second point, I have illustrated that there is inadequate attention to justice elements across international, national and local scales. The concept of a 'just transition' is visible in international environmental discourse, and formal endorsements were introduced in the Paris Agreement in 2015 and the Solidarity and Just Transition Silesia Declaration in 2018. Whilst this is a step-change towards securing political and public support, it has received limited endorsement from all UNFCCC parties, highlighting the lack of progress in this area and the varying commitment of the international community for enabling just transitions (e.g. Jenkins, 2019). In other words, the inadequate attention given to justice elements in climate agreements has resulted in the exclusion of just transitions from mainstream climate policy.

I have asserted that the marginalisation of just transition in climate policy is also evident on a national level, so commitments to an inclusive transition remain implicit and result in a lack of political consensus and vision (e.g. Raikes *et al.* 2019a; Robins *et al.* 2019a). This has repercussions for just transitions at the local level, with justice dimensions being seldom referenced in the limited climate change strategy from Nottinghamshire County Council. On the one hand, there is reference made within Nottingham City Council strategy to justice dimensions and combatting the social inequality prevailing in the city, however this is also inconsistent and ambiguous e.g. with regards to reducing fuel poverty 'where practicable'. Therefore, the measurability and accountability of progress for achieving fuel poverty reduction is questionable. On the other hand, there is no mention of tackling inequality

dimensions with relation to cycling (with the exclusion of providing free bike rides) by the City Council, and the provision of priority bus lane use for ULEV owners, which is inconsistent and contradictory to the Local Transport Plan where accessibility and social inclusion are a key feature. Therefore, attempts by the City Council to facilitate a just transition within the transport sector are fragmented, implicit and lack uniformity across policy, which suggests the presence of political silos in governing low carbon and inclusive policies (Hirsch, 2018; Robins *et al.* 2018).

Again, the core argument here is that the inadequate attention to justice on an international and national level reinforces the political and institutional inertia and resistance for tackling social justice issues, despite urban areas such as Nottingham which have displayed some degree of commitment through their policy. I have argued that such inattention to justice on national and international levels has created a lack of path-dependency, transition pathway and policy stabilisation which is in turn disrupting the governance of low carbon and just transitions. Despite these issues, Nottingham City Council in its political capacity as a local authority has overcome some barriers to govern sustainable and inclusive transitions, as described in the next chapter.

CHAPTER 5

GOVERNING LOW CARBON EQUITABLE URBAN TRANSITIONS IN PRACTICE

5.0. INTRODUCTION

Due to mounting political pressure within recent years, many local authorities across the world have started to recognise the detrimental effects of present-day unsustainable urban practices. As such, some local authorities have begun to address environmental issues and social inequalities prevalent in cities through low carbon governance. The concept of governance is highly contested but broadly, governance is understood here to be the range of approaches and actors involved in enacting sustainable transitions at the urban level. The governance of such climate change mitigation by local authorities is not uniform across the UK however, with levels of energy governing activity being differentially distributed across the UK. In a study by Webb *et al*. (2016), only 9 per cent of the UK's local authorities were classified as 'energy leaders' (i.e. those investing in a minimum of three and up to eight projects, with or without an accessible energy plan) in comparison to 23 per cent of local authorities being classified as 'yet to join' (i.e. had no accessible evidence of plans or investment). This differentiation is likely to be attributed to distinctive political, economic and cultural factors. The governance of low carbon and equitable transitions should therefore not only be considered from a purely economic perspective, but it is also important to consider differing governing modes as a result of varied political capacities, social and cultural differences; all of which can be shaped over time and result in diverse historical and institutional legacies. Chapter 4 has provided a contextual background to sustainable transitions by examining the multi-level policy surrounding low carbon and inclusive transitions on international, national and local levels.

Following a multi-level and multi-sectoral perspective, in this chapter I explore the ways in which political capacity is shaped by various factors, including: first, the type of local authority; second, collective and individual agency of local government; third, path creation; and fourth, local ownership; all of which have advanced the governance of low carbon and

just urban transitions, as demonstrated by the case study of Nottingham. The rest of the chapter is structured as follows. In the first section I argue that political capacity is crucial to implement low carbon and just transitions, and the presence of political capacity is partially owed to the type of local authority in existence (e.g. Kuzemko & Britton, 2020). Through examining local authorities in urban areas, the multiple and differing responsibilities across the UK are highlighted. This in turn can hinder (or facilitate, as in Nottingham's case) the local government's ability, commitment and interest to drive low carbon and equitable transitions, all of which have an influence on political capacity.

For the second section, I consider the agency of individual actors and group of local government actors for governing sustainable and equitable trajectories at an urban level. As acknowledged, these can differ between councils across the UK and therefore have a significant impact on the governance of sustainable transitions in urban areas. Therefore, it is important to examine this agency using a scalar approach which can reveal different political practices and discourses, and their relations at and across varying scales (e.g. MacKinnon, 2010). Hence, actors and their agency are considered at two levels of local government; first, the larger (collective) political administration (i.e. the council institution as a whole), and second, at a smaller (individual) personal level. By considering both collective and individual agency, I highlight the importance of political stability and leadership for the governance of equitable and low carbon transitions, as shown by the Nottingham example.

Next in the third section, I consider the role of path creation in governing sustainable transitions, which can be viewed as an enabler by positively contributing to Nottingham's political capacity for governing low carbon and equitable trajectories (MacKinnon *et al.* 2019). I highlight that agency on an administrative and individual level in the past brings to the fore transition pathways and the role of lock-in, path creation and temporality in sustainable transitions, all of which are key conceptual themes that resonate strongly with the Nottingham case study and contribute to transition thinking. As shown by the historical examples of the Nottingham Declaration and the city's district heating system, path-dependency, lock-in and self-reinforcement are very much prevalent in the pursuit of the city's current decarbonisation strategy.

In the fourth section, I examine the role of local government ownership in transitions, which in turn has benefitted Nottingham by providing increased political capacity to enable low

carbon and equitable transitions (e.g. Cumbers, 2012). Using a cross-sectoral approach, I discuss local government ownership of energy, social housing and transport in turn, and the ways in which this has positively influenced low carbon and equitable projects. As such, the City Council has begun to address environmental and social inequality in practice by progressing schemes including: first, low carbon and affordable energy (demonstrated by the establishment of an energy service company Robin Hood Energy, and through retrofitting social housing); and second, low carbon and affordable transport (demonstrated by the bus network, Workplace Parking Levy and tram).

Finally, in the fifth section I conclude by drawing upon the overarching themes that are apparent across this multi-level and cross-sectoral perspective and argue that the engagement of local authority in low carbon and inclusive transitions is contingent on political capacity. This in turn is influenced by: the type of local authority present in urban areas; agency of actors; path creation; and local government ownership; all of which are beneficial for pursuing low carbon and just trajectories.

5.1. LOCAL GOVERNMENT CAPACITY FOR LOW CARBON AND INCLUSIVE TRANSITIONS

The capacity of government entails the extent to take political decisions in pursuit of agreed public goods, and the type of local governmental capacity can vary in relation to sustainable energy systems (Kuzemko & Britton, 2020). Kuzemko and Britton (2020) usefully highlight that local government capacity can take a variety of forms, by way of: responsibility, political authority, finance, personnel, knowledge and energy materiality; all of which can promote or hinder transitions to decarbonised and equitable urban areas, as shown in **Table 5.1**.

Capacity type	*Description*
Responsibility	Statutory duties; defined administrative authority, often assigned by central government and/or national constitution
Political authority	Policy discretion; ability to make policy decision in relation to the locality, rather than contributing to national policy
Finance	Financial resources; local tax raising abilities; capital assigned from the centre; land
Personnel	Personal capital; number and quality of staff capable of making and implementing sustainable energy policies
Knowledge	Experience; access to specific forms of knowledge; sustainable learning and innovation
Energy materialities	Proximity to energy resources; low carbon energy assets; local infrastructure

Table 5.1: Types of capacity (Kuzemko & Britton, 2020, p.2).

Eckersley (2017) stresses that capacity and autonomy should not be confused, since autonomy refers to the degree of freedom from central direction. This may be constrained for example by an unclear constitutional status, reliance on unpredictable revenue streams, and a lack of resources. Therefore, a municipality may have autonomy but also a reduced capacity, which may make it more reliant on other actors to achieve objectives.

Nottingham's experience demonstrates that the type of local authority that is in operation (i.e. whether it is a one-tier (unitary) authority or two-tier authority) is a significant factor for progressing low carbon and equitable transitions, as this in turn affects its capacity for governance. As highlighted in Chapter 4**,** the UK has a complex and evolving political system made up of different local authority structures across four devolved countries: England, Wales, Scotland and Northern Ireland. Within this political system, there can be tensions between actors at different scales and it is out-with the scope of this chapter to examine in detail all the different types of local authorities in the United Kingdom. Presently, there are 343 local authorities in England alone which are a mixture of two types of local government structure: a two-tier system and a one-tier system (also known as single-tier or unitary) as shown in **Table 4.2.**

Nottingham is classified as a medium-sized core city and is governed by two local authorities: Nottingham City Council and Nottinghamshire County Council. Nottingham City Council has an administrative boundary area tightly surrounding the inner-city with a population of approximately 330,000 inhabitants (**Figure 5.1**). Nottingham City Council has been a unitary authority since 1998, until which it was a non-metropolitan district.

Figure 5.1: Map of Nottingham City Council and ward boundaries (Nottingham Insight, 2019b).

In comparison, Nottinghamshire County Council surrounds the wealthier outskirts and suburbs and covers an approximate population of almost 818,000 (ONS, 2017). Nottinghamshire County Council is a two-tier authority and made up of seven district and borough councils (**Figure 4.3**).

In the case of Nottingham, there are different levels of responsibility between the local authorities, which are in turn affecting their approach and subsequent political capacity to implement sustainable transitions. Nottingham City Council as a unitary authority has responsibility for all local services, such as transport, housing and planning, and therefore the planning, implementation and operation of low carbon transitions is considered a simpler process than other two-tier systems which share responsibility between county council and district councils. For example, in the case of Nottingham, decisions are predominantly made in-house within the City Council, and therefore minimise the requirement for external stakeholder decision-making which can also be hindered from differing political priorities and result in a lengthier process.

Instead, as a two-tier system Nottinghamshire County Council and its seven district and borough councils have varied and devolved responsibilities, such as planning and social housing. It is important to reinforce here that unlike Germany or the USA, there is an uneven, fragmented and patchwork landscape of regional governance in the UK. As mentioned in Chapter 4, the abolition of RDAs has resulted in no clear regional tier of government or strategic planning in the East Midlands. It is important also to reiterate that the UK is the most centralised government of the G7 according to the proportion of revenue raised by sub-central government, with 5 per cent of revenue raised locally in comparison to France (13 per cent) and Germany (29 per cent). This is despite gestures for increased localism which were part of a broader centralising logic from the Coalition Government in the UK, in combination with fiscal austerity and curtailed powers (Featherstone *et al.* 2012; Featherstone *et al.* 2020).

Consequently, the different levels of responsibility have resulted in varying political authority which is impacting decision-making and political capacity to implement low carbon and just transitions. In Nottingham, Nottinghamshire County Council does not have the same decision-making powers or autonomy as Nottingham City Council. For example, planning applications in the county area are determined by the district councils, with each having their own local plans, in comparison to the City Council which is a unitary authority therefore has both housing and planning responsibility. Due to these differences in responsibility (e.g. in housing), one interviewee argued that this has led to a different engagement between the councils:

> "The County Council in a way doesn't have quite the contact with householders, or the same perspective of the difficulties that householders face […] Some councils

> have said 'well we cannot really put resources into something that is non-statutory when we've got the demands for us as a county council'. It's like social care, and young people, it's difficult to argue that the work we used to do around climate change could still be done when we are really struggling to look after people who are very vulnerable adults or young people" (Interview with P18, Nottingham County Council).

It is arguable that since unitary authorities have all the duties 'in-house', they have formal responsibility and are subsequently more engaged with issues of energy and affordable warmth at the city level. In comparison, county councils do not have specific remits such as housing, and therefore are less inclined to be engaged with energy issues at the household level (such as fuel poverty), since this is not in their remit. In addition, the austerity measures posed on local authorities' (austerity localism) further places pressure on their ability to meet their statutory requirements, let alone meet non-statutory requirements. This is problematic for enabling sustainable and just urban transitions in the UK especially since the two-tier system of government (like that of Nottinghamshire County Council) is the structure that is in operation in most of England.

This is reinforced by Bulkeley *et al*. (2013), who state that cities as actors of low carbon transitions may have differing responsibilities (and by extension rights) on a national and international scale, and therefore there may be substantial differences within cities where duties, burdens and benefits of addressing climate change could and should be. Such reflections are particularly important when considering low carbon urban transitions as they emphasise the multi-scalar nature (i.e. local, regional or national levels) of addressing climate change in justice terms, and the different governance approaches that might be taken in various contexts. The broader point here is the local authority structure in operation leads to the obvious lack of city-region strategy, which would allow local authorities to combine in their efforts towards a decarbonised and inclusive transition.

Furthermore, the Nottingham example highlights that the spatial arrangement of the city can affect the governance of low carbon and sustainable transitions. In Nottingham, the urban area is governed by two different authorities and therefore the urban area of Nottingham *itself* is problematic to define, as commented:

> "[The administrative boundary] is really tightly knit, so if we go 2 miles we are in the County, even though we are still in the Nottingham urban area. So what people regard as Nottingham and the Nottingham City boundary area are 2 very different things" (Interview with P4, Nottingham City Council, 2018).

Whilst the urban area of Nottingham is problematic to define and can add a layer of complexity to Nottingham's urban governance, the tight administrative boundaries have indeed been beneficial for the City Council by maintaining a relatively small and compact size. This has been positive by allowing value for money to be a lot easier to obtain, since energy materiality's (such as local infrastructure) are in closer proximity, which in turn can make projects more appealing for the City Council financially since there are smaller distances to cover. On the one hand, this can also be particularly advantageous for transport and mobility justice by allowing the City Council to provide an extensive network in the city. This supports arguments of the benefits of a 'compact city' approach for achieving sustainable city objectives and improving social equity and spatial mobility (Ahlfedlt & Pietrostefani, 2017; Neuman, 2005). On the other hand, this can have negative implications since Nottinghamshire County Council has a more spread out and rural population, leading to accessibility and isolation being worse (Interview with P18, Nottinghamshire County Council). This can therefore be disadvantageous for the wider Nottingham conurbation in terms of spatial equity and transition policy across the region, echoing critiques of compact cities on social equity dimensions (e.g. mobility in rural areas, inner-city affordability), as per Ahlfedlt and Pietrostefani (2017).

The bounding of the urban unit by administrative responsibilities into a smaller, more confined location has therefore shaped the way in which transitions are enacted at the city-level and have in turn made them more desirable and easier to implement from an economic standpoint. Whilst it is acknowledged that other spatial considerations of low carbon urban transitions have tried to shift away from the concept of urban areas being 'bounded' units and more inter-related, interwoven and complex, (e.g. Bulkeley *et al.* 2011; Wittmayer & Loorbach, 2015), the Nottingham example reinforces that the governance of low carbon just urban transitions is indeed influenced by, and to some extent restricted to, each local authority's administrative boundaries. This is because of the different responsibilities and remits of local authorities within their own administrative boundaries, which as shown in this example has stimulated transitions within Nottingham City Council administrative boundary, but inhibited actions outside of this area (Franzen, 2013). This appropriately reinforces the point that the decarbonised energy transition is a fundamentally geographical process which involves reconfiguring current spatial patterns of economic and social activity (Bridge *et al.* 2013). It is also important to consider the agency of local government actors in governing low carbon and just transitions, on both collective and individual scales, as examined next.

5.2. AGENCY OF LOCAL GOVERNMENT ACTORS

As I have contended, the type of local authorities (i.e. unitary or two-tier authority) for governing sustainable and equitable transitions is critical to consider, since this can significantly alter a local authority's political capacity to implement changes at the local level, due to variations in responsibility between local authorities. Additionally, the type of local authority consequently impacts the role of actors and agency for governing sustainable and equitable transitions at an urban level. In other words, actors (both individuals and groups of individuals) and their agency (behaviours) in attempts to prevent, sustain and generate change at the urban level.

Since actors can work collectively and independently of one another, it is worthwhile to examine their agency using a scalar approach which can reveal different practices and discourses and therefore agents of change, as in the context of governing urban sustainable transitions (Affolderbach & Schulz, 2015; Coe & Jordhus-Lier, 2010; MacKinnon, 2010). The actors which are particularly important for governing sustainable transitions in Nottingham can therefore be considered at two scales of local government: first, as a collective set of actors, i.e. the political administration and institution; and second, as individual actors, independent of one another.

Nottingham's local authority Nottingham City Council is a democratic organisation covering 20 electoral wards in the city. At the time of writing, the Labour Party is the main political administration with a large majority of 50 out of 55 councillors representing the Labour Party; 2 representing the Conservative Party; and 3 councillors representing the Independent Party (Nottingham City Council, 2019) (**Figure 5.2** as per 2019 elections).

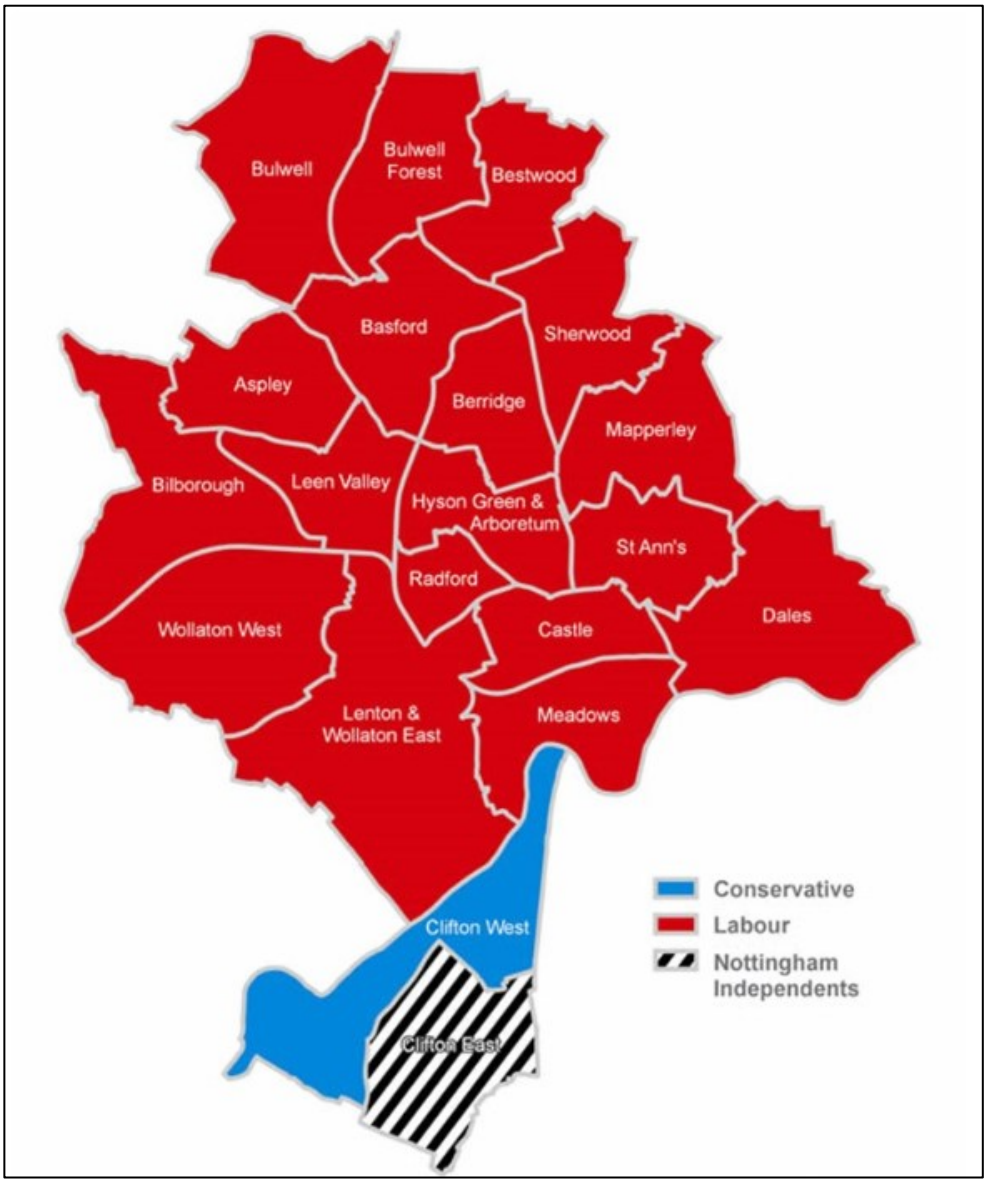

Figure 5.2: Political representation of Nottingham by Ward in 2019 (Nottingham City Council, 2019).

There has been a stable Labour administration at the City Council since 1991 and there is no indication that this political stability will change in the next number of electoral cycles (Dale, 2017). Part of the reason for this political stability can be attributed to Nottingham City Council's small administrative boundary which comprises a largely working-class population, with most of the wealthier residents of the city who traditionally vote conservative living out-with the City Council boundary in the neighbouring Nottinghamshire County Council, for example in areas such as West Bridgford and Rushcliffe (Interview with P3, Nottingham City Council, 2018). Given this past (and possibly future) political stability, the City Council has a strong degree of political power, since there is not an immediate risk

of change in administration. This political stability has also allowed for the ability to plan longer-term and make decisions which might be considered politically controversial, such as the Workplace Parking Levy and tram extension (discussed in Section 5.4.2) and is therefore a key factor for governing sustainable transitions. However, Nottingham appears to be fortunate in its experience of political stability and advancing sustainable transitions, since the prevalence of one-party councils over time can also be subject to negative consequences, such as complacency, stagnation, reduced accountability and lack of competition for the governing elite (e.g. as per the controversial reported political corruption in former industrial heartlands including Scotland (such as Glasgow City Council), England (Hull and Doncaster) and South Wales)) (Barrington & Maxwell, 2013).

In comparison, Nottinghamshire County Council has had a much more dynamic political representation that has been changing over recent years. As noted in Chapter 4, local government authorities run on different electoral cycles, with Nottingham City Council having whole council elections in 2019, 2023 and every 4th year; Nottinghamshire County Council having whole council elections in 2019, 2021, and every 4th year; and Nottinghamshire's 7 District Councils having elections in 2019, 2023 and every 4th year (UK Government, 2019e). Between 1981-2009 and 2013-2017 the political administration was Labour-majority, and in interim periods 2009-2013 and 2017-present the County Council was (and presently is) controlled by a Conservative majority. Today, the County Council is represented by 66 councillors with a more varied political administration, with 36 seats to Nottinghamshire County Council Conservatives and Mansfield Independent Group; 22 seats to Labour; 6 seat to Ashfield Independent; 1 seat for Liberal Democrats; and 1 seat for Independent (Councillor Maureen Dobson) (Nottinghamshire County Council, 2021). Such a broad array of political groups within the County Council can arguably make project planning problematic within the local authority, due to differing political views and priorities, and as a result the County Council requires more collaboration between parties (Interview with P18, Nottinghamshire County Council, 2018).

Long-term political stability and consistency has enabled a strong collective leadership and political will in the leadership of the country, which has been particularly favourable for low carbon and equitable transitions in terms of collective agency. This is because historically, the Labour party are ideologically socially democratic, which is commonly aligned with more environmentally and socially-conscious values. This is certainly the case in Nottingham, and the environmental and social consciousness is possibly more distinctive in

Nottingham than other English Labour councils, as stated: “Everything we do is through a lens of reducing deprivation and supporting the most vulnerable in society…” (Interview with P3, Nottingham City Council). Again, this demonstrates the delicate and contested balance of agency of collective political party politics and those of individuals at the city council-level (Coe & Jordhus-Lier, 2010; O’Neill & Gibbs, 2014).

Evidently, a Labour administration has been beneficial to the progression of low carbon and equitable transitions in Nottingham, by maintaining collective political control which has allowed sustainable projects to progress, as commented:

> “It’s obvious that knowing some of the characters in the opposition party in the city that we would have never had a tram. The Workplace Parking Levy would have been cancelled if there had been any chance to cancel any of these things in the progress they had been happening because they [the opposition party] wouldn’t have been prepared to make that investment. And Robin Hood Energy wouldn’t have happened. They are very much opposed to that. There are all sorts of indications that if we lost elections, a lot of these things would have been derailed” (Interview with P3, Nottingham City Council).

This reiterates arguments in Chapter 6 of the contested nature of transition processes, and that in practice these involve political conflicts which in some ways have been avoided and/or overcome in Nottingham from the stable political leadership in the city council over many years. In addition, it is considered that the environmental and social ethos has been built up over several years and therefore to a certain extent become politically embedded (Interview with P12, Nottingham City Council). As noted in Chapter 4, this local government agency for driving low carbon and equitable trajectories is also reflected in Nottingham City Council’s environmental and social policy (e.g. Fuel Poverty Strategy 2017), and its targets and commitments to become a leading low carbon and equitable city (e.g. Go Ultra Low Strategy). Such strong environmental and social policies have encouraged positive policy feedback and stability (Roberts *et al.* 2015). Furthermore, as a set of collective actors, the political administration can be viewed as forming a core alliance at the regime level, which has overcome political resistance to change from opposing political parties (Geels, 2015) and powerful incumbent interests in the energy sector. This collective agency is also known to act as a role of ‘path advocates’, which has legitimised and anchored pathways to more sustainable trajectories at the urban level (MacKinnon *et al.* 2019). Though, it is important to note that such collective agency needs to be maintained to avoid political dismantling of sustainable approaches, an example of which is previously

noted in Chapter 4 and the dismantling of national government climate change policy (Bauer *et al.* 2012; Innes, 2019).

In addition to the governance by collective local actors, Nottingham City Council is considered to have had particularly strong agency and political leadership on an individual level, particularly those of council members who are considered to have made bold and brave decisions and are therefore crucial for driving forward and governing sustainable and equitable transitions. Individual agency is therefore considered to have been imperative in Nottingham's sustainable transition, particularly through individual actors. An example of this is the late Councillor Alan Clarke who was the Portfolio Holder for Energy and Sustainability between 2011-2017, and during this role set up Robin Hood Energy, developed the Nottingham Declaration on Climate Change and oversaw Nottingham's commitment to become one of the UK's cleanest cities (Nottingham Post, 2017). In addition, individual agency is essential for the progression of controversial decisions for the benefit of the environment and Nottingham residents (Interview with P12, Nottingham City Council; Interview with P3, Nottingham City Council). A pertinent example of this is Robin Hood Energy and the Workplace Parking Levy, which are both unique models in the UK:

> "On the face of it [the schemes] are not an obvious vote winner, you've really got to be quite bold and ambitious to be prepared to do it… [the City Council] had people in power who have been very progressive about what they want for their city and perhaps emboldened a bit about the stable position they've got, and perhaps being prepared to go that bit further. I mean our neighbouring city Derby has currently got no overall control and it's very hard to make decisions like this which are extremely controversial, you have the Chamber of Commerce up against you, doing something that looks bad for the economy on the face of it now as well" (Interview with P6, Nottingham City Council).

As highlighted, the individual actors and their principled sense of environmental and social values to take bold, decisive and progressive decisions in local government is compelling in the example of Nottingham's transition. In this instance, both Robin Hood Energy and the Workplace Parking Levy (as discussed in Section 5.4) can be considered as 'urban infrastructure regimes' and 'experiments' through which climate change is governed and can lead to institutional change (Bulkeley *et al.* 2012; Coenen & Truffer, 2012; Hodson *et al.* 2017; O'Neill & Gibbs, 2014). Bulkeley *et al. (*2012) explain that climate change experiments establish new circuits, configure dominant actors in new sets of relations, and through these means realise the potential for addressing climate change in urban areas. Whilst they can also become 'sites of conflict, a means through which new forms of urban

circulation can be confined and marginalised, leaving dominant energy regimes (relatively) intact' (Bulkeley *et al.* 2012, p.1471), this is not quite the case in Nottingham. On the contrary, whilst there were sites of conflict, i.e. much contestation amongst local businesses and groups, in time this has dissipated and led to a positive behavioural change and modal shift to active, more sustainable travel (as examined in Section 5.4.5). The role of individual agency is consistent with findings that individual actors are motivated by interests and values that emerge from personal interests, culture, political and ideological persuasion, and other institutional functionalities (e.g. Pesch, 2015). As such, individual actors have a significant role in stimulating sustainable transitions and trajectories, even if they are dealing with conflicting sets of meanings or organisational behaviour (Vringer *et al*. 2020).

Furthermore, the City Council has been particularly fortunate in their pursuit of a low carbon urban transition as it has had capable, knowledgeable and skilled officers working for the council who have carried out projects successfully. The motivations behind this agency are not confirmed, but this is likely because the individuals had a strong interest in improving the city environmentally and making it more socially equitable (Interview with P3, Nottingham City Council; Interview with P4, Nottingham City Council). Furthermore, Wurzel *et al*. (2019) comment that the extent to which actors develop into climate pioneers is dependent on their internal and external ambitions, as well as more structural drivers, such as competitive and problem pressures and the political/public salience of climate change. Both Van der Heijden (2019) and Bulkeley and Kern (2005) emphasise that the presence of a local climate champion, by means of mayors or other urban political leaders, are looked upon as a precondition for effective climate governance, and to an extent this is reinforced in Nottingham (however, it is recognised that such arguments can reinforce a top-down notion of politics).

The Workplace Parking Levy is a particularly good example of agency in governing low carbon and sustainable transport (as highlighted in Section 5.4.7). Whilst this scheme was introduced in 2012, it underwent a long period of planning and discussion which began in 1998 - a time when sustainable transport was not perhaps so political salient in comparison to present-day. This was before local authorities were even given the powers to implement Workplace Parking Levies (which was permitted under the Transport Act 2000). The benefits that are being accrued to date in Nottingham, both financially and environmentally, demonstrate the forward-thinking foresight and long-term planning of the individuals at the City Council, which is particularly advantageous for low carbon and equitable trajectories.

Furthermore, whether well-judged or coincidental, the timing of the scheme is a key factor for the political and public palatability of the project, since this was during a time of public spending and when bolder decisions could be made:

> "The noughties were very much a time of public spending, they had been willing to go a bit further I think from the time that Tony Blair got (elected) in, up until Gordon Brown, and then the (2008 Financial) Crash. I think [back then] was the time when there was bolder investment, and now doing something which attacks the employee in the city or the employer in the city could be seen as something as politically challenging, I think" (Interview with P6, Nottingham City Council).

This supports arguments that not only is individual agency a fundamental component of low carbon and equitable transitions, but emphasises the importance of understanding the timing of agency and its effects on significant and lasting change (Coe & Jordhus-Lier, 2010). Clearly, the early planning and subsequent implementation of what is now a well-functioning and sustainable transport system continues to reap present-day benefits, particularly with sustainable transport becoming an increasingly prominent issue. It is also important to reflect on the past influences on agency and capacity for shaping contemporary urban transitions, as considered next.

5.3. PATH CREATION AND GOVERNING URBAN TRANSITIONS

I have argued that collective and individual agency has contributed to the political capacity of urban governments to progress low carbon and just transitions. In addition to this, agency has a temporal nature and spans to past activities, which can embed sustainable transitions in urban areas. This can result in a trajectory of path creation (shown in **Figure 2.12**), which asserts that actors have actively and/or intentionally interacted with their environment in an innovative fashion (also known as mindful deviation) to purposefully change the structures, practices and regulations to influence a certain outcome (MacKinnon *et al.* 2019).

This therefore highlights the socio-cognitive processes in agency and the ability to influence future trajectories and is useful for understanding why certain urban areas have followed a certain trajectory, and why others have not. In the instance of Nottingham, I argue that it is evident that path creation has played a key part in political capacity and subsequent low carbon and just urban transitions, as apparent in the establishment of the city's district

heating network in 1974, and launch of the Nottingham Declaration in 2000, as discussed in turn next.

5.3.1. District Heating

Path creation and agency for low carbon and equitable transitions are certainly apparent in Nottingham, and the city's district heating system is a fitting example. Particularly in recent years, the use of district heating has been advocated as an energy and carbon saving measure for urban areas. Whilst this has been a popular method in Europe (particularly in the 1970s), district heating development has been limited in the UK, with less than 2 per cent of the UK's heating demand being met currently by district heating (Randall, 2014).

Contrary to this, Nottingham is exceptional to most cities and established a district heating system in 1974, which remains owned by Nottingham City Council under the present arms-length management organisation Energy Services Company Enviroenergy (Brandon *et al.* 2017; Enviroenergy, 2018). The district heating system was set up by the National Coal Board at the time and built to provide heating and hot water to some 7,000 dwellings, civic buildings, colleges and shopping malls, and to supply steam for industrial loads (Lawson & Mason, 1974). Motives behind the scheme were to primarily tackle the city's increasing refuse and to decrease cost, since most existing and potential refuse tips were becoming filled up by 1965. At the time, an exhaustive search revealed that there were no available sites which were likely to have planning permission granted for tipping (Lawson & Mason, 1974). Furthermore, the scheme was implemented to deliver anti-pollution measures by substituting two chimneys for otherwise many hundred, and utilising waste allowed for the conservation of energy (Lawson & Mason, 1974). The political context of the introduction of the district heating system in Nottingham at the time is unclear, however this system was in parallel with many others introduced in urban areas during the 1970s, such as Paris and Hong Kong (Schumacher, 1985).

There are numerous benefits which are clear from the building of this scheme, and the advantages that this has on political capacity for implementing low carbon and just transitions at present. Currently, the district heating network is the largest in the UK and is comprised of a 68km network, supplying heat and hot water for 4,700 dwellings and over 100 commercial partners such as the Nottingham Arena and Nottingham Trent University (Vital Energi, 2018). The heat energy supplying these buildings is from an incineration of

160,000 tonnes of the city's municipal waste at the Eastcroft Incinerator (Enviroenergy, 2018).

This is a form of sustainable energy which replaced, and continues to replace, the need to burn fossil fuels for heating and hot water. The establishment of a municipally-owned energy system, Enviroenergy, has benefitted the city's progression towards present and future low carbon systems by developing knowledge capacity in the infrastructure and wider operation and flows of energy across the city (Kuzemko & Britton, 2020). Whilst there is still a high level of pollution within the city at present (especially air pollution as aforementioned), the emphasis is on the historical delivery of this scheme which was particularly forward-thinking for that time and has provided many present-day benefits.

In addition, by building the district heating network, the city has been historically and positively embedded towards low carbon energy systems, which has allowed for the development of learning and expertise in the field over three decades. This is both through Enviroenergy and the Council's Energy Directorate, which have full in-house operation covering generation, distribution and network operations, metering, retail and billing (Interview with P15, Robin Hood Energy). As aforementioned, this was, and remains to be, a relatively unique venture for a UK city, with the exception of a small number of cities such as Sheffield, Birmingham, and Aberdeen having successful networks (Randall, 2014). As stated by one interviewee, timing is a key element:

> "When looking at other cities like Copenhagen, you can't just say, 'we'll have the same model', as they have forty years on from when they started doing it, because we don't have 40 years to get there" (Interview with P9, BEIS).

Again, the temporal aspects are reinforced as a key factor in the success of Nottingham, and the lock-in and embeddedness of a system can be beneficial in terms of timing for low carbon and equitable transitions.

Importantly, it has further stimulated sustainable trajectories by enabling the City Council to expand the district heating system (and make savings from sunk costs in existing infrastructure which was built almost 40 years ago) and operate this as a commercial service (Interview with P9, BEIS):

> "I think there is a uniqueness in Nottingham, the reason being if you are an authority thinking about it the other way round, you're an authority and you're looking to go

> where we've gone, that's a long journey and you've really got to develop a team and bring in that expertise and reputation and it would be very difficult to start from a small team or nothing to get to where we are" (Interview with P20, Nottingham City Council).

As such, it can be argued that this arrangement, i.e. low carbon technology operated by the City Council, has become acceptable to Nottingham's city residents, which I argue is key to the delivery of low carbon projects in practice. Therefore, a pattern of positive self-reinforcement has occurred which in turn has aided political capacity to drive forward sustainable futures (Bulkeley & Kern, 2005; Rosenbloom *et al.* 2019). However, it is noted that the benefits of district heating systems are restricted to those households that they serve, which excludes the city as a whole as it serves a finite number of households. As a result, there are no direct benefits for most city residents (Interview with P15, Robin Hood Energy), although Nottingham City Council sought to address this issue in the establishment of a wider energy service company Robin Hood Energy (as discussed in Section 5.4.1).

Through having a long history in energy supply and management, the City Council has assembled a dedicated Energy Services department which is to date a large team consisting of approximately 40 full-time staff that are committed to providing a commercial service and can fulfil sustainability drivers. This Department is particularly significant and demonstrates the weight and capacity given to these issues by the Council. The existence and size of the Energy Services department in Nottingham is unusual, with most other UK councils having very limited (if not any) staff with the remit of energy and sustainability (Interview with P1, APSE Energy).

Furthermore, since the Energy Services department is deeply embedded within the Council and provides a commercial business and necessary income, it can be suggested that there is less risk of being abolished. As such, the establishment of district heating in Nottingham in 1974 has set a particular course in motion of societal development which affect choices into the future, i.e. path-dependence, which is highly significant for transitions (Rosenbloom *et al.* 2019). Therefore, the core argument here is that the early action of individual and collective agents establishing a municipally-owned city district heating system has been a positive development for the city through providing sunk costs, interest, learning and expertise; all drivers of which are positively self-reinforcing and enable political capacity for governing contemporary low carbon and equitable transitions in the city.

5.3.2. Nottingham Declaration

Additionally, the notion of agency and path creation can be witnessed in the example of the Nottingham Declaration, a voluntary pledge signed in October 2000 by 326 local government bodies to tackle the causes and impacts of climate change at a local level. The Declaration committed local authorities to three broad aims: first, to acknowledge the existence of climate change; second, to welcome and engage government targets; and third, to commit to working at a local level on carbon management (Brebbia & Longhurst, 2008). The significance of this is two-fold. First, the Declaration was co-founded and signed in the city of Nottingham, putting the city at the heart of climate change action, whilst also being the UK's first local authority initiative to combat climate change. Second, the East Midlands was the first UK region where all 46 of its local authorities became signatories, revealing the strong environmental awareness and political willingness of the city and wider region to tackle climate change. As of 2012, The Nottingham Declaration was superceded by the Climate Local, which was a Local Government Association initiative to drive, inspire and support council action on climate change (LGA, 2019).

While criticisms have been made regarding the absence of targets for cutting emissions, this Declaration is considered as a breakthrough in the UK and more broadly in terms of political support for climate change mitigation (Friends of the Earth, 2011). Again, the individual and collective agency to form, sign and engage with this Declaration has influenced future sustainable trajectories in Nottingham, causing a positive lock-in and path creation for sustainable transitions. Therefore, the agency at collective and individual levels has led to much discussion of historical path-dependency and subsequent lock-in, that is, the idea that characteristics of existing regimes set preconditions for the development of new transition pathways (Foxon *et al.* 2010; Klitkou *et al.* 2015). As noted by one interviewee:

> "We need to still remember that back in 2000, Nottingham created the Nottingham Declaration and that was the basis for local authorities signing up to environmental best practice across the whole of the UK. So there was a political engagement in environmentalism" (Interview with P9, BEIS).

To a certain extent, it provides a historical legacy of climate change commitment in the city, with sustainability becoming strongly embedded and ultimately empowered the city with "a strong platform to move forward" (Interview with P20, Nottingham City Council). This is not only restricted to Nottingham itself but as stressed above, this influenced and enabled

actors in other local authority areas to collectively pursue environmental strategies and potentially initiated pathways for wider regional climate governance.

As appropriately highlighted by Rosenbloom *et al.* (2019), path-dependent processes have traditionally been considered as a barrier to the adoption of low carbon systems. Yet as the Nottingham example demonstrates, path creation, positive lock-in and self-reinforcement have contributed to political capacity of urban governments to pursue urban decarbonisation. This illustrates that path creation can act as an enabler by positively contributing to Nottingham's present-day sustainable and equitable transition and therefore create a virtuous cycle for sustainable governance (MacKinnon *et al*. 2019). This can be through collective leadership which can enrol other interests and actor agency, and in doing so, individuals and leaders can act as path advocates and have the ability to legitimise and anchor sustainable pathways (MacKinnon *et al.* 2019; O'Neill & Gibbs, 2014). In addition, the local government ownership of assets is favourable for implementing low carbon and equitable transitions, as discussed next.

5.4. OWNERSHIP AND LOCAL GOVERNMENT CAPACITY

Collective ownership has encountered a resurgence in recent years across Europe with new initiatives emerging in cities such as Barcelona and Grenoble (Cumbers, 2012; Cumbers & Paul, 2020). There has been a particular increase of public ownership in terms of low carbon and equitable transitions[26]; ranging from buying back the existing electricity network by municipalities (e.g. remunicipalisation, also referred to as 'new municipalism' of over 305 cases in German energy sector since 1990), to the building of new low carbon systems by communities (e.g. wind farms and solar farms in western Europe) (Cumbers, 2018; Cumbers & Paul, 2020; Featherstone *et al.* 2020). A number of motivations are behind such ventures; chiefly, collective ownership allows: a strong governance towards more political influence in the local energy market; greater participation and decision-making with citizens; allows profits to be reinvested back into the council and used for local services (Wagner & Berlo, 2015); and promoting synergies between various stakeholders (Energy Cities, 2018). This may also be influenced by a wider environmental movement, and as witnessed in the German *Energiewende* (energy transition) and some areas of Scandinavia, remunicipalisation reflects

[26] Though the trend towards municipalisation (or new municipalism) is also evident in other sectors of local public and service provision, e.g. water, education, health and social services (Cumbers & Paul, 2020).

a deeper historical and social ethos of public value and responsibility for public well-being (Beveridge & Kern, 2013; Cumbers & Paul, 2020). Municipal ownership of low carbon systems is therefore considered a 'win-win' scenario in terms of urban low carbon and equitable transitions, by linking justice dimensions and environmental benefits and is thus of key importance to sustainable transitions (Chatterton *et al.* 2013; Cumbers, 2018; Johnstone *et al.* 2020). Importantly, the argument developed here is that these processes of neoliberalisation and nationalisation shape and configure contemporary (urban) governance (Leitner *et al.* 2007).

In the UK, public ownership has had a varied history, particularly within the last few decades. During the Thatcher era of neoliberalism and privatisation in the 1980s, and partially continued in the New Labour era, many councils within the UK sold their council-owned assets to gain capital which was cut from central government (Harvey, 2007). However, the city of Nottingham is distinctive and went against the grain by not selling public assets unlike many other Labour councils in the UK, for instance Glasgow. The results behind this variation of privatisation in UK Labour-council cities could be a result of differing local politics to influence policy (Millins & Murie, 2006). Again, this is noteworthy and highlights the effect of individual and collective agency in negotiating local government policy and a willingness of urban actors to break with some of the characteristic neoliberal politics (Featherstone *et al.* 2020). Furthermore, this underlines the distinctiveness of Nottingham for local political transformation in relation to the strategies of other UK Labour councils. Unlike most UK cities, Nottingham City Council retained ownership of its bus network and social housing, which has positively influenced low carbon and equitable trajectories in the transport and energy sectors to date by providing political capacity for enabling transitions.

I argue that from this municipal ownership, Nottingham City Council has been able to pursue environmental benefits (in terms of low carbon initiatives), social benefits (in terms of equity and justice dimensions) and converge low carbon transitions and ownership to generate economic benefits (in terms of sustainable income streams). This is demonstrated through the provision of low carbon and affordable energy and low carbon and affordable transport, both of which are an important commercial asset for the City Council, as described next.

5.4.1. Provision of Low Carbon and Affordable Energy

The privatisation and liberalisation of the UK energy markets was driven during Thatcher's Conservative Government in the 1980s. Since 1947, the energy sector structure was under complete public ownership as a result of the 1945–1951 Labour government which had nationalised almost 570 private and public bodies involved in the generation and distribution of electricity to a single, nationalised industry (International Business Publications, 2015; Pond, 2006; Wollmann & Marcou, 2010). It was envisaged at the time of nationalisation that a coordinated, integrated industry structure was the most optimal for restructuring the national economy (Wollmann & Marcou, 2010) and energy infrastructure was considered a non-competitive, 'natural' monopoly (Bielecki & Geboye Desta, 2004).

The Conservative Government under Thatcher's administration viewed this system of state-control as highly inefficient in comparison, with the need for investment by private actors and the function of the sector using a market-oriented approach (Hulsink, 1999). It was arguably used as a key agenda to break the power of the National Union of Mineworkers (and other unions) particularly during the 1984-85 strikes against coal pit closures and the loss of 20,000 jobs which devastated communities in Northern England, Scotland and Wales (Pearson & Watson, 2012). The impact of these closures continues to have significant socio-economic legacies and hence raises justice implications for deindustrialisation and the low carbon transition (e.g. Johnstone & Hielscher, 2017). As such, during the 1980s the liberalisation, restructuring and privatisation of the UK energy sector came into force, which involved the processes: introduction of competition through structural changes, such as the removal of subsidies; horizontal unbundling of incumbents in order to create competitors; vertical unbundling to facilitate access to monopoly networks; the establishment of an independent energy regulator; and selling to private corporations (Pollitt, 2012). These processes were carefully planned and managed over a period of 10-15 years, and at the time it was considered unique in that the UK undertaking this large shift was the first country at the time, and therefore had little experience to draw upon (DTI, 2000).

Consequently, the present-day ownership of the UK's energy sector is concentrated into few, large multinational utilities which operate across generation, distribution and supply. The energy supply market is comprised of six utilities known as the 'Big Six' which supply approximately 95 per cent of domestic and 80 per cent of commercial consumers (Hall *et al.* 2017). Furthermore, only three out of the 'Big Ten' generators in the UK are owned by

British companies and seven are owned and controlled by foreign stakeholders. Moreover, only 25 per cent of UK energy is generated by British corporations, with 66 of the UK's generating capacity being owned by European countries and 70 per cent of nuclear sector foreign owned (International Business Publications, 2015). Such oligopolies are particularly concerning for low carbon and equitable transitions as these concentrations of vested interests can have consequences for long-term decision-making being geared towards short-term profits, and is a particular issue for the benefit of society since local political agency is largely redundant.

In response to this concentration of a select number of energy oligopolies, the energy supply market has witnessed an increased number of entrants in the sector within recent years, for example in the UK the incumbent energy suppliers had reduced from almost 100 per cent in 2008, to 85 per cent in 2015 (Johnstone et *al.* 2020). Correspondingly, there has been increased activity using a wide variety of business models, particularly from local authorities and third sector organisations. One such example is the establishment of Energy Service Companies (ESCo) which are organisations that provide customers with energy services and relate to the physical benefit, utility or good consumers derive from energy (Hannon & Bolton, 2015), as shown in **Figure 2.6**.

As such, ESCos are heralded for having strong environmental, economic and social well-being dimensions to their development (e.g. reducing the effects of fuel poverty) since the nature of the energy network (such as combined heat and power) is often more energy efficient and low carbon than conventional market-led fossil-fuel energy supply from private companies. As noted previously through the setting up of Robin Hood Energy, Nottingham pursued an active governance in this venture which I argue has aided low carbon and equitable transitions in the urban area. However, as highlighted in the methodology chapter, it is important to note Robin Hood Energy was municipally-owned up until September 2020, when during the time of writing it became privatised and sold off to Centrica (which also owns British Gas) following a loss of £34.4 million by March 2019 despite receiving £43 million of public cash and £16.5 million of loan guarantees (Ambrose, 2020; Centrica, 2020). Regardless of this privatisation, Robin Hood Energy is a valuable illustration of the benefits of municipally-owned energy in low carbon and just transitions. For example, even though the concentration of incumbent energy suppliers is declining with a net loss of 1.4 million 'Big Six' customers (Ofgem, 2018), the retail markets are still concentrated and dominant which despite a rhetoric of competition, emphasises the irony of neoliberal policies that tend

to concentrate power in few hands. As such, the incumbent energy suppliers still hold a degree of market and political power and can hinder UK sustainable energy transition, and Robin Hood Energy is illustrative of contesting this market and dominant political power (Johnstone *et al.* 2020; Kuzemko, 2015), as discussed next.

'ROBIN HOOD ENERGY' ENERGY SERVICES COMPANY

The city of Nottingham recognises that a transition to a low carbon and equitable energy system is essential, particularly because it has had a persistent problem of high and fluctuating rates of fuel poverty. Overall, Nottingham's fuel poverty was 21.7 per cent in 2011/12, 12.6 per cent in 2014/15, and 14.6 per cent in 2016/17 (Nottingham City Council, 2018c). This is in comparison to the rest of England which has an average of 10.2 per cent in 2017 (UK Government, 2019c). Fuel poverty is also highly variable across the Nottingham urban conurbation, with areas such as Dunkirk and Lenton having the highest percentage (30.2 per cent in 2015), in comparison to the lowest percentage in Wollaton West (10.7 per cent in 2015), as shown in **Table 5.2**. These disparities reaffirm arguments that energy justice is a deeply geographical phenomenon since it is unequally distributed and experienced across different places (Bouzarovski & Simock, 2017), and therefore addressing energy justice from a spatial perspective (e.g. on the urban scale) can provide a more comprehensive understanding of the problem.

As emphasised in Chapter 4**,** Nottingham City Council has developed the Energy Strategy 2010-2020, with a target of 20 per cent of energy used to be produced within the Greater Nottingham area from renewable or low/zero carbon sources (Nottingham City Council, 2010). Tackling Nottingham's social inequality is very important according to the City Council (Interview with P3, Nottingham City Council), and this mission is clearly echoed in the City Council's Energy Strategy, which continuously refers to eliminating societal issues caused by energy, most commonly fuel poverty, as one of the Council's top five priorities identified in the Nottingham Plan. As such, Nottingham is one of few city councils within the UK to have a dedicated Fuel Poverty Strategy (2018) and commitment "To eliminate E, F and G EPC-rated homes occupied by fuel poor households by 2025, where practicable" (Nottingham City Council, 2018c, p.3).

An important scheme to alleviate fuel poverty has been led by the Council through the establishment of Robin Hood Energy in 2013. This municipally-owned ESCo, which was

the city's second ESCo (the first being Enviroenergy) was established predominantly in response to: i) a limited competition in the energy market in the East Midlands area and subsequent high levels of fuel poverty; ii) poor representation of existing energy suppliers; iii) a disengaged base of residents; and iv) high number of Nottingham residents on prepayment meters (Interview with P15, Robin Hood Energy). Robin Hood Energy is a notable initiative as it aimed to reduce fuel poverty, both within Nottingham and across the UK, through an ownership model which went against the status quo. At the time of research, the customer base was approximately 180,000 domestic customers and increasing (Interview with P15, Robin Hood Energy).

Prior to its collapse in 2020 and being bought out by Centrica, the ESCo was set up and owned by Nottingham City Council. This is key to the uniqueness of Robin Hood Energy, which was the only council-run ESCo in the UK before its privatisation. Robin Hood Energy as a company can be viewed as an exemplar of the emergence of new kinds of actors in energy provision and services (Johnstone *et al.* 2020). Through this public ownership, the ESCo operated and marketed itself on being not-for-profit and therefore Nottingham City Council did not take a dividend, which allowed for the cost benefits to be passed onto the consumer, whilst also ensuring that general interests take precedence over private interests (Piketty, 2017), a fundamental difference to the neoliberal logics of incumbent energy companies.

Such an emergence of new kinds of actors in energy provision and services is an example of energy 'disruption', which can challenge incumbent ownership and wider regimes, linking to issues of energy democracy and justice (Johnstone *et al.* 2020). For instance, an important feature of the broader energy democracy principle is increasing transparency in ownership (for example being owned by a public body), and therefore the dominant energy agenda is resisted by reclaiming public control over a privatised market and serving the public interest (Burke & Stephens, 2017). However, given the market difficulties and uncertainties adversely affecting smaller energy suppliers, and the collapse of Robin Hood Energy in 2020, it is indeed questionable of how 'disruptive' new actors are in practice. I argue that the privatisation of the ESCo (given its financial debts which amounted to £34.4 million in 2020) reiterates the broader flawed competitive energy market, rather than the company itself.

Furthermore, the institutional organisation of the ESCo was noteworthy and based on social justice principles, by not having shareholders or director bonuses in order to allow the economic benefits to be passed onto the customers (Robin Hood Energy, 2020). These financial savings were also continued through its staffing structure: "We try and keep the staffing structure quite lean and try and attract people who want to be at the company for the ethics and ethos, rather than necessarily the salary being as high as other suppliers" (Interview with P15, Robin Hood Energy). Again, the provision of 200 full time jobs in Nottingham and lack of director bonuses deliberately supported the principles of energy justice, by reclaiming the energy sector in order to redistribute local wealth (Burke & Stephens, 2017), as highlighted in **Table 5.3,** and shape an alternative imaginary in the current energy market (Featherstone *et al.* 2020). This is particularly important as re-municipalisation (or new municipalism) can often not always lead to progressive outcomes, with many turning back to the same top-down management and which ultimately reinforces a set of top-down elitist and exclusionary practices (Cumbers & Paul, 2020; Featherstone *et al.* 2020).

Moreover, by employing individuals who are like-minded, this further suggests that energy justice principles were supported by the City Council by allowing the company to be managed and operated by individuals who supported the ESCo and were likely to operate in the best interest of society. This demonstrates the strong corporate social responsibility of Robin Hood Energy and its engrained social justice and environmental ethos. In addition to this, Robin Hood Energy was overt about its mission to reduce fuel poverty through its marketing. Their marketing was based on strong justice ethics, and Nottingham City Council appears to have utilised the famous tale of Robin Hood - a legendary heroic outlaw who defended and protected the rights of the poor against the wealthy (Valdes Miyares, 2019) to further reinforce this message. Through using a familiar and heroic character, this may potentially have attracted greater attention from Nottingham's residents, particularly because of its local and cultural association with Nottingham, and possibly stimulate behavioural change (though this was undetermined).

District Name	Fuel Poverty by Ward					
	2010	2012	2013	2014	2015	2014-2015 change
Dunkirk and Lenton	24.3	31.3	22	21	30.2	up 9.2
Berridge	23.9	24.7	19.7	16.9	22.6	up 5.7
Wollaton East and LA	24	21.8	17.1	12.1	20.4	up 8.3
Radford & Park	20.7	19.4	16.9	15.5	20.3	up 4.8
Dales	25.5	22.5	18.1	16.5	20	up 3.5
Arboretum	27	28.7	19.5	17.4	19.8	up 2.4
Aspley	27.1	25.7	19.1	16.2	17.7	up 1.5
St Ann's	26	19.2	14.9	13.3	16.1	up 2.8
Sherwood	21.4	19.4	14.8	13.9	15.1	up 1.2
Mapperley	17.4	15.7	12.2	12.4	14.5	up 2.1
Basford	19.9	15	12.7	11	14.3	up 3.3
Leen Valley	19.8	17.8	13.2	9.7	13.5	up 3.8
Bestwood	23	15.2	11.2	10	13.3	up 3.3
Bulwell	20.7	14.9	12	10.6	13	up 2.4
Bulwell Forest	17.9	10.9	10	9.2	12.4	up 3.0
Bridge	20.4	15.3	10.5	9.2	12.3	up 2.1
Clifton South	20.2	12.1	9.5	9.4	12.1	up 2.7
Clifton North	18.7	12	9.7	9.6	11.9	up 2.3
Bilborough	21.6	16	11	9.7	11.7	up 2.0
Wollaton West	15.8	12.5	9.9	8.6	10.7	up 2.1

Nottingham City	2012/13	2013/14	2014/15	2015/16
	18.40%	14.00%	12.60%	15.80%

Table 5.2: Nottingham fuel poverty statistics by ward (Nottingham City Council, internal, unpublished, received 02/06/2019).

Robin Hood Energy was distinctive from other energy companies by having a central aim on the reduction of fuel poverty and therefore promised to keep prices low, with 'clear, simple pricing' (Robin Hood Energy, 2020). This transparency is particularly important in the energy sector which has experienced scrutiny especially in recent years, with record-breaking energy price hikes, despite government price caps and falling wholesale and environmental costs (Syal, 2019). As Robin Hood Energy maintained, "[our] tariffs are consistently cheaper than the Big Six" (Interview with P15, Robin Hood Energy). Furthermore, Robin Hood Energy introduced an 18-month fixed tariff, which was their first 'roll-over' tariff. Through this scheme, the customer was automatically moved onto the cheapest available fixed tariffs, without an exit fee, rather than defaulting to a standard variable tariff (which is historically more expensive). As stated, "That's something we couldn't do until quite recently, and will probably expand to the rest of our fixed tariffs as

well" (Interview with P15, Robin Hood Energy). Again, in a time of austerity, keeping profit margins low and alleviating economic distress for vulnerable groups is essential for a just transition and helps decrease social inequality.

The ESCo also offered a green tariff which provided 100 per cent of electricity from UK wind and solar generators (Robin Hood Energy, 2020). However, this tariff was more expensive and therefore it was likely to be purchased by those on higher incomes and evokes justice considerations. However, since Robin Hood Energy offered other competitive tariffs, there was a choice for consumers, and the energy being utilised in each home is part of the overall energy mix. This provision of clear pricing and a green energy tariff was therefore in-line with the concept of the energy justice framework (**Table 5.3**)**,** which advocates for principles of availability; affordability; due process; transparency and accountability; sustainability, intergenerational and intragenerational equity and responsibility (Sovacool & Dworkin, 2015). Moreover, as of April 2019, Robin Hood Energy won a contract to supply green electricity to Nottingham Express Transit, the council-owned tram network (as discussed in Section 5.4.2), with the company giving the 'most competitive price' and 'has clear green credentials' (Nottingham Post, 2019b). Again, this illustrates firstly, the wider, joined-up sustainable vision for the city; and secondly, the pro-active behaviour of local state actors in pursuing low carbon and equitable transitions through the (albeit temporary) environmental and social benefits of the company.

Principle	*Description*	*Contemporary applications*
Availability	People deserve sufficient energy resources of high quality	Investments in energy supply and energy efficiency; upgrades to infrastructure
Affordability	The provision of energy services should not become a financial burden for consumers, especially the poor	Fuel poverty eradication efforts; low-income assistance for weatherization efficiency improvements; retrofits to older buildings
Due process	Countries should respect due process and human rights in their production and use of energy	Social and environmental impact assessments; free, prior informed consent
Transparency and accountability	All people should have access to high-quality information about energy and the environment; and fair, transparent and accountable forms of energy decision-making	The Extractive Industries Transparency Initiative; independent accountability mechanisms; international accounting standards for energy subsidies
Sustainability	Energy resources should not be depleted too quickly	Natural resource funds designed to save for future generations; system benefit charges
Intragenerational equity	All people have a right to fairly access energy services	The UN's Sustainable Energy for All initiative; Sustainable Development Goal 7
Intergenerational equity	Future generations have a right to enjoy a good life undisturbed by the damage that our energy systems inflict on the world today	Promoting environmentally friendly forms of low-carbon energy such as renewables or efficiency that can minimise externalities or prolong resource efficacy; implementing environmental bonds
Responsibility	All nations have a responsibility to protect the natural environment and reduce energy-related environmental threats	UN Framework Convention on Climate Change; the Green Climate Fund

Table 5.3: Energy justice decision-making framework (Sovacool *et al.* 2016, p.5).

Furthermore, a significant issue with regards to fuel poverty is the discrepancy between tariffs for customers on prepayment meters and those on direct debit schemes. Typically, prepayment meters have several disadvantages as they charge above-average rates for gas and electricity (as shown in **Figure 5.3** and **Figure 5.4**). As a result, one quarter of all households using prepayment meters are fuel poor in comparison to less than one in 10 of those paying by direct debit, and one in 6 of those on standard credit (Climate Just, 2017). A key aim of Robin Hood Energy was to actively reduce the number of customers on pre-payment meters (at the time of writing this was approximately 30 per cent of the customer

base) and onto direct debit which allowed for reduced tariffs and therefore a cheaper method of payment (Interview with P22, Municipia). Through this initiative, Robin Hood Energy engaged closely with the customer and installed a smart meter in 'pay-as-you-go-mode' and monitored the customers top up activity. Customers that top up regularly and stay out of emergency credit suggests that they do not need to be on a pre-payment meter, as stated: "[After monitoring] At Robin Hood Energy we write to them [the customers] and offer them the opportunity to move onto a direct debit tariff. Through this, the customers are able to go on a lower tariff and save money" (Interview with P15, Robin Hood Energy). Therefore, as per the concept of energy justice, Robin Hood Energy was actively promoting an inclusive transition in the city by increasing the affordability of energy to consumers.

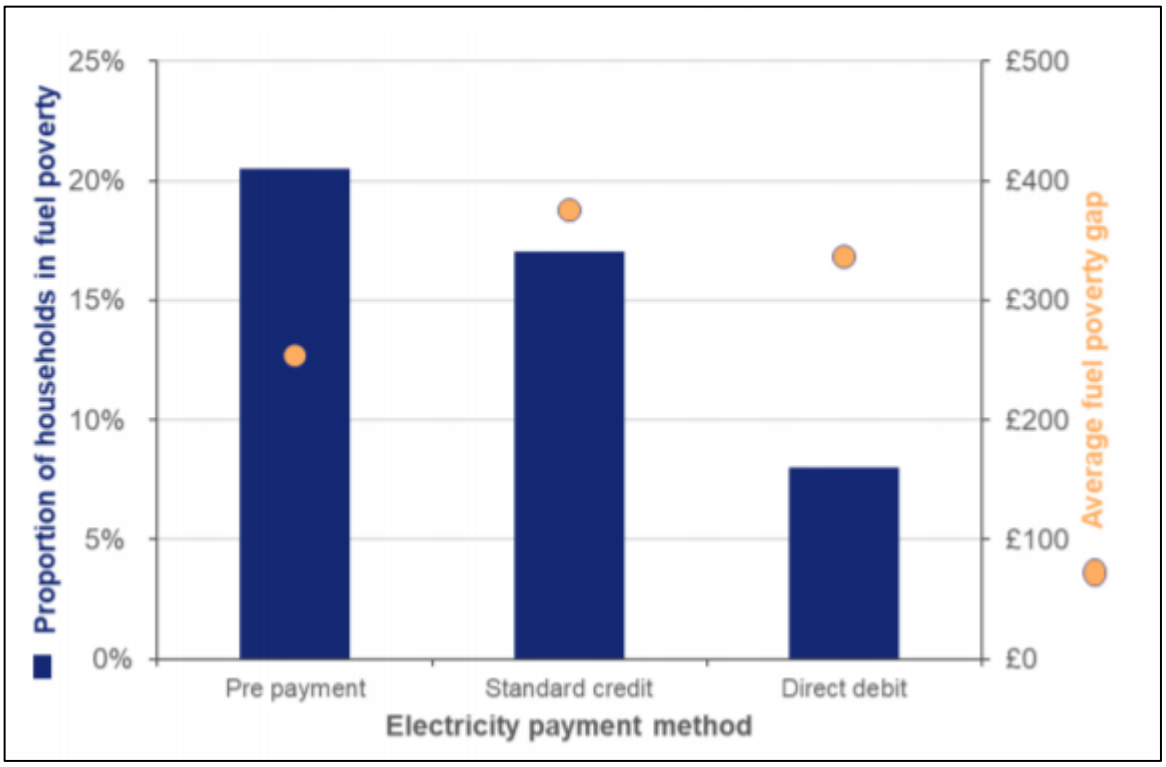

Figure 5.3: Proportion of households in fuel poverty and electricity payment method against average fuel poverty gap (BEIS, 2020, p.42).

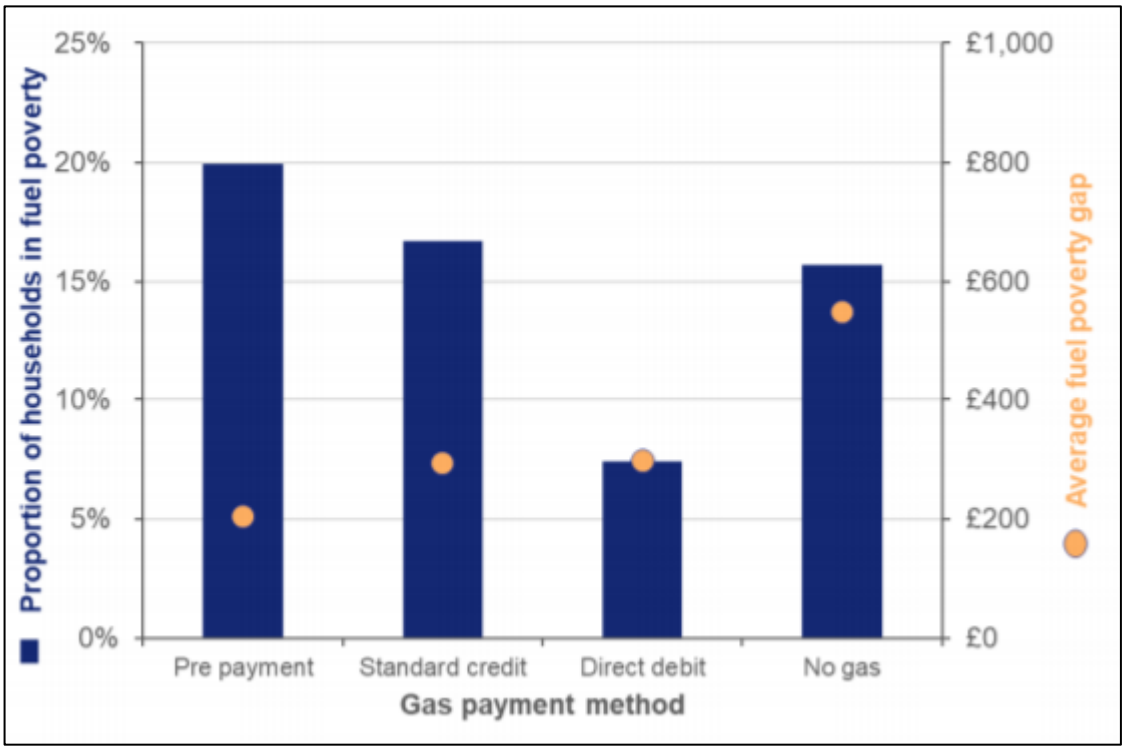

Figure 5.4: Proportion of households in fuel poverty and gas payment method against average fuel poverty gap (BEIS, 2020, p.44).

Another key scheme for targeting fuel poverty was that Robin Hood Energy voluntarily offered the Warm Home Discount Scheme (Interview with P15, Robin Hood Energy). This is noteworthy as even though it is a nation-wide strategy and set up by the UK Government to tackle fuel poverty, this is only mandatory for suppliers with 250,000 or more domestic customers (Ofgem, 2020). As noted, Robin Hood Energy's client base at the time of writing before privatisation was approximately 180,000 domestic customers across the UK, and therefore they were not statutory obligated by the UK Government to provide the Warm Home Discount Scheme. The company set themselves apart from other energy companies by offering this at a beneficial time of year "When it is needed the most" (Interview with P15, Robin Hood Energy) i.e. in October or November, rather than March:

> "This is what the Big Six suppliers do, they leave it as late as they are allowed. We are going to do it before it gets really cold so [the customers] can put it straight onto the prepayment meter or get it credited to their account" (Interview with P15, Robin Hood Energy).

This is a striking initiative in terms of fuel poverty alleviation and speaks to the different logics of energy provision in terms of profit-seeking motives and social equity dimensions,

such as customer well-being. Therefore, the provision of this to customers across the UK demonstrates the wider spatial effects of municipal energy in tackling social inequalities.

Furthermore, Robin Hood Energy stated a clear aim to reduce fuel poverty within the city itself, through the provision of a discounted tariff for Nottingham residents specifically. Whilst there is no information on the total numbers of Nottingham-based customers, this customer base significantly increased, with Nottingham tariff customers doubling in the last 12 weeks of 2018. As commented by one respondent, this shows that "people in our heartland are backing us as a business which is vitally important" (Interview with P15, Robin Hood Energy). This reiterates findings by Devine-Wright (2011) and Devine-Wright and Batel (2017) of citizen identity, place attachment and social acceptance of low carbon transitions, and that local residents with strong place attachments are likely to give support if proposals or projects maintain or promote place distinctiveness and historical continuity. Additionally, Robin Hood Energy stated the protection of 2,500 Nottingham-based prepayment tariff customers from a 5.6 per cent price increase. This demonstrates the strategic endeavour of a municipal energy company in alleviating fuel poverty, particularly at the urban level (Interview with P15, Robin Hood Energy; Interview with P18, Nottingham City Homes).

An additional key measure to help reduce fuel poverty implemented by Robin Hood Energy was through switching void properties (i.e. properties which are empty or in between occupied tenancy) to a Robin Hood Energy tariff. Through being contracted by Nottingham City Homes (an arms-length management organisation which manages Nottingham City Council's 27,000 social houses), this produced far-reaching economic savings for the company:

> "We are putting the properties on a tariff that might be £200 a year cheaper than British Gas tariffs or SSE [Scottish & Southern Electric] tariffs. When the tenants move in, they don't engage with the energy supplier and they don't switch around. At least [now] they are on a competitive tariff, so it's a big accumulated benefit there… They were switching to British Gas previously, the [cost] difference in our tariff versus British Gas that we generate their new tenants over a 4-year period is a £2.1 million saving, which is money which stays into their pockets and the local economy" (Interview with P15, Robin Hood Energy).

The securing of green electricity supply from Robin Hood Energy to Nottingham Express Transit as aforementioned is indicative also of the low carbon vision of the city and the joined-up strategy helping its continuity. Moreover, the close connection of Robin Hood

Energy and Nottingham City Homes is undoubtedly favourable by encouraging a long-standing customer base, which further facilitated the on-going operation of the ESCo and coordination for pursuing an integrated strategy across the city, as outlined next.

ENERGY EFFICIENCY BY NOTTINGHAM CITY HOMES

Domestic housing accounts for 14 per cent of the UK's carbon emissions, mostly from heating and hot water. However, policy attempts to encourage a decrease of emissions (such as the Green Deal Scheme in 2013) have failed (CCC, 2019c; Syal, 2019). As illustrated in Chapter 4, policies to support low carbon measures in domestic housing have been weakened or withdrawn. Though, the ownership of housing structures is found to also have an impact on low carbon domestic housing transitions. For example, the progress in energy efficient insulation of privately-owned houses has been incremental and patchy, and can therefore alter the practical implementation of energy efficiency programmes (Webb, 2015).

As shown in **Table 5.4**, there is a variation across the UK but by and large, most local authorities in England transferred ownership of their social housing largely from the introduction of the Right to Buy policy (sales to tenants) under the Housing Act 1980 and Large Scale Voluntary Transfers (transfers from local authorities to housing associations), that were developed in the late 1970s (Murie, 2016). This was part of a broader shift towards privatisation, deregulation and cuts to public expenditure under Thatcher's Conservative government. However, Nottingham City Council retained its social housing, which has proved advantageous when implementing energy efficiency programmes in practice, as discussed next.

Location	*Date of transfer*	*No. of homes*	*Tenant electorate % voting 'yes'*	*Turnout %*
Glasgow	March 2003	80,556	37	64
Sunderland	March 2001	38,356	64	73
Bradford	February 2003	24,764	41	66
Walsall	March 2003	22,971	50	71
Coventry	September 2000	20,125	32	58
Knowsley	July 2002	17,090	44	59
Tameside	March 2000	16,959	43	69
St. Helens	July 2002	14,632	59	70
Telford	March 1999	13,081	58	74
Calderdate	March 2001	12,759	42	62
Bromley	April 1992	12,393	42	76

Table 5.4: The biggest transfers in social housing in the UK up to March 2004 (Ginsburg, 2005, p.120).

At present, Nottingham City Council has one of the largest proportions of publicly owned housing in the UK, which resonates with the broader context in terms of public ownership of energy and transport. Nottingham City Homes is the arms-length management organisation (ALMO) which is owned by the City Council and manages 27,000 of the city's social houses. This is significantly high in Nottingham, with social housing rented from the council constituting 20.8 per cent, in comparison to the average in England which is 9.4 per cent (ONS, 2011). Whilst the term 'energy justice' was not used explicitly, it is clear that Nottingham City Council are trying to pursue energy justice elements through affordable warmth strategies and low carbon, efficient homes. To reiterate, the democratic control of the housing allows a more just transition through serving in the interests of the public and not a private, profit-driven motive.

Nottingham City Council in conjunction with Nottingham City Homes have been conducting thermal upgrade retrofits of 1,240 social houses with a value over £7 million. This is part of a wider scheme called 'Greener Housing Nottingham', which has delivered external wall insulation to 7,000 homes and solar panels to over 5,000 homes (Preston *et al.* 2020). This scheme also involves connecting 94 new households[27] to the city's energy-from-waste, low

[27] Despite this progress, the number of new households involved in this scheme is discernibly low which raises concerns about the uneven impact of this scheme. This number is likely to be due to financial constraints however could not be confirmed.

carbon district heating network, allowing the residents to have more energy efficient homes which are cheaper to run. Furthermore, another example of an affordable warmth and low carbon housing strategy is through 'REMOURBAN', a European wide smart city project using £5 million from the EU[28] (**Figure 5.5**). This project has identified Sneiton in Nottingham as one of three demonstrators to pilot energy efficiency in cities. The project is a collaboration between Nottingham City Homes, Melius Homes and Energiesprong, and involves the UK's first Energiesprong retrofit model on 10 homes as part of a wider scheme to retrofit 200 homes (Observational notes). This involves innovative insulation techniques, solar panels on roofs, battery storage and ground source heat pumps, which have been proven to radically improved the homes warmth and fuel running costs over a 30-year period (CCC, 2019a; Remourban, 2020).

Figure 5.5: Nottingham City Homes – 2050 'Energiesprong' homes (Committee on Climate Change, 2019, p.43).

Additionally, Nottingham City Homes has employed a full-time fuel poverty officer in-house since 2009 (notably outlasting austerity and budget cuts). This position involves home visits, supporting tenants with fuel debt, switch and save, energy saving advice and training

[28] At the time of writing, the UK was in the process of leaving the EU following a UK membership referendum in 2016. Therefore, the provision of funding and collaboration on future low carbon projects is ambiguous and is likely to present an additional barrier for low carbon urban transitions, and for implementing climate policies more generally.

frontline staff. Having a dedicated fuel poverty officer is considered to be beneficial to both Nottingham City Homes and tenants alike, with home visits conducted with 126 tenants and over £8,000 of fuel debt wiped off in 2018, and saving tenants on average £197 through the 'Switch and Save' service (Interview with P19, Nottingham City Homes). Furthermore, this position is important particularly by signposting vulnerable groups to other services, such as Nottingham Energy Partnership, food banks, and advice centres such as St Ann's Centre. Again, this promotes the agency and capacity to implement change. As explained by one anonymous individual:

> "Most people don't understand what fuel poverty genuinely looks like on a day-to-day basis. Some people go to food banks, but they don't take home food that they need to heat up because they can't afford the electricity, or don't have the equipment [microwave, oven]. It genuinely is a case of choosing whether to heat or eat […] I know that some organisations work [collectively] to help individuals get second-hand or free equipment to heat food, but still, that level of poverty is harrowing" [National Energy Action Fuel Poverty Conference, 2019].

As such, this evidence demonstrates that as well as addressing fuel poverty in the Nottingham City Homes Corporate Plan, Nottingham City Homes is committing time and resources to address fuel poverty, which can be considered uncommon for an ALMO: "I've not met another officer yet whose role is just like mine, they usually have an energy saving or an environmental remit, rather than specifically fuel poverty and energy saving" (Interview with P25, Nottingham City Homes). Furthermore, this close connection and support of tenants can facilitate effective personal relationships with energy consumers, break down barriers (such as mistrust), and promote changes to more sustainable behaviours (as outlined in Chapter 6).

It is acknowledged that energy efficiency not only includes the social housing sector, but also includes the private domestic sector and commercial sector as well. Owner-occupied and privately-rented houses are a growing sector and as highlighted by **Figure 5.6** constitute a higher proportion of fuel-poor households, therefore tackling these households is important for urban areas. Whilst the Energiesprong and Greener Housing schemes have highlighted that Nottingham City Council has begun to address energy efficiency in the social housing sector, their ability to address this is restricted to that of council-owned assets, for example their own council estate and social housing. Almost one third of Nottingham's homes are privately-rented, many of which are Victorian builds, solid walls, and as previously acknowledged private-rented houses are three times more likely to be in fuel poverty (Ebico

Trust, 2019). The poor standard and energy efficiency of private-rented housing is highlighted by St Ann's Advice Centre as a particular issue of Nottingham residents:

> "I think the [Nottingham] City Homes and the social housing tends to be fairly well maintained and the tenants are well supported. I think the problem we've got, and it's an increasing problem, is the private-rented accommodation and it's a poor standard" (Interview with P14, St Ann's Advice Centre).

This therefore reaffirms firstly, the importance of municipal ownership for allowing the appropriate governing capacity for low carbon and equitable transitions for low carbon energy governance (Cumbers, 2012). Secondly, it reiterates the need for appropriate policy support for implementing low carbon housing. Thirdly, this highlights the barriers and complexities when working with other sectors, such as the private sector (as discussed in Chapter 6, Section 6.2.2), and the challenges faced when certain climate change policies are not mandated or legislated, for example, energy efficiency in housing.

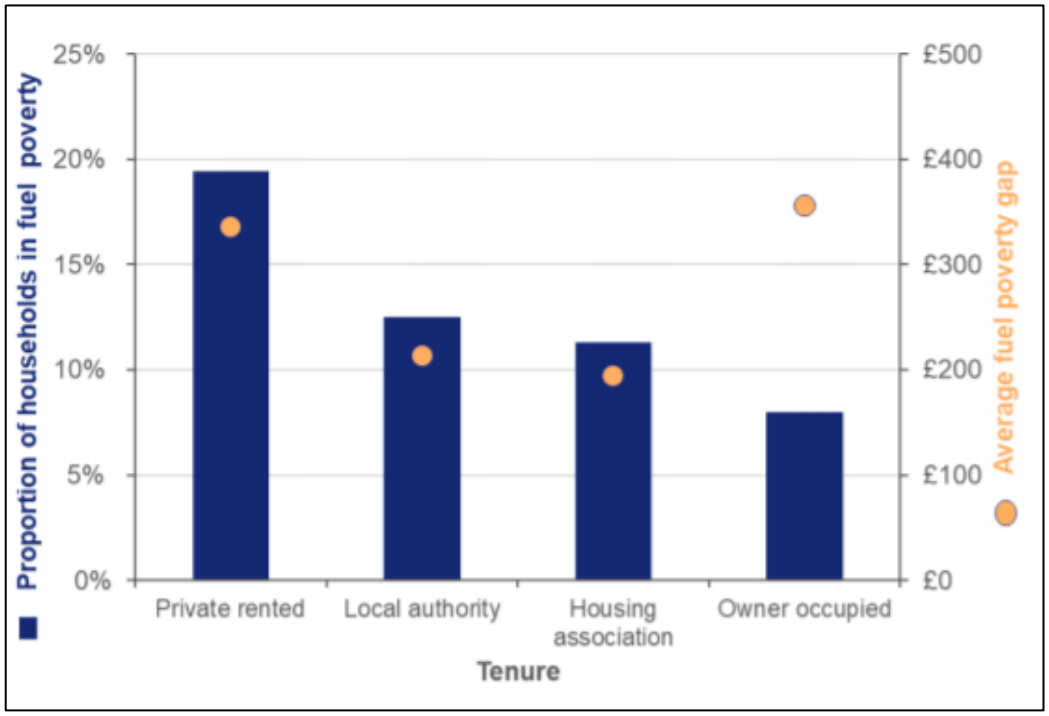

Figure 5.6: Proportion of households in fuel poverty by tenure type (BEIS, 2020, p.31).

5.4.2. Provision of Low Carbon and Equitable Transport

Focusing now on the transport sector, the operation and structure of the bus and wider transport network is a key factor in low carbon and equitable urban transitions, since transport accounts for the largest emitting sector of UK greenhouse gas emissions of 27 per cent in 2018 (BEIS, 2018). Not only does this have a detrimental impact on the environment, but exposure to poor air and noise quality can cause adverse health implications including premature death, long-term health problems and hospital admissions (Kingham *et al.* 2007). Transport must therefore contribute fully to achieving greenhouse gas reduction targets. However, energy use and emissions reduction within the transport sector is proving to be difficult to achieve due to: i) the high dependency fuelled by carbon-based travel and the subsequent lock-in this has created; ii) the lack of political will; iii) public support; and iv) (perceived) high restructuring costs (Banister, 2011; Gossling, 2016). Banister (2011) highlights that at the city level, some local governments have sought to engage in the reduction of carbon emissions in the transport sector, such as demand management (pricing, parking and access control, congestion charging, car free city centres); investing in public transport; priority for walking and cycling; and the concentration of urban development around accessible public transport. However, there is considerable variation between cities and these initiatives are generally in their infancy.

Before 1985, the bus industry in the UK was dominated by public sector companies and subsidiaries of the state-owned National Bus Company in England and Wales, and the Scottish Bus Group subsidiaries in Scotland (Butcher, 2010). Yet, under neoliberalism and the new terms of the 1985 Transport Act, local authorities were encouraged to privatise their municipal bus companies in order to boost a deregulated and competitive market in public transport (Helm, 2009). The Conservative Government argued that this would improve the passenger experience by making buses and trains more efficient.

Similar to the energy sector, despite a deregulated system, today's bus network across the UK is criticised as being dominated by the 'Big Five'[29] operators which run monopolies in many areas and as such, deregulation has not necessarily encouraged healthy competition in the bus market. To illustrate, as of 2010 the Big Five controlled 70 per cent of the market, with an estimated 24 per cent being owned by foreign multi-nationals, and this figure is

[29] The 'Big Five' bus and/or coach private operators include: Stagecoach, First Group, Go-Ahead, Arriva and National Express.

expected to have increased. At present, there are eleven locally-owned bus companies across the UK (the largest being Lothian Buses in Edinburgh), and in 2017, the Bus Service Users Bill passed a clause which bans local councils from creating their own public bus companies (We Own It, 2019). This is despite the core principles of the Bill to tackle poor air quality and introduce new franchising powers with decisions at a local level (DfT, 2016). Again, not only does this demonstrate the uneven ownership in the transport sector, it highlights the contradicting rhetoric of localism of the current national government and the enduring legacy of privatisation on present-day transport systems.

LOW CARBON BUS NETWORK

Unlike most UK cities, Nottingham City Council retained ownership of its bus network by establishing the ALMO Nottingham City Transport in 1986 and retained 100 per cent equity of the company until 2000, after which Transdev PLC acquired an effective 18 per cent stake in the corporation (NCT, 2020; Transdev, 2019). Nottingham City Transport (NCT) is the largest commercial operator in Nottingham, with the private company Trent Barton being second to this. In terms of the transport network, the city has a very extensive and well-used bus network, with Nottingham notably ranking in the top three in the UK for bus usage (London being first and Brighton and Hove second). This is particularly important in a context of declining public transport usage across the UK (**Figure 5.7**), whereas in Nottingham, bus usage has remained relatively static (with decline only being due to the introduction of a second tram line) (Interview with P7, Nottingham City Council). Nottingham has a particularly low level of car ownership with 43.7 per cent of inhabitants having no car or vans in households in comparison to 25.8 per cent in England in 2011. Whilst the low level of car ownership can be indicative of low-income levels and subsequent high levels of social inequality in the city (Power, 2012), it might complement the high bus usage numbers and the good mobility across the city may reinforce the use of public transport over private car ownership. Despite this high public transport use, like many UK cities Nottingham still measures very high for air pollution, exceeding EU recommended safe levels with a reading of 12 for PM2.5 and 21 for PM10[30] (WHO, 2016), therefore the high use of bus transport is an encouraging development for the city.

[30] Both PM2.5 and PM10 refer to particulate matter as a result of human made air pollution from the combustion of solid and liquid fuels such as for power generation, domestic heating and vehicles.

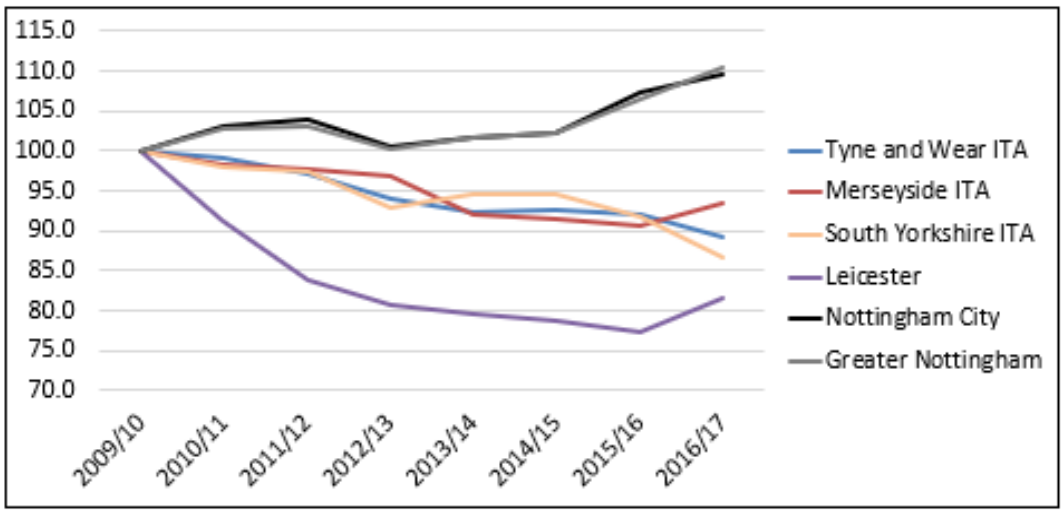

Figure 5.7: Public transport usage in Greater Nottingham and comparator city areas (baseline 2009/10=100) (Received from Nottingham City Council, 06/06/2018).

Today, NCT acts on both a commercial and non-commercial basis. With regards to the commercial bus operation, the municipal majority stake in the bus company is particularly beneficial for the transport system as profits can be reinvested into public transport services, with Nottingham City Council receiving a dividend from NCT of approximately £2 million per annum. The reinvestment of profits goes towards the non-commercial services, which is run by the contracted company CT4N, which uses electric buses and bio-methane buses owned by Nottingham City Council. The non-commercial services are predominantly the Linkbus network, which are networks which are deemed socially necessary, i.e. free services to support mass suburban areas, employment sites, hospital sites and to help the interchange between commercial bus services through Park and Ride services (Interview with P7, Nottingham City Council). Such services are not commercially viable since they are not high frequency and therefore do not have a high peak vehicle requirement, however, they are particularly important for mobility justice by increasing accessibility to residents to maintain leisure, retail, and health services.

Not only is municipal ownership of assets important for reinvesting profits, generating a sustainable income and for providing good accessibility throughout the city, it also raises the profile and status of Nottingham City Council, placing the City Council as a key actor in the city and encourages a greater interest in the functioning and operation of sustainable transport in local government:

> "I think it helps that we own our own bus company as well as there has always been that investment in public transport in the infrastructure, whether that's things like bus priority or the real-time system at bus stops which we have a really big system in comparison to most cities […] You have to look at things in and around 360-degree package of measures that make public transport use attractive to people in the city" (Interview with P7, Nottingham City Council).

It can also be argued that a greater interest in bus operation has encouraged a greater quality of service, and consequently NCT is a multiple award-winning bus company, ranking 94 per cent in 2017 for passenger satisfaction, one of the highest in the country (NCT, 2020). As such, this can have a virtuous cycle on social behaviour and can further stimulate perceived opinion of public transport and encourage public use of sustainable transport (Burian *et al.* 2018). This is beneficial for addressing social resistance to low carbon transitions which was raised as a significant barrier by local level urban actors (as discussed in Chapter 6, Section 6.2.3).

Such an interest and subsequent development in the city's transport is also particularly attractive with regard to funding applications. There has been a big emphasis on sustainability in the bus network in the city within recent years, with the electric bus fleet and infrastructure receiving an investment of approximately £15.1 million since 2012 (Interview with P7, Nottingham City Council). This has enabled the city to finance 58 electric buses on 18 bus routes, one of the UK's and Europe's largest electric bus fleet. Municipal ownership of assets can encourage the local authority to contribute match-funding and invest in their own assets and programme, which can signal a stronger commitment and an incentive to deliver on time and within budget (Vaughan *et al.* 2013). As such, being successful with funding from both UK (e.g. Department for Transport) and wider EU bodies can have a positive knock-on effect, insomuch that the city becomes accountable for carrying out successful projects that they commit to, which allows them to make a stronger case and receive more funding (Interview with P7, Nottingham City Council). Such financial support has been crucial in facilitating the city's drive towards low carbon transitions, and it is evident that municipal ownership of assets when planning projects can embed the city in strong environmental and social justice commitments:

> "If that grant funding hadn't been available to purchase the infrastructure and buses, and if we didn't have the Workplace Parking Levy money available to contribute to the cost of those buses, we probably wouldn't have got into it as much as we did and as much as we want." (Interview with P7, Nottingham City Council).

Again, the governance of low carbon equitable transitions at the urban level is predicated on local authorities having sufficient funding available, which as discussed in Chapters 4 and 6 has been subject to reductions particularly since 2010.

From switching Nottingham City Council's fleet to electric and bio-methane buses over a period of 6 years, it is estimated that this has reduced carbon emissions of at least 1050 tonnes (Nottingham City Council, 2016b). Furthermore, according to Nottingham City Council there are improvements to local air quality, with NOx savings of 15 tonnes and PM10 reductions of at least 83kg, in comparison with equivalent Euro 5 diesel buses (Nottingham City Council, 2016b). Although there are no noise comparisons available from switching to electric buses and therefore the benefit of this is not quantifiable.

The introduction of sustainable buses was not from an environmental motive, but from an economic one, and the Council has been very clear about this. Similar to motives behind the introduction of the WPL, this is due to the significant cost savings that are associated with switching from diesel to electric buses. For example, the fuel cost savings of an electric bus in comparison to diesel are approximately 85 per cent (including the 6p per km Department for Transport Low Carbon Emission Bus Incentive Grant). Furthermore, approximately 40 per cent of costs are saved due to lower maintenance costs and no liability for Vehicle Excise Duty for electric buses. As a result, the replacement of electric buses has allowed the Council to save approximately £300,000 per annum, which is a significant cost saving in the context of budget pressures which have resulted in a reduction of £4 million per annum over the past three years (Nottingham City Council, 2016b). Therefore, through the ownership of the bus network, the Council has been able to achieve two key objectives, which are, first, cost-savings; and second, a more sustainable bus fleet, which would be difficult under a deregulated transport sector, as it restricts the ability to mandate bus fleets in the city*:*

> "The only other major bus operator in Nottingham is Trent Barton and they haven't necessarily changed their buses like the way we have done with Nottingham City Transport buses because we aren't funding it because they're a private company. And this is where an issue comes in, where private companies have to get their own money and they have to be fiscally responsible, whereas we have more funding available to us and the fiscal responsibility is to the buses to keep the prices low, to reinvest and make the buses worth using in Nottingham" (Interview with P35, Nottingham City Council).

This quote suitably reaffirms the different priorities and logic of council ownership versus that of private ownership. As such, municipal ownership is essential for securing

responsibility, which in turn positively affects Nottingham City Council's political capacity to drive sustainable transport forward.

Not only has ownership of the bus network been successful, but ownership of land has been equally important to Nottingham City Council in order to implement a low carbon transition in the transport sector, as stated:

> "I think we were quite lucky that we had land available to install the infrastructure. I think if we had not had land available at our park and ride site, that would have been quite a significant issue for us as a local authority as we would have had to go out and purchase land and that would have added to cost and all the issues around planning" (Interview with P7, Nottingham City Council).

Not only has land ownership resulted in a simpler planning application (since Nottingham City Council is responsible for planning), this has in turn allowed costs to be kept down, further benefitting the Council politically and financially.

As highlighted by Matioli *et al.* (2017), inequalities related to transport are linked to the affordability of transport costs, which is dependent on income, prices and energy efficiency. In terms of equality in Nottingham's low carbon transition, mobility/transport justice/transport poverty were not terms used explicitly by interviewees. However, it is evident that Nottingham City Council are conscious of justice dimensions in their low carbon transport strategy, as highlighted in Chapter 4. By plugging the gap between commercial services, Nottingham is able to serve the majority of its residents through its extensive bus network and therefore accessibility is high in the city, with a high proportion of residents (95 per cent) living within 400m of a 30-minute peak service to the City Centre, which is beneficial in terms of mobility justice (as shown in **Figure 5.8**).

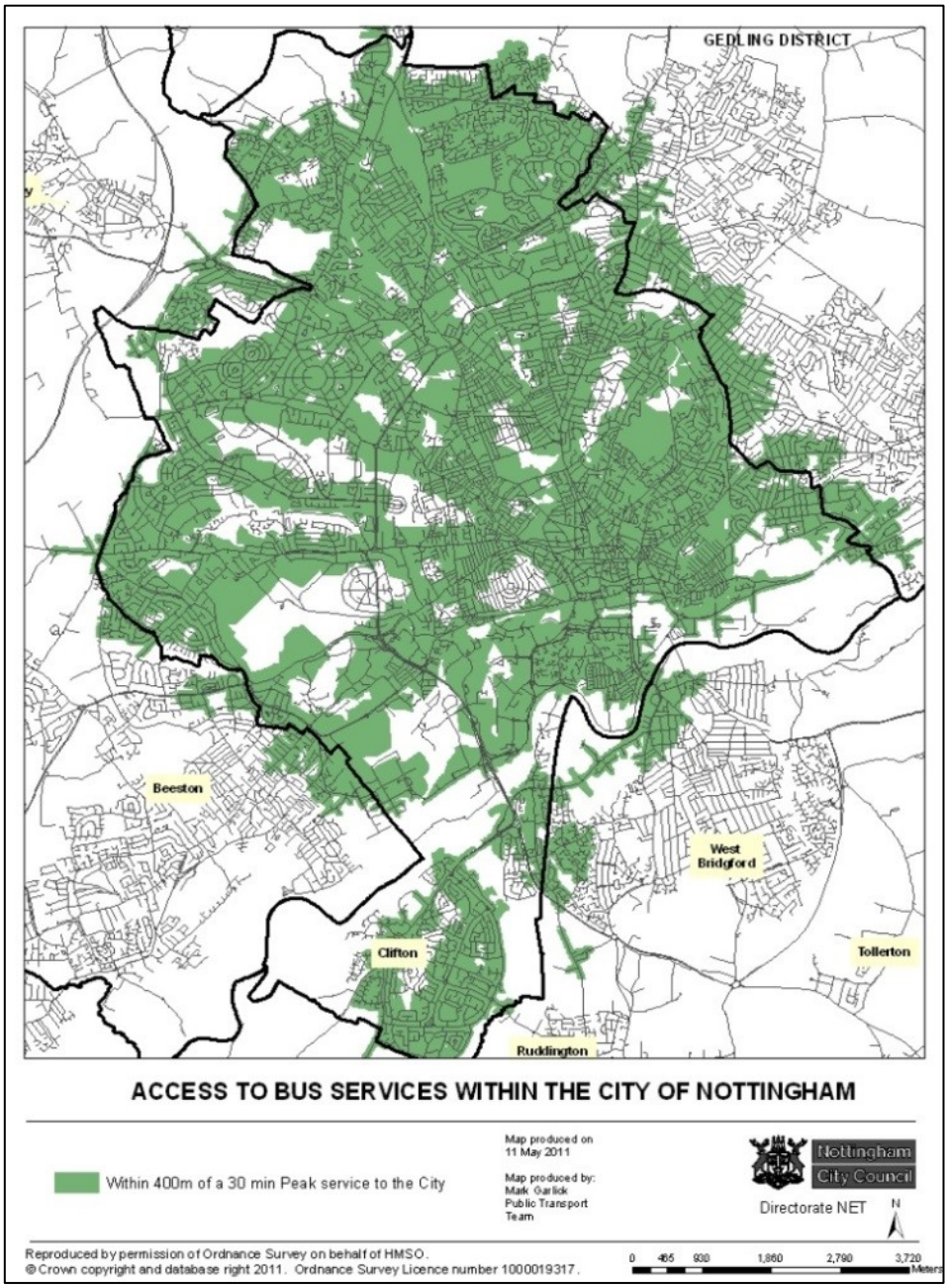

Figure 5.8: Accessibility to bus services in the city of Nottingham (Nottingham City Council, 2016a).

Furthermore, with regard to transport justice, the majority of NCT buses have next stop announcements and audio and visual aids in place, which is very important to the Council in terms of accessibility for all: "Providing that [audio and visual aids] is the norm in Nottingham, but it's not in a lot of places" (Interview with P7, Nottingham City Council; observational notes). Furthermore, as highlighted by one interviewee at Nottingham City Council, the fares of the tram are comparable with buses and are quite low in comparison to other UK cities (Interview with P6, Nottingham City Council). As such, this demonstrates

that NCT has taken care to ensure that transport in the city is accessible for all users and vital services are maintained. As previously noted, part of the low carbon bus network has been funded by the WPL, indicating the benefits of a wider integrated transport strategy for the city, as discussed next.

WORKPLACE PARKING LEVY AND ELECTRIC TRAM

An initiative which has attracted political attention is the Workplace Parking Levy (WPL) in Nottingham. To date, it is the first of its kind in the UK and Europe (Dale, 2017) and therefore can be considered as an 'urban infrastructure regime and experiment' (Bulkeley *et al.* 2012; Hodson *et al.* 2017). This scheme was introduced by Nottingham City Council in April 2012 and builds on the Transport Act 2000, a policy instrument introduced in England and Wales to permit the creation of congestion charges. As such, it places a charge on employers who provide more than 11 parking spaces by implementing a Levy of approximately £402 per annum per additional car park space.

The motivations behind this initiative were premised on firstly, a commitment to tackle congestion traffic problems in the city, which accounted for approximately £160 million per year during the AM peak period of which 70 per cent of the traffic was commuters (Hallam & Gibbons, 2017); and secondly, as part of a commitment to encourage economic growth in the city. Santos *et al.* (2020) importantly underline that the creation of the WPL in Nottingham has to some extent closed a political 'loophole', since local authorities do not have authority with regard to private non-residential parking spaces. This has therefore allowed local government actors in Nottingham to pursue an active agency for a low carbon initiative.

However, it is worth noting here that this scheme caused much contestation and was perceived by businesses, politicians and civil society alike to be unnecessary business taxation and would discourage business investment, stunt economic growth and have minimal impact on traffic congestion (Dale, 2017). As previously asserted, Nottingham remains the only UK council to date with such a scheme, with the idea being rejected by councillors in cities such as Greater Manchester, Cambridge and Edinburgh (Edwards, 2019; Santos *et al.* 2020). Most recently, Birmingham City Council has proposed to introduce a similar WPL for 2024 alongside its Clean Air Zone, however this has already been met with resistance and the outcome of which remains to be seen (BBC, 2019). At the time of writing,

London and Durham are therefore the only two UK cities that have implemented other forms of congestion charging (Santos *et al*. 2020). This clearly reaffirms the political and conflicting nature of environmental schemes, particularly which involve taxation and other economic interventions against dominant technologies, such as private, fossil fuel-based car transport.

Perhaps most importantly, this scheme was implemented specifically to raise hypothecated funds (on average £12 million per year over a 23-year lifetime) for public transport improvements, specifically the city's tram extension development NET Phase 2, which cost £570 million and was completed in August 2015. This doubled the size of the city's existing tram network (Line One) which was built in 2004 by allowing the addition of two new tramlines from the City Centre to Toton and Clifton, linking the existing tramlines to Phoenix Park and Hucknall (Dale, 2017), as shown in **Figure 5.9**. Nottingham is one of 9 light-rail systems in the UK, having the fifth largest track length of 32km and 16 million passengers in 2016/2017 (Urban Transport Group, 2018).

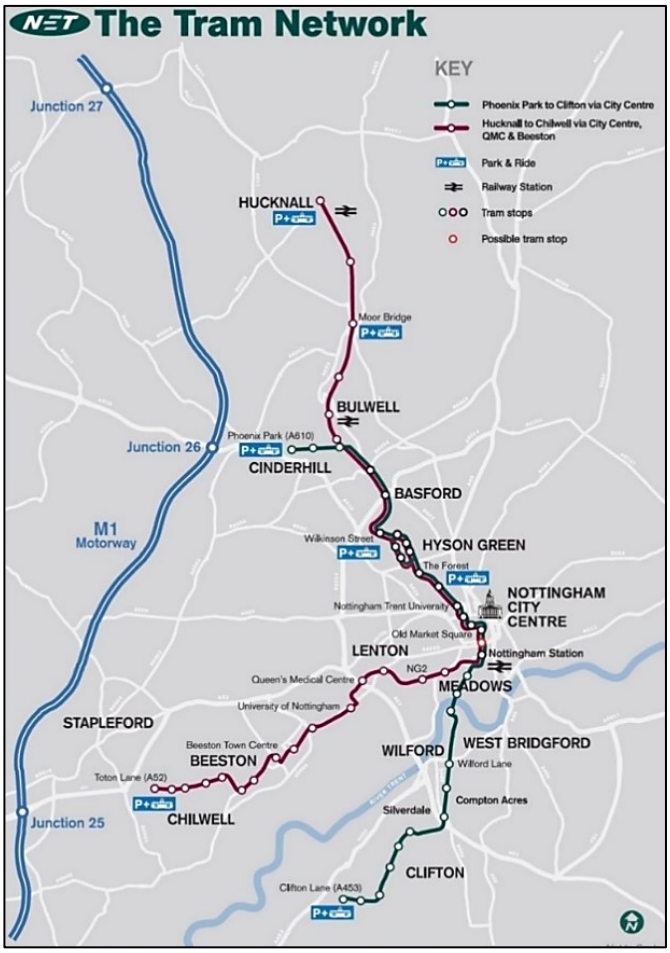

Figure 5.9: Extension of tramline in Nottingham (Nottingham City Council, 2016a).

Not only has this scheme provided a secure income to pay off the public loans for the tram extension, the income generated from the scheme has been ring-fenced to fund other public transport aside from the tram, including a £50 million redevelopment of Nottingham Railway station of which £12 million was raised through the WPL from Nottingham City Council and £29.5 million from Network Rail (Catlow, 2018). This is in addition to funding Nottingham's Linkbus electric bus fleet, which as noted fills in the gaps in the commercial network service by providing routes to key employment sites, hospitals, and Park and Ride services.

Furthermore, the WPL's generated revenue has been used as seed, grant or match funding, and it is estimated this has brought in an additional £200 million since 2012, or put another way, for every £1 raised by the Levy, this has helped to lever at least £3 of external funding (Interview with P32, Nottingham City Council). An example of this is shown in **Table 5.5**.

Funded schemes	***WPL local contribution (£M)***	***External funds (£M)***
Tram extension	199	371
Train stations	12	48
Electric buses	5.8	9.2
Bus stations	1.7	1.3
Smartcard system	1.1	1.0
Real time info system	1.2	1.0
TOTAL	**220.8**	**431.5**

Table 5.5: Match funding of Workplace Parking Levy (Hallam & Gibbons, 2017).

This scheme has therefore successfully converged low carbon transitions and transport ownership for sustainable income streams, which are fundamental for overcoming barriers such as economic austerity and continuing political uncertainty towards climate change policy in the UK (as highlighted in Chapter 4 and Chapter 6).

There are multiple important benefits because of the WPL. Although the WPL has not reduced congestion *per se*, it has indeed halted the rate of congestion, which was predicted to go up significantly had the Levy not been introduced. Hence, this is seen as a major success in the city since congestion has risen in most other cities in the UK.

Moreover, the WPL has encouraged behavioural change and modal shift, whether this has been an increase in public transport use (for example the tram receives nearly 18 million users of trips per year), active travel by bicycle or walking, and/or car sharing, and as such has been an important public engagement for the city council:

> "On a really basic level, a lot of people don't know how to get on a bus because they are embarrassed, they haven't done it before they don't know how to pay, they don't know where they're going to go. They're somehow afraid they'll miss their stop and be carried on for miles and miles which isn't the case. So, we're providing this basic level of support and information to people" (Interview with P4, Nottingham City Council).

In addition, to date there has been no employer which has received a sanction for non-compliance. This demonstrates an element of behavioural change and social acceptability of the scheme across the city since the implementation of Levy and the effect it has changed opinion over time. It also is a good example to reaffirm that penalties for non-compliance have been avoided, which strengthens arguments from the council for the scheme to benefit and not simply 'punish' businesses, which is an on-going critique of parking levies made commonly by the business community (e.g. in the cases of proposals in Birmingham and Glasgow). As stated in the Nottingham example:

> "When the levy was first introduced, there were a lot of companies who were very anti [the Levy] and some of them still are, sometimes that's on personal levels or a political level. No business likes having to pay any kind of tax which is what we have here, but most of them have just taken it as a cost of business - in fact some, if not most, have forgotten about it over the years, they are still paying it, but it's just one more thing, it's the business rates" (Interview with P32, Nottingham City Council, 2018).

Again, this benefits the urban area more generally by stimulating behavioural change and social acceptability of the scheme which was identified as a significant barrier for sustainable transitions by local level urban actors (Dale, 2017; Santos *et al.* 2020).

Additionally, Nottingham City Council has proactively provided business support to approximately 300 companies to encourage modal shifts in transport use. This business engagement has been through running one-to-one workshops, hosting on-site events to share sustainable travel advice and information to staff, providing travel planning support, and personal journal planning (Interview with P4, Nottingham City Council). In conjunction, the Council has provided financial support by launching a small grants scheme (up to £10,000)

in 2012/2013 to encourage the uptake of sustainable transport methods (such as bicycle shelters or showers) or put car park management schemes in place.

Furthermore, the City Council has been working with local service providers, such as the local sustainable transport charity Ridewise, to offer cycle training which positively impacts the economic development of local businesses. As stated, even though there was a stipulation in the Act when the WPL was created to provide this service, advice is not restricted to those on the WPL:

> "If someone wants to know about cycle routes or wants to know what the local buses are or wants to encourage that sort of thing and they've got less than 10 people, so fall off the radar for the Levy, then I'll still generally go talk to them and help them out if I can. They aren't eligible for the grants that we provide for cycle shelters but I will go and talk to them (Interview with P4, Nottingham City Council, 2018).

Clearly, this type of support from the local government and other third party actors has been particularly important in the implementation and operation of the WPL:

> "Quite often it's the only positive engagement people have with the council, because otherwise it's a body that you pay tax to which is how much people see councils. But if they actually have some kind of engagement with somebody who you can provide some kind of positive outcome for them, then that's a really valuable thing" (Interview with P4, Nottingham City Council, 2018).

Above all, such practical support is important for enabling low carbon transitions since it can build up trust and help with the social acceptance of the WPL across employers which can in turn improve the reputation of the council and success of decarbonisation strategies (Pfluger *et al.* 2017). Moreover, this can also benefit the city council's relationship with local private and third sector actors more generally, which in turn can help overcome problematic local multi-actor engagement which was identified as a significant barrier to low carbon urban transitions (as addressed in Chapter 6).

Like the case of the bus network, the WPL is an interesting initiative in particular for low carbon urban transitions as it was not implemented as an environmental measure, but was as a result of impacts from congestion and therefore premised from economic motives. To date, the City Council has made it very clear that the economic case took priority over the environmental in the WPL. It is most importantly and primarily considered as an income revenue stream. A key advantage of the scheme is the modest operating cost of

approximately £485,000 per year, which is proportionally lower than other road user charging schemes (Clayton *et al.* 2017).

An important by-product of the scheme has been the considerable environmental benefits which has been favourable for the city in a time of increasing environmental consciousness, with a 33 per cent fall in carbon emissions since 2005, of which 13 per cent is estimated to be as a result of modal shift to public and active travel (Hallam, 2016). As stated however, the income revenue was the driving factor in the project:

> "A lot of officers have a lot of interest in the environmental side [of the WPL], and to be fair the Portfolio Holder who was in position when we first started it off was interested in that side of things as well. But ultimately it all comes down to the harsh economic reality at the time and that's partly because things like the air quality agenda weren't as much in the public consciousness as they are now. I think the environmental aspect of it has grown in importance over the past couple of years, particularly with regards to air quality" (Interview with P32, Nottingham City Council).

The agency of individual and collective actors is reinforced here, in addition to the role of municipal ownership in converging with low carbon technologies to produce sustainable business models. Furthermore, this echoes findings by Hodson and Marvin (2013) of urban entrepreneurialism, whereby cities (such as Greater Manchester and Nottingham in the UK) have largely economic agendas and environmental interests remain peripheral, which re-enforces the status quo of market-based urban development. As such, there is a narrative to include low carbon elements, although arguably this is not a significant and systemic transformation to radically transform society.

In terms of social equity issues, there are a number of measures taken by Nottingham City Council to ensure that the WPL does not directly or indirectly cause issues of inequality. For example, Nottingham City Council is concerned about the disproportionate effect of the Levy on small to medium enterprises and therefore only charges those employers with 10 or more parking spaces. Out of the 42,000 workplace parking places that had been licensed, 25,000 of these are chargeable, with 2,900 premises around the city. In other words, 42 per cent of the city's workplace parking spaces are liable to pay the Levy, and 18 per cent of Nottingham's employers pay the Levy (Nottingham City Council, 2020c). There are exemptions to the Levy as well, including disabled Blue Badge holders, emergency and NHS frontline services and schools.

Furthermore, whilst the Levy was extremely controversial politically and there were counter-arguments made that this would act as a deterrent for businesses, there is evidence that no businesses have moved nor not located in the area as a result of the WPL since the Levy has been introduced (Dale, 2017). Instead, the extension of the tram line and halt in congestion has been linked to positive development in the city, creating transport opportunities to a further 1,800 city workplaces to which 55,000 employees commute (Nottingham City Council, 2020c). According to Nottingham City Council (2020c), the tram extension has been an attractive factor for businesses locating to Nottingham, and it is estimated that since the WPL was introduced, new companies have created over 2,000 additional jobs. This is beneficial for the city, and for the citizens of Nottingham by providing new sources of jobs and therefore is positive in terms of recognition-based justice (Bulkeley *et al.* 2013).

In terms of transport justice considerations, the social impacts of the project were required at public inquiry in the form of an Environmental Impact Assessment and therefore accessibility was a key factor in considering the final tram route, which was approved by an independent Inspectorate. For example, it was a fundamental component of the route plan to connect more deprived areas (such as the Meadows), or areas with low car ownership (for example Clifton) with the tram line to allow good accessibility to employment, health and other key services (Interview with P6, Nottingham City Council). As such, the scheme has benefitted the city in terms of mobility justice through increased accessibility, especially for those in traditionally lower-income and socio-economically deprived neighbourhoods. As previously stated, the fares are nationally low and in line with bus transport and therefore considered as 'affordable' for lower-income households.

However, this research has shown that there are justice issues that have been overlooked as a result of the Levy. Primarily, Nottingham City Council do not specify how the money to pay the Levy is accrued, i.e. employers can either pay for the Levy directly out of the business, or the cost can be transferred onto employees. It is estimated that 80 per cent of companies pass the Levy onto employees, but this is ultimately at the choice of the employer (BBC, 2019). In this instance, there is a risk that this could disproportionately affect those on lower wages (Interview with P4, Nottingham City Council). Although this was not confirmed, potential reasons for this flexibility in policy may have been to encourage public acceptance (which was variable at the time as previously stated) (Dale *et al.* 2014), and because this has been the only model implemented in the UK, and therefore there were no 'standards' to follow in this regard. As such, the theme of responsibility is raised, yet it is

unclear who is responsible for costs, i.e. the employer or employee, and therefore there are potential consequences for just transitions (Bulkeley *et al.* 2014).

5.5. CONCLUSION

The pursuance of low carbon and inclusive transitions at the urban level is highly dependent on effective governance in practice by multiple actors, especially local authorities. The governance of sustainable and inclusive urban transitions across England is not uniform, and this is due to the varying political, social and cultural differences of local councils to enable change. In this chapter, I have highlighted the ways in which political capacity has shaped the governance of Nottingham's low carbon and inclusive transition. Following a multi-level and multi-sectoral perspective, I have demonstrated that ownership and municipal control across sectors are clearly critical to both decarbonisation and just transitions in urban areas.

In the context of governing low carbon and inclusive transitions, political capacity is influenced by various elements. First, I have argued that political capacity is affected by the type of local authority located in the urban area (Kuzemko & Britton, 2020). A perhaps obvious, but nonetheless important finding is that the extent to which a local authority has responsibility significantly impacts political capacity, which is demonstrated by the example of Nottingham City Council as a unitary authority, in comparison to Nottinghamshire County Council as a two-tier authority. As a unitary authority, having responsibility internally has led to a greater engagement with sectors such as energy and affordable warmth due to the presence of this remit in the City Council. This has generated a greater autonomy for decision-making and familiarity within the City Council, in comparison to two-tier authorities which have responsibility of sectors spread differently across county and districts and boroughs and which may be subject to different political administrations (Bulkeley *et al.* 2013; Franzen, 2013). In addition, I have contended that the size of geographical administrative area has proved to have a consequence on local actor political capacity in Nottingham. The smaller administrative boundary of Nottingham City Council has been advantageous by allowing value for money to be easier to obtain, which in turn can make projects more appealing for the city since they prove financially feasible. Consequently, there are benefits for justice, e.g. transport and energy justice, since there are smaller distances to cover and therefore infrastructure is on a smaller scale, in comparison to Nottinghamshire County Council which covers a larger rural area and therefore can lead to greater distances and costs, which can thereby lead to exclusion and isolation. This echoes

arguments frequently made of increased sustainability in compact cities (e.g. Ahlfedlt & Pietrostefani, 2017), but more importantly reiterates arguments of using a spatial and multi-level lens in examining transitions (Bridge *et al.* 2013; Coenen & Truffer, 2012).

Second, I have stressed that the agency of local government actors is fundamental for political capacity and enabling low carbon and inclusive urban transitions, which is produced through various forms of political contestation, both internal and external of local government. Not only is this agency restricted to individual actors, but this also extends to collective actors, such as those in the political administration and institution of local authorities (Affolderbach & Schulz, 2015; Coe & Jordhus-Lier, 2010). In the case of Nottingham City Council, the political stability of a Labour-run council since 1991 has allowed a stronger degree of political power since there is no immediate risk of change in administration. This has benefitted sustainable transitions by allowing for the ability to plan longer-term and progress initiatives which otherwise would be considered as politically controversial. This is complemented by a leadership which is ideologically environmentally and socially-conscious, and as a set of collective actors, the political administration can be viewed as forming a core alliance at the regime level, which has overcome political resistance to change from opposing political parties. This has therefore provided political capacity to establish low carbon and inclusive projects, even at the expense of political resistance and economic and political risk. Additionally, there is evidence of 'climate champions' by way of individuals at Nottingham City Council who are crucial for driving forward and governing sustainable transitions and their willingness to go against the status quo for the benefit of the environment and Nottingham's residents. Not only is this restricted to councillors, but highlights the role of capable and skilled officers within the council, especially during times of national austerity. The role of individual actors is imperative by way of foresightedness, early project-planning and implementation of low carbon projects and have therefore progressed urban sustainable trajectories (Bulkeley & Kern, 2005; Wurzel *et al.* 2019).

Third, I have contended that the political capacity to implement sustainable and inclusive transitions at the urban level is influenced by past agency of actors and the subsequent embedding of low carbon transitions by way of path creation, lock-in and positive self-reinforcement (MacKinnon *et al.* 2019). This is apparent in the city's district heating scheme which has provided the city with multiple benefits. For example, the district heating system has embedded and locked-in infrastructure for the production of clean energy. Since this

system has sunken costs already in the city by way of infrastructure, this allows a base for expansion of the system. It is an important revenue for the city, since it can operate as a commercial service and generate sustainable income, particularly in a time of austerity and competition (Gibbs & Lintz, 2016; Gibbs & O'Neill, 2014; Jonas *et al.* 2011). Furthermore, this historical delivery has resulted in the development of learning and expertise in the energy sector for over three decades, again positively embedding knowledge and skills within the energy department of the City Council which is strongly connected to current energy transitions and commercial operations (Kuzemko & Britton, 2020). Similarly, the Nottingham Declaration has been a positive and historic development for the city. From being co-founded in the city and committing local authorities to tackle the causes and impacts of climate change at the urban level, it has drawn attention to Nottingham as a leading urban area with strong ambition and political willingness to govern and tackle environmental problems on urban and regional levels. The argument developed here is that this has resulted in a historical legacy and virtuous cycle for the city which reveals positive lock-in and self-reinforcing sustainable behaviours (Bulkeley & Kern, 2005; Rosenbloom *et al.* 2019).

Finally, I have argued that the municipal ownership of Nottingham's assets (e.g. social housing and transport) has been imperative for political capacity to enact sustainable transitions (Cumbers, 2018). From this municipal ownership, the City Council has been able to provide low carbon and affordable energy, firstly through the establishment of Robin Hood Energy, and secondly by social housing retrofitting projects. Despite this privatisation in September 2020, Robin Hood Energy is a compelling illustration of the benefits of municipally-owned energy in low carbon and just transitions for contesting the market and dominant political power (Johnstone *et al.* 2020; Kuzemko, 2015). The unique creation of Robin Hood Energy has demonstrated the city's dedication to combatting fuel poverty, through its lean management and not-for-profit business structure, and in turn has pursued different priorities from the neoliberal logics of the 'Big Six'. As such, the municipal-owned ESCo had multiple initiatives for decreasing fuel poverty, by way of: local discounted tariffs for Nottingham residents; provisions to reduce the number of prepayment meters for consumers; voluntarily offering Warm Home Discount Scheme; and the switching of void properties. These initiatives, in addition to supplying 100 per cent renewable energy from 2018, resulted in an energy company which challenged incumbent actors and the status quo, albeit temporarily. More broadly, I argue that this agency demonstrates a revival of the political imagination and progressed a 'disruptive' form of low carbon and inclusive urban

transition which went against neoliberal logics (Burke & Stephens, 2017; Featherstone *et al.* 2020). Moreover, the ownership of Nottingham's 27,000 social houses has benefitted political capacity for energy efficiency programmes, by allowing Nottingham City Council to work in partnership with Nottingham City Homes to progress retrofit programmes. Consequently, this can address energy efficiency issues in social housing which constitute a significant portion of housing tenure (approximately 20 per cent) and can protect vulnerable citizens from fuel poverty. In addition, the energy efficiency developments allow the City Council to save costs internally, which can therefore be sustainably reinvested into the provision of services, for the benefit of the urban area. The eradication of fuel poverty is a significant issue for the City Council and Nottingham City Homes, and this commitment is demonstrated by employing a full-time fuel poverty officer, which is considered rare for a social housing organisation. As such, behavioural barriers can be overcome by supporting residents to switch and save and by referring to fuel debt services. The collapse and subsequent privatisation of Robin Hood Energy in 2020 is further illustrative of the failings of a competitive energy market.

Equally, I have argued that municipal ownership of Nottingham's transport network has been crucial for political capacity for developing sustainable transport initiatives. Firstly, through local ownership, Nottingham City Council has formed an extensive bus network which operates both on a commercial and non-commercial basis. This has allowed the regeneration of profits back into the transport network, thereby leading the transport network to more sustainable bus fleets. As such, this has had a positive knock-on effect for the City Council, with public transport in Nottingham having the largest electric bus fleet, and having one of the highest usages in the UK. Furthermore, ownership of the land has been imperative for low carbon transport, as this has enabled the Council to save costs by installing electric charge points at existing sites, and also resulted in a simpler and faster planning process. Secondly, the implementation of the WPL has been significant by raising hypothecated funds for the extension of the city's electric tramline and any surplus being ringfenced and reinvested into sustainable transport measures (e.g. the improvement of Nottingham's main train station). This in turn has halted congestion in the city which has environmental benefits, and improved the overall connectivity of the city, thereby having social benefits. As such, I have argued that both Robin Hood Energy and WPL are examples of low carbon urbanism and experimentation (Bulkeley *et al.* 2012; Hodson *et al.* 2017), through municipally governed schemes which combine both long-term economic development and climate change objectives. Furthermore, they are examples of 'austerity urbanism' which has

engaged the city in entrepreneurial practices for securing future financial income (North & Nurse, 2014; O'Neill & Gibbs, 2014; Whitehead, 2013). Yet, I argue that there are justice implications of the distribution of levy costs onto employees, which is worthy of consideration.

Despite the developments discussed in this chapter, there are nonetheless significant barriers which have, and continue to hinder the implementation of low carbon equitable urban transitions in practice, as discussed in the next chapter whilst drawing on the Nottingham example.

CHAPTER 6

BARRIERS TO IMPLEMENTING LOW CARBON EQUITABLE URBAN TRANSITIONS IN PRACTICE

6.0. INTRODUCTION

As examined in Chapter 4, a multi-level perspective on policy for sustainable and equitable transitions indicates that despite progress being made, there are significant policy barriers which are affecting the international, national and local governance of low carbon and inclusive transitions. Whilst the analysis of policy content from a multi-level perspective has been useful for understanding transition governance, sustainable transitions are rarely restricted to formal policymaking arenas. Instead, socio-technical transitions are made up of complex engineering practices, infrastructures, scientific knowledge and process technologies that are intertwined within society and evolving over time. Such transitions are considered as co-evolutionary, thereby involving a system of wider practices and a diverse set of actors on the ground (Rutherford & Coutard, 2014). A multi-level perspective of socio-technical transitions therefore considers the human and non-human dimensions of low carbon transitions across various scales, and Chapter 5 has sought to demonstrate this in the context of Nottingham.

The lack of advancement to low carbon and inclusive urban trajectories in the UK appropriately raises questions about the barriers that are experienced at the local scale; that is, the obstacle, condition, or factor that can impede, obstruct, or delay the agency of actors and their individual and collective capacities to implement sustainable trajectories in urban areas. Since actors from different sectors and levels of government are questioned with regards to the barriers encountered, the perception and understanding of a barrier to urban low carbon transition may differ as it is subjective to the person, their field in question and wider contexts in which they operate. For example, what may be a barrier to a third sector actor may not be relevant to a local government representative, and *vice versa*, and this can be context-dependent with regard to the sector being discussed. Therefore, it is important to

emphasise the multifarious perceptions and multi-scalarity of urban low carbon transitions with relation to barriers, and the numerous factors affecting implementation, including political, social, economic, technological, and legal dimensions.

In keeping with a multi-scalar perspective, in this chapter I set out the barriers that are experienced by multiple urban actors when implementing low carbon and inclusive transitions in practice in Nottingham. As such, I consider the barriers primarily from a multi-level nature, that is, national level factors which are impeding urban trajectories, and local level factors which are impeding urban transitions. This does not necessarily imply that these barriers are static, simply unidirectional, nor isolated in nature (Reckien *et al.* 2015). On the contrary, they are complex, interlinked and variable. A multi-level perspective thereby offers a deeper understanding of what the barriers are, the way in which they occur and when, by whom they are encountered, and where the root of such barriers stem from and impact in turn.

The rest of this chapter is divided into three parts. In the first section, I argue that barriers experienced at the urban level are largely underpinned by broader national level policy and political action. This includes: first, the economic barriers as a result of national austerity; second, the institutional barriers because of insufficient tough regulation and government intervention on a national level; third, the political barriers due to uncertainty from central government; and fourth, socio-economic factors as a result of government ineffectiveness to tackle social inequality on a national level. As such, the agency and capacity of urban actors to govern low carbon and inclusive transitions in the city is hindered across sectors such as housing, transport and energy.

In the second section, I contend that barriers arising at the local level are often manifested because of the specific urban area itself, such as its urban materiality and the diverse actors operating within this space. Therefore, barriers arising are more context-specific, and so the urban environment is a diverse socio-cultural and political arena for differing power constellations, political agendas and actors which can shape the direction, pace and scale of transitions that are constituted through flows, connections, locations and scales (Gibbs & Krueger, 2005; Murphy, 2015). Nevertheless, these may also present commonalities to other urban areas. As such, I argue that the barriers arising at the local level include: first, the economic and political barriers due to competing prioritisation within and between local councils; second, socio-cultural barriers due to problematic local multi-actor engagement;

and third, behavioural change barriers due to local societal resistance. Again, these barriers are experienced locally and in practice hinder urban actors' agency and capacity to implement low carbon and equitable transitions across sectors, both within and out-with local government.

In the third section, I conclude first that the national policies of austerity and de-regulation, which are typical of present-day neoliberal governance, have impacted low carbon and inclusive transitions in practice in Nottingham. This is witnessed through the economic, political and institutional barriers that are experienced by urban actors. Second, I argue the current inconsideration of inequality from a national level has resulted in an uneven and fragmented approach to inclusive transitions. Third, I stress that the local level issues reveal that there are socio-cultural barriers which are encountered at the urban scale. Therefore, in this chapter I highlight the obstacles experienced at the urban level as a result of national and local level issues; all of which are constraining the agency and capacity of urban actors to progress low carbon and just transitions.

6.1. NATIONAL LEVEL FACTORS IMPEDING URBAN GOVERNANCE

Financing low carbon and inclusive transitions has been subject to much debate, insomuch that energy finance has become a distinct field in sustainable transitions literature. Recent estimates by Hall *et al.* (2018) suggest that the total investment needed to fulfil the Paris Agreement is up to $61 trillion. Such large amounts of low carbon finance will need to enrol diverse forms of capital not only from state actors, but also non-state actors such as private and third sector bodies. To catalyse sustainable urban transitions, it is important to consider the ways in which finance is sourced, the amount of finance that is required to be sourced, and which actors and institutions are involved in providing finance (McCauley *et al.* 2019).

As highlighted in Chapter 4, the 2008 financial crisis and the election of a Coalition Conservative-Liberal Democrat Government in 2010 triggered a programme of austerity as a fiscal policy solution for deficit reduction which has continued for the rest of the decade, as shown in **Figure 6.1**. At the time of writing, the current Conservative Prime Minister Boris Johnson pledged to end austerity and continue international action against combatting climate change (Lombrana *et al.* 2020). However, the outcome of these pledges remains to be seen.

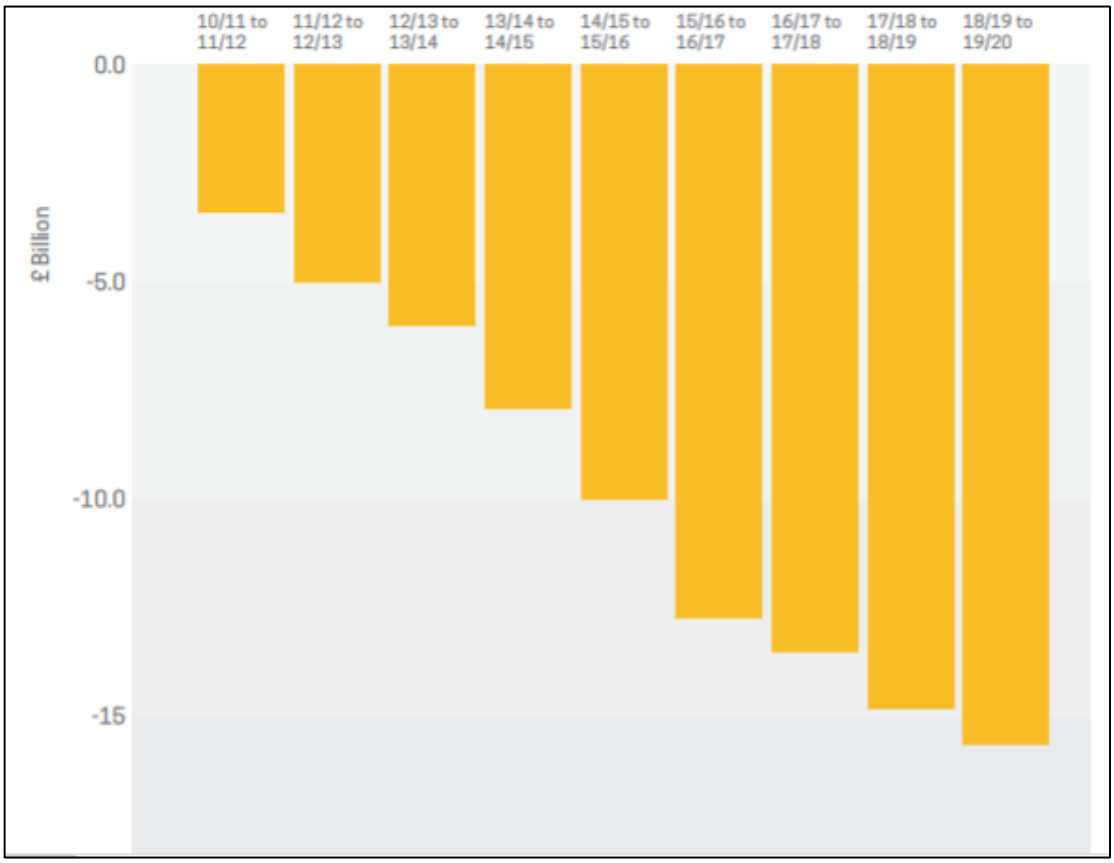

Figure 6.1: Reduction in core government funding (LGA, 2018, p.3).

In particular, the outbreak of Covid-19 has resulted in an albeit temporary yet significant transformation of the way in which society operates, and has had severe economic and social impacts. Nevertheless, this pandemic has led to (unintended) environmental benefits, such as the reduction of transport pollution in cities (e.g. Barbier, 2020; Le Quere *et al.* 2020). There have been wide-ranging discussions of how the outbreak is illustrative of how society can capitalise on the profound opportunities that the pandemic has presented and 'build back better' in terms of climate mitigation and societal changes (Barbier, 2020; World Resources Institute, 2020). However, concerns have also been raised of climate change becoming even further politically side-lined due to the Covid-19 outbreak and the potential austerity measures as a result of the pandemic (e.g. Hepburn *et al.* 2020; Woodcock, 2020).

Government austerity is not a new phenomenon in the UK; however, the latest austerity agenda has resulted in the largest financial cuts since the Second World War (Oxfam, 2013). While it is acknowledged that there are multiple ways of measuring inequality, the UK has stark differences in wealth and income amongst its population and is currently ranked as

having the highest level of income inequality in the EU. In addition, the UK is one of the most regionally unbalanced countries in the industrialised world (House of Commons, 2018; McCann, 2019). Furthermore, even though the national deficit is now relatively low in comparison to its highest in 2010, public debt is approximately double the level relative to the size of the economy measured pre-financial crisis[31] (Cribb & Johnson, 2018).

The effects of austerity on urban society has become an emerging field of research, and contemporary austerity in cities is a growing theme in urban scholarship known as 'austerity urbanism' (Hastings *et al.* 2017). Additionally, the rise of UK cities progressing different kinds of urbanism in response to austerity and neo-liberalism has been introduced in transition studies. For example, the terms 'entrepreneurial urbanism' (North & Nurse, 2014; Whitehead, 2013) and 'austerity urbanism' (Peck, 2012) refer to a focus on economic development over environmental and social strategies, and more recent 'low carbon urbanism' (Bulkeley *et al.* 2012) is evolving to include climate change mitigation in economic development. Whilst some studies have acknowledged that austerity has allowed some cities e.g. Leicester and Manchester to become more entrepreneurial (Davies *et al.* 2018; O'Neill & Gibbs, 2016), it is evident that financial cuts have had a detrimental impact for funding projects for low carbon and equitable transitions, as discussed next.

6.1.1. Austerity Measures

Local authorities in England receive funding from four main sources, that is, central government grants, business rates, council tax, and fees and charges (DCLG, 2013). Councils address the costs of their statutory and discretionary services through a combination of revenue expenditure (e.g. day-to-day spending) and capital expenditure (e.g. investment in assets). Such expenditure can vary geographically between local authorities due to the particular services each authority may provide and the distinctive nature of their local economies (National Audit Office, 2016), as highlighted in **Figure 6.2**.

[31] This is excluding the latest impacts of Covid-19 on the budget which are yet to be fully determined since the pandemic is on-going at the time of writing.

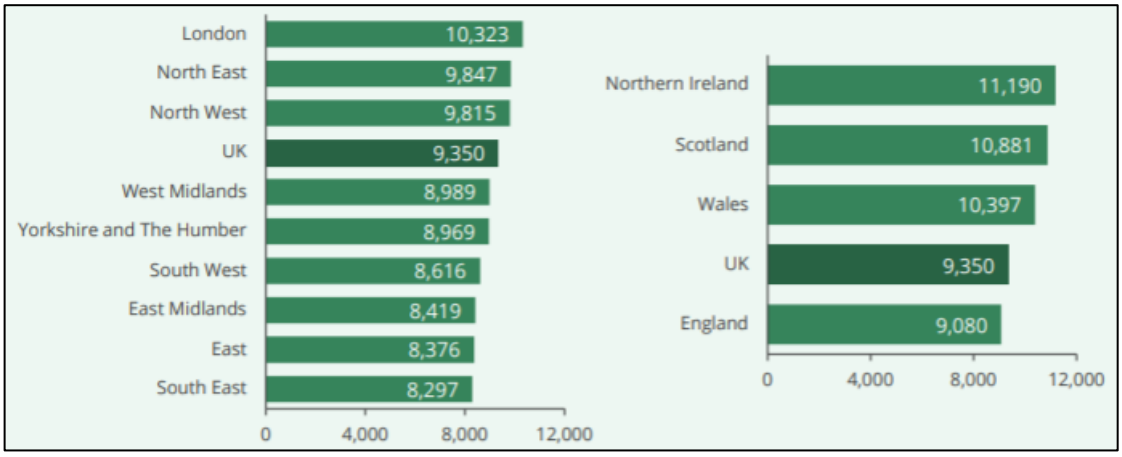

Figure 6.2: Public spending per person, by country and region of the UK (£ per person, 2017/28) (House of Commons, 2018).

Like most other UK councils, Nottingham City Council has faced significant cuts in budgets from central government within recent years which in turn is affecting the council's agency and capacity to implement low carbon and just transitions. Since 2013, the City Council's main government funding has been cut by £127 million, meaning it received only £25 million for 2019/20 (My Nottingham News, 2020). The City Council is quite distinctive in comparison to other English local authorities by having maintained ownership of its council assets including social housing and transport (discussed in Chapter 5), which enables the council to receive an income of approximately £20 million a year through its commercial activities, such as reducing energy bills and generating sustainable income from solar panels on council buildings (Nottingham City Council, 2018b). However, to balance the 2019/2020 budget and secure the necessary £23 million pounds of savings to do so, a re-evaluation of Council services has been necessary. Such funding cuts overall are problematic for governing low carbon and equitable transitions as this reduces the capital funding received by local authorities for implementing projects (Bulkeley & Kern, 2004).

Reduction in funding to local authority from central government not only has a detrimental effect on financing upfront costs of low carbon projects, but this also places stress on the longevity of existing projects which require on-going money for maintenance and the lifespan of schemes (i.e. revenue funding):

> "[Councils] can get capital money but they don't have this day-to-day operational funding because the funding is being cut left, right and centre. So, it's getting that balance right between financial resources" (Interview with P1, APSE Energy).

This in turn places a greater pressure on the provision of local authorities to secure match-funding or projects with continuous income streams, and also focus their capacities on providing the bare minimum in terms of meeting their legal responsibilities (NLGN, 2018).

Whilst it is important for low carbon projects to have a sustainable business model, this can place an overemphasis on profitability for low carbon projects, rather than the wider incorporation of environmental and social priorities (Hodson & Marvin, 2015). This can be counterproductive for sustainable transitions since low carbon options tend to require greater up-front capital investments than fossil fuel options (Fankhauser & Jotzo, 2017).

Moreover, a dominant and narrow economic interest (i.e. an overemphasis on profitability) can undermine serious enactments for transformative low carbon and inclusive transitions and subsequently re-enforce the status quo of urban economic activity and the symbolic representation of transition (Hodson & Marvin, 2010). Take for example the transition to lower carbon vehicles - despite the well-documented social and environmental benefits, the higher economic costs of implementing low carbon infrastructure continue to dominate.

In addition, the establishment of the district heating network in 1973 (discussed in Chapter 5) has been advantageous for Nottingham by providing a low carbon source of energy. However, this has also resulted in an ageing, high-maintenance energy network which requires ongoing capital investment (Interview with P15, Robin Hood Energy). Nottingham is often able to mitigate this barrier to a certain extent using its commercial services (as shown by the examples of the department for Energy Services and Workplace Parking Levy in Chapter 5*)*, but the cost of maintenance is a drawback that is faced by local government which in turn places a pressure on financing new low carbon and just transition projects.

In other countries, the finance gap for low carbon projects is overcome to a large extent through alternative financial institutions. For example, Germany has an established decentralised banking sector which enables more funding to be granted through local subsidiarity, common public benefit values and promotional lending, often over long-term time frames (e.g. 30 years) and with fixed low interest rates (Hall *et al.* 2016; Marois, 2017). In comparison, the UK's centralised, market-led financial system is reliant on central and international sources of private capital. As a result, the UK has a disadvantageous system of investment which favours large projects by incumbent corporations and an environment which is not viable for capitalising small-scale renewables (Hall *et al.* 2016).

Not only are reductions made to funding streams (e.g. capital and revenue funding as aforementioned) for low carbon projects, financial cuts also have a negative implication for resources and staff capacity. Such measures are particularly detrimental for implementing decarbonised transitions in urban areas as this causes there to be a lack of capacity and expertise at a local level to drive forward projects, particularly in the public and third sectors. In Nottingham, this has been particularly evident in the implementation of low carbon energy efficiency projects in the domestic housing sector:

> "[The issue] is the capacity of staff to deliver as it's over and above their workload and we are having these issues all the time in that we are cutting staff and we have 27,000 properties in our portfolio, so it's really difficult" (Interview with P25, Nottingham City Homes).

As highlighted, this creates a pressure on implementing just transitions, such as the fuel poverty reduction programme implemented by the City Council, and therefore there is mounting risk that reduced funding for staffing and resources can create setbacks for achieving local authority fuel poverty targets. This supports arguments by Hastings *et al.* (2017, p.2022) that in England, austerity urbanism 'involves a dual regressive redistribution' by targeting cities which in turn leads to targeting the poor, by attempting to resist the redistribution of austerity to the most economically marginalised. Furthermore, this lack of staff capacity in the housing sector is echoed by another participant, who comments on this barrier in the context of urban heat networks:

> "I think the issues of capacity to develop projects and get opportunities and integrate energy into wider strategic thinking at the local authority level is missing […] most energy people at the local authority these days are building managers who are looking at how they reduce their own carbon footprint. That's a very different skillset to designing and putting in a heat network in a city. So actually, having access to all of the skills you need to do this is very difficult" (Interview with P9, BEIS).

As indicated, the reduction in funding restricts the local authority by creating difficulties hiring staff with the required skillsets and expertise, and equally decreases the provision of training and broader lack of investment in human resources (Cumbers & Hanna, 2019). Furthermore, cuts in staffing also detrimentally impacts the local government by having a lack of staff continuity, which negatively affects the Council in terms of project momentum and security: "We have to bring people on using our capital funding on short-term contracts, so we tend not to have the continuity that we once did, so that's a bit of a barrier" (Interview with P12, Nottingham City Council). As such, the reduction of staff on the whole places a strain on the local authority for implementing low carbon transitions.

In addition, the lack of specialist staff and staff on longer-term contracts can be particularly disruptive since low carbon and inclusive transitions are dependent on large-scale technological changes which can evolve over long periods of time (particularly at the niche and regime levels, as highlighted by the multi-level perspective on socio-technical transitions). Whilst it can be argued that the lack of specialist staff within the local authority opens up opportunity to engage with intermediaries (i.e. external actors which can provide specialist expertise) (Bush *et al*. 2017), this reduction (or lack) of longer-term, specialist staff within the local authority can be viewed as problematic for stimulating low carbon technological change as this requires a greater multi-actor engagement out-with the council which encounters barriers also (as discussed in Section 6.3) (Johnstone *et al.* 2020).

The lack of capacity and expertise resulting from funding cuts is not only experienced by local government but is stressed by other actors, such as third sector actors who are beneficiaries of grants and funding from central and local government, as highlighted by the charity Nottingham Energy Partnership (NEP):

> "At the height of operation, NEP had 23 members of staff, now we have 9 [members of staff]. It's the ebb and flow of grants, funding from central government, there used to be regional governmental funding and now it's gone and also local authority [funding is gone]" (Interview with P31, NEP).

Lack of funding is further echoed by the charity National Energy Action in relation to fuel poverty: "The majority of health staff are overworked, there aren't enough of them to do the job that needs doing and they are lacking in time, so encouraging them to do additional work that needs to be done is a challenge" (Interview with P24, NEA). As highlighted by a sustainable transport charity in Nottingham, insufficient funding has created a subsequent lack of staff capacity in the private sector:

> "15 years ago we used to have lots and lots of people in businesses with dedicated travel plans and more and more often you see that role being devolved and put on the side of somebody else there because businesses are really under pressure" (Interview with P16, The Big Wheel).

Whilst the cuts to staffing may not be surprising nor unexpected given the context of austerity in the UK, this has had an overwhelming and notably detrimental impact on governing low carbon and just trajectories at the urban level, often being mentioned as the primary barrier by a range of actors. Cumbers and Traill (2020) importantly emphasise that despite austerity being faced by cities and local authorities across Europe, neoliberal policy

hegemony has been particularly severe in the UK context. The economic barriers highlighted demonstrate how the insufficient funding is not only restricted to those within local government, but also within non-state sectors such as third and private sectors. Furthermore, as explained in the previous chapters, the UK's Coalition Government strategy of localism and devolution was believed to strengthen and empower communities and instigate economic innovation (DCLG, 2011). However, in the UK context this has been flawed by the increased centralisation of budgets and reduction in local autonomy in cities (Eagle *et al*. 2017). As such, successful devolution and localism is problematic without state government sustaining financial support, therefore central government has exercised increased dominance over municipalities through the funding system (Eckersley, 2017). In addition, structural support in terms of effective regulation and enforcement is prerequisite for urban climate change governance, as argued next.

6.1.2. Ineffective Regulation and Government Intervention

The role of regulation and enforcement in climate change governance has been subject to much on-going debate. Proponents of binding climate change targets believe that mandating change at the local level provides local authorities with the autonomy for implementing change, and binding legislation helps to hold the state to account amidst political variability, with a greater chance of success from this added pressure and accountability (Lockwood, 2013). It is also argued that by removing mandates, national government is abdicating responsibility for climate change governance. However, counterarguments by opponents assert that statutory requirements from national government are interventionist, and that governance should be made at the local level and not by force or coercion of the state. Instead, opponents argue that central state intervention limits the ability for local authorities to adapt in their own terms (Giddens, 2009).

The devolution of national climate change targets to a regional and local level has so far remained largely voluntary in a UK context and consequently, most cities have had limited energy decision-making functions (Bale *et al.* 2012). Whilst most UK cities have begun to set local climate change targets, aligning with the 2008 Climate Change Act is not a statutory duty and therefore not legally-binding nor mandated (Bulkeley & Kern, 2004). Local authority engagement with energy systems is very variable as a result, and as highlighted by Webb *et al.* (2016), although 82 per cent of local authorities surveyed in the UK were found to be active on sustainable energy to some degree, almost two thirds were yet to start, or

were early on, in their implementation. These findings therefore reflect the uneven engagement of local authorities for climate change mitigation, which is deregulated and non-mandatory. Furthermore, the rhetoric of localism in the UK amid the context of austerity further reflects the variegated engagement of local authorities and the lack of significant devolution of real power (Fudge *et al.* 2016). To a certain degree, the devolution of climate change responsibility to local authorities is a double-edged sword which may or may not stimulate local authorities to enact change.

To illustrate, even though the 2008 Climate Change Act sets emission targets at the national level, these targets are not reinforced by mandate or legislation, which is in turn restricting transitions at the local level. For example, the Act mandated that devolved administrations (England, Scotland, Wales and Northern Ireland) should create their own climate change policies and implement national targets. However, there are no provisions for councils, cities and the English regions (Fankhauser *et al.* 2018). For Nottingham as a city on the whole, it is evident that the role and responsibility for low carbon transitions at the local level is ambiguous:

> "We have really seen a transition in local authorities being, in the late 2005, 2006, 2007, they were increasingly drawing [upon] local authorities and saying 'you have got a role in this'. But now it's almost like we haven't got a role. So, whilst we still have our national targets around CO_2 reductions, signing the Paris Agreement etc, I think local government is uncertain of how national government sees its role in contributing" (Interview with P18, Nottinghamshire County Council).

In this instance, the absence of formal responsibility and statutory requirements on a local level is a barrier, with local authorities not being explicitly mandated to meet targets by national government (Bush *et al.* 2017). This has negative consequences on the political argument for enabling low carbon and just transitions, since the lack of mandate diminishes the importance of climate change mitigation and prioritisation at a local level, as explained:

> "When it comes to prioritisation at the local level, a lot of the funding and resourcing is given over to the things that have to be done by the local authorities. Because that's what they have to deliver and there is a lot left that they don't have to statutorily deliver" (Interview with P9, BEIS).

The refrainment of making climate change targets a statutory requirement for local authorities problematises their ability and capacity to implement projects, since it is not a necessity and there are other competing priorities which need to be fulfilled (Bush *et al.* 2017).

Interestingly, Reckien *et al.* (2015) note the variation in climate change responsibilities across the EU, with 24 national governments out of the EU-28 not requiring the preparation of Local Climate Plans (LCPs) and 33 per cent of cities having no LCP at all. Their results show that factors such as membership of climate networks, population size, GDP per capita and adaptive capacity act as drivers of mitigation and adaptation plans. Perhaps surprisingly, only Denmark, France, Slovakia and the UK have national regulation for the compulsory adoption of LCPs, as shown in **Figure 6.3**. Therefore, it is clear that without national regulation, local authorities do not have capacity, or are reluctant to produce plans (Reckien *et al.* 2015).

However, despite a statutory duty to include climate change issues in general local planning documents, this requirement is vague and acts as a barrier for local actors. For instance, the UK Government requires local planning authorities to include in their plans: 'policies designed to secure that the development and use of land in the local planning authority's area contribute to the mitigation of, and adaptation to, climate change' (UK Government, 2019d). However, this has been critiqued since firstly, the requirement of the LCP is dependent on the type of local authority (e.g. county council, district council, unitary authority); and secondly, the Climate Change Act did not set local authorities local carbon budgets, which ultimately has not helped local councils understand what is expected from them, nor helped them implement their own independent carbon reduction programmes (Britton, 2019; Friends of the Earth, 2019). Such findings therefore reinforce the nuances of mandated climate change policy, and the UK and Nottingham example highlights that despite having a statutory duty, this is ambiguous in practice, with no clear responsibility for carbon and demand reduction. Furthermore, it does not provide actors with the necessary agency and capacity (both financially and politically) to overcome barriers, and therefore stifles sustainable urban trajectories (Bush *et al.* 2017).

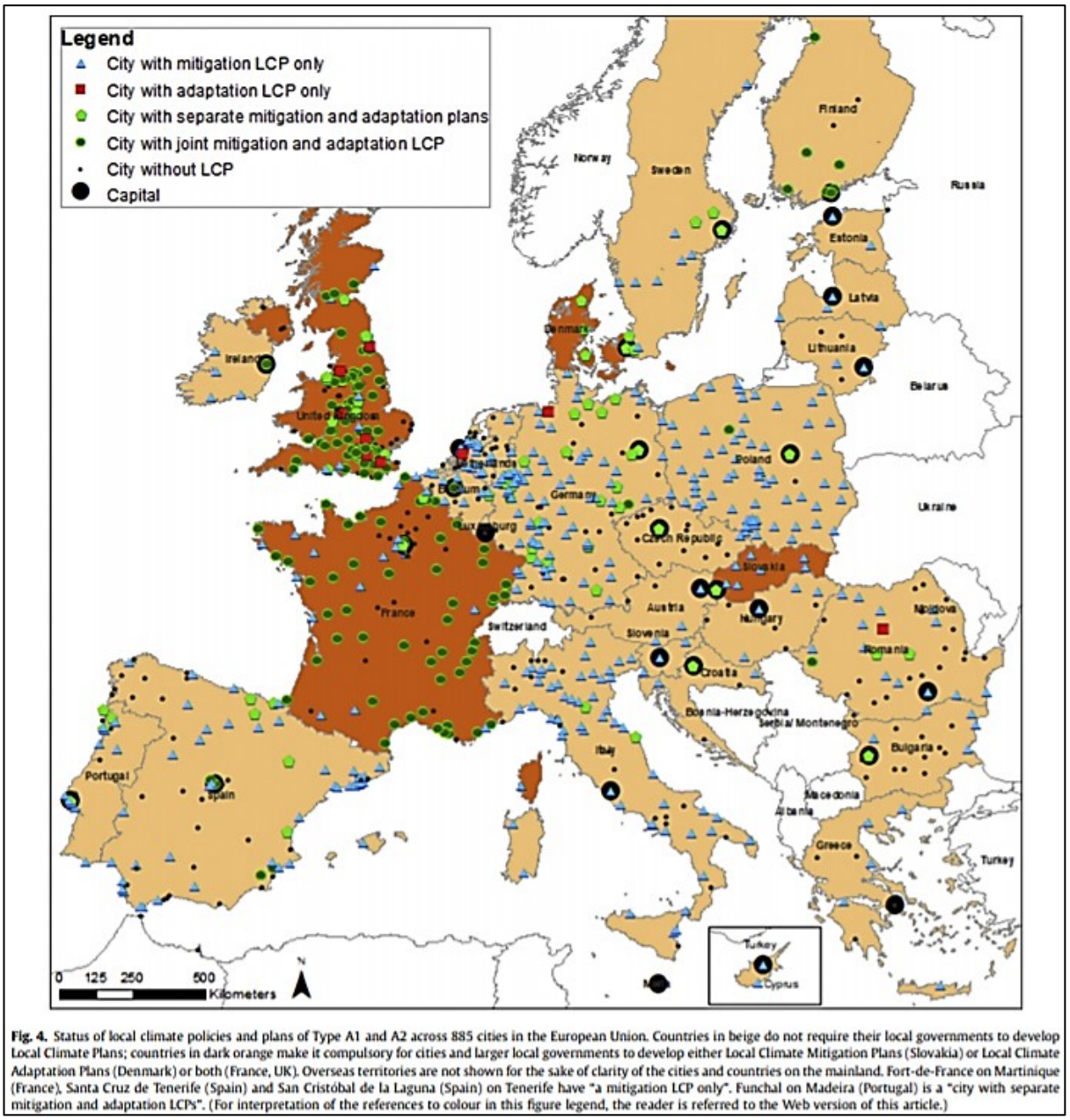

Fig. 4. Status of local climate policies and plans of Type A1 and A2 across 885 cities in the European Union. Countries in beige do not require their local governments to develop Local Climate Plans; countries in dark orange make it compulsory for cities and larger local governments to develop either Local Climate Mitigation Plans (Slovakia) or Local Climate Adaptation Plans (Denmark) or both (France, UK). Overseas territories are not shown for the sake of clarity of the cities and countries on the mainland. Fort-de-France on Martinique (France), Santa Cruz de Tenerife (Spain) and San Cristóbal de la Laguna (Spain) on Tenerife have "a mitigation LCP only". Funchal on Madeira (Portugal) is a "city with separate mitigation and adaptation LCPs". (For interpretation of the references to colour in this figure legend, the reader is referred to the Web version of this article.)

Figure 6.3: Local climate plans across EU (Reckien *et al.* 2015, p.125).

A good example of the consequences of this lack of a direct mandate is witnessed in the housing sector. The Code for Sustainable Homes was firstly introduced by the Labour Government in 2008 in the UK as a statutory requirement to help reduce domestic carbon emissions and create more sustainable homes. However, this statutory requirement was withdrawn by the Coalition Government in July 2015, following the Department for Communities and Local Government technical Housing Standards Review in 2014 and part of the government's wider mission to 'cut red tape', which decreased housing regulations by 90 per cent (Mark, 2014; Nottingham City Homes, 2019). The abolition of this Code was

claimed by the government as a less bureaucratic and easier to understand route for achieving zero carbon homes. However, this has been disputed and critiqued for further reducing minimum standards that must be met (O'Neill & Gibbs, 2020).

Subsequently, the Code became voluntary for councils and it is therefore the decision of local authorities whether to put the Code in place. Following consultation, Nottingham City Council has prescribed homes to be built to Code for Sustainable Home Level 4 standards (Nottingham City Homes, 2015). However, this is notably not the most ambitious code (which is Code 6) and therefore it is arguable that under current deregulated conditions, local authorities are not encouraging the utmost sustainable development possible, reiterating the constraints posed by the current political settlement. Again, this raises the importance of statutory requirements in driving low carbon transitions evenly across urban areas, and the impacts this has on local government agency and wider urban infrastructure. Furthermore, it reinforces the fragility of legislation over time because of party politics, and the ways in which attempted transitions can encounter political resistance and policy dismantlement (O'Neill & Gibbs, 2020).

The absence of regulations can be considered to lock-in incumbent technologies and stifle the diffusion of innovation or technological changes which in turn can hinder low carbon and inclusive transitions at the local level. An example of this can be witnessed in the housing sector, as highlighted:

> "We are still building homes now either not in the right volumes to be able to satisfy demand, but also not in the same level of energy efficiency to what we potentially could be. We are still building the homes of yesteryear and somehow expecting this low carbon transition future and we will be living in low carbon homes that will be retrofitted to being very energy efficient and that is totally the wrong way to do it" (Interview with P23, WPD).

A lack of mandate can reinforce lock-in and inertia and hinder local state actors to invest in more sustainable technologies or materials, since there is no stimulus to do so. As highlighted in a study by Heffernan *et al.* (2015), legislation in the housing sector was identified as a driver for and barrier to the delivery of zero carbon homes, with actors being reticent to make steps to prepare for zero carbon homes in the UK until there is legislation in place. Indeed, the lack of consistency in legislation highlights the fragility of low carbon policies, with the need for a greater cross-party consensus on approaches to sustainable transitions.

Turning to the transport sector, the lack of regulation is also witnessed regarding the provision of electric vehicle infrastructure. Whilst the UK has made targets to phase-out conventional vehicles by 2040 (2030 in Scotland), it can be argued that a lack of a mandate for electric vehicle infrastructure is hindering low carbon and inclusive transitions at the local level. As commented by a private distribution network operator:

> "When we are building new homes now, we don't mandate provision of additional capacity for electric vehicles […], even though we have said that that is the future, so why are we making short-term investment now on infrastructure that isn't fit for purpose when we know we need to do that in the long-term?" (Interview with P27, WPD).

The quote suitably highlights that the neglect of statutory requirements does not encourage incremental measures to be put in place. This raises an important point with regard to transition pathways more generally (e.g. Foxon *et al.* 2010; Geels & Schot, 2007), with incremental transitions being heralded as a potential pathway since this can help mitigate negative consequences which are associated with abrupt transitions, such as job losses and additional stresses (Gambhir *et al.* 2019). Moreover, such mandated requirements can help establish processes of path creation, which can allow for systems to be put in place gradually and further facilitate low carbon trajectories (MacKinnon *et al.* 2019).

Furthermore, the lack of alignment with EU regulation is further discouraging low carbon transitions, and ultimately brings into consideration the benefits and limitations of top-down climate change governance for urban areas. As stressed by the UK's Committee on Climate Change (2018a, p.176), the recent EU Energy Performance of Building Directive requires charge-points and pre-cabling in new buildings (both residential and non-residential) and therefore UK local planning policies should align with this legislation to help facilitate the transition to electric vehicle use via housing sector measures and infrastructure. The UK's withdrawal from the EU further calls into question the environmental regulations and legislations that will be replaced by former EU rules, since the UK will no longer be bound to apply to EU environmental laws (Directives and Regulations) (UK Government, 2019c). This changing political nature of the UK more generally brings to light the future uncertainty of low carbon urban trajectories from the national government, as discussed next.

6.1.3. Lack of Political Direction and Uncertainty

National policies are imperative for driving low carbon urban development in two ways. First, they allow for policies and incentives that directly or indirectly affect urban mobility, energy use or waste management to be established. Second, national policies allow for the creation of frameworks for sub-levels of government to develop, implement and align urban policies by providing policy direction and incentive structures, and building local capacities and resources (Broekhoff *et al.* 2018). Hodson and Marvin (2010) emphasise that agency at the city level cannot be solely reduced to the actors working at this scale, and highlight how a lack of interaction between multiple layers of governance can create barriers to effective low carbon trajectories.

A changing political climate on a national level compounds uncertainty surrounding environmental policy, and this was particularly apparent during this research which was conducted during political events, such as the UK's referendum of European Union membership in 2016 and the UK-wide general elections in 2017 and 2019. Such political changes on a national level can be particularly disruptive for implementing low carbon urban transitions and progressive action on climate change (Meadowcroft, 2011). A notable example is where one interviewee shared their views explicitly on the role of Brexit and future environmental policy:

> "I'm very, very concerned about Brexit and the impacts of Brexit. I don't think they [the Conservative Party] can be trusted with our environmental policy at all but we are where we are. One of my motivations for campaigning hard for 'remain' locally was because of my fears about what they would do to workers' rights and the environment" (Interview with Anonymous).

Chapter 4 has demonstrated that there has been a general shift in climate change policy since a change in central government in 2010, which has led to unsupportive policy, a lack of ambitious climate change targets and reference to justice dimensions. This has resulted in implications for climate change policy at the local level, but also led to barriers experienced by a range of local actors when implementing low carbon transitions in the city in practice.

The governance of climate change mitigation is particularly challenging, partially due to the complexity of the socio-technical systems that must be transformed to avoid climate change and the great uncertainties in outcomes, but also in terms of action (Roelich & Giesekam, 2019). Urban actors highlight the difficulty in progressing urban low carbon and inclusive

transitions in practice, due to a lack of direction from central government. As highlighted in Chapter 4, this is reflected by shifting and unsupportive national government policy in terms of climate change within recent years. Notable examples include: unanticipated changes to the subsidy regime for renewable energy and energy efficiency; the scrapping of the zero-carbon homes commitment; freezing of the carbon price floor; cancellation of funding for the carbon capture and storage commercialisation programme (Fankhauser *et al.* 2018); and more recently, scrappage of the electrification of the Midlands rail line (BBC, 2017). Despite climate change commitments, these measures question the reliability of such commitments across political parties, emphasise the continuous fragility of climate change policy, and highlight the powerful and incumbent actors frustrating transitions, with one respondent stating:

> "There is a need for more certainty at a national level around energy priorities so you're operating within the framework, it's not just about money, it's about what the direction is. [For example, the 2008 Roadmap to Low Carbon] actually provides a really useful framework for low carbon transitions, but successive governments have come along and changed priorities within that" (Interview with P22, Municipia).

Thus, it is apparent that there is a significant disconnect between rhetoric, climate change policy, and supportive measures, which in turn have impeded low carbon and inclusive transitions in practice. This echoes findings by Fudge *et al.* (2016) of barriers at the regime level for influencing energy agendas.

Consequently, the shifting political landscape and consistent lack of political will on a national level significantly influences how decisions are taken at a more local, urban level (Fudge *et al.* 2016). Inconsistency has led to uncertainty and undermined confidence in government policy, which has a negative knock-on effect particularly by deterring investors across all sectors (CCC, 2018a). For instance, as stated by a respondent from a private distribution network operator:

> "We have a pretty good relationship with national government, obviously directly as a monopoly company we are regulated, and being part of the future Industrial Strategy means a lot relies on the electricity network. In fact, everything relies on it, so we are a very important cog in that future. But what we do seem to have a lack of is long-term vision mapped out to short incremental steps to be able to achieve that. So, there are certain things that I would always consider as a no brainer, and I can sympathise with the government that they are very hard to achieve, but we are not being bold enough to do so" (Interview with P23, WPD).

As emphasised in the above quote, although there is a generally good-working relationship between multiple actors to implement low carbon transitions, the lack of bold decision-making, coherent long-term strategy and communication on this matter is causing uncertainty and blockages for transitions. This highlights that good-working relationships between multiple actors are not the sole elements for successful sustainable transitions, but also transparency and open communication is a key component of this process. The absence of a clear transition pathway and unified direction is particularly problematic between different levels of government, as observed by a respondent:

> "There isn't sufficient joined up ambition between central government that is looking at the long-term strategy of [electric vehicle uptake] and the local government that is trying to deliver that" (Interview with P23, WPD).

Hence, I would argue that this lack of transition trajectory, in conjunction with shifting and inconsistent policy, has had a detrimental effect in terms of governing low carbon transitions because of a lack of long-term and coordinated strategy. This is particularly important for low carbon transitions which can result in different pathways dependent on timing and technological deployment, and the nature of the multi-level interactions, for example, the extent of incremental, purposive adjustments, and disruptive, uncoordinated and emergent transformation (Geels & Schot, 2007). Although it is recognised that pathways are not completely unchangeable and may be altered by local dynamics, they are nonetheless an important factor for transition governance.

The transition to a low carbon and equitable future is undoubtedly very dependent on changing infrastructure to more environmentally friendly technologies in the energy, housing and transport sectors, in particular. However, infrastructure investment can be problematic due to high costs which rely on investment and the prevalence of risk (Bolton & Hawkes, 2013). The lack of uncertainty at a national political level also exacerbates these economic barriers, since this can cause great instability and risk to investors, and thereby result in under-investment in infrastructure. To illustrate, this can be witnessed in the energy sector and the example of EVs:

> "I think one of the big challenges that we are going to have is the final end transition of a low carbon future. Once we've decided what that looks like, if that is going to be dominated by electricity supply, then we need a bigger network. We've done a lot of work on EV uptake and heat pump uptake, and the UK's uniquely not suited to that particular future with its current infrastructure […] When we get to the latter stages of a low carbon transition with a lot of the EV and heat pumps etc we need to

> start re-laying the low voltage network and that will be very, very expensive and time consuming. So, unless everyone is prepared to flex with their needs, then we are going to have to make some of that investment and someone is going to have to pay for it" (Interview with P27, WPD).

The current neoliberal economic growth model pursued by the national Conservative Government is centred on the necessity of the private sector for investment (as emphasised in Chapter 4). However, the absence of direction from central government has created an atmosphere of uncertainty, which in turn is problematic and counterproductive for stimulating private sector investment. This has had implications on the rolling out of electric vehicle infrastructure:

> "There not being enough infrastructure was one of the biggest reasons why people are not buying ultra-low emission vehicles (ULEVs) and why manufacturers weren't initially pushing for ULEVs because it was a chicken and egg situation - the infrastructure must come first or the vehicle must come first for the infrastructure to be there […] again it's showing the need for infrastructure investment to be able to push the market further" (Interview with P5, OLEV).

These statements demonstrate the ideational influence of neoliberal economics as a rationale for governing in the UK, with the logic that investments should be made by the private sector and left to market forces, and not supported by the state (Gillard, 2017). However, this again raises questions of whether the state should take a more interventionist role in transport planning (Banister, 2001). Furthermore, this spotlights the extent to which government intervention is required in a market-led approach to low carbon transport (Cooper, 2019), and raises issues of the uncertainty of responsibility with regards to who bears the costs for the electric vehicle infrastructure. The next section leads on to consider the justice dimensions that are not being addressed at the national level which in turn have an uneven effect of low carbon transitions at the urban level.

6.1.4. Government Ineffectiveness to tackle growing social inequalities

Particularly since 2010, social inequality has been growing in the UK which now has some of the highest levels of income inequality and regional inequality in comparison to other OECD countries (McCann, 2019). This has been exacerbated by austerity, welfare reforms and reduced public spending as a rhetoric to reduce the public deficit. In reality, these welfare cutbacks have had the most negative impact in the poorest areas, for example in places with higher concentrations of welfare claimants such as older industrial areas. This geographic variation is demonstrated in **Figure 6.4.**

In conjunction with this austerity and inattention to tackling social inequality from a national level, Bridge *et al.* (2013) highlight the significant geographical elements of low carbon transitions, and how factors such as location (absolute and relative), landscape, territoriality and spatial differentiation can generate new patterns of uneven development. Uneven and exclusionary funding from central government can lead to inconsistent and uneven finance for low carbon transitions for local authorities, which in turn has justice implications for cities. Like many cities, Nottingham is characterised by varying patterns of social inequality, with the highest percentage in Bulwell, as shown in **Figure 3.2**.

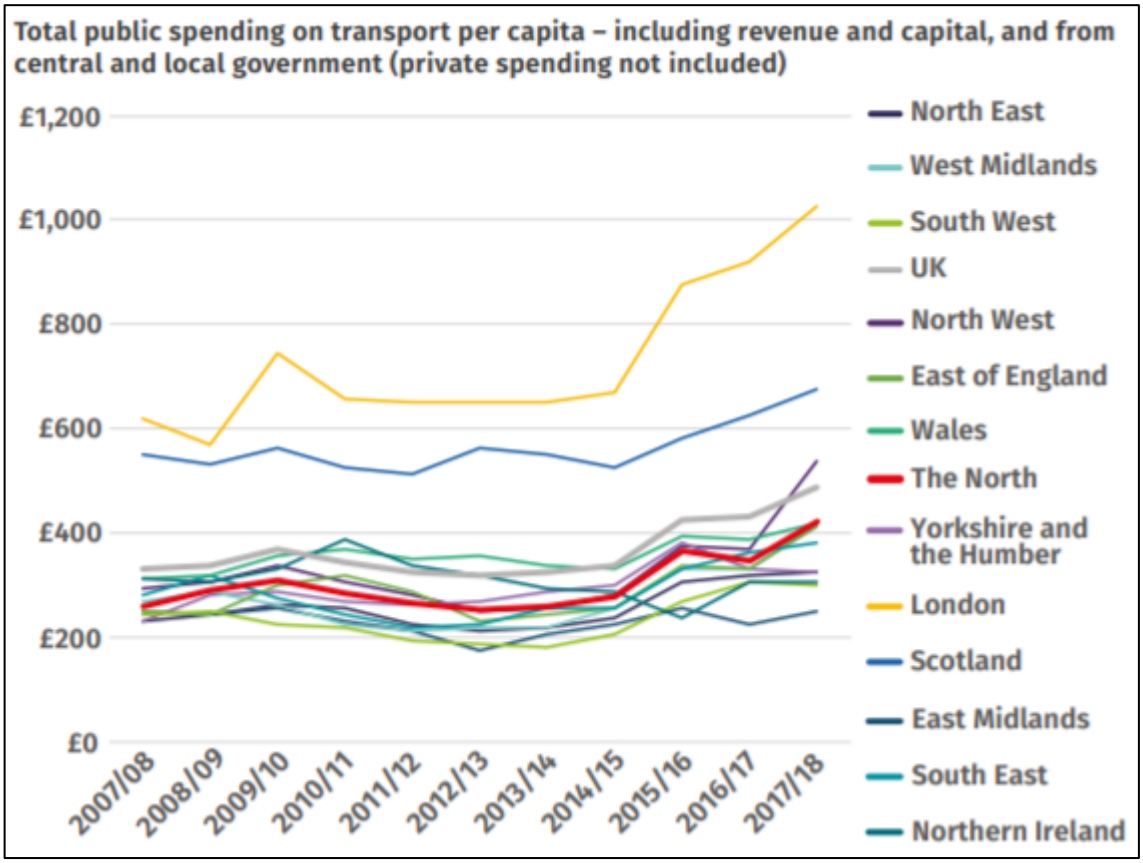

Figure 6.4: Transport spending per capita across the UK from 2007-2018 (Raikes, 2019, p.8).

One explanation for uneven development, particularly between urban areas, is due to the centralisation of finance in the UK, with England having one of the most centralised finance systems amongst OECD cities (McGough & Bessis, 2015). For example, UK local authorities have currently 18 per cent of their revenues raised locally, in comparison to European cities such as Denmark, Sweden, Finland and Norway which control 40-70 per

cent of their income (Friends of the Earth, 2015). Although the argument for greater autonomy for urban areas is not new, it is reiterated in the case for implementing low carbon and just transitions, as argued: “If there was much more devolution to reasonably-sized authorities around the country so they could actually work and develop their economies in a way that they saw fit, then that would be a much better way of doing it” (Interview with P4, Nottingham City Council). Whilst there has been some progress of fiscal devolution with the Cities and Local Government Devolution Act 2016, this progress is clearly not sufficient at this stage in Nottingham’s urban transition given the aforementioned limited fiscal decision-making and the wider context of austerity (Bulkeley *et al.* 2013; Robins *et al.* 2019).

The regional disparities in England are long-standing and the notion of the ‘North-South’ divide, that is, between formal industrial areas and rural areas in the North and Midlands, and between South and the South East, is particularly salient in political debate and the addressing of social inequality (MacKinnon, 2017). This uneven landscape is of particular importance for just transitions and reveals a spatial dimension to problems of funding for low carbon futures. Historically, spending in London and the South East has been disproportionately higher per person, as shown in **Figure 6.4** which illustrates that over the last decade, transport spending per capita has been more than twice as high in London than in the North. This disparity is projected to continue in planned transport spending, as indicated in **Figure 6.5**.

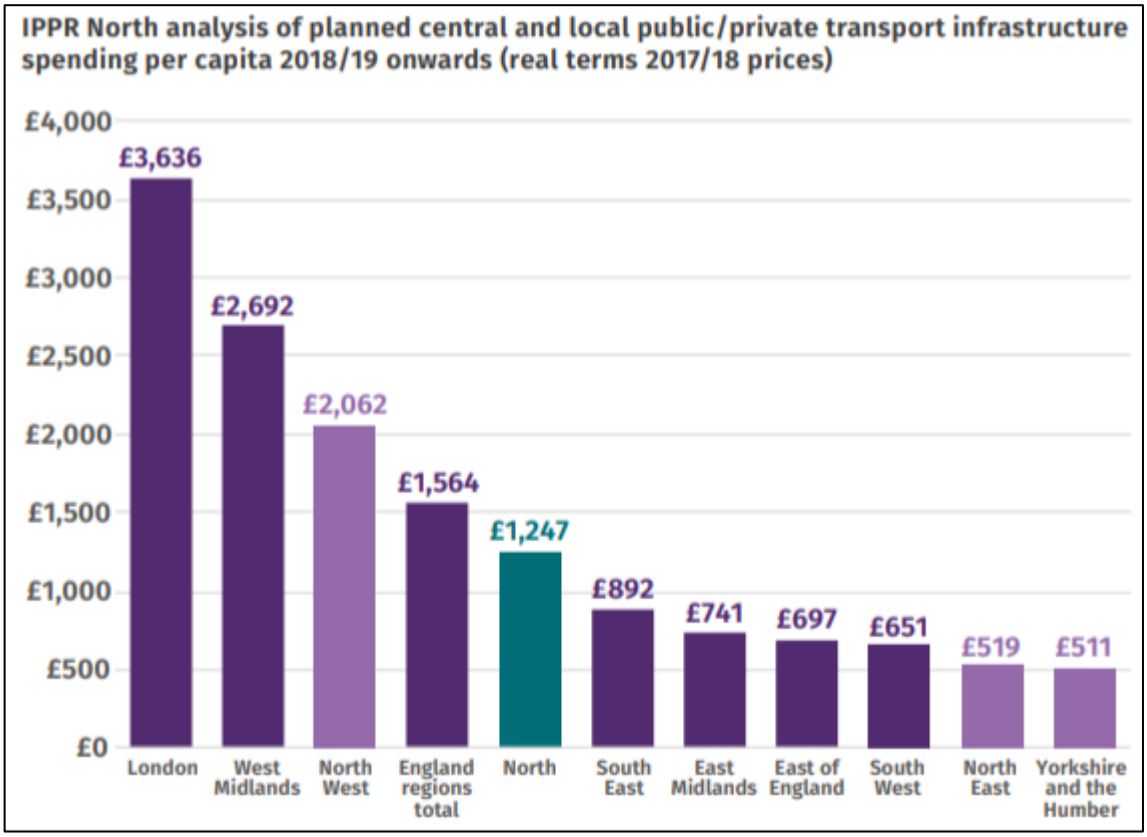

Figure 6.5: Planned transport spending across the UK from 2018/19 onwards (Raikes, 2019, p.13).

Furthermore, these arguments are exacerbated by the recent scrapping of the Midlands mainline electrification, which received heavy criticism from the areas affected, such as the East Midlands Chamber of Commerce, Nottingham City Council and advocacy groups such as Nottinghamshire Campaign for Better Transport. As a result, the region is disproportionately impacted which can produce and reinforce inequalities. A common explanation for regional inequality is that the central government's location in London has more centralised decision-making powers and control over prioritising development which is arguably focused in the south-east: "Because London is such an economic powerhouse it draws [in] so much of the funding and the people and the knowledge and expertise and the rest of the country is left almost on breadcrumbs" (Interview with P8, The Green Party). Therefore, the prioritisation of spending in London and the South East because of government centralisation, can result in a discontent amongst urban actors out-with these areas and echoes arguments that funding concentration to these areas act as a generator of deepening inequality (Massey, 2007). This can subsequently lead to greater problems of urban governance of low carbon and just transitions.

The cuts from central government to local government has led to ephemeral and unpredictable availability of funding, which consequently places an increased competition between local authorities (Gibbs & Lintz, 2016). For example, as discussed in detail in Chapter 5, Nottingham City Council has an income stream from the Energy Service Department and Workplace Parking Levy which helps fund some of its projects and also provides match-funding. However, Nottingham City Council is distinctive in this regard, and many English councils do not have such income streams as a result of privatising their assets. As part of funding conditions, many councils are required to provide match-funding to help facilitate the funding and to illustrate dedication, commitment, and a well thought-through sustainable plan as funding recipients. Match-funding can be beneficial for these aforementioned reasons, yet in many instances its requirement can disproportionately affect some councils more than others, and as such, they can be competitively phased out across the national scale. Although there is no official evidence or studies undertaken of the disproportionate impact on other councils, one respondent remarked:

> "[How money is allocated] is a really difficult question to answer. European funding such as ERDF (European Regional Development Fund) which many councils use to drive the transition is calculated on a needs and scale base, and so varies both in terms of size and match required. Some cities have used Devolution Deals to leverage more [central] Government funding but that obviously only covers 7 or 8 places. The Local Energy Programme is not city-focused and has attempted to give equal opportunity to each area – which is not the same as equal funding – as there is not enough to meet all demand. Some areas have additional funding for pilots and demonstrators and again this is done through competition so theoretically it is equal opportunity but again some benefit more than others – based on ability to bid, political support locally etc" (Interview with P9, BEIS).

It is clear from this comment that the disproportional allocation of funding for local councils is complex and warrants cause for concern as it is likely to exacerbate existing regional inequalities in the UK by providing some urban areas with increased (and more frequent) funding than others (Gray & Barford, 2018). For example, Hastings *et al.* (2015) note this disparity in England, with data between 2010/11 to 2014/2015 revealing that in 2015, the most deprived authorities received cuts of more than £220 per head compared with under £40 per head for the least deprived authorities.

Moreover, many low carbon funding streams are determined by the capacity and capability of councils to deliver successful outcomes and their historical involvement with sustainable energy systems which to reiterate is a core argument of this thesis. This means that they may favour those already more advanced in their transition strategies over those less advanced

authorities. For instance, Nottingham has tended to benefit from this, since the City Council has received funding[32] and has ensured the delivery of successful projects, in addition to having existing low carbon energy infrastructure such as a district heating network (as explored in Chapter 5), it performs competently from a funder perspective. Having had the opportunity to receive funding in the first instance has allowed a positive knock-on effect, but equally virtuous circle of funding to take place, which excludes other areas even more. Therefore, whilst there may be a rhetoric of equal opportunity, there is not a level playing field for local authorities, which can exacerbate inequalities, as Featherstone *et al*. (2012, p.179) highlight:

> Policy agendas that foster localism, but assume a level playing field exists by treating what are markedly unequal localities equally, risk deepening inequalities in material resources and social capital between and within communities.

As such, there is a particularly uneven landscape of funding which can therefore be exclusionary and problematic not only at the city level, but which can also reinforce disparities on a regional level (Hastings *et al.* 2015, LGA 2020c).

Streams of funding also remain unpredictable, ad-hoc and piecemeal, and this is because they are mostly dictated by political priorities at the time. As mentioned previously in the case of renewable energy, the scrappage of the Feed-in Tariff[33] in 2019 has been particularly problematic in terms of renewable energy projects, since this can change the financial viability of projects:

> "Some people just think we've got no certainty about what the situation is going to be like in the next 12 months' time, so why get into these kinds of schemes when we don't know if the support in this case is going to be around to make it worthwhile" (Interview with P1, APSE Energy).

This uncertainty and unpredictability of funding (and the broader lack of an effective renewable energy policy) is challenging governance for low carbon transitions at the urban scale since companies do not want to invest in ambiguous technologies or projects which

[32] An appropriate illustration of this is that in January 2016 Nottingham was one of four successful cities in securing funding for the Go Ultra Low City Programme. This involved £6.12 million of funding from the national government's Office for Low Emissions (OLEV) to support measures across Nottingham and Derby to support the uptake of Ultra Low Emission Vehicles.

[33] Introduced in 2010, the Feed-in Tariff is a government programme designed to promote renewable energy generation by paying small-scale renewable energy generators a fixed rate for each unit of electricity generated.

may change in the short-term. Moreover, this can be witnessed in the example of transport policy, and the ad-hoc and piecemeal nature of electric vehicle funding streams, as highlighted by one respondent:

> "There's a suggestion that [funding for the Local Transport Plan] is going to be reduced further so it's very difficult to implement measures. There are always pots of money and grants and initiatives that get announced […] it sometimes is difficult because you suddenly get clean bus grants, you get all these different pots all over the place, and you're bidding into initiatives that suddenly come along. It's very hard for us to put together our plan to say 'Right, this is our coordinated, integrated transport strategy for the next 10 years, we are going to do this'. It's very hard for us to do that." (Interview with P6, Nottingham City Council).

Whilst there has been a focus to develop electric vehicle infrastructure with targets set for almost every car and van to be zero emission by 2050 (DfT, 2018), the funding for electric vehicles has been criticised as ad-hoc and precarious, which as the quote emphasises makes it increasingly difficult for councils to plan ahead. Again, this can create difficulties with creating long-term strategy and planning, and echoes arguments of the lack of a coordinated, integrated strategy which resultantly stifles sustainable transport transitions (e.g. Banister, 2001). Relying on different sources of income is not completely negative for the third sector since it offers more resilience with regards to funding scrappages (Interview with P14, St Ann's Advice Centre). However, this uncertainty can be detrimental from a local government perspective, since it can encourage a system which is opportunistic, short-term and patchwork in nature, further rejecting the notion of clear, long-term decision-making and strategy.

Furthermore, funding can be dependent on the location and attributes of an area, and therefore can be asymmetric and exclusionary in nature and hinder low carbon transitions. Energy-related funding calls are often dominated by techno-economic thinking and neglect a societal dimension, which can hamper the governance of sustainable and just transitions, as highlighted by Foulds and Christensen (2016) using the case study of Horizon 2020. This is also illustrated in the energy supply sector which is technology-specific:

> "What the [central] government tends to do is they will focus on a certain technology - at the moment it's around heat networks […]. These are going to be in mostly big towns where there is a group of maybe a hospital, or a police station, a university or some big energy users close together […]. So they've cut the money for solar farms but they are making money for heat networks available […] of course not everybody has got a site which is appropriate for a heat network, so you're not going to have any benefit if it's a rural authority or if it's a rural area, and even some town centres

might not even have those particular circumstances – they're ruling people out which is another difficulty really" (Interview with P1, APSE Energy).

As asserted, this type of funding pattern can be detrimental for exclusion, for example in areas which are less densely populated and less compact, and therefore would not be as viable for heat network funding: "Some of the funding that is available is not suitable for what we are looking at. So, things like off-gas priorities, and there are very few off-gas properties in the city" (Interview with P12, Nottingham City Council). Whilst it can be argued that uniformity is unlikely due to the geographic nature of low carbon transitions (Bridge *et al.* 2013), this can nonetheless contribute to patterns of uneven development across the nation, further exacerbating inequalities and low carbon just transitions.

The barriers and tensions that have been discussed therefore demonstrate the economic, institutional and political causes, for example from austerity, ineffective regulation, lack of direction, and government ineffectiveness to tackle social inequality, all of which stem from the national level and impede urban governance. The identification of these barriers reinforces important arguments by Geels and Schot (2007) that in the context of transitions, there is a need to examine the macro-level developments that take place at the landscape level, since macro-level political, economic and social developments allow for external pressures to be considered. Needless to say, there are also obstacles that arise from the local level, as discussed next.

6.2. LOCAL LEVEL BARRIERS IMPEDING URBAN GOVERNANCE

Within low carbon and equitable transitions in urban areas, there are many differing interests from a wide range of actors and stakeholders, many of whom have vested and conflicting interests and the chances of contestation and disagreement are high. Even when there may appear to be overall consensus for ambitions of lowering emissions, problems still exist in how this is achieved. Overcoming incumbent systems and transitioning to a low carbon society is conditional upon changes to technology and investment which are locked-into contemporary business models (Foxon, 2002). As a result, low carbon projects require bolder and somewhat more controversial decisions to be made in terms of political backing, financial investment and risk in the face of higher levels of scrutiny and opposition (Geels, 2015). Therefore, the role of human agency, capacity and politics cannot be understated for delivering urban low carbon and inclusive transitions (Meadowcroft, 2011).

The investigation of the plurality of multiple actors within low carbon transitions has received much attention in transition literature. For effective multi-level governance and urban sustainable transition management, there should be equal engagement at the micro-level, i.e. across and between actor networks. Effective coordination and interaction are paramount for network governance of urban low carbon transitions, without which can cause practical implications for successful transitions on local, national and international scales.

For a successful transition[34], it is therefore crucial to investigate the micro-politics of sustainable just transitions, i.e. the internal dynamics of actor-networks and the practical implications and management of network governance (Spath & Rohracher, 2015). This is shaped by socio-spatial and context-specific factors, whereby the rules, practices, and identities shape where the transitions are situated, and in turn the actors who determine the shape, pace, scope and direction of transitions. Therefore, context is considered territorial and relational which are constituted through flows, locations, connections and scales that transcend boundaries (Gibbs & Krueger, 2005; Murphy, 2015).

I argue that the Nottingham example demonstrates that there are barriers experienced by multi-actor networks, and that a lack of political coordination, interaction, unequal dynamics of power, trust, and contestation are inhibiting network governance arrangements and the practicalities of implementing low carbon transitions at the local level, as highlighted next.

6.2.1. Contestation Within and Between Local Government

Since the 1980s, the global political economy has been dominated by a neoliberal political and economic order of free markets and private property (Cumbers & Traill, 2020). Balancing the needs and interests of all users can be problematic at a time when there is a shifting emphasis upon achieving sustainable business models (While *et al.* 2013). Despite being part of the same local authority, there are conflicting prioritisations between local government sectors and antagonism between actors which are stifling transitions at the urban level. For example, as stated by one interviewee within local government:

[34] It is acknowledged here that there are numerous ways of envisioning what may constitute a 'successful' transition, and that these perceptions can be influenced by multiple and contested social, cultural and political processes. For the purposes of this thesis, a successful transition is considered to be one which broadly achieves a low carbon trajectory, i.e. reduces carbon emissions, whilst also having transformative political, social economic benefits, i.e. having no disproportionate impacts on marginalised groups, whilst also reducing inequalities and exclusion (Luque-Ayala *et al*. 2018; Mundaca *et al.* 2018).

> "There are some areas where specific councils have to work where there is no overall control, Labour is in bed with the Lib Dems [Liberal Democrats], and they are not sure that someone might cross the floor and go with the Tories [Conservatives]" (Interview with Anonymous).

This comment suggests that a lack of common cross-party environmental agreements can lead to a degree of dissatisfaction, mistrust and caution within local government which are consequently challenging sustainable urban transitions. As highlighted in Chapters 4 and 5, the local government elections that occur within Nottingham (i.e. Nottingham City Council; Nottinghamshire County Council; and Nottinghamshire District Councils) all occur on four year cycles which are out-of-sync. Although this is the nature of a political democracy, since decision-making is often arguably planned and organised with electoral cycles and voters in mind (Meadowcroft, 2011), this can pose a notable challenge for cooperation and collaboration across different local authorities, which may in turn obstruct joined-up sustainable transitions at the local level.

Not only does the reduction in revenue as a result of austerity affect the financing of low carbon projects alone, this also has a negative knock-on effect on other council services by increasing competition and prioritisation between departments with certain sectors receiving greater cuts over others (Interview with P17, Nottingham City Council; Bulkeley & Kern, 2004). For instance, social care within local government has been relatively protected whereas cuts to services such as culture and environment and planning have been more severe, again reiterating a competing prioritisation in funding (Hastings *et al.* 2015).

A useful example to illustrate contestation within local government is Robin Hood Energy, as discussed previously in Chapter 5. The ESCo model, which was set up by Nottingham City Council, has been followed in only white-label arrangements[35] by other councils, but not been adopted in full by other councils, and the reasons for this are the financial and political risk aversions of councils:

> "It comes at a lot of cost and a lot of risk which I think is why we haven't seen it widely adopted. At the moment we've got to consider that councils are being squeezed and squeezed in terms of budgets. It's a very bold decision to make a large multi-million-pound investment to get a licensed energy supplier off-the-ground. You've got to have a lot of confidence to do that. So I think that's why the model hasn't been adopted more widely, I don't think we are going to get where the market

[35] In the energy market, a white-label provider is an organisation that offer energy tariffs as a partner supply, but does not hold a supply license.

> is completely flooded with councils operating fully licensed supply businesses, there's too much cost and risk […]" (Interview with P15, Robin Hood Energy).

This quote suitably illustrates that the financial and political risk aversion is problematic particularly in an energy market wherein municipalities must compete economically with multi-national, multi-million private companies, such as the 'Big Six'. It also appropriately demonstrates the compromises made in municipal decision-making between the short-term (e.g. in the interests of the electorate) against the long-term (e.g. in the interests of the environment) (Meadowcroft, 2011). Furthermore, Robin Hood Energy was loss-making for the first 2 years and (until it was privatised in September 2020), it was still expected to be paying off loans which were required for the ESCo to launch (Interview with P15, Robin Hood Energy). Although it is arguable that this can be expected for a new energy entrant for the first 2 years or more, this is still an overwhelming deterrent for most councils, which are actively trying to keep as risk-averse as possible both politically and financially, in the context of austerity and political longevity.

Furthermore, in October 2019 Robin Hood Energy secured an emergency £9.4 million loan in order not to have their license revoked due to a disputed failure to make outstanding payments for Renewables Obligation Certificates to the energy market regulator, Ofgem (Robin Hood Energy, 2019a). This was particularly controversial at the time, since Robin Hood Energy was a municipal company (therefore paid for by the public). These circumstances reiterate the financial risk of a young and small company being competitive in a complex energy market. Moreover, it underlines an on-going issue of dominant incumbents and the vulnerability of new entrants in the energy market (Poudineh, 2019), as highlighted:

> "I think there's a problem at the minute with the reputation of smaller suppliers because there have been a lot of new entrants. Some [new entrants] are really good, really well run. Some of them are not, some of them have gone out of business and taken customers credit balances away with them […] some of which there is no real vetting before they come to market and which they have not been operating in an ethically and sustainable way. I think there are issues with appearing price competitive at all times because again, a lot of new entrants are heavily loss-leading, it's not sustainable, we can't do that it wouldn't be right when we are funded by a public body loans money" (Interview with P15, Robin Hood Energy).

This comment importantly raises attention of the increased number of small energy providers having gone out of business in the UK. Since these companies are operating within a highly competitive landscape dominated by a privatised system and have no grid and distributional

capabilities, they have limited control and capacity over the larger private corporations and rising prices on wholesale energy markets, therefore suffer as a result (Cumbers & Traill, 2020). This includes non-profit suppliers such as Our Power (which was owned by a coalition of Scottish housing associations) becoming insolvent, as well as smaller companies such as Economy Energy, Spark Energy and Extra Energy (BBC, 2019b; Cumbers & Traill, 2020). In this regard, growth was a particular concern for Robin Hood Energy:

> "As the turnover increases there's a bigger financial risk and we have to recruit and expand, and as soon as we hit that 250,000 account mark, a certain number of charges that come in that we have to add onto the customer's bill, so we will have to take a step back in terms of competitiveness so it's about how we cross that threshold without losing our competitive edge" (Interview with P15, Robin Hood Energy).

As stressed, there are conflicting factors at play, such as the difficulties of new market entrants surviving amongst the incumbent companies with non-traditional business models, financial and political risk, and challenges of sustainable business growth and consumer reputation. Furthermore, this demonstrates that the current energy market in the UK treats incumbent energy companies and municipal ESCos as if they were equal (Interview with P15, Robin Hood Energy). However, this is evidently not the case as there is clearly an advantage for incumbents and not a level playing field, with different economies of scale, scope and sunk costs (Poudineh, 2019). The motivations and business models of incumbent energy companies versus municipal ESCos are also different; for example, incumbent energy companies operate on a for-profit basis with limited social and environmental objectives in comparison to municipal ESCos which are owned by local government operating on a not-for-profit basis with social and environmental ethos. Ultimately, I argue that it is the functioning of the energy market more broadly that was the result of the failing sustainability of Robin Hood Energy.

In addition, in 2019 the energy regulator Ofgem introduced stringent tests, for example, proof of sufficient funding for the first year of operation, in order to prevent the risk of supplier failure (Shrestka, 2019). Whilst this is arguably protecting consumers, this opens up the debate as to whether the UK's energy regulations should be more supportive towards decentralised energy across the energy market, i.e. whether there should be a shift for more supportive and favourable regulatory measures for those with non-profit, environmental and social objectives. For example, this could be through a combination of local, community, regional and national state ownership models of energy systems (such as grid and associated

infrastructure), as per arguments by Cumbers *et al.* (2013), Hall (2016) and Hawkey *et al.* (2014).

Moreover, I argue that based on this research Nottingham has demonstrated that the need for a sustainable economic income is a priority whilst transitioning to a low carbon and equitable future, particularly from a local government perspective. On the one hand, this is not surprising given the context of austerity and that Nottingham has been relatively successful with regard to its transport network; yet, on the other hand, the prevailing need for economic arguments can present obstacles.

Turning now to the transport sector, an example of this contestation is evident in the bus fleet replacement programme in Nottingham, where it can be difficult to implement sustainable technological changes due to the economic and subsequent technological lock-in of fossil fuel-based systems. According to Nottingham City Council, the programme of replacing diesel buses with electric buses must be done gradually, since the diesel buses are still functional and this would be of detrimental economic impact for the City Council: "Obviously [Nottingham City Transport] can't just write off a load of perfectly good buses, they have to tie in with their fleet replacement programme" (Interview with P7, Nottingham City Council). This is therefore an operational challenge for the Council in terms of implementing low carbon transitions which although may be more sustainable, might have higher implementation costs, and the slower, incremental nature of change (in comparison to a faster, radical reorientation of new technology) adds a delay in timing. Such reluctance to invest immediately in sustainable solutions also transcends to private sector transport operators, as a result of competing commercial and technological reasons, and therefore decelerates efforts to transition to low carbon urban systems and exacerbates economic and technological lock-in.

The competing prioritisations are experienced in the transport sector in Nottingham, with the pressure on multi-modal transport (such as walking, cycling and use of electric vehicles). This results in rivalling demands for the limited road space that is available, which can have significant implications for urban, transportation and mobilities justice (Nello-Deakin, 2019). The provision of 'fair' distribution of road space can be inherently problematic, as highlighted:

> "We want high quality facilities which gives road space to the cyclists [and] with quite narrow roads often, you've got to take [away] parking for the travelling

> motorists, which can lead to conflicts as it's less easy for them to travel around. The space could be used by public transport which is the thing you want to promote, like the tram for example, and trams and bicycles often don't mix as of the tram tracks, as we know from Edinburgh's experience" (Interview with P21, Nottingham City Council).

With regards to the implementation and operation of Edinburgh's tram installation, cycle tracks on roads were removed to allow sufficient space for the tram on the roads. However, there have been safety concerns regarding cyclists along tram routes, with instances of tyres getting stuck or slipping on the tram lines and resulting in injuries and fatalities (Spokes, 2019). In Nottingham's instance, there have been efforts to integrate multi-modal transport, but the competing interests encountered reiterates that progressing a low-cost, equitable urban transition in a moderate timeframe whilst balancing the needs of different road space users is a challenging task which should not be underestimated. An appropriate example of this is the current banning of bicycles on Nottingham's trams due to the minimal space available once provisions for wheelchairs and pushchairs have been put in place (Interview with P32, Nottingham Express Transit). Whilst Nottingham's policy is the same for trams in Manchester and Birmingham, Edinburgh has taken a different approach and allows bikes on trams out-with peak hours.

These examples therefore firstly highlight the different priorities of various needs and users, and the antagonisms which may arise between these interests and groups in the energy and transport sectors within the local government. Secondly, this emphasises the somewhat controversial and fractured planning in local government, and the lack of coordinated strategy (Castan Broto & Westman, 2020; Fuchs & Hinderer, 2014). As a result, sectors operate in political siloes and are restrictive to their own economic priorities and interests, which can have a negative impact on low carbon and equitable transitions, for example sustainable transport.

The variation in political structures across UK councils is a particular matter of contention for sustainable transitions. As emphasised, Nottingham City Council as a unitary authority has responsibility of all the services it provides. Whilst this can be viewed as positive in terms of decreasing the need to collaborate with other actors, this can also raise negative views as the City Council risks becoming too independent and not collaborating with other actors, as stated:

> "[The City Council] can just do [projects] themselves as they are a unitary authority. So I'm not sure they are great at partnership working. As a County [Council] we have to collaborate with the Districts [Councils] more. There will be political differences that make that a bit more difficult" (Interview with P18, Nottinghamshire County Council).

From the standpoint of the neighbouring two-tier authority Nottinghamshire County Council, the asymmetric responsibilities result in the councils having different and often opposing agendas which can consequently make city-wide implementation difficult. The devolution of responsibilities between Nottinghamshire's district councils is also problematic, and can lead to barriers for networking (i.e. collaboration between actors), since political priorities can be diverse. Such networking issues between and within municipalities are concerning, particularly in terms of knowledge-sharing and collaboration, both of which are fundamental for low carbon and equitable transitions (Bush *et al*. 2017). Whilst there is no easy solution, it is acknowledged that the political make-up of councils in the UK (and therefore the differing electoral cycles that they adhere to) is particularly convoluted, which has also produced political barriers for low carbon transitions.

The lack of networking by the City Council with other actors can also be identified in one of their schemes. Take for example the energy supply sector. As previously introduced in Chapter 5, Robin Hood Energy was an energy services company (ESCo) owned and delivered by Nottingham City Council in response to alleviate of fuel poverty, which is particularly high in the Nottingham area and affected 15 per cent (or 18,980 residents) in 2016/2017. From being a wholly owned council initiative, the ESCo was not-for-profit and had a particularly strong social justice element in comparison to traditional energy utilities, before falling into administration in 2020.

During research it was discovered that whilst Robin Hood Energy had successfully networked with several other councils across the UK in 'white-label' arrangements, e.g. Doncaster (as shown in **Figure 6.6**), it had not collaborated with its neighbouring authority Nottinghamshire County Council. As such, opportunities may have been missed:

> "In terms of the energy services company, I think that's just something the city (council) have gone on and done […] I think there are opportunities which have been missed. For example, take Robin Hood Energy (RHE) (and this is a personal view), if you were to ask people which county is [RHE] associated with, it is associated with Nottinghamshire and that would include the city – so the brand of RHE actually would have traction outside of the city. But, it's very much a city set-up company. I don't know if there was any approach whether the county would have a role,

> obviously there would be difficulties working jointly because it's about are you willing to share that risk and investment? But I suppose if you look at it from the outside you might think, that's a million people in Nottinghamshire that you could present something to, rather than a quarter of a million in the city" (Interview with P18, Nottinghamshire County Council).

The exclusion of Nottinghamshire County Council is somewhat surprising given that Nottinghamshire County Council administrative area covers some of the city's boundary. There are multiple benefits from collaboration such as a larger customer base, better local authority relationship, and a greater level of legitimacy with respect to energy governance since the local authorities may take credit for successfully delivered projects (Hannon & Bolton, 2015). However, whilst there is a degree of insulation from operating as a separate legal entity, an unsuccessful project can also be negative for the councils, as specified economically and politically.

It is also questionable why an arrangement between county and city council could not be organised, for instance Fosse Energy is a white-label energy company by Leicester City Council and Leicestershire County Council, in partnership with Robin Hood Energy and can therefore be held up as an exemplar (Fosse Energy, 2020). Considering the collaboration of City Council and County Council in the example of Fosse Energy, this poses the question of why Nottinghamshire County Council had not been involved to date with Nottingham City Council's Robin Hood Energy (Interview with P26, Great North Energy). A potential reason for the lack of collaboration as suggested is the political differences between the councils, with Nottingham City Council having a Labour leadership at the time, and Nottinghamshire County Council having a changing political leadership (as discussed previously in Chapters 4 and 5). The role of intermediaries is a possible solution for the lack of engagement and knowledge-sharing between urban actors (e.g. Bush *et al.* 2017; Hodson & Marvin, 2010; Hodson *et al.* 2013). Yet, the possible role of intermediaries for a potential strategic energy plan is unclear in this example. Nevertheless, the lack of collaboration on this venture across the urban scale is an interesting critique which can be viewed as hindering low carbon and equitable transitions in this context.

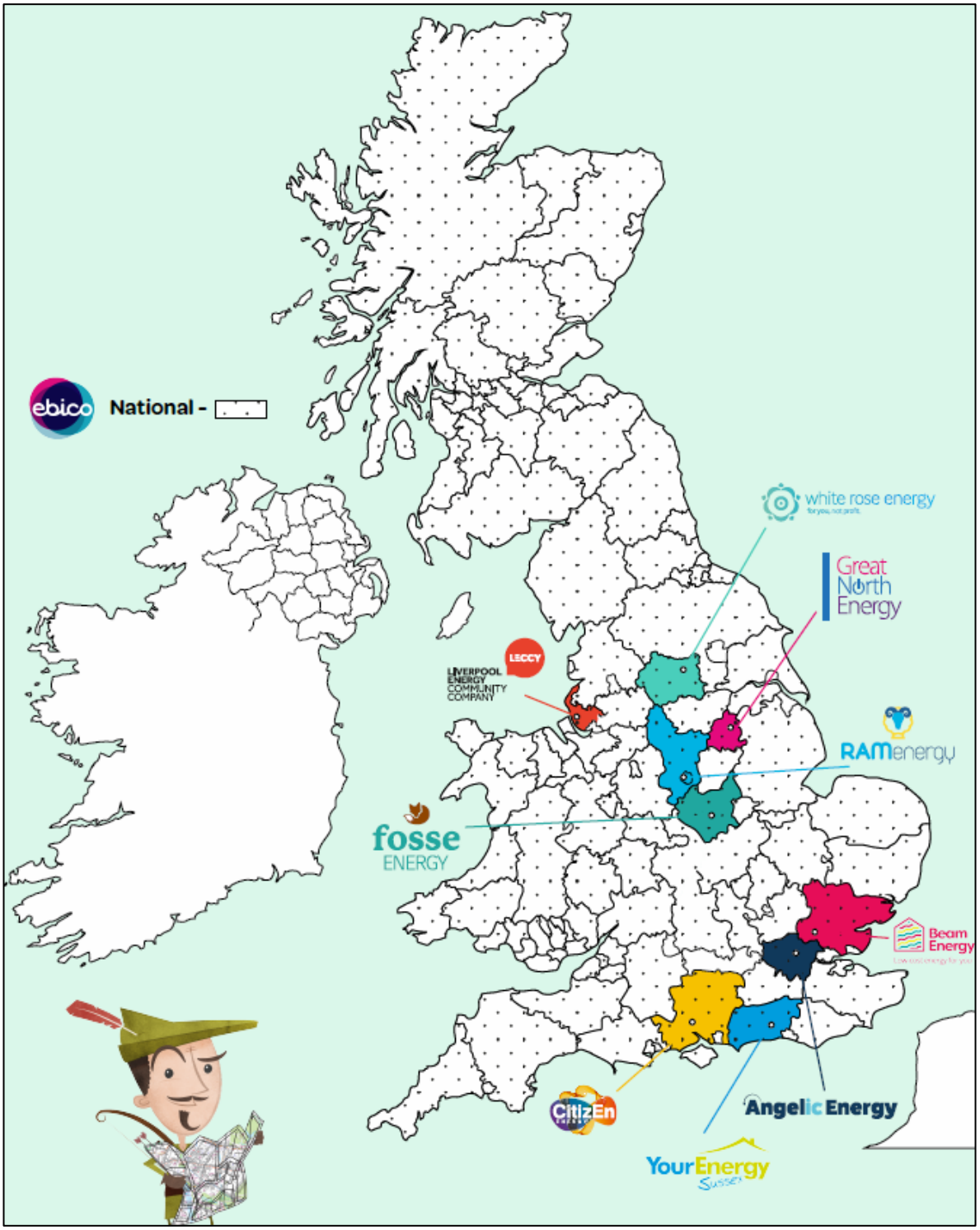

Figure 6.6: Robin Hood Energy white-label location map (Robin Hood Energy, 2019b).

6.2.2. Problematic Local Multi-Actor Engagement

When implementing low carbon and just transitions there is generally a shared interest and a common goal, although alignment is not guaranteed. Instead, there may be considerable differences which exist between agendas of different actors that can lead to conflicts

(Hannon & Bolton, 2015; Spath & Rohracher, 2015). A degree of conflict is expected (or perhaps unavoidable to a certain extent) between different political parties, structures and actors. However, the existence of conflict between actors may hinder or suppress the capacities of actor networks to govern low carbon urban transitions (Sovacool & Brisbois, 2019). It is therefore important to consider the ways in which these conflicts are understood and negotiated, as they can reflect the operational obstacles when implementing low carbon transitions across the urban area in practice.

As discussed in Chapter 5, the political leadership at Nottingham City Council has been particularly stable since 1991 with a Labour administration. On one level this can be beneficial for long-term planning, but this can also produce negative consequences which affect networking as there is a pattern of consistency and stability which may cause resistance to change and the status quo:

> "The downside of [political stability] is I think, and a lot of people think, is that [Nottingham City Council] have become a bit complacent and set in their ways. There is a certain arrogance there that 'we believe in things done our way and that people develop us' or other bodies that come to Nottingham find the council a bit entrenched and find them a bit difficult to work with because it is often 'you do it our way or you do not do it at all'" (Anonymised Interview).

The lack of networking by the City Council is an opinion that is also experienced and expressed by one third sector community organisation:

> "Our own local authority [Nottingham City Council] at times have been difficult because they don't like people doing things that they haven't initiated. […] Nottingham City Council are very proud of what they've done, but they want to control it all. They've done some great stuff, it's fantastic, but there is this mentality about a lot of things the City [Council] does, it's not just energy, they don't like people doing stuff off their own backs. And if these things are successful, they are suddenly claiming that it's this thing they've developed" (Interview with P11, MOZES).

As such, the above narrative reflects the perception and experiences of multi-actor coordination and possibilities of resistance to collaborative working (Sovacool & Brisbois, 2019). This highlights the power dynamics between the differing actors and sectors of transitions and a degree of animosity across sectors.

Moreover, the transition to low carbon transport is an interesting example to reflect the complicated dynamics of multi-actor relationships. Part of this is due to transport being de-

regulated in the UK. While local government actors attempt to work with the private bus operators, their influence on operators is limited to an extent, leading to a greater potential for disagreement and delay when decisions must be taken by a consortium of stakeholders in any given scheme (Scottish Executive Social Research, 2004). An illustration of this is the multi-operator transport card Robin Hood Network which is fully administered by the Council and is intended to allow multi-modal transport across a network of bus, tram and rail operators (Nottingham City Council, 2016b). Nevertheless, operator participation is voluntary, as highlighted:

> "At any point in time [the operators] can choose to withdraw [from the Robin Hood Scheme]. So, we have to work walking on eggshells. It's an interesting relationship between us and the operators sometimes, because they do know effectively that they have power really. But we've done pretty well to get the Robin Hood as it is, and it is a fully smart scheme. Our issue with it is that there is a premium for interchange between bus and tram and different operating companies" (Interview with P7, Nottingham City Council).

As reflected upon by Nottingham City Council, there have been difficulties implementing the multi-modal ticket, due to multi-modal tickets being more expensive than individual operator tickets, to encourage season-ticket purchasers for using one operator. This was also identified as a barrier by Turner and Smith (2001, in Scottish Executive Social Research, 2004), who stated that the varying and irreconcilable fare policies and/or structures might deter a potential transport partner in the scheme from participating in multi-modal ticketing schemes. This is a drawback from a user perspective, with the inflexibility to accommodate different service operators on multi-modal tickets resulting in an increase in fares, and therefore has certain justice dimensions.

Consequently, the degree of decision-making for the transport sector in Nottingham is limited for the City Council and suggests that compromises have been made in favour of private and commercial coordination. Furthermore, as highlighted by Go Ultra Low Nottingham, to avoid the confrontations of working with multiple stakeholders, the focus has been primarily on implementing charge-points within Council-owned car parks only:

> "[…] It's so much harder to work with private sector business [in comparison to local authorities]. A lot of [private sector businesses] will already have ongoing contracts with major charge-point providers who may not be the one we've selected. But also they can have someone from [their] head office saying 'oh yeh you should look at this charging', but it's still up to the managers of those locations to decide if they want it. And if they don't see if it's the future or they don't see that they need it, then they won't go for it. Whereas, because the council own the car parks we can basically

> say ‘yes it’s council-owned so we can basically put it in’” (Interview with P35, Nottingham City Council).

Again, this highlights the obstacles when working across sectors and stakeholders with different interests, priorities, assets and organisational structures (Jeffrey, 2019). It emphasises the importance of public ownership in terms of low carbon transitions outlined in Chapter 5, whereby cooperation and the harnessing of synergies play a major role in the context of re-municipalisation, and as witnessed for example in the German energy sector and the transition to more democratic forms of energy ownership (Cumbers, 2016; Wagner & Berlo, 2015). This is further reinforced by **Table 6.1**, which illustrates the uneven ratio of charging points to EVs and of distance to charging points across Nottinghamshire. It demonstrates that in some areas, owning an electric car is more than ten times easier in some parts of Nottinghamshire e.g. Gedling, Broxtowe and Mansfield, in comparison to others e.g. Bassetlaw and Newark and Sherwood. This therefore raises a justice dimension as some poorer communities may have to travel further to access charge points. Since charge points have mostly been installed privately, this variation and unevenness across the urban conurbation is likely to be due to networking barriers and other factors (e.g. grid capacity), therefore stifling transitions in different ways across space (Whitfield, 2019).

Local authority	***No. of charging locations***	***No. of licensed vehicles***	***Rate of charging locations per 1,000 vehicles licensed***	***Mean average distance (km)***
Ashfield	2	136	1.5	2.85
Bassetlaw	10	153	6.5	4.48
Broxtowe	3	185	1.6	1.07
Gedling	7	191	3.7	0.41
Mansfield	5	127	3.9	1.11
Newark and Sherwood	10	218	4.6	4.34
Nottingham	50	384	13.0	0.40
Rushcliffe	3	262	1.1	4.16
NOTTS AVERAGE	**11**	**207**	**45.0**	**2.35**

Table 6.1: Electric vehicle charge points across Nottingham and Nottinghamshire (Whitfield, 2019)

In addition to networking barriers with local government, there have also been criticisms of inadequate and unsatisfactory engagement, particularly from third sector organisations regarding the private sector. One such example is within the energy supply sector with regard

to repayments of fuel debt and breaking away from fuel poverty. As noted in the following quotes, the question of commitment by many of the private sector is speculated, and whether many of the campaigns are tokenistic or superficial because of the need for social corporate responsibility. For example*:*

> "I feel sometimes it's a tick-box exercise, I do personally because of course they do want to come over as being caring […] even that simple thing that the fact why not allow them [residents in arrears] to pay 2 weeks if they get paid fortnightly? I've asked this time and time again, and nobody can give me a specific answer. It's as broad as it's long, but if that was the case and that was changed then that is a genuine method of being able to help somebody" (Interview with P25, Nottingham City Homes).

It is important to reflect on these narratives, particularly because such opinions and interactions can create barriers which can hinder transitions. Similarly, feelings of mistrust and disengagement were echoed by the third sector:

> "We tried very hard at the beginning to work with British Gas and collaborate with them and do stuff, get them to involve themselves and we did some of their competitions and they did give us some money. But we found very quickly that they only wanted to get engaged [because] we were trialling what they could roll out commercially. They weren't really interested in community stuff at all. So energy companies have been a problem, trying to deal with them […] they come to us wanting to be engaged in communities, it's rubbish. You can't trust them" (Interview with P11, MOZES).

These narratives therefore reinforce the multi-actor conflict that is associated with low carbon transitions, and the multi-scalar level of (mis)trust in socio-technical transitions, for example, at the micro-scale (between individuals), at the meso-scale (between organisations), and at the macro-scale (due to structural factors within society, such as class and gender) (Murphy, 2015). Whilst these levels can overlap, the wider point is that they can manifest and make it difficult to re-direct trajectories towards more sustainable and equitable outcomes, and therefore act as a barrier. This political tension and contestation are key arguments here. It further highlights the need to re-examine the nuances of urban politics which are as a result of contestation between different groups and interests in the urban area, instead of simply assuming that climate policy is solely due to neoliberal rationalities (North *et al.* 2017). Furthermore, this emphasises the complexity of sustainable and equitable transitions, in that they are multi-faceted in practice. By promoting alternatives to business-as-usual systems, these antagonisms and contestations cause the continuous re-making of

places and reconfiguration of power structure, institutions, and positionalities (Murphy, 2015).

As highlighted previously, the impact of austerity has had a significant impact on the capacity of urban staff to deliver low carbon and equitable transitions. This lack of capacity and resources across state and non-state sectors has had a significant impact on local level engagement, as highlighted:

> "15 years ago we used to have lots and lots of people in businesses with dedicated travel plans and more and more often you see that role being devolved and put on the side of somebody else there because businesses are really under pressure.…I think finding the right people to engage and then escalating that up to senior management is always very, very difficult" (Interview with P16, The Big Wheel).

As such, it is important to recognise the impact of austerity on non-state actors in society, and the subsequent hindrances this can cause for low carbon and inclusive transitions. Featherstone *et al.* (2012) emphasise that austerity localism can decentralise power to certain people, instead of providing an equitable process of decentralisation. This leads to the same default actors becoming involved in the provision of resources, expertise and social capital, which in turn reinforces existing power relations, social marginalisation, and inequalities within communities. Therefore, it is increasingly difficult to engage with actors out-with the status quo, which can undermine low carbon and equitable urban transitions.

Furthermore, when promoting energy efficiency in private domestic housing, a lack of engagement from private landlords is a particularly difficult barrier and can affect low carbon transitions at the local level. The uncertainty and unpredictability of funding also extends to energy efficiency in the private housing sector in Nottingham. There has been a significant increase in the private housing sector (rental and owner-occupied), which represents 20 per cent of the housing market in England in 2019, compared to 10 per cent in 1999 (O'Neill & Gibbs, 2020). As highlighted by Emden *et al.* (2018), many landlords may be unwilling to pay costs of energy efficiency upgrades above the legal requirement cap of £2,500. This landlord-tenant problem is one of the market failures which affect efficiency in energy markets, and is commonly referred to a problem of 'split-incentive' whereby the benefits for energy efficiency investment will be financed by the landlord, however the benefits will be reaped directly by the tenant, without a direct influence on the rent the landlord can charge (Babie & Leadbeter, 2014). Therefore, this can lead to issues in the increasingly competitive private-rented sector in harder to treat properties such as older,

Victorian properties in the inner city (Interview with P31, NEP). This also brings in the notion of urban materiality as a constraint of low carbon transitions, as reinforced by one interviewee:

> "We've got to do [sustainable transitions] with the existing buildings we have here. Historically, Germany built and rebuilt a lot of its cities in the 50s and 60s. We still have cities with hundreds of thousands of Victorian houses, we can't apply the same technology and outcomes to those, so we have to learn and adapt for the building and infrastructure and urban design, rather than saying 'Oh look they've done it, so we can do it, we can just copy them'. Everything is the same in terms of the problem, but everything is different in terms of the solution" (Interview with P9, BEIS).

This quote above appropriately demonstrates that the materiality of buildings and infrastructure and the lock-in of these systems is raised as a key barrier to urban transitions. Undoubtedly, in the case of buildings this can create problems and increased inequalities for certain populations, particularly those with vulnerable occupants such as disabled, elderly and minority groups, and lead to difficulties implementing uniform sustainable transitions.

6.2.3. Local Societal Resistance

The changing of behaviour at household (or individual) level is identified as a key issue for low carbon and equitable transitions, and has been referenced as an obstacle for pursuing sustainable and just transitions in Nottingham. One example highlighted by Nottingham City Council is the barriers encountered for reducing fuel poverty. Although Robin Hood Energy had taken steps to switching void properties, there were still non-switching customers which presented a challenge for the company to address. This could have been due to a lack of awareness or willpower from consumers; fuel-poor consumers are less likely than more active customers to switch to cheaper tariffs, leaving them left behind to pay the higher prices charged as large energy companies lose their market share, which in turn worsens the depth of fuel poverty they experience (TNS, 2016 in Emden *et al.* 2018).

To overcome this drawback, Robin Hood Energy and Nottingham City Council stated that they had engaged with communities by hosting and attending local events and engaged directly with faith and worship groups and other community initiatives. However, this was limited in scope and also very resource-intensive, and therefore added to existing financial stresses:

> "You might send a couple of people out into a local estate to engage with residents for a full day and get a very small number of switches back, so it's not cost effective in that sense but that's the way you have to engage with certain communities" (Interview with P15, Robin Hood Energy).

Not only is the lack of change in behavioural and engagement represented by local government, but it also extends to those experienced by the charity sector, and the persisting problem of behavioural change for reducing fuel poverty:

> "I think changing behaviour is the biggest challenge as we need to ensure tenants are not in the same position next year. So quite often what can happen is that I will go and arrange to cut the debt to the back of the meter, they will make that arrangement until the energy trust has kicked in, and wiped the debt. Then when we go and do the gas service the following year, they've got no credit on the meter so they've not learnt that or taken on board the advice given. So that's a big thing. Change in behaviour is a massive thing, it's like to turn the titanic around, it's so difficult" (Interview with P25, Nottingham City Homes).

This reinforces the lack of awareness of the causes of fuel poverty, which in turn can create a vicious cycle for those living within these circumstances (Emden *et al.* 2018). As highlighted by Kearns *et al*. (2019), occupant behaviour can be counterproductive for reducing fuel poverty and energy efficiency interventions as this may cause what is termed a 'rebound effect', whereby some households may decide to 'take-back' some of the gains of energy efficiency measures by increasing the use of energy to raise thermal comfort, and subsequently not change their own behaviours. As such, the motive of consumers and their engagement with fuel poverty is an important consideration for enabling low carbon urban transitions. The lack of awareness could be caused by lack of education on the matter, and as Bailey and Hodgson (2017) argue, there is evidence particularly in the UK of a dominant, negative cultural narrative of energy providers and their customers having high levels of mistrust.

The lack of engagement in energy efficiency is not only observed in individuals and households, but also by private landlords and the private housing sector. This is particularly detrimental for the city since there is a high proportion of privately-rented accommodation from landlords and letting agencies in Nottingham, with latest statistics from 2011 revealing this to be 21.6 per cent of households by tenure, in comparison to 15.4 per cent in England as a whole (ONS, 2011). As mentioned previously, since landlords in the domestic private-rented sector are only willing to meet minimum legal requirements for energy efficiency as set out by national government, the City Council considers itself limited in what it can

enforce, reiterating a sense of inertia due to a lack of legal mandate (Embden *et al.* 2018). As a result, those in privately-rented accommodation are three times more likely to suffer from issues of fuel poverty, in comparison to those living in social housing.

As aforementioned, Nottingham City Council has committed to addressing the issue of energy-efficiency in private-rented housing through the Minimum Energy Efficiency Standards (MEES) legislation, which was brought in by the UK Government Clean Growth Plan for all UK homes to have an Energy Performance Certificate (EPC) band C by 2035 and for fuel poor homes by 2030, and the Housing Act 2004 including selective licensing (Nottingham City Council, 2018a; 2018c). MEES has been criticised for its lack of enforcement from a council perspective across England and Wales, however this has been linked to the lack of capacity at a local authority level (Ebico Trust, 2019). Furthermore, although this scheme is the first of its kind in terms of introducing minimum standards in the sector, it has limited potential due to many exemptions (Ebico Trust, 2019). Again, like many different UK environmental policies, the longevity of this regulation is questionable, as highlighted:

> "It is something that was launched for a particular timeframe for a particular purpose and will be reviewed. It was to try and make sure the (energy efficiency) standards are there, and bring standards and regulations into the spotlight, and enforcement as a way of getting minimum standards up" (Interview with P12, Nottingham City Council).

This reiterates arguments of the dismantling of legislation for the housing sector in the UK within recent years, and the challenges this causes for governing low carbon and inclusive urban transitions (O'Neill & Gibbs, 2020).

Turning now to the transport sector, the lack of changing behaviour at individual level is also recurrent, for example in the encouragement of electric vehicle usage. The shift to electric vehicles is particularly contentious for low carbon transports and has been widely criticised in sustainable transitions debate. Whilst proponents argue that over the lifecycle of the electric vehicle the technology is more sustainable than that of conventional internal combustion engines, opponents dispute this due to increased electricity requirements and the sourcing of fragile raw materials of batteries such as lithium (e.g. Liaw & Pistoia, 2018; Sovacool *et al.* 2019). Furthermore, electric vehicles arguably do not encourage a modal shift in transport use and can cause an increase in inequality due to high costs of electric vehicles and its supporting infrastructure (e.g. Sovacool *et al.* 2019). In Nottingham, one

interviewee highlighted that electric vehicles are very much the focus of Nottingham City Council's transport transition, with cycling regarded as a lower priority, behind the tram and bus network:

> "We have a culture [in the UK] where cycling is not aspirational at all. We could give away bike after bike to people who are here in the country because either they have achieved refugee status or they are seeking asylum. We could give so many bikes away. But trying to encourage people who have been born in this country to do that because they've grown up in this culture, is way more challenging. People associate it with images of poor people, the aspiration is for everyone to own a car, because that's 'cool'… […] It's trying to push that cultural shift, there's just this cultural resistance" (Interview with P21, Nottingham City Council).

This also potentially relates to automobile drivers and their attitudes towards cycling:

> "Transport is a secondary thought, they jump in their cars because they don't give it any thought, it's habitual, it's just there, it's natural that you just get in your car and go. I think there's a massive issue there about breaking that cycle" (Interview with P16, The Big Wheel).

Again, the issue of the lack of education on the health and environmental benefits of active travel is present in these barriers (Interview with P13, anonymous third sector). As aforementioned regarding the contestation between tram line and cycling space, concerns for safety may also compound public resistance to engage in cycling as a method of transport (Hopkins & Higham, 2016). This suitably links back to the concept of urban materiality and the reciprocal, interlinking and complex nature between both human and non-human agents. This stresses the importance of considering the strong emotional and personal investments of urban spaces and materials, which in turn can alter individual and collective agency (Coe & Jorhus-Lier, 2010; Rutherford, 2014).

Insufficient engagement and participation by the local community is a significant roadblock for implementing urban transitions. This includes blockages in the social acceptance of low carbon technologies and measures, such as cycling with regards to safety concerns as mentioned previously. As suggested by Vladimirov and Galev (2017), passive agreement is not enough; instead, the active participation of whole social groups, both on collective and individual levels is necessary to facilitate the large-scale transformation to low carbon cities. This reiterates arguments for greater community engagement in decision-making, which can not only lead to increased awareness and participation, but increased democracy and decision-making, an important component for equitable transitions by ensuring all voices are included (Featherstone *et al.* 2012). Furthermore, the transition to a low carbon and

inclusive future is not simply a technical or financial matter but requires the willpower and behavioural change of society which is an evident and significant barrier from the Nottingham example.

6.3. CONCLUSION

To transition towards low carbon and inclusive urban futures, it is important to investigate barriers experienced by a range of actors in practice. In this chapter I have highlighted the complex, multi-faceted, fluid and interlinked nature of low carbon transitions experienced at the urban level, through the lens of Nottingham's trajectory, by considering the tensions and obstacles encountered by actors across private, third, and multi-level public sectors. Using a multi-level and multi-dimensional analysis has enabled low carbon governance to be at the forefront of enquiry by highlighting the different roles of actors across multiple scales, and barriers affecting the agency and capacity of urban level actors.

I argue that there are a number of economic, political, institutional and social barriers facing urban actors in facilitating the low carbon transition. First and perhaps most critically, national level policy and agenda has had negative effects which is detrimentally impeding low carbon urban governance in the UK at all scales. For example, the current political system in the UK is heavily centralised (despite a rhetoric of localism), and the current austerity agenda which has been implemented by the Coalition Government since 2010 has provoked a programme of austerity which is continuing to present-day (Cribb & Johnson, 2018; Cumbers & Traill, 2020). This has resulted in significant cuts in budgets, which in turn affect the financial revenue available to invest in new and existing low carbon transition projects. Moreover, the lack of national level funding available for local authorities has a knock-on effect for overall local budget spending, and therefore there is a significant impact on resources and staff capacity. This detrimentally affects the sustainable and inclusive transition process by reducing agency and capacity of local government, and the continuity of low carbon project delivery. The financial burdens from austerity are also experienced by third sector actors, such as charity organisations, and private sector actors. Institutional barriers, such as ineffective regulation and government intervention also exist and are thwarting low carbon urban transitions. I argue that the lack of mandate and responsibility for climate change for local authorities has resulted in the diminished importance of climate change mitigation and prioritisation at the local level (Bush *et al.* 2017; Fankhauser *et al.* 2018). This is exacerbated by national agendas like austerity and a lack of political decision-

making power, resulting in local authorities only progressing in areas where they have statutory requirements and remits, and having restricted action out-with these areas. The lack of mandate has consequently resulted in lock-in and inertia for driving low carbon and inclusive projects.

Second, I contend that political barriers are experienced at the local level because of lack of national strategic direction from central government, which in turn has caused uncertainty and an unstable climate change policy (Fudge *et al.* 2019). This uncertainty and lack of long-term strategy is particularly detrimental from an investor perspective, especially the private sector which engage in business models that are predominantly short-term, profit-seeking and risk averse. Moreover, the lack of national political commitment to addressing inequality has accentuated socio-economic barriers at the urban level, which is having a negative impact on transitions to a just society. The absence of justice dimensions is witnessed in the provision of uneven and exclusionary finance which is disproportionately impacting urban areas by favouring local authorities that have already made progress over more deprived and less resilient places (e.g. MacKinnon, 2017; Massey, 2007). Again, this raises questions of conflict over what kind of transition is envisioned i.e. by whom and for whom. For example, funding is determined by staff capacity to implement successful projects. However, since some local authorities do not have this capacity, this can lead to a vicious and uneven cycle of investment which can contribute to inequality locally and nationally. Thus, it is arguably fostering competitions rather than collaboration (Gibbs & Lintz, 2016). It is clear therefore that unless these issues are addressed on a national level, urban areas are somewhat limited in their position to fully surpass these issues due to their uneven financial, political and institutional dependency on central government.

Third, by considering the barriers at the local level, I have highlighted the localised, day-to-day barriers experienced in practice. Balancing the needs and interests of all local users can be problematic, and a particular set-back for progressing low carbon and inclusive transitions is the competing prioritisations which are at play, specifically within the local government. This is evident in the provision of low carbon housing, transport and energy, all of which operate in political siloes and are restrictive to their own economic priorities and interests (Hastings *et al.* 2015; Meadowcroft, 2011). As such, there is a risk that sustainable solutions which are environmentally, financially and socially beneficial in the long-term are side-lined in favour for locked-in fossil fuel-based systems which have existing sunken costs. Additionally, there are political barriers encountered between local councils, which can be

attributed to the differing share of responsibilities across the city, and the reluctance to network because of political complexities. Again, this reinforces a competitive and segregated aspect to sustainable transitions across one urban area rather than encouraging greater collaboration, integrated policy, and sharing of knowledge and resources (Castan Broto & Westman, 2020; Fuchs & Hinderer, 2014). Furthermore, I draw attention to the problematic engagement of local actors which has resulted in socio-cultural barriers, with perceptions of unequal power dynamics, animosity, mistrust and disengagement between actors; all of which are hindering strategic collaboration and coordination for transforming the urban area.

Finally, I have identified that a common barrier is the lack of behavioural change due to societal resistance. This reinforces the importance of active participation of whole social groups, both on collective and individual levels in facilitating large-scale low carbon and inclusive transitions (e.g. Featherstone *et al.* 2012; Vladimirov & Galev, 2017). The lack of engagement from the public can reinforce elements of injustices (such as lack of switching energy tariffs, or sustainable behavioural changes which can reinforce cycles of fuel poverty), in addition to sustaining technologies based on the status quo (such as the unwillingness of landlords to invest in energy efficiency, and the public's continued reliance on private internal combustion engine cars instead of a shift toward more active and sustainable forms e.g. cycling, public transport). Furthermore, this appropriately raises the concept of urban materiality i.e. the reciprocal, interlinking and complex nature between both human and non-human agents, and stresses the importance of considering the strong emotional and personal investments of urban spaces and materials, which in turn can alter individual and collective agency (Coe & Jorhus-Lier, 2010; Latham & McCormack, 2004; Rutherford, 2014).

Taking the aforementioned points into consideration, I draw attention to the fact that barriers can manifest themselves in numerous ways, on different scales, across multiple sectors and between various actors. Whilst there is no 'one-size-fits-all' approach to urban sustainability, the Nottingham example reinforces the numerous difficulties encountered at the urban level and the ways in which these can be context-specific. They are also representative of the wider inefficiencies and shortcomings at the national level for encouraging low carbon urban trajectories in practice across the UK.

The next chapter brings the thesis to a close by reiterating the main objectives achieved in this thesis and a summary of the main conclusions and contributions.

CHAPTER 7

CONCLUSION

7.0. INTRODUCTION

The main purpose of this thesis was to critically investigate the governance of sustainable and equitable transitions in cities in advanced economies. It has examined the ways in which low carbon and just transitions are being implemented in practice within urban areas, using the example of Nottingham in the UK. The Nottingham case study has proven to be a compelling example which highlights the multi-faceted, fluid and interlinked nature of low carbon transitions experienced at the urban level.

In this research, I have identified the key governing actors involved and their agency; the barriers encountered in their pursuits; and the approaches and pathways undertaken for progressing low carbon and equitable urban transitions. I have examined these factors using an analytical approach (refer to **Table 3.1**) which conceptualises cities as complex arrangements of socio-technical systems that are comprised of and co-produced by social and technical elements, including technology and material, technical systems, political and legal institutions, processes of design and social practice.

I have utilised a multi-level perspective across multiple levels and scales of governance (local, national and international) to analyse the city's integrated strategy as a whole to challenge the often siloed governing and policy arrangements which separate energy supply and urban form. This has allowed me to constructively look beyond the local in isolation and avoid considering transitions simply using one scale of politics. Instead, I have taken into consideration the wider political and economic conjuncture from a scalar perspective and the ways in which relations, articulations, contestations and politics are shaped in different urban spaces and sustainable transitions. The argument developed here is that these processes shape and alter the dynamics of contemporary urban governance. In addition, I have constructively engaged with notions of local agency and political capacity for implementing transitioning on an urban level, and how path creation and ownership have enabled, and in some cases embedded, these processes.

To achieve the aim of investigating governance of low carbon and inclusive urban transitions, I pursued the following research objectives:

1. To identify the key governing actors (state and non-state actors) engaging with low carbon and equitable urban transitions.

2. To investigate the main tensions and barriers which are encountered by multiple actors in the pursuit of low carbon and equitable urban transitions.

3. To explore the key factors (e.g. initiatives, measures, conditions) in Nottingham that have helped in the implementation of low carbon and just transitions 'in practice'.

4. To examine the key policies on local, national and international levels which are progressing and hindering low carbon and equitable urban transitions.

In this chapter, I provide a summary and synthesis of the main research findings before finally providing suggestions for policy intervention. I end this chapter with my final reflections.

7.1. SUMMARY AND SYNTHESIS OF MAIN FINDINGS

To achieve the aforementioned research aim and objectives, there were two broad concerns: firstly, the main factors which are constraining local actor governance of sustainable and equitable urban transitions; and secondly, the factors that are influencing low carbon and equitable urban governance. A multi-level perspective has been vital to examine these factors which transcend across different scales (i.e. international, national and local) and multiple actors and sectors (i.e. both state and non-state). My arguments to these two broad concerns have been summarised, as discussed next.

7.1.1. Constraints on Local Actor Governance of Sustainable and Equitable Urban Transitions

AMBIVALENT AND UNSUPPORTIVE CLIMATE POLICY

A core contribution from this research is that there is inadequate and unsupportive multi-level policymaking for low carbon and equitable urban transitions and this research has demonstrated the inherent reliance of local government on national and international institutions for adequate policies and supporting mechanisms for low carbon and just transitions. My analysis of international, national and local level policy has found that that there are overarching commonalities across all levels; that is firstly, there is a weakness of climate targets and subsequent fragmented and uneven climate policy across all levels; and secondly, there is inadequate attention to justice elements across all scales. It is evident from these findings that low carbon and equitable transitions cannot be effectively implemented without supportive, timely policy (Gambhir *et al.* 2019). Despite attempts for international climate change governance e.g. Paris Agreement, the targets for climate change commitments are weak, uneven and fragmented. An illustration of this is the voluntary nature of the Paris Agreement pledges and global SDGs, which lack clarity on targets, measurements and accountability. These are also unevenly localised on international, national and local levels, making a global coherent approach difficult to govern in practice (e.g. Bodansky, 2016; Hickel, 2015; Liverman, 2018).

I have emphasised that despite some progress in emissions reductions, the UK has weak targets and inconsistences in its national environmental policy (e.g. Clean Air Strategy, 2019; Road to Zero Strategy, 2018; and Clean Growth Strategy, 2017). I have stressed that this has been exacerbated by changes in central government administrations and different political party stances and priorities on climate change. This is notable particularly since 2010 where there was a Coalition Government, and subsequently during the Conservative Government (2015 to present), where there has been an overall decreased willingness and commitment for climate change and social equality policy strategies (Gillard, 2017). In addition, I have argued that the complex division of powers and responsibilities across the UK (and England in particular) is illustrative of the patchwork nature of devolution and subsequent uneven approaches to low carbon transitions. Through this research, I have clearly shown that there is no clear nor explicit mention of just transitions within UK national

climate policy, and therefore commitments to an inclusive transition remain implicit from a national level, reiterating the lack of political consensus, vision and commitment.

Local level action is particularly limited in its capacity without national policy support. I have illustrated that at a local level, Nottingham City Council has set some of the most ambitious targets for combatting greenhouse gas emissions from a UK council, and the policy and strategy generally reflect these ambitions. Yet, I have argued that this is again inconsistent, for instance, even though there is reference made within Nottingham City Council strategy to justice dimensions, this is uneven. Therefore, City Council attempts to facilitate a just transition within the transport sector are fragmented, implicit and not uniform across policy arenas. I asserted that the uneven strategy across different local authorities can be attributed to the patchwork nature of responsibility in English councils more generally (Hirsch, 2018; Robins *et al.* 2019). The Nottingham example clearly illustrates this, with the neighbouring local authority Nottinghamshire County Council having very limited policy and strategy for emissions reductions and tackling social inequality. Such inconsistencies of climate policy are damaging for low carbon and inclusive urban transitions in cities, particularly which span two differing local authorities (like Nottingham), and highlight the different and conflicting approaches to low carbon and inclusive transitions and the lack of a unified approach (Meadowcroft, 2011). Again, this emphasises that social justice remains largely peripheral and excluded from wider urban national agendas (Bulkeley & Fuller, 2014; Castan Broto & Bulkeley, 2013; McKendry, 2015). Importantly, these findings emphasise the 'messy' politics of urban responses, and that these responses are continuously reworked and redefined (Cochrane, 2019; Hodson & Marvin, 2012). The argument here is that without such institutional, political and economic support from national and international levels, it is evident that there are numerous knock-on (or 'domino') effects which constrain the implementation of low carbon and inclusive urban transitions in practice (such as reduced political capacity and austerity), as described next.

DISRUPTIVE NATIONAL GOVERNMENT MEASURES

In addition to ambivalent and unsupportive climate multi-level policy, I have highlighted how the effect of national government measures are disrupting effective low carbon and equitable urban governance, which is a core contribution of this research. I found that national austerity measures were a primary barrier for implementing low carbon and equitable urban transitions. The current political system in the UK is heavily centralised

(despite a rhetoric of localism), and the current austerity agenda which has been implemented by the Coalition Government since 2010 has provoked a programme of cuts to local government spending and other areas which continues to the present-day (Featherstone *et al.* 2012). This has resulted in significant reductions in budgets, which in turn affect the financial revenue available to invest in low carbon transition projects. Moreover, the lack of funding available for local authorities has a knock-on effect for overall local budget spending, and therefore this has a significant impact on resources and staff capacity (Cumbers & Hanna, 2019). I argued that the lack of sustained financial and structural support from state government has detrimentally impacted the low carbon and inclusive transition process by reducing agency and capacity of local government (Eckersley, 2018). The financial burdens from austerity are also experienced by third sector actors (such as charity organisations), which in turn hinder actors' agency and block sustainable transitions.

I also argued that ineffective regulation and lack of government intervention on the national level are thwarting low carbon urban trajectories. In particular, the lack of mandate and responsibility for climate change for local authorities has resulted in the diminished importance of climate change mitigation and prioritisation at the local level. This is compounded by national agendas, like austerity and a lack of political decision-making power, resulting in local authorities only progressing in areas where they have statutory requirements and remits, and being restricted out-with these areas. The lack of national strategic direction from central government has caused uncertainty and an inconsistent climate change policy (Amundsen *et al.* 2010; Broekhoff *et al.* 2018; Bush *et al.* 2017), as is witnessed by the examples of the Feed-in Tariff and Code for Sustainable Homes. This uncertainty is particularly detrimental from an investor perspective, especially the private sector, which operates on business models that are predominantly short-term, profitable and risk averse.

Furthermore, I argued that the national government ineffectiveness in addressing growing social inequality has resulted in socio-economic barriers at the urban level, which is having a negative impact on transitions to a just society. Clearly, the absence of justice dimensions (which is reflected in policy) is also witnessed in an uneven and exclusionary financial landscape, and thereby disproportionately impacting urban areas. For example, funding is determined by staff capacity to implement successful projects, however since some local authorities do not have this capacity, this can lead to vicious and uneven cycles of investment (i.e. under-investment in highly affected areas), which can worsen social inequality locally

and nationally. From this, it is evident that social justice remains peripheral (e.g. Bulkeley *et al.* 2014), and unless these issues are addressed on a national level, urban areas are somewhat limited in their position to fully surpass these issues due to their uneven financial, political and institutional dependency on central government (Jaglin, 2013). The identification of these barriers importantly reinforces that in the context of transitions, there is a need to examine the macro-level developments that take place at the landscape level, since macro-level political, economic and social developments allow for external pressures to be considered (Geels & Schot, 2007), even though they play out in multifarious ways at the local level.

CONTESTATION AND RESISTANCE AT LOCAL LEVEL

Another core contribution of this research is that contestations and resistance that are occurring at the local level are subsequently hindering the governance of sustainable urban transitions, and I have illustrated this using the Nottingham example. The competing prioritisations that exist between and within local authorities is a fundamental barrier for implementing low carbon and inclusive urban transitions in practice. It is evident that balancing the needs and interests of all local users can be problematic, specifically within the local government and hence there is a contested local politics of climate change (Meadowcroft, 2011). I have argued that this is apparent in the provision of low carbon housing, transport and energy, all of which operate in political siloes and are restrictive to their own economic priorities and interests (and again financial cuts exacerbate these pressures). As such, there is a risk that sustainable solutions which are environmentally, financially and socially beneficial in the long-term are side-lined in favour of locked-in fossil fuel-based systems which have existing sunken costs. Additionally, I have emphasised that there are political barriers encountered between local councils, which can be attributed to the differing share of responsibilities across the city, and the reluctance to networking because of political complexities. Again, I have argued that this reinforces a competitive and segregated nature to sustainable transitions across one urban area (instead of one which is coherent, joined up and collaborative) and therefore restricts the pursuit of a long-term and cohesive transition strategy as a whole (Fuchs & Hinderer, 2014; Gibbs & O'Neill, 2016; Nello-Deakin, 2019).

The problematic engagement of local actors has resulted in socio-cultural barriers and conflicts, with perceptions of unequal power dynamics, animosity, mistrust and

disengagement (Sovacool & Brisbois, 2019). I have argued that such perceptions are detrimental for transitions by inhibiting coordination and overarching consensus for transforming the urban area. Not only is this experienced within and between state actors, but this is also experienced amongst non-state actors working with state actors, for example, with perceptions from the third sector that handling fuel poverty measures causes antagonism with the private sector. These findings echo arguments that social relations in urban areas are bound up and entwined, with unequal structures of power, capital, discourse and groups (Bridge *et al.* 2013; Coenen & Truffer, 2012; McFarlane, 2011). As such, this reinforces the notion that cities need to be conceptualised as urban assemblages made up of infrastructures, politics, communities and economies which are constantly open to manipulation and contestation (Bulkeley *et al.* 2013; Rutherford, 2014).

A commonly held argument is the lack of behavioural change due to societal resistance, which emphasizes the importance of active participation of whole social groups, both on collective and individual levels in facilitating large-scale low carbon and inclusive transitions. This importantly links back to the concepts of lock-in and urban materiality i.e. the reciprocal, interlinking and complex nature between both human and non-human agents. This stresses the importance of considering the strong emotional and personal investments of urban spaces and materials, which in turn can alter individual and collective agency (Coe & Jorhus-Lier, 2010; Latham & McCormack, 2004; Rutherford, 2014). I have stressed that this lack of engagement from the public can reinforce justice dimensions (such as fuel poverty), in addition to technologies based on the status quo (for example, the continued reliance on private internal combustion engine cars). Using the Nottingham example, I have built arguments regarding the blockages to low carbon and inclusive transitions, and highlighted the complex and context-dependent experiences of a multitude of actors and sectors, and the 'messy' politics of urban responses, which are continuously negotiated, reworked and redefined (Cochrane, 2019; Hodson & Marvin, 2012).

7.1.2. Influences on Local Actor Governance of Low Carbon Equitable Urban Transitions

LOCAL AUTHORITY AGENCY AND POLITICAL CAPACITY

I have investigated the key factors that have helped the implementation of low carbon and inclusive trajectories in practice, despite the identified unsupportive multi-level policy,

disruptive national government measures and contestation and resistance experienced by local governing actors. The pursuance of sustainable and inclusive transitions at the urban level is highly dependent on effective governance in practice by multiple actors, especially local authorities (Bulkeley & Castan Broto, 2013; Kern & Alber, 2008). A key contribution is that the governance of low carbon and inclusive urban transitions across England is not uniform, and I have stressed that this is due to the varying political, social and cultural differences of local councils to enable change.

In the context of governing low carbon and inclusive transitions, political capacity is influenced by various elements. First, I have argued that political capacity is influenced by the type of local authority located in the urban area, and the Nottingham example clearly illustrates this. The extent to which a local authority has responsibility significantly impacts political capacity (e.g. Eckersley, 2017; Kuzemko & Britton, 2020), which is demonstrated by the example of Nottingham City Council as a unitary authority, in comparison to Nottinghamshire County Council as a two-tier authority. As a unitary authority, having responsibility internally has led to a greater engagement with sectors such as energy, affordable warmth and housing, due to the presence of this remit in the City Council. This has generated a greater autonomy for decision-making in the City Council, in comparison to two-tier authorities which have responsibility of sectors spread differently across the county council, districts and borough councils, and which are commonly subject to different political administrations. An example of this is the planning and housing sector which is within the City Council responsibilities alone, but distributed between district and county council. Consequently, energy-related issues (such as fuel poverty and energy efficiency) are arguably easier to implement within the City Council due to this mandate.

In addition, I have noted that the size of geographical administrative area has proven to have a consequence on local actor political capacity. For example, the smaller administrative boundary of Nottingham City Council has been advantageous by allowing value for money to be easier to obtain, which in turn can make projects more appealing for the city since they prove financially feasible. Additionally, there are benefits for transport and energy justice; in the City Council administrative boundary there are smaller distances to cover which necessitates infrastructure on a smaller scale, in comparison to Nottinghamshire County Council which covers a larger rural area and therefore can lead to greater distances, costs, and result in exclusion and isolation. As aforementioned, whilst the density and geographical scale of urban areas cannot be necessarily nor easily adjusted, this has nonetheless been an

important and worthy contributor for implementing low carbon and urban just transitions from a City Council perspective. This supports arguments of the benefits of a 'compact city' approach for achieving sustainable city objectives and improving social equity and spatial mobility (Ahlfedlt & Pietrostefani, 2017; Neuman, 2005). However, this also clearly demonstrates the spatial unevenness of transitions, since it is acknowledged that the hierarchy of jurisdictions binds them to geographical space, and therefore political capacity out-with these municipal areas is somewhat limited (Franzen, 2013), highlighted by the Nottinghamshire County Council example. This reinforces that the low carbon energy transition as a fundamentally geographical process which involves reconfiguring current spatial patterns of economic and social activity (Bridge *et al.* 2013).

I have argued that the past and present agency of local government actors heavily influences low carbon and equitable transitions in practice. In the case of Nottingham City Council, the political stability of a Labour-run council since 1991 has allowed a stronger degree of political power since there is no immediate risk of change in administration. This has benefitted sustainable transitions by allowing for the ability to plan longer-term and progress initiatives which otherwise would be considered as politically controversial. In the case of Nottingham, this is complemented by a leadership which is ideologically environmentally and socially conscious. As a set of collective actors, the political administration can be viewed as forming a core alliance at the regime level, which has overcome political resistance to change from opposing political parties and acted as path advocates (MacKinnon *et al.* 2019). This has therefore provided political capacity and legitimation to establish low carbon and inclusive projects, even at the expense of political resistance and economic and political risk.

Additionally, there is evidence of 'climate champions' by way of individuals at Nottingham City Council who are crucial for driving forward and governing sustainable trajectories and their willingness to go against the status quo for the benefit of the environment and Nottingham's residents, even if they are dealing with conflicting sets of meanings or organisational behaviour (Vringer *et al*. 2020). This is not only restricted to councillors, but highlights the role of capable and skilled officers within the council. The role of individual actors is imperative by way of early project-planning and implementation of low carbon projects and have therefore progressed urban sustainable trajectories (Bulkeley & Kern, 2005; Van der Heijden, 2019). Not only does this demonstrate the role of individual agents, but also the ways in which this agency can be closely related to, and shaped by the spaces

and scales that actors inhabit in an uneven and cultural differentiated world (Coe & Jordhus-Lier, 2010). It is noteworthy reflecting here that such findings are contradictory of other cities, such as Glasgow, which have had long and stable Labour leaderships but resulting in political inertia, corruption and complacency. I have contributed to debate on the effect of individual and collective agency in negotiating local government policy, a willingness of urban actors to break with some of the characteristic neoliberal politics, and the distinctiveness of Nottingham City Council for local political transformation (Featherstone *et al.* 2020, Millie & Murrie, 2006).

PATH CREATION

Using the Nottingham example, I have argued that political capacity to implement low carbon and inclusive transitions at the urban level is influenced by past agency of actors and the subsequent embedding of low carbon trajectories via path creation, lock-in and positive self-reinforcement (e.g. MacKinnon *et al.* 2019; Unruh, 2000). This is apparent in the city's district heating scheme whose pre-existence has provided the city with multiple benefits in implementing its sustainability objectives not available to many other UK cities, which is a core contribution of this thesis.

I have used Nottingham's distinct district heating system as an appropriate example of energy infrastructure which has embedded and locked-in the production of clean energy from waste. As the largest district heating system in the UK, this system has sunken costs already in the city by way of infrastructure, which allows a base for expanding the system. It is an important revenue for the city, since it can operate this as a commercial service and generate sustainable income, particularly in a time of national austerity measures and increased competition (Gibbs & Lintz, 2016; Jonas *et al.* 2011). Furthermore, this historical legacy of delivering the district heating in the 1970s has resulted in the development of learning and expertise in the energy sector for over three decades, again positively embedding knowledge and skills within the energy department of the City Council which is strongly connected to current energy transitions and commercial operations. Again, this is important for sustainable urban transition understanding by emphasising the strong relationship of urban materiality, the embeddedness of energy systems and its effects on actor agency, which can in turn influence wider transition governance (Coe & Jordhus-Lier, 2010).

Similarly, the Nottingham Declaration has been a positive and historic development for the city. From being co-founded in the city and committing local authorities to tackle the causes and impacts of climate change at the urban level, it has drawn attention to Nottingham as a leading urban area with strong ambition and political willingness to govern and tackle environmental problems. I have argued that this has resulted in a historical legacy and virtuous cycle for the city which reveal positive lock-in and self-reinforcing sustainable behaviours. The point here is that this also affects actor agency, with collective visions and leadership initiating, legitimising and anchoring certain sustainable trajectories at local and regional scales (MacKinnon *et al.* 2019; Yu & Gibbs, 2019). By drawing upon the concepts of path-dependency, lock-in and path creation in particular, I have contributed to debate on the important consideration of these processes and how they can impact present-day transitions in practice.

MUNICIPAL OWNERSHIP OF ENERGY AND TRANSPORT SYSTEMS

A significant contribution of this thesis is that municipal ownership has a key role in implementing low carbon and equitable urban transitions (e.g. Cumbers, 2012; Cumbers & Becker, 2018). Municipal ownership of Nottingham's assets (e.g. social housing and transport) has been imperative for political capacity to enact sustainable transitions. From this municipal ownership, Nottingham City Council has been able to provide low carbon and affordable energy, firstly through the establishment of Robin Hood Energy, and secondly by social housing retrofitting projects.

I have argued that the unique (but albeit temporary) creation of Robin Hood Energy demonstrated the city's dedication to combatting fuel poverty, through its lean management and not-for-profit business structure. As such, the municipally owned ESCo had multiple initiatives for decreasing fuel poverty, by way of: local discounted tariffs for Nottingham residents; provisions to reduce the number of prepayment meters for consumers; voluntarily offering Warm Home Discount Scheme; and the switching of void properties. I have argued that these initiatives, in addition to supplying 100 per cent renewable energy from 2018, resulted in an energy company which challenged incumbent actors and the status quo and in turn progressed (albeit temporarily) a 'disruptive' form of low carbon and inclusive urban transition. More broadly, this demonstrates a revitalisation of the political imagination and a willingness to break from neoliberal policies (Featherstone *et al.* 2020).

Moreover, I have demonstrated that the ownership of Nottingham City Council's 27,000 social houses has benefitted political capacity for energy efficiency programmes by allowing Nottingham City Council to work in partnership with the ALMO Nottingham City Homes to progress retrofit programmes. Again, it is worth noting here that this is contrary to most UK councils which sold off their assets as a result of privatisation, and again highlights the local transformative political capacity of Nottingham City Council. Consequently, this ownership has allowed the addressing of energy efficiency issues in social housing which constitute a significant portion of housing tenure (approximately 20 per cent) and can protect vulnerable citizens from fuel poverty. In addition, the energy efficiency developments enable the Council to save costs internally which can be sustainably reinvested into the provision of services, for the benefit of the urban area. The eradication of fuel poverty is a significant issue for the City Council and Nottingham City Homes, and this commitment is demonstrated by employing a full-time fuel poverty officer (notably outlasting austerity and budget cuts) and which is considered rare for a social housing organisation. As such, behavioural barriers can be overcome by supporting residents to switch and save and by referring to fuel debt services.

Likewise, I have contended that the municipal ownership of Nottingham's transport network has been crucial for political capacity for developing sustainable transport initiatives. Firstly, through local ownership, Nottingham City Council has formed an extensive bus network which operates both on a commercial and non-commercial basis. This has allowed the regeneration of profits back into the transport network, thereby leading the transport network to more sustainable bus fleets. I have argued that this has had a positive knock-on effect for the City Council, with public transport in Nottingham having the largest electric bus fleet, and having one of the highest usages in the UK. Furthermore, ownership of the land has been imperative for low carbon transport as this has allowed the Council to save costs by installing electric charge points at existing sites, and also resulted in a simpler and faster planning process.

Secondly, I have argued that the implementation of the WPL and Electric Tram has been significant by raising hypothecated funds for the extension of the City's electric tramline and any surplus being ringfenced and reinvested into sustainable transport measures (e.g. improvement of the main train station). This in turn has halted congestion in the city which has environmental benefits, and improved the overall connectivity of the city, thereby having social benefits. As such, this particular scheme can be an example of 'low carbon urbanism'

(Bulkeley *et al.* 2012), through a municipal scheme which combines both long-term economic development and climate change objectives. Furthermore, this can be an example of 'austerity urbanism' (North & Nurse, 2014), which has engaged the city in entrepreneurial practices for securing future financial income (Gibbs & O'Neill, 2017; Yu & Gibbs, 2019). Yet, there are justice implications of the distribution of levy costs which may produce and reinforce inequalities and therefore need to be considered. Nevertheless, the example of low carbon energy and sustainable transport provision are compelling illustrations of the ways in which local government has engaged with urban infrastructure regimes and 'experiments' to facilitate climate change governance in attempts to lead sustainable trajectories (Bulkeley *et al.* 2012; Coenen & Truffer, 2012; Hodson *et al.* 2017). This thesis has made important empirical contributions by highlighting the critical role of municipal ownership in transitions, and the ways in which this can facilitate political capacity and agency for low carbon and just urban trajectories.

I have demonstrated that the case study of Nottingham has proven to be a distinctive and powerful example which highlights the complex, multi-faceted, fluid and interlinked nature of low carbon transitions experienced at the urban level. Using a multi-level and multi-dimensional analysis has enabled low carbon governance to be at the forefront of enquiry, and highlights in particular the different roles of actors across multiple scales and barriers affecting agency and capacity of urban-level actors. Not only has it demonstrated the barriers that are encountered by actors across private, third, and multi-level public sectors, but it has also included the ways in which the city of Nottingham has overcome these in a context of national austerity and ambivalent climate change and social equity policies in contemporary Britain. As such, I have contributed to debate of these processes and the effects on low carbon and inclusive urban transitions. There is no 'one-size-fits-all' approach to urban sustainability, and Nottingham's experience, reported here, provides examples which may indeed be context-specific to the city and are not exactly replicable in this respect. Yet, they are notable for the implementation of sustainable trajectories in other urban areas on both national and international scales. The point here is that the Nottingham example offers new insights which can be beneficial for future policy intervention, as discussed next.

7.2. RECOMMENDATIONS FOR POLICY AND FINAL REFLECTIONS

As time passes, there is a profound urgency for addressing the detrimental and uneven impacts of climate change. Following a multi-level perspective and pragmatic approach to this research, I have modestly put forward a number of policy recommendations based on the research findings in the hope to contribute to improvements in policy and decision-making. I appreciate the complex nature of policymaking in practice, and therefore these are intended as preliminary suggestions and to promote further discussion within context-specific cases, rather than viewed as a whole system and definitive approach.

As highlighted by this research, policy must align with climate change targets, across international, national and local levels. In this thesis I have argued that a supportive policy environment is essential for climate change mitigation, and this is by no means a new argument (e.g. as highlighted by Castan Broto & Westman, 2020).

It is the responsibility of the global community to produce ambitious climate targets, to ensure national governments are held to account. As shown by the Paris Agreement and Silesia Declaration, there is already a step-change in the right direction. However, the just transition should feature more heavily within this, and targets should be ambitious. Without this, it is increasingly difficult to approach the climate emergency in a coherent and joined-up manner, and the just transition will become increasingly side-lined. Advanced economies have a responsibility to work collaboratively with developing economies to help the transition to low carbon and inclusive futures, in terms of the provision of adequate finance and supporting mechanisms, e.g. knowledge and expertise.

In turn, the UK Government must provide a consistent and supportive policy environment for implementing low carbon and equitable transitions at the local level. This is by means of the provision of adequate funding, which is currently unacceptable, given the increased rhetoric of Localism since 2011 and introduction of the Cities and Local Government Devolution Act in 2016. There needs to be a clearly set-out national direction and responsibilities for all levels of government, in order to prevent political unwillingness, risk aversiveness and short-termism, and to instead promote greater cooperation between multiple actors with differing interests, needs and views. A clear national policy can open new windows of opportunity for low carbon transitions, which in turn can help foster local

experiments and engagement, such as those shown in the Nottingham example. In addition, there must be clearer regulations in the housing, energy and transport sector, which again will help with the national decarbonisation strategy and certainty in decision-making. Finally, binding climate and social equity targets are vital, particularly which cannot be subjected to the unravelling and dismantling of subsequent governments, both on national and local levels.

The recent departure from the EU presents the UK at an important crossroads with opportunity to pioneer sustainable trajectories, and one way of achieving this is primarily meeting (and exceeding) the environment strategies laid out by the EU in the UK's own policy post-Brexit (which is yet still to be definitively addressed).

Additionally, there is an absence of joined-up strategies between urban areas, demonstrated in Nottingham's example which has had success, but this is limited in scope by its own municipality. I believe the appetite for this is there in urban areas; however the political and economic uncertainty often in low carbon and fair schemes results in a competitive (and exclusive) environment between urban areas. The long shadow cast by austerity has also detrimentally impacted on urban council's ability to act in a sustained way too. Again, a clear and consistent national vision and policy environment can help achieve this coordination between multiple actors across sectors and space.

Finally, from a personal perspective I am disheartened at the collapse of Robin Hood Energy and join calls for the reclaiming of 'common goods', such as energy, transport (and in some circumstances social housing) back into forms of public ownership to allow a reform of the energy market. This is an important strategy for shifting away from the dominance of profit-seeking multi-nationals, and towards non-profit sustainable business models, which in turn address social equity issues, as Robin Hood Energy tried to do.

To end on a more personal reflection, we are living in exceptional times and within an economic and political system which is detrimentally harming our environment, natural resources and humanity. Particularly during the writing of this thesis, we have witnessed growing environmental movements on a global scale. This is enlightening to witness, particularly from the global youth population and from city leaders around the world. The (very narrow) re-election of Democratic President Joe Biden in 2020 is somewhat encouraging in terms of leadership on low carbon and equitable governance, and I hope the

next four years will witness more progression in this area by the USA and global community. At the same time, the Covid-19 pandemic has led to unprecedented circumstances, which have had, and undoubtedly will continue to have distinct changes on the ways in which society functions. However, to add a silver-lining to these challenging times - what is clear is that it has demonstrated what can be achieved by local, national and international governance in a short period of time, and the environmental benefits of such changes.

With appropriate environmental governance and the right supportive resources, the UK (and international community more broadly) must work together to implement a decarbonised and equitable transition - to prevent the enduring warnings of catastrophic climate change and to fundamentally address the deepening inequality that our global economic system facilitates, and which will only worsen with a rapidly growing global population. Such changes will not only have short-term benefits, but ones which are long-term and result in the path creation of a sustainable system which will be embedded for future generations to build on. To echo many who have, and continue to advocate for sustainable and equitable transitions, time is too short and the Earth's planetary boundaries are too fragile, to settle for anything less.

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APPENDICES

APPENDIX A: INDIVIDUALS INTERVIEWED PER ORGANISATION/SECTOR

Actor type	*Organisation/Entity*	*Number of individuals interviewed*
National Gov (n=2)	Department for Energy, Business, Industrial Strategy	1
	Office for Low Emission Vehicles	1
Local Gov (n=5)	Doncaster Council/Great North Energy	1
	Green Party	1
	Nottingham City Council	14
	Nottingham City Homes	2
	Nottinghamshire County Council	1
Third Sector (n=12)	Anonymous Charity	1
	APSE Energy	1
	Campaign for Better Transport Nottingham	1
	Global Justice Nottingham	1
	Great North Energy	(same as Doncaster Council)
	Meadows Ozone Energy Services (MOZES)	1
	National Energy Action	1
	Nottingham Energy Partnership	1
	Pedals	1
	Robin Hood Energy	1
	St Ann's Advice Centre	1
	The Big Wheel	1
Private Sector (n=3)	LEVEL	1
	Municipal	1
	Western Power Distribution	1
	TOTAL	**35**

Sector	*Organisation/Entity*	*Number of individuals interviewed*
Energy (n=11)	APSE Energy (Not-for-Profit)	1
	Department for Energy, Business, Industrial Strategy (UK Government department)	1
	Energy and Carbon Management (Nottinghamshire County Council)	1
	Energy Services (Nottingham City Council)	6
	Global Justice Nottingham (Not-for-Profit)	1
	Great North Energy (Doncaster Council)	1
	Meadows Ozone Energy Services (Charity/Not-for-Profit)	1
	Municipia (Private Consultancy)	1
	Nottingham Energy Partnership (Not-for-Profit)	1
	Robin Hood Energy (Nottingham City Council/Not-for-Profit)	1
	WPD (Private Distribution Network Operator)	1
	Green Party	1
Transport (n=10)	Anonymous Charity (Charity)	1
	Campaign for Better Transport (Charity)	1
	Cycle City (Nottingham City Council)	2
	Electric buses (Nottingham City Council)	1
	Go Ultra Low (Nottingham City Council)	1
	LEVEL (Private Consultancy)	1
	Nottingham Electric Trams (Nottingham City Council)	1
	Office for Low Emission Vehicles (UK Government department)	1
	Pedals (Charity)	1
	The Big Wheel (Charity)	1
	Workplace Parking Levy (Nottingham City Council)	1
Housing (n=6)	Energy Services/REMOURBAN (Nottingham City Council)	1
	Fuel Poverty (Nottingham City Homes)	1
	National Energy Action (Charity)	1
	St Ann's Advice Centre (Charity)	1
	Strategic Housing Assets (Nottingham City Council)	1
	Sustainable Energy (Nottingham City Homes)	1
	TOTAL	**35**

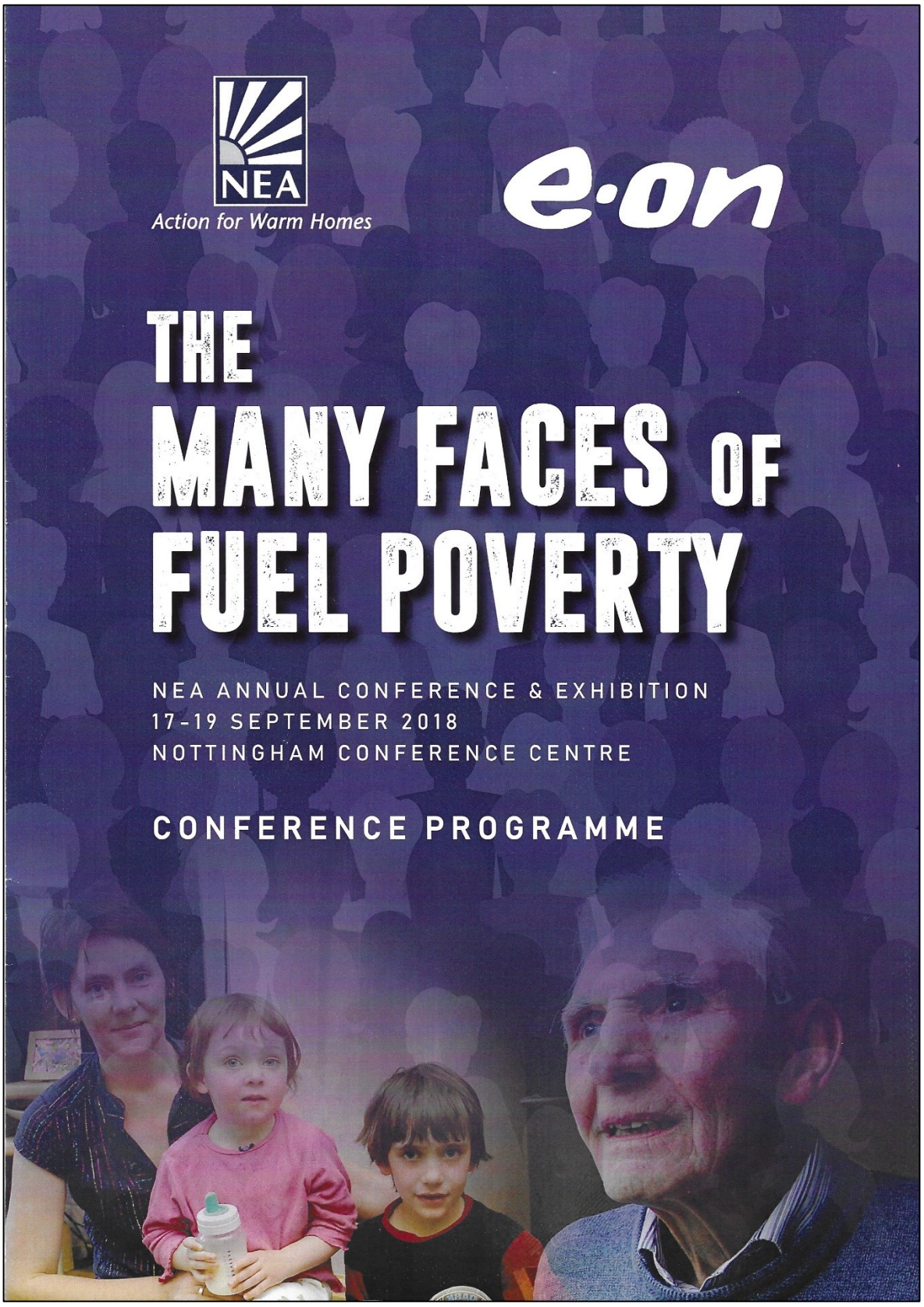
APPENDIX B: INTERVIEW QUESTION GUIDE

Theme	Indicative Questions
Organisation/Department	• What is the purpose of the organisation and why was this organisation established? • What is your role within organisation?
Low carbon and equitable initiatives and approaches	• What in your opinion are the problems that cities face in terms of environmental sustainability? • What in your opinion are the problems that cities face in terms of equality?? • What are the main initiatives/approaches by the organisation and how are these addressing climate change and social inequality? • What are the main motivations for initiatives and what criteria do you look for when identifying initiatives? i.e. location, social criteria, cost-effectiveness, etc. • What are the processes for developing these initiatives, i.e. how was this implemented, who was consulted? • Is equality considered explicitly in these initiatives/approaches i.e. targeting lower-income neighbourhoods? If yes then how? If not, then why not?
Financial structure	• How is the organisation and/or initiative funded? • What is the financial model for the organisation and/or initiative i.e. for profit/not for profit?
Business/Ownership structure	• What is the operational structure of organisation and/or initiative? E.g. municipally-owned? Community-owned? Private shareholders/investors?
Actors	• What other actors/entities (state and non-state) are involved in the organisation/initiative and how are they involved? • What is their motivation for being involved in the organisation/ /initiative? • How important are the other actors' involved? i.e. how dependent is the organisation/initiative on their involvement and has their involvement changed?
Successes/barriers	• What is the impact/effectiveness of the organisation/initiative to date? • What are the successes encountered to date? • What are the barriers encountered to date, and what is your approach to overcome these?
Future considerations	• What are the timescales for the project? • What are the future issues in the medium/long-term? • What improvements can be made to the organisation/initiative? • What improvements/changes should be made to the wider national policy arena? • What could be done on other scales, e.g. regional, global

APPENDIX C: PROGRAMME FLYER FOR GO ULTRA LOW FESTEVAL

Source: Visit Nottinghamshire, 2020. *What's On* [online] Available at: https://www.visit-nottinghamshire.co.uk/whats-on/go-ultra-low-nottingham-electric-vehicle-festeval-p743701 [Accessed 30/07/2020].

APPENDIX D: PROGRAMME FOR NATIONAL FUEL POVERTY ANNUAL CONFERENCE



CONFERENCE PROGRAMME

Monday 17 September

18:00 EXHIBITION OPENING & EVENING BUFFET

Welcome speeches from:

- **Maria Wardrobe, Director of Communications and External Relations, NEA**
- **Cllr Sally Longford, Portfolio holder for Energy and Environment, Nottingham City Council**
- **Nigel Dewbery, Director of Obligation Delivery, E.ON**

Networking continues in the upstairs function room at Revolution de Cuba, 26-28 Market St, NG1 6HW

Tuesday 18 September

09:00 OPENING ADDRESS

- **Adam Scorer, Chief Executive, NEA**
- **Sara Vaughan, Director Political & Regulatory Affairs, E.ON**

09:30 KEYNOTE ADDRESS

- **Julian Critchlow, Director General, Energy Transformation and Clean Growth, Department for Business, Energy & Industrial Strategy**

09:45 SESSION 1 – THE STATE OF THE NATION

The first session of the conference will give an overview of the current energy policy context in each of the four countries of the UK, highlighting progress in delivering policies to tackle fuel poverty. The session links to NEA's advocacy priorities in enhancing cooperation across the nations and prevention is better than cure.

NEA will launch the UK Fuel Poverty Monitor, an annual report produced with Energy Action Scotland. The report will focus on the progress that has been made on how to drive up co-ordination locally and nationally in order to reduce the scale, cost and pressures cold-related morbidity still has on health and care services and related agencies across the UK nations. The report will specifically review this in the context of the national and local responses to the severe winter weather that was experienced in 2017/18, and reflect on where key lessons can be learned in advance of this coming winter.

- **Adam Scorer, Chief Executive, NEA (Chair)**
- **Philip Sellwood, Chief Executive, Energy Saving Trust**
- **Peter Smith, Director of Policy & Research, NEA**
- **Anthony Ball, Public Health Practitioner (Wider Determinants of Health/Fuel Poverty), Cornwall Council**
- **Alison Challenger, Director of Public Health, Nottingham City Council**

11:00 REFRESHMENT BREAK

11:30 SESSION 2 – THE HOMES OF THE FUEL POOR

The session links to NEA's advocacy priority in consistently supporting the most vulnerable by focusing on housing standards in different tenures and locations, in particular the Private Rented Sector and in rural areas. It will highlight the challenges and the gaps in assistance as well as examples of good practice in overcoming them. There will be a particular emphasis on the effective implementation of legislation to improve housing standards.

- **Peter Smith, Director of Policy and Research, NEA (Chair)**
- **Kelly Greer, Research Director, ACE**
- **Eamonn Ives, Researcher, Bright Blue**
- **Phillip Dawson, Business Development Account Manager, E.ON**

12:45 LUNCH

14:00 SESSION 3 - ENHANCING THE HEALTH OF THE FUEL POOR

The session will link to NEA's advocacy priority that prevention is better than cure. On average there are 32,000 excess deaths each year in the UK between December and March. Of these, around 9,700 are attributable to cold homes, In England alone, between 1st January and 31st March 2018, an additional 15,544 deaths occurred. This is 12% higher than the five-year average. Millions of people will have suffered the health impacts of living in a cold home placing further strain upon the health service.

The evidence base around cold homes and health is well documented and there is official recognition of the problem by health-related bodies such as National Institute for Health and Care Excellence (NICE), Public Health England (PHE) and the Royal College of General Practitioners (RCGP). However this has not been reflected in the development of consistent cross-organisational work programmes to deliver the necessary improvements.

The session will examine evidence and practices where health bodies have worked in partnership with fuel poverty alleviation schemes to demonstrate how the gaps in provision can be filled.

- **Peter Sumby, Director of Operations, NEA (Chair)**
- **Jamie-Leigh Ruse, Senior Research and Policy Officer, NEA**
- **Teresa Howarth, Principal Environmental Health Officer, East Suffolk**
- **Clare Mains, PEC Project Manager, Plymouth Energy Community**

15:15 REFRESHMENT BREAK

15:45 SESSION 4 - THE IMPACT OF LOW INCOMES ON THE FUEL POOR

NEA believes the most cost-effective and enduring solution to ending fuel poverty is increasing investment in domestic energy efficiency. However, like many other campaigning organisations, we are increasingly concerned by the impacts poor earnings growth, cuts to working-age benefits, the roll-out of universal credit and above-inflation rises in the cost of essential goods and services are having on the poorest in our society. Those impacts are realised in the everyday experiences of people living in fuel poverty: prepayment meter customers self-disconnecting, off-gas households unable to buy heating oil and families in rented housing living in damp and mouldy properties they cannot afford to keep warm.
This session will review the problem of low household incomes in the UK, its impact on fuel poverty and the key actions needed to plug the gaps that exist between the incomes and living costs of fuel poor households. It links to NEA's advocacy priority in consistently supporting the most vulnerable.

- **Carl Packman, Head of Corporate Engagement, Fair by Design Campaign (Chair and speaker)**
- **Dawn Stobart, Director of External Affairs, Christians Against Poverty**
- **Joanne Lazzari, CSM Debt Resolution, E.ON**
- **Claire Harrold, Managing Director, Warm Zones**

SESSION ENDS 17:00

Tuesday evening

19:00 CONFERENCE NETWORKING DINNER

ST MARY'S IN THE LACE MARKET, 40 HIGH PAVEMENT, NG1 1HN

19:00 Drinks
19:30 Seated for dinner
Welcome speech from Sara Vaughan, E.ON

Please check your booking confirmation to ensure you have registered to attend the dinner. If not, but you would like to attend, please see a member of NEA staff on the registration desk.

Wednesday 18 September

09:00 DEMENTIA FRIENDS AWARENESS SESSION (optional)

- **Ian Hind, Senior Dementia Friends Regional Officer, Alzheimer's Society**

09:30 SESSION 5 - ENSURING MARKETS DELIVER FOR THE MOST VULNERABLE

The session will provide an overview of the retail energy market and actions to engage vulnerable consumers in the market, linking to NEA's priority to consistently support the most vulnerable. It will focus on the work of the newly-appointed Commission for Customers in Vulnerable Circumstances and changes in legislation and programmes that aim to reduce energy bills for low-income households.

The session will have a focus on inclusivity and the need to address the gaps in assistance for energy customers with specific needs.

It will also reflect on the social impact that programmes addressing the needs of vulnerable consumers can have in ensuring energy is affordable for all.

- **Adam Scorer, Chief Executive, NEA (Chair)**
- **Meghna Tewari, Head of Retail Market Policy (Household, Business and Vulnerable), Ofgem**
- **Audrey Gallacher, Director of Policy, Energy UK**
- **Anna Bird, Director of Policy and Research, Scope**

10:45 REFRESHMENT BREAK

11:15 SESSION 6 - CLEAN, INCLUSIVE GROWTH & INNOVATION

The Clean Growth Strategy is a vehicle that we can exploit to end the individual suffering caused by fuel poverty and deliver on energy efficiency will contribute towards achieving other UK Government objectives; a successful industrial strategy, supporting small business growth in every region and achieving carbon emissions reductions. Delivering these outcomes will also help improve local air quality, reduce health and social care costs and provide real benefits to households who are struggling financially. The session will focus on how the transition to a low-carbon economy can be done affordably. It will include evidence from the National Infrastructure Commission and their Assessment calling for an increase in the rate of domestic insulation and for public capital funds to be made available.
Other speakers will provide evidence that innovation can bring real benefits to vulnerable energy consumers.

- **Danni Crosland, Director of Operations, NEA (Chair)**
- **Katie Black, Head of Energy, Transport and Digital, National Infrastructure Commission**
- **Stewart Reid, Head of Asset Management and Innovation, SSEN**
- **Rob Lambe, Managing Director, Melius Homes Ltd**
- **Angeliki Koulouri, Innovation Project Lead, UK Power Networks**

12:40 CLOSING ADDRESS: THE MANY FACES OF FUEL POVERTY

- **Adam Scorer, Chief Executive, NEA**

13:00 CLOSE AND LUNCH

14:00 ENERGIESPRONG SITE VISIT

Please check your conference itinerary to see if you are registered for this visit. If not, and you would like to go, please speak to a member of the team on registration.

A coach will leave the front of the building at 2pm and return delegates back to the conference centre for 3.30pm.

APPENDIX E: EXAMPLE OF DATA ANALYSIS CODING

Theme	Code/sub-code
Barriers	Political [Local]; [National]; [International] Social Cultural Economic [UK (national)] [International (EU-level/Global] Other
Influence	Existing Infrastructure Actor [Institution)]; [Collective]; [Individual] Economic Structure [Ownership] Policy
Actors	State [Local Authority]; [UK Government] Non-state [Private]; [Third Sector] Relationship [Networking] Motivation Narrative [Vision]; [Priority]
Future	Issues (TRANSFER INTO BARRIER CODE) [Short-term] ; [Medium-term]; [Long-term] Improvements/changes [Local] ; [National] ; [International]

APPENDIX F: ETHICAL APPROVAL CONFIRMATION

University of Glasgow | College of Science & Engineering

Dr. Christoph Scheepers
Senior Lecturer

School of Psychology
University of Glasgow
58 Hillhead Street
Glasgow G12 8QB
Tel.: +44 141 330 3606
Christoph.Scheepers@glasgow.ac.uk

Glasgow, June 18, 2018

Ethical approval for:

Application Number: 300170217

Project Title: Governing Transitions towards Low Carbon and Equitable Cities

Lead Researcher: Dr David Featherstone

This is to confirm that the above application has been reviewed by the College of Science and Engineering Ethics Committee and **approved.** Please refer to the collated reviews on the system for additional comments and some potentially useful suggestions. Good luck with your research.

Sincerely,

[redacted]

Dr Christoph Scheepers

Ethics Officer

College of Science and Engineering

University of Glasgow

APPENDIX G: PARTICIPANT INFORMATION SHEET

Information Sheet for Participants

PhD Thesis
Governing Transitions towards Low Carbon and Equitable Cities

My name is Katherine Sugar and I am a PhD student from the University of Glasgow. I am conducting a research project for a PhD degree in Geography which examines sustainable and equitable transitions towards low carbon cities, using the case study Nottingham in the United Kingdom.

The overall aim of this project is to examine the ways in which city actors are implementing low carbon transitions, which are pursuing just and equitable dimensions.

The main focuses of this project are:

- The UK national priorities, policies and plans to transition to low carbon and equitable futures.
- The establishment of schemes implemented within the city of Nottingham to achieve a transition towards low carbon and equitable urban futures.
- The successes, obstacles and challenges such schemes have experienced for low carbon and equitable urban transitions.
- The governing actors and stakeholders in the city's pursuit to transition to a low carbon and equitable future.

This information will be collected primarily by interviews and secondary data literature analysis. I would be grateful if you would allow your participation in my thesis research. This will involve taking part in an interview on questions relating to the city and the city's intended transition to a low carbon city. It is anticipated that the interview will take 60-90 minutes, subject to your availability.

The information collected will be used in the presentation of data for this thesis. If agreed to, information will be collected by note-taking and/or Dictaphone. This information will only be made accessible to me and the lead supervisor, Dr David Featherstone. If requested, you can remain anonymous and your material confidential. You have the right to stop the interview at any time, and withdraw your participation from the dissertation project at any stage. If required, you can request to review the notes, transcripts or other data collected during the research pertaining to your participation. This data will not be shared with other organisations or for commercial purposes. Therefore no royalties or payments from the research project will be made.

The dissertation will be completed by November 2021 and submitted to the School of Geographical and Earth Sciences at the University of Glasgow. It will be assessed by my supervisor, and read by other staff members within the School of Geographical and Earth Sciences and out-with the School from another UK university.

Thank you for taking the time to read this information sheet. If you have any questions, please contact me directly on (+44) XXXXXXXXXX and k.sugar.1@research.gla.ac.ik. You can also contact my lead supervisor Dr David Featherstone at David.featherstone@glasgow.ac.uk for further information. This project has been approved by the University of Glasgow.

Participant Name and Signature:.....
Participant Contact Details:.....
Researcher's Signature.....Date.....

APPENDIX H: PARTICIPANT CONSENT FORM

Consent Form for Participants

PhD Thesis
Governing Transitions towards Low Carbon and Equitable Cities

I would be grateful for your consent to allow myself, Katherine Sugar, to conduct an interview with you as part of a PhD thesis project for a PhD in Geography from the University of Glasgow on 'Governing Transitions towards Low Carbon and Equitable Cities.'

It is estimated this interview will last between 60 – 90 minutes, subject to your availability. Please note you have the right to stop the interview or withdraw from the research at any time. Ethical procedures for academic research undertaken from UK institutions require that interviewees explicitly agree to being interviewed and how the information contained in their interview will be used. The information you provide will be used subject to your permission with this consent form.

If you have any questions regarding this form, please contact Katherine Sugar directly on (+44) XXXXXXXXXX and k.sugar.1@research.gla.ac.uk and if required, the lead supervisor of this project Dr David Featherstone at David.featherstone@glasgow.ac.uk.

Please read the following below and tick where applicable in the designated space.

(_____) I have read and understood the accompanying Information Sheet.

(_____) I understand that I am voluntarily taking part in this project and that I can stop and withdraw my participation and the information I provide, at any time throughout the interview and the dissertation project.

(_____) I understand that I am free to contact the researcher with any questions I may have.

(_____) I grant permission for note-taking and/or the use of a Dictaphone during the interview (please specify which).....
.....

(_____) I grant permission for the information I provide to be analysed by Katherine Sugar as research investigator.

Please choose **one** of the two options below:

(_____) I agree to be quoted directly if my participation remains anonymous and a pseudonym is used.

(_____) I do not wish to be quoted at all.

Participant Name and Signature:.....
Participant Contact Details:.....
Researcher's Signature.....Date.....