Co-benefits of low-carbon policies in the built environment: an Australian investigation into local government co-benefits policies

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Co-benefits of low-carbon policies in the built environment:
An Australian investigation into local government co-benefits policies

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A thesis in fulfilment of the requirements for the degree of Doctor of Philosophy

School of Architecture & Design
Faculty of Built Environment
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Thesis/Dissertation Sheet

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Climate change is undeniably the most urgent issue facing humanity. While the Paris Climate Agreement made progress in bringing about international collaboration, for Australia, outcomes at the national level remain uncertain. Nevertheless, the growing involvement of local governments in climate action is encouraging. Not only are the impacts most keenly experienced at this level, there is greater opportunity for control. This is particularly so as a range of non-climate-related co-benefits of climate change mitigation are available at this level. These co-benefits motivate governments to frame climate change mitigation in a positive light to operationalise broader economic, social, health and environmental benefits of low-carbon policies within the concept of sustainable development. Despite substantial evidence for co-benefits, their policy impact remains limited and under-developed. This thesis investigates local government's understandings of the 'co-benefits approach' in planning for climate change. It provides a systematic understanding of local policy context to plan, generate and purposively integrate co-benefits into the policy-decision-making processes.

A methodology was developed to analyse the use of co-benefits in local government climate-related policies in New South Wales from July 2015 to May 2016. Investigation comprised three phases: a targeted on-line survey; review of councils' climate-related policies; and in-depth interviewing of council officers. The on-line survey provides an informative overview of the factors that drive local action on climate change. The narratives generated from the interviews take this further revealing in-depth insights into policy-makers' perceptions about the role of each factor, as well as an understanding of motivations for the uptake of co-benefits in policy.

The thesis found that climate change mitigation is primarily driven by the dual objectives of reducing emissions and energy consumption. A focus on monetary considerations, together with constrained authority, policy and legislative support from higher levels of government, absence of data and know-how to assess co-benefits collectively, are key influences. As a consequence, most councils target only certain (quantifiable) benefits from 'energy-related' mitigation measures. This excludes significant health-related benefits. A broader policy direction from state to local government is required to facilitate adoption of a co-benefits framework by local government. This will enable councils to more readily consider non-climatic and non-energy-related benefits of low carbon measures.

This thesis contributes a clearer understanding of local governments' current use of the co-benefits approach in tackling climate change. This will help to purposively consider, plan, generate and promote co-benefits in planning for climate change in Australia by decision-makers.

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ABSTRACT

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DEDICATION

I dedicate my work in this thesis to

my mother, father, and my sister ...

I am indebted to them for teaching me the art of learning.

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ABBREVIATIONS

ABARE	Australian Bureau of Agriculture and Resource Economics
ACCU	Australian Carbon Credit Units
ACT	Australian Capital Territory
AGO	Australian Greenhouse Office
AIHW	Australian Institute of Health and Welfare
ALP	Australian Labor Party
ANREU	Australian National Registry of Emissions Units
AR	Assessment Report
AUD	Australian Dollar
BREE	Bureau of Resources and Energy Economics
CAPs	Climate-altering air pollutants
CBA	Cost-benefit analysis
CBSWM	Community-based solid waste management
CCA	Climate Change Authority
CCP-Australia	Cities for Climate Protection – Australia
CDM	Clean Development Mechanism
CEFC	Clean Energy Finance Corporation

CEFP	Clean Energy Future Plan
CFI	Carbon Farming Initiative
CO_2-e	Carbon dioxide equivalent
CoA	Commonwealth of Australia
COAG	Council of Australian Governments
COP	Conference of the Parties (to the UNFCCC)
CPRS	Carbon Pollution Reduction Scheme
CSIRO	Commonwealth Scientific and Industry Research Organisation
CSP	Community Strategic Plan
DAP	Direct Action Plan
DCCEE	Department of Climate Change and Energy Efficiency
DCP	Development Control Plan
EPA	Environmental Protection Agency
ERF	Emissions Reduction Fund
ERT	Emission Reduction Target
ESD	Ecologically Sustainable Development
ETS	Emissions trading scheme
EU	European Union
Eur. Comm.	European Commission

GCP	Greenhouse Challenge Program
GHG	Greenhouse gas
GMR	Greater Metropolitan Region
IAM	Integrated Assessment Modelling
ICLEI	International Council for Local Environmental Initiatives
IEA	International Energy Agency
INDC	Intended Nationally Determined Contribution
IP&R	Integrated Planning and Reporting
IPCC	Intergovernmental Panel on Climate Change
IPT	Interim planning target
IRENA	International Renewable Energy Agency
LAPP	Local Adaptation Pathways Program
LG	Local Government
Mt	megatonnes
NGAP	National Greenhouse Advisory Panel
NGERS	National Greenhouse and Energy Reporting Scheme
NGRS	National Greenhouse Response Strategy
NRC	National Research Council
NSW	New South Wales
OLG	Office of Local Government

RET	Renewable Energy Target
SPM	Summary for Policymakers
SWS	Special Working Session
TS	Technical Summary
UN	United Nations
UNEP	United Nations Environment Programme
UNFCCC	United Nations Framework Convention on Climate Change
USA	United States of America
USEPA	United States Environmental Protection Agency
WASIP	Waste and Sustainability Improvement Program
WCC	World Climate Conference
WCED	World Commission on Environment and Development
WG	Working Group
WGIII AR5	Working Group Three Fifth Assessment Report
WHO	World Health Organization
WMO	World Meteorological Organization

CHAPTER 1: INTRODUCTION

1.1 Background

Climate change is undeniably the most urgent issue that humankind faces. Scientific evidence confirms that human-generated emissions of greenhouse gases (GHGs) into the atmosphere are causing our planet's climate to change rapidly (IPCC [Intergovernmental Panel on Climate Change], 2014a). The IPCC, in its Fifth Assessment Report (AR5), warns that if we do not drastically change policies and technologies to transform the world into low-carbon development pathways, the Earth will ultimately cross the dangerous tipping point in its climate system (IPCC, 2014b). According to the latest climate science, global temperature rise needs to be limited to 2^0C to avoid the prospect of catastrophic irreversible global warming (UNFCCC [United Nations Framework Convention on Climate Change], 2015a). The twenty-first session of the Conference of the Parties (COP21) to the UNFCCC in 2015 at Paris was a turning point in international negotiations in reaching an agreement to reduce global GHG emissions (UNFCCC, 2015a, b). In the Paris Agreement, 146 countries who collectively generate 86 per cent of global GHG emissions agreed to reduce their emissions. They agreed to attempt to 'limit the rise of global average temperature to 2^0C and then scale up efforts to bring it down to 1.5^0C, with the ultimate aim of achieving net-zero emissions by the end of this century' (UNFCCC, 2015c, p. 22). The Paris Agreement has finally

built on the scientific certainty of climate change, identifying policy responses to mitigating its influence (Falkner, 2016).

Australia ratified the 2015 Paris Agreement on 10 November 2016 and has committed 'to reduce its GHG emissions by 26 to 28 per cent below 2005 levels by 2030' (CoA [Commonwealth of Australia], 2015a, p. 01). Australia is underperforming in GHG reduction among developed nations (Cheung & Davies, 2017). Its per-capita emissions are among some of the highest in the world (IEA [International Energy Agency], 2011, pp. 97-99; Nachmany et al., 2014; OECD [Organisation for Economic Cooperation and Development], 2015). Despite its rich renewable-energy potential (BREE [Bureau of Resources and Energy Economics], 2014), the contribution of fossil-fuel-based electricity to the energy sector has remained high at 85 per cent (CoA, 2015b). With limited impact on emission levels, Australia's GHGs continue to grow rapidly (Garnaut, 2008). New data[1] have confirmed that Australia's GHG emissions are rising with longer-term projections showing that carbon pollution, without significant intervention, is set to rise by 3.5 per cent between 2020 and 2030 (CoA, 2017). Being a signatory to the Paris Climate Agreement, Australia now faces a challenge to significantly reduce its GHG emissions to fulfil its international commitment.

There is a consensus around the urgency of adopting low-carbon development pathways such as low-carbon energy sources like renewable energy and

[1] http://www.environment.gov.au/climate-change/publications/emissions-projections-2017

energy-efficient technologies which have been available for decades. Thus, it is perplexing that the deployment of these solutions has been painfully slow in Australia. One of the main reasons for slow progress is the widely held belief that implementing policies for tackling climate change will be both socially and financially demanding (Ganten, Haines, & Souhami, 2010). It is held that such policies will damage the economy, reduce growth, and threaten jobs. Underlying this scepticism is a deep-rooted conflict between economic and environmental values (Bulkeley, 2001; Smith, 2013). This has turned the climate change debate into one of pressing economic needs versus long-term, uncertain, and barely visible threats of climate change. This may be changing into 2019 with record breaking hot summers, intense bushfires, and extensive floods (Hughes et al., 2017; Steffen, Alexander, & Rice, 2017). At the national, state, and regional level, policy-makers are now facing enormous challenges balancing the immediate interests of development with long-term interests of stabilising global climate. Yet such a narrow framing of the climate change issue, seen only in terms of trade-offs, misses the larger picture.

1.1.1 Climate change mitigation benefits

Conventionally, climate policies are designed to focus on options that target a single outcome instead of a broad set of multiple outcomes (Spencer et al., 2017). Such policies usually aim to achieve long-term goals through large-scale solutions. For example, until recently, UNFCCC negotiations have focused solely on large-scale emissions reduction (Gupta, 2010). However, over the years, assessments of climate policies have found that these policies have effects on other areas and can serve several purposes.

As global attention to mitigating climate change grows, several studies have indicated that many measures to reduce GHG emissions have additional benefits not related to climate change. These benefits are often substantial and span multiple sectors, scales, and timeframes. However, when assessing climate polices these benefits are largely ignored (Hamilton & Akbar, 2010). Particularly in the transport, agriculture, and food sectors, and in electricity generation and household energy, measures to reduce GHG emissions have demonstrated significant health benefits which, in turn, have associated economic benefits. These additional benefits include less air pollution, increased physical bodily movement, improved health, more nutritious diet, improved energy security, and less dependency on oil, less traffic congestion, and enhanced social and cultural capital (Capon & Rissel, 2010; Smith, 2013). Together, these additional benefits go well beyond improving environmental sustainability by venturing into other aspects of the sustainability domain. The growing body of evidence of what are being termed ‘co-benefits’, which are obtainable through low-carbon development, challenges the prevailing conviction that policies to address climate change are socially and economically too demanding (Ganten et al., 2010).

1.1.2 The co-benefits

The findings noted above suggest that addressing climate change and development issues separately is not an effective approach. Rather, an integrated or ‘co-benefits approach’, which addresses the two issues together, would be more effective not only on cost grounds but also on the grounds of

achieving broader sustainable development benefits (Burtraw et al., 2003; Davis, Krupnick, & McGlynn, 2000a). Studies have found that the co-benefits of most policies for reducing GHG emissions could be the same as, or close to, the costs of implementing these policies (Davis et al., 2000a). If considered, these co-benefits could substantially reduce net costs of GHG emission-reduction measures (Global Commission on the Economy and Climate, 2014, p. 10; Smith et al., 2014, p. 714; Ürge-Vorsatz, Herrero, Dubash, & Lecocq, 2014, p. 576). These findings have drawn the attention of several international organisations and government agencies. Based on these findings, as well as in response to international efforts to reach a climate agreement in the late 1990s, the UNFCCC and other international and government agencies have directed significant efforts to investigate co-benefits. Studies have been conducted to understand the value of integrating co-benefits and their accompanying advantages into the analysis of climate policy-making (Floater et al., 2016; Minist. Environ., Gov. Jpn. [Ministry of the Environment, Government of Japan], 2009; Pearce, 2000; UNEP [United Nations Environmental Programme], 2011; UNFCCC, 2003). All these efforts collectively have facilitated the emergence of the co-benefits approach as a critically important approach to analyse, develop, implement, and assess policies and strategies that can tackle climate change as well as local developmental and environmental issues (Doll & Puppim de Oliveira, 2017; Mayrhofer & Gupta, 2016). In the IPCC's Fifth Assessment Report, co-benefits are featured as a central concept in the discussion about mitigation policy options that highlight the value of multi-objective policy perspectives which

integrate climate policies with non-climate development initiatives (IPCC, 2014b).

For some commentators, climate change is viewed as a planetary problem that demands a collective global response (Edenhofer, Flachsland, Jakob, & Lessmann 2013; Ostrom, Burger, Field, Norgaard, & Policansky, 1999). On the other hand, its source, GHG emissions, is increasingly viewed as being generated and more easily checked at the local level (Revi & Satterthwaite, 2014). Achieving goals of mitigating climate change, such as limiting warming to 2°C, is more economical when approached from a worldwide perspective and results in appreciable long-term international benefits but with significant short-term costs (Clarke et al., 2009). However, most climate policies are increasingly devised at national, sub-national and local levels. This is where many of the local environmental and developmental objectives are often more salient as policy drivers (Dubash, Hagemann, Höhne, & Upadhyaya, 2013a; Seto et al., 2014; Somanathan et al., 2014; von Stechow et al., 2015). Reason for this is 'most co-benefits, unlike the primary benefit' of GHG mitigation, are 'typically enjoyed at regional or local scales, are closer to the agents bearing the mitigation costs (generally the taxpayers and/or the consumers), have more immediate welfare effects' (Markandya & Rübbelke, 2003; Ürge-Vorsatz et al., 2014, p. 554) and are easier to measure. Hence, they provide incentives for policy-makers to consider stricter climate action and are considered more politically feasible (John & Rübbelke, 2009; MacKerron, Egerton, Gaskell, Parpia, & Mourato, 2009; Rübbelke, 2002). Instead of aiming mainly for 'long-term goals and large-scale solutions' to climate change per se, the co-benefits

approach addresses 'immediate, intermediate, and long-term, local, regional, and global concerns concurrently' (Spencer et al., 2017, p. 649).

Although efforts have mainly been focused on fostering cooperation to develop an international response to climate change through the negotiation process of the UNFCCC framework, it is now apparent that participating nations will unlikely be able to fulfil their commitments made in the 2015 Paris Climate Agreement without the assistance of local governments. This is based on the realistic understanding that attaining any emissions-reduction target would require the cooperation of local government, a player that influences many processes and can, in turn, produce a significant amount of GHG emissions (Bulkeley, 2000a). Most local governments have jurisdiction over land-use, physical planning and development and management of waste. They can also play a significant role in transportation management and energy consumption for the local community. These roles affect GHG emissions (Kates, Mayfield, Torrie, & Witcher, 1998; Norman, 2018; Rayner & Malone, 1997).

While most national governments are a party to international negotiations, through the UNFCCC framework, to reduce GHG emissions, over past two decades it has been observed that the local governments across the world are increasingly making efforts to reduce GHG emissions (Betsill, 2001; Bulkeley, 2010; Hoff, 2010; Norman, 2018; Storey, Brennan, Pillora, & Thomas, 2012; Urbis, 2010; Zeppel, 2012). This is despite local governments having limited capacity and lacking control over key relevant policy areas, as well as being without any formal recognition of their role in the formulation of national climate change mitigation policies (Bulkeley & Schroeder, 2009; Dowling, McGuirk, &

Bulkeley, 2013; Jones, 2012). The increasing involvement of local government has drawn the attention of the research and policy communities to investigate the factors that have played a key role in motivating local government in engaging in local climate action.

Such studies have found that local government policy-makers rarely devise local climate policy to address climate change alone. They usually make such policy work for other purposes as well (Ürge-Vorsatz et al., 2014). For instance, Betsill (2001) 'points to cities that have 'hung' climate action on such local 'hooks' as air quality and growth concerns', and notes that focusing on co-benefits permits local government policy-makers to reframe climate change as a local issue (Salon, Murphy, & Sciara, 2014, p. 68). These studies exemplify local benefits that can be attained through taking action on climate change and how these benefits can be used as motivators for local climate action (Bassett & Shandas, 2010; Bedsworth & Hanak, 2013; Puppim de Oliveira, 2013; Spencer et al., 2017).

1.2 The need for co-benefits research

Despite the substantial evidence for co-benefits, they largely persist at rhetorical or discourse level, although their implementation could beneficially influence outcomes of decision-making processes. In Australia, co-benefits are hardly addressed in climate change-related policy discussions. Indeed, policymakers' understanding of the approach is very limited. At local government level, main focus on cost minimisation has primarily limited the target of local climate policies to the cost of abating GHG emissions, together

with the attainment of energy-related monetary savings. Non-climatic and non-energy-related benefits, which include significant human health outcomes from improved air quality, physically active modes of transport uptake, enhanced 'liveability', and creation of local employment (Hickman, 2013; IPCC, 2014c; Woodcock et al., 2009), rarely enter local government's climate change policy discourse. Indeed, there is limited understanding of these co-benefits in the Australian context (Philp, Taylor, & Thompson, 2015).

Over the past decade, an increasing number of Australian local governments have initiated local climate actions. A number of studies have investigated the demographic, economic and geographic links of local climate actions (Fallon & Sullivan, 2014) to assess or identify policy actions and to test whether such actions produce outcomes (Carmin, Nadkarni, & Rhie, 2012; Hoff, 2010; Pillora, 2010; Urbis, 2010; White, 2009). Some of those studies have attempted to investigate factors which influence, facilitate or confront local governments as they engage in local climate action (Baker, Peterson, Brown, & Mcalpine, 2012; Bond, 2010; Scally & Wescott, 2011; Smith et al., 2008). These studies exploring local climate initiatives have sought to highlight the characteristics of local actions that are associated with climate change. The findings of these studies indicate that one council may be more likely than another to engage in climate action, which increase our understanding of which councils might respond more favourably to encouragement or incentives to implement local climate actions.

However, these studies do not provide insight into what local motives drive local climate action. Understanding local motives would offer insights into

issues of policy strategy that would be helpful to craft policy encouragements or incentives. This perspective is particularly relevant if climate-change issues at the local level are to be addressed (Askew & Sherval, 2012; Jones, Dettman, Park, Rogers, & White, 2007).

Understanding motives for climate action policy-making at local government level is vital as these policies have the potential to significantly affect more than 80 per cent of Australians who live in areas administered by local governments (House of Representatives Standing Committee on Environment and Heritage, 2005). Being the lowest level within Australia's government structure, as well as nearest to the community, local governments can influence their community members in terms of how they respond to climate change. Without investigating the processes of local government's climate policy development, we lack understanding of the factors that influence local government in developing these policies. By understanding how local government's climate change related policies are planned, developed, and implemented, we can develop better understanding of the complementary roles for each level of government in tackling climate change. This can also help other levels of the government to develop effective climate policies (Jones, 2009). These observations indicate the need for a systematic evaluation of local policy context that could assist policymakers in identifying, planning, generating and purposefully promoting co-benefits in climate policy-making processes.

This research aims to fill this gap. It will contribute to policymakers' present understanding of a 'co-benefits approach' in climate policy-making processes

within Australian local government as a way of incorporating climate change concerns into local development in general. More specifically, this research will help determine under what conditions a co-benefits approach could be effectively integrated into decision-making frameworks in Australia.

1.3 Justification for the current study

This research is based on the recognition of three major premises.

Firstly, there is a broad scientific consensus that in spite of the evidence confirming the reality of climate change and the availability of low-carbon solutions to tackle climate change, the deployment of these solutions has been painfully slow (IEA [International Energy Agency]/IRENA [International Renewable Energy Agency], 2017; IPCC, 2014b). This is in spite of the growing evidence that the co-benefits of low-carbon solutions are substantial and can significantly offset the costs of implementing these solutions (Ganten et al., 2010; Mayrhofer & Gupta, 2016; Puppim de Oliveira & Doll, 2017; Ürge-Vorsatz et al., 2014). This is the prime reason for this research.

Secondly, over the last two decades various methods and several frameworks have been developed to integrate co-benefits analysis with policy decision-making, but the impact of the co-benefits concept has been limited (Williams, Hasanbeigi, & Wu, 2012; Ürge-Vorsatz et al., 2014). Indeed, recent efforts to evaluate the costs and benefits of climate policies have largely overlooked co-benefits (Berry et al., 2015; Spencer et al., 2017). This significant gap between the potential of co-benefits and their practical impact suggests a lack of

understanding both in terms of assessing the strengths and weaknesses of existing co-benefits-related resources and in understanding the policy context for which these resources are intended. Gaining these insights is considered critical, which gives focus and direction to this research.

Finally, there is the acknowledgement that as the co-benefits approach is advocated as a way of incorporating global climate change concerns into local issues, any effort to integrate co-benefits through policy intervention must take into account local conditions (Puppim de Oliveira et al., 2013).

Therefore, in-depth understanding of local situations is essential to promote the co-benefits in the policy process (Bai, Nath, Capon, Hasan, & Jaron, 2012; Capon, Synnott, & Holliday, 2009; ICSU [International Council for Science], 2011; Proust et al., 2012). This awareness adds another dimension to the aim of this research: that of emphasising the need for making assessment of the local policy context possible in a way that reveals potential 'entry points' for co-benefit actions, as well as enabling policy-makers to assess the options available to them. This, in turn, will help them to incorporate co-benefits in the decision-support framework, in qualitative as well as quantitative terms.

It is expected that by providing a systematic understanding of the local policy context, this research will help local governments integrate co-benefits more effectively into their policy processes. In turn, this will help to accelerate the adoption of low-carbon development policies and activities by the policy decision-making community in Australia.

1.4 Objectives of the research

Thus, the objectives of this research are as follows:

1. To investigate the adoption of a 'co-benefits approach' in the Australian local government policy context — including planning the urban built environment.
2. To examine the main opportunities, obstacles, and challenges of adopting the co-benefits approach in the policy process.
3. To evolve a systematic understanding of the Australian local government policy context that will help plan, generate, and purposefully promote co-benefits in urban planning.

1.5 Research questions

The following four questions are framed to investigate and meet the objectives outlined above. The first research question is framed as an overarching question to investigate the nature and extent of adoption of a co-benefits policy by Australian local governments:

1. *Has Australian local government adopted a 'co-benefits approach' in its low-carbon policies? If so, to what extent?*

The second question is to understand the perspectives of local government policy-makers regarding the adoption of co-benefits in the decision-making process:

2. *What considerations guide local government policy-makers in devising low-carbon policies? How do these considerations generate co-benefits?*

The third question is to identify relevant issues in local government policy that could be considered critical for introducing co-benefits in the planning and development processes:

3. *What aspects of the local government policy context are critical for considering co-benefits in decision-making processes?*

The fourth question is to explore the types of interventions that would be necessary to promote and intentionally scale-up co-benefits in the policy process:

4. *What interventions are necessary to plan, generate, and purposefully promote co-benefits in local government policy?*

1.6 The structure of the thesis

This thesis consists of ten chapters and is divided into four parts.

PART ONE: SETTING THE CONTEXT

Chapter 1 – Introduction gives an overview of the challenges the world is facing in developing effective policies to mitigate climate change, the growing involvement of local governments in climate action, and the role of co-benefits as a powerful motivator for local climate action. The chapter then focuses on the local government climate policy context. It highlights the need for co-benefits research to purposefully promote co-benefits in the local government policy context. The chapter concludes by outlining the objectives and framing the four research questions in undertaking this research.

Chapter 2 – The evolution of climate change understandings and responses summarises the evolution of the climate change debate, scientific understandings, and global responses to climate change to contextualise the literature review, develop the methodological framework, and assist data analysis undertaken in the subsequent chapters. The science and global politics around climate change are discussed, and the main streams of the evolution of global climate policies and their limitations in meeting the political challenges are critically reviewed.

Chapter 3 – Understanding co-benefits discusses what co-benefits are, how they have evolved, and their application in climate action. It begins by reviewing commonly used definitions in co-benefits research. This is followed

by an overview of the development of co-benefits concept; review of terminologies; its various applications; and the frameworks and methodologies used in the literature to identify, analyse, and incorporate co-benefits into decision-making processes. The strengths and weaknesses of these resources and their policy implications are critically reviewed. Finally, the chapter gives an overview of the major categories of co-benefits resulting from action on climate change identified in co-benefits studies. The chapter concludes by identifying some major gaps in the co-benefits literature needing further research, particularly focusing on those areas that relate to the scope and objectives of this research.

Chapter 4 – Climate change discourse and climate policy in Australia discusses the main contributing factors and institutions that govern Australia's national discourse and policy responses to climate change. First, the contextual factors of Australia's national circumstances and major climate change impacts that shape its responses to climate change are discussed. The current organisation of Australian government which defines the roles, powers, responsibilities, and relationships between various levels of government regarding climate change are explored. The chapter then presents a brief account of the development of the climate change debate in Australia, identifying the key contours in the development of the current state of Australian climate policy. Finally, the current Australian national and NSW state climate policy settings are outlined and their implications for the development of a stable and compelling climate change policy in the future are discussed.

PART TWO: APPROACH

Chapter 5 – Research methodology clarifies the theoretical framework of this research, outlines the methodological approach, the research design and the strategy adopted to investigate the research questions, and describes the methods of data collection and subsequent analysis of the data. First, the implications of the interdisciplinary nature of this research are considered and the rationale behind the selection of methods is clarified. Then the methodological framework developed to undertake this research is explained. The research strategy adopted, and parameters of the study are clarified, and the methods of data collection employed are then explained. Finally, the specific approach to analysing and interpreting the quantitative and qualitative data collected from primary, as well as secondary sources, is discussed.

PART THREE: RESULTS

Chapter 6 – Planning for climate change in NSW local government focuses on understanding NSW local government's operational processes in terms of its governance structure, regulatory frameworks, and policy settings. These inform councils' consideration of climate change in their decision-making processes. The chapter begins by outlining the role of local governments in climate change, then assesses NSW local governments' current policies and controls that relate to climate change within the Integrated Planning and Reporting (IP&R) framework. The chapter provides insight into how, and to what extent, councils in NSW currently embrace climate change mitigation in decision-making. The chapter concludes by identifying a number

of critical issues that limit consideration of climate-change mitigation in NSW local government's climate planning.

Chapter 7 – The role of co-benefits in local climate action investigates the role of co-benefits as a motivating factor for NSW local councils' climate action. By asking local government officials directly about the issues that influence and facilitate local climate action, the chapter provides in-depth insights into these issues and their critical role in making local climate action possible. The chapter also investigates to what extent co-benefits are playing a role in motivating councils to pursue local climate action. Particularly, the chapter focuses on understanding policy-makers' perceptions and use of co-benefits in the policy decision-making process related to climate change. The chapter concludes by identifying a number of important issues that may have a significant bearing on possible adoption and scaling up of a co-benefits approach by local governments in their climate-oriented decisions.

Chapter 8 – Barriers and enablers to scaling up co-benefits focuses on presenting a critical analysis of the key research findings drawn together from the preceding two chapters (Chapters 6 and 7). The chapter identifies the main barriers and enablers to adopting a co-benefits approach in NSW local government's current policy processes related to climate change. Based on the analysis, the chapter identifies a list of cross-cutting issues that need to be considered to scale up the co-benefits approach in planning for climate change at local government level. Understanding of these issues in turn, will help to accelerate the adoption of low-carbon development policies and programs by the local government in Australia.

PART FOUR: SYNTHESIS

Chapter 9 – Activation of co-benefits focuses on synthesising the key findings drawn together from the preceding three chapters (Chapters 6, 7 and 8). It makes recommendations on possible interventions that would be necessary to promote and scale-up co-benefits intentionally in the local government policy processes. The chapter concludes by recommending specific measures that could help purposefully consider, plan, generate, and integrate co-benefits in climate policy-making processes by the policy decision-making community in Australia.

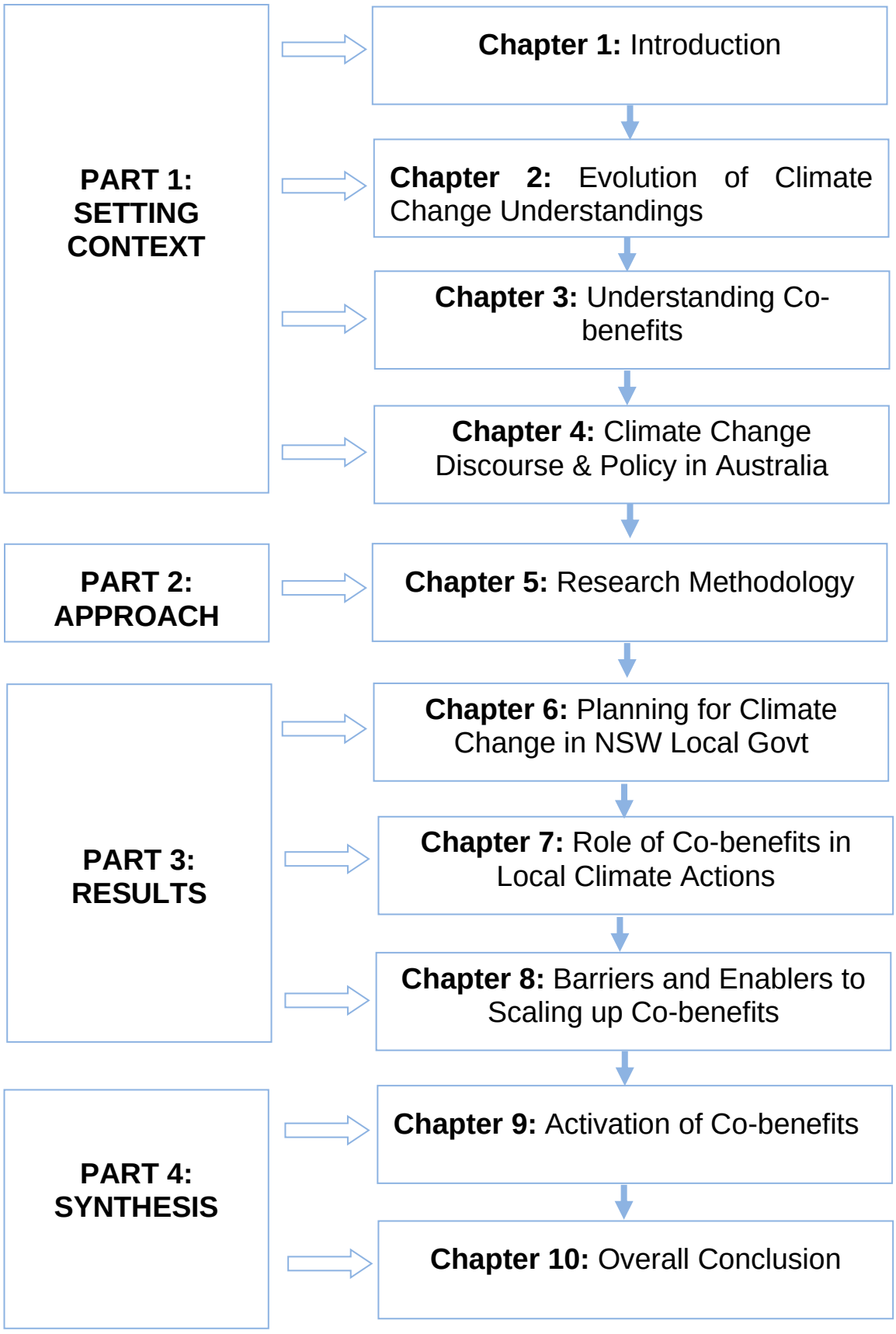
Chapter 10 – Conclusion reviews the main findings from the research reported in this thesis. The policy significance and implications of the findings and the original contribution made by this research are discussed. Limitations of the research are then addressed and the transferability of the research to settings outside Australia, particularly to the local government context, is considered. Finally, the chapter highlights possible directions for future research.

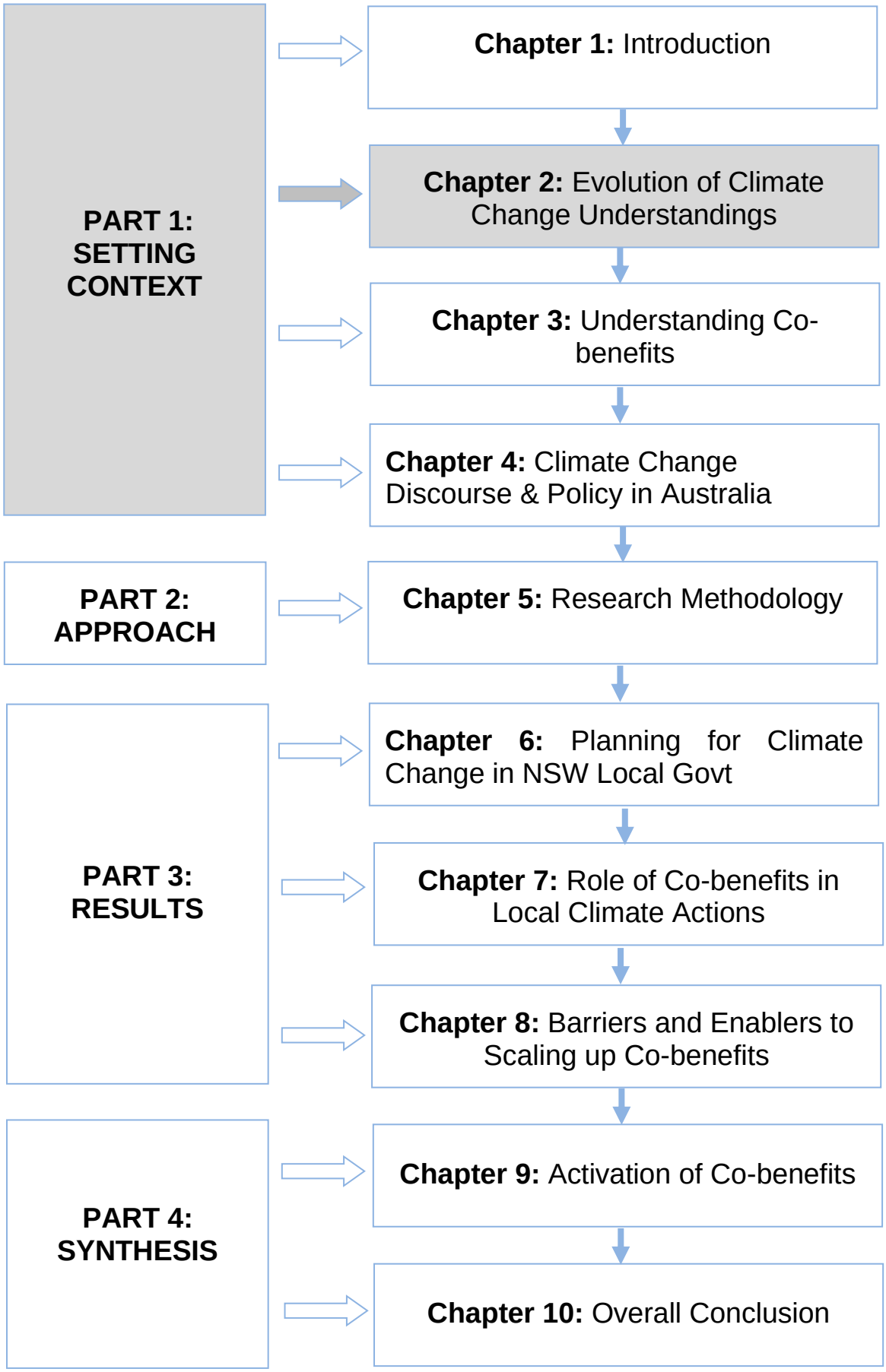
1.7 Conclusion

This chapter has provided an outline of the context in which this research was undertaken. It established the need and justification of conducting the research and outlined a detail structure for presenting the research findings in this thesis. The following chapter explores the evolution of climate change understandings and global policy responses to climate change to further

contextualise the literature review, methodological approach and the results presented in the subsequent chapters.

Figure 1.1: Schematic overview of the structure of this thesis




PART 1: SETTING CONTEXT
Chapter 1: Introduction
Chapter 2: Evolution of Climate Change Understandings
Chapter 3: Understanding Co-benefits
Chapter 4: Climate Change Discourse & Policy in Australia
PART 2: APPROACH
Chapter 5: Research Methodology
PART 3: RESULTS
Chapter 6: Planning for Climate Change in NSW Local Govt
Chapter 7: Role of Co-benefits in Local Climate Actions
Chapter 8: Barriers and Enablers to Scaling up Co-benefits
PART 4: SYNTHESIS
Chapter 9: Activation of Co-benefits
Chapter 10: Overall Conclusion

CHAPTER 2: THE EVOLUTION OF CLIMATE CHANGE UNDERSTANDINGS AND RESPONSES

2.1 Introduction

This chapter traces the evolution of climate change debate, scientific understandings, and global responses to climate change to contextualise the literature review, develop the methodological framework, and assist data analysis undertaken in the subsequent chapters. The science and global politics around climate change are discussed, and the main streams of the evolution of global climate policies and their limitations in meeting the political challenges are critically reviewed.

2.1.1 The climate change debate

Climate change has generated unparalleled debate around the world. It is the most contested issue of our time. At present the focus of the debate has moved from questioning the scientific basis and inevitability of climate change to finding appropriate policy solutions for mitigating climate change. Recently, scientists have found clear evidence about human influence on the climate system. The IPCC (Intergovernmental Panel on Climate Change) has confirmed that

> 'warming of the climate system is unequivocal, and since the 1950s, many of the observed changes are unprecedented over decades to millennia. The atmosphere and ocean have warmed, the amounts of

> snow and ice have diminished, and sea level has risen' (IPCC, 2014a, p. 2).

While the magnitude and speed of climate change is not completely certain, there is now a broad scientific agreement which suggests that the change is predicted to be highly disruptive for the climate system in terms of raising Earth's average surface temperature (i.e. between 1.5^0C and 4.8^0C by 2100), influencing precipitation and weather patterns and, most importantly, causing melting of the polar icecaps (IPCC, 2014a, p. 10).

As a result, the prediction is that 'the volume of the world's oceans will increase, probably somewhere between 0.26 and 0.82 metres by 2100. By the end of the 21st century, it is very likely that sea level will rise in more than 95 per cent of the ocean area. About 70 per cent of the coastlines worldwide are projected to experience a sea-level rise' (IPCC, 2014a, p. 11). There could be severe flooding in coastal areas around the world. This could dislocate millions of people worldwide. In addition, the changes in the climate system may result in heightened frequency of intense weather-related events like severe storms, heatwaves, droughts, and fires. All these events could damage the world economy and adversely affect human health (IPCC, 2014a, c & d; Reddy & Assenza, 2009).

The extent and pace of future climate change will ultimately depend on:

i) how much concentration of greenhouse gases (GHGs) in the atmosphere rise, remain constant or decline;

ii) how different climatic elements (e.g. temperature, precipitation, and sea level) react in response to variations in GHG concentration in the atmosphere; and

iii) how much climate fluctuates because of natural effects (e.g. from volcanic activities and variations in sun's intensity) and its inner volatility (i.e. changes in the atmosphere and oceans due to random variations in the circulation of wind and currents) (IPCC, 2014d; EPA [Environmental Protection Agency], 2008).

This uncertainty surrounding the magnitude and the precise nature or timing of climate change impacts suggests that an adaptable and sensitive approach to preparing for climate change will be necessary.

In this scenario the debate about climate change has evolved into two distinct discourses, both largely centred on the costs of mitigating climate change. At opposing ends of the spectrum of views on climate change are what can be described as 'supporters' and 'sceptics'.

The supporters, who advocate acting on climate change, fear that not acting on climate change will incur huge environmental and socioeconomic costs. They think that the cost of delaying action on climate change will be much greater than that of taking urgent action.

Whereas the 'climate sceptics', who do not want to act on climate change, argue that the cost of action will adversely impact the economy (Reddy & Assenza, 2009). In advancing their argument, the sceptics often exaggerate, using worst-case scenarios and excluding consideration of available 'no-

regrets' options in calculating the cost of climate action. Here 'no-regrets' options are 'available GHG emissions reduction measures that have negative net costs, because they generate direct or indirect benefits that are large enough to offset the costs of implementing the options' (IPCC, 2001a, p. 52). In contrast, supporters argue that there are opportunities for every country to utilise 'no-regrets' options to mitigate climate change at zero economic cost.

In between these two polarised discourses there is a less polarised third one whose supporters propose that development should come first, and climate change policies should be integrated with development priorities (Bradley, Houghton, Mustard, & Hamburg, 2006).

Amid the above discourses three distinct categories of climate policies can be observed:

1. The first is focused on *interventions* to minimise the impacts of climate change (Reddy & Assenza, 2009). The main rationale behind this approach is the consideration that a full solution for the climate problem may be worse than minimising its negative impacts.
2. The second is *adaptation,* which is

> 'the process of adjustment to actual or expected climate change and its effects. In human systems, adaptation seeks to moderate or avoid harm or exploit beneficial opportunities. In some natural systems, human intervention may facilitate adjustment to expected climate change and its effects' (IPCC, 2014e, p. 118).

Adaptation does not prevent or minimise climate change but only proposes measures for adapting to anticipated impacts of climate change in the future.

3. The third one is *mitigation,* which is 'human interventions to reduce the sources or enhance the sinks of greenhouse gases (GHGs) which may contribute directly or indirectly to limiting climate change' (IPCC, 2014e, p. 125). Mitigation requires immediate investments to prevent future damages.

While these three different categories of policy responses cannot be directly corelated to the discourses discussed earlier, the dominance of the third discourse, which is the less-polarised version of the other two, is observed in all three categories of climate policies.

This chapter intends to provide a snapshot of the evolution of the main discourses of global climate policies to contextualise and understand the relevance of a co-benefits approach as an emerging paradigm to meet the economic as well as political challenges of climate change action.

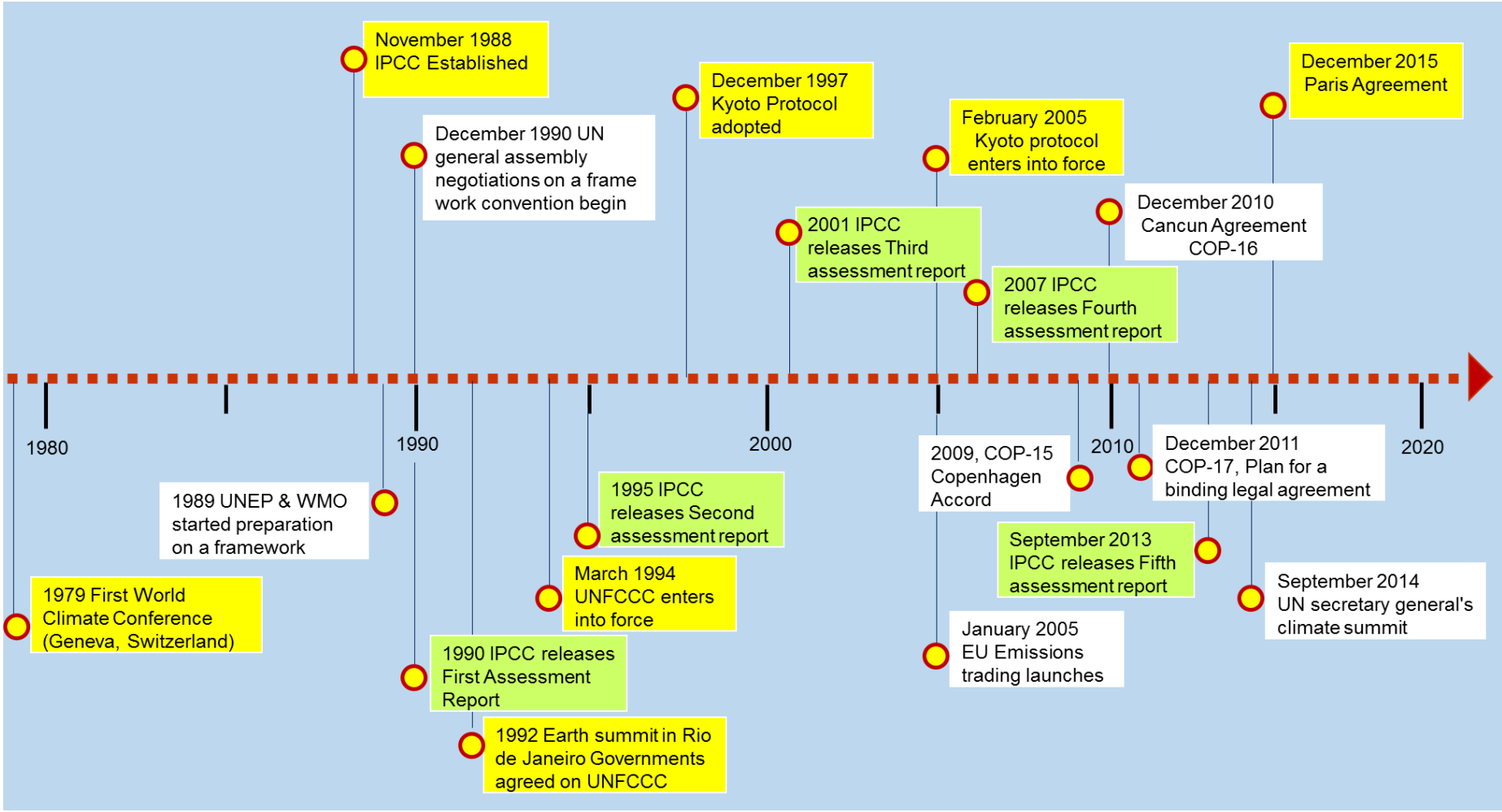
2.2 Climate change: scientific knowledge and global responses

'Climate change' appeared as a global issue at the first World Climate Conference (WCC) in 1979 at Geneva, Switzerland. The conference was organised by the World Meteorological Organization (WMO) to evaluate existing knowledge of how higher concentrations of GHGs in the atmosphere could raise Earth's average surface temperature. At the conference, a

declaration was issued calling all countries ‘to foresee and prevent potential man-made changes in climate that might be averse to the well-being of humanity’ (WMO, 1979, p. 725). This initiated a chain of events in international negotiations on climate change that ultimately resulted in the Paris Climate Agreement (see Figure 2.1).

At that time, the possibility of global warming due to human influence on the climate system was not supported by enough scientific evidence and was mainly considered a theoretical possibility. Later, when scientists managed to predict the change in the climate with more certainty based on improved climate models, awareness about the issue among both the public and politicians was increased (Arts, 1998).

Figure 2.1: Timeline showing major events in UNFCCC's negotiations that culminated in the Paris Agreement



Source: Compiled from WMO, 1979; IPCC, 1990; UNFCCC, 1992; UNCED, 1992; IPCC, 1995a; UNFCCC, 1998; IPCC, 2001a; UNFCCC, 2006; IPCC, 2007a; IPCC, 2014a; UNFCCC, 2015a and UNFCCC, 2015d.

2.2.1 Establishment of Intergovernmental Panel on Climate Change (IPCC)

In 1988, eight years after the World Climate Conference, the United Nations Environment Programme (UNEP) and the WMO, under the auspices of the United Nations (UN), established the Intergovernmental Panel on Climate Change (IPCC). The IPCC was given the mandate to 'assess on a comprehensive, objective, open and transparent basis the scientific, technical and socioeconomic information relevant to understanding the scientific basis of risk of human induced climate change, its potential impacts and options for adaptation and mitigation' (UNFCCC, 2006, p. 54). This was to help policy-makers better understand the dangerous implications of human interference with the climate system that would help them to prepare for appropriate policy response.

2.2.2 Adoption of United Nations Framework Convention on Climate Change (UNFCCC)

Parallel to establishing the IPCC, in 1989 the UNEP along with the WMO also started a negotiation process in developing a framework convention on climate change. The objective was to agree on some fundamental rules and arrangements that could later be drawn up in detail through required revisions and general protocols (Grubb, Vrolijk & Brack, 1999). Later, in 1992, at the United Nations Conference on Environment and Development (UNCED), at Rio de Jeneiro, Brazil, the participating countries adopted the United Nations Framework Convention on Climate Change (UNFCCC). This conference is also known as the Earth Summit or the Rio Summit. Under this framework,

154 countries, plus the European Community, signed a non-binding document where they agreed to work on the 'stabilisation of greenhouse gas concentrations in the atmosphere at a level that would prevent dangerous anthropogenic interference with the climate system' (UNFCCC, 1992, p. 4).

2.2.3 Organisation of the IPCC

The IPCC is governed by a panel of government members representing 195 countries under the auspices of the UN. IPCC is unique as it is the foremost authority on climate change. It consists of a very large group of scientists and climate experts coming from all over the world. They voluntarily contribute their time in preparing the Assessment Reports on behalf of the IPCC. These reports synthesise recent leading publications on climate change research, covering its causes, effects, and possible measure for mitigation.

The IPCC is structured into three distinct Working Groups and a specific Task Force, which prepare evaluation reports covering:

- latest scientific evidence on climate change;
- environmental, ecological, and socioeconomic effects of climate change; and
- preparation of coping strategies (IPCC, 2010).

'Working Group I is engaged in 'The Physical Science Basis of Climate Change', Working Group II tackles 'Climate Change Impacts, Adaptation and Vulnerability', and Working Group III is assigned with 'Mitigation of Climate Change'. The Task Force clarifies and improves the methodology for

calculating and reporting of GHG emissions and reductions at national level. Each group consists of two co-chairs, one for representative from a developed nation and one for representative from a developing nation'[2] (IPCC, 2010). These representatives take part in the process by formulating research questions and research priorities, and by granting approval to the completed assessment reports for policy-makers (Jamieson, 2014).

The involvement of government representatives in IPCC's working processes contributed to resolving the complexity of climate science into shapes that are understandable and manageable for policy-makers. This, in turn, has helped to convert climate change from a marginalised issue into one that is now widely recognised as needing urgent action (Vardy et al., 2017). Moreover, the participation of governments in the process means governments generally recognise the IPCC's Assessment Reports as reliable, which is considered a fundamental prerequisite for successful climate negotiations (Bolin, 2007).

2.2.4 IPCC's Assessment Reports

Since the formation of IPCC in 1988, five assessment reports have been released. Each of these reports usually consist of three volumes, written by the three scientific working groups (as mentioned above), which reports, separately:

[2] https://www.ipcc.ch/about/structure/

1) ‘research from the natural sciences on climate change itself — whether, how, and to what extent it is happening (Working Group I);
2) the impacts of climate change on natural systems and on human society and how society might adapt to climate change (Working Group II); and
3) approaches to the mitigation of climate change, including, importantly, policy options for reducing GHG emissions (Working Group III)’[3] (IPCC, 2010).

The main findings of the five assessment reports are presented in Table 2.1, with further details discussed in the following sections.

[3] https://www.ipcc.ch/reports/

Table 2.1: Key findings of IPCC's Assessment Reports

Year	Name	Key findings	Contribution to UNFCCC
1990	First Assessment Report (FAR)	• GHG emissions from human activities are increasing atmospheric concentrations of GHG which have raised Earth's temperature by an average of 0.3–0.6^{0}C over the last century. (IPCC, 1990, p. 52). • The warming is predicted to cause 'thermal expansion of oceans and melting of some land ice', which will result in 'sea-level rise of about 20 cm by 2030, and 65 cm by the end of the next century' (IPCC, 1990, pp. 52 & 53). • It would require an 'immediate reductions of over 60% in GHG emissions from human activities to stabilise their concentrations at today's levels' (IPCC, 1990, p. 52).	• Informed the negotiations at the 1992 UNCED in Rio de Janeiro.
1995	Second Assessment Report (SAR)	• 'The balance of evidence suggests a discernible human influence' on global climate. This has been called the first definitive statement that humans are responsible for climate change' (IPCC, 1995a, p. 22).	• Substantive input to development of UNFCCC negotiations for the Kyoto Protocol.
2001	Third Assessment Report (TAR)	• 'Observed warming of Earth's surface, attribution of observed warming to human activities, projected increases in future global mean temperature, rising sea levels, and increased frequency of heatwaves' (IPCC, 2001d, pp. 4, 5, 8, 9). • 'Future warming will have both beneficial and adverse effects, but for higher levels of warming, adverse effects will predominate' (IPCC, 2001d, p. 9). • 'Developing countries and poor people are most vulnerable to climate change' (IPCC, 2001d, p. 9).	
2007	Fourth Assessment Report (AR4)	• 'Anthropogenic warming could lead to some impacts that are abrupt or irreversible' (IPCC, 2007d, p. 53). • 'Approximately 20–30% of species assessed so far are likely to be at increased risk of extinction if increases in global average warming exceed 1.5–2.5°C (relative to 1980–1999). As global	• Inform the proceedings of the 2009 COP to the UNFCCC in Copenhagen.

Year	Name	Key findings	Contribution to UNFCCC
		average temperature increase exceeds about 3.5°C, model projections suggest significant extinctions (40–70% of species assessed) around the globe' (IPCC, 2007d, p. 54). • 'Partial loss of ice sheets on polar land could imply metres of sea-level rise, major changes in coastlines and inundation of low-lying areas, with greatest effects in river deltas and low-lying islands' (IPCC, 2007d, pp. 53, 54).	
2014	Fifth Assessment Report (AR5)	• Evidence is now stronger that 'human influence, primarily the burning of fossil fuels, has been the dominant cause of global warming over the past several decades' (IPCC, 2014a, pp. 2, 4, 5). • Without urgent action to reduce GHG emissions substantially, 'warming by the end of the 21st century will lead to high to very high risk of severe, widespread, and irreversible impacts globally' (IPCC, 2014a, pp. 8, 10, 16). • 'There is stronger evidence of the many ways Earth is already experiencing the effects of human-caused climate change' (IPCC, 2014a, p. 6.).	

Source: IPCC, 1990; IPCC, 1995a; IPCC, 2001d; IPCC, 2007d; IPCC, 2014a

The First Assessment Report (FAR) was published in 1990. In FAR, Working Group I concentrates on discussing the physical sciences basis of climate change. This was followed by publication of a Special Report, specifically to inform the 1992 UNCED in Rio de Janeiro and the negotiations for the UNFCCC (Bolin, 2007; Houghton, Callander & Varney, 1992; IPCC, 1990).

The Second Assessment Report (SAR) was released in 1995. In SAR, Working Group I underscored significant progress science has made since 1990 in understanding climate change. Working Group II expanded its evaluation scale by including discussions on the technological and economic viability of wide-ranging potential strategies for adaptation and mitigation to climate change. Working Group III dealt with the social and economic aspects of climate change across both immediate and long-term. The report made substantial contribution to the advancement of the UNFCCC, specifically, the negotiation processes for the Kyoto Protocol, which was passed in 1997 (IPCC, 1995a; IPCC, 2010, pp. 5, 6).

The Third Assessment Report (TAR) was published in 2001. In TAR, Working Group I offered clearer understanding of climatic processes. It showed how human actions contribute to climate change by highlighting various driving agents and their feedback in the processes. The forecasts of future climate were presented drawing multiple scenarios based on a wide range of models. Working Group II offered latest information about climate change impacts, consequent vulnerabilities and possible adaptation measures and their implications for pursuing sustainable development. Working Group III evaluated various options for mitigation, associated costs and co-benefits of

those options. It also discussed about the main barriers, opportunities, and appropriate policy instruments that need to be considered for such options. More importantly, for the first time, the report considered climate change mitigation within the broader context of sustainable development (IPCC, 2001a, b & c).

The Fourth Assessment Report (AR4) was released in 2007. In AR4, Working Group I presented new findings on human as well as natural drivers of climate system. Based on a detailed evaluation of the records of past climate change incidents and their causes, the report offered robust evidence of climate change including continent wise evaluation of climate change. Working Group II assessed manifested impacts of climate change. It charted projected impacts based on future trends of global warming and identified the most vulnerable places and people likely to be affected by the projected impacts. The analysis based on which these projections were drawn considered different pathways of development and interaction of multiple stresses. Working Group III evaluated future trends of greenhouse gas emissions, different options, and pathways for reducing emissions to stabilise concentrations of greenhouse gases in atmosphere. It also estimated associated costs of these options both for the near and longer term. The most notable feature of AR4 which distinguishes it from earlier assessments reports is its emphasis on integrating climate change responses with sustainable development policies. The report paid greater attention to achieving synergy between pathways of mitigation and adaptation, adhering Article 2 of the UNFCCC, and consistently evaluating uncertainty and risk. In addition, AR4

offered detail information to the 2009 Conference of the Parties (COP) for conducting negotiations at the UNFCCC in Copenhagen (IPCC, 2007a, b & c).

The Fifth Assessment Report (AR5) was published in 2014. In this report Working Group II provides a summary of the risks based on the experts' consensus. It discusses possible scenarios resulting from 2^0C or 4^0C of global warming that might change those risks. Notably, the report offers an evaluation of the possibility of reducing the resultant risks through adaptation. It observes that the cost of adapting to the threats of climate change identified is likely to be excessive compared to the cost of reducing greenhouse gas emissions that are causing climate change (IPCC, 2014d).

In the third instalment of this Fifth Assessment Report, Working Group III presented a policy summary titled 'Summary for Policymakers' (SPM). It assesses policy options for mitigating climate change at different government levels and various sectors of the economy, and social implications of these options. However, this assessment does not suggest any specific option for mitigation as these are intended not to be prescriptive (IPCC, 2014b).

The report concludes that a multi-objective policy perspective is necessary when considering mitigation policy options. As climate policy intersects with other policy goals it can either generate co-benefits or adverse side-effects. When considering mitigation policy options these intersections should be carefully managed to establish the justification for undertaking climate policy. The report also observes that when climate policies are designed in coordination with other non-climate development policies it can deliver low-

carbon development with substantial health benefits, positive impacts on the ecosystem, sustainable use of resources, and resilience of the energy system (IPCC, 2014b, c).

In the wake of publication of the AR5, criticism and accusations were raised in the media that the report had been censored by governments and significant changes had been made to the draft summary (Schiermeier, 2014; Stern, 2014). Notably, it was argued that the approved Summary for Policymakers (SPM) does not adequately emphasise the need for countries to cooperate to deal with climate change. Due to objection from the delegates some parts of the draft report that mentioned the greenhouse gas emissions of specific regions and groups of countries were deleted. The approved summary only presents data on total global greenhouse gas emissions (Clark, 2014).

However, in response to this accusation, the IPCC made it clear that this approved summary does not undermine the scientific integrity of the entire report, as governments were not allowed to make any fundamental changes to the main report. There is also a second executive summary called the Technical Summary (TS), which governments were not allowed to edit (Stavins, 2014).

Despite having such weakness in the IPCC Government Approval Process and IPCC not having the responsibility to recommend policies, most commentators concur that these reports have managed to establish the links between politics and science around climate change (Stavins, 2014; Vardy et al., 2017). This is important, as the process increasingly demonstrates that the

most difficult challenges the world is facing to tackle climate change is not technological, but political.

2.3 Climate change politics: from Kyoto Protocol to Paris Agreement

While international community has been trying to reach a global agreement to deal with climate change for over two decades, progress on this matter has stalled at international as well as domestic front. While we observe three distinct broad discourses in the climate change debate, the present controversy and dead-lock in finding a global response to the climate problem are almost entirely centred on mitigation. Specifically, the issues here are whether to take urgent policy measure to lessen worldwide GHG emissions, and if so, how strictly and in what form. These issues are difficult to resolve as they require policy responses from governments mainly involving regulatory control over private actions.

The discussion of policy options at the national level is important as this is where direct regulatory authority over emissions lies. However, in this section the discussion concentrates on policy options at the international level, because GHG emissions anywhere contribute to climate change everywhere, and efforts to mitigate climate change must be coordinated internationally to be effective. To this end, UNFCCC was formed in 1992 to coordinate the negotiation among representatives of national governments to attain the goal of stabilising GHG concentrations in the atmosphere. The participating countries were categorised into two distinct groups: ‘the developed (‘Annex 1’)

countries were encouraged to cut their GHG emissions back to 1990 levels, while the developing countries ('Annex 2') did not have to commit to such reductions, following a principle of 'common but differentiated responsibilities' as agreed under 'Principle 7' of the Rio Declaration on Environment and Development' (UNCED, 1992, p. 2). Subsequently, as part of the negotiation process, member countries adopted the Kyoto Protocol in 1997. To fulfil the requirements of 'Article 3 of the Protocol, Annex 1 countries commit to reduce their emissions of GHGs by at least 5 per cent below the 1990 level by the years 2008–2012' (UNFCCC, 1998, p. 3). While at the initial stage the United States' withdrawal put the Protocol into uncertainty, Russia's delayed ratification helped reach the required 55 per cent threshold for bringing the Protocol into effect in February 2005 (Reddy & Assenza, 2009, p. 2999) .

Since the Kyoto Protocol was the most important initiative in international climate policy, much of the evolving policy debate around climate change focused on the Protocol itself. As the first international climate agreement to limit human contributions to global climate change, with binding obligations to reduce GHG emissions for many of the world's industrialised countries, it is considered a milestone. However, the Kyoto Protocol also deepened the pre-existing divisions between the world's nations (particularly between industrialised and developing countries) that had been growing around climate change for over a decade. The Kyoto Protocol only required emission cuts by industrialised countries. It did not provide any specific obligations for developing countries to limit their emissions. This ultimately emerged as one of the sharpest points of controversy over the Protocol. The three main types

of criticisms about the Protocol are: i) the specific terms of the Protocol; ii) accuracy of the scientific evidence for climate change; and iii) arbitrary and strict mitigation targets (Dessler & Parson, 2006).

Critics of the Protocol argued against it mainly on two grounds: firstly, commitments for reducing emissions did not require actions by the major developing countries; and secondly, the emissions reduction targets were arbitrary and did not have any scientific basis. While it is true that the Protocol did not require any emissions reduction commitment from any developing country for the first commitment period, this argument failed to take into consideration that the treaty was drafted this way on 'the basis of the principle of common but differentiated responsibilities' (UNCED, 1992, p. 2). The principle is based on the understanding that industrialised countries, when compared to developing countries, have more financial and technical capacity for undertaking required initial policy changes and investments which they were willing to commit. The principle also acknowledged the argument that the industrialised countries have the obligation to take the lead in reducing GHG emissions because these countries are responsible for most of the present build-up of atmospheric GHG through widespread use of fossil-fuel in the past.

But critics of the Protocol also disputed this principle of 'common but differentiated responsibilities', arguing that not controlling the emissions of developing countries would ultimately allow emission-intensive industries to move to these countries, thereby making the treaty ineffective. They also argued that some of these developing countries are now competing with developed countries in many sectors and major emitters of greenhouse gases

— and so are expected to become major contributors to world emissions soon. Hence, not controlling the emissions of these developing countries will put the developed countries that are required to reducing emissions at a major competitive disadvantage and will offset any reductions being made by these countries (Dessler & Parson, 2006).

There is some merit on both sides of these arguments. Any mitigation regime, to be effective, must have near-global participation. However, given the complexity of the problem it is not practical to expect that full global participation will take effect immediately. Instead, having a flexible arrangement will allow it to resolve the appropriate balance of global mitigation effort between developed and developing countries over time. Demanding full global participation from the start would virtually guarantee an extended deadlock in the negotiation process in which no action would be taken.

The second main criticism against the Protocol was its arbitrary emissions-reduction targets, which do not have any scientific basis (Dessler & Parson, 2006). In addition, it was argued, although paradoxically, that they were too 'strong' as it would be too costly to achieve the targets in the near term, as well as too 'weak' to achieve any significant reduction in mitigating climate change.

While the targets seem arbitrary at a glance, they reflected a negotiated compromise between most countries that wanted either weaker or no targets and some countries that wanted more stringent targets. These targets resembled all other politically negotiated outcomes where arbitrariness is common. In this regard, arbitrariness of these targets was not unique to the

Kyoto Protocol. It is not appropriate to judge whether such targets have any scientific basis or not either, because science cannot specify any particular level of GHG emission targets. Science can only help policy-decision-makers take informed decisions about targets by offering knowledge about the consequences of alternative emission levels.

Despite its limitations and detractors, the Kyoto Protocol is widely acknowledged as a reasonable agreement, given the world's situation in the mid-1990s and available scientific knowledge about climate change that informed the Protocol through the first two sets of reports by the IPCC. However, the Kyoto Protocol's potential to move the climate negotiation process forward was largely wasted in subsequent years due to the growing absence of political will among some of the major industrialised nations. Instead of remaining faithful to the guiding principles embedded in the UNFCCC and fulfilling their national obligations under the Kyoto Protocol, these countries started to question the Kyoto approach, which only contributed to sustaining the deadlock rather than showing any way out of it (Dessler & Parson, 2006).

2.4 The Paris Agreement: a breakthrough in climate negotiations

To break the deadlock, countries again started negotiation to devise a follow-up agreement to the Kyoto Protocol in Bali in 2007. This was followed up in Copenhagen in 2009 where countries rejected collectively negotiated commitments and developed countries refused to take a lead. As a result, in

Copenhagen negotiators only managed to adopt a voluntary accord, which was even weaker than the Kyoto Protocol. In the Copenhagen Accord the countries submitted widely different voluntary national commitments for reducing their respective emissions by 2020. These were considered utterly insufficient to avoid the two-degree Celsius mark for global temperature increases which scientists consider a threshold necessary to prevent dangerous consequences of climate change (Selin & VanDeveer, 2015).

After this dismal performance in Copenhagen and just one year before the expiry of the Kyoto Protocol in 2012, countries again decided to restart negotiations. The goal was to come to an agreement in Paris in 2015 that would require commitments from all participating countries for the period up to 2030. Finally, the Paris Agreement was reached at the Conference of the Parties 21 (COP21) UN climate summit on 12 December 2015. The Paris Agreement is widely regarded as the first comprehensive world-wide treaty for tackling climate change which will take effect following the expiration of the Kyoto Protocol in 2020 (UNFCCC, 2015a). The deal is historic in the sense that for the first time 196 countries agreed to globally coordinate actions on climate change. These include both developed and developing countries. It was not just rhetoric but three defining elements that make this agreement a robust one:

- First, the agreement has a common goal that states the participating countries will ‘hold the increase in the global average temperatures to well below 2^0C above pre-industrial levels and to pursue efforts to limit

the temperature increase to 1.5^{0}C above pre-industrial levels' (Article 2.1[a]) (UNFCCC, 2015a, p. 3).

- Second, it introduces the objective to 'achieve net zero emissions in the second half of the century'. It entails 'matching scientifically credible reductions in carbon dioxide and other greenhouse gas emissions'. It declares that emissions level should reach its peak 'as soon as possible' and then be quickly lowered. The next task is to: 'achieve a balance between anthropogenic emissions by sources and removals by sinks of greenhouse gases in the second half of this century, on the basis of equity' (Article 4.1) (UNFCCC, 2015a, p. 4).
- Third, as current pledges to reduce emissions are not adequate to keep increase of temperature under 2^{0}C above pre-industrial levels, it outlines a process to make progress from where countries are at present, to reach zero emissions. For this it requires: 'Each Party's successive nationally determined contribution will represent a progression beyond the Party's then current nationally determined contribution and reflect its highest possible ambition' (Article 4.3) (UNFCCC, 2015a, p. 4). This implies at each stage member countries should raise their levels of emission reduction from the day the agreement was signed. To ensure 'clarity and transparency' of the process 'Each Party shall communicate a nationally determined contribution every five years' (Article 4.9) (UNFCCC, 2015a, p. 5).
- Finally, a key part of the agreement is 'developed countries shall provide financial resources to assist developing countries with respect

> to both mitigation and adaptation' (Article 9) (UNFCCC, 2015a, p. 13, 14).

Considering the above aspects, at a glance there is a lot to commend the Paris Agreement — countries agree on to work together on a shared goal to avert the worst effects of climate change; the reduction of emissions committed are practically credible; a reliable mechanism is there to ensure countries raise their emission reduction over time to achieve 'net zero' emission and a transparent process is followed in this regard; and there is also arrangement to secure funding from developed countries to help developing countries quickly change from fossil-fuel-based energy to renewable sources. In summary, the agreement gives a clear direction for ending the world's dangerous dependence on fossil-fuel-based energy.

But on the other hand, viewed critically, in its current form there is nothing in this deal that can assure us with certainty that we will avoid dangerous climate change. This caution is reflected in an analysis by the UNFCCC Secretariat:

> 'the national climate policy pledges submitted in the run-up to the Paris conference would result in global warming of 2.7°C above pre-industrial levels, and this estimate is based on the optimistic assumption that all national pledges will be fully implemented' (UNFCCC, 2015b, p. 45).

Most importantly, as there is no legal provision for penalties for member countries who fail to fulfil their commitments of reducing their emissions, the implementation of this agreement will rely partly on the good will of most governments and partly on the efforts of concerned citizens, civil society

groups, and opposition political parties being able to keep government policies, which are largely driven by the deep politics of the fossil-fuel industry, in check.

However, it is widely anticipated that the Paris climate deal will be able to shift the focus of the climate debate finally back onto the broader question of mitigation, including what types of responses and how much mitigation effort is appropriate (Falkner, 2016). Arguably, this is a turning point and a way forward in the negotiation process when compared with the Kyoto Protocol, which had stalled the process by causing much of the debate to focus on the Protocol itself. This shift will influence climate change debate to centre on policy changes both at the national and international levels to get to zero emissions. One of the main policy shifts is anticipated in the global financial sector. For example, investments in high-carbon-emitting infrastructure will end (e.g. the subsidies for fossil-fuel companies will disappear) and new investments will occur to address the limitations of available technologies for renewable energy, with expectations that large investments will be made mostly in the storage of power. As a result, the cost of renewables is expected to decline a lot further and quickly as these technologies are developed and made available throughout the world. All these initiatives are likely to have positive impacts on the development of the global carbon market, resulting in improved transparency and the possibility of adopting a global carbon tax (Falkner, 2016).

2.5 The policy implications of the Paris Agreement

The Paris Agreement has opened a new door for the international community to negotiate a global mitigation regime with the broadest possible participation of both industrialised and developing countries. However, the effectiveness of any mitigation regime in making significant contribution towards limiting climate change will depend on real and long-term commitments for reducing their respective emissions from industrialised as well as developing nations. Such commitments need to match the required large-scale reduction in global greenhouse gas emissions. This will ultimately require total conversion of world's energy system from fossil-fuel-based to renewable source-based energy system, over the next several decades. While stringent mitigation goals are necessary, this alone is not a sufficient condition for realising such a transition. To achieve a sustainable global energy transition international community needs to work together to make progress across multiple dimensions beyond mitigation goals (Fleurbaey et al., 2014; Riahi et al., 2012; van Vuuren et al., 2012).

Climate change mitigation poses an enormous challenge as it warrants a coordinated global as well as national and local action. On the one hand, it is a 'global commons'[4] issue for which all countries need to work together

[4] **Global commons** is a phrase commonly applied to refer to earth's common-pool of shared natural resources which are generally found in supranational, international, and global resource domains and include the atmosphere and outer space, high oceans and the Antarctic continent specifically. (Ostrom,1990).

towards a coordinated collective response (Edenhofer et al., 2013; Ostrom et al., 1999). This is because attaining specific mitigation goals, like the goal of limiting warming to 2°C, is most cost effective when coordinated at a global scale. The studies have found such approach can achieve maximum long-term benefits at substantial short-term costs (Clarke et al., 2009; van Vuuren, Weyant, & de la Chesnaye, 2006).

On the other hand, it has been observed that policies that are found to be effective in reducing greenhouse gas emissions are mostly developed at national and local levels. Many of the objectives of these policies are not primarily intended to mitigate climate change, instead non-climate related national and local development concerns are the predominant policy drivers (Dubash et al., 2013a; Seto et al., 2014; Somanathan et al., 2014), because

> 'the co-benefits of mitigation hold the prospect of helping achieve some of these objectives and reducing the short-term costs of climate polices that accrue on the local or national level, such an approach views climate change not as a burden to be avoided, but as a side-benefit of sustainable development' (von Stechow et al., 2015, p. 365).

Indeed, the failure of the Kyoto Protocol showed that the principle of 'common but differentiated responsibility' in addressing climate change (UNCED, 1992, p. 2) as a global commons problem was insufficient to motivate countries (both developing and industrialised) to join an international long-term mitigation regime (Dessler & Parson, 2006). As the negotiations after the Paris Agreement progress, it is becoming increasingly obvious that negotiating a viable mitigation regime will require countries to develop their own appropriate mitigation strategy, reconciling development, and climate priorities at the

national level. One of the major criticisms levelled at previous negotiations was their apparent failure to address the priorities of developing countries 'for sustainable development, support for adaptation activities, aid assistance and technology transfer' (Reddy & Assenza, 2009, p. 3004).

According to Reddy and Assenza (2009):

> 'For developing countries, climate change issues are not the main concern, when compared with problems such as poverty, natural resource management, energy and livelihood needs. From their perspective, development should come first, i.e., one should start from a sustainable development perspective which prioritises poverty reduction and equity. The challenge for such a type of development is the practical question of choosing sustainable pathways that provide food and energy security, employment opportunities, and at the same time minimise environmental impacts' (Reddy and Assenza, 2009, p. 3003).

A more pragmatic way of dealing with the challenges of climate change and achieving a truly sustainable global energy transition is to build climate policies upon the development priorities of the participating countries. In such a mitigation regime, countries need to adopt a more unified policy approach where the goal of mitigating climate change can be integrated with the goal of sustainable development. In such approach climate policies will be formulated 'as part of well-designed policy packages' that can potentially 'reduce the overall cost of achieving multiple sustainability objectives' (von Stechow et al., 2015, p. 364).

This understanding conforms to IPCC Working Group III's observation in the Fifth Assessment Report (WGIII AR5) where the necessity of adopting a 'multi-

objective policy perspective' is discussed when considering mitigation policy options at the national level (IPCC, 2014b). Hence, IPCC suggests that all member countries' efforts for mitigating climate change should be evaluated in a multi-objective assessment framework where global energy transition can be considered as an integral part of a broader sustainable development strategy (Edenhofer et al., 2014a, b; Riahi et al., 2012; Ürge-Vorsatz, Herrero, Dubash, & Lecocq, 2014; van Vuuren et al., 2012; von Stechow et al., 2015). This multi-objective framework can improve understanding about the potential synergies and trade-offs between climate change mitigation and development goals. This, in turn, can assist policy decision-makers to adjust existing priority settings in order to overcome existing political impasse in formulating more effective climate policy to fulfil their country's international commitments (Edenhofer & Kowarsch, 2015).

2.6 Conclusion

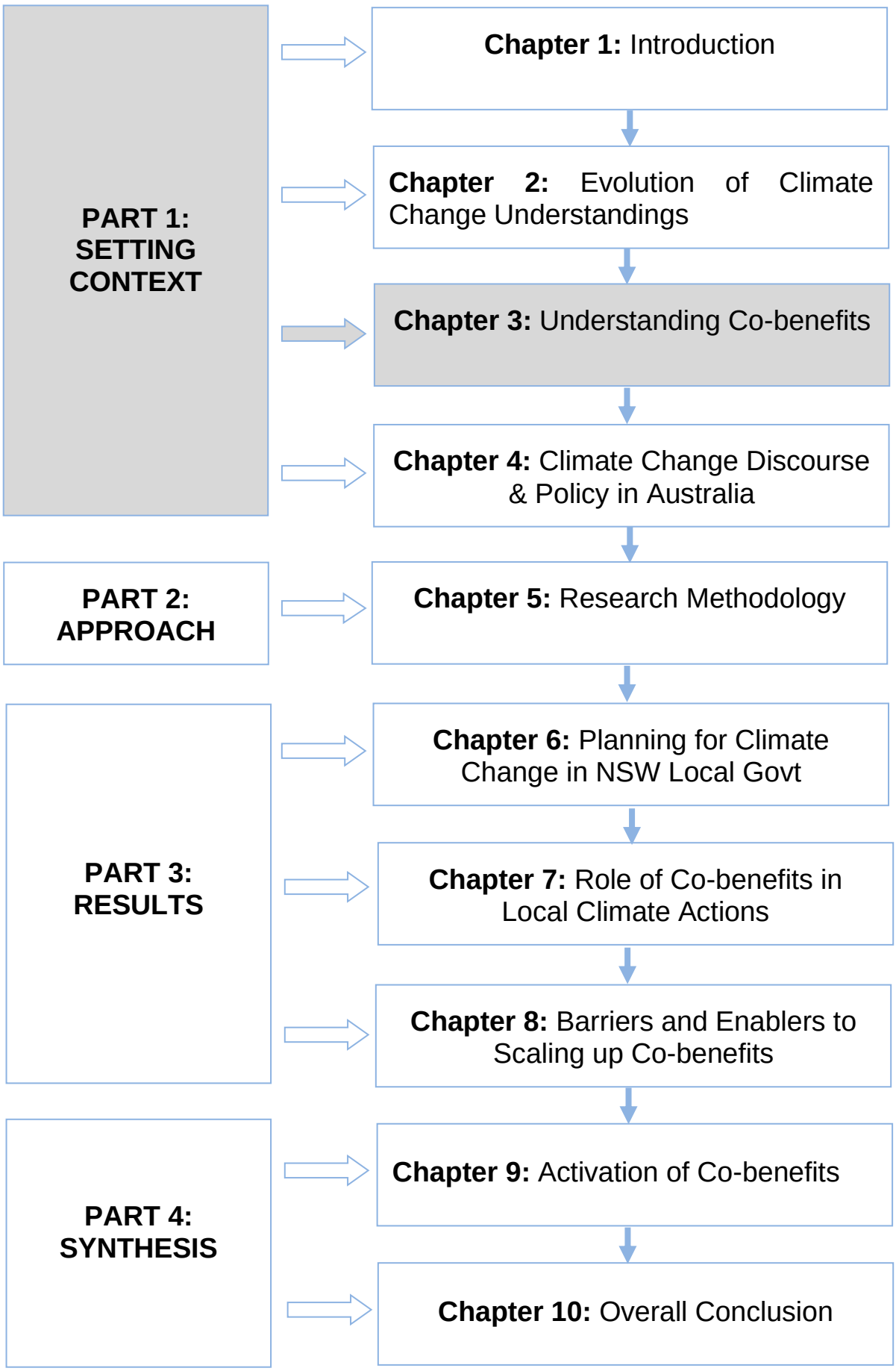
Under the Kyoto Protocol countries failed to reach a global climate deal on mandatory GHG emissions reduction following a top-down approach. This marked the end of the top-down approach in the UNFCCC negotiation process. A new approach was initiated where countries pledged self-determined emissions reduction targets. It transformed the negotiation process from focusing on resolving conflicts over mandatory targets of emission reduction into a bottom-up process of encouraging participating countries voluntarily make their individual pledges of emission reduction. Giving freedom to participating countries to propose their own mitigation targets, the new approach succeeded in removing the major obstacle that had

held back the post-Kyoto negotiation and ultimately helped to reach the Paris Agreement.

Whether the Paris Agreement will deliver the desired results in advancing the global-mitigation efforts will ultimately depend on whether the mechanism of five-yearly reviews proposed in the Agreement is effectively pursued. For this, all countries of the Paris Agreement need to commit to a transparent method of reporting and verification of their commitments to reducing GHG emissions and their national strategies for emission reduction to the UNFCCC.

This means that, while the Paris Agreement was a breakthrough, its potential as an effective global agreement remains to be developed through future negotiations. In this respect, the Paris Agreement has not solved the climate problem but only provided an opportunity to adopt a more realistic approach in achieving the goal of limiting global warming to 2°C.

Significantly, the Paris Agreement has successfully shifted the focus of the climate-change debate from questioning the scientific basis and inevitability of climate change to finding appropriate policy solutions for mitigating climate change. An urgent, high-priority global response is now required through international negotiation of coordinated national policies for large-scale reduction in global emissions. At national level, policy-makers are now facing the challenge of how to balance the immediate interests of their country's development with the long-term interests of stabilising the global climate.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CHAPTER 3: UNDERSTANDING CO-BENEFITS

3.1 Introduction

Climate change is posing as a major challenge for sustainable development (IPCC, 2014b). Following the signing of the 2015 Paris Climate Agreement, countries who signed the agreement have been trying to develop national climate policies to cut their greenhouse gas (GHG) emissions. So far, the United Nations Framework Convention on Climate Change (UNFCCC) has received 165 pledges from these countries to lower their GHG emissions, which is known as Intended Nationally Determined Contributions (INDCs) (UNFCCC, 2015a). Nevertheless, these INDCs are widely considered as insufficient to limit global temperature rise by 2^0C, as targeted in the Paris Agreement (UNFCCC, 2015b; Falkner, 2016). The review of global politics around climate change and international efforts to reach an agreement on climate change (as discussed in Chapter 2) has shown that there are many reasons why countries are unable to consider climate change as a priority on their national agenda. These reasons include domestic politics around climate change, concerns about the costs of climate action on the economy, and fairness of sharing the burden of the costs across various sectors of the economy.

As a result, concerns about climate change draw little attention from the public and 'climatic stability' is considered an 'underprovided global public good[5]' (Ürge-Vorsatz et al., 2014, p. 554). The benefits of mitigating climate change are shared globally by all countries whether a country is contributing to mitigation or not. Such benefit is non-excludable and non-rival in consumption. In such a scenario, individual countries find little or no incentive to join in a global climate change mitigation regime, and so finding a global solution to the problem is difficult.

The realisation that the goal of mitigating climate change alone may not be enough to draw public support for implementing GHG emissions-reduction measures in part has led to a growing awareness in and research on other non-climate-related benefits resulting from emissions-reduction measures. Over the years, research in the assessment of climate polices has found that these policies also have impacts on areas other than climate. A wide range of positive macro-economic, environmental, human health, social, and equity effects are associated with most of the GHG emissions reduction measures. In many cases these non-climate related benefits are greater than the value of benefits obtained from mitigating climate change per se. These additional benefits from climate change mitigation are often referred to as 'co-benefits'. This chapter provides an understanding of co-benefits in terms of what they are, how they have evolved, and their application in climate action.

[5] A benefit whose consumption is non-excludable and non-rival is considered as public good (Hardin, 1968).

3.2 Defining co-benefits

A basic understanding of what does ‘co-benefits’ mean is necessary to navigate a wide spectrum of concepts found in the literature that are related to co-benefits. Generally, in public policy discourse, the positive effects of a policy that happen apart from the planned primary goal of that policy are commonly considered ‘co-benefits’ (Mayrhofer & Gupta, 2015). However, in climate change-related policy discourse, the co-benefits concept is applied as a ‘win-win strategy’ aimed at capturing both ‘development and climate benefits’ in one or a specific set of policies or measures (Puppim de Oliveira et al., 2013, p. 2).

The use of the term ‘co-benefits’ was first observed in the literature during the 1990s. At that time, it focused mostly on reconciling environmental and developmental goals. Later, co-benefits generated wider interest when the Intergovernmental Panel on Climate Change (IPCC) in the Third Assessment Report (AR3) differentiated co-benefits as ‘the intended positive side-effects of a climate policy from its unintended positive side-effects’ (IPCC, 2001a, p. 523) (see Chapter 2).

More recently, the use of the co-benefits terminology in literature can be distinguished in three distinct streams of climate policy related studies:

- ‘Development co-benefits’ denote the non-climate benefits that occur from climate policies at a local level. These include a wide variety of benefits such as health benefits from reduced air pollution to economic

benefits from reduced energy usage to creation of more jobs through use of cleaner and energy-efficient technologies.

- 'Climate co-benefits' refer to the climate benefits of GHG emissions reduction resulting from policies and measures planned for the purpose of development. This view of co-benefits originated given the need of developing countries to give priority to development over climate when considering climate change (Schipper, 2008).
- 'Climate and air co-impacts' relate to the multiple effects of policies designed to reduce air pollution at local and regional level. This view is held by researchers in air-pollution research when focusing on the impacts of short-lived climate pollutants (SLCP), such as hydrofluorocarbons, black carbon, and ozone or short-term climate coolers, such as sulphur dioxide (SO_2) (Nemet, Holloway, & Meier, 2010).

The above observations suggest that the application of the co-benefits concept is not rigid. The concept has no clearly identifiable boundaries, and there is a notable absence of a unanimous definition of the term in the literature. Depending on the way the term is used in targeted areas or sectors of policy studies, the definition may vary. Several notable definitions of co-benefits used by major organisations in co-benefits studies related to climate change policies are presented here:

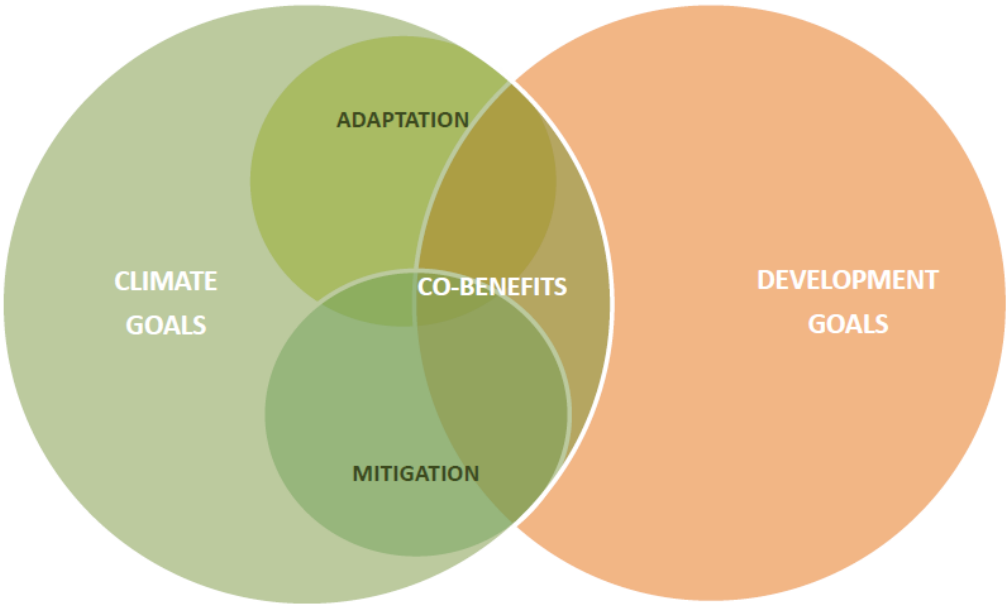
> 'The benefits of policies that are implemented for various reasons at the same time including climate change mitigation — acknowledging that most policies designed to address greenhouse gas mitigation also have other, often at least equally important rationales (e.g. related to

> objectives of development, sustainability, and equity). The term co-impact is used in a more generic sense to cover both positive and negative side of benefits.' (IPCC, 2001a, p. 711)
>
> 'The positive effects that a policy or measure aimed at one objective might have on other objectives, irrespective of the net effect on overall social welfare. Co-benefits are often subject to uncertainty and depend on local circumstances and implementation practices, among other factors. Co-benefits are also referred to as ancillary benefits.' (IPCC, 2014e, p. 121)
>
> 'Co-benefits approach refers to the development and implementation of policies and strategies that simultaneously contribute to tackling climate change whilst addressing local environmental and developmental problems.' (UNU-IAS [United Nations University Institute of Advanced Studies], 2013, p. 5)
>
> 'For GHG mitigation policies, co-benefits can best be defined as effects that are additional to direct reductions of GHG and impacts of climate change and have estimated to be large, relative to the costs of mitigation (e.g. anywhere from 30% to over 100% of abatement costs).' (OECD [Organisation for Economic Co-operation and Development], 2018, p. 01)
>
> 'Co-benefits is used to refer to two or more benefits that are derived together from a single measure or set of measures. Benefits can be generated unintentionally when decision makers implement a policy with a single aim and then later discover that the policy resulted in additional co-benefits. This document … considers any positive benefit derived from a policy measure or scenario to be a co-benefit of the policy, provided that one of the benefits achieved is reduced GHG emissions.' (USEPA [United States Environmental Protection Agency], 2004)

A critical review of these definitions suggests that they are based on a common understanding that policies explicitly formulated to address climate or

development objectives can generate other benefits. Therefore, in discourse on climate change related policy, co-benefits are widely understood as the set of benefits occurring due to actions that connect the climate-change goals (both mitigation and adaptation) with other development goals (see Figure 3.1).

Figure 3.1: Co-benefits — conceptual diagram



Source: Adapted from UNU-IAS, 2013, p. 7

The IPCC in its Fifth Assessment Report has used the terms ‘co-benefits’ and ‘adverse side-effects’ with respect to ‘the positive and negative side-effects’ (respectively) of climate change ‘mitigation policies and measures’ (IPCC, 2014f, pp. 1251, 1257). The IPCC also used the term ‘co-impacts’ in general when synthesising these two terms (Edenhofer et al., 2014a, b; IPCC, 2014a). Based on these understandings, this thesis considers all positive side-effects of policies and programs related to climate change mitigation as co-benefits.

3.2.1 Brief history of co-benefits

Before the analysis of climate co-benefits, which specifically focuses on reconciling climate change mitigation with other development goals, became predominant in academia, the study of co-benefits originated as part of the methodology developed to examine the measures to reduce air pollution and other pollutants associated with fossil-fuel combustion (Comar & Sagan, 1976; Mendelsohn, 1980). These studies predominantly relied on cost-benefit analysis (CBA) to quantify the externalities associated with polices designed to control air pollution resulting from the use of fossil fuel-based technologies. Such studies usually assess the costs of implementing polices with the benefits of those policies. However, one major limitation of these studies is that the assessment only considers the costs and benefits of those actions and effects that would have a direct result from the main objective of the policy.

For example, if saving energy is the goal of the policy, then the costs of implementing the technology for saving energy need to be evaluated, to compare with the immediate benefits of saving energy (i.e. savings in energy cost resulting from reduced energy usage and savings in operational cost from the technology). But the additional benefits of reduced air-pollution that also result from such measures are excluded from the cost-benefit analysis as these benefits are more difficult to define and provide no direct benefits to the policy-makers of energy-saving measures. Later, the introduction of air-pollution regulation with a direct public-health objective opened the possibility of examining the benefits of air-pollution mitigation as public externalities (USEPA [United States Environmental Protection Agency], 2004). Eventually,

this led to the development of specific methodologies to examine the effects of policies to control air pollution, which can be viewed as the precursor of present-day co-benefits studies (Williams, Hasanbeigi, Price & Wu, 2012).

3.2.2 How do co-benefits link climate-policy goals with development-policy goals?

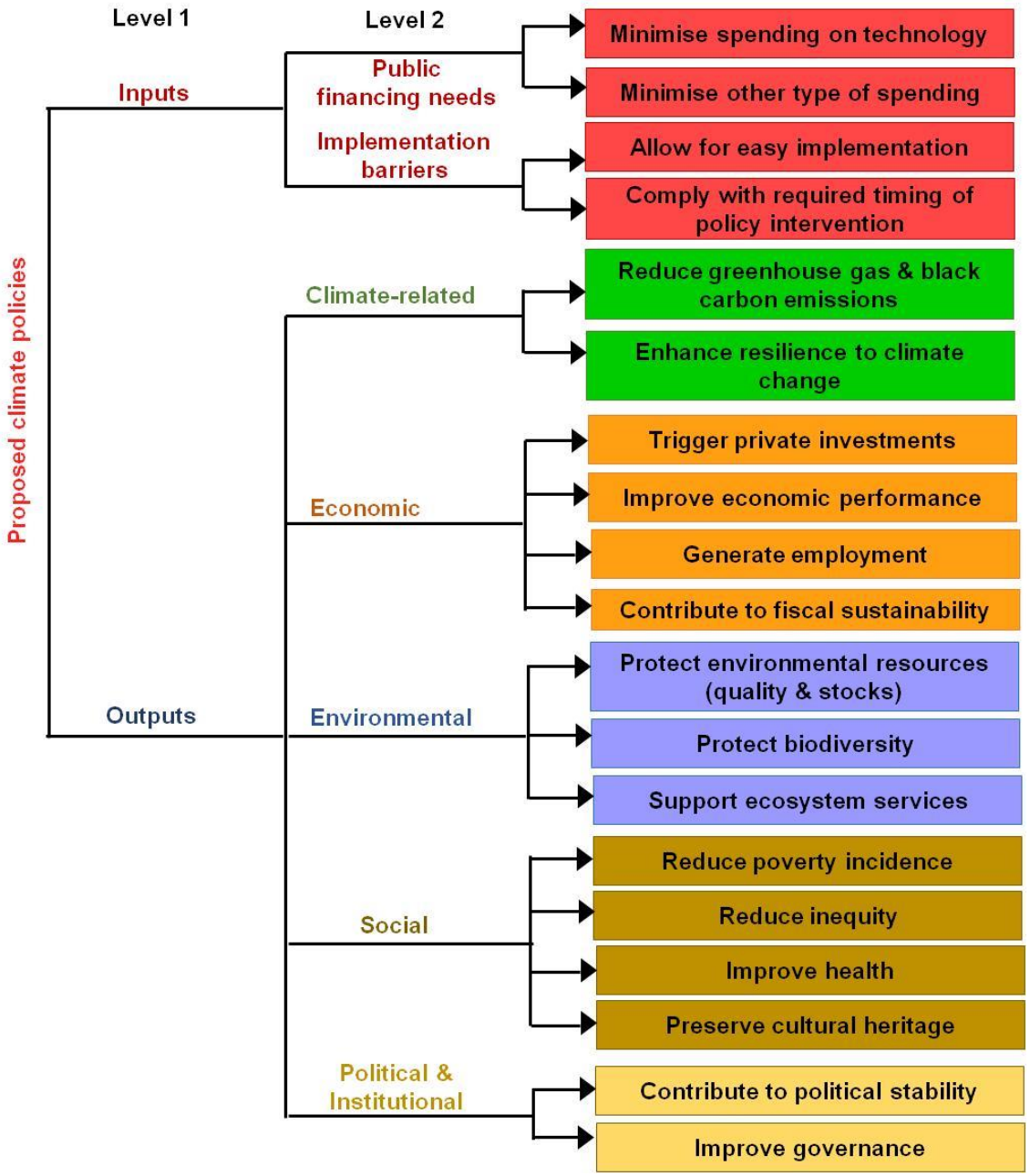
With growing global concern about climate change and the need to curb GHG emissions, studies indicate that the co-benefits of GHG emissions reduction policies could be close to the cost of implementing these policies (Davis, Krupnick, & Thurston, 2000b). Several of these studies found that if these co-benefits are taken into account, they would significantly cut down the total costs of GHG emissions reduction measures (Burtraw et al., 2003). These findings, together with the movement for reaching an international climate agreement during the late 1990s, prompted several international as well as government organisations, including the UNFCCC to initiate significant efforts to investigate co-benefits of various climate change mitigation policies. The purpose of these efforts was to find ways to integrate co-benefits into mainstream climate policy-making process.

Initially, co-benefits studies faced a number of difficulties in evaluating the benefits of climate policies. There was a lack of understanding in terms of how to deal with the complex linkages and trade-offs between climate related policy goals and development related policy goals. In addition, there was also a lack of knowledge about the available policy options to address climate change and how to evaluate their impacts. At that time, the most common approach for assessing the costs and benefits of climate polices was reliant upon CBA

(cost-benefit analysis). While CBA could effectively evaluate the direct costs and benefits of climate policies, it was unable to evaluate its indirect social and environmental effects. This is because non-market impacts of climate policies, such as impacts on human health, well-being and ecological systems, are difficult to evaluate in monetary terms. Thus, CBA approach has major limitations in evaluating policies designed to address climate change. At the time, energy-savings related policy measures (mostly energy efficiency and fuel switching) that result in GHG emissions reduction, were mainly the focus of co-benefits studies related to climate change mitigation (Mayrhofer & Gupta, 2015).

In response to these shortcomings of the CBA approach in climate policy analysis, the United Nations Environment Programme (UNEP) developed a climate policy evaluation framework that adopted multi-criteria analysis (MCA) (UNEP, 2011). MCA is a method of analysis that assesses a policy based on multiple criteria (Belton & Stewart, 2002; von Winterfeldt & Edwards, 1986). It is capable of assessing both the monetary and non-monetary impacts of a policy. It can also distinguish between different dimensions of the climate-change problem, ensuring transparency and accountability. The UNEP's proposed framework is structured into a hierarchical criteria tree which consists of generic criteria divided under two main levels: Level 1 (Inputs and Outputs) followed by Level 2 under which specific categories are grouped (see Figure 3.2).

Figure 3.2: Hierarchical criteria tree for climate policy evaluation framework



Source: Adapted from UNEP, 2011, p. 49

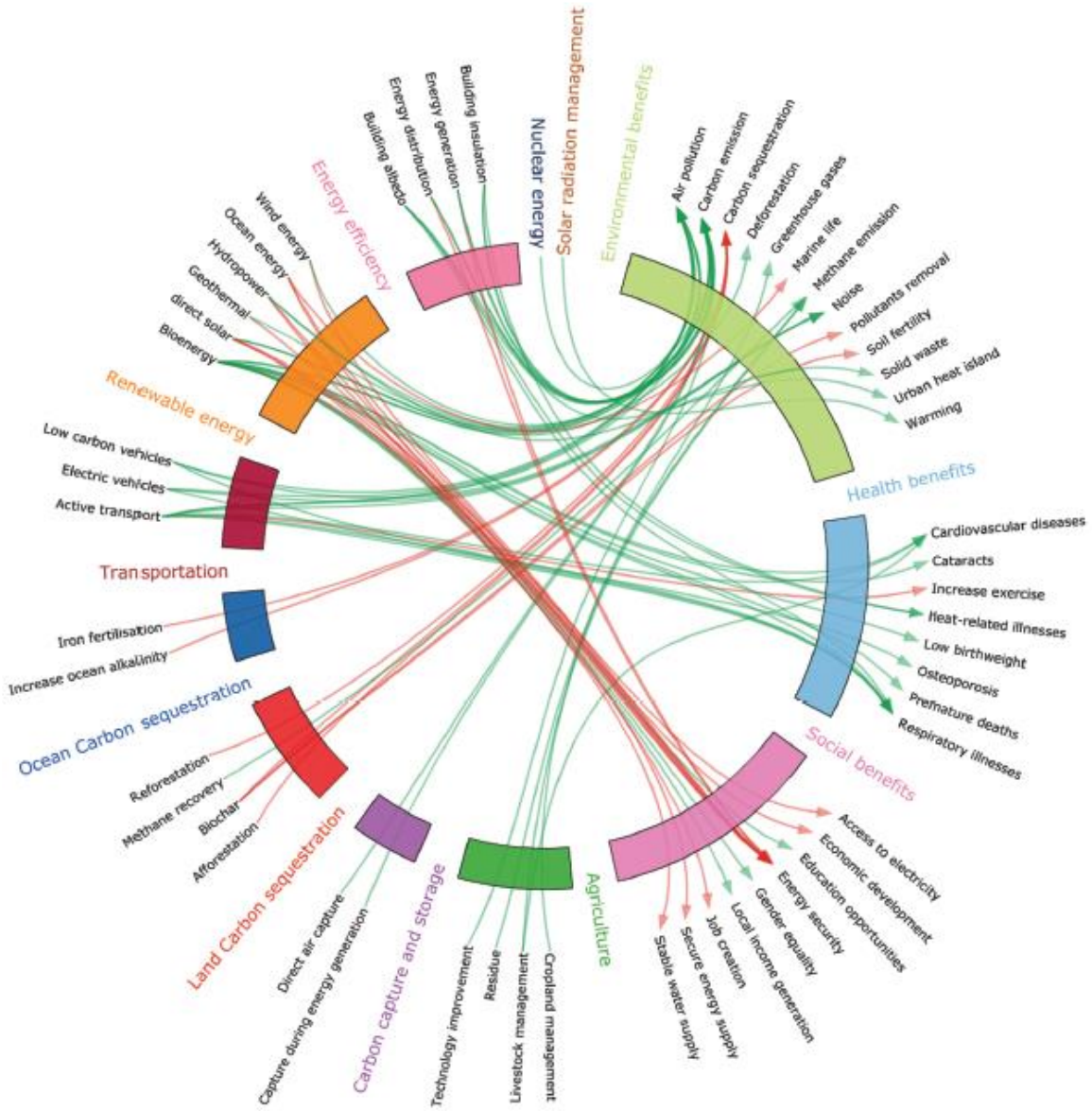
The development of UNEP's climate policy evaluation framework acted as a major catalyst in developing other similar frameworks based on multi-criteria analysis, which helped broaden the application of the co-benefits concept in research related to climate policy. As a result, the focus shifted onto

understanding the wider links between climate-policy goals and broader development-policy goals through identifying a wide range of environmental, health and social co-benefits resulting from major policy measures related to climate change mitigation (see Figure 3.3).

This progress in understanding of co-benefits has occurred concurrently with the advancement of climate change science since the publication of the IPCC's first assessment reports in the early 1990s (Pearce, 2000; Ürge-Vorsatz et al., 2014).

Figure 3.3: Commonly mentioned co-benefits of main GHG emissions reduction measures

Note: Red arrows connecting an emission-reduction technology and an effect show that the technology will increase the effect; green arrows show a reverse trend (Watts et al., 2015, p. 1885).



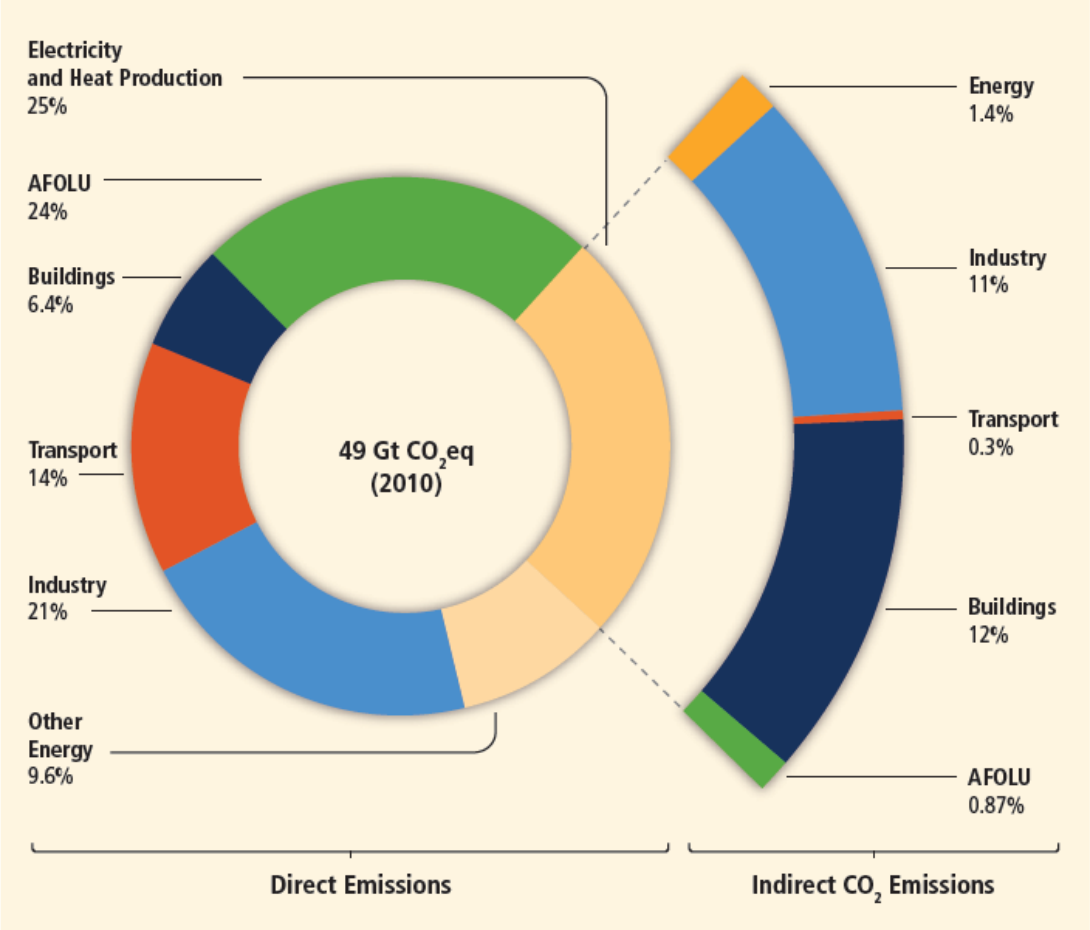
Source: Watts et al., 2015, p. 1885

In the IPCC's Fifth Assessment Report (AR5) — 'co-benefits' is featured as a central concept in the discussion about mitigation policy options that highlight the necessity of a multi-objective policy perspective for integration of climate policies with non-climate development policies (IPCC, 2014b, f).

The AR5 in its Summary for Policymakers (SPM) has clearly identified both sectoral and cross-sectoral pathways and measures for mitigation with co-benefits potential (IPCC, 2014b). Multiple scenarios are considered based on various technological and behavioural options with implications for sustainable development. These scenarios highlight 'reduced costs for achieving air quality and energy security objectives, with significant co-benefits for human health, ecosystem impacts, and savings of resources and resilience of the energy system' (IPCC, 2014b, p. 16, 17).

The IPCC report identifies the energy-supply sector as the main source of GHG emissions (14.4 $GtCO_2$/year in 2010), followed by transport (6.7 $GtCO_2$), buildings (8.8 $GtCO_2$), and industry (13 $GtCO_2$), with agriculture, forestry and other land use (AFOLU) (10–12 $GtCO_2$) seen as other major 'energy end-use' sectors (see Figure 3.4). These sectors are considered for mitigation through pathways with a range of technological and behavioural options. Measures to increase energy-efficiency and changes in behaviour pattern and lifestyle that cut energy demand are identified as key mitigation strategies in the energy-supply sector. Both sectoral and cross-sectoral studies provide supporting evidence that implementing such strategies in the transport, building, and industry sectors can significantly reduce energy-demand as well as generate important co-benefits (IPCC, 2014b).

Figure 3.4: Major sources of greenhouse gas emissions by sectors



Source: IPCC, 2014b, p.9

The report observes:

> 'Mitigation options in urban areas vary by urbanisation trajectories and are expected to be most effective when policy instruments are bundled … Effective mitigation strategies involve packages of mutually reinforcing policies, including co-locating high residential with high employment densities, achieving high diversity and integration of land uses, increasing accessibility and investing in public transport and other demand management measures. The largest mitigation opportunities are in rapidly urbanising areas where urban form and infrastructure are not locked in, but where there is often limited governance, technical, financial, and institutional capacities' (IPCC, 2014b, p.25, 26).

These strategies can also provide significant local co-benefits, which include reduced travel demand, improved access and mobility, reduced air pollution, and health co-benefits.

3.3 The evolution of co-benefits

This section discusses various concepts and terms related to co-benefits and the methods and frameworks that are commonly used in co-benefits studies to identify, quantify, and incorporate co-benefits in existing policy-decision-making frameworks.

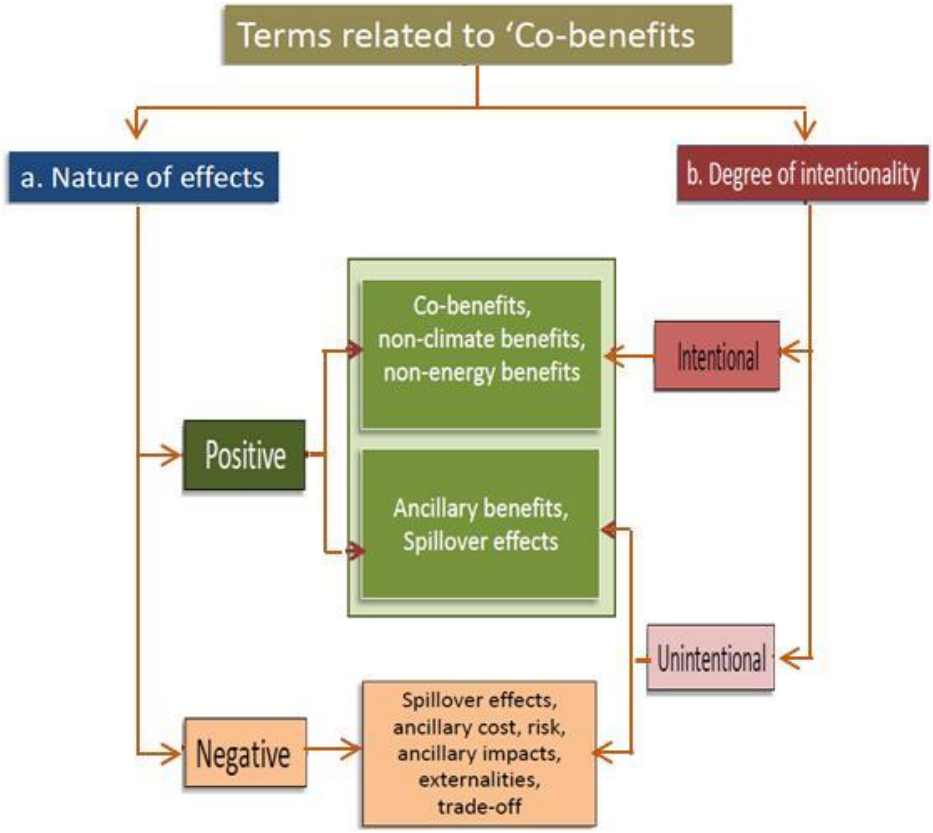
3.3.1 Classification of the terms related to co-benefits

A wide range of concepts and terms associated with 'co-benefits' are found in the literature such as: ancillary benefits, ancillary impacts, spill over effects, risks, adverse side-effects, externalities, trade-offs, co-costs, co-impacts etc. The use of these terms does not follow any defined guidelines and are often 'used either interchangeably or with major overlaps' (Ürge-Vorsatz, 2014, p. 554). A large number of terms, sometimes used with overlapping meanings and definitions, make it difficult to differentiate them from one another and can often lead to confusion. The review of the attributed meaning and relationship of these terms to each other found in the literature suggests that these terms can be broadly organised into two main groups based on the following two parameters:

i) 'the positive and/or negative nature of the effects' and

ii) 'the degree of intentionality with which multiple effects are considered' (Ürge-Vorsatz, 2014, p. 555) (see Figure 3.5).

Figure 3.5: Classification of the terms related to co-benefits



Source: Adapted from Ürge-Vorsatz et al., 2014, p. 555

While the above classification is intended for ensuring consistency in the use of these terms, in empirical research there are other issues that complicate such classification.

First, in practical terms, it is not always straightforward to recognise what the primary objective of a policy is, which makes it difficult to specify which benefit is the primary and what benefit(s) is(are) secondary (i.e. co-benefits). For this, predominant practice in co-benefits studies is to consider multiple benefits rather than to define what is primary and what is secondary.

Second, often it is difficult to specify beforehand whether an effect of a policy would be positive or negative as it would depend upon various contextual factors (such as socio-economic condition of effected groups of population, nature and level of the economy etc.). These factors play a critical role in determining whether an effect is considered as a 'co-benefit' or an 'adverse side-effect'. Therefore, categorising a policy effect as co-benefit (or similar terms) within a positive group (as shown in green box of Figure 3.5) or as adverse side-effect (or similar terms) within a negative group (as shown in orange box of Figure 3.5) is often challenging and does not reflect the complexity involved in such a categorisation. Due to this complexity, the categorisation based on positive and negative effects or intentionality, which is traditionally followed — has become less important with trends towards a combined treatment in recent co-benefits studies (Ryan & Campbell, 2012). This has been observed in IPCC's use of the terms *co-impact* and *ancillary impact* in their assessment reports when referring to positive as well as negative effects of climate policies (IPCC, 2007b). This suggests, to be scientifically precise, it is more appropriate to use *co-impacts* instead of *co-benefits* to avoid any bias when dealing with the different effects of climate polices. However, generally, from political perspective and occasionally, in the policy studies, 'use of *co-benefits* or *multiple benefits* may still be justified owing to a specific focus on leveraging the positive impacts' of climate policies (Ürge-Vorsatz et al., 2014, p. 558).

In summary, for a coherent use of terminology, in this thesis, all 'positive side-effects' (intentional and unintentional) of all climate change related policies are

considered as ‘co-benefits’ and all negative effects are referred to as an ‘adverse side-effect’.

3.3.2 Different applications of the co-benefits concept

Policy-makers prioritise and value policy goals differently when addressing climate change in their policies. They rarely devise policies with the aim to mitigate climate change alone, but most policies that are intended to address climate change typically serves other purposes as well. What policy-makers consider as the primary aim of a policy determines what benefit(s) of that policy would be co-benefit(s) to the primary (or direct) benefit of that policy. Depending on the valuation policy-makers place on climate-change mitigation compared with other goals, three different applications of the co-benefits concept can be distinguished in the empirical research, resulting in notable difference in the approach and valuation of climate-policy goals.

First, is the *‘development first’* approach. In this category, policies are not specifically planned to address climate change but may nonetheless contribute towards mitigating climate change as a side-benefit (i.e. co-benefit). The main objective of these policies could be, for example, achieving energy-security (Mondal, Kamp, & Pachova, 2010), obtaining health benefits (De Nazelle et al., 2011) or managing waste more efficiently (Kurniawan, de Oliveira, Premakumara, & Nagaishi, 2013). Climate change mitigation is referred to as the ‘climate co-benefit’ that results from the positive impacts of the development policies on global climate change (Bradley et al., 2006). The idea behind such application of the ‘co-benefits’ concept is that it can facilitate

creating a pathway for development that is sensitive to climate change. This approach is mainly observed in developing countries where immediate development concerns are given priority over climate change concerns (Spencer et al., 2017).

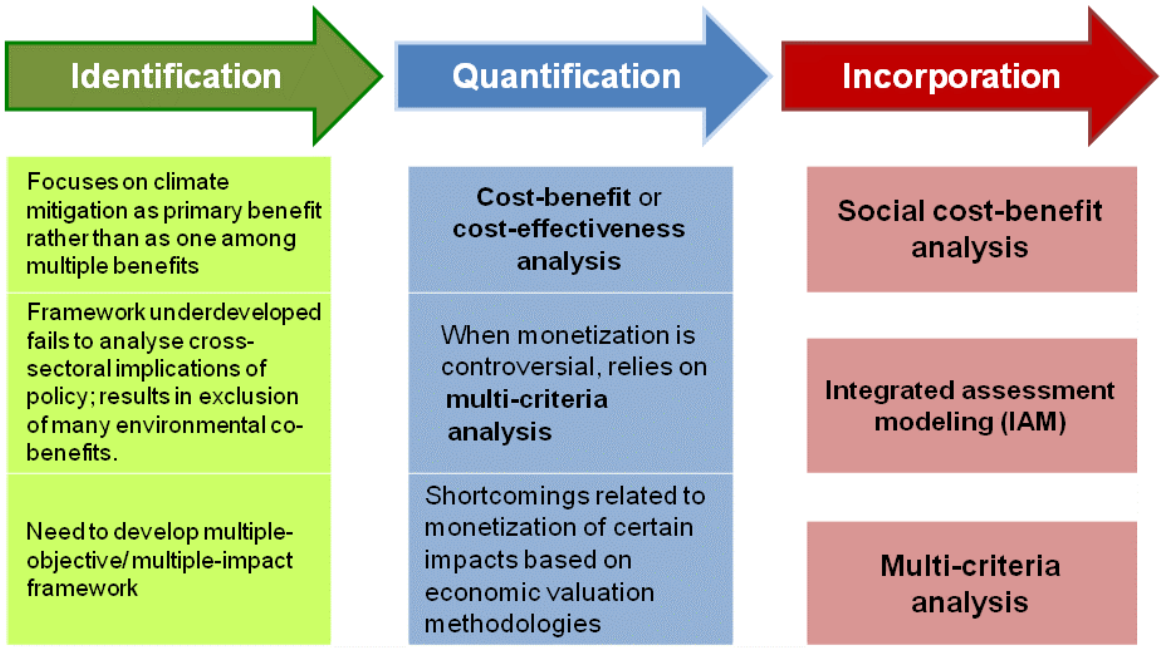
Second, is the *'climate first'* approach. In this category, the policies studied are formulated primarily for mitigating climate change or adapting to climate change. Local positive impacts of such policies, for example, low-carbon energy policy might have positive effects on economic policy goals such as job creation (Cai et al., 2016) as well as health policy goal of improved public health (Haines et al., 2009). These are considered as 'development co-benefits'. This is usually referred to as the 'climate first' approach.

Third, is the *'climate and other goal'* approach. In this category the policies studied are characterised by the non-prioritisation of either goal (i.e. development or climate change mitigation) and are planned to attain both goals concurrently. Common example of such application of the co-benefits concept is 'climate and pollution co-benefits' (Bollen, van der Zwaan, Brink, & Eerens, 2009b) where policy measures to reduce greenhouse gases simultaneously reduce other air-polluting gases (such as N_2O, NOx, NH_3), thereby automatically resulting in air-pollution control as a 'co-benefit'. The fundamental principle is to 'co-control of atmospheric emissions to yield simultaneous benefits for climate change and air quality' (Thambiran & Diab, 2011, p. 2683), with the benefits considered together as co-impacts or co-benefits.

3.3.3 Identifying, quantifying and incorporating co-benefits into policy-decision-making process

Irrespective of various definitions of co-benefits and different applications of the co-benefits concept found in the literature, all co-benefits studies are essentially based on an overarching methodological framework that consists of three distinct phases: i) identification, ii) quantification, and iii) incorporation of co-benefits (see Figure 3.6).

Figure 3.6: Three phases of the co-benefits framework



Source: Collated and developed from Pearce, 2000; Japanese Ministry of the Environment, 2009; UNEP, 2011; Williams et al., 2012; Ürge-Vorsatz et al., 2014; Floater et al., 2016

Each phase relies on a specific set of assumptions, has certain limitations, and faces specific methodological challenges in performing its respective tasks. This section provides a detailed guide for understanding these three phases of the co-benefits framework. It includes discussion of (a) some general challenges faced by each phase, (b) the assumptions and limitations of the

methods utilised in respective phases, and (c) a discussion of how to address these limitations of the existing framework in the context of future co-benefits studies.

Identifying and considering co-benefits

In general, most co-benefits studies focus on studying climate change mitigation as the main benefit instead of considering it as one of the multiple benefits of a policy. This is because the majority of co-benefits studies are focused on the benefits within a single sector rather than on the benefits across multiple sectors. This limitation is due to the absence of a multi-objective policy-perspective and integrated framework necessary for a proper assessment of co-benefits across multiple sectors (Ürge-Vorsatz et al., 2014).

The UNEP's climate policy evaluation framework (see section 3.2.2 for detail) addressed this limitation to some extent by promoting adoption of a multi-objectives policy perspective when evaluating various policy options. While UNEP's framework acted as a major catalyst in developing other similar frameworks (Dubash et al., 2013a; Japanese Ministry of Environment, 2009) based on multi-criteria analysis, these efforts are still at the development stage and yet to be employed and assessed carefully.

To understand the net benefits of a policy, including all effects resulting from its interactions with other policies, a rigorous and comprehensive analysis of co-benefits is required. Considering the time and resources required for conducting such an analysis it is often not feasible in practice. Particularly, for developing countries where policy operates within a resource-constrained

environment, this type of analysis may be considered superfluous. In such circumstances, even if the magnitude of the effects cannot be assessed, efforts to explicitly consider possible co-benefits of a policy and to measure them can nonetheless be considered sufficient for decision-making.

In theory, net welfare impacts of a given climate policy should be measured considering all direct and indirect effects, including cross-sectoral interactions of that policy with other policies. In practice, however, welfare impacts are assessed using 'general equilibrium models' (general equilibrium models try to represent functioning of 'the economy as a whole'), which 'typically do not include externalities and thus exclude a large range of environmental co-benefits' (Ürge-Vorsatz et al., 2014, p. 559).

In some cases, it is difficult to undertake a correct evaluation of co-benefits of certain climate policies due to lack of information about relevant contextual factors. For example, when considering the social impacts of a particular mitigation policy, it would be misleading if the assessment is based only on the net welfare effects as the same intervention may have different effects on different stakeholder groups. To ensure proper assessment of co-benefits it is necessary to consider all relevant groups of stakeholders who might be impacted by the given policy.

All these challenges involving proper identification and consideration of co-benefits in the literature point to a need for:

i) a detailed taxonomy of co-benefits and

ii) a multiple-objective and multiple-impact assessment framework.

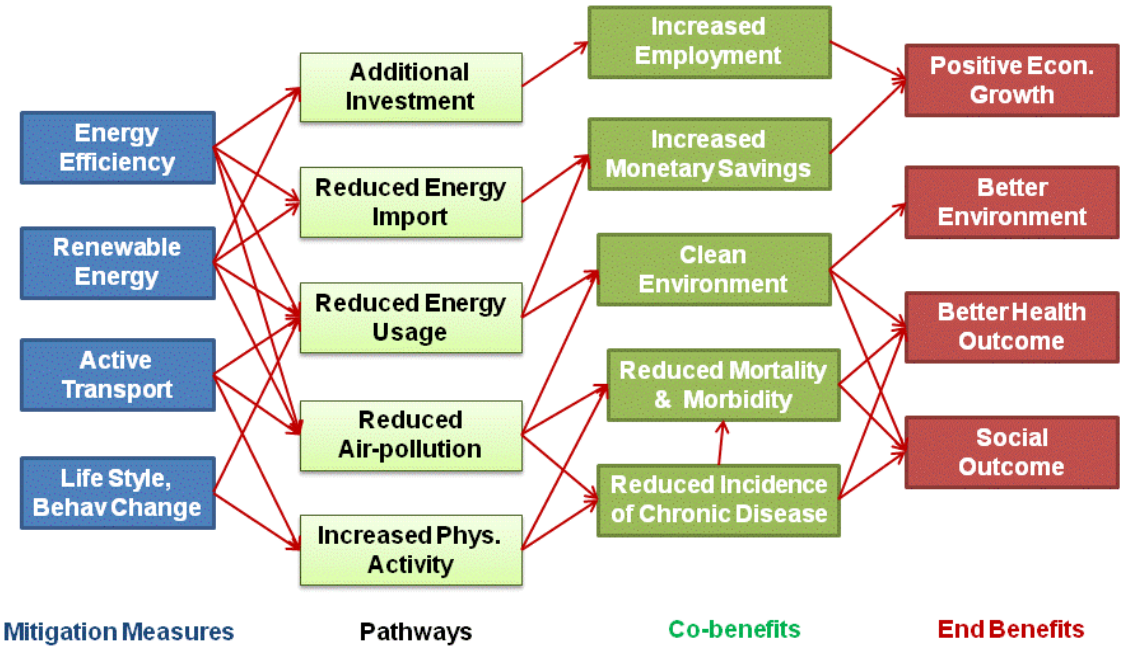
An ideal taxonomy that would cover distinct, independent co-benefits for individual sector of the economy — or particular sector based classification of co-benefits that are identified in the literature — has not been developed (Ürge-Vorsatz et al., 2014; Floater et al., 2016). In any event, it may not be possible because of the complexity of the task such a taxonomy would demand. In the absence of such an ideal taxonomy of co-benefits, the key is twofold:

i) to detect the cause-and-effect relations and interactions between the effects and
ii) to differentiate between co-benefits based on their points of origin, end points and intermediate phases that affect other outcomes.

This approach is used in the 'Impact Pathway Methodology' devised by the 'ExternE Project' for assessing the economic effect of atmospheric pollution in the European Union (EU) (UNEP, 2011; Ürge-Vorsatz et al., 2014, p. 560).

Figure 3.7 illustrates a conceptual diagram of such a process for mapping pathways of different co-benefits. Using commonly used mitigation measures (e.g. energy efficiency, renewable energy, active transport and life style/ behaviour change) as examples, the diagram tracks the impact chains and identify possible intermediate impact points and their interactions with each other that may occur for such measures. Notably, the diagram highlights the wide variety of multiple impacts of each measure and how their interactions with each other may affect the final impact.

Figure 3.7: Conceptual framework for mapping pathways of co-benefits



Source: Adapted from Ürge-Vorsatz et al., 2014. p. 570

Quantifying and valuing co-benefits

Perhaps the most challenging part of the co-benefits framework is the valuation of the identified co-benefits in some form of quantifiable units that would enable their integration into existing decision-making processes. Since existing decision-making frameworks rely heavily on cost-benefit or cost-effectiveness analysis, which is mainly based on monetary valuation of units, a monetary value of the co-benefit needs to be estimated first before it can be incorporated into such a valuation process. This results in a number of challenges.

First, theoretically, it is possible to estimate monetary value for some of the co-benefits of polices related to climate change mitigation (e.g. amount of energy saved, reduced amount of air pollutants, reduced amount of waste, number of

additional jobs created, etc.) based on certain economic valuation methodologies (Azqueta, 2007; Pearce, Atkinson, & Mourato, 2006). However, monetisation of certain 'non-climate' and 'non-energy' related co-benefits (such as environmental- and health-related co-benefits) is questionable, as methodologies used to monetise such co-benefits are criticised for commodifying ecosystem services for which no market value exist (Luck et.al., 2012; Toman,1998) or to the ethical implications of differential valuation of human life in countries and regions based on income levels (Grubb, Vrolijk, & Brack, 1999; Miller, 2000).

Second, another major challenge is co-benefits are always dependent on the policy context. While direct costs and benefits of a given policy can be assessed with some degree of certainty, the size of its welfare effects largely depend on local situation. This includes how policies are applied and under what conditions. This makes it difficult to judge the size of the impact of different co-benefits and provide simplified methodologies for precise assessment of co-benefits.

Third, there is the possibility of 'double counting' for some co-benefits as they are closely related and often overlap. For example, renewable or energy-efficiency related measures result in reduced air pollution and cleaner environment which in turn generate number of closely related co-benefits such as improved health outcomes, increased comfort and productivity – these benefits partly overlap (see Figure 3.8). There is a risk of 'double counting' these co-benefits when their monetary values are incorporated into the cost-benefits analysis of the present decision-making frameworks. Therefore, to

avoid double counting, careful analysis is necessary. However, if it is not possible to completely eliminate this risk, it is worth considering whether such risk is significant to compromise the effort of integrating them into the decision-making frameworks.

Fourth, to avoid complex analysis most studies target specific categories of co-benefits. Such selection fails to consider the specific relationships and the full range of interactions and feedback loops that exist between different co-benefits. For example, studies of sustainable energy policies generally focus on assessing only the benefits resulting from reduced air pollution and related health benefits. While such policies may also result in decreases in health-care costs and associated savings of resources that can be utilised for other developmental purposes, these benefits are not included in the analysis (Shih & Tseng, 2014). As a result, in the majority of co-benefits studies the total positive and negative effects of a given climate policy are rarely considered.

Fifth, in certain cases, when climate policy/measures likely to have different effects on different stakeholder groups, it is not sufficient to consider the net welfare effect of the given policy/measures. In such cases, to ensure proper evaluation of co-benefits, the distributional effects of the policy/measures should also be considered. This is critical particularly when measures undertaken to mitigate climate change also contribute to reducing inequality across socioeconomic groups. For example, a policy measure such as promoting public transport which has climate change mitigation benefit as well as net welfare benefits (through reduced air pollution, reduced congestion, savings in energy cost etc.) can also facilitate access to economic

opportunities for the disadvantaged section of the society by lowering their travel cost (Hosking, Mudu, & Dora, 2011).

The above discussion has identified some limitations of the existing co-benefits framework and the challenges it faces in quantifying and valuing certain co-benefits. The most important shortcoming is absence of valuation techniques for certain categories of co-benefits (e.g. health benefits, social benefits, ecosystem services etc.) appropriate for incorporation into the cost-benefit analysis of the existing decision-making framework. In those cases, when monetary valuation of a co-benefit is considered questionable, valuation in physical units is often advisable. Such valuation needs to be combined with alternative assessment techniques (instead of cost-benefit analysis), such as multi-criteria analysis (which is discussed in the next section).

Incorporating co-benefits into policy-decision-making process

Generally, co-benefits studies on policies to mitigate climate change is framed within a cost-benefit analysis approach. Such approach generally evaluates co-benefits in financial terms. It means it only considers the benefits of a given policy which have or can be quantified in monetary units and benefits that do not have any monetary value are generally excluded from the analysis. To address this limitation, there is a growing trend of using welfare analysis in co-benefits studies where different methods are used. Most of these methods are capable of assessing most of the co-benefits including non-monetary valuation of those co-benefits that often occur as a nonmarket benefit. This thesis has

identified three main methods for incorporating the identified co-benefits into climate change related policy-decision-making process:

i) social cost-benefit analysis,

ii) integrated assessment modelling, and

iii) multi-criteria analysis.

Social cost-benefit analysis

Social cost-benefit analysis is considered more appropriate tool than financial cost-benefit analysis in co-benefits studies on climate policies. This is because it considers costs and benefits of a particular policy as variations in human well-being. Such approach permits evaluation of benefits of defined climate policy options in terms of their contribution to the net welfare of society. This approach to cost-benefit analysis distinguishes social cost-benefit from financial cost-benefit (Azqueta, 2007; Eur. Comm. [European Commission], 2008; Pearce et al., 2006). The method is particularly relevant when quantifying and valuing certain climate co-benefits, which frequently arise as non-market costs and benefits. For this, the method uses various economic valuation tools (such as computable general equilibrium (GCE) models, contingent valuation, energy pricing, hedonic pricing, input-output (I/O) analysis etc.) (Garg, 2011; World Bank, 2008; Tirado Herrero, Ürge-Vorsatz & Petrichenko, 2013; Costanza et al., 1997; Zivin & Neidell, 2012; Tirado Herrero, Ürge-Vorsatz, Arena & Telegdy, 2011; Böhringer, Keller & van der Werf, 2013).

Integrated Assessment Modelling (IAM)

Integrated assessment modelling (IAM) is developed specifically for climate change mitigation policy analysis, which evaluates the costs of different mitigation policies. As IAM operates within a cost-effectiveness system, the model does not consider the primary benefit or the welfare implications of climate change mitigation. The IPCC relied on IAM in analysing different mitigation policy options in its Fourth and Fifth Assessment Reports (Edenhofer et al., 2014b; IPCC, 2007a). IAM estimates direct costs of mitigation based on partial or general equilibrium analysis where macroeconomic feedback typically remains limited (Shukla, 2013). In such analysis, 'the employment effects of climate policies, implications for investment flows and trade balances, or interactions between climate policy and the fiscal setting are not captured' (Ürge-Vorsatz et al., 2014, p. 572). The strength of IAM lies in its ability to include assessments in monetary as well as physical units. This permits evaluation of environmental, social and health related impacts of mitigation policies in non-monetary way. The process requires complex model and large amount of data which makes IAM unsuitable, particularly for policy context where resources are limited.

Multi-Criteria Analysis (MCA)

Multi-criteria analysis (MCA) is perhaps the most suitable method available for incorporating all categories of co-benefits into existing policy-decision-making framework. It has three important strengths that distinguish it from social cost-benefit analysis in considering most climate co-benefits:

i) First, it provides an appropriate framework that can bring quantitative and qualitative information together. This allows consideration of the co-benefits for which quantitative or monetary information is not obtainable or cannot be estimated through available valuation techniques (Munasinghe, 2007; Munda, 2004; Ramanathan, 2001).

ii) Second, there is provision for the incorporation of stakeholders' diverse perspectives and preferences into the decision-making based on a process of weighting objectives (Bohringer, Keller, & van der Werf, 2013; Milne & Boardman, 2000).

iii) Third, 'it frames decision-making in procedural terms by embedding it within a structured process of deliberation and discussion' (Ürge-Vorsatz et al., 2014, p. 573). Utlilising a deliberative process, the method ensures relevant stakeholders' perspectives are duly considered for productive use of qualitative information in the analysis. This ultimately helps to achieve better decision over time (Munda, 2004).

Collectively, these aspects make the MCA capable of productively processing qualitative and quantitative information together and achieving better policy outcomes. Its methodological specificity of arriving at decisions through stakeholder deliberation distinguishes MCA from other two methods — social cost-benefit analysis and integrated assessment modelling.

As discussed earlier in this chapter (see section 3.2.2 for detail), the most comprehensive effort to develop a climate policy evaluation framework adopting multi-criteria analysis was initiated by the UNEP (2011*).* There is a

growing body of literature where multi-criteria analysis is used in environmental decision-making (Brown & Corbera, 2003; Munda, 1995; Ramanathan, 2006; UNEP, 2011) — for example, using MCA studies were conducted to understand the wider development implications of introducing carbon markets for conservation of forests (Brown & Corbera, 2003).

However, when applying multi-criteria analysis its limitations need to be carefully considered alongside its strengths. As the method relies on subjective values and weights for some benefits, all implicit values and weights are required to be explicit for ensuring transparency and credibility of the process. Therefore, to be reliable, multi-criteria analysis requires a supportive social process where these subjective values and weights are given 'explicit' consideration in discussion and decision-making (Ürge-Vorsatz et al., 2014). This means the MCA requires extensive background work to:

i) clearly explain all assumptions, source details and opinions;

ii) clearly transmit the outcomes, and

iii) record all streams of argumentation and analysis leading to the results, among all the stakeholders.

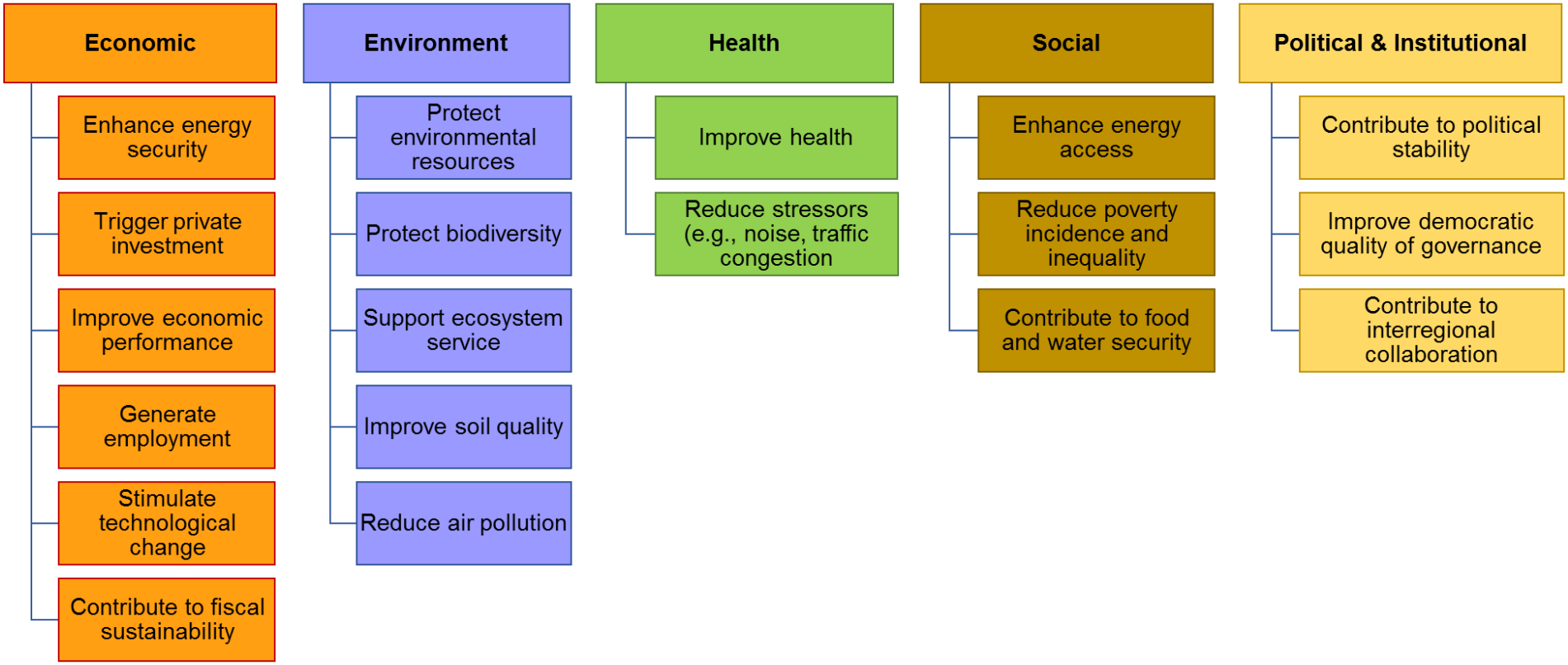
3.4 Co-benefits from actions on climate change

This section discusses different types of co-benefits resulting from various climate policy measures based on review of available studies. Based on established co-benefits terminology, these studies have utilised the concept to investigate wide-ranging climate, environmental, economic, health, social and

political benefits of climate related policy measures. The scope for potential co-benefits considered in the literature is vast. While there is no standard common typology for co-benefits, most co-benefits identified in the literature could be grouped within five broad categories of impacted systems (Floater et al., 2016; Mayrhofer & Gupta, 2015) (see Figure 3.8). However, in practice, it is found that the studied policies often cut across multiple sectors.

Considering the immediacy relative to the direct impact of a given policy, these co-benefits can also be grouped into two broad categories – 'direct' co-benefits and 'indirect' co-benefits. Direct co-benefits are closely related to the primary impact and are easily discernible through their impact pathways. For example, financial savings, cleaner environment, health benefits resulting from energy/resource efficiency related mitigation policy measures are considered direct co-benefits. Whereas indirect co-benefits are not directly related to the primary impact and they are not easily discernible as they are connected to the primary impact through indirect impact pathways. For example, creation of new employment, and distributional impacts of economic growth can be indirect co-benefits resulting from policies encouraging investment in renewable energy technologies. Similarly, food security can be an indirect co-benefit of a climate policy if reduction of GHG emissions resulting from the policy also leads to fewer drought and increased crop yields (Deng et al., 2017).

Figure 3.8: Grouping co-benefits based on five broad categories of impacted systems



Source: Adapted from Mayrhofer & Gupta, 2016, p. 23

3.4.1 Economic co-benefits

The economic co-benefits of GHG emissions reduction measures include economic growth, job creation, and increased productivity.

Energy security: Energy policy that supports the development of renewable energy sources can provide economic co-benefits through attaining 'energy security' as a consequence of reduced dependency on imported fossil fuels (Mondal et al., 2010). A country's capability to safeguard 'uninterrupted provision of vital energy services' is perceived as energy security (Banerjee et al., 2012, p. 805). It generally depends on the strength, autonomy, and flexibility of its energy systems. Commentators observe that the majority of the countries' energy-security risks are associated with one of these three aspects (Banerjee et al., 2012). Policies designed to cut the energy demands of a country can significantly reduce its reliance on the imported energy which, in turn, can minimise the risks linked with the usage of imported energy — for example, a sudden interruption in the supply of imported energy may lead to high energy costs in the long term (Maibach et al., 2007) — which is particularly relevant in energy-dependent economies. This can also cut import related expenditure and associated savings can make a country economically more stable (Dowling & Russ, 2012). On the other hand, for the same reason, countries that are dependent on imported energy may be forced to adopt measures that might go against climate goals — for example, due to a sudden disruption in supply of imported natural gas may prompt a country to switch to domestic coal as its substitution (Banerjee et al., 2012).

Macro-economic benefits: Investing to tackle climate change can have positive macro-economic effects in the long-term. Such effects include additional growth in economy and generation of new employment. This is particularly applicable to those economies which operate below their potential level of production. Such positive economic effects have been recurrently observed for cases of investments in improving energy-efficiency and generation of renewable energy in developed economies (Caldes, Varela, Santamarıa, & Saez, 2009; Moreno & Lopez, 2008; Scott, Roop, Schultz, Anderson, & Cort, 2008; Tourkolias & Mirasgedis, 2011; Ziegelmann, Mohr, & Unger, 2000). Compared with fossil-fuel-based technologies, technologies used to generate renewable-energy are generally more labour-intensive, which results in more jobs (Cai et al., 2016; Kammen et al., 2004). For developing countries, the transfer and adoption of green technologies for climate change mitigation can spur technological change in other sectors, resulting in economic growth (Barker et al., 2010). Certain developing nations usually use biomass to produce energy on a commercial scale for domestic consumption (firewood) as well as export such energy (biofuel) which is part of a growing sector that contribute to their economy by adding growth to gross domestic product and generating employment (Openshaw, 2010; Silalertruksa Gheewala, Hunecke, & Fritsche, 2012).

However, it has been observed that economy-wide impacts of climate change mitigation are mixed (Jochem & Madlener, 2003). Anticipated macro-economic effects are not always positive and stable. For example, it has been observed that positive effects on employment resulting from investment in

generation of renewable energy, after a few years, may be offset by the negative effects of job losses linked with rising price of electricity (Hillebrand, Buttermann, Behringer, & Bleuel, 2006). In case of investments in improving energy efficiency, after two or three decades, this can lead to negative effects on employment in the form of increasing job losses in the energy sector (Tirado Herrero, Ürge-Vorsatz, Arena, & Telegdy, 2011). Associated with this, investments to tackle climate change may lead to growing unemployment in certain sectors like energy distribution, which may increase mental-health problems among laid-off employees (OECD, 2000).

3.4.2 Environmental co-benefits

Environmental co-benefits constitute a main group of co-benefits from climate change mitigation. This is because most GHG mitigation measures that are used in various sectors (such as electricity, transport, buildings) either reduce or replace fossil fuel-based energy usage which result in improved environmental quality. While stopping global warming is the most important environmental goal of climate policies, associated non-climate related environmental co-benefits such as improved soil, water and air quality (Rive, 2010; Thambiran & Diab, 2011; Winiwarter & Klimont, 2011) or protection of environmental resources (Liang & Zhang, 2011) are considered significant drivers as these environmental co-benefits are visible and have immediate impacts.

The provision of environmental services by ecosystems is perhaps the most important category of environmental co-benefits as ecosystems offer wide-ranging resource allocation, regulating, habitat, and cultural services (De

Groot et al., 2012). Measures undertaken to reduce GHG emissions are found to improve the state of ecosystems by lowering emission levels of airborne pollutants (Paoletti et al., 2010) and by implementing activities that prevent forest degradation and deforestation (Phelps, Webb, & Adams, 2012), or safeguard forest from harm by changing land-use — for example, managing forest sustainably to produce biofuel (Gasparatos, Stromberg, & Takeuchi, 2011).

Forests are considered as the most potential area for policy intervention to mitigate climate change. This is because while forests are potential source of GHG emissions through uncontrolled deforestation, at the same time, forests act as storage of massive amount of carbon di oxide above and below ground. Studies on policies designed to control land use and conserve forest through afforestation, reforestation and measures to stop deforestation and forest degradation – these policies have been found to generate both climate- and non-climate related environmental co-benefits such as protection of biodiversity (Dıaz, Hector, & Wardle, 2009) and preservation of ecosystems (Locke & Rissman, 2012).

3.4.3 Health co-benefits

Health-related co-benefits of climate policies are amongst the largest group of co-benefits and often dominate the literature in terms of importance compared with other categories of co-benefits (Arrow, Dasgupta, Goulder, Mumford, & Oleson, 2012; Pearce et al., 2006). This has also been confirmed by IPCC's findings in the human health chapter (Chapter 11) of its Fifth Assessment Report (AR5):

> '… the short-term and relatively localised health co-benefits from reducing greenhouse gas emissions could be very large. Opportunities to capture health co-benefits include reducing health-damaging, climate-altering air pollutants (CAPs) through: energy-efficiency measures; shifting to cleaner energy sources; shifting consumption away from animal products toward less CAP-intensive healthy diets; and designing transport systems that promote active transport. In economic terms, these health co-benefits from reducing emissions would be extremely cost-beneficial' (Smith et al., 2014, p. 714).

Health co-benefits studies of climate policies can be grouped into six groups (Smith and Balakrishnan, 2009; Smith et al., 2009):

i) 'Reduce emissions of health-damaging pollutants, either primary or precursors to other pollutants in association with changes in energy production, energy efficiency, or control of landfills
ii) Increase access to reproductive health services
iii) Decrease meat consumption (especially from ruminants) and substitute low-carbon healthy alternatives
iv) Increase active transport particularly in urban areas
v) Increase urban green space' (Smith et al., 2014, p. 737).

A large body of health-related co-benefits studies focus on reduced air-pollution impacts on human health resulting from reduced GHG emissions (Apsimon et al., 2009; Dennekamp et al., 2010; Jacobson, 2010; Markandya et al., 2009; Nemet et al., 2010; Puppim de Oliveira et al., 2009; Rive and Aunan, 2010; Shindell et al., 2012; Shonkoff et al., 2011; Smith et al., 2009; Tollefsen et al., 2009; West et al., 2013; Wilkinson et al., 2009). Improvements in human health are estimated based on either decrease in mortality,

morbidity, and disease prevalence, or reduced healthcare costs. The methods to do such estimation are developed through establishing link between people's exposure to concentration of air pollutants and public-health outcomes. Such research found that reduced exposure to air pollution have beneficial effects on human health in the form of reductions in cardiovascular, respiratory and other non-communicable diseases on a large scale (Jack & Kinney, 2010). Such 'reductions in health damages are by far the largest category of co-benefits arising from abating greenhouse gas emissions and account for 70–90 per cent of the total value of quantified co-benefits in energy-related co-benefits analyses' (Aunan, Aaheim, & Seip, 2000; Williams et al., 2012, p. 15).

Measures to increase active travel (such as walking, cycling and use of public transport) that increase physical activity are identified for their zero-carbon emissions, less air pollution and a wide range of health benefits such as reduced obesity; reduced non-communicable diseases, improved mental health and associated savings in health care costs (Durand et al., 2011; McCormack and Shiell, 2011; Jarrett et al., 2012; Woodcock et al., 2013). The expansion of public transport is found to save human lives because it involves less deadly and non-fatal injuries (Creutzig & He, 2009).

3.4.4 Social co-benefits

Social benefits of climate policies include access to affordable energy through the implementation of locally based clean-energy generating systems (Ürge-Vorsatz & Tirado Herrero, 2012) and securing and protecting food and water

resources through conservation of forest (McAlpine et al., 2010) and nutrient recycling (Haq & Cambridge, 2012).

Climate policies can also create equity effects on local population if carefully planned (Garg, 2011). Not all people or population groups are equally impacted by climate change. People living in different geographic areas, with varying capabilities, and with various jobs will experience the impacts of climate change differently. The disadvantaged section of the society – particularly, the poor, women, children, the elderly, and ethnic minorities are more vulnerable as their capability to adapt to climate change impacts are often very limited. They have limited power and often lack access to resources, basic services, and amenities. Poverty decreases their capability to absorb rising prices of food, water, and energy. Policies and measures that lead to reduction of GHG emissions are found to have positive effects on social equity if they are holistically and thoughtfully implemented. Examples include:

- *Promotion of low-carbon public transport* improves accessibility and mobility for people from lower income brackets who typically spend more time commuting, thereby benefitting the disadvantaged section of society in particular (Figueroa, Fulton, L., & Tiwari, 2013).
- *Improved air quality resulting from adoption of low-carbon measures* benefit marginalised groups disproportionately as they often live and work in polluted areas and are more likely to have poorer health than the average.
- *Waste-recycling schemes* that reduce greenhouse gas emissions can also offer new job opportunities for skilled and unskilled workers and

can generate new revenue streams for local governments, and result in improved working conditions for waste workers (Santucci, Puhl, Sinha, Enayetullah, & Agyemang-bonsu, 2014).

- *Reducing Emissions from Deforestation and Forest Degradation (REDD+)* programs can assist the affected local community through arranging payment for environmental services (Pagiola, 2011).

3.4.5 Political and institutional co-benefits

Some recent co-benefits studies have found that effective climate policies often lead to political and institutional co-benefits in the form of increased public participation, support, cooperation, and political stability. Such co-benefits are particularly observed in international trouble spots where effective implementation of co-benefits policies has successfully defused tensions and avoided conflicts among local communities in relation to sharing water, food, and energy (Nordås & Gleditsch, 2007). It has been observed that successful implementation of REDD+ programs has also resulted in active participation of the local community as a co-benefit, which in turn has facilitated simultaneous management of forest and climate change mitigation (Chhatre et al., 2012). Co-benefits are also used as incentives to achieve locally driven effective inter-regional collaboration (Nakamura & Kato, 2011; Puppim de Oliveira et al., 2013).

3.5. Conclusion

This chapter has explored the concept of co-benefits. Based on the review of co-benefits literature, it offered an understanding of co-benefits in terms of what they are, how they have evolved, and their application in climate action.

The discussion presented in the chapter has revealed that research on co-benefits of climate polices is developing. While theoretically the application of co-benefits concept is now well established, the most advanced studies still have some significant limitations. Over the past two decades, co-benefits research has evolved based on certain common methodological steps, assessment tools and frameworks. However, it has been observed that there is a significant gap in terms of both assessing the strengths and weaknesses of these resources and in gaining a detailed understanding of the policy context for which these resources are intended. This suggests the need for further research to broaden the implementation of co-benefits concept in practice. This thesis has identified the following key areas in co-benefits research where significant gaps currently exist, which in turn are the focus of investigation by this thesis.

First, the application of co-benefits concept depends on the policy context which varies extensively among countries and geographic locations (i.e. urban vs rural). This mirrors the diversity in terms of governance arrangements, institutional frameworks, policy-settings, and local situations. As the co-benefits approach is advocated as a way of incorporating climate change concerns into local issues, any attempt to intervene by utilising this approach

should preferably consider the local context. Ultimately, local concerns are key drivers in development and execution of policies that can generate co-benefits, which is central to understanding how to promote co-benefits in policy processes (Puppim de Oliveira et al., 2013).

This understanding highlights the need of conducting a systematic analysis of the local situation to determine specific development needs across different fields of policy-making that have potential to generate co-benefits. These policy fields could be considered as potential 'entry points' for advancing the co-benefits approach, which could be pursued by policy interventions in those fields.

Second, there is a need for research to understand the existing policy framework and to identify the most efficient ways to advance co-benefits approach in climate change related policy-decision-making processes. The aim should be to identify the shortcomings of the existing decision-making framework and recommend appropriate interventions so that co-benefits considerations become part of mainstream climate policy development process.

Finally, although 'co-benefits approach' is theoretically sound, there is a significant shortfall of streamlined methods and practical tool sets that could facilitate their consideration in a complex, multi-objective climate-related decision-making framework. For all co-benefits studies, substantial uncertainty is inherent — for example, growth in energy-demand and GHG emissions cannot be predicted with scientific accuracy, as both are related to economic

change which is dependent upon a larger number of variables (Williams, Hasanbeigi, Price, & Wu, 2012). Data validity and resource limitation are also major sources of uncertainty in co-benefits research. These uncertainties often produce analysis which are not very sound and transparent enough for direct policy applications (Williams et al., 2012).

To address these issues, most co-benefits studies increasingly rely on simplifying co-benefits evaluation by accommodating resource- and data-limitations. The majority of studies have narrowed investigation by limiting the number of impact areas, concentrating on specific sectors (such as energy), and geographically focusing on particular areas (such as urban areas), where the concentration of population and co-benefits potentials are high. These strategies are often justifiable considering the importance of potential co-benefits and significance of those areas as centres of large population and high economic activity and major sources of GHG emissions. However, these simplifications often significantly reduce accuracy of research output and create conflicts between outputs.

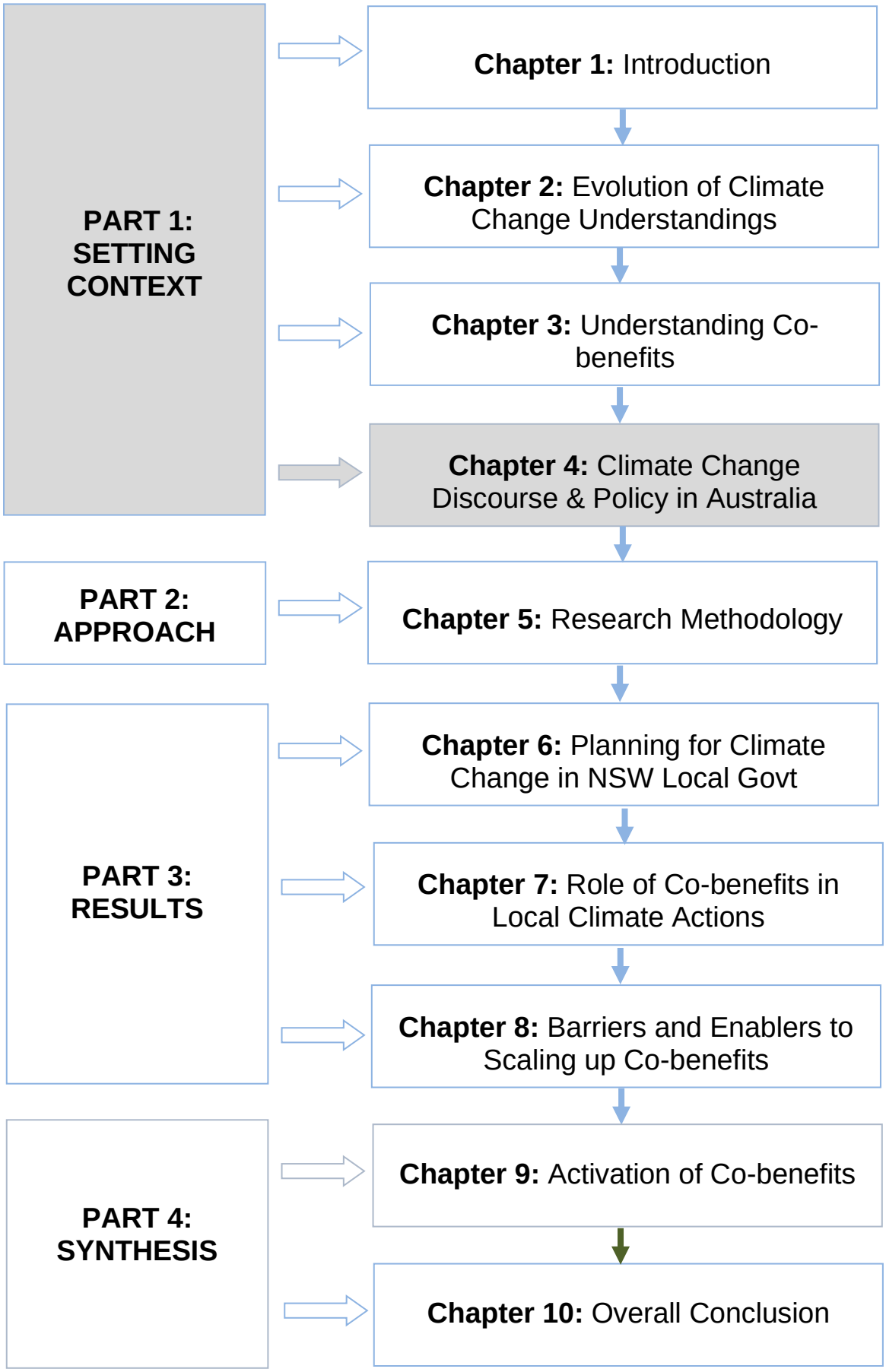
The above observation points to the need to develop:

i) simplified methods and easy-to-use toolkits that can help policy-makers assess individual co-benefit within local circumstances; and
ii) simpler framework for integrating those co-benefits with direct benefits into the existing decision-making framework.

This will require considerable up-front standardisation efforts based on a detailed understanding of the local policy context to safeguard that the

simplified methods do not cause inaccurate results and loss of transparency and credibility.

Based upon above understanding of co-benefits approach in mitigating climate change, the next chapter will investigate the Australian climate policy context. This understanding will help the investigation to explore how co-benefits could potentially be a relevant approach in the current state of Australian climate policy for the development of a stable and compelling climate change policy in the future.


PART 1: SETTING CONTEXT
Chapter 1: Introduction
Chapter 2: Evolution of Climate Change Understandings
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CHAPTER 4: CLIMATE CHANGE DISCOURSE AND CLIMATE POLICY IN AUSTRALIA

4.1 Introduction

Climate change has emerged as an extremely critical and contentious issue for Australia. This is partly, due to the very nature of the issue itself and partly, Australia's susceptibility both to the impacts of climate change on the one side and the challenges it faces to mitigate climate change on the other. Australia's severe susceptibility to climate change is largely due to it being 'one of the hottest, driest continents, with one of the most naturally variable climates in the world' (Commonwealth of Australia [CoA], 2013a, pp. 4, 5). Australian economy is heavily reliant upon fossil fuels for fossil fuel-based energy for domestic uses and export earnings. Abundant availability of low-cost coal has significantly contributed to its economic growth, employment generation, and regional development which have created powerful deterrents for Australia acting on climate change (Pearse, 2009). As a result, Australia is facing several challenges in responding to the danger of climate change - protecting its innate environment and safeguarding sufficient energy supply and natural resources for fulfilling its development needs (CoA, 2011b; Hussey & Pittock, 2012). Being a nation with 'one of the highest per capita greenhouse gas (GHG) emissions in the world' (IEA [International Energy Agency], 2011, pp.

97–99) Australia needs to significantly cut its GHG emissions to fulfil its international commitment (CoA, 2015a; CoA, 2016; CoA, 2017; OECD, 2015).

Given this context, it is not surprising that climate action is supposed to be contentious which poses as a challenging problem for Australia (Garnaut, 2011). Indeed, over the past decade, the process of developing national policy responses to climate change has been facing challenges in terms of, on the one hand, reconciling economic interests and environmental concerns and, on the other, sharing responsibilities and rights between different tiers of government. Bulkeley (2000) observes that 'the ways in which the costs and benefits of addressing, or ignoring, GHG emissions are to be distributed between regions, between sectors of the economy, and across future generations has been the subject of sustained policy debate' (Bulkeley, 2000a, p. 304).

The purpose of this chapter is to understand the main contributing factors and institutions that govern Australia's national discourse and policy response to climate change.

First, the contextual factors of Australia's national circumstances and major climate change impacts that shape its response to climate change are discussed (section 4.2) and the current organisation of the Australian government, which defines the roles, powers, responsibilities, and relationships between various levels of government regarding climate change, are explored (section 4.3).

Then it presents a brief account of the development of the debate around climate change in Australia, identifying key contours in the course of developing the current state of Australian climate policy (section 4.4). This is followed by a detailed investigation of how economic considerations dictate Australia's climate policy-making process and how different attempts to resolve the conflicts between economic interests and environmental concerns have been articulated under different interpretations of the concept of a 'no-regrets approach' to climate policy development (section 4.5).

Finally, the current Australian national (section 4.6) and NSW state (section 4.7) climate policy settings are outlined and their implications for the development of a stable and compelling climate policy in the future are discussed (section 4.8).

4.2 The impacts of climate change on Australian environment, people and economy

Mainland Australia is the largest island as well as the smallest continent in the world. In terms of land mass, it is 'the sixth largest country in the world with an area of 7.7 million square kilometres' (CoA, 2017b, p. 15). Its varied ecosystems consist of extremely dry desert, tropical rain forests, delicate alpine regions, and vast coastal and ocean zones. Climate variability has played a major role in shaping Australia's inhabitants' settlement pattern, type of agriculture and form of infrastructure development (CoA, 2016). Due to its

vast land area, wide environmental diversity, and its climate variability, Australia faces major challenges to manage climate change impacts.

Added to this, Australia's economy relies on fossil-based fuels (mainly coal and natural gas) for generating energy for domestic usage and export revenues. The total volume of energy Australia produces amounts to almost three times the volume of its domestic consumption making it one of the major energy-producing countries of the world. This allows Australia to export its excess energy overseas which is significant (CoA, 2017; Pearse, 2009). In addition, Australia has a huge agricultural sector, which produces substantial volume of food targeting domestic as well as overseas market. Such large volume of resources and agricultural production make Australia dependent on long-haul transport which generates significant amount of its carbon emissions making its per capita emissions relatively high compared with other developed countries. In 2015, Australia's 'per capita emissions were 23.2 tonnes of carbon dioxide equivalent (CO2-e) per person (including land use, land-use change, and forestry)' (CoA, 2015b, p. 16).

These critical context-specific issues demand that Australia's policy responses to climate change need to be comprehensive in scope as well as specific to its very local circumstances. This section explains those circumstances, setting out the challenges Australia confronts in acting on climate change. Knowing these circumstances will offer a foundation on which Australia's policy responses to climate change can be understood.

Deteriorating extreme weather events

Australia is regarded as one of the world's most susceptible nations to climate change impacts among all developed countries (Saul et al., 2012). Most Australians live in the coastal regions who are at risk due to rising sea levels (CoA, 2017). Australia has a highly variable and typically dry climate, which is prone to disastrous severe weather conditions such as droughts, bushfires, and floods; all these events will be exacerbated by global warming (CoA, 2016). As a dry continent, Australia already faces water scarcity, which has led to rationing of water both in major cities and for agricultural use. Climate change could make this situation worse. By 2010 average temperatures in Australia had already warmed by almost 1°C since 1950 (Commonwealth Scientific and Industry Research Organisation [CSIRO] and Bureau of Meteorology [BoM], 2007).

Adverse impacts on the economy

It is difficult to evaluate the precise economic costs of a changing climate on the economy. However, it is possible to identify the major categories of direct impacts and define the problem to understand the magnitude of the economic costs involved. As discussed, major categories of direct impacts are: fires and severe weather events; sea-level rise; human health, comfort, and disease; agricultural productivity; energy requirements; and natural systems.

Among the costliest extreme weather events are bushfires. For example, the damages caused by the worst bushfire that happened in Victoria in 2009 known as Black Saturday fires is calculated at about $4 billion (Teague et al., 2010), with $1.3 billion in insured losses (ICA [Insurance Council of Australia],

2013). In the agriculture sector, drought caused large economic impacts by decreasing farm output between 2002 and 2003, causing a 1 per cent decline in the GDP and a 28.5 per cent fall in the gross value-added for the industry (Australian Bureau of Statistics [ABS], 2004).

Increased frequency and intensity of storms, like Categories 4 and 5 tropical cyclones, cause devastating economic losses. For example, Cyclone Yasi inflicted more than $2 billion in losses to the tourism and agricultural industries in Queensland (Queensland Reconstruction Authority [QRA] and World Bank, 2011).

From these direct impacts, indirect impacts flow onto financial services and insurance, trade, tourism, worker productivity, and generally on investment, employment, and overall economic growth. In the United Kingdom's well-known *Stern Review: The economics of climate change*, it is estimated that, globally, the overall economic impacts of (unmitigated) climate change by 2100 will include a 5 to 20 per cent drop in per capita consumption and a 5 to 10 per cent reduction in GDP (Stern, 2007, pp. 161-62). Based on this estimation, for Australia, that would equate to an annual cost of $50 billion–$200 billion to the Australian economy, or $5000–$20,000 per household annually, by the end of the century (Saul et al., 2012, p. 29). It means even if strong measures are undertaken now to reduce GHG emissions, there will still be costs involved in dealing with the impacts of climate change that is already occurring and will continue to affect Australia for many years.

Adverse impacts on the ecosystems

The measurable economic impact of climate change generally gets priority on top of the less easily quantifiable cost of the harm to Australia's diverse ecosystems. These ecosystems have immense value beyond their apparent role in driving the tourism industry and the cash flow they generate, even though their value is normally not counted in conventional measures of economic terms. It is not counted because it is difficult to quantify them, and they are subjective, as with any unique asset for which no market exists. However, to make rational decisions, care must be taken to recognise costs to the harm of ecosystems, rather than implicitly assuming that they do not have any economic value.

4.3 Organisation of Australian Government

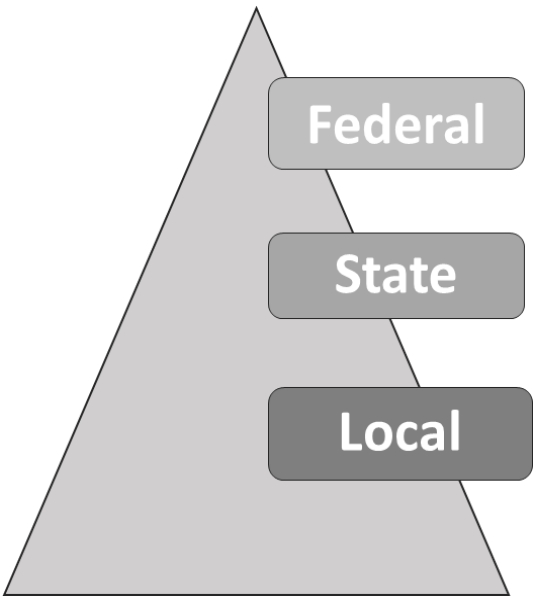
Australia's policy responses to climate change are closely linked to the constitutional roles, powers, and delegated responsibilities of various levels of Australian government. This section explores the current arrangements and relations between various levels of Australian government regarding climate change.

Australia's government is based on a federal system which has 'three levels: Commonwealth (the Australian Government), state and territory (New South Wales, Victoria, Queensland, Western Australia, South Australia, Tasmania, the Australian Capital Territory, and the Northern Territory) and local' (CoA, 2013, p. 19). In this three-tiered federal system of governance, local government is not listed in the Commonwealth Constitution. Local councils

come within the constitutional accountability of the state and territory governments. States have their respective local government Acts which grant them power to 'control the form, function and boundaries of local authorities' (Jones, 2013, p. 977; Painter, 1993; Keen, Mercer & Woodfull, 1994). See Figure 4.1.

All three levels of government are responsible for managing the inherent risks of climate change for infrastructure and environment. They provide facilities and deliver services as well as create necessary institutional, regulatory and market environment to support the Australian community, businesses, and industries in their efforts of mitigation and adaption to climate change (Keywood, Emmerson, & Hibberd, 2016). Coordination between the three levels of government occurs though the Council of Australian Governments (COAG). COAG is the apex intergovernmental body dedicated to 'inter-jurisdictional cooperation. It comprises the Prime Minister, State Premiers, Territory Chief Ministers and the President of the Australian Local Government Association' (CoA, 2013a, p. 19). The main responsibilities of COAG are initiating, developing, and monitoring policy reforms which are of national importance and those require collaborative action by Australian governments. The roles and responsibilities of three tiers of government regarding climate change are articulated through COAG (CoA, 2013a).

Figure 4.1: Australia's three-tiered governance system — national, state and local



Federal — broad and limited role in environmental matters

State — largely independent and provides legislation which outlines local governments' purpose, processes, activities and operations

Local — no constitutional recognition, limited autonomy, delegated responsibilities

Source: NSW Government, 2013c

4.3.1 Intergovernmental relationships and responsibilities

In the Australian federal system of governance, policy levers for dealing with climate change rest mainly with national and state (and territory) governments. Traditionally, the Commonwealth has played a limited role in environmental matters as the Australian Constitution does not confer on it any 'general direct power over management of the environment' (Williams and Maginn, 2012, p. 39). Aside from certain situations related to 'matters of national environmental significance' (as specified by the *Environment Protection and Biodiversity Conservation Act 1999* (CoA, 1999, www.environment.gov.au/epbc/about), overall powers in this regard largely rest with state (and territory) governments (Williams & Maginn, 2012). Such arrangements allow each state and territory

government to develop and administer 'its own planning system with statutory, policy, and procedural frameworks' (Williams & Maginn, 2012, p. 39) and local government's responsibilities in this regard are to perform 'day-to-day decision-making functions' delegated by their respective state governments (Jones, 2013, p. 977; CoA, 2013).

Such arrangements have resulted in complexities, with the roles and responsibilities of the various levels of government overlapping. This steered Commonwealth and state and territory governments to delineate a specific set of principles for governing the environment by the *Inter-Governmental Agreement on the Environment* (CoA, 1992a). This set of principles have been outlined in the agreement under section 2 which clarifies that —

> 'the Australian Government has responsibility for international matters (such as implementation of treaties) and those that are of direct Commonwealth relevance. Each of the states (and territories) has prime responsibility for all environment and natural resource management in its territory, and an 'interest' in international matters. Each local government authority is responsible for management of the environment within its boundaries, but in compliance with the relevant state and Australian laws and policies' (CoA, 1992a – Section 2.1, 2.2, 2.3 & 2.4).

Based on the above broad set of principles, functions, and responsibilities of the three levels of the Australian government regarding climate change are articulated.

The Australian Government

The Australian Government is accountable for an all-encompassing climate policy and strategy for the country and plays a significant role in providing climate science and information. It has responsibility for international agreements, which means it can influence climate change policy commitments across all jurisdictions. At the domestic level, it oversees management of natural resource throughout the 'land, water, marine, and coral reef systems', and takes into account 'the economy-wide' consequences of measures implemented at the regional and local level (CoA, 2016, p. 19).

State Government

Each of the states and territories has responsibility for areas where it can make significant impact on climate change for both mitigation and adaptation — 'land-use planning, water supply, transport, infrastructure, public transport, and electricity generation and supply' (CoA, 2016, p. 19). Through state policies and planning laws the state governments provide the regulatory frameworks that ensure availability of locally relevant information, and delivery of responses to climate change within their jurisdiction. This involves provision of basic services like emergency services, protecting environment, and urban and regional planning and planning and provision of transport infrastructure (CoA, 2016).

Local Government

Being the lowest level of the government and the closest to the community, local governments are at the front line of climate change impacts. Their major responsibilities include — 'general public services, education, health, welfare, recreation and culture, housing and community amenities, transport and communications, economic development, natural resource management, planning and development, and control or regulation of building and subdivision' (CoA, 2016, p. 19). Many of these functions could potentially be affected by climate change, particularly, managing and maintaining infrastructure, managing waste, land-use and planning of transport, and management of land (CoA, 2010). Local government is at the right position to provide information to the state, territory, and Australian governments regarding specific requirements of the regional and local communities, to talk directly with such communities, and responding to local changes. Local governments make sure that local conditions are taken into account in overall government's response and engage local communities directly in the efforts to contribute to the effective change (CoA, 2016).

Despite acknowledgement of local government's role for management of the environment in the *Inter-Governmental Agreement on the Environment*, its role regarding climate change has not been formally defined by Commonwealth or state governments (Urbis, 2010). The record of involvement in developing climate change policies indicates that both Commonwealth and state governments have tended to ignore local government as a real partner in governance concerning climate change or have failed to bring into line climate

policy with local developmental issues (Jones, 2012; Storey et al., 2012). This means local government is constrained by the current arrangements in Australia's federal system of governance, an arrangement that place limitations on their policy capacity to respond to climate change.

4.3.2 Effectiveness of the current arrangements

The problem caused by climate change begins with the greenhouse gas emissions, which mainly generate from various sectors like energy, transport, and industrial sectors. All these sectors are managed by separate Commonwealth, state, and local government agencies. The current arrangements for management of the environment in the three-tiered federal system of the Australian government make it difficult to coordinate effective policy outcomes for climate change. For example, major impacts of climate change generally occur on water resources – marine ecosystem, fisheries; biodiversity, coastal infrastructure, agriculture, trade, economic growth, and insurance - most of which are managed by separate levels of government having responsibility for different elements of the environment, development, and the operation of utilities and other services (CoA, 2016).

Despite the national and state (and territory) governments having the main policy leverage to deal with climate change, at present there is clear absence of coordination and leadership at these levels. This has contributed to a situation where, without any overarching policy and regulatory framework, Australian climate change initiatives lack policy integration and coordination across various sectors and levels of government (Jones, 2013).

4.4 The story of Australia's climate change policy

Australia's climate policy has a brief but tumultuous history. To outline a chronology of the Australia's climate change policy development, Talberg, Hui, & Loynes (2015) has provided a snapshot of the key events that marked its development —

> '… At times Australia has been an early adopter of climate action, establishing the world's first government agency dedicated to reducing greenhouse gas emissions; signing on to global climate treaties the same day they were created; establishing the world's first emissions trading scheme (ETS) (albeit at a state level); and pioneering an innovative land-based carbon offset scheme. But at other times, Australia has erratically altered course: disbanding the climate change government agency; creating a new one, then disbanding that; refusing to ratify global treaties until the dying minute; and being the first nation in the world to undo legislated action on climate change, with the repeal of the Carbon Price Mechanism' (Talberg, Hui, & Loynes, 2015, p. 1).

All these events can be viewed as inconsistent and lacking any direction, which pose as 'a set of interlocking puzzles for analysts attempting to understand policy formation and implementation in this domain' (Christoff, 2013, p. 349). Despite this apparent inconsistency, 'Australia's domestic climate policy has arguably demonstrated more consistency than its climate diplomacy' (Beeson & McDonald, 2013, p. 335). Christoff (2013) observes significant pattern and consistency in Australia's climate change discourse and policy development at national level. Based on the concept of 'climate

discourse complex'[6] and through 'discourse analysis',[7] the development of Australia's climate policy could be divided into several distinct phases (see Table 4.1).

It began with a phase of 'naïve altruism' (1988–1994) when Bob Hawke-led Labor government, responding to growing global call for action on climate change, proposed certain ambitious policy measures. This phase abruptly ended when international climate negotiations failed to accomplish some definite results and the Labor government lost its power to John Howard led conservative government in 1996. The Howard government's active opposition to climate action steered to a new period of reactive economic discourse, which continued until the mid-2000s. During this period climate change issue was framed as an economic problem which emphasised the negative impacts of the cost of climate actions on the economy and on this basis, government refused to endorse the Kyoto Protocol. This period is particularly noted for its introduction of the 'no regrets'[8] policy approach, which wanted to safeguard that any policy measure undertaken to deal with climate change would not burden Australian industries and would not disrupt current

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[6] 'Climate discourse complex' is 'a dominant (and occasionally hegemonic) ensemble of sometimes loosely coupled, sometimes mutually constitutive, climate discourses arising from several fields — such as the scientific, ethical and economic' (Fairclough, 2006b, p. 148). It is 'a structural arrangement or composite of different climate-related discourses and their elements that frames and governs public and private practices' (Stephenson & Dryzek, 2012, p. 201). The national climate discourse complex 'constructs and governs the shape of the national climate debate and resultant policy outcomes. The discursive fields forming this complex are dynamic and can vary at any given point in time, as well as change over time. As a consequence, while the climate discourse complex tends towards stability and is sometimes hegemonic, it too is dynamic and can change in response to contests and challenges' (Christoff, 2013, p. 354).

[7] 'Discourse analysis' examines discourses to understand dominant and marginalised discourses, explores how they are articulated, and charts how they change over time (Hajer, 1995; Hansen, 2006; Litfin, 1994).

[8] The 'no regrets approach' is interpreted as a policy-strategy for climate policy development which advocates adopting 'available GHG emissions reduction measures' that have 'negative net costs, because they generate direct or indirect benefits that are large enough to offset the costs of implementing the options' (IPCC, 2001a, p. 52; CoA, 1992b).

sectoral arrangements of the economy (Bulkeley, 2000b, 2001; Hamilton, 2001). The next phase (mid-2000s to present) observed an emergence of a 'new' economic discourse, which explicitly recognised the existence of climate change and the need to respond to the threat that could cause significant harm to the economy. It facilitated the development of 'a domestic regulatory discourse around mitigation targets, renewable energy targets, and associated policy measures to effect economic decarbonisation' (Christoff, 2013, p. 361). This section presents an overview of Australia's evolving debate around climate change as well as outlines key contours in the development of the current state of Australia's national climate policy.

Table 4.1: Development of Australia's Climate Change Policy

Key phases	Dominant discourses	Key events	Key Policies
Enthusiastic first response (1988–1991)	Scientific, Ethical	• Interim planning target (IPT)	
Emergence of economic turn (1992–1996)	Economic 'old', Ecological modernisation	• Signing of the UNFCCC at Rio de Janeiro, Brazil • Ecologically Sustainable Development (ESD) consultation process and report; • Industry Commission Report • Endorsement of National Greenhouse Response Strategy (NGRS)	• National Greenhouse Response Strategy (NGRS) • Greenhouse 21C plan
Entrenched dominance of economic considerations (1996–2006)	Economic 'old', 'Weak' ecological modernisation	• Australian Bureau of Agriculture and Resource Economics (ABARE)'s economic modelling • Review of NGRS by National Greenhouse Advisory Panel (NGAP)	• Greenhouse Challenge Program (GCP) • National Greenhouse Strategy (NGS) • Safeguarding the future package
New economic turn (2007–2013)	Economic 'new', Ethical, 'Weak' ecological modernisation	• Ratification of the Kyoto Protocol • Garnaut Review released • CPRS rejected by the Senate • ETS legislation passed by Federal Parliament	• Clean Energy Future Plan
New economic turn — climate policy reversal (2014–present)	Economic 'new'	• Repeal of Carbon Tax • Direct Action Plan (DAP) introduced	• Direct Action Plan • Emissions Reduction Fund

Source: Adapted from Christoff, 2013, p. 358.

4.4.1 Enthusiastic first response of ‘naive altruism’

The first sound scientific assessment of the scale of climate change expected to occur from growing intensities of GHG in the atmosphere was presented during a scientific conference at Villach in Austria in 1985. About three years after the conference, climate change appeared as a major public matter in Australia in 1988 (Hamilton, 2001). In the lead-up to the Villach conference, the Commonwealth Scientific and Industry Research Organisation (CSIRO) performed a critical part in transforming recommendations of the Villach Conference into climate policy formation in Australia. In 1985, CSIRO organised two major climate change conferences in Australia — the first, Greenhouse ’87 and the second, Greenhouse ’88. Both events were successful in terms of receiving substantial media coverage, attracting public attention, and raising the prominence of climate change as an important policy issue among policy-makers (Beder, 1999; Bulkeley, 2000b).

The most notable feature of the early years (1988–1991) of the development of the Australian climate policy was when the then Bob Hawke led Labor Government made a commitment to an ‘interim planning target’ (IPT) of lowering Australia’s GHG emissions by 20 per cent by 2000 from 1988 levels. At that time this was one of the strongest commitments made by any country in the world (Hamilton, 2001; McDonald, 2015). Australia’s such a progressive position at the forefront of international climate action at that time can partly be attributed to the importance of environmental issues for the Australian Government due to public awareness of and concerns about the matter (Doyle, 2000) and partly due to a particular approach Australia adopted to its

international diplomacy. This diplomatic approach was driven by the belief that adopting a progressive position in climate action would serve Australia's national interests best by presenting Australia as a 'good international citizen': who is actively engaged in the international arena, and working towards shaping 'a global order and accruing reputational benefits in the process' (Evans, 1990 pp. 1, 7 & 8; Evans & Grant, 1995). However, this initial enthusiastic response might be viewed 'as one of 'naive altruism' as scant consideration was given to the associated potential technological, legal or economic challenges, beyond the unimplemented measures described in the 1992 *National Greenhouse Response Strategy* (NGRS)' (Christoff, 2013, pp. 358-359; CoA, 1992b).

4.4.2 Emergence of 'economic turn' in climate change discourse

By the mid-1990s, when the United Nations Framework Convention on Climate Change (UNFCCC) was unable to reach an agreement on an initial mandatory target for reducing emissions by developed countries, a disappointed Australian Government steadily rolled back its initial level of commitment to climate action in the international arena. Since then Australian Government gradually shifted its efforts to domestic policy action to reducing emissions (McDonald, 2015). During this period (1992–1996), the rise of a strong reactive economic discourse was observed within both industry and government, which emphasised the 'costs of mitigation, highlighted the apparent uncertainties of climate science, and extolled the role of markets in effecting timely and least-cost abatement' (Christoff, 2013, p. 359). While such

narrative did not challenge the fundamental scientific basis of climate change, it led the discourse around climate change to an 'economic turn', which later introduced 'no regrets' policy approach which presaged much that was to come. It advocated for actions for reducing emissions that also have economic benefits, or at least have no economic costs (Bulkeley, 2001). Guided by this 'no regrets' premise, Paul Keating led Labor Government decided to pursue only those measures for climate action which would have no negative impact on Australian economy. This means measures which might have any negative effect on Australia's economic competitiveness as well as economic growth were excluded from consideration for climate policy action (Doyle, 2000; Bulkeley, 2001).

Entrenched dominance of economic considerations

Over the next ten years (1996–2006), the 'economic turn' in climate change discourse had become increasingly dominant and deeply entrenched. It effectively framed the climate change debate by persistently emphasising the potential risks that climate change mitigation measures posed to continued growth of the Australian economy, which depended on continued exploitation of fossil-fuel resources (Christoff, 2013). During this time little support was given to climate change research and emergent renewable energy technologies, and influential people in the fossil-fuel industry were allowed to unduly influence all aspects of climate policy formation (Hamilton, 2001; Pearse, 2007). On the contrary, environmental organisations' access to and influence over government diminished. The opinion-forming and policy-guiding influence of local and international organisations such as CSIRO and IPCC

declined (Christoff, 1998; McDonald, 2005). The 'national interest' based on the conservative Howard Coalition 'Government's 'neo-realist approach' to national security' gained priority in international climate change negotiations (Christoff, 2013, p. 359), which resulted in Australia's refusal in 2001 to accept the binding targets of the Kyoto Protocol (CoA, 1997).

4.4.3 Emergence of 'new' economic discourse

During the mid-2000s public concern around climate change increased dramatically with the occurrence of a number of high-profile international events. The release of the IPCC's Fourth Assessment Report, the UK's *Stern Review*, and the screening of Al Gore's popular documentary film about climate change, *An Inconvenient Truth* caught global attention and brought climate change issue back into the spotlight. These events coincided with a severe drought of unprecedented duration in Australia, which served to raise concerns and re-sensitise public opinion to global warming in Australia (Christoff, 2013; Curran, 2007; McDonald, 2015; Pietsch & McAllister, 2010).

The Clean Energy Future Plan and Carbon Tax

In response to the changing public sentiment, the conservative Howard Coalition Government's domestic climate change policy also began to change (McDonald, 2015). Government undertook number of measures to reinvigorate its climate action which reflected a shift positioning around on the pricing and trading of carbon emissions. Kevin Rudd-led Labor Opposition also committed to a carbon-pricing proposal ahead of the 2007 election. These similar policy moves by the government and the opposition, for the first time,

signalled a bipartisanship in Australian politics on climate change (Beeson & McDonald, 2013).

However, this brief period of bipartisanship on climate change in Australian politics quickly disappeared soon after the 2007 election. When Rudd's Labor government moved to introduce an emissions trading scheme (ETS) through passing of its Carbon Pollution Reduction Scheme (CPRS), it faced opposition. After two unsuccessful attempts to pass the CPRS, it was shelved in early 2010. Within months of Rudd's removal as leader by Julia Gillard, the minority Labor Government led by Julia Gillard and backed by the Australian Greens, implemented carbon pricing in November 2011 as part of its *Clean Energy Future Plan* (McDonald, 2015). This marked a clear shift from Australia's past dependence on grants-based climate policy. Following its implementation, Australia observed a significant drop in the demand for electricity and the largest reduction in GHG emissions in the 24 years of monitoring (O'Gorman & Jotzo, 2014).

Repeal of Carbon Tax and introduction of Direct Action Plan (DAP)

However, the legislation did not last long. After winning the September 2013 federal election, Tony Abott's Coalition Government revoked the carbon tax through the roll-out of the Clean Energy Legislation (Carbon Tax Repeal) Bill 2013 into the parliament in July 2014 (DoE, 2014). It introduced its Direct Action Plan (DAP) instead, which relies mainly on the Carbon Farming Initiative (CFI) (i.e. carbon sequestration) and includes an Emissions Reduction Fund (ERF) to provide funding for private industrial improvements to reduce greenhouse gas emissions (The Coalition, 2013). While it retains the

Labor government's 5 per cent Renewable Energy Target (RET), it reversed the Emissions Trading Scheme (ETS)'s polluter-pays onus to taxpayer-funded incentives for private businesses to reduce emissions (Crowley, 2017).

The DAP has been subject to extensive and intense criticism, with leading economists questioning its efficiency, based on its high costs and likely inability to deliver substantial emission cuts (Garnaut, 2014; Jotzo, 2014). A recent independent review of the DAP by the Climate Change Authority (CCA) described government's emissions reduction target of 5 per cent as 'inadequate' and concluded the target was not a 'credible start … to achieving the below 2-degree goal' (Climate Change Authority [CCA], 2014, p. 10). Rather, it recommended that 'a minimum target of 15 per cent (including carryover) should be adopted because it represents a more suitable response to the latest evidence; is in line with the targets of comparable developed countries; and the costs of meeting it would be manageable' (CCA, 2014, pp. 10–11).

This critique of the current target and subsequent recommendation was endorsed by the 2014 Senate Inquiry into the DAP and the then Abbott Coalition Government's approach to national strategy on climate change (Environment and Communications References Committee, 2014, p. 22). Indeed, given that Australia is a signatory to the 2015 COP21 'Paris Agreement, which aims to limit global warming to well below 2°C above pre-industrial levels' (UNFCCC, 2015a, p. 22), setting and achieving meaningful national reduction targets is critical to ensure Australia fulfils its international obligations.

It remains questionable as to whether the DAP will allow Australia to achieve substantial emission cuts and facilitate the transition to a de-carbonised economy. Although the latest report released by the federal government suggests that Australia is on course to reach its 2020 target (CoA, 2015c, p. 1), strong growth in black coal electricity generation has seen Australia's carbon emissions increase 4.2 per cent since July 2014 (Pitt & Sherry, 2016), thereby validating the projections of the DAP critics.

Christoff (2013) considers this phase (mid- to late-2000s) in the Australian climate change discourse as a transition from 'old' to 'new'. While retaining its dominance, this 'new' economic discourse compared with the 'old' one explicitly recognised the existence of climate change and the need to respond to its threat, which could cause significant harm to the economy. It also started considering renewable energy as viable technologies (Department of Climate Change and Energy Efficiency [DCCEE], 2012). All these changes ultimately contributed towards the development of 'a domestic regulatory discourse around mitigation targets, renewable energy targets, and associated policy measures to decarbonise the economy' (Christoff, 2013, p. 361).

However, a bitter political contest, invigorated by politically motivated disapproval of the carbon pricing and emissions trading scheme as policy measures to tackle climate change undermined the political momentum towards reaching a stable and effective climate policy regime in Australia (McDonald, 2012). This ultimately worn out support for action on climate change among Australians (Hanson, 2012), and shifted their attention away

from the growing evidence about climate change and the need of taking urgent action which further delegitimised robust climate policy in Australia.

The two main political parties of Australia (the Australian Labor Party and the Liberal Party of Australia) have adopted significantly different policy approach to climate change through the years. However, it is imperative to point out here that the 'no regrets' policy approach introduced by Keating's Labor government and later adopted by Howard's Coalition government was followed by successive Labor and Coalition governments, which consistently maintained priority of economic interest over concerns for the environment, and national sovereignty over environmental standards in international climate negotiations and in domestic policy development and implementations (McDonald, 2005). This suggests that persistent dominance of economic considerations in Australia's climate change discourse is not dependent on any political leadership as its continuity is maintained through climate policy regimes under successive governments (Christoff, 2013).

From the above account, it can be pointed out that Australia's profound financial interests in continuation of a fossil-fuel based economy, together with the role and subtleties of domestic party politics influenced by the ways in which powerful groups from the industries have mobilised against any action on climate change, as well as the dynamics of negotiation process at international level through the UNFCCC, have all in their various ways prevented the development of a strong climate policy in Australia. These issues are distinctly important when it comes to making sense of the impediments Australia is facing to devise effective climate policy. However,

such an account does not help to explain Australia's changing position over time and how economic considerations dictate Australia's policy-decision-making process and affect climate policy outcomes.

4.5 'No-regrets' approach: reconciling economic and environmental objectives

This section examines how economic considerations dictate Australia's policy-decision-making process in the formulation of climate policy and how different attempts to reconcile the goals of the economy and environment have been articulated under the guiding principle of the 'no-regrets' approach. It details the consultation processes conducted by the Ecologically Sustainable Development (ESD) working groups and the Industry Commission where 'no-regrets' approach was first interpreted as a strategy for climate policy development which led to the formation of the National Greenhouse Response Strategy (NGRS) (CoA, 1992b). Then it traces how the 'no-regrets' concept has evolved through different interpretations in the Greenhouse Challenge Program (GCP) and the Australian Bureau of Agriculture and Resource Economics (ABARE)'s economic modelling. In every instance, methods adopted to estimate the costs of climate actions scaled down the scope of no-regrets measures, marking a clear departure from the initial concept proposed in the ESD working group's report. Lastly, it examines the attempts made to re-define no-regrets retaining some aspects of the initial concept during the 1996-1997 review of the NGRS by the National Greenhouse Advisory Panel (NGAP).

4.5.1 Formation of the National Greenhouse Response Strategy (NGRS)

During 1990–1992 the Australian Government initiated the process of searching for feasible policy alternatives for reaching its Interim Planning Target (IPT) of reducing 20 percent of its GHG emissions from 1988 levels by 2000. It was attached with the condition that 'in attempting to reach the IPT there should be no adverse effect on the Australian economy, and upon trade competitiveness in particular, in the absence of similar action by other countries' (CoA, 1992b; Lowe, 1994, pp. 315–316; Taplin, 1994, p. 145). The rationale behind attaching such condition was apparently based on the government's perception that climate protection might have a cost. This perception played an important role in framing initial relation between economy and environment in Australia's domestic climate policy discourse. It suggests that the 'tensions between economic objectives and environmental values were written into, rather than out of, policy discourses' (Bulkeley, 2001, p. 159).

As part of this process two separate consultations were conducted - one through the ESD consultation process by the Greenhouse Working Group and other by the Industry Commission, to explore feasible policy alternatives for attaining IPT, and evaluate accompanying costs and benefits of those alternatives (Bulkeley, 2000a). The two processes followed distinctly diverse paths and drew different conclusions in their attempts to reconcile economic objectives and environmental values for climate policy development.

‘Ecological modernisation’: reconciling economic and environmental objectives

The ESD consultation process is widely acknowledged as the most rigorous and coordinated effort ever undertaken to form a broad consensus on climate change issue to avoid prevalent environment-economy conflict in environmental-policy making in Australia (Downes, 1996; Kinrade, 1995). The ESD consultation involved forming a Greenhouse Working Group comprising representatives from governments, industry, environmental groups, and community, and making deliberations about possible economy-wide policy options for sustainable development. The way the consultations were conducted, and conclusions were drawn, reflect that the process followed an ecological modern approach to environmental policy-making (Dryzek, 1990). It was fundamentally based on the ‘central tenet of ecological modernisation’ that ‘there is no inherent contradiction between protection of environment and pursuit of economic growth’ (World Commission on Environment and Development [WCED], 1987, p. 43). Following a deliberative process, it approached the problem of climate change as a global issue that requires to be tackled taking into account the concerns of future generations. It considered the need of implementing precautionary measures, indicating that climate protection might have a cost (Christoff, 1998; Hajer, 1995). Overall, the process achieved significant consensus about the matters to be addressed and the principles to be followed to do so (Bulkeley, 2001; Lowe, 1994; Toyne, 1995). It endorsed the need of valuing the environment in making economic decisions and accepted the primacy of ‘market liberalism’ to achieve this (Barns, 1992, p. 201).

The ESD working groups reached conclusion 'that there [are] a large range of actions which would be cost-effective on energy grounds alone, so that additional benefits in greenhouse gas reduction would be free' (Wilkenfeld, Hamilton, & Saddler, 1995, p. 9). These recommendations were articulated to reflect the guiding principles of government's 'no-regrets' approach which is to adopt measures that would be economically beneficial, or at minimum would not incur any financial losses, but at the same time, can reduce GHG emissions (CoA, 1992b). However, such interpretation essentially reflected a very limited understanding of the 'no-regrets' approach to the climate policy problem as it did not consider the full range of non-instrumental values of the environment, other non-climate-related and non-energy-related benefits from greenhouse emissions-reduction measures. This limitation was reflected in the recommendations which only suggested measures that can be implemented through existing settings of institutions and social structures, but did not explore the institutional and structural changes in the relation between the economy and energy that would be required to consider full range of benefits from such measures (Bulkeley, 2000b; Downes, 1996, p.186).

The aim of the consultation process was to build a broad consensus about the possible ways of attaining reconciliation between environmental and economic goals in developing climate policy. However, the way the process selected the issues, participants, and agendas for discussion restricted the manners how such reconciliation was followed (Bulkeley, 2000b; Downes, 1996). The objectivity of the entire ESD consultation process was ultimately put into

question when the participants of the working group were excluded in the drafting of the NGRS (Bulkeley, 2001).

'Economic rationalism': prioritising economic over environmental objectives

Parallel to the ESD consultation process, government also assigned Industry Commission to investigate the potential costs and benefits of cutting GHG emissions across Australian industries. Responding to the brief, the Commission conducted an inquiry based on 'public hearings and submissions from interested parties' (Taplin, 1994, p. 145).

The Commission found that taking unilateral action to comply with the IPT would be costly for Australia and would not serve Australia's national interest, as other countries were unlikely to cooperate on climate actions (Taplin, 1994). It also highlighted the uncertainties surrounding climate change science and based on this argued that Australia should not take action to tackle climate change (Hodgson & Barns, 1998). While the Commission estimated the likely cost of reducing emissions for reaching IPT on the economy would be a 1.5 per cent reduction of national output, it did not quantify the economic costs of not taking action and also conceded that it could not estimate the benefits of climate actions either (Lowe, 1994). Its recommendations starkly contradicted the conclusions of the ESD working group, which found large numbers of 'no-regrets' alternatives available for cutting emissions which would be economical and would not result in net economic loss.

The objectivity of Industry Commission's report is questionable as its recommendations were based on a methodological approach which narrowly

focused only on the sectors which are energy-intensive. In emphasising economic efficiency, it failed to address environmental or sustainability objectives (Taplin, 1994). As a result, in its calculation of the costs and benefits of climate actions, the values of the environment were absent. Moreover, the assumption that carbon tax was the only available market instrument and the appropriate means for reducing greenhouse gas emissions meant alternative means of reducing emissions were excluded from considerations (Kinrade, 1995, pp. 101–103).

The Industry Commission's report markedly diverged from the ESD working group's report in the ways it attempted to address the environment–economy conflict over climate change. While the ESD report attempted to reconcile economic and environmental goals by adhering to the guiding principles of the government's 'no-regrets' approach, in contrast, the Industry Commission's report clearly gave primacy to economic objectives over environmental objectives in considering policy options for reaching IPT. This marked an obvious deviation from the discourse of ecological modern approach to environmental policy-making which was followed in the ESD consultation process. Instead of focusing on possible reconciliation, it emphasised the possible conflict that is likely to occur between the interest of the economy and the concerns for the environment in addressing climate change.

Although both reports came out in late 1991, it is the Industry Commission's report that generated a revealing reaction in the media. A scare campaign was generated against the carbon tax, one of the proposed measures highlighted in the Industry Commission's report as the appropriate means for reduction of

greenhouse gas emissions (Hamilton, 2001). It contributed towards generating illogical fears against climate action within the powerful fossil-fuel industry, which responded with rage to the carbon tax. They started an organised campaign through media and lobbying to object action on climate change. Ultimately, this campaign was successful in securing government's support for their concerns (Christoff, 1998; Kinrade, 1995).

Subsequently, the Industry Commission's report, despite its limitations, significantly contributed to the development of the NGRS (Bulkeley, 2000b), whereas the ESD consultation groups' recommendations were ignored. In the process of drafting the NGRS, the ESD working group members were excluded (McDonald, 2005). Consequently, the final draft for NGRS shared few similarities with the ESD consultation groups' report, with most of the recommendations either undermined or abandoned (Bulkelely, 2000b, 2001; Diesendorf, 2000; Taplin, 1994).

National Greenhouse Response Strategy (NGRS)

The Council of Australian Governments (COAG) adopted NGRS in December 1992. It is considered as the first stage of a developing climate strategy for reaching the IPT (CoA,1992b). In its final form, while the NGRS resembles the findings of the ESD working group's report, yet it markedly differs from the ESD report in the ways it re-interpreted 'no-regrets measures' through some accompanied caveats — reflecting the dominant influence of the Industry Commission's report:

- 'Response measures should be effective in furthering the strategy's goal, and be economically efficient …

> Implementation of such measures would not have any net adverse economic impacts nationally or on Australia's trade competitiveness, in the absence of similar action by major greenhouse-producing countries' (CoA, 1992b, NGRS, Guiding Principles).
>
> - 'Equity considerations should be addressed by ensuring … that any undue burden of adjustment potentially borne by a particular sector or region is recognised and accounted for' (CoA, 1992b, NGRS, Guiding Principles).
> - 'Any social and economic costs of no-regrets measures will be low. First-phase measures will meet equity objectives by causing minimal disruption to the wider community, any single industry sector, or any particular geographic region' (CoA, 1992b, NGRS, Characteristics of Measures).

The ways 'no-regrets measures' were re-interpreted suggests a notable divergence from the ESD working group's interpretation which had acknowledged that 'some industrial decline and closure, and some restructuring, would be necessary to achieve cuts in greenhouse gas emissions but that this would be countered by growth in industry orientated towards energy efficiency and renewable energy' (Taplin, 1996, p. 391).

Adoption of these measures and strategies clearly reflect that a completely different set of principles were followed from that of the ESD working group's report in the formation of the NGRS (Eckersley, 1993). Based on this new set of principles, the NGRS essentially redefined the scales over which the environmental and economic objectives were to be reconciled and explicitly endorsed the interest of the economy over the concerns for the environment in the formation of climate policy.

Despite such controversy surrounding the process of its formation, the NGRS was acknowledged as a positive start in Australia's efforts to develop a national climate change strategy (Bulkeley, 2001). It considered adequate measures to make a start on reducing greenhouse gas emissions — such as improving awareness, updating and sharing information; exploring all possible measures to improve efficiency for the various sectors and removing barriers to implement those; and acknowledging the need of long-term planning for climate change.

However, the implementation of the NGRS proved challenging due to a lack of coordination and absence of clear division of responsibilities between different levels of governments, jurisdictions, and policy areas (NGAP, 1996; Wilkenfeld et al., 1995). This resulted in 'actions taken in the energy and resource sectors ran counter to the NGRS in both principle and practice, despite its focus on these sectors' (Bulkeley, 2001, p. 161; CoA, 1992; Wilkenfeld et al., 1995).

There are widespread criticisms about the effectiveness of the NGRS in attaining any reconciliation between environment and development objectives as the results show that it only maintained the status quo (Taplin, 1996). Indeed, it has been found:

> 'there is no evidence that the NGRS has saved one single tonne of greenhouse gas emissions which would not have been saved in any case for other reasons. In other words, there has been no departure from "business as usual" (Wilkenfeld et al., 1995, p. 4).

4.5.2 Re-interpretation of 'no-regrets' approach

In responding to the growing criticisms about the shortcomings of the NGRS and the failure to implement actions or programs from the NGRS, the government tried to reinvigorate it with the introduction of the *Greenhouse Challenge Program* (GCP). At the same time, it came up with an economic assessment of the probable cost of climate action on the economy to justify its slow progress in climate action and more cautious approach to the international climate negotiations (Bulkeley, 2001; Christoff, 1998; Taplin, 1994). In both cases, government adopted its re-interpretation of 'no-regrets' approach to demonstrate how the concept should be applied in practice.

The Greenhouse Challenge Program (GCP)

The GCP sought to encourage companies and industries voluntarily sign up to implement 'no-regrets' measures for reducing their greenhouse gas emissions in exchange for government's endorsement of their green credentials (CoA, 2005a). Energy and resource-based businesses and large industries, mainly from the oil and gas extraction, mining, electricity generation, and manufacturing sectors, participated in the program (Bulkeley 2001; CoA, 2005b; Hamilton, 2001). The support for the program is attributed to its extended time frame over which financial returns from implementation of energy related efficiency measures were made rewarding, which fitted in well with pre-existing business goals for the participating companies (Bulkeley, 2001; Parker, 1999).

However, the consideration of the GCP as a strategy to reduce greenhouse gas emissions to a scale that could be considered at the national level was

absent as it set the assessment of costs and benefits of the program tightly within the individual company's boundaries. It meant the scales over which values could be weighed to consider economic and environmental objectives of any GHG emission reduction program at the national level had been reduced to the narrow limit of individual companies (Bulkeley, 2001).

The way 'no-regrets' measures were approached in the GCP by narrowing the scale within an individual company's boundaries, and their assessment within a context that mainly considered the monetary costs and benefits of emissions-reduction measures, clearly manifested the primacy of economic objectives over environmental objectives and raised questions about its appropriateness as a strategy to reconcile economic and environmental objectives.

Use of ABARE modelling in estimating economic cost of climate change mitigation

To justify its position, the government came up with an economic modelling conducted by the ABARE. The model attempted to assess the projected impacts of different emissions-reduction situations based on some key indicators representing the well-being of the economy. It suggested that the cost of emissions reduction by 10 per cent below 1990 levels by 2020 would be equivalent to a decrease in GDP growth over several decades, which equates to AUD$9000 per person less compared to the 'business as usual' scenario (ABARE, 1997; Hamilton, 1997a).

However, these figures as well as the methods applied to calculate them are widely disputed (Bulkeley, 2001; McDonald, 2005). The assumptions behind

the modelling were dubious, which led to presenting the costs of reducing emissions unreasonably high by: not considering available inexpensive technologies (such as implementation of various energy efficiency measures and using natural gas for generating electricity); at the same time, disregarding the financial benefits of reducing emissions; and considering use of a carbon tax as the only available option to reduce emissions (Diesendorf, 2000). In addition, instead of selecting a broad range of indicators that would cover the whole economy, the analysis focused on the indicators representing those areas where the economy might experience losses and did not take into account the benefits which might occur to other sectors (Hamilton, 1997b; Tarlo, 1996). Moreover, there was no consideration of the environmental costs and benefits. Overall, the analysis put so much 'emphasis on the incommensurability of economic objectives and environmental values' that the fundamental premise of "no-regrets" principle seemed 'to have disappeared' (Bulkeley, 2001, p. 164; Hamilton, 1997b).

The objectivity of the modelling process was questionable, as it was largely funded by a committee where all the non-government members were from fossil-fuel and resource industries, which included very large greenhouse gas emitters (Hamilton, 2001). This was evident when, in responding to a submission by the Australian Conservation Foundation for investigation, the Commonwealth Ombudsman observed that the ABARE's modelling process was unduly influenced by the industry (Bulkeley, 2001; Commonwealth Ombudsman, 1998).

4.5.3 Review of NGRS and redefining 'no-regrets'

In 1994 the government established the *National Greenhouse Advisory Panel* (NGAP) to review Australia's national climate policy. As part of this a major review of the NGRS was undertaken during 1996–1997. The process involved consultations with relevant government agencies, stakeholders, and the public. Like the ESD consultation process, the NGAP followed a similar multi-interest deliberative format in conducting this review (NGAP, 1996). In its appraisal of the NGRS, NGAP identified that 'lack of clearly assigned responsibilities and confusion surrounding the form that no-regrets actions should take' acted as a significant obstacle to advancement in emissions reduction (Bulkeley, 2001, p. 164). It explained how the absence of a clear definition of the term 'no-regrets' permitted the term to be interpreted inconsistently:

> 'No-regrets has in many cases been interpreted as no losers, and greenhouse reduction measures with demonstrated national economic benefits have been deferred or diluted because some industries or interest groups have perceived themselves to be losers. In those cases where this perception is justified more attention needs to be paid to mechanisms which redistribute benefits between 'winners' and 'losers'. In no other area of public policy does such a restriction apply; instead, governments are obliged to weigh up the overall public benefit in their decision-making' (NGAP, 1996, p. 53).

To address these shortcomings in the NGRS, the NGAP attempted to re-define no-regrets by shifting its focus outside the limits and financial concerns of particular businesses or industries in the short-term to the broader benefits

to the wider community in the long-term. This was reflected in the NGAP's draft discussion document as part of the 1996–1997 review of the NGRS:

> 'A no-regrets measure is one which has financial, social and environmental benefits to the community at large, in addition to reducing greenhouse gas emissions, and these benefits over time are sufficient to outweigh the direct and indirect costs of the measure' (ICESD, 1997, p. 7).

Subsequently, this re-definition of no-regrets influenced the formulation of the *National Greenhouse Strategy* (NGS), which is reflected in one of its guiding principles:

> 'Pursuit of greenhouse action consistent with equity and cost-effectiveness and with multiple benefits [which]:
>
> - Focus on approaches which have financial, social and environmental benefits to the community. These measures will reduce greenhouse gas emissions and over time outweigh the direct and indirect costs associated with their implementation. Within this framework costs and benefits are considered:
>
> - from a community rather than an individual perspective, though individual impacts need to be recognised and equity considerations addressed
> - over all time frames, including the short, medium and long term
>
> - Recognise the need for equity by ensuring that any undue burden borne by a particular sector or region is taken into account in the development and implementation of measures' (CoA, 1998, p. 3).

Despite such attempts of re-defining no-regrets to bring the environmental objectives back into the formulation of climate policy and consider broader economic, environmental and social benefits of GHG emission reduction

measures, and the long-term gains; it has been observed that ‘tensions remain between taking a national or international long-term perspective and ensuring that specific sectors and regions do not bear too high a cost’ in the policy process (Bulkeley, 2001, pp. 164, 165).

Since its inception through the ESD consultation process, the concept of ‘no-regrets’ approach in Australia’s climate policy discourses has repeatedly been re-interpreted. Instead of using it to define an unified policy response to climate change, the term ‘no-regrets’ has continually been entangled in disagreements about what measures should constitute ‘no-regrets’ and how ‘no-regrets’ could, and should, be applied to reconcile between economic and environmental objectives in implementing such measures. Without resolving these disagreements government adopted an essentially narrow re-interpretation of no-regrets through the review of the NGRS by the NGAP and the enactment of the NGS has ultimately marginalised possible alternative conceptions of the climate problem.

4.6 Australia’s present climate change policy settings

Over the past decade, in the course of developing a national policy response to climate change Australia has been facing challenges in terms of, on the one hand, balancing tensions between the economy and the environment and, on the other, sharing responsibilities and rights between different tiers of government. The factors that have influenced the development of the Australian narrative on climate change and the government’s climate policy

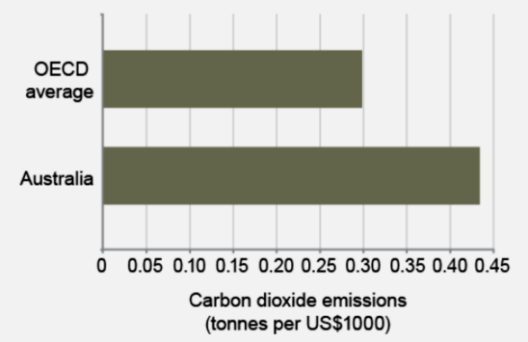
discourse were discussed in detail earlier in this chapter. This section focuses on the present national and sub-national climate policy settings in Australia. It particularly focuses on assessing national and NSW state government policies and legislation that relate to NSW local government's role in addressing climate change.

4.6.1 Australia's greenhouse gas emissions

Australia's annual 'GHG emissions in 2015 were 541 megatonnes (Mt) of carbon dioxide equivalent[9] ($MtCO_2$-e)' (CoA, 2016, p. 8). While compared with major emitters like China (estimated at 10,756 $MtCO_2$-e, in 2010) and the United States of America (estimated at 5,791 $MtCO_2$-e in 2013) (UNFCCC [United Nations Framework Convention on Climate Change], 2014) this appears insignificant, 'Australia's emissions are some of the most 'intense' in the world. Per person, Australia's CO_2 emissions in 2013 were the second-largest among the Organisation for Economic Cooperation and Development (OECD) countries – 16.8 tonnes, which is 75 per cent higher than the OECD average of 9.6 tonnes' (see Figures 4.2a, 4.2b and 4.2c) (CoA, 2016, p. 8; IEA [International Energy Agency], 2014, 2015; OECD, 2015). From this it is evident that Australia is 'one of the highest per capita emitters of greenhouse gases in the world' (IEA, 2011, pp. 97–99).

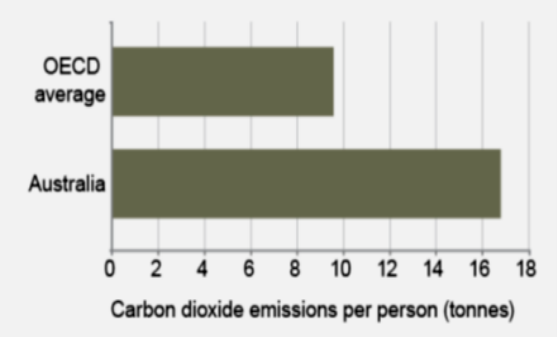
[9] 'Carbon dioxide equivalent (CO_2-e) is a term for describing different GHGs using a common unit. For any quantity and type of GHG, CO_2-e signifies the amount of carbon dioxide that would have the equivalent global-warming impact' (CoA, 2016, p. 8).

Figure 4.2a: Carbon dioxide emissions per US$1000, 2013



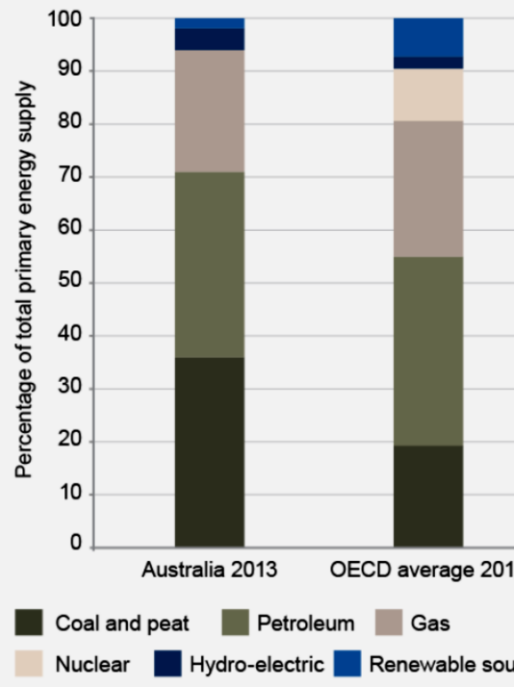
Source: CoA, 2016, p. 10

Figure 4.2b: Carbon dioxide emissions per person, 2013



Source: CoA, 2016, p. 8

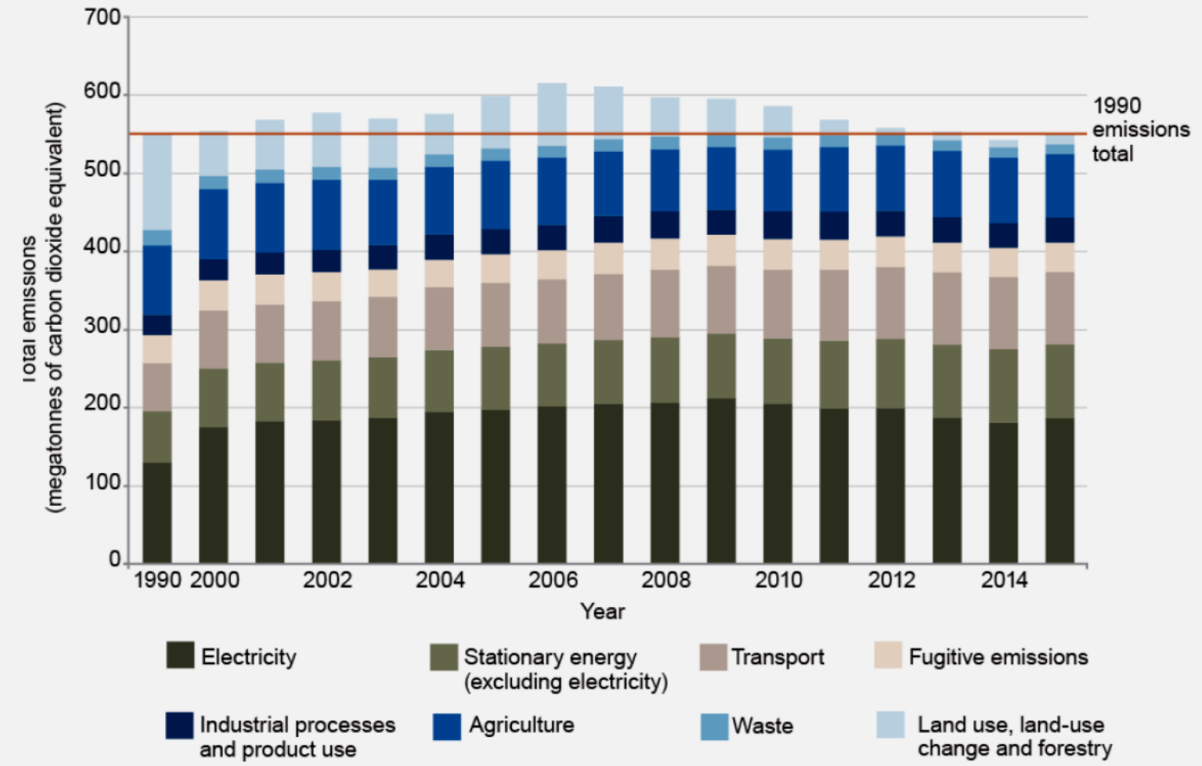
Figure 4.2c: Fuel mix contributing to total primary energy supply, Australia (2013) and OECD average (2014)



Source: CoA, 2016, p. 10

The data in the figures above reflect that Australia is heavily dependent on fossil-fuel based energy sources and, particularly, it relies mainly on coal for electricity generation. The energy sector is the main source of GHG emissions, which contributed 76 per cent of Australia's net emissions in 2015 — of these emissions 52 per cent come from electricity generation and 17 per cent from transport (CoA, 2015b, c) — see Figure 4.3.

Figure 4.3: Australia's net greenhouse gas emissions by sector, United Nations Framework Convention on Climate Change accounting, 1990 and 2000–2015



Source: CoA, 2016, p. 13

4.6.2 Australia's commitments to the Paris Agreement

Australia has committed to work with other countries towards reducing greenhouse gas 'emissions to levels consistent with limiting global warming to less than 2 degrees Celsius above pre-industrial levels' (CoA, 2015a, p. 1). To this end, the Commonwealth Government endorsed 2015 Paris Agreement on 10 November 2016. Australia has committed 'to reduce its GHG emissions by 26 to 28 per cent on 2005 levels by 2030 as its INDC (intended nationally determined contribution) to the Paris Agreement. This equates to projected cuts of 50 to 52 per cent in terms of per capita emissions by 2030 and a 64 to

65 per cent decrease in the intensity of emissions across the economy between 2005 and 2030' (CoA, 2015a, pp. 1-3).

Compared with other countries Australia's target of reducing 26 to 28 per cent of its emissions puts Australia close to the bottom of the group of similar countries with comparable developed economies (refer Table 4.2).

Table 4.2: Comparison of Australia's 2030 targets with other developed countries (CCA, 2016, p. 34)

Countries	Change from 2005
United Kingdom	-61%
Switzerland	-51%
Germany	-45%
Norway	-44.5%
European Union (EU)	-34%
Canada	-30%
New Zealand	-30%
Australia	**-26 to 28%**
Japan	-25%
China	+72 to 96%
Republic of Korea	+1 to -5%

Source: Royal Norwegian Embassy; Historical emissions: Australia 2014–15 Projections (CoA, 2015a); China and Korea: (WRI, 2014); Remaining countries: (UNFCCC, 2014); China GDP: OECD, 2014

The Climate Change Authority (CCA) — an independent, statutory advisory body of the Australian Government on climate policy matters — observed that the amount of GHG emissions reduction committed within the government's INDC is substantially weaker than the CCA's recommended 'target of 30 per cent reduction below 2000 levels by 2025' (CCA, 2015, pp. 1-2). The CCA further observed that 'measured against the reductions in global emissions required to deliver a reasonable chance of limiting global warming to 2 degrees' and based on current targets, 'Australia is likely to slip further behind the efforts being made by comparable countries and is likely to face large catch-up adjustments in later years' (CCA, 2015, pp. 2-3).

4.6.3 National climate policy settings

From 2011, Australian governments started implementing policies to lower Australia's GHG emissions. The current Commonwealth Government has endorsed a policy framework known as the Direct Action Plan (DAP) under which there are various policies and programs in place to meet its targets committed to the Paris Agreement. The main components of the DAP include Emissions Reduction Fund (ERF) and the Safeguard Mechanism. The ERF is aimed at a target of reducing 5 per cent of Australia's total GHG emissions below 2000 levels by 2020. In addition, to support ERF there is the Renewable Energy Target (RET) program which has a target of supplying 23.5 per cent of Australia's total energy needs from renewable sources by 2020 (DoE&E, 2017a). Both targets are bipartisan — that is, they are supported by both the Australian Labor Party (ALP) and the current Liberal–National Party (LNP) Coalition Government — and represent the equivalent of a 19 per cent reduction in GHG emissions against business-as-usual levels in 2020 (Nachmany et al., 2014).

Apart from the ERF, the Safeguard Mechanism, and the RET, other sector-specific initiatives are: The National Energy Productivity Plan (NEPP), the Clean Energy Innovation Support, the Carbon Neutral Program, Solar Communities Program (SCP), Energy Efficiency Regulations and Standards (EERS), and Energy Efficiency Labelling (EEL). All these policies are summarised in Table 4.3, with further details discussed in the following paragraphs.

Table 4.3: Overview of the Australian Government's main emissions-reduction policies

Policy	Coverage	Details	Estimated Emission Reduction
Emissions Reduction Fund (ERF) (crediting/ purchasing)	All sectors	'Voluntary scheme where the government issues or buys emissions-reduction credits from eligible projects' (CCA, 2016, p. 45). https://www.environment.gov.au/climate-change/emissions-reduction-fund	'189 Mt CO_2-e of emissions reductions contracted in auctions held as of 16 November 2017' (CCA, 2017, p. 18)
Safeguard Mechanism	Covers facilities emitting over 100,000 ton CO_2-e per year	'Regulation that requires covered facilities to stay below specified baseline emissions levels. Up to 370 facilities are covered by the safeguard mechanism' (CCA, 2016, p. 45; CER, 2016c). https://www.environment.gov.au/climate-change/emissions-reduction-fund/about/safeguard-mechanism	Safeguard started 1 July 2016
Renewable Energy Target (RET)	Covers electricity sector	'Technology pull' scheme that requires liable entities to buy renewable energy certificates. The scheme supports large-scale and small-scale renewable energy generation' (CCA, 2016, p. 45). https://www.environment.gov.au/climate-change/renewable-energy-target-scheme	'RET is projected to reduce emissions by about 200 Mt CO_2-e (cumulatively) between 2015 and 2030' (CCA, 2016, p. 45 - CCA calculation based on ACIL Allen Consulting, 2014).
National Energy Productivity Plan (NEPP)	All sectors	'A framework and economy-wide work plan to improve Australia's energy productivity by 2030 and reduce emissions' (CCA, 2016, p. 46). https://www.environment.gov.au/energy/national-energy-productivity-plan	Not available
Clean energy innovation support	National	Clean Energy Finance Corporation (CEFC): 'Innovation support through government corporation that co-finances and invests in renewable energy and energy efficiency projects and technologies' (CCA,	Projects under CEFC portfolio (as of 30 June 2015) achieved 77 Mt CO_2-e of emissions reductions over their lifetime (CEFC, 2015). Attributing reductions

Policy	Coverage	Details	Estimated Emission Reduction
		2016, p. 47). http://www.cleanenergyfinancecorp.com.au/ Australian Renewable Energy Agency (ARENA): 'Provides innovation support for renewable energy activities including research and development funding' (CCA, 2016, p. 47). https://arena.gov.au/about-arena/	'here is complex as the national RET is an important policy driver for many CEFC projects' (CCA, 2016, p. 47).
Carbon Neutral Program	National	'A voluntary scheme that certifies products, business operations and events as carbon neutral against the National Carbon Offset Standard' (CCA, 2016, p. 46). http://www.environment.gov.au/climate-change/carbon-neutral	'Estimated to offset about 1 Mt CO_2-e per year' (CCA, 2016, p. 46; Hunt, 2015)
Solar Communities	Local	Support local responses to climate change through financing community groups for installing solar panels on rooftops, solar hot water systems, and solar-connected battery systems in community-owned buildings.	Not available
Energy efficiency regulations and standards	National Applies to electrical goods, and building construction	Setting regulations specifying minimum standards of energy performance for electrical equipment, lighting and appliances (CCA, 2016, p. 46). Inclusion of regulations in the National Construction Code requiring buildings to adopt measures to attain specific energy efficiency standards (CCA, 2016, p. 46).	The Greenhouse and Energy Minimum Standards program is estimated to cut emissions by 60 to 70 Mt CO2-e between 2014 and 2020 (Databuild, 2015).
Energy efficiency labelling	National	Program requiring manufacturers to put labels on appliances displaying information about energy performance based on approved energy-rating (CCA, 2016, p. 46).	See above.

Sources: Collated from ACIL Allen Consulting, 2014; CCA, 2016; CCA, 2017; Databuild, 2015; DoE&E, 2017a; CEFC, 2015; Hunt, 2015

The ERF is the main component of the Direct Action Plan, which is a voluntary emissions-reduction offsets scheme. It relies on a voluntary purchasing and crediting mechanism through which the government purchases emission reductions from qualified projects via competitive auctions. The Safeguard Mechanism is a controlling measure designed to prevent any increase in emissions from elsewhere in the economy do not cancel out emission reductions achieved from ERF purchasing (CCA, 2016, p. 48). Since its inception, 'as of 16 November 2017, the ERF has contracted to buy 189 million tonnes of future emissions reductions at a cost of AUD$2.23 billion' (CCA, 2017, pp. 18-19).

The RET is an enacted policy which encourages both large- and small-scale projects for generating renewable energy and remains a major component of Australia's emissions-reduction policy. It is anticipated to 'deliver around 200 million tonnes of emissions reductions over the period from 2015 to 2030' (ACIL Allen Consulting, 2014; CCA, 2016, p. 45).

While attributing emissions reductions separately to these various programs is difficult, 'as other policies are often the main driver', the projects in 'government's portfolio are projected to achieve around 77 million tonnes of reductions over their lifetime' (CEFC, 2015; CCA, 2016, pp. 47). The EERS and the EEL program, through establishing energy-efficiency standards and labelling for appliances and lighting, are projected to decrease emissions around 60 to 70 million tonnes between 2014 and 2020 (Databuild, 2015).

Impact of present policies on long-term emissions reduction

There are many factors that influence Australia's greenhouse gas emission levels that are beyond the scope of the Australian Government's current set of climate policies. These factors include growth of the economy, change in global trade, development of technologies, and social developments. The interactions between these factors are complex and their effects cannot be anticipated with certainty, which makes projecting Australia's future emissions challenging. This is particularly so given the frequent changes of direction in climate policy in Australia in recent years. In such a varying policy framework, it is difficult to evaluate the effectiveness of Australia's current set of climate policies, specifically over the time scales necessary for climate policy analysis.

At present there is uncertainty as to whether the Commonwealth Government's current climate policy settings provide an appropriate framework for meeting the 2030 emissions target. Government's recent forecasts indicate that Australia's GHG emissions likely to rise in the next few years. New data[10] has confirmed that Australia's GHG emissions are rising with longer-term projections also showing that carbon pollution is set to rise by 3.5 per cent between 2020 and 2030 without significant intervention (DoE&E, 2017c). This raises concerns about the credibility of the government's claim

[10] http://www.environment.gov.au/climate-change/publications/emissions-projections-2017

that current climate policies will meet the Paris targets (see section 4.2.3 for details).

Such growth in emissions would likely to make meeting Australia's INDC commitment a challenging task and greater efforts will be required for achieving goals beyond its current Paris INDC to drive a steady transformation that will fully decarbonise its economy (Hatfield-Dodds et al., 2015).

Review of national climate change policies

Responding to this concern, the Australian Government conducted a review of its climate policies in February 2017. The process involved consultation with stakeholders from businesses and industries in all economic sectors of the country and the community. As part of the consultation process a discussion paper was released, which drew over 350 public submissions.[11] These have been published on Department of the Environment and Energy's website. The outcome of the review was published as *2017 Review of Climate Change Policies*[12] (DoE&E, 2017a). The review acknowledges the need of updating climate policies in order to keep pace with advancements in climate responsive technologies and developments in international climate negotiations and has suggested six areas for change. These are summarised in Table 4.4, with further details discussed in the following section.

[11] http://www.environment.gov.au/climate-change/review-climate-change-policies/discussion-paper-2017

[12] http://www.environment.gov.au/system/files/resources/18690271-59ac-43c8-aee1-92d930141f54/files/2017-review-of-climate-change-policies.pdf

Table 4.4: Outcome of the 2017 Climate Policy Review

Suggested actions	Description of policy measures
1. **Introduce a 'review and refine' cycle**	'Introduction of domestic policy 'review and refine' cycles with the five-yearly review process under the Paris Agreement would allow policies and goals to be considered and renewed as each yearly update is complete. This approach will provide for integrated consideration of domestic policy and international targets and provide guidance for industry about future policy review processes.' (DoE&E, 2017b, p. 41)
2. **Examine electricity generation**	'Consultation with stakeholders over the National Energy Guarantee (NEG) scheme, and COAG's energy council using feedback to consider the best design and implementation methods to reach emission reductions. The NEG scheme requires energy retailers and big polluters to commit to a reliability guarantee, which is expected to commence from 2019, and an emissions guarantee, which is due in 2020.' (DoE&E, 2017b, p. 41)
3. **Change the Safeguard Mechanism**	'The Safeguard Mechanism allows the biggest business polluters to measure, report and manage their emissions, with the Clean Energy Regulator setting the baseline, often off historical data. The government should move to keep baselines up to date and reflective of 'individual business circumstances' with changes due to take effect for the 2018–19 financial year.' (DoE&E, 2017b, pp. 41, 42 & 43)
4. **Trade international units**	'The government should allow companies to offset their carbon emissions by buying international permits subject to a global system being finalised after 2020.' (DoE&E, 2017b, pp. 43, 44)
5. **Review the transport sector**	'Measures to support a low-carbon transport sector have been considered, including a potential fuel-efficiency standard for cars. This could save motorists $237 to $519 per year in 2025 for fuel, and net benefits to the economy could range from $8 billion to $13.9 billion over 20 years.' (DoE&E, 2017b, pp. 44, 45)
6. **Plan a long-term climate change strategy**	'The government should consult the public and experts to develop long-term goals for emission reduction to be completed by 2020.' (DoE&E, 2017b, pp. 45)

Source: DoE&E, 2017b

While this result was widely anticipated by analysts across the Australian energy and climate policy fields, both the terms of reference[13] for the review and the discussion paper[14] limited its scope and lowered expectations. As expected, the final report does not come up with any breakthrough policy recommendations. The document restates Australia's commitment to the Paris Agreement and reiterates the Australian Government's target of cutting 26 to 28 per cent of its emissions below 2005 level by 2030, but there are no further promises. While it observes that various policies are currently in place in different sectors, it fails to critically evaluate existing policies or provide replacements for those judged to be ineffective.

As generation of electricity is the single source of large scale GHG emissions in Australia, amounting 34 per cent of Australia's total emissions, the review's main focus is on electricity. However, it does not make it clear what will happen to the remaining 66 per cent of emissions and whether current policies are capable of delivering the required emission reductions throughout rest of the economy to meet the target committed in the Paris Agreement.

The review indicates the possibility of expanding emissions reduction beyond the electricity sector. In transport sector, it considers introducing a minimum standard of fuel-efficiency for light-vehicles. In the built environment, it also

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[13] http://www.environment.gov.au/system/files/pages/64722841-01ab-4067-a978-40d63174d4c7/files/tor-climate-change-review.pdf

[14] http://www.environment.gov.au/system/files/consultations/dcb346e1-f0c0-4ba4-aa83-047c062b4bbc/files/discussion-paper-review-of-climate-change-policies-2017.pdf

suggests specifying standards of energy-performance for commercial buildings. In addition, the review also considers the possibility of arranging additional funding for the Emissions Reduction Fund, which would provide economic incentives for organisations as well as individuals to cut their emissions. However, the review does not make any promise in this regard.

The analysts observe that the main outcome of this review is the government's commitment to undertake more consultation and reviews, the key one being developing an all-encompassing long-term, economy-wide, emissions-reduction strategy for 2050 by 2020 (Griffiths, 2017; Hayes, 2017; Irlam, 2017).

Absence of specific programs and support for local government

A strong criticism raised by most local governments throughout Australia in their submissions to the *2017 Climate Policy Review* is the absence of suitable programs, funding, and regulatory support for local governments in the Commonwealth Government's current set of climates polices. While councils are eligible to apply for funding under the government's ERF, most councils are unable to meet the ERF's strict minimum emissions-reduction threshold and 'reverse-auction' mechanism, which is considered too costly and complex for councils.

In the past, there were Australian Government programs such as Greenhouse Friendly, the Low Carbon Communities Package, the Community Energy Efficiency Program (CEEP), and Carbon Firming Initiative (CFI), which have been critical in helping councils achieve significant emissions reductions. Projects have included building/facility energy-efficiency improvement,

renewable energy, street-lighting improvements, and waste-management activities. Councils have received critical funding from the federal government through these programs over the past decade, which has helped councils to support the significant administrative component of the costs in running those programs in competition with internal resource demands. In contrast, participation in the ERF through the 'reverse auction' process has meant that no upfront capital is available for local government to make investment in relatively short contracts of five years in large, capital-intensive projects with longer payback periods as the ERF demands.

4.7 State and territory governments' climate-policy settings

While an overarching climate change strategy combining a range of policies, plans and programs at the national level is essential, if Australia is to succeed in climate action, it is also imperative that other levels of government play their part in the national initiative and that their actions are coordinated effectively with those of the Australian Government.

Australian state (and territory) governments have been playing important roles in developing and implementing climate change policies. In 2003, the NSW Government introduced its first market-based emission reduction program — the Greenhouse Gas Reduction Scheme (GGRS)[15] — which is recognised as

[15] https://www.ess.nsw.gov.au/ESS_Notices_and_Updates/Updates/20121_NSW_Greenhouse_Gas_Reduction_Scheme

the first mandatory carbon market in the world. Initially, state governments led energy efficiency and renewable energy policies acted as the main drivers for national climate policy development. However, this scenario started to change amidst recent political and policy turmoil surrounding climate change which has seen gradual withdrawal of state governments from such initiatives; for example, the introduction of national carbon pollution limits and pricing under the *Clean Energy Future Act* was used as an argument to remove many state-based policies (IPART [Independent Pricing and Regulatory Tribunal], 2013). The government's such move was found to be premature due to the subsequent repeal of the legislation. Climate policy initiatives suffered further setback when federal government decided to withdraw from other national climate and energy policies. This has created an opportunity for state governments to again take a more active part in Australia's emissions-reduction efforts (The Climate Institute, 2014).

4.7.1 NSW Government's climate-policy settings

Amid such shifting policy settings, the NSW Office of Environment and Heritage released the *NSW Climate Policy Framework*[16] in November 2016. The purpose of the framework is to 'maximise the economic, social and environmental wellbeing of NSW in the context of a changing climate, and current and emerging international and national policy settings and actions to

[16] http://www.environment.nsw.gov.au/research-and-publications/publications-search/nsw-climate-change-policy-framework

address climate change' (OE&H [Office of Environment and Heritage], 2016a, p. 2). The framework:

- 'defines the NSW Government's role in reducing carbon emissions and adapting to the impacts of climate change;
- sets policy directions to guide implementation of the framework;
- commits NSW to achieving aspirational long-term objectives of net-zero emissions by 2050 and to help NSW become more resilient to a changing climate; and
- sets out the next steps for implementation' (OE&H, 2016a, p. 2).

While the proposed framework has not provided any detail about the specific measures to be undertaken to meet this target yet, it provides some 'directions' to reduce emissions. As part of implementing the framework, NSW Government has released the *Climate Change Fund Draft Strategic Plan.*[17] (OE&H, 2016b). This draft plan outlines priority areas for investment and possible measures. For this up to $500 million will be allocated from the Climate Change Fund throughout next five years. Three priority areas for investment have been identified in the plan based on which detail plans for actions will be developed in the future:

- speeding up development of advanced energy ($200 m);
- state leadership in improving energy efficiency ($200 m); and
- preparation for a changing climate ($100 m) (OE&H, 2016b).

[17] http://www.environment.nsw.gov.au/resources/climatechange/EnvironmentalfuturefundingpackageDraft-climate-change-fund-strategic-plan-20160438.pdf

The framework also includes a '*Draft Plan to Save NSW Energy and Money',*[18] which considers number of options for achieving the energy-savings target of the NSW Government and support businesses and households to save money (OE&H, 2016c).

The government will invest up to $200 million in energy efficiency. The 500 largest energy users consume 30 per cent of NSW electricity. Targeted reductions for these users will be a key focus of the energy-efficiency target. On a smaller scale, new homes will be subject to the Building Sustainability Index target to integrate their efficiency capacity into design in anticipation of climate change. An energy-efficient appliance standard will also be introduced, which will require cross-jurisdictional cooperation. Together, the overall plan for energy efficiency is expected to save 16,000 GWh annually by 2020. There will be a focus on working with heavy industries to determine the degree of reduction possible. This will include enhancing NSW business access to the Commonwealth's Emissions Reduction Fund.

Renewable energy will be incentivised in the state by creating price guarantees for new projects through the contracts for different programs, which will be executed through a competitive tendering process. There will be inter-body cooperation in the development of renewable energy management processes. These projects will filter down to local government and communities who will be able to own, buy, and trade community energy, with

[18] http://www.environment.nsw.gov.au/resources/climatechange/Environmentalfuturefundingpackage/a-draft-plan-to-save-energy-money-160642.pdf

the eventual objective of building the capacity of communities to anticipate the challenges of climate change and be resilient.

Government policy will provide support for innovation in providing clean, reliable energy. This will involve partnership and co-design between community and local council as well as government investment in supporting start-up investment. Innovation will be supported by a stable policy environment creating investment certainty for emerging technologies.

The final aspect in regard to accelerating more efficient energy sources is improving motor vehicle productivity. This will require advocating for ambitious fuel-efficiency standards, providing incentives for very efficient light vehicles and investigating public electric-vehicle fleets and public-charging infrastructure. Practical outputs of these plans include an incentive scheme targeting commercial fleet managers by encouraging super-efficient vehicles and charging infrastructure through partnering with car manufacturers.

4.7.2 Collaborative approach to climate change action

The *NSW Climate Change Policy Framework* appears to reflect global and domestic commitments to climate-change mitigation by engaging communities, business, and local government. The framework is structured around a feedback system that intends to connect governments, communities, and business to achieve the ultimate goal of net-zero emissions by 2050. Investment will focus on local capacity building, incentivising innovation and industry consciousness of energy efficiency and accountability. The policy

analysts observe that the proposed grassroots collaborative approach to climate action reflects the structure of the Paris Agreement, and is considered a positive shift that rejects the traditional administrative top-down approach to climate-change action. Rather, it recognises that the sustainability of outcomes is best reached by community participation throughout the entire process.

4.7.3 Explicit intention to capture the co-benefits of reducing emissions

There is also an explicit intention in the framework to capture other benefits from cutting GHG emissions, for example, improved health from reduction in air pollution. It suggests including a selection criterion that requires any grants or schemes set up under the Climate Change Fund to consider the holistic benefits of projects. This is to encourage that projects planned to achieve multiple outcomes get priority over projects that are focussed on single outcome. For example, a local government project with moderate energy savings but with other identified environmental and social co-benefits may have greater impact (i.e. achieving public benefits) and thus more desirable than a large-scale commercial project focusing on only higher energy savings. This shift in government's perspective to consider wider benefits of climate policy measures certainly represents a welcome progress and is likely to provide a basis to pay attention to climate co-benefits in NSW's climate policy measures.

4.7.4 Balanced approach to both the supply and demand side of the energy market

Australia's climate policy development is essentially dependent upon the policy development in its energy sector. Over the last decade, its climate policy debate has almost exclusively been centred on the issues related to supply side of the energy market. Particularly, it focused on the comparative advantages of using coal against different forms of renewable sources for energy generation. Experts observe that managing an effective transformation of Australia's energy system would require more than focusing on how energy is generated. They suggest that it needs a more comprehensive approach that also considers the demand side of the energy market — that is the way we currently use energy. To effectively manage this transformation, the experts expect that there should be a balanced and integrated approach to ramping up investment in renewable energy on the one side, and energy-efficiency and energy-demand management on the other (Menzel, 2016). In that respect, observers consider the NSW Climate Change Policy Framework is a necessary step in the right direction as it adopts a balanced approach by focusing both on the supply-side and the demand-side of the energy market.

4.8 Conclusion

From the very beginning, how to reconcile the interests of economy and concerns for the environment has remained an unresolved issue in the discourses surrounding the development of Australia's national climate policy. The discussion presented in this chapter has shown, attaining such

reconciliation has proven extremely difficult as there is persistent disagreement about the time and spatial scales over which costs and benefits of climate change policies need to be assessed, shared and distributed. This disagreement first emerged during the consultations of the Ecologically Sustainable Development (ESD) process. The ESD was initiated to develop a broad climate change strategy to avoid the economy-environment disputes that pervade environmental policy-making in Australia.

The ESD consultation process attempted this reconciliation through adopting a modern, ecological approach which tried to bring the environment into the economy by valuing the environment into economic decisions. In the process, it introduced 'no-regrets' approach as a driving principle for developing climate policy.

During the consultation phase, the 'no-regrets' approach appeared promising as it was broadly conceptualised to consider all possible policy options that could reconcile the goals of economy and environment. It recommended that the implementing costs and resulting benefits of climate policies need to be unevenly spread across different regions and economic sectors of the country. However, later disagreement emerged about what measures would constitute 'no-regrets' and what time and spatial scales need to be considered when evaluating the costs and benefits of such measures.

Over time, a narrative has become dominant in Australia's climate policy discourse that explicitly advocates the primacy of economic concerns over environmental values and progressively narrowed the scales over which the

costs and benefits of no-regrets measures are to be assessed. In its re-interpretation of 'no-regrets', the narrative asserts that any climate policy measure must not cause any unequal financial load on any specific economic sector or region of the country. In addition, it suggests any costs incurred by industries in implementing GHG emission-reduction measures should be evaluated on an individual case-by-case basis. Such narrow re-interpretation of the 'no-regrets' concept, ultimately dictated the development of Australia's national climate policy in the following ways:

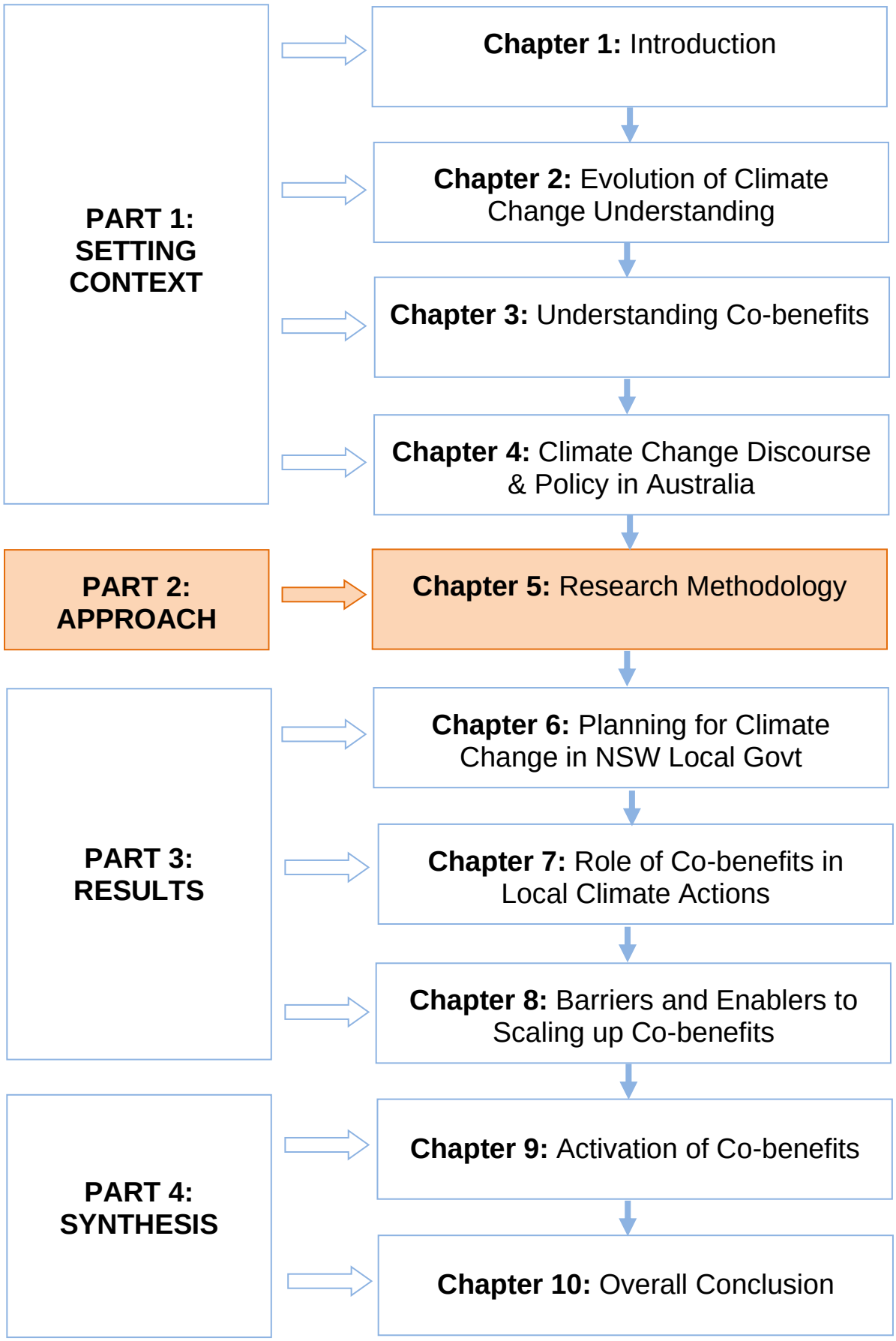
i) Climate policy actions with proven overall national economic, environmental, and social benefits were not considered on the grounds that the costs of implementing such measures would be more for certain sectors of the economy and industries than others.
ii) Instead of weighing up the overall public benefit of implementing economy-wide and long-term policy measures and exploring appropriate mechanisms that could redistribute the resulting benefits evenly across different sectors of the economy and the wider community, actions that are only financially effective in short-term have been implemented - mainly within energy sector of the economy.
iii) While clear emphasis was given to the economic interests, the values concerning environment are hardly taken into account and remain marginal in the policy process.

This dominance of economic considerations in framing climate change into an economic problem has grown to such an extent that any climate policy measure is now predominantly assessed based on short-term economic

interests without taking into consideration the long-term environmental and social benefits to be gained from climate action.

Attempts were made to challenge this dominant economic interpretation of 'no-regrets' by shifting its focus from the economy and industries to broader community and from temporal referent of short term in the present to the long term in the future. However, again the scope of such attempts was limited as these were essentially pursued by managing the energy demand through increasing efficiency and stretching the temporal dimensions based on which costs and benefits of such measures are calculated. This had limited impact as it tried to justify climate action by articulating values of mitigating climate change based on financial valuation and level of efficiency without requiring any structural change in the relation between energy and economy (Buttel, 2000; Bulkeley, 2001; Curran, 2007). While this re-defining of no-regrets helped to reach short-term compromises in reconciling economic goals and environmental objectives, it failed to make any significant impact on the development of a stable and effective climate change policy in Australia.

With this understanding of the Australian climate policy context, in the next chapter a methodological framework will be developed to explore the application of the co-benefits concept in Australian local government context.


PART 1: SETTING CONTEXT
Chapter 1: Introduction
Chapter 2: Evolution of Climate Change Understanding
Chapter 3: Understanding Co-benefits
Chapter 4: Climate Change Discourse & Policy in Australia
PART 2: APPROACH
Chapter 5: Research Methodology
PART 3: RESULTS
Chapter 6: Planning for Climate Change in NSW Local Govt
Chapter 7: Role of Co-benefits in Local Climate Actions
Chapter 8: Barriers and Enablers to Scaling up Co-benefits
PART 4: SYNTHESIS
Chapter 9: Activation of Co-benefits
Chapter 10: Overall Conclusion

CHAPTER 5: RESEARCH METHODOLOGY

5.1 Introduction

This chapter outlines the methodology developed for conducting this research. It clarifies the theoretical framework underpinning this thesis, outlines the methodological approach, the research design and the strategy adopted to investigate the research questions, and describes the methods of data collection and subsequent analysis of the data.

First, the interdisciplinary nature of this research is considered and the theoretical framework and rationale behind the selection of methods are clarified (section 5.2). Then the methodological approach and the research strategy adopted are explained (section 5.3), and the study region is defined (section 5.4). The study design, the methods of data collection employed (section 5.5), and ethical considerations are discussed (section 5.6). Finally, the specific approach to analysing and interpreting the quantitative and qualitative data in combination, from the primary as well as the secondary sources used within this thesis, is explained (section 5.7).

5.2 Theoretical framework

This thesis spans across several discipline-content areas such as climate change, planning, and built environment. The interdisciplinary nature of this thesis warrants that an interdisciplinary approach is selected for this study, one

that can cross the traditional boundaries between sub-disciplines and between the natural sciences and social sciences. The review of the published literature revealed that the most critical issue for interdisciplinary research is developing its own appropriate theoretical and methodological framework which can overcome the qualitative-quantitative research divide. It has been argued that this divide constitutes a major barrier for interdisciplinary cooperation particularly in research related to climate change (Jahn, Bergmann, & Keil, 2012; Strang, 2009).

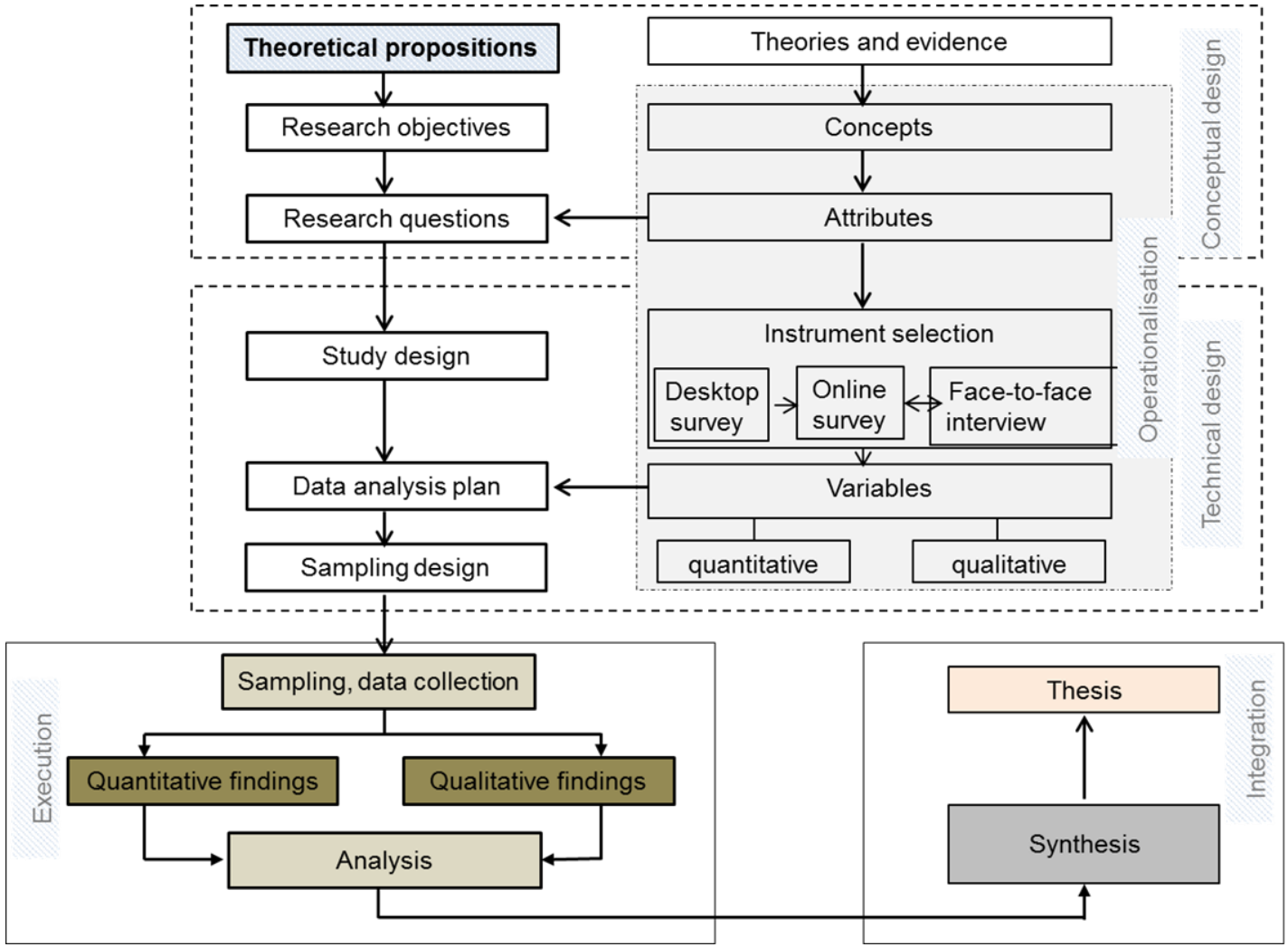
Taking into consideration the interdisciplinary nature of this thesis, this research embraces a mixed-methods approach which draws upon the strengths and perspectives of both qualitative and quantitative methods (Johnson & Onquegbuzie, 2004) and can be viewed as:

> 'An approach to research in the social, behavioural, and health sciences in which the investigator gathers both quantitative (close-ended) and qualitative (open-ended) data, integrates the two, and then draws interpretations based on the combined strengths of both sets of data to understand research problems.' (Creswell & Creswell, 2017, p. 2).

The review of the available literature suggests that a growing number of researchers use the mixed-methods research. This is because, when contrasted with using a solely quantitative or solely qualitative method, using mixed-methods research helps them to gain a deeper, broader understanding of a phenomenon (Creswell & Plano Clark, 2007; Dunning, Williams, Abonyi, & Crooks, 2008).

The combination of adopting qualitative and quantitative research methods will be particularly helpful to handle the twofold complexity of co-benefits issues related to climate change and urban systems. Qualitative methods are used to develop a conceptual assessment framework, which in turn is complemented by using quantitative methods (see Figure 5.1). This approach of combining qualitative and quantitative methods helps to validate the theoretical position adopted by this research and ensures a stronger evidence base for the outcome of this research.

Figure 5.1: Methodological framework



Source: Adapted from Tobi & Kampen, 2017, p. 1212

5.3 Methodological approach

Before turning to the details of the methods, at this point it is pertinent to recall the objective of this thesis to set the background and rationale for outlining the methods. To recap, the objective of this thesis is to investigate the incorporation of a 'co-benefits approach' by Australian local governments in its decision-making process regarding climate change. The four research questions that are framed to undertake this investigation focus on understanding how councils are responding to climate change (Q.1); the rationale behind their decisions to adopt various measures that relate to GHG emissions reduction (Q.2); the consideration of various benefits from those measures in the decision-making process (Q.3); and the possible interventions to promote co-benefits in local government policy processes (Q.4).

To maximise leverage over these questions, the study design was constructed mainly upon in-person, semi-structured interviews complemented by a comprehensive online survey and expanded by publicly accessible information on government websites and published documents as well as certain internal documents obtained upon request.

The qualitative research involved documenting and critiquing information from the literature, review and evaluation of policies, legislations, and related documents available in the public domain and conducting in-depth interviews. The quantitative research included evaluation of data from an extensive online survey questionnaire. The online survey and interviews together form the

primary data source. Interviews were conducted with local government officials who met with the eligibility criterion: involvement in the development and deployment of policies and programs regarding climate change. Survey and interviews are complemented by secondary sources, mainly key local government's climate change related policy documents that were identified during the desktop review and online survey prior to the interviews.

5.4 Region of study

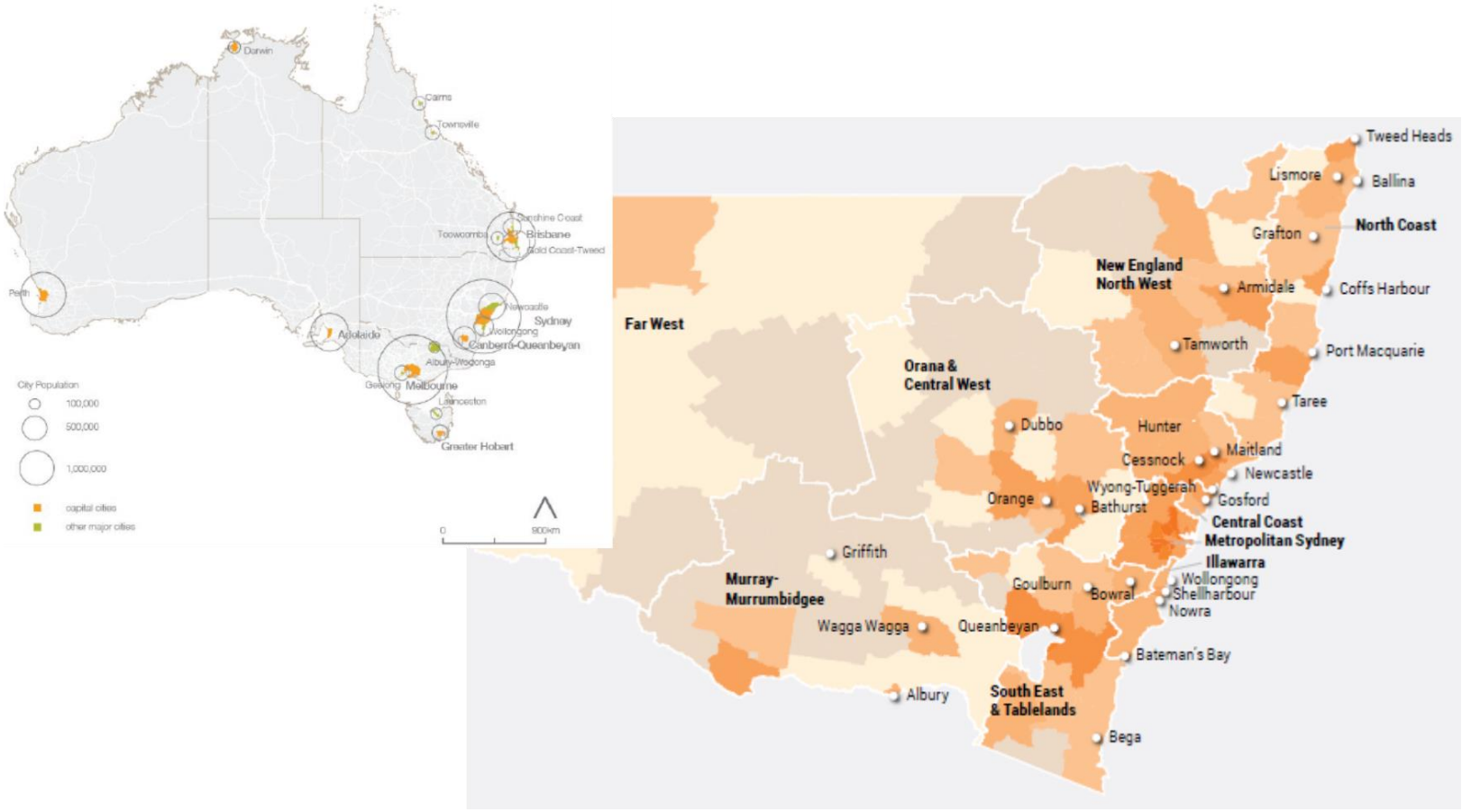
The geographic area of investigation for this study is Sydney's Greater Metropolitan Region and rural and regional NSW. The area includes the six sub-regions of the Sydney Metropolitan area (i.e. Central, West Central, West, North, South West and South) (see Figure 5.2b) and the eleven regions of Greater Sydney (i.e. Central Coast, Illawarra, North Coast, New England North West, Orange and Central West, South East and Tablelands, Murray-Murrumbidgee, Far West, Hunter, Lower Hunter and Northern Rivers) (see Figure 5.2a) (DoP&E [Department of Planning and Environment], 2014a, 2014b). At the time of the investigation (i.e. January 2015 to March 2017), this designated study area comprised 152 local governments, of which 41 were in Sydney's GMR and the rest (111) were in the eleven regions of Greater Sydney.

As the largest economy in Australia, NSW is significantly challenged by the impacts of climate change. The government has made some effort to reduce these impacts. It has been a leader in energy efficiency and is supporting several large-scale renewable investments. NSW was also one of the pioneering states to introduce emissions trading, under Australia's former

Greenhouse Gas Reduction Scheme. Local governments in NSW have long been active in local climate actions and the majority of them (i.e. 80 in total) have taken part in the International Council for Local Environmental Initiatives (ICLEI)'s Cities for Climate Protection – Australia (CCP-Australia) program. Overwhelming majority (i.e., 89 per cent) of these councils are city councils located in metropolitan and regional urban areas (Fallon & Sullivan, 2014; Hoff, 2010; Pillora, 2010). Considering all these activities, local governments in Sydney's GMR and the Greater Sydney Region were selected for investigation for this study. The reasoning behind this selection was that studying the co-benefits as motivations for local climate action would serve the purpose better, if the study is conducted in areas where there is climate action rather than in areas where there is no climate action (IPCC, 2014a & b).

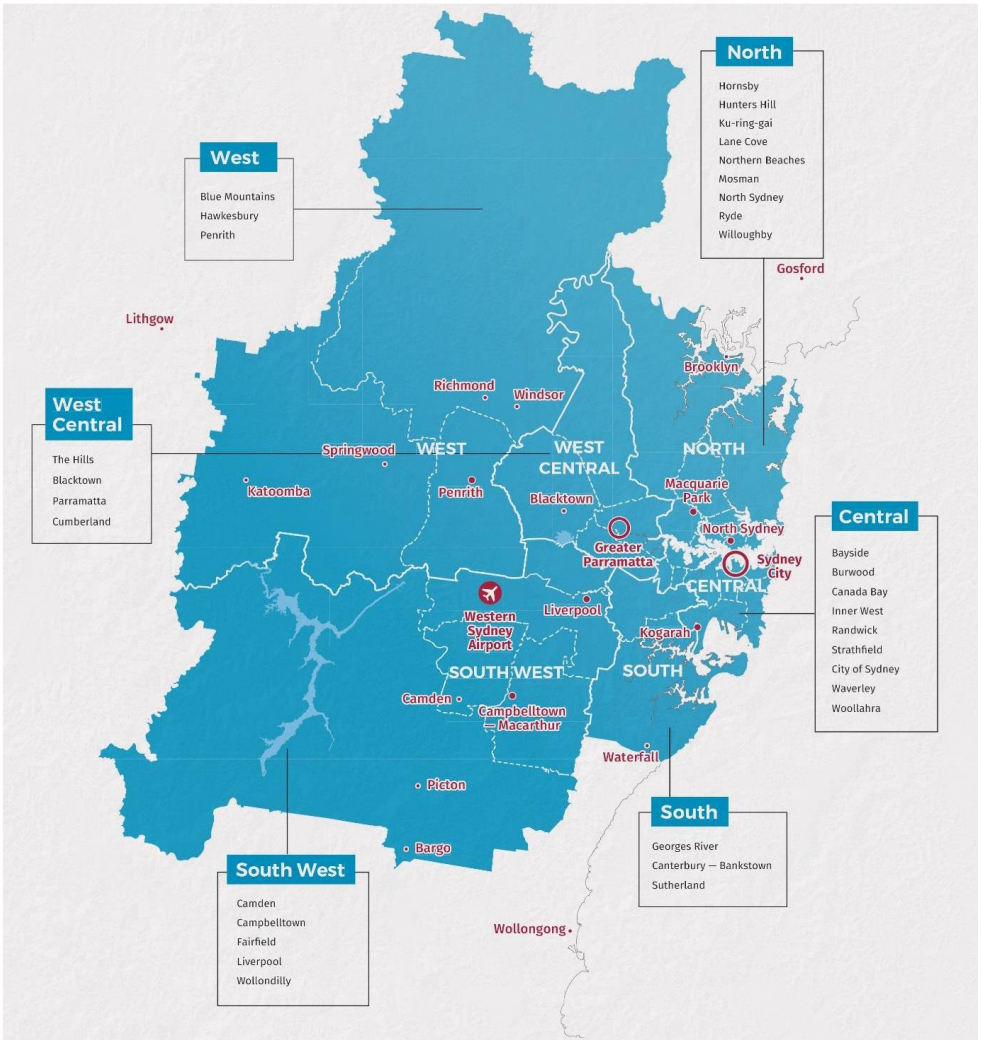
It is worth making two clarifications about the selection of local governments as units of analysis for this thesis. First, the investigation focused on local government policies related to climate change; which is, the decisions, measures and actions taken by local governments with authority. Non-governmental initiatives, projects and programs devised, implemented and operated by private organisations (businesses, community and/or civil society entities) were beyond the scope of this investigation. Second, while the investigation focused primarily on the policies and processes under the authority of local governments, it also considered the links of local to state, and broader national processes.

Figure 5.2a: Geographic area of investigation - Greater Metropolitan Region (GMR) of Sydney and adjacent local governments in NSW



Source: Collated from DoP&E, 2014a, p. 50; DoP&E, 2014b, p. 107; CoA, 2013c, p. 20.

Figure 5.2b: Geographic scope - Six sub-regions of Sydney Metropolitan Area

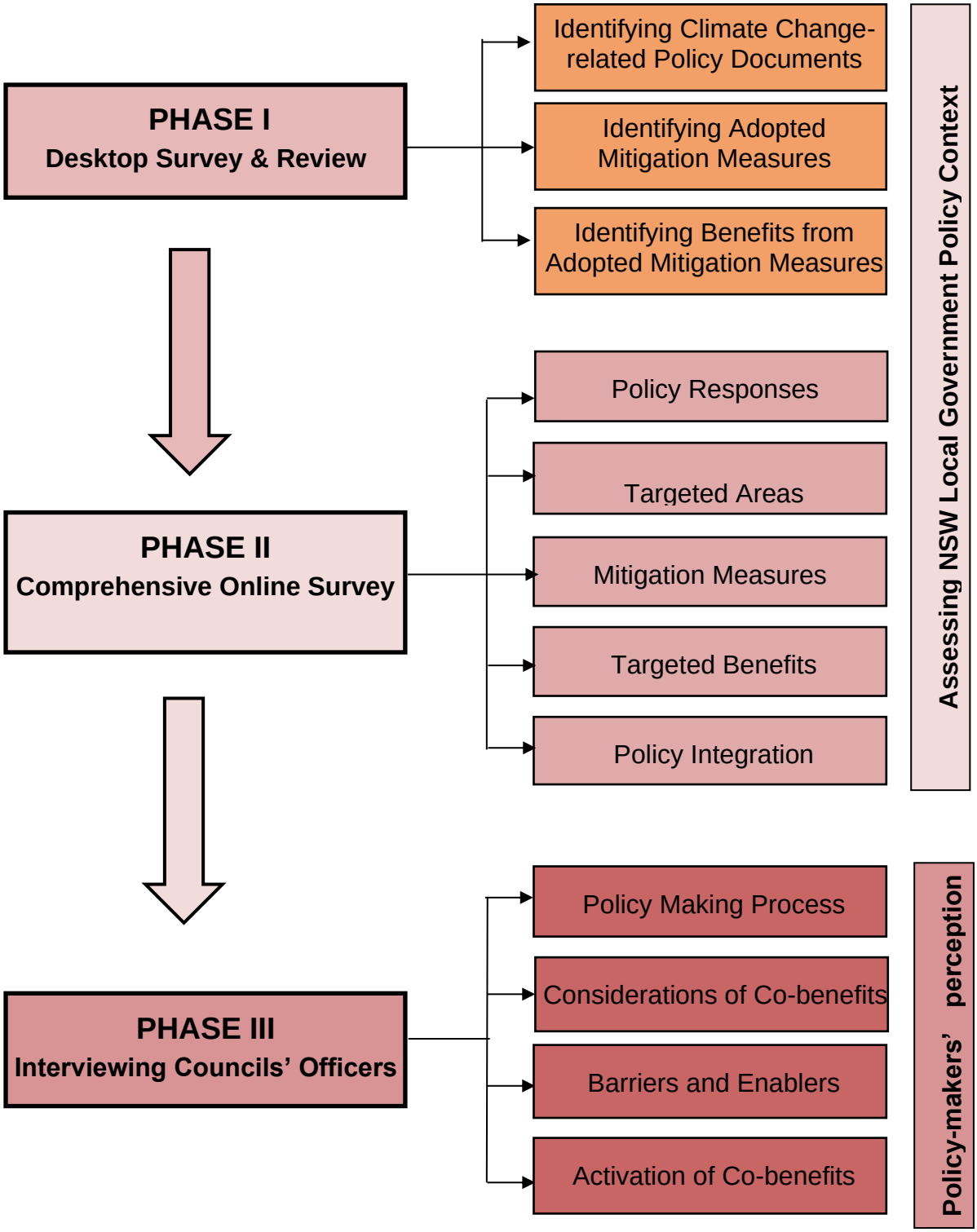


Source: Greater Sydney Commission (www.greater.sydney/)

5.5 Study design

The study consists of three distinct phases. Phase one encompassed a desktop survey of NSW council websites and a review of council policies related to climate change. Phase two was a comprehensive online survey, and phase three was the in-depth interviewing of selected local government officials (see Figure 5.3). This provided multiple choices of data collection methods, which were used to supplement each other, ensuring the reliability of the process and serving to confirm the credibility of the research.

Figure 5.3: Study design: diagrammatic representation



Source: Author

5.5.1 Desktop survey

In phase one, a desktop survey of councils' websites was conducted. The *Government Information (Public Access) Act 2009* (GIPA) grants access to council information through mandatory proactive release via council's website (open access information) (NSW Govt., 2009). This allowed access to council's relevant policy documents, which were available online through all 152 councils' websites at the time the survey was conducted (from January to June 2015). This survey undertook a qualitative review of all 152 councils' policies and plans related to GHG emissions reduction — specifically, policies listed within the Integrated Planning and Reporting (IPR) framework.

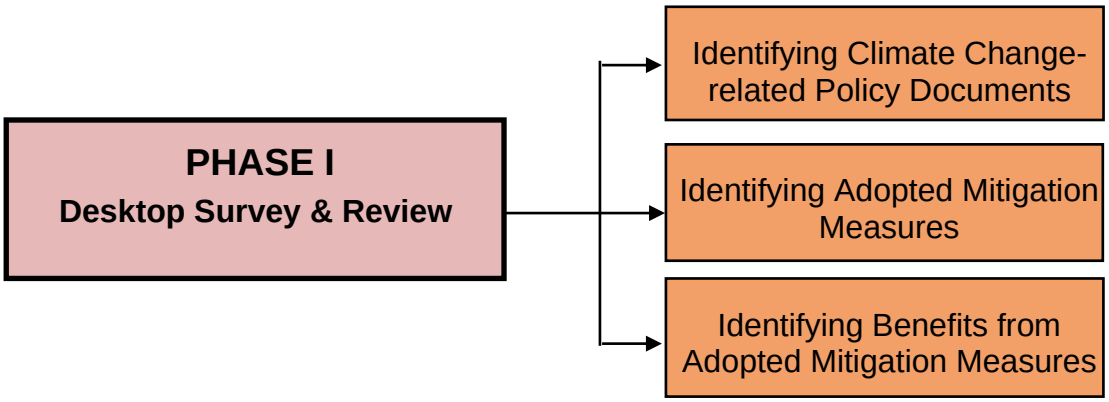
The survey comprised three distinct components (see Figure 5.4):

1) *Identifying Climate Change-related Policy Documents*: The survey identified a wide range of policy documents that relate to climate change, which included: Community Strategic Plans (CSPs), strategic plans, Local Environmental Plan (LEPs), Development Control Plans (DCPs), energy-savings action plans, ecologically sustainable development plans, climate change action plans, the Delivery Programs, Operational Plans, and State of the Environment reports (SoEs).
2) *Identifying Adopted Mitigation Measures:* A qualitative review using content analysis of the identified documents was undertaken for each council to extract information about the following:
    - programs, goals and targets related to climate change;
    - targeted sectors and areas for climate actions;

- measures adopted that relate to reduction of GHG emissions;
- benefits targeted/achieved through adopted measures;
- provisions in planning instruments related to climate change;

3) *Identifying Benefits from Adopted Mitigation Measures*: The review also looked into what types of benefits are targeted in the policies, how these benefits are considered, and how the benefits are measured.

Figure 5.4: Phase I: Diagrammatic representation



Source: Author

The desktop survey provided an overview of NSW local governments' policy scenarios related to climate change and informed the design of the questionnaire for the web-based survey conducted in the second phase.

5.5.2 Online survey

The second phase of this research was a comprehensive web-based online survey of 152 local governments in New South Wales. The survey was informed by the desktop review of council policies related to climate change to investigate how councils in NSW are addressing climate change. In constructing the survey, the questions were designed to collect data about council activities related to climate change, focusing on those policy

dimensions where councils are found to be most active. To be comprehensive the questions covered council activities across a broad spectrum of areas. The survey also queried councils about whether they had articulated climate commitments via undertaking specific organisational change, such as forming a specific department, committee or team and organisational memberships.

The policy dimensions targeted in the survey are as follows:

1) Energy: energy efficiency and conservation, co-generation, low-carbon fuel, renewable energy;
2) Waste: waste reduction and recycling, waste to energy;
3) Water: water efficiency and waste-water systems;
4) Transport: sustainable/active transport (i.e. walking, cycling, and public transport);
5) Organisational action: specific department, committee, team, staff and organisational memberships, such as participation in international or transnational climate change programs or networks.

Survey structure

The electronic questionnaire of the survey has in total 31 questions (see Appendix I), arranged under eight separate sections. The first section (Q.1 to Q.3) requests the participant's consent and the second section (Q.4 to Q.8) asks for background information. The remaining 28 questions are arranged under six sections, each with a title covering the following (see Figure 5.5):

A. Policy for Climate Change (Q.9 to Q.14):
   - policies currently in place to address climate change;

- State and federal government policies which inform Council policy(ies);
- operational domain of these policies; and
- targeted areas of operation.

B. Measures Adopted to Reduce Emissions (Q.15 to Q.17)
   - measures adopted that relate to GHG emissions reduction;
   - most preferred measures;
   - criterion for the selection of the measures.

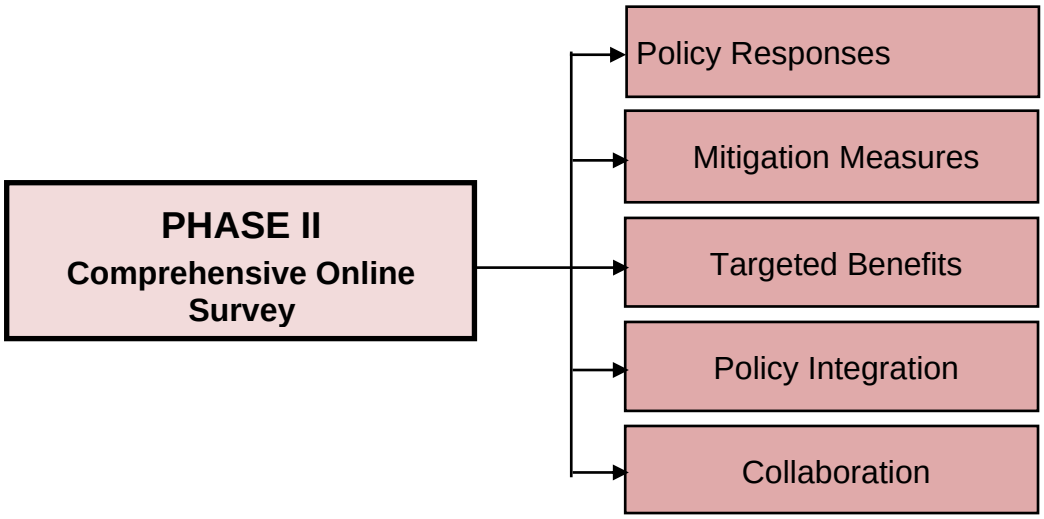
C. Benefits of Climate Change Policies (Q.18 to Q.23):
   - benefits targeted from the adopted measures;
   - considerations behind targeting different categories of benefits;
   - indicators used to calculate the benefits; and
   - consideration of the benefits in the policy-making process.

D. Policy Integration (Q.24 to Q.27):
   - the extent of integration of climate policy(ies) with other policies; and
   - organisational change to support the integration.

E. Finance for Climate Actions (Q.28, 29):
   - source of finance to fund climate actions;
   - utilisation of savings from climate actions

F. Collaboration (Q.30, 31):
   - participation in international climate program or network;
   - benefits of such participation

Figure 5.5: Phase II: Diagrammatic representation



Source: Author

Survey administration and response

The survey was designed and hosted using SurveyMonkey™, an online survey platform. The survey was launched in July 2015 and remained open for six months. At the time the survey was administered (July to December 2015) all 152 councils in NSW were contacted through email to participate in the survey. The email requested identification of the relevant officer accountable for climate change and/or sustainability related action. A second email was sent out approximately two weeks after the initial email. Subsequently, phone calls were made to each non-responding council approximately three weeks after sending of the second email. For majority of the cases, attempts to speak directly with the appropriate officer (who met the eligibility criteria: council official engaged in the development and implementation of policies and programs related to climate change) were not successful. In such cases, email addresses of the appropriate officers were obtained which was followed up with sending an additional email.

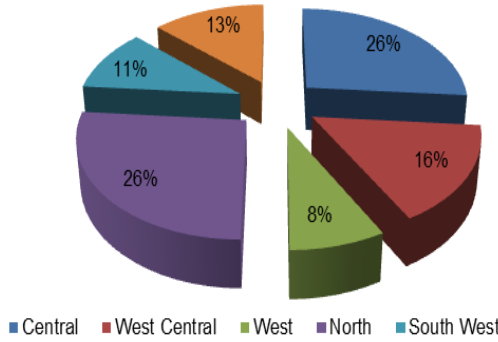
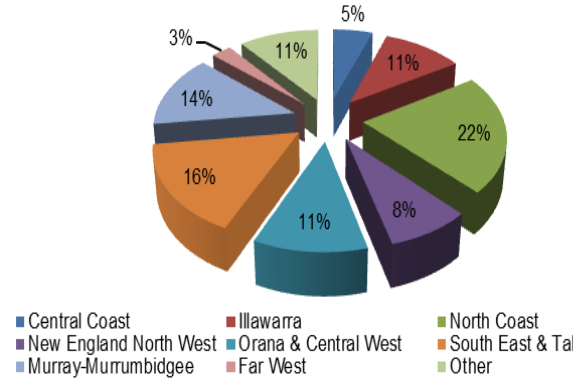
Upon receiving positive response, the nominated officers fulfilling the eligibility criteria were contacted through email with a letter requesting to complete the survey online. This invitation explained the purpose of the survey and the type of questions involved in the survey. Participants were assured of the confidentiality of their individual responses. A web link to the online survey instrument was included in the email.

To increase the number of participanting councils for the survey, a news item about the survey was published in the NSW Office of Local Government's (OLG) newsletter, *Sustainability Snippets,* in July 2015. The news item described the purpose of the study and requested all councils in NSW to participate in the online survey.

Several weeks into the survey, when a lower than expected response rate was observed, individualised follow-up emails as well as reminder phone calls were made to any targeted participants who had not responded to the survey, steps that boosted the initial response rate considerably.

After repeated contacts and reminders, upon closure of the survey, 75 councils had completed the survey (i.e. 49% response rate) of which 38 councils were from Sydney's GMR (out of a total of 41 GMR councils) and the rest 37 councils were from around the outlying regions(see Table 5.1).

Table 5.1: Distribution of participated councils in the online survey

Regions	Sub-regions	Respondent	Response rate		% Distribution
			Sub-total	Total (%)	
Greater Metropolitan Region (GMR) (Total: 41*)	Central	10	38 (93%)	49%	
	West Central	6			
	West	3			
	North	10			
	South West	4			
	South	5			
Greater Sydney Regio (Total: 111*)	Central Coast	2	37 (33%)		
	Illawarra	4			
	North Coast	8			
	New England Nort West	3			
	Orana & Central West	4			
	South East Tablelands	6			
	Murray-Murrumbidgee	5			
	Far West	1			
	Other	4			

*Note: Number of councils at the time of the survey (i.e. July to December 2015)

Source: Author (Online survey of NSW local governments, 2015)

It appears that most rural councils were found unenthusiastic compared with urban councils in responding to the request for participation in the survey. Given the political controversy associated with climate change, this was not unexpected. However, in the final response, respondents comprised of evenly distributed councils across NSW, with a balanced participation of both urban and rural councils.

Based on the findings of the survey, suitable councils were short-listed for invitation to participate in face-to-face, in-depth interviews in the next phase of the study. The survey findings also informed the design of the interview questions.

5.5.3 Interviews

Recruitment of participants

In phase three, in-depth interviewing of selected council officers was conducted from February 2016 to March 2017. Councils were purposively selected for getting wide-ranging perspectives on key issues identified from the online survey, specifically aiming for variation in size, density, and diversity in location across NSW. However, the focus of this selection was limited to councils where the survey found sufficient evidence of local climate action. The reasoning behind this selection was that studying the co-benefits as motives for local climate action is better done in those councils who are proactive in acting on climate change rather than those who are not. Based on this criterion, the councils (i.e. 32 councils) who earlier indicated willingness to participate in interviews in the online survey were approached. Among them

15 councils ultimately agreed to be interviewed, of which nine councils were in Sydney's GMR covering all six sub-regions (two from Central, two from West Central, two from North and one each from South, South West and West) and six councils were located in the Greater Sydney Region (three from Illawarra, one each from Hunter, Lower Hunter and Central Coast) (see Table 5.2).

Table 5.2: Distribution of participated councils in interviews

Regions	Name of Councils	Sub-regions	Population	Area (sq km)	Density (persons/km²)
Greater Metropolitan Region (GMR)	Bankstown	West Central	196,974	76.8	2,565
	Blacktown	West Central	325,185	240.1	1,354
	Fairfield	South West	201,427	101.6	1,982
	Ku-ring-gai	North	119,027	85.4	1,394
	Marrickville	Central	82,523	16.5	5,001
	Penrith	West	190,428	404.8	470
	Randwick	Central	142,310	36.3	3,920
	Rockdale	South	106,712	28.2	3,784
	Warringah	North	152,636	149.4	1,022
Greater Sydney Region	Cessnock	Lower Hunter	55,862	1965.4	28
	Kiama	Illawarra	21,505	257.7	84
	Lake Macquarie	Central Coast	204,166	648	313
	Newcastle	Hunter	161,225	186.8	857
	Shoalhaven	Illawarra	100,147	4567	22
	Wollongong	Illawarra	208,875	684	302

Source: OLG [Office of Local Government, NSW], 2015

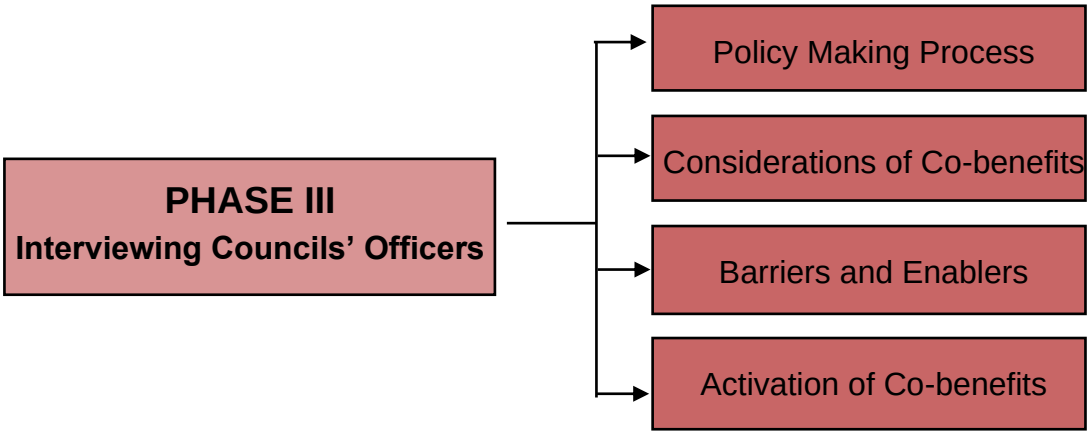
Interview questions

A set of open-ended questions was carefully designed to investigate local government policy-makers' perceptions of climate change considerations in the policy decision-making process, particularly focusing on their current use of the co-benefits approach in policy-making related to climate change. The questions were built on the key findings from the online survey. The questionnaire comprised 10 questions, which were organised into three main sections. The first section probed participants' views about NSW local governments' climate considerations in the policy-making process. The next two sections investigated participants' perceptions on consideration of co-benefits; barriers and enablers for integrating co-benefits; and possible activation of co-benefits in the policy-making process. The reasons for inclusion of these questions are presented in Table 5.3 (for full details, see Appendix II).

Table 5.3: Reasons for inclusion of the questions in the interview questionnaire

Section	Questions	Reasons for inclusion
Context	Policy-making process and prioritisation of climate considerations (Q.1 & Q.2)	• to gain an overall picture about NSW local governments' policy-making processes related to climate change • to understand policy-makers' perspectives on how climate considerations are incorporated into local government's policy process, and • to find out what factors influence their priority around climate change
Consideration of co-benefits	Consideration of co-benefits in policy-making process (Q.3, Q.4, Q.5 & Q.6)	• to understand the rationale behind council's adoption of various GHG emission reduction measures, and • to learn what, how and why different benefits from these measures are considered in the decision-making process
Integration of co-benefits	Barriers and enablers for integrating co-benefits in policy-making process (Q.7 & Q.8)	• to understand participants' perceptions on main barriers and enablers to considering co-benefits
	Possible activation of co-benefits (Q.9 & Q.10)	• to get their opinions on the possible measures to integrating co-benefits in local governments' decision-making process related to climate change

Figure 5.6: Phase III: Diagrammatic representation



Source: Author

Interview technique

All interviews were conducted face-to-face in the interviewees' offices. The interview employed a semi-structured procedure to keep consistency and some form for allparticipants. This was to facilitate comparative analysis between interviews, while also permitting each partcipant to be explored on points of specific interest. Interview lengths ranged from 45 to 90 minutes.

The use of a semi-structured interview format permitted flexibility in the ordering of questions which supported natural flow of conversation. Conversation was allowed to diverge from the structured questionnaire as follows. First, a question was omitted in the event that the participant had earlier answered the question when responding to a previous question. Second, additional probing questions were asked to understand interviewee's responses as clearly and precisely as possible. Third, in several instances where there were time limitations, questions were prioritised by what was considered most important to learn from that interviewee.

Interview process

All prospective participants when first approached to participate via email were supplied with necessary information regarding the study to enable them to make an informed decision regarding participation. The information included the purpose of the study and what it would entail. It clearly stated the type of information that would be sought and why, and the approximate duration of the interview.

Subsequently, when prospective participants confirmed participation, a formal letter along with a Project Information Statement (see Appendix III) and Project Consent Form (see Appendix IV) were sent to each applicant. The Project Information Statement explained the project in detail and provided information about the researcher and the principal supervisor of the research. Contact details were provided to answer any questions the participant might have about the research. This included the basis of selection of the prospective participants.

The Project Information Statement also included a revocation clause for the participant to use in case the participant decided to withdraw consent at some later stage. An understanding was conveyed that any information that was acquired through this study and that could be identified with the participant would be kept confidential and would be divulged only with the participant's permission. The results of this study would be written up in aggregate in the thesis.

In addition, each participant had been provided with (one week before the interview): i) a copy of the interview questions and ii) a copy of the online survey responses (earlier completed by the participant). In addition, prior to the commencement of the interview each participant was briefed about the research project.

The interview process comprised the following steps:

1) Prior to interviewing permission was requested from each interviewee for recording interviews to support the transcription process. No participant opposed to the recording of the interview.
2) Consent forms were signed by all participants before start of interview.
3) Interviewees were given the choice to be de-identified to protect their identity.
4) All interviews were transcribed, and then transcripts were verified to ensure accuracy of the transcription process.

Interview process — some biases

In conducting the interviews, some techniques were employed to encourage participants to share maximum information and their insights spontaneously, which might have inadvertently influenced the responses of some interviewees. However, measures were followed to keep these possible effects to a minimum. These measures are outlined below:

- The briefing and provision of the background information to the participants prior to the start of the interview may have changed some of their perceptions of the research topic. As some of the participants

had not thought about the topic before, it would have been their introduction to the topic. This may have influenced their opinions on the questions asked. However, attention was given to present background information objectively in a manner that would likely help participants understand the relevancy of the topic in their professional field and identify more issues that related to it. This also ensured participants answered questions in a relevant manner instead of deviating from the main topic.

- During the interview, to encourage participants to make further comment about a subject, sometimes reflections on participants' remarks were made, which in some instances might have influenced the responses. However, use of this technique was limited to instances when it was required in order to ensure participants' thoughts were accurately understood, recorded, and interpreted.
- To ensure that participants fully understood the question and could fully express the point that they were trying to make, probing questions were asked from time to time on the participant's last remarks.
- Probing questions were also asked when there was a need to get further insight into a point raised by the participant considering the comments made previously by the participant. In such instances, the participant was asked to go back to the previous comments to fully explain that point. This was done to ensure that the participant could fully express their point of view, avoid any inconsistency in response, and get clear understanding of the participant's point.

- As all interviews were face-to-face, physical gestures (such as nodding) as well as supporting sounds were made in conducting the interviews. While use of these subtle cues encouraged participants to expand their comments and elicited further information, they may have unintentionally influenced their answers. However, such actions were limited to a minimum and only used when it was perceived that a participant's response was not forthright.
- In some interviews, when participants requested examples in answering certain questions, relevant examples of answers to those questions that other participants had provided were shared. However, these examples were very brief and limited to cases where it was perceived that they were related to the issues raised by other participants.

Recording and playback

Each interview was digitally recorded using an OLYMPUS™ digital voice recorder (VN-733PC) and generic voice memo software. Playback of information was through Olympus Sonority™ software.

These devices and software were used because they were convenient, effective and portable. Playback of the recorded items could be controlled to the second, background noise could be reduced and, if needed, the volume of voices could be enhanced.

5.6 Ethical considerations

Ethical approval of this research to collect data from human subjects for analysis was obtained from the Human Research Ethics Advisory Panel of the Faculty of the Built Environment (approval number 155045) on 29 April 2015, prior to the commencement of the online survey and participant recruitment to conduct the in-depth interviews (see Appendix V). This approval was granted in accordance with the generally accepted clearance standards reflected in Australia's 'National Statement for Ethical Conduct in Research Involving Humans' (NHMRC 1992), and all corresponding ethical research policies of the University of New South Wales (UNSW). Details and methodology of the research were approved and adhered to throughout the course of the project. This clearance ensured research design and methods accorded with requisite ethical codes, and the researcher's compliance to them in conducting interviews. These codes covered confidentiality, voluntariness of participation, anonymity of participants, and harm avoidance to participants (including not invading participants' privacy).

5.7 Data analysis

Two sets of primary data were generated from the study.

a) quantitative data from the online survey; and
b) qualitative data from in-depth interviews and review of policy documents.

5.7.1 Analysis of quantitative data

The first set of primary data is the quantitative data from the online survey. Synthesis of this dataset provides an overall picture of the scenario related to climate change policy within local governments in NSW and the extent of their embracing of 'co-benefits' approach in policy responses to climate change.

The survey data were imported from the SurveyMonkey™ platform in Excel and Statistical Package for the Social Sciences (SPSS) format for analysis as appropriate.

A data-driven set of indicators was devised to quantitatively evaluate the level of councils' adoption of co-benefits in terms of policy responses, adopted measures, targeted benefits, and consideration of the resultant benefits in policy-making processes. As reported previously in Karim et al., 2017 these indicators are:

i) policy responses;
ii) targeted areas;
iii) mitigation measures;
iv) targeted benefits; and
v) policy integration.

Based on the above indicators the findings from the survey were then analysed in two ways.

*Firs*t, total number of councils carrying out various GHG emission reduction measures in each indicator and their percentage was calculated. This

information for all the indicators is then collated together in order to show an overview of the level of adoption of a 'co-benefits approach' by councils across NSW in their policy responses to climate change. This number is used to obtain a broad quantitative picture of NSW councils' extent of involvement in GHG emission reduction measures rather than to evaluate the quality of each adopted measure (Karim et al., 2017).

Second, the data were then categorised through being grouped based on each council's location and its population size. On the basis of council's location within or outside the GMR, the data were clustered into two broad categories (Karim et al., 2017):

i) GMR councils; and
ii) Beyond-GMR councils.

To classify the data based on population size, the participating councils were divided into three distinct categories (Karim et al., 2017):

i) large councils (over 50,000 inhabitants);
ii) medium councils (over 15,000 but less than 50,000); and
iii) small councils (less than 15,000 inhabitants) (see Table 5.4).

Table 5.4: Variation in councils' policy responses and targeted benefits (Source: Author - Online survey of NSW local governments, 2015)

Councils' responses to Climate Change		GMR Councils (n=38)	Beyond-GMR Councils (n=37)	Distribution based on location & population						Total (N=75)
				GMR			Beyond GMR			
				L	M	S	L	M	S	
A. Policy responses	A.1. No climate-change-related policy measure	03	05	02	00	01	00	00	05	08
	A.2. Climate change addressed broadly under 'sustainability' (but no specific policy for climate change)	20	18	16	04	00	06	08	04	38
	A.3. Dedicated or specific climate change policy	08	10	07	01	00	07	03	00	18
B. Targeted areas	B.1. No specific target area	09	12	07	02	00	04	02	06	21
	B.2. Only council's emissions	17	09	12	04	01	03	04	02	26
	B.3. Council's emissions + community emissions	12	14	11	01	00	06	06	02	26
C. Mitigation measures	C.1. Only 'energy-related' measures	00	04	00	00	00	01	00	03	04
	C.2. Multiple measures including 'active transport'	25	17	19	05	01	08	07	02	42
	C.3. Multiple measures excluding 'active transport'	12	13	10	02	00	04	05	04	25

Councils' responses to Climate Change		GMR Councils (n=38)	Beyond-GMR Councils (n=37)	Distribution based on location & population						Total (N=75)
				GMR			Beyond GMR			
				L	M	S	L	M	S	
D. Targeted benefits	D.1. Only 'financial savings' (in addition to GHG reduction)	10	10	08	02	00	04	03	03	20
	D.2. Multiple benefits (in addition to GHG reduction & 'financial savings')	18	15	14	03	01	05	06	04	33
	D.3. Multiple benefits, which include 'health benefits' (in addition to GHG reduction & 'financial savings')	07	04	06	01	00	01	02	01	11
E. Policy integration	E.1. Climate-change-related measures aligned and integrated with other policies	13	09	10	03	00	05	03	01	22
	E.2. Organisational change occurred to accommodate climate-change-related policy measures	19	08	15	04	00	05	03	00	27

* S: small (less than 15,000); M: medium (over 15,000 but less than 50,000); L: large (over 50,000); number of participants, n=73; for A, n=64; B, n=73; C, n=71; D, n=64; E, n=75

Source: Author - Online survey of NSW local governments, 2015

All quantitative statistical analysis was performed by using SPSS for Windows, version 24 (SPSS™, Inc., Chicago, Illinois). Descriptive statistics were reported using percentage calculation. Independent sample t-test were used for continuous variables and chi-square test were used for categorical variables, for making comparison between groups. Two-sided $p<0.005$ was considered statistical significance. Microsoft Excel 2007 was used for data processing and graphical presentation.

5.7.2 Analysis of qualitative data

The second set of primary data is the qualitative data generated from the thematic content analysis of the interviews. The process involved the following steps:

Transcribing interviews: The first step in the process of analysing the interview data was the transcription of the interviews. Detailed, handwritten notes were taken during the interviews. These notes helped when transcribing the audio recordings of the interviews. An expanded form of these notes helped to undertake thematic analysis of the transcripts. In transcribing the interviews, the 'semi-verbatim transcription' technique was followed — where all false starts, stutters, laughter, and any non-speech sounds were excluded when transcribing audio recording of the interviews to focus instead on the words. Conversational sections of the interviews were not transcribed word for word; rather, those sections informed the context in which key words and themes from those sections were identified. However, some sections were transcribed

verbatim, such as specific quotes relating directly to the question, interesting quotes, and contextual wording from the digital audio recordings.

This transcription technique together with the detailed handwritten notes taken during the interviews and reflective journalising were done immediately after an interview to best gain the richness of the verbal data generated. This strategy helped in doing parallel analysis of the interview data during the transcription process and helped to develop familiarity with the data.

Coding the contents: The next step in analysing the interview data was to follow the process where data were broken down into component parts, which were then given names known as 'coding' to identify the narrative. This can be done either manually or electronically with a computer software package like NVivo™ (Bryman, 2012; Richards, 2005). While I performed mainly manual coding, I also utilised NVivo™ 11 software to electronically code the transcripts based on the defined themes. This combination helped me to retain my discretion in the coding process based on interrelated considerations of participants' experience and knowledge, relevancy of information shared or focus on a particular topic of interest to identify the narrative of each question informing each defined theme. Later, the use of NVivo software complemented this process by helping to compare the narratives of the interviews for each theme when doing thematic analysis of the transcripts.

Generating themes: Each interview was listened to several times (minimum of three times) with reference to the original handwritten notes. As more

interviews were analysed, key issues emerged, which were then grouped into themes.

First, content analysis was used to generate a matrix of dot points, based on which participants' responses to the questions were analysed as narratives. The process involved highlighting relevant part(s) of the response and attaching brief comments, which is known as 'descriptive coding'. This was the first stage in thematically analysing the interview data (King & Horrocks, 2010; Richards, 2005).

The next stage was to perform 'interpretive coding' through clustering 'descriptive codes' and then interpreting the meaning of the identified clusters in relation to research questions and narratives identified for each theme. This interpretive coding was then applied to the full dataset.

In the final stage, through interpretive analysis, narratives were derived for the whole dataset with respect to the theoretical stance of this research.

5.7.3 Interpreting qualitative and quantitative data in combination

While the online survey provides a quantitative overview of the factors that play key roles in councils' adoption of co-benefits, the interviews provide insight into how these factors influence policy-makers' considerations of co-benefits. The narratives generated from the interviews focus on understanding their perceptions about the role of each factor for permitting climate action, how these factors and the themes identified in the narrative act in combination, and what motivates or discourages them considering various co-benefits in the

policy decision-making process. The process of generating these narratives helped to establish the case that every factor identified was important for considering co-benefits in the decision-making process related to climate change policy in the unique context of each local government in NSW. The statements by the interviewees consistently share a high degree of agreement when emphasising the role and importance of these factors in the decision-making process.

5.8 Limitations of the study

In this section, some limitations in terms of scope of this research are discussed.

5.8.1 Exclusion of 'trade-offs'

The focus of this research is limited to the positive impacts of low-carbon development and climate change mitigation policies and programs. The research does not include investigation into the negative impacts of such policies and programs. There are cases when climate policies have some adverse impacts on certain sectors of the economy, cause social, environmental or health issues for specific group of people in a society such as worsening health status, crime, and other negative impacts. These adverse impacts of climate policies are commonly called 'trade-offs'. In climate policy studies research on 'trade-offs' is less common compared to research on co-benefits. As 'trade-offs' involves large number of externalities, which are not well understood (Davis et al., 2000a), they are generally not incorporated in co-benefits studies and are not considered in this research.

5.8.2 Limitation in sample size

The selection of the local governments and interview participants from the GMR and Greater Sydney with a bias towards the state of NSW may limit the generalisability of the findings of this study to the whole of Australia.

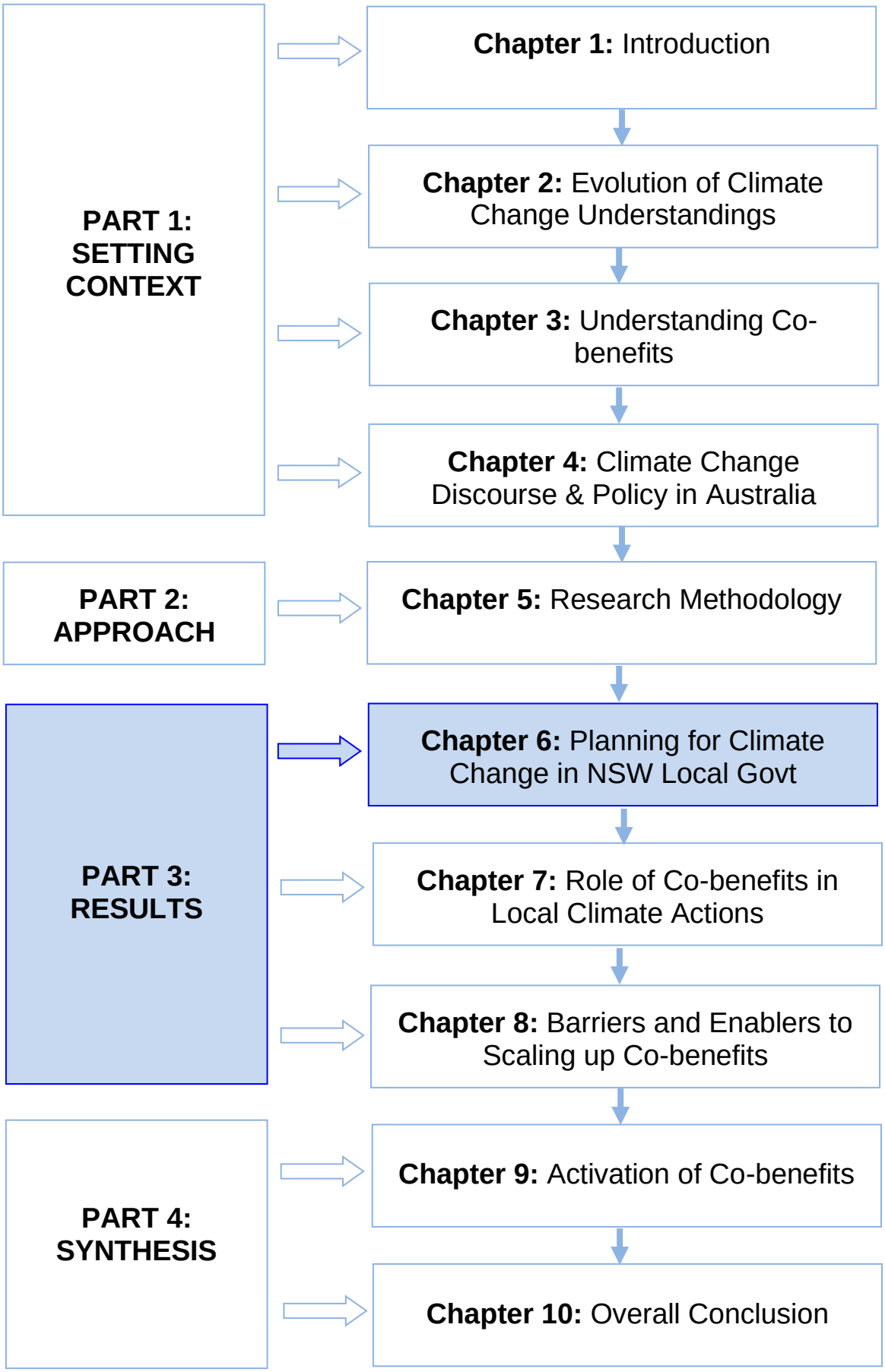
Limited sample size (n=15) of the interviews was compensated by the comprehensiveness of the survey (n=75). The analysis of the interviews, survey findings together with the review of policy documents show that major themes identified are supported by the repetition of these themes and absence of new themes emerging which suggest that data saturation was achieved.

5.9 Conclusion

The combination of qualitative and quantitative methods applied for conducting this research was very useful and proved insightful to understanding local government policy-makers' perceptions of adopting a 'co-benefits approach' in their decision-making process related to climate change.

The results are presented in the following four chapters (Chapters 6, 7, 8 and 9) before concluding the thesis in Chapter 10. Chapter 6 presents the thematic and narrative analysis and identification of the findings of the first theme: *NSW local government's policy process*, followed by the same process in Chapter 7 for the second and third theme (*Prioritisation of climate change consideration* and *Consideration of co-benefits*). Then Chapter 8 presents the fourth theme (*Barriers and enablers to co-benefits*) and Chapter 9 the fifth theme (*Activation of co-benefits*), which also presents discussion and a detailed analysis of the

five themes along with their cross-connections in order to derive the main findings of this study.


PART 1: SETTING CONTEXT
Chapter 1: Introduction
Chapter 2: Evolution of Climate Change Understandings
Chapter 3: Understanding Co-benefits
Chapter 4: Climate Change Discourse & Policy in Australia
PART 2: APPROACH
Chapter 5: Research Methodology
PART 3: RESULTS
Chapter 6: Planning for Climate Change in NSW Local Govt
Chapter 7: Role of Co-benefits in Local Climate Actions
Chapter 8: Barriers and Enablers to Scaling up Co-benefits
PART 4: SYNTHESIS
Chapter 9: Activation of Co-benefits
Chapter 10: Overall Conclusion

CHAPTER 6: PLANNING FOR CLIMATE CHANGE IN NSW LOCAL GOVERNMENT

6.1 Introduction

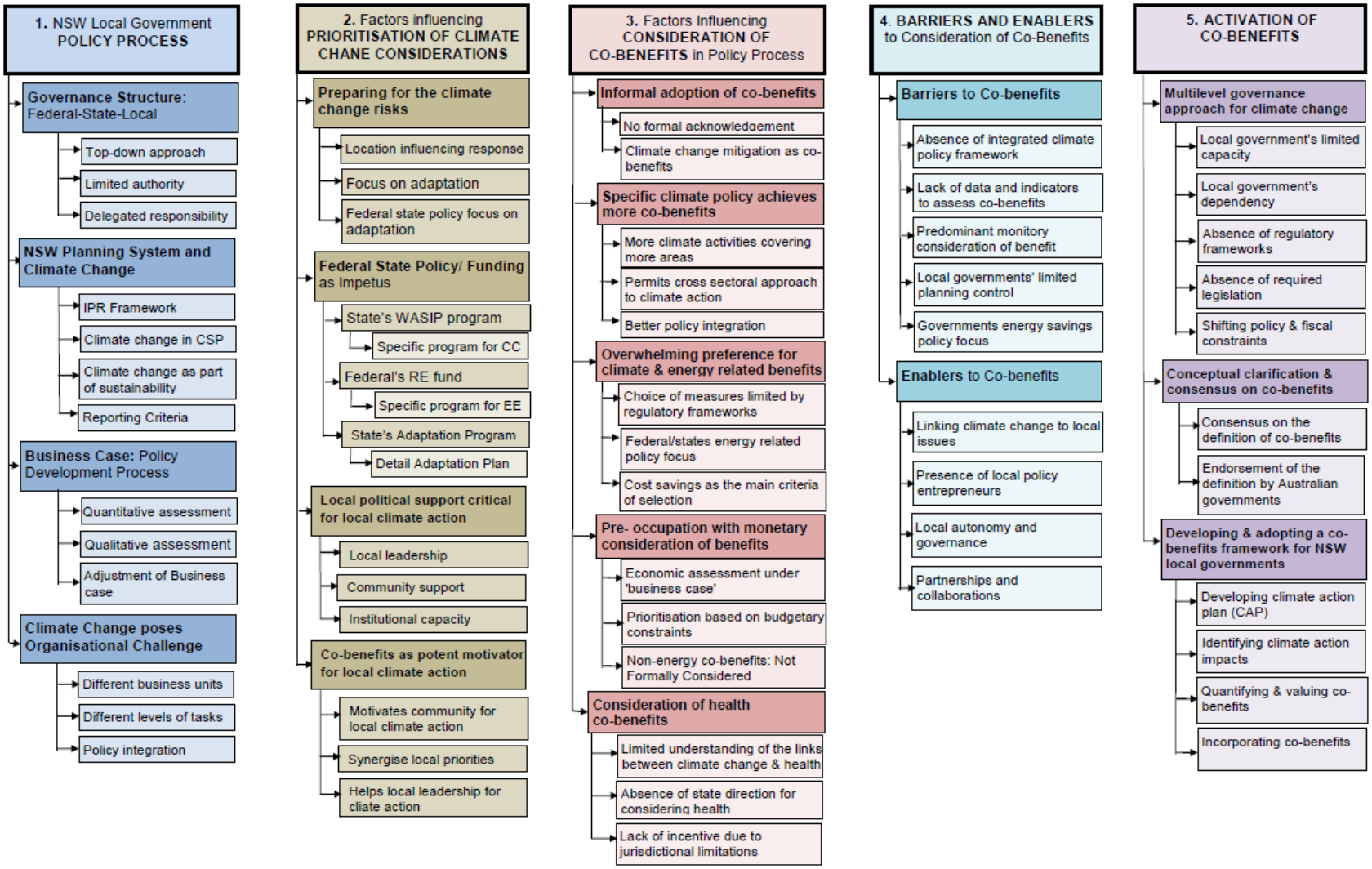
Co-benefits approach to climate actions can integrate climate concerns into local development. As implementation of policies to address climate change result in co-benefits which are mostly experienced at the local level, understanding local concerns is central to promoting a co-benefits approach in the policy process (Puppim de Oliveira, 2009). This suggests any policy intervention through co-benefits approach needs to consider local situation. Thus, application of the co-benefits approach in planning for climate change at the local government level warrants a comprehensive understanding of local government's operational processes. Since policy setting, varies widely across national boundaries, governance levels (i.e. federal, state and local) and geographic locations (i.e. urban and rural), the application of co-benefits approach is dependent upon these variable factors (Puppim de Oliveira, 2013). These challenges necessitate a careful and systematic approach to analysing the local context (Bai, Nath, Capon, Hasan, & Jaron, 2012; Capon, Synnott, & Holliday, 2009; ICSU, 2011; Proust et al., 2012).

The results of my investigation into NSW local councils' adoption of the co-benefits approach to climate change policy and decision-making processes

are presented in this and the following two chapters (Chapter 7 and 8). Based on the methodology detailed in Chapter 5, the broad results of the interviews of council officers, the comprehensive online survey and the review of NSW councils' policies and regulations related to climate change are coded. The analysis of these coded results identified several major themes, which are presented in Figure 6.1. The five major themes that emerged through the thematic content analysis are:

1) *NSW local government's policy-making process* the main factors that dictate councils' consideration of climate change in their policy-making process.
2) *Prioritisation of climate change consideration* discusses the factors that influence council's prioritisation of climate change considerations in their decision-making process.
3) *Consideration of co-benefits* discusses the rationale behind council's decision to adopt various measures that relate to GHG emissions reduction and the consideration of the benefits from these measures in the decision-making process.
4) *Barriers and enablers to co-benefits* focuses on understanding the main barriers and enablers to integrating co-benefits in local government's climate-policy related decision-making process.
5) *Activation of co-benefits* discusses the measures that can enable possible adoption of a co-benefits approach in local government's policy-decision making processes in a planned and purposive manner.

Figure 6.1: Major themes based on overall thematic content



Source: Author

This chapter focuses on understanding NSW local government operational processes in terms of its governance structure, regulatory frameworks and policy settings. These inform councils' consideration of climate change in their decision-making processes. It begins by outlining the role of local government in climate change (section 6.2), then assesses NSW local councils' current policies and controls within the Integrated Planning and Reporting (IP&R) framework relating to climate change (section 6.3, 6.4 and 6.5). In doing so, the chapter addresses the question: *Do current policies and controls have adequate provisions for NSW local government to consider climate change mitigation in the policy and decision-making process?*

As is explored in the analysis below, several factors have influenced the consideration of climate change mitigation in NSW local government climate planning. Understanding these factors is critical, as they inform how local government has taken up co-benefits in the climate change policy-making process.

6.2 Role of local government in climate change

The role of local government in tackling climate change was first considered in the National Greenhouse Strategy (NGS) (Commonwealth Ombudsman, 1998). However, it was the culmination of a process that was initiated earlier when the federal government published its first National Greenhouse Response Strategy (NGRS) in 1992. As the constitutional structure of Australian government comprises of three tiers of governments –

Commonwealth, State/Territory and local government, there was a need of a coordinating body to coordinate and involve all three levels of governments in developing a strategy for addressing climate change. To this end, the Council of Australian Governments (COAG) was assigned with this task, developed NGRS and formally endorsed the strategy in December 1992 (CoA, 1992).

The NGRS was initially strongly criticised for:

i) Absence of any consideration of coordinating the roles and responsibilities between different jurisdictions and policy areas;
ii) Lack of clarity in assigning responsibilities between Commonwealth and State governments; and
iii) Failure to consider local government's role – in terms of identifying the specific tasks local councils were expected to undertake in reducing greenhouse gas (GHG) emissions (see Bulkeley, 2000a; Lumb, Pears, & Buckley, 1995, pp. 204–5; Taplin, 1994; Wilkenfeld et al., 1995).

In responding to the above criticisms of the NGRS, an amendment called *Greenhouse 21C* was published in 1995, which explicitly recognised local government's potential role in reducing GHG emissions towards reaching national emissions-reduction targets. *Greenhouse 21C* identifies activities that are responsible for 50 per cent of GHG emissions at local government level (CoA, 1995).

In the revised NGS local government's potential role in Australia's GHG emissions-reduction target was formally recognised (Commonwealth

Ombudsman, 1998). In the NGS the roles and responsibilities of different government agencies regarding addressing climate change were more clearly outlined than the previous NGRS which also include specifying several measures that require local government's active involvement (ICESD, 1997; NGAP, 1996). The strategy recommended numerous measures which would require active participation of local government for implementation. Subsequently, the Commonwealth Government recognised the critical roles local councils can perform in responding to the effects of climate change. It was also suggested that engaging local government in the process of formulating a national climate policy should be an integral part of any agenda for reform of national climate policy (CoA, 2010). However, it is pertinent to point out here that despite formal recognition of local government's role, to date local government's roles and responsibilities in this matter have not been formally defined either by Commonwealth or State governments (see Chapter 4).

6.2.1 Local Government Act and councils' responsibilities

Policy levers to deal with climate change largely rest with the Commonwealth and State governments in Australia (see *Chapter 4*). Particularly, state governments are given relevant powers to act as lead policy-makers in relation to planning and climate change. However, it is local government whose core function is planning and who plays a central role addressing f climate change effects and impacts (Urbis, 2010). Within the context of the planning system councils are assigned to play the following two roles:

i) *Strategic planning* – 'A council will establish the strategic direction for planning within its area and will generally initiate changes to the relevant planning instruments, when required. This strategic planning function involves the development of planning frameworks, policies and strategies to further the objectives of the municipality' (Sousa, Sommer & Thwaites, 2010, p. 6; NSW Govt., 1979).

ii) *Statutory planning* – 'A council's statutory planners will apply and enforce the state and local planning controls within the council area. Statutory planning involves the case-by-case assessment of applications for development or change of land use' (Sousa et al., 2010, p. 6; NSW, 1979).

Council's ability to respond to climate change in an effective manner in the execution of the above roles depends upon several factors. These include access to information and resources, administrative processes, local community's attitude towards climate change, and the regulatory framework. These factors define the context within which councils are required to perform their roles that relate to planning for climate change (Sousa et al., 2010).

In NSW, the *Local Government Act 1993* (LG Act) prescribes strategic planning principles that apply to the Integrated Planning and Reporting (IP&R) framework used by local councils (section 8C), including in the development of comprehensive local policies via a *Community Strategic Plan* (CSP), required by section 402 of the LG Act (NSW Govt., 1993). It is a mandatory requirement for all councils in NSW to comply with the IP&R framework in reporting their activities. The IP&R framework ultimately specifies State

government's power over the local government and affects councils' strategic responses to climate change.

Under the LG Act councils are obligated for managing the local environment with regard to the principles of *Ecologically Sustainable Development* (ESD). Section 7(e) – 'Purposes of the Act' dictates 'Councils, Councillors and Council employees to have regard to ESD principles in carrying out all of their responsibilities' (NSW Govt., 1993, Section 7(e), the LG Act). Among these principles one of the key ones is the 'precautionary principle' which provides strong direction for councils to manage risks and take actions to mitigate climate change impacts. In New South Wales, Section 6(2) of the *Protection of the Environment Administration Act, 1991* outlines 'the precautionary principle' as: 'where there are threats of serious or irreversible damage, lack of full scientific certainty shall not be used as a reason for postponing cost-effective measures to prevent environmental degradation' (NSW Govt., 1991, Section 6(2), the POEA Act).

Section 8A of the LG Act outlines the local councils' charter, listing the following guiding principles for councils in carrying out their functions:

- 'To exercise community leadership; and
- To properly manage, develop, protect, restore, enhance and conserve the environment of the area for which it is responsible, in a manner that is consistent with and promotes the principles of ecologically sustainable development;
- To have regard to the long-term and cumulative effects of its decisions;

- To bear in mind that it is the custodian and trustee of public assets and to effectively plan for, account for and manage the assets for which it is responsible;
- To engage in long-term strategic planning on behalf of the local community; and
- To exercise its functions in a manner that is consistent with and promotes social justice principles of equity, access, participation and rights' (NSW Govt., 1993, Section 8A, the LG Act).

Many of the functions listed under the above guiding principles of the LG Act could be affected by climate change. Several of these functions are also conferred by the *Environmental Planning and Assessment Act 1979* (NSW). These include managing and maintaining infrastructure and providing public services, like roads, bridges, public structures, recreational facilities, waste- and storm-water drainage systems, water supplies, management of waste, land-use and transport planning, management of land, retention of vegetation and protection of environment (NSW Govt., 1993) (see Table 6.1).

Table 6.1: Local government responsibilities that could potentially be affected by climate change

Traffic and transport	**State**	**Local**
Strategies for transportation planning to support growing population, e.g. introducing new bus routes, dedicated bus lanes, new transport interchanges etc.	√	√
Advocate for improving the efficiency of state's road network		√
Maintain local roads and implement measures to ease traffic congestion		√
Provide and maintain traffic lights and regulatory traffic signages	√	√
Coordinate with state government and transport operators to fill up any service gaps in the public transport		√
Providing and maintaining supporting transport infrastructure like bus shelters and seats for ensuring smooth operation of the bus network		√
Encourage use of public transport as a means to reduce traffic congestion and environmental impact	√	√
Provide and maintain council car parks		√
Cycleways and footpaths		
Promote physically active modes of transport – such as walking, cycling as alternative modes of transport and provide walkways, cycleways and bike paths	√	√
Plan for well-connected networks of walkways, bike paths and cycleways throughout council area		√
Maintenance of existing pavements, walkways and bike paths		√
Construct new segments of walkways, bike paths, cycleways and related infrastructure		√
Utilities – energy (electric and gas), water and sewerage		
Plan to improve existing drainage network for storm-water to prevent local flooding		√
Maintain and renew storm-water drainage network, e.g. cleaning up streets and keeping drainage pipes and pits clear from clogs		√

Traffic and transport	**State**	**Local**
Community education programs to educate households re reducing energy and water usage that supplement related state programs		√
Initiatives for reducing the overall use of energy and water throughout council area		√
Establish requirements and make payments for lighting in the streets, major roads and public places within council area		√
Health services		
Community health programs to improve community health and fitness, such as nutrition awareness and healthy weight loss programs; identify gaps in the existing health services/evolving health issues within the council area and look for solutions on behalf of the local community		√
Designate suitable locations in the local land-use plans for the delivery of health services		√
Provide information and arrange referral services on important health issues targeting vulnerable groups in the community (e.g. youth and aged)		√
Law enforcement		
Enforce compliance and issue infringement notices, e.g. for illegal construction works, unauthorised use of land, and for any breaches in safety of the environment, and public health		√
Environment		
Management of environment and natural resources (through implementation of policies, plans and education), e.g. maintaining biodiversity, responses to climate change impacts (adaptation and mitigation); managing coastal zone, floodplains, waterways; recycling waste and water ; and conservation of heritage	√	√
Protection of native animals and plants and preservation of their natural habitats, which includes protecting endangered species, issuing orders to preserve trees and conditions of consent for development	√	√

Traffic and transport	**State**	**Local**
Management and protection of local ecosystems, e.g. local reserves and lagoons water quality, bush regeneration, controlling weeds and pets, protection from fire, provision of recreation and access facilities		√
Controlling and reducing pollution (air, water, land and noise) on all unlicensed premises		√
Waste collection, recycling and cleaning of streets and facilities		√
Waste management – illegal dumping	√	√
Residential and commercial development		
Establish State Environmental Planning Policies (SEPP) to assess development applications which are considered as state significant development. In such cases, SEPPs can overrule council's policies and l plans.	√	
Devise local land-use plans for council, e.g. Local Environmental Plan (LEP) and Development Control Plans (DCPs) which specify types of permissible land uses and buildings, that can be constructed on land; and plan to accommodate targets of growth for population, dwellings, businesses etc. set by state government.		√
Assess and determine development applications under the LEP, DCPs and SEPPs.		√
Make sure compliance through enforcement of conditions of consent on developments and in case of any breaches of conditions report to the Building Professional Board – State Government.		√

Source: Adapted from Warringah City Council's *Strategic Community Plan 2012* (p. 46, State and Local Government responsibilities)

Within this broad regulatory framework, councils in NSW are increasingly using planning to address climate change through adopting a wide variety of mitigation and adaptive measures. For example, for adaptation, councils are utilising various planning instruments to help their communities adapt to the impacts of climate change such as rising sea-level, increase in the frequency and intensity of storms, floods, bushfires, and drought. For mitigation, councils' efforts involve exercising their role as the approving authority in the assessment of development or changes in land use proposals through imposing relevant conditions and playing leadership roles in promoting measures such as energy efficiency, renewable energy and active transport to reduce their community's GHG emissions.

6.3 Councils' policy responses to climate change

In this section, the results from the desktop survey of councils' relevant policy documents and the results from the targeted online survey of council officers are presented.

6.3.1 Results – desktop survey

In the desktop survey, all 152 NSW local government websites were reviewed to assess publicly available information on climate change. The investigation focused on identifying:

i) information that relates to addressing climate change;

ii) current strategies, actions and plans that relate to reducing emissions;
iii) specific sectors and actions focusing on reducing emissions;
iv) extent of engagement in terms of covering council and community emissions; and
v) variation in the degree, form and nature of actions based on location and size.

The desktop survey shed light on NSW councils' overall climate change engagement and actions and helped to identify specific issues for a more thorough and in-depth investigation through the targeted online survey.

Before turning to the results of the online survey, it is interesting to note several important findings from the desktop survey about councils' approach to addressing climate change:

1) Generally, most councils demonstrate awareness and commitment to respond to climate change. However, the nature of that response varies significantly. While many councils do not specifically provide information on their websites about climate change, they include relevant information within their overall strategic plans, risk and resilience action plans and other policies listed within the IP&R framework.
2) Most councils are found active in undertaking various measures in certain areas of their operations to reduce GHG emissions. However, these actions are often pursued without formulating any comprehensive

climate action plans. Such actions are either explicitly identified as actions undertaken to address 'climate change' or more often as one of the many components to address 'sustainability' in the councils' CSPs;

3) Councils are not active equally in all strategic sectors under their jurisdictions in pursuing GHG-reduction initiatives. They concentrate their efforts in a few selected areas and are more energetic in those sectors where NSW state policy requires action and where there is opportunity for funding;
4) Councils are more active in reducing emissions from their operations including the facilities and assets owned by them ('corporate level') than from their community and local businesses ('community level');
5) Councils located within the GMR of Sydney with a higher population (i.e. over 50,000) engage in more mitigation-related activities than councils situated beyond the GMR with smaller populations (i.e. less than 15,000). This demonstrates a particular urban bias.
6) Generally, it is observed that rural and coastal councils' priority around climate change is focused more on adaptation than mitigation, in contrast with metropolitan and large urban councils, whose priority is focused more on mitigation than adaptation.

6.3.2 Results – online survey

Informed by the above findings from the desktop survey, the online survey investigates a number of specific questions that relate to councils' initiatives to reduce GHG emissions:

1. What types of council policies are currently in place that relate to reducing emissions?
2. How well these policies reflect councils' awareness of climate change?
3. How well are these policies informed by the analysis of the impacts of climate change on local jurisdictions?
4. What sectors and areas of council operation are considered for attention by these policies and which sectors and areas receive the greatest and least attention?
5. What type of GHG abatement measures are adopted and which measures are most and least utilised?
6. Do the traditional contextual variables (i.e. council's location and size) affect the extent and quality of council's climate actions?

Overall, the results show that many GHG reduction-related measures were being considered, planned, and implemented by NSW councils at the time the survey was administered (July to December 2015). However, of the respondent councils who were active, most of them were acting without a comprehensive climate change policy, strategy or action plan.

Table 6.2 presents a summary of the number and types of policies utilised for GHG-reduction-related measures in the sample (n=71). The overwhelming majority (i.e. 86% or 61) reported having a policy or set of policies to address climate change. While a limited number of these councils (i.e. 25% or 18) reported having a 'dedicated or specific climate change strategy or climate action plan', the majority of them (i.e. 60% or 43) reported having no specific policy — climate change being addressed broadly under a 'sustainability'

heading in another policy or set of policies. Only 14 per cent (10 councils) stated that they do not have a policy or an action plan to tackle climate change, but they did have a variety of energy-saving measures that also lead to reduction of GHG emissions.

Table 6.2: Variation in the types of policy responses

Type of policy response	Relevant policies	Location		Total	
		GMR	Beyond-GMR	%	Total
1. Specific climate policy, strategy or action plan (n=18)	Community Strategic Plan, Climate Change Strategy or Action Plan, Cross Departmental Climate Change Action Plan, Environmental Sustainability Strategy	08	10	25	18
2. Policy is designed to address climate change generally under 'sustainability' (but no specific climate policy) (n=43)	Community Strategic Plan, Cross Departmental Climate Change Action Plan, Environmental Sustainability Strategy	05	38	60	43
3. No policy (but measures adopted to reduce energy usage) (n=10)	Energy Savings Plan	05	05	14	10

Number of participants, n=71

Source: Author (Online survey of NSW local governments, 2015)

Of those councils who have a policy (or set of policies), 69 per cent reported that they cover climate change mainly within their CSP, 39 per cent in a Cross Departmental Climate Change Action Plan, 32 per cent by their Environmental Sustainability Strategy, and 12 per cent within an Environmental Management Plan (12%) (see Table 6.3).

Table 6.3: Relevant council policies that address climate change

Relevant Policies	%	Total
Community Strategic Plan (CSP)	69	49
Cross Departmental Climate Change Action Plan	39	28
Environmental Sustainability Strategy	32	23
Dedicated (department-specific) climate change policy and/or action plan	25	18
Environmental Management Plan	12	09

Number of participants, n=71

Source: Author (Online survey of NSW local governments, 2015)

Evaluation of the quality of the policies

This section examines the identified policies, strategies and plans to analyse how well councils recognise the underlying concepts of climate change and undertake necessary measures for mitigation of climate change. To be effective, local government policies related to climate change should indicate three critical components: firstly, a sound awareness of climate change; secondly, a systematic assessment of the impacts of climate change on its jurisdiction, and thirdly, concrete actions to address climate change (Tang,

Brody, Quinn, Chang, & Wei, 2010). The presence of these critical components is considered vital for effective incorporation of climate change mitigation and adaptation into local climate policies (Bedsworth & Hanak, 2013; California Climate Change Center, 2006; ICLEI [International Council for Local Government Initiative], 2008; UKCIP, 2003). With this understanding, the contents of the policies, strategies and plans identified from the online survey were evaluated based on the three components: (1) Awareness; (2) Analysis; and (3) Action (as identified in Tang et al., 2010) — which are defined as follows:

1) *Awareness* assesses the level to which councils' policies, strategies and plans reflect councils' understanding of climate change. Councils are expected to know about the scientific evidence of a changing climate and global warming (Lindseth, 2004). This should be reflected in their policies through clear identification of the impacts of climate change on local jurisdictions (Tang et al., 2010);
2) *Analysis* assesses whether a council identifies the sources and contributors to climate change and maintains a GHG-emissions inventory for the local jurisdiction (Angel et al., 1998). It also identifies long-term goals, detailed targets and tools and software used to track progress in GHG-emissions reduction (Bedsworth & Hanak, 2013);
3) *Action* considers how council plans to reduce GHG emissions. Council's policies should identify targeted sectors, areas of operation under their jurisdiction (i.e. corporate and community) and specify abatement actions and how such actions are integrated with other

council policies and plans (Bedsworth & Hanak, 2013). The strategy should also identify appropriate measures to achieving and quantifying a reduction in emissions (Tang et al., 2010).

Awareness component of the policies

In evaluating the level of awareness in council policies of the concept of climate change, the survey investigated the extent to which councils address the impacts of climate change on local groups in the CSPs. Three levels of awareness were defined:

1) Awareness is considered 'poor' when no consideration was found in the CSP to address the impacts of climate change on local jurisdictions.
2) Awareness is considered 'limited' when a council demonstrates concern in the CSP about the impacts of climate change on local jurisdiction but fails to put a strategy in place to address them.
3) Awareness is considered 'good' when a council identifies the impacts of climate change on local jurisdiction in the CSP and has long-term goals and a strategy to address them.

Overall, the majority (i.e. 60% or 34) of the participating councils (n=56) indicated through their CSPs a 'good' level of awareness, 32 per cent (18) 'limited' awareness, and only 7 per cent (4) 'poor' awareness of climate change. Among the councils with a 'good' degree of awareness, 14 of them possess a 'specific climate policy or strategy and 20 of them have 'sustainability'-related policies. In contrast, among the councils with 'limited'

and ‘poor’ awareness are mainly the councils (i.e. 16 and 4, respectively) with ‘sustainability’-related policies only (see Table 6.4).

When location is considered, among the councils with ‘good’ awareness, 59 per cent (20) of them are from the Sydney GMR and 41 per cent (14) of them are from Beyond GMR. In contrast, among the councils with ‘limited’ and ‘poor’ awareness, the overwhelming majority of them are from Beyond-GMR councils (i.e. 11 and 3, respectively).

Table 6.4: Extent of awareness of climate change in the policies

Awareness level	**Type of policy response**						
	Specific climate policy/ strategy (n=18)			Climate change addressed broadly under ‘sustainability’ (n=43)			**Total** (n=56)
	GMR	Beyond-GMR	Total	GMR	Beyond-GMR	Total	
Poor	00	00	00	01	03	04	04 (7%)
Limited	00	02	02	07	09	16	18 (32%)
Good	08	06	14	12	20	20	34 (60%)

Source: Author (Online survey of NSW local governments, 2015)

Analysis component of the policies

The analysis component evaluates the depth of analysis that informed councils’ policy development related to climate change in terms of three indicators:

1) GHG-emissions inventory;

2) base year of GHG-emissions and patterns in future emissions; and
3) GHG-reduction targets.

GHG-emissions inventory is an essential component of any emissions-reduction program which keeps account of the sources and amount of GHG-emissions. It highlights the possible areas for emissions reduction and presents a baseline to monitor emissions over a period. Emissions inventories, a baseline for tracking future emissions and specific emissions-reduction targets are considered reliable indicators of council's explicit intention of reducing emissions by undertaking a detailed program (Bedsworth & Hanak, 2013).

Table 6.5 shows that overall, the Analysis component of the policies is weak for all three indicators. While 54 per cent (31) of the respondent councils (n=57) have specific GHG-reduction targets, only about 23 per cent (13) of them maintain a GHG-emissions inventory and have set a base year of emissions and predict future emission trends for local jurisdictions. Notably, all of them are councils with a specific climate policy/strategy. In contrast, none of the councils without a specific climate policy/strategy maintain a GHG-emissions inventory nor have set a base year of emissions and predict future emissions trends.

When location is considered, among the councils with specific GHG-reduction targets (n=31), 64 per cent (20) of them are from the GMR and 35 per cent (11) of them are from Beyond-GMR councils. Eight of the GMR and five of the Beyond-GMR councils maintain a GHG-emissions inventory and have set a base year of emissions and predict future emission trends for local jurisdictions (see Table 6.5).

Table 6.5: Depth of analysis in the policies

Depth of Analysis	Type of policy response						
	Specific climate policy/strategy (n=18)			Climate change addressed broadly under 'sustainability' (n=43)			Total
	GMR	Beyond - GMR	Total	GMR	Beyond - GMR	Total	
GHG-emissions inventory	08	05	13	00	00	00	13 (23%)
Base year of emissions & future trends	08	05	13	00	00	00	13 (23%)
GHG-reduction targets	08	05	13	12	06	18	31 (54%)

Number of participants, n=57

Source: Author (Online survey of NSW local governments, 2015)

Most of the councils that have a GHG-emissions inventory reported that they mainly maintain a regular baseline inventory for their corporate emissions. A range of accounting methods, tools and registries are used by councils to develop inventories for their corporate emissions. For example, smaller councils mostly maintain their databases internally and set up spreadsheets to assess emissions, while larger city councils and larger regional councils tend to employ consultants like Planet Footprint to track their corporate emissions.

Unlike the baseline inventory for corporate emissions, most councils do not maintain a baseline of their community's emissions. The most common reported barrier in developing and maintaining an inventory of community emissions is defining a suitable method to accurately measure a community's GHG emissions. Other common barriers included the lack of direct control over emission sources, limited capacity to do the evaluation, and absence of guidance and funding from federal and state governments.

Action component of the policies

The action component evaluates the policies in terms of three indicators:

1) Policy domains, which identifies targeted sectors for action;
2) Targeted areas — identifies corporate areas of operation for action like council facilities and operations and community-level action areas including residents and local businesses; and

3) Policy integration — identifies the measures taken to integrate policies related to climate change with other council policies/strategies/plans.

1) Policy domains

The online survey sheds light on which specific policy areas councils are most actively pursuing in order to reduce GHG emissions in NSW. The desktop survey of the publicly available information on councils' websites indicated that councils are not equally active across all strategic sectors under their jurisdiction.

The online survey has identified the policies and programs that seem to have most traction among local government for GHG abatement-related actions. The domain with the highest levels of implemented activities that relate to GHG-emissions reduction is concerned with energy and the least is transport (refer Table 6.6).

Most councils (i.e. 91% or 60) reported adopting 'energy-related measures', which mostly focus on energy-efficiency measures, solar installations, co-generation and LED street lighting. This is followed by waste management (i.e. waste reduction, recycling and land-fill gas capture), with 81 per cent of councils participating; water-use efficiency, with 78 per cent of councils participating; and promoting active transport (i.e. public transport, bicycling and walking through land-use planning that reduces driving), with 59 per cent of councils participating.

Measures aimed at reducing GHG emissions in the transport sector are the least often undertaken by councils across NSW. This trend reflects local government's limited legislative and regulatory authority in the transport domain. Switching to low-carbon and fuel-efficient council vehicle fleets is a common initiative pursued by most councils in this area. For individual residents, council efforts are limited to addressing motorised individual travel behaviour through demand management.

Table 6.6: Specific policy domains of councils' GHG-reduction actions

Policy Domain	**Type of policy response**						
	Specific climate policy/strategy (n=18)			Climate change addressed broadly under 'sustainability' (n=43)			**Total**
	GMR	Beyond GMR	Total	GMR	Beyond GMR	Total	
Energy	08	10	18 (27%)	22	20	42 (63%)	60 (91%)
Waste	08	09	17 (25%)	21	16	37 (56%)	54 (81%)
Water	08	08	16 (24%)	21	15	36 (54%)	52 (78%)
Transport	07	08	15 (22%)	16	08	24 (36%)	39 (59%)

Number of participants, n=66

Source: Author (Online survey of NSW local governments, 2015)

As reported previously in Karim et al., 2017 the larger councils surveyed (61%) pursue ‘multiple measures’ (n=67) more in their action plans than do smaller councils (10%) (see Table 6.7 on page 233). When council’s location and size are taken into consideration jointly, it is observed that large GMR councils (43%) aim for ‘multiple measures’ more than do small Beyond-GMR councils (9%) (Karim et al., 2017).

Table 6.7: Variation in types of adopted mitigation measures

Combination of adopted measures	GMR Councils (n=38)	Beyond-GMR Councils (n=37)	Distribution Based on Location & Population						TOTAL (n=75)
			GMR			Beyond GMR			
			L	M	S	L	M	S	
Only 'energy efficiency' measures	00	04	00	00	00	01	00	03	04
Multiple measures (both energy- and non-energy-related measures including 'active transport')	25	17	19	05	01	08	07	02	42
Multiple measures (both energy- and non-energy-related measures excluding 'active transport')	12	13	10	02	00	04	05	04	25

Note: S: small local council (less than 15,000 population); M: medium-sized council (over 15,000 but less than 50,000 population); L: large council (over 50,000 population); number of participants, n=75.

Source: Author (Online survey of NSW local governments, 2015)

2) Targeted areas

For targeted areas of actions, all the participating councils (n=71) considered actions to reduce corporate emissions from their own facilities and operations. Among them, 42 per cent target both 'corporate emissions' and 'community emissions' (i.e. residents and local businesses) and the remaining 57 per cent limit their actions to their own facilities and operations (see Table 6.8). This is not surprising as the opportunity for control is typically much higher within council's own operations than over community-level emissions.

It is also noted that the councils with a specific climate policy/strategy (66%,12) are more likely to target both council and community emissions compared to councils who do not have a specific climate policy or strategy (41%, 18).

When location is considered, it is found that 46 per cent (14) of councils within the Sydney GMR conduct climate change actions that cover both 'Council and community emissions' (n=30), while this is the case for 53 per cent of the small beyond-GMR councils. It appears that small beyond-GMR councils are slightly more active than GMR councils in engaging with their communities. It is likely that the smaller size of these beyond-GMR councils has encouraged them to engage with their communities through operating small-scale programs to reduce community emissions (refer Table 6.8).

Table 6.8: Targeted areas of actions

Targeted Areas	**Type of Policy Response**						
	Specific climate policy/ strategy (n=18)			Climate change addressed broadly under 'sustainability' (n=43)			**Total**
	GMR	Beyond GMR	Total	GMR	Beyond GMR	Total	
Only Council	03	03	06	19	16	35	41 (57%)
Council and Community	05	07	12	09	09	18	30 (42%)

Number of participants, n=71

Source: Author (Online survey of NSW local governments, 2015)

Commonly, targeting 'corporate emissions' involves energy-saving measures focusing on retrofitting council's own assets and facilities such as council buildings, community libraries and community centres, childcare facilities, swimming pools or launching energy-efficiency standards for new council building. Larger councils, mostly city councils in the GMR and larger regional councils, reported undertaking initiatives of installing low-carbon energy infrastructure such as the provision of renewable and/or low-carbon energy supply and commitments to reduce use of carbon-intensive energy and purchase 'green power'.

Councils active in engaging their communities in climate action focus mostly on building sector which includes both residential and commercial buildings. Such initiatives include regulatory, technological, and behavioural means to reduce buildings' energy demands. Most technological means involve using

techniques to persuade households and local businesses to make their residential or commercial buildings and facilities more energy efficient and/or providing incentives for the installation of solar PVs. Behavioural means focus mainly on reducing energy demand by encouraging adoption of various sustainable practices for more efficient use of energy.

Council's support includes offering free evaluations of energy use for households and businesses, distributing free energy-auditing toolkits, and conducting educational workshops on energy-saving measures. Raising public awareness strategies — such as Newcastle's 'Climate Cam', which is used to publicly display carbon emissions from specified zones across council jurisdiction — are also used.

3) Policy integration

In terms of integration of policies related to climate change with other council policies, among the participating councils (n=66), the majority (about 60%) reported linking their climate change related policies and measures with other council policies including their CSPs. However, only 13 per cent of councils were found to have linked these with their Operational Plans (OPs) and Delivery Plans (DPs); and only 38 per cent and 45 per cent of councils, respectively, implemented specific measures to integrate these with their Local Environmental Plans (LEPs) and Developmental Control Plans (DCPs) (see Table 6.9).

Council's location appears to play a role in its effort to integrate climate actions with other council activities. More GMR councils (80%) are found active than

beyond-GMR councils (77%) in undertaking measures to integrate their climate policy and program with other council policies and programs (see Table 6.9).

Table 6.9: Integration of GHG abatement measures with other policies

Specific policies and plans	**Type of policy response**						
	Specific climate policy/ strategy (n=18)			Climate change addressed broadly under 'sustainability' (n=43)			**Total**
	GMR	Beyond-GMR	Total	GMR	Beyond - GMR	Total	
Community Strategic Plan (CSP)	05	07	12	15	13	28	40 (60%)
Operational Plan (OP) & Delivery Plan (DP)	01	01	02	03	04	07	09 (13%)
Local Environmental Plan (LEP)	04	06	10	10	05	15	25 (38%)
Developmental Control Plan (DCPs)	04	07	11	11	08	19	30 (45%)

Number of participants, n=66

Source: Author (Online survey of NSW local governments, 2015)

6.3.3 Key findings

The above evaluation of the extent and quality of NSW councils' policies, strategies and measures related to climate change has identified a number of important findings:

1) Generally, while most councils reported having some form of policy to reduce GHG emissions in their local jurisdictions, there is an apparent absence of verifiable data and analysis-based strategies to inform the formulation of these policies. Particularly, there is notable absence of transparency with respect to GHG emissions inventories, abatement strategies and reporting on the impact of the adopted measures.
2) Most councils are acting without having formulated a comprehensive climate change policy, strategy or action plan. The GHG abatement-related actions of these councils are based on single-issue projects or plans. Most of them do not maintain a GHG-emissions inventory and often do not have any specific target or long-term goals to reduce emissions.
3) Only a handful of councils (18) are identified with specific climate policies, strategies or action plans. These are mostly larger councils (i.e. over 50,000 population), particularly city councils in the GMR (8) and larger regional councils (7). These councils demonstrate greater awareness of climate change, are more likely to maintain a GHG-emissions inventory and have specific GHG-reduction targets with an implementation strategy to achieve their goals. They are

also showing leadership in engaging with their communities to help them set and achieve the community's emissions-reduction target.

4) In contrast, while most of the smaller councils (i.e. less than 15,000 population) and medium-sized councils (i.e. 15,000–50,000 population), particularly smaller regional councils, claimed to have targets to reduce emissions, they have not yet committed to specific measures that would enable these targets to be met.
5) Most councils are active in undertaking actions to limit GHG emissions from their own facilities and operations ('corporate emissions'), but most do not have strategies for engaging with their communities, or policies and measures for influencing the path of community emissions. Some councils offer simple guidance such as support for community events, information or rebates.
6) Councils are not equally active across all strategic sectors under their jurisdiction in pursuing GHG-reduction initiatives, tending to concentrate their efforts on specific sectors. Gauged by councils' formal policies and programs, the survey reveals that the domains with the highest levels of implemented activities and programs that relate to GHG-emissions reduction are related to energy and the least is transport.
7) For most councils GHG reduction is considered in specific sectors or areas in the CSP, but the strategies either have not been fully developed or integrated or are not aligned with other sectoral policies. As a result, the strategies lack the strength that would

otherwise result in reduction of emissions, thereby raising questions about their value.

8) In most cases, information about mechanisms to determine and track the effectiveness of the actions in the policies are vague. In addition, there are no performance indicators against which the effectiveness of various actions could be measured. While some councils do have performance indicators, their nature and form (i.e. quantitative vs qualitative) varies widely across councils. Moreover, the lack of standardisation of indicators makes it difficult to use such indicators as reliable tools to compare performance among councils. In addition, documents sometimes fail to emphasise the importance of data collection: without this it is impossible to determine how effective each action has been in reaching targets.

6.4 Climate consideration in local government policy processes

Local government in NSW is required to develop a CSP for a minimum of ten-year period through consultation with the local community based on the principles of social justice which acts as Council's principal strategic planning document (LG Act 1993, section 402[1]–[7]). Previously, local government strategic planning was limited to mainly land-use planning related mostly to the management of the built environment and activities involved with land-use (Prior & Herriman, 2010). Such activities included preparation of local strategic land-use plans, such as LEPs (local environmental plans) and DCPs

(development control plans), along with related procedures to evaluate development applications and ensure compliance under those plans.

The CSP as part of the IP&R framework for NSW local government was introduced in response to 'a diverse series of influences such as the rise of participatory democracy, a desire for longer-term and more integrated forms of planning, as well as increasing concern about sustainability and social equity' in local government policy across Australia (Prior & Herriman, 2010, p. 47). The essential elements of the IP&R framework are outlined in Figure 6.2. The framework allows councils to draw their various plans together, to see how they work together, and to obtain maximum strategic advantages by their efforts of planning in a holistic way for the future (NSW Govt., 2013c).

Figure 6.2: Integrated planning and reporting framework

Source: NSW Govt., 2013c, p. 6

The concept of sustainability appears to be the dominant theme found across most councils' CSPs, and climate change is often dealt with as part of a council's broader sustainability agenda. This is not surprising, as local government has been required by the LG Act to incorporate ESD considerations into its operations since 1993, and the discourse around the subject has developed an international profile over the last twenty years (Urbis, 2010). However, despite being a concern for scientists and other key stakeholders for decades, climate change is, arguably, a relatively new concept for the broader community. In such a context, councils commonly tackle 'climate change' as part of their efforts to address 'sustainability' being the one of the various elements in the CSPs, which is evident in the findings from both the online survey and interviews:

> Council has not, for a number of years, taken a high priority stand on climate change. We do not have a climate change policy that says how we're going to address climate change. We've got a number of environmental issues and sustainability actions, but it's never been stated as climate change and these are the actions out of it. It's more often addressing our local area needs, like biodiversity and water catchment. Underneath all of those, we will demonstrate the benefits or actions for mitigation or adaptation. That will assist Council to be working towards addressing climate change, rather than the other way around. (Council in West Central region, interviewee, 2016)

6.4.1 Climate change is addressed as 'part of sustainability'

This approach of dealing with climate change as part of a 'broader sustainability' agenda has significant bearing on local government's current GHG emissions-reduction efforts. Generally, it is observed that, while most councils demonstrate a willingness to recognise and respond to climate change through endorsement in the CSPs, one notable feature of this approach is that most councils avoid using the term 'climate change' explicitly and often address it under the term 'sustainability' in their CSPs. When asked to clarify council's position in this regard one interviewee stated:

> I guess, our position is not to make things overtly about climate change. So, we have gone through the program and that kind of thing and identified the whole range of actions that have climate change benefits. But that's something that we keep internal and it is integrated across the organisation. But it's not something that we promote and publicise … I guess the trick for council is we try not to be too overt … we try not to mention climate change too much actually, just for political reasons, because it can be a sensitive topic. So, we find if we can focus things on other subjects that it's generally much easier to get things approved. So, while our Cooling the City Strategy does have a climate-change-related focus, it's really a policy about or a strategy about urban heat and talking about the urban heat island. (Council in Sydney's West region, interviewee 2016)

It appears that most councils consider it prudent to deal with climate change tacitly under 'sustainability' instead of publicising it overtly in their CSPs. This is not surprising given, politically, climate change has proven to be a

controversial policy area and some councils are not certain about engaging the local community in this regard. As another interviewee explained, their council found it safer to deal with ‘climate change’ by breaking it down into a number of issues under ‘sustainability’, as this helped to keep politics out of the programs:

> I think … because of the politics of climate change and the dialogue around climate change, it's always been a little bit safer to be proactive by breaking it down into energy, transport, water savings, coastal management, community education and involvement … So, the climate change priorities for us, in a way, have been done for a long time, but we've been focusing on those specific issues or components. So, the distraction of whether climate change was real or not, and how politically acceptable it was at different levels of government, was something that we were able to play down or avoid over the history of our activities. (Council in Sydney’s Central region, interviewee 2016)

6.4.2 Climate policy is subject to satisfying the ‘business case’

Local climate change policies are normally formulated by local government administrations in a fairly open process. The process involves consideration of any project, action or policy measure that relates to climate change within the broader context of council’s CSP, having regard to the main priorities and objectives set out in the plan and the availability of resources, and then developing a business case with respect to cost and benefits. In explaining the process of taking up local climate actions, one interviewee stated:

> The challenge is getting the [climate] policy into some sort of "operational document". So, the primary document we have in Council is the Community Strategic Plan [CSP], which has a number of long-term objectives or goals and one of those relates to environment. So, in developing a business case for a project you must put it into the context of the Community Strategic Plan. And that's a sort of driver if you need longer-term goals. There is a process for getting things into what's called the "delivery program". There's a whole bunch of processes that goes on ... and it means any project has to stack up against the requirements of the Community Strategic Plan and meet the "business case" specifications to be approved. (Council in Sydney's North region, interviewee, 2016)

The above statement suggests that to be adopted by council, it is important that proposed policies, measures or projects related to climate change present a good business case that can be demonstrated to have a positive cost-benefit ratio within a reasonable timeframe. Currently, those that demonstrate a beneficial effect on the budget or on the local economy will be prioritised.

6.4.3 Climate change poses institutional challenge for councils

Local councils are made up of elected councillors and various departments responsible for providing particular service to their citizens, such as corporate division is responsible for council's financial planning, city planning division is responsible for strategic planning and development assessments and community service division is responsible for delivering various community services such as infrastructure, libraries, waste services, street cleaning, public swimming pool etc. Due to difference in the type, nature and form of

services there are significant variations in the agendas, values and priorities set by different departments. For most councils, there is no specific department assigned to deal with climate change, so it is often left with the environmental department to be considered as part of its broader sustainability role. This is reflected in most councils' responses in the online survey, where councils generally address 'climate change' based on single-issue plans or projects as part of the many components of sustainability under the CSP (refer section 6.7.2).

In the absence of any specific order from senior management or a specific policy about climate change, and without support from councils' executive, this approach cannot give clear direction to staff across different departments and fails to integrate required action into their different work processes, as one interviewee explained:

> … it's [climate change] not always addressed as an "afterthought", but it's addressed as part of Council's general administrative process … but I suppose, it all comes down to Council and how they look at those higher-order policies and how they use them. If you try to drive them from the bottom, it tends to lose its importance ... you need it come from the top ... I think currently climate change in Council tends to be "bottom-up" ... that is, it resides in the environment department and unless that department is integrated throughout the organisation and allocated resources to do that, climate action is very difficult to carry out. (Council in Sydney's Illawarra region, interviewee, 2016)

6.4.4 Climate policy integration with other policies

Most councils' climate actions are based on single-issue based projects or plans. Such approach to climate action usually follows certain guidelines with the intention to focus on selected issues related to climate change and tackle them individually. This approach is convenient in terms of administering, managing and implementing projects and achieving certain specific outcomes. However, the problem with such approach is projects are often developed in isolation de-touched from other council policies and programs, there by failing to attain harmonisation with other policies and resulting in policy conflicts (Fallon & Sullivan, 2014; Morrison & Pickering, 2013; Pittock, Hussey, & McGlennon, 2013). For example, a risk assessment-based approach to adaptation target number of selected potential impacts to be tackled in the adaptation plans. This limits the scope of such plans in addressing the complex of multiple impacts that may clash with the interest of other councils beyond the local jurisdiction (Morrison & Pickering, 2013). Thus, councils' single-issue based projects or plans to address climate change are unable to achieve the benefits of policy synergy and may not protect against potential policy conflicts. Acknowledging councils' limited integration of policies related to climate change with other council policies, one interviewee said:

> Well, it's a challenging issue. There is always concern for consistency. And you want to make sure that if they are implementing a policy around an area that impinges on climate change that the policy and other policies in relation to mitigation will be considered in whatever the proposal may be ... for example, a new building or something like that. That works to an extent, but I think it's fair to say it's not fully integrated across

> Council's numerous organisational units. There are some units that have taken up climate change mitigation fairly actively but in other parts of the organisation there is a less well-developed sense of ownership. So, that's a work-in-progress. (Council in Sydney's Illawarra region, interviewee, 2016)

6.4.5 Lack of federal and state government funding

In recent years both the federal and state governments stopped funding specific climate-change projects for local government, making it even harder for councils to continue their limited climate-change-related work. Many councils, which were reliant on such funding, were forced either to scale down or stop these programs altogether. One council officer observed that political uncertainty surrounding climate change at the national level may have contributed to state government withdrawal of support to local government in this regard:

> With the state government … my feeling is their ability to assist us has reduced over the last probably five years, in the assistance effort, the work that they could do with Council. There's been a big change towards waste, it's the big initiative. We are still working closely with them around that and perhaps renewable energy from waste but they're certainly … their ability, staff, and resources around climate change have been reducing dramatically in the last number of years … and the political system does it … So, we no longer have a stream of funds (available) to do any sustainability initiatives. That's the state government policy saying, "We'll take all this money for landfill [of] your waste. You can only have it back if you spend it on waste." So, we have almost, I believe, an embarrassment of funds around what we can do with waste because that's the

> priority the state government has set. As part of that initial sustainability funding, they made us do things like an Energy Management Plan and a Water Plan and an Environmental Action Plan. We had to demonstrate in a particular format how we were achieving these things, and climate change is very much a part of that. That was actually very good because it made us develop these action plans. We had, as I said, support from the WASIP, the Waste and Sustainability Program initiative, I think. We had the plans adopted by council … they were wonderful programs. I mean, well we worked with them in their program, so we were very supportive there. All of that is gone. So now, it's almost, it's my personal opinion … as if, the state government said, "Great. We're done with that. We have done all that we need to do with climate change and helping local government." I can do it as business as usual now. (Council in Sydney's Central region, interviewee, 2016)

Funding is critical, particularly for those councils with a low revenue base, because in the absence of such funding, councils look to finance their climate change actions within existing departmental budgets. Considering the limited budget, councils need to prioritise actions:

> I really hate to say it, but it comes down to available funding. And if the money is there, Council will make sure its staff is trained to be able to do all of these things. But until the money is available, that will not happen … if there's money there that we have to spend on climate change, adaptation, or other tried low-carbon economy issues, Council will make sure that its staff is on board working on that project, prioritising projects that [have] lower-carbon emissions. But if there's no money available, they simply won't do it because it's not a priority. (Council in Sydney's Central Coast region, interviewee, 2016)

6.4.6 Policy uncertainty impacts councils' climate actions

Frequent changes of both federal and state government positions and support for climate change create uncertainties among local communities, which make councils reticent to make long-term commitments, including investing their limited resources, to dealing with climate change. One of the interviewed officers highlighted how these uncertainties make it difficult for councils even to undertake policy formulation that relates to climate change:

> … the way the community reacts to all the levels of the government does not give great confidence in being able to set a consistent policy or work towards a consistent goal, because there is so much discourse and that does feed down into the community and create confusion and conflict. So, for instance, there has not been any study on climate change risks [in our area] which Wollongong and Shoalhaven Council have been through and Shoalhaven has created a lot of discourse and angst within the community and we are yet to go through that process. But it will be the same here, because it's just such a controversial topic. (Council in Sydney's Illawarra region, interview, 2016)

In the absence of any clear and consistent direction from the higher levels of government, councils are undertaking their climate change measures with little coordination and often with different results:

> … we get into situations where everyone [is] acting on their own ... like you have some really good stuff going down in Eurobodalla Shire in terms of research in sea-level rises ... which they did in partnership with Shoalhaven Council ... Then Eurobodalla used that research and implemented it whereas Shoalhaven used that

> research and implemented it in a different way. So, even when they partnered on the same project and found the same thing ... the two councils used it in a completely different way. (Council in Sydney's South-eastern coastal region, interviewee, 2016)

6.5 Climate change in the NSW planning law and planning system

While policies, strategies and plans are indicators of local government's explicit intention to drive local climate actions, they are not legally binding and do not have statutory force. The extent of their implementation largely depends on existing legislation. This section of the research examines the NSW Government's planning laws that determine local government's ability to control GHG emissions through planning, environmental assessment and development-control processes, which collectively constitute the planning system. It focuses on assessing the major planning law in NSW — the Environmental Planning and Assessment Act 1979 (NSW) (EP&A Act) — as this Act dictates NSW local government's ability to consider, control or reduce GHG emissions through the planning system.

6.5.1 No clear direction on climate change in the EP&A Act

While the NSW Government has incorporated ESD (Ecologically Sustainable Development) in a range of environmental laws, including the EP&A Act (Williams & Williams, 2016), the Act does not contain any specific consideration for the potential impacts of climate change nor does it mandate actions to reduce GHG emissions, either in its objectives or its operational

provisions (Ghanem & Ruddock, 2011; Sahukar, 2018). In addition, while local councils have received significant support and encouragement to become 'sustainable', their role in relation to 'climate change' has not formally been defined by state or federal governments (Urbis, 2010). In the absence of any explicit reference in the Act for this purpose, climate change and GHG emissions are addressed in the NSW planning system in a more indirect way through the operation of ESD. In NSW planning, pollution and environmental legislation, ESD asks for the incorporation of environmental, social and economic considerations in decision-making, on principles embedded in ESD (Ghanem & Ruddock, 2011). Such application is derived from the guidelines provided under section 6 of the *Protection of the Environment Administration Act 1991* (NSW) (POEA Act), which include:

- 'the precautionary principle (i.e. that scientific uncertainty should not delay action to avert serious harm);
- conservation of biodiversity and ecological integrity as a fundamental consideration;
- intergenerational equity (and intra-generational equity); and
- full valuation of environmental costs and benefits (including the polluter-pays principle)' (NSW Govt., 1991, Section 6 of POEA Act).

The notable absence of an explicit objective or purpose regarding climate change in the EP&A Act creates two clear legislative and policy challenges for both statutory and strategic stages of the planning process. Firstly, for statutory planning it provides weak legislative provisions to effectively consider limiting GHG emissions at the development-assessment stage. Secondly,

there is no direction and framework to consider climate change at a strategic (especially regional) planning level.

6.5.2 Weak provisions in the EP&A Act to limit GHG emissions through development assessment

Firstly, under Part 4 of the EP&A Act the procedure for assessing development applications has been outlined. For most cases, local government as the consent authority, is obligated to take into account the environmental, social and economic impacts of a development proposal. In considering these aspects councils are bound to consider all the factors listed under section 79C[19] of the EP&A Act (NSW Govt., 1979). In making determination, councils 'must evaluate the Statement of Environmental Effects (SEE) or Environmental Impact Statement (EIS) and associated reports, public submissions, relevant LEPs and SEPPs, likely impacts on the environment, the suitability of the site, and the "public interest". If approved, conditions may be imposed to minimise adverse impacts on the environment' (Sahukar, 2018, p. 74). Since there is no clear obligation under section 79C to take into account the climate impacts of a development proposal, climate change is currently addressed in an indirect way 'under a general requirement to consider environmental impacts' (Ghanem & Ruddock, 2011, p. 27). This limitation has given rise to 'an increased reliance on the Land and Environment Court's interpretation of the EP&A Act' to incorporate climate change consideration in

[19] Sections in the EP&A Act listed here are pre-changes to the EP&A Act which came in effect on 1 March 2018. These revisions did not change any of the substantive matters discussed here.

the assessment of development proposals with potential climate impacts (Ghanem & Ruddock, 2011, p. 28). For instance, the Land and Environment Court has observed 'the requirement to consider the "public interest" in section 79C of Part 4 requires the consideration of the principles of ESD, which would, in turn, necessitate the consideration of climate change' (Sahukar, 2018, p. 67). The court has interpreted that the 'public interest' warrants high-level consideration of ESD and its principles (Walker v Minister for Planning (2007) 157 LGERA 124; Minister for Planning v Walker (2008) 161 LGERA 423; Aldous v Greater Taree City Council (2009) 167 LGERA 13).

This approach is considered challenging when considering the 'precautionary principle' for the reason that, possibly, this issue has been viewed as the most difficult part of ESD (Sahukar, 2017; Williams and Williams, 2016). When challenged, the court must rely on the definition of the 'precautionary principle' as adopted in the Protection of the Environment Administration Act 1991 (NSW). This happened for several cases requiring the court's intervention to make determination (Walker v Minister for Planning (2007) 157 LGERA 124; Minister for Planning v Walker (2008) 161 LGERA 423; Aldous v Greater Taree City Council (2009) 167 LGERA 13).

At present, there is no clear direction for local government regarding what level of GHG emissions impact resulting from a development project should be considered as unacceptable that may give councils enough ground to refuse a proposal. For example, when assessing resource-extraction proposals under the *State Environmental Planning Policy (Mining, Petroleum Production and Extractive Industries) 2007*, there is no clear guidance on how to evaluate

the GHG emissions from the proposed project and what 'state or national policies, programs or guidelines' must be followed (Sahukar, 2017). This ultimately led councils to make decisions and attach approval conditions which are generally ineffective and not legally enforceable. This is reflected in the determinations of several recent projects with significant GHG emissions impacts (Ghanem & Ruddock, 2011; NSW Government, 2015; Sahukar, 2017).

Thus, it can be concluded that there is currently no explicit obligation in the EP&A Act for local government being the consent authority to consider climate change and enforce measures to reduce the GHG emissions that may result from proposed developments through the development assessment process. Overall, current requirements in the EP&A Act in this regard are ambiguous and inconsistent.

6.5.3 No framework for climate planning at strategic level

Secondly, at the strategic planning level, Parts 3 and 3B of the EP&A Act deal with the management of the use of land and natural resources through a high-level process. The provisions require regions to be considered holistically rather than focusing only on individual sites through development applications and rezoning instruments. This is to ensure that decisions made at the development assessment stage conform with long-term environmental, social and economic goals and consider changing conditions of the regions.

To deliver these goals councils are required, firstly, to consider relevant state-level policies, and secondly, to follow state guidance in developing local planning instruments.

State Environmental Planning Policies (SEPPs)

The EP&A Act grants power to the NSW Government to legislate SEPPs, which address strategic planning issues related to environment of state significance. SEPPs give directions regarding how land is developed, and natural resources are used, managed and conserved across NSW (NSW Govt., 1979). SEPPs are currently developed by the Department of Planning and Environment at the discretion of the Minister for Planning. While it is generally required to conduct public consultation before SEPPs are made, currently no formal community consultation is undertaken in the process of making a SEPP.

SEPPs are powerful legal instruments and very important part of the planning system. They can override LEPs and development controls (Huntlee Pty Ltd v Sweetwater Action Group Inc; Minister for Planning and Infrastructure v Sweetwater Action Group Inc (2011) 185 LGERA 429; (2011) NSWCA 378).

Given SEPPs are powerful strategic planning instruments they have the potential to be utilised for effective control of GHG emissions through the planning system. However, to date the use of SEPP for such purpose is very limited. Currently, there are only two SEPPs that explicitly refer to GHG emissions. The relevant provisions in these SEPPs stipulate that consent to development must not be given unless conditions aimed at reducing GHG

emissions are considered (SEPP (Mining, Petroleum Production and Extractive Industries) 2007; SEPP (Building and Sustainability Index) 2004). As pointed out earlier there is very limited scope for councils in making determination based on these SEPPs that could effectively control GHG emissions.

The above analysis suggests despite having the opportunity to utilise SEPP in controlling GHG emissions, currently no single comprehensive SEPP exist that could effectively integrate consideration of climate change into all decision-making under the EP&A Act through the operation of the planning system.

Standard Local Environmental Plans (LEPs)

All councils in NSW are required to follow a standard instrument — the Principal Local Environmental Plan in developing their respective LEPs. This is to ensure that all LEPs are uniform and that standard zonings and terms are used throughout NSW (NSW Govt., 2006a, b).

In relation to climate change, there is a mandatory clause 5.5 in the Principal LEP that requires: 'all development consent authorities within the NSW Coastal Zone consider the effect of coastal processes and coastal hazards and potential impacts, including sea level rise on the proposed development, and arising from the proposed development' (NSW Govt., 2006b, Clause 5.5 of Principal LEP). However, since the clause is not legally enforceable, most councils adopt it as an aspirational element in their LEPs (EDO NSW [Environmental Defender's Office], 2008). Such aspirational provision in the LEPs is found inadequate to stop development in the coastal zones if

applicants can show that potential climate change impacts on and/or from the proposed development are sufficiently considered.

Regarding mitigation, 'there is nothing in the Standard LEP to encourage energy-efficient or climate-friendly building beyond the existing requirements for new residential development under the State Environmental Planning Policy (SEPP) (Building Sustainability Index: BASIX) 2004 (BASIX)' (Ghanem & Ruddock, 2011, p. 23). This has been confirmed in the findings of the online survey, which reveals that there is a notable absence of appropriate mitigation provisions within councils' LEPs (see section 6.3.2). More specifically, councils do not have strategies codified within their LEPs either to undertake in-depth assessment of emissions or to mitigate emissions from a proposed development.

The above discussion reveals that, at present, there is no clear direction on climate change in the main planning law — the Environmental Planning and Assessment Act 1979 (NSW). The EP&A Act, as currently framed with no explicit reference to climate change, is inadequately equipped to consider climate change in a substantive manner at both strategic and statutory stages of the planning process. In the absence of adequate legislative support, the current planning regime in NSW is unable to effectively consider, control or reduce GHG emissions through the operation of the planning system.

6.5.4 Need for reform of the planning system

While environmental concerns were one of the main drivers for the development of the EP&A Act almost forty years ago, at that time climate

change was not a major issue, nor was sustainability per se. Hence the absence of any explicit reference to climate change as part of sustainability in the Act was not a problem. However, over the years as scientific consensus on climate change grew, there is now widespread acknowledgement of the necessity to update the Act to make it adequately equipped to effectively respond to the issues related to climate change. While currently climate change consideration is being addressed in an ad hoc manner through the operation of ESD in the Act, this approach is problematic. The interpretation of the Act by the NSW Land and Environment Court in determination of several cases suggests simple requirement to consider ESD cannot guarantee that ESD is given proper effect in decisions that effectively consider climate change (Drake-Brockman v Minister for Planning (2007) 158 LGERA 349).

To ensure climate change is properly considered in the operation of the planning system, the Act needs to be amended to incorporate explicit provisions that would require development to follow specific standards to reduce GHG emissions. As discussed earlier, currently, in the absence of such explicit provisions in the Act, the attempt made to address climate change impacts through SEPPs has not been effective. It requires the planning system to depend on judicial decision-making through the NSW Land and Environment Court, which is currently the pre-eminent mechanism for dealing with developers' challenges to council decision-making.

It is clear from the above discussion that amendments are required to the EP&A Act to incorporate explicit provisions to consider climate change and its impacts in both strategic and statutory planning processes. Such amendment

in the Act would ultimately support the development and adoption of an integrated assessment framework at the local government level. This would enable local government to comprehensively assess the climate change impacts of all development proposals through the operation of the planning system.

Since the passage of the EP&A Act, over 150 amendments have been made to respond to changing conditions. With the NSW state government performing badly on almost all planning indicators, there is widespread concern and recognition of the need to reform the planning system (EDO NSW, 2010a; Parliament of NSW, 2009; NSW, 2012a). In June 2011, the NSW Government conducted an independent review of the planning system. The review was done by an Independent Panel with terms of reference requiring the panel to recommend a statutory framework and required measures for implementing a new planning system for New South Wales (NSW, 2012a). The review found that planning law needs clear and stronger requirements for strategic (especially regional) planning. With reference to climate change, the panel advised that any new Act should establish clear objectives for strategic planning to consider climate change:

> 'Consider the scientifically anticipated impact of climate change within the footprint of the strategic planning study area and the broad measures required to mitigate its impact.' (NSW Govt., 2012c, p. 17)

However, the report of the review was initially held back for release. Ultimately, it was released with the NSW Government's publication of the Green Paper.

The Green Paper made little reference to the review and mostly disregarded the panel's recommendations (NSW Govt., 2012a, b). Subsequently, the NSW Government introduced the Planning Bill 2013, which proposed a new framework for strategic planning, but did not endorse the panel's advice to incorporate climate change as a strategic planning factor (NSW Govt., 2013b).

This development clearly raises questions about the NSW Government's current approach to the planning system reform. It confirms government's unofficial position on the issue in recent times, which has been that 'the planning system is not the place to curb GHG emissions' (Sahukar, 2017, p. 65). The NSW Government's position is in direct conflict with the widely recognised view that the planning laws should be a key governance mechanism in the reform of the planning system to address climate change (Thorpe & Hart, 2013). Adding to the impasse, the Planning Bill lapsed in 2013, with reform of the statutory planning system being somewhat piecemeal since then.

6.6 Conclusion

This chapter has explored NSW local government's operational processes in terms of regulatory frameworks, policy and legislative settings to understand the relevant provisions within local government's current policies and controls that inform consideration of climate change mitigation at the policy and decision-making stages. The findings reveal that local government's responses to climate change are primarily shaped by the interplay of several critical factors resulting from: i) its delegated responsibilities, ii) regulatory

frameworks, iii) current national and NSW state climate policies; and iv) NSW planning system and legislative settings. The surveys, interviews and evaluation of the relevant council policies and legislation identified the following major issues:

i) Most councils in NSW are acting without having any specific climate change policy, strategy, or action plan. Their GHG abatement-related actions are mostly single-issue-based projects that have not been integrated with their Community Strategic Plans and other sectoral policies. Not all strategic sectors under councils' jurisdiction are equally targeted for GHG-reduction initiatives. The sector with the highest levels of implemented activities and programs is energy and the least are transport. These actions are mostly confined within councils' own facilities and operations; and most of them do not have strategies to reduce community emissions.

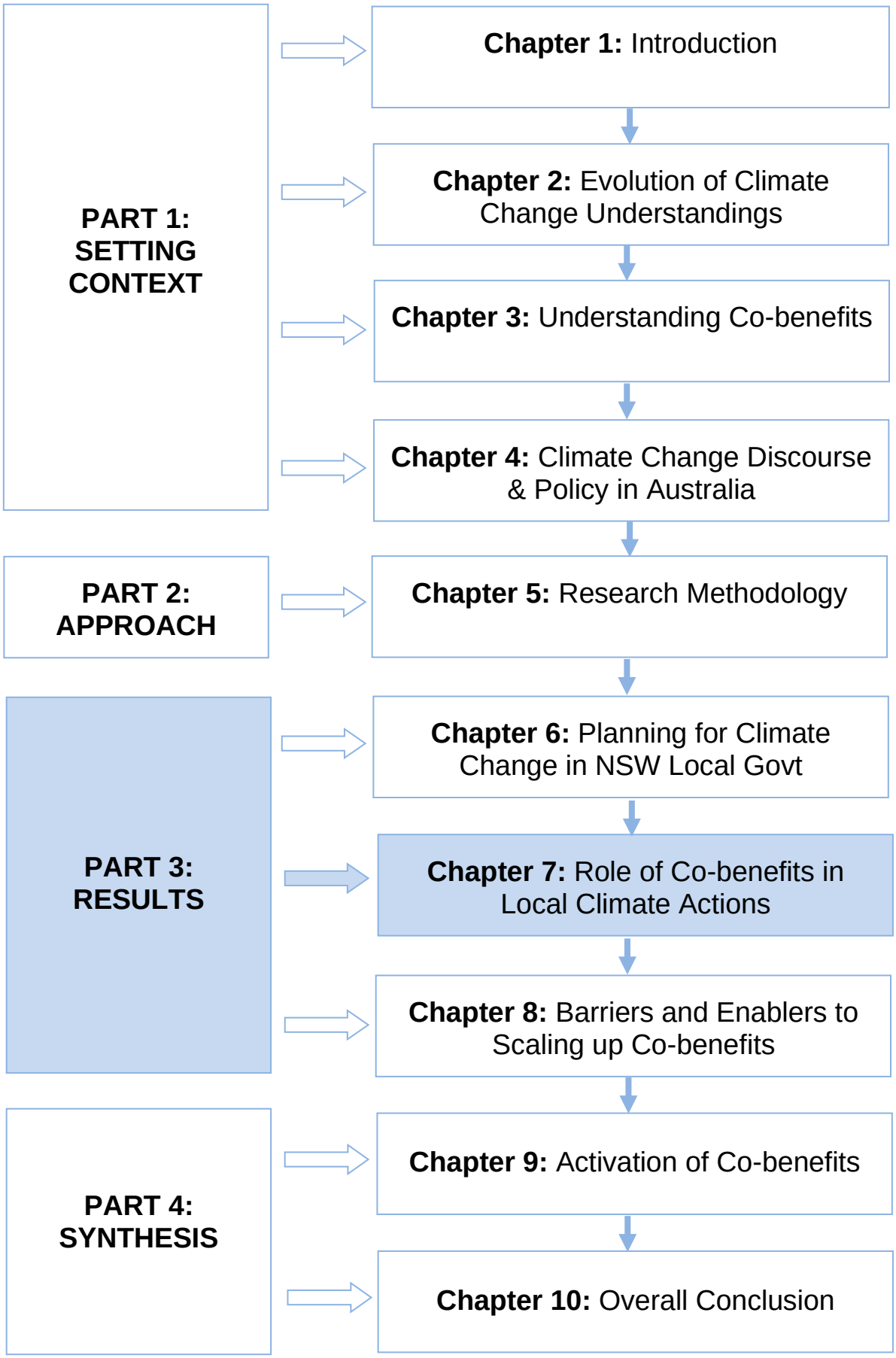
ii) There is apparent absence of verifiable data and analysis-based strategies to inform most councils' policies related to climate change. Particularly, there is a notable absence of GHG-emissions inventories, abatement strategies, reporting on the impact of the adopted measures and long-term goals to reduce emissions. In most cases, mechanisms to determine and track the effectiveness of the actions are vague. There are no performance indicators against which the effectiveness of various actions can be measured. While some councils do have performance indicators, they lack standardisation, which makes it difficult to use such indicators as reliable tools to compare performance

among councils. Only a handful of councils — mostly large city councils in the GMR (n=8) and large regional councils (n=7) — maintain a GHG-emissions inventory and have a specific implementation strategy to achieve GHG-reduction targets. They are also showing leadership in engaging with their communities to help them set and achieve community emissions-reduction targets.

iii) The absence of any clear and overarching national and state policy direction for climate change discourages councils from committing limited resources into long-term planning for climate change. Amid prevailing uncertainty at both national and state levels, a recurrent problem is that national/state policies may change at short notice and frequent shifts in policy lead to the abrupt termination of the programs, which jeopardises councils' plans and priorities. It is impossible for councils to counter such changes with new strategies when fiscal resources are limited.

iv) There is a notable absence of an explicit objective or purpose regarding climate change in the main planning legislation — the *Environmental Planning and Assessment Act 1979*. With such limitation, the NSW planning system fails to integrate climate change considerations effectively into its operational process. Among other factors, a weak state legislative framework to limit GHG emissions and the absence of a policy framework for climate planning at the strategic level are found to be two major issues that need to be addressed urgently to enhance NSW local government climate actions.

It is evident from the above findings that decision-makers in NSW local government need clear policy direction and guidance and stronger laws to achieve GHG-emissions reductions through the planning system. The absence of a unified approach to taking into account and cutting GHG emissions through the planning system is a critical policy gap. With this understanding, the next chapter will investigate how local government takes up co-benefits in the climate policy-making process related to climate change.


PART 1: SETTING CONTEXT
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CHAPTER 7: THE ROLE OF CO-BENEFITS IN LOCAL CLIMATE ACTION

7.1 Introduction

It is evident from the findings presented in the preceding chapter that the absence of leadership from either the Commonwealth or NSW state government on the issue of climate change has served to create a policy vacuum with no clear guidance for councils to pursue local climate action. However, local climate action is still happening in most councils across NSW. While councils' such proactive climate action is inspiring, it is also rather uncertain considering that, conventionally, state government policies predominantly define local government actions in their operational areas.

This chapter investigates the factors that contribute to local climate action. It focuses mainly on exploring the role of co-benefits as a motivating factor for the councils in NSW in pursuing climate action. Based on the interviews of local government officials (n=15) and the online survey of the councils (n=75), the findings presented here provide valuable insights into councils' various climate related actions, what factors are making it possible, and whether and to what extent co-benefits are playing a role among these factors in motivating councils to pursue local climate action.

The online survey, interviews and review of policy documents together provide a qualitative as well as quantitative understandings of the most frequently

mentioned reasons why local government policy-makers act on climate change and the most commonly reported impediments. The on-line survey provides an informative overview of the factors that drive local action on climate change. The narratives generated from the interviews take this further revealing in-depth insights into policy-makers' perceptions about the role of each factor, as well as an understanding of motivations for the uptake of co-benefits in policy. These findings also highlight how internal and external motivations influence councils' policy responses and offer insights into issues of policy strategy.

7.2 Why do councils in NSW engage in climate action?

While existing governance, policy and legislative settings for climate change act as an overarching mechanism for driving NSW local government climate action (see Chapter 6), there are other factors that influence individual councils' prioritisation of climate change considerations in their decision-making processes. Some of these factors are considered in this chapter: councils' physical context (i.e. location and size); socioeconomic context (i.e. demographic composition, economy, and revenue); and political environment (i.e. community's perceptions and role and local political leadership). These may shape councils' priorities around climate change, and in turn result in differences in councils' actions on climate change across NSW. Subsequently, how specific legislation, policy and funding act as the impetus for driving council actions around those priorities are also explored.

Generally, it is observed that the priority around climate change of most rural and coastal councils in NSW is focused mainly on protecting their assets and helping their community adapt to the immediate risks of more severe heat, droughts, storms and floods due to climate change. Conversely, for metropolitan and large regional councils their priority is focused more on mitigation rather than adaptation as it is often driven by a council's desire to demonstrate leadership through reducing emissions from its own operations. However, irrespective of the variation in emphasis an individual council puts on mitigation and adaptation, the opportunity to capture certain tangible co-benefits emerged as a common reason why councils in NSW are engaging in mitigation activities as part of their climate-related action. Particularly, the financial co-benefits of saving money through reducing energy usage, and associated reduction of GHG emissions, is without doubt the most common potent motivator for most councils in NSW to engage in the mitigation component of their climate-related actions.

7.2.1 Preparing for the risks — risk management approach to climate change

Climate change has the potential to damage local government assets, disrupt their capacity to deliver services, cause them to suffer unanticipated financial losses, and affect their community's wellbeing (Urbis, 2010, p. 9-14). In particular, the councils in rural and coastal areas of NSW are vulnerable to the risks of more severe heat, droughts, storms, and flood (ARTD Consultants, 2015). These councils are aware of these risks and are more concerned about preparing for the unavoidable impacts of climate change (adaptation) than

trying to minimise it (mitigation). As one interviewee from a coastal council said:

> I would say that our Council's overwhelming priority for climate change is to be able to continue to deliver the range of services to our community that they currently enjoy. So, any potential climate change impact that can decrease our ability as a Council to deliver those services will be a priority for our Council. So, we are a coastal Council. A lot of our assets are at risk of being impacted by rise of sea-level and storm-surge events, and so those are the priorities for Council. So, we have a coastal hazard policy that deals specifically with the increasing climate change impacts in relation to sea-level rise. (Council in Greater Sydney's coastal region, interviewee, 2016)

Responding to councils' concerns about such potential climate risks, in 2006 the Commonwealth Government launched the National Climate Change Adaptation Program. The program was based on a risk management approach to adaptation. It recommended that all councils perform climate change risk assessments. The process required councils to undertake assessment of potential impacts of climate change, identify associated risks and based on the assessment, prioritise those risks and develop a climate change adaptation plan (CoA, 2006). Subsequently, as a follow up to this program, mostly councils in coastal areas received Commonwealth Government's funding through participation in the Local Adaptation Pathways Program (LAPP) for the purpose of developing local adaptation plans (CoA, 2009).

In NSW, following the launch of the Metropolitan Plan for Sydney 2036 in 2010, councils were asked to assess the risks associated with climate change and

prepare their detail plans of adaptation to climate change. The process was a prerequisite for councils who intended to avail funds out of the Waste and Sustainability Improvement Payment Program (WASIP) (NSW Govt., 2010). Subsequently, responding to the call, increasing number of NSW councils completed climate change risk assessments and based on the assessments developed their adaptation plans. Apart from fulfilling the requirement to avail funding through the WASIP program, most councils' motivation behind developing adaptation plans were driven by the 'perceived threats, such as sea-level rises or loss of snow cover on ski fields, and the potential for litigation arising from planning decisions, were powerful motivators for action' (Fallon & Sullivan, 2014, p. 231).

These federal and state government initiatives acted as main drivers for councils to undertake adaptation works. The 2015 Local Government Climate Adaptation survey has found 'adaptive capacity across the NSW local government sector is increasing, evidenced by increasing risk assessment processes, growing need for climate change data and tools, more adaptation plans, and the inclusion of climate change adaptation in strategic policy documents' (ARDT Consultants, 2015, 43).

However, while local councils through these programs received clear direction and support from both the Commonwealth and state governments for adaptation, they did not receive any such direction and support for mitigation. This policy shift contrasts with the Commonwealth Government's previous support for mitigation when emissions-reduction funding was available through the Cities for Climate Protection (CCP) program from 1997 to 2009 (Dovers,

2009; Measham et al., 2011). This change is perceived by local government officials as clear indication of the Commonwealth and NSW Government priority around climate change. As one interviewee noted:

> There is certainly a lot more government support for adaptation at the moment, particularly, at the federal level, than there is for mitigation. It seems to be more politically acceptable, if you like, and I think that's mainly to deal with the fact that it's very important in the agriculture and water resources, because they're facing real issues, and climate change adaptation is one of the ways of dealing with that … and that's why it spills over into other areas then. (Council in Greater Sydney's Hunter region, interviewee, 2016)

7.2.2 Federal-state policy and funding act as impetus for local climate action

Generally, the results of the online survey show that councils located in the GMR with higher population (over 50,000 inhabitants) are involved in more mitigation activities than councils located outside the GMR with a smaller population base (less than 15,000 inhabitants). This distinct bias towards Sydney councils being proactive in climate actions is partly due to the limited capacity of small rural councils but is also due to NSW Government's previous engagement with large GMR councils through pursuing various policies and programs. This also conforms with the observation of the Office of Local Government (OLG) that a council's population density plays an important role in determining its capacity of achieving goals (OLG, 2012). Highlighting their Council's limited capacity as one of the primary causes for not being able to ramp up their climate actions, one interviewee from a regional council stated:

> We are a “land rich but resident poor” council. So, we're a “low rate based” council with a large area to manage. We have a lot of roads and a lot of infrastructure and not a lot of income! … our council's overwhelming priority for climate change is to be able to continue to deliver the range of services to our community that they currently enjoy. So, addressing any potential climate change impact that can decrease our ability as a council to deliver those services is a priority for our council. (Council in Greater Sydney’s Illawarra region, interviewee, 2016)

In the recent past, the NSW Government operated a range of policies and programs with large GMR councils such as the Sydney Metropolitan Plan, the Waste and Sustainability Improvement Program (WASIP), and the Energy and Water Savings Action Plans (ESAP). The main purpose of these policies and programs was to engage and support local governments to implement various energy- and resource-efficiency related projects. This observation is also supported by most interviewees from major councils in the GMR. They recognised the state government’s targeted engagement with GMR councils through these policies as an impetus for intensifying these councils’ climate actions. As one interviewee from an inner-city council noted:

> When the state government said, “if you want that [i.e. funding through WASIP program]” — this is one time they forced councils to do things, essentially! They said, “you must complete a Climate Change Risk Assessment” [...] so any council who wants to have that money must do a Climate Change Risk Assessment, which has, sort of, kick-started the adaptation side of things. So, from that we kept progressing ... you know, moving from a “risk assessment” to developing an “action plan” … (Council in Sydney’s Central region, interviewee, 2016)

It is pertinent to mention here that while policy and legislation - both act as key mechanisms in driving local government's climate actions, their application and implementation vary among councils. This is because not all legislations, policies and funding schemes are intended to target all councils uniformly. In addition, while legislation is mandatory for the designated councils, implementation of policies, strategies and plans are at the discretion of individual council (EDO NSW, 2010). For instance, the Clean Energy Act 2011 requires councils to report their GHG emissions, but only if councils' emissions cross over a threshold of 25,000tCO_2-e. Similarly, only councils with population more than 50,000 people were needed to develop Energy Savings Action Plans (ESAPs) (Australian Government, 2011; Lodhia, 2011). In highlighting the role of state policies in driving councils' climate change actions one interviewee stated:

> I would say the impetus for creating the Climate Change Strategy combining "adaptation" and "mitigation" together came from the state government (one of the agencies) — that is, Office of Environment & Heritage or whatever it was back then — Department of Environment, Climate Change and Water. It was from them, sort of forcing us, to do this Climate Change Risk Assessment and then we sort of thinking, why not marry the two together! And then we decided to do that. Because we were writing or re-reviewing what was then the Energy Savings Action Plan ... which came from stuff we have done in the past with the Planet Foot Print and we were creating a Carbon Management Strategy that we were going to do ... actually creating a Carbon Management Strategy and then this work with Climate Change Adaptation Risk Assessment and looking at how we are going to adjust these risks and then with [wondering] why we got these

> two things separately! So, then we combined them together and we got this Climate Change Strategy, instead of a Carbon Management Strategy. And that's how it all happened. (Council in Sydney's Central region, interviewee, 2016)

In addition to legislation and policy, funding from federal and state governments provided further incentives to drive councils' climate change actions. However, availability of such funding is considered inadequate and not all funding uniformly targets all councils. In highlighting the difficulty of accessing such funding, one interviewee from a council in a metropolitan area pointed out its limited scope and role in helping council's actions related to climate change:

> … there might be individual projects which may be eligible for "grants" but we haven't been terribly successful in getting grants particularly from Commonwealth Government. And there is a little bit of support we get from the state government in relation to programs for "energy efficiency", which do have a, in a sense, kind of climate change element to them. But in terms of specific or 'dedicated climate change funding', we get no support from either Commonwealth or state government. In terms of some of the adaptation works, there is money that floods around … little bit of money that can be attracted for doing some of the planning works, which does have an element of climate adaptation. So, that may relate to "land-use planning" and there is sometimes state government-assisted development planning — master plans or structural plans which will incorporate some of the elements of climate change adaptation. So, it's not dead, but what I am going to say [is] that it's not dedicated to climate change. (Council in Sydney's metropolitan region, interviewee, 2016)

7.2.3 Local political support is critical for local climate action

The findings of this study suggest that while councils' leadership plays a critical role, particularly in the process of adopting policy commitments, it is not sufficient on its own for the implementation of a local climate agenda. This is because to sustain the implementation of climate change commitments beyond local government electoral cycles and changes in political leadership, councils need to depend on their communities in building broad and enduring political and social support for local climate actions. Securing political support is particularly critical at the local government level given that climate change is still not a prominent electoral issue in local democratic politics in Australia. To overcome this challenge, the councils at the forefront of climate action are often found to have successfully linked actions on climate change to local issues in advancing the climate agenda. In this thesis, several cases have been identified where councils' political leadership and individuals acting as 'political entrepreneurs' or 'climate champions' played a key role in initiating local climate actions. For such cases, generally, it is found that they are high-ranking council officials or elected representatives like mayors or councillors who assume leadership roles in advocating for the climate agenda or particular climate initiatives at the local level. The rationale behind their performing such role may vary. In some cases, they may have an ideological commitment; for others, it may have been acquired as part of their 'normal' official or administrative responsibilities. Highlighting such political leadership, one local government official pointed out that while their council occasionally depended on federal or state (relatively small-scale) funding to undertake various

initiatives related to climate change, it was council leadership, backed by councillors and the senior management, that enabled them to exercise their autonomy in devising and implementing their own climate policy:

> … in a way, Council is given statutory requirements to do certain things, and that is partly a driver, but it tends to be very patchy and specific. So, for example, in the waste sector there are issues around waste reduction and emissions and so on from waste facilities that Council has to abide by. But in other areas there's not really anything from the federal or the state government other than general things about what direction we might go. And that mandates Council's performances around things like climate change mitigation. So, it's pretty much largely a matter of choice by council leadership. And by that, I mean the elected council and the senior management. And generally, neither of them can be independent nor act on their own … they have to be on the same page for it to work. And that was the case here. So, the decision really to take some responsibility for making climate change mitigation a major responsibility for council is really a political decision, and that seems to be integrated with their operations. And there are times when it coincides with state government — the state and federal government programs and policies — but generally speaking, it's just really driven by the leadership here. (Council in Sydney's Central region, interviewee, 2016)

Investigation into the climate politics of several major councils in the GMR of Sydney, which are widely known for their leadership role in local government climate action, found that political leadership was a major influence behind their initial adoption of climate change policies and plans. For these councils, either the mayors, councillors or appointed senior officials played key roles in adopting climate commitments and encouraging the development of

institutional frameworks on climate change within their local government area. For example, in the case of Marrickville Council the political support for its climate action was secured through unanimous support from all councillors irrespective of their political affiliation, which in turn reflected community aspiration:

> … I think it was unanimous and every single councillor we had put it through. And so, I think that shows that whether you are from whatever part of the political spectrum ... that those councillors see in here in the community that Marrickville Community wants us to do our part for addressing climate change. So that's a big part of our culture and I think that's something that you can't find [in other councils]. That's a qualitative part of the culture. And the culture is very different inside and out … and all of the councillors, I said, if you look through our council meeting where this Climate Change Strategy was adopted, it was a unanimous vote and there was no one against it. So, I think that reflects the community's aspiration. Because if the councillors had someone banging on their door [saying], 'why do you bother?', they might have a different opinion, because they are representing their community. (Marrickville Council in Sydney's Central region, interviewee, 2016)

However, several researchers and experts point out the drawbacks of depending on the political champions alone in furthering the local climate agenda. Bulkeley and Schroeder (2009) and other scholars (Martins & Ferreira, 2011; Romero-Lankao, 2007), for instance, argue that policy entrepreneurs have limited ability to influence local policy agenda. While their activism can create the positive environment to initiate local climate action,

broader institutional capacity is necessary to overcome administrative and political obstacles to sustain the initiatives in the long run. The findings of this thesis confirm this, showing that changes in leadership seriously diminished the momentum of the climate agenda and the implementation of the existing policy commitments in some councils that are known for their climate leadership. In these cases, the new leadership did not consider climate issues to be as important in their political agendas. As one interviewee noted:

> At the moment, we have a green mayor, so she's extremely supportive of most environmental issues, including climate change. But we have some liberal councillors who don't actually acknowledge that climate change is happening, and we have other councillors who swing, so it's very difficult. I wouldn't say you'd get a unanimous answer from our council. They're very split. They'll vote together on some things, and not on others. Climate change has been a very problematic topic here because there's this certain core of our council that doesn't believe it's a problem. And so, they … usually will not vote for anything that is putting money into climate change issues. (Council in Sydney's Illawarra region, interviewee, 2016)

This clearly shows the relevance, but also the limitations, of political leadership in fostering action on climate change. Moreover, it stresses the need to build institutional capacity as well as social-political coalitions that can support and sustain climate policies and programs beyond electoral cycles and changes of leadership.

7.2.4 Co-benefits as potent motivator for local climate action

It has been observed that if the wider benefits of climate actions can be demonstrated to the communities, the communities are more likely to support councils in taking actions on climate change (Bain et al., 2016). This is because while the primary benefits of greenhouse gas mitigation occur at the global level which cannot be experienced locally, most co-benefits of climate actions occur at the local level. Since these co-benefits have some immediate welfare effects on the communities who bear the costs of climate actions (typically as the taxpayers and/or the consumers), highlighting these co-benefits councils can convince them of the justification of acting on climate change (Markandya & Rübbelke, 2003). Hence, these co-benefits provide incentives for local government policy-makers to engage in stricter climate action and are considered more politically feasible. On the other hand, it has also been observed that local government policies which are designed based on innovation and aimed to deliver wider economic, environmental and social benefits to their communities could potentially lead to key climate co-benefits (e.g. substantial reduction of GHG emissions).

These observations suggest that at the local government level, the potential of co-benefits as a motivator for pursuing climate action is especially high as people can often experience the benefits of policy measures directly in their day-to-day lives.

In Australia, local climate action mainly started when some 238 local councils joined the ICLEI's 'Cities for Climate Protection' (CCP) program to lower GHG

emissions from their operations, and from their communities (Hoff, 2010). While there is a difference of opinion about individual council motivation in joining the CCP program, it has been widely acknowledged that the program's 'win-win' potential to reduce the energy-usage, and resulting reduction of GHG emissions, as well as securing significant monetary savings, predominantly motivated these councils in joining the program (Bulkeley, 2000; ICLEI, 1997). Other common motivations were: the responsibility in planning for the future, demonstrate leadership to their community through adopting measures that reduce emissions from councils' operations and concern about the possibility of facing litigations from the communities, businesses and other stakeholders (LGSA NSW, 2010; MAV, 2011; Zeppel, 2011). The CCP program successfully demonstrated that local climate action can be constructed as a local issue which can be resolved with local issues and priorities that can lead to cutting of GHG emissions. This means the program managed to synthesise the climate policy goal with local development objectives in taking up climate change actions that resulted in GHG abatement with significant co-benefits.

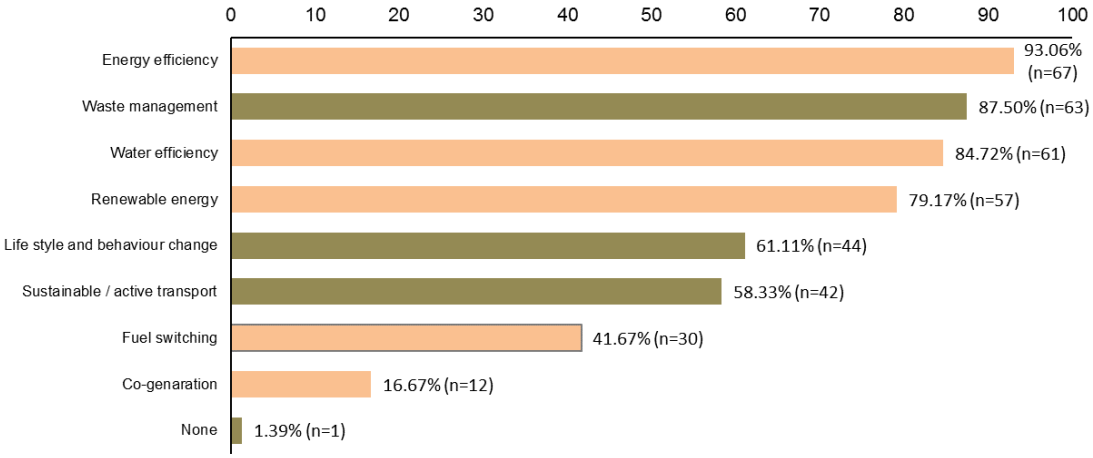
7.3 Consideration of co-benefits in policy process

The survey questionnaires as well as the interview questions administered to the local government officials were mainly focused on understanding the rationale behind their council's decision to adopt various measures that relate to GHG-emissions reduction and the consideration of benefits from these measures in the decision-making process.

7.3.1 Informal adoption of co-benefits approach

While most interviewees observed that councils generally do not purposively adopt a 'co-benefits approach', nor explicitly mention 'co-benefits' when developing their policies related to climate change, they are aware of the wide range of benefits resulting from these policies and they do purposively target some benefits over others when devising these policies. Regardless of whether councils have any particular policy to deal with climate change or not, almost all interviewees stated that they carry out similar types of measures that relate to climate change. Most of these measures can also contribute to reduction of GHG emissions (see Figure 7.1).

Figure 7.1: Various adopted measures that result in mitigation



Source: Author (The online survey of councils in NSW, 2016)

While councils observe that there is no 'explicit intention' of adopting these measures for the purpose of reducing GHG emissions, they acknowledge that their implementation usually leads to the reduction of emissions as an additional benefit besides the particular benefits aimed for by these measures. As the type, form and degree of councils' responses to climate change differ

significantly from each other throughout NSW, so too does the extent of adoption of a 'co-benefits approach'. The response of one of the interviewees illustrates this well:

> … anything that we (Council) can do is to refer to the objectives in the Community Strategic Plan and … these are related to environmental and social objectives … when we are producing policies we have to give alignment to these objectives and … all [are] about [technically] environment, efficiency with use of resources, caring inclusive communities … that's the main avenue to demonstrate how a proposal is proposing to align with those objectives we need to deliver as a council … it [co-benefits approach] is not formalised. There is no clear tool to say what the co-benefits are. We are simply putting words together to have a strategic reason to implement a policy and then whether the policy gets delivered or not, that is another question. (Council in Sydney's metropolitan region, interviewee, 2016)

This finding supports the general idea that, for a majority of councils, climate change mitigation is itself the co-benefit rather than the primary objective of activities that encompass 'local climate action'. It also reinforces similar findings from available co-benefits research that have found that climate policy, with few exceptions, 'rarely takes place for the sole purpose of mitigating climate change, but most typically these serve other primary purposes, with the co-benefit being climate mitigation' (Ürge-Vorsatz et al., 2014, p. 557).

7.3.2 Variation in policy responses and targeted benefits

The vast majority (i.e. 86% or 61) of the participating councils (n=71) in NSW in the survey reported that they have some form of policy to address climate change. Of them, only 25 per cent or 18 councils stated that they have a 'specific climate policy' and the rest (60% or 43 councils) reported that, while they do not have a specific policy, they address climate change broadly under 'sustainability'.

Conversely, only 14 per cent or 10 councils stated that they have neither a policy nor an action plan to deal with climate change (see Table 7.1).

It was found that councils who perceived climate change as a major policy issue by embracing a particular, or dedicated climate change policy (n=18 or 25%), managed to boost their climate actions by targeting more areas. It is more likely that local government with a specific climate policy or strategy would efficiently integrate their various climate change-related measures throughout different areas of their operation in a consistent manner. This enabled them to attain maximum benefits, in contrast to councils that do not have a specific climate policy or strategy (n=43 or 60%) (see Table 7.1).

Table 7.1: Variation in councils' policy responses in the online survey

Policy response	Location		Type of adopted measures				Integration with other policies		Targeted benefits			
	GMR	Beyond-GMR	Energy related	Non-energy related			Integrated	Not integrated	Climate & energy related		Non-climate & non-energy related	
				Waste	Active transport	Lifestyle & behaviour			Economic	Environ-mental	Health	Social
1. Specific climate policy/ strategy (n=18)	08	10	18	17	15	12	09	09	18	17	02	05
2. Climate change addressed broadly under 'sustainability' (n=43) (but no specific climate policy)	05	38	42	37	24	28	20	22	41	41	09	13
3. No policy (n=10) (but measures adopted to reduce energy usage)	05	05	07	06	01	01	00	00	05	04	00	02

Number of participants, n=71

Source: Author (Online Survey of Councils in NSW, 2016)

Having a specific strategy to deal with climate change, which is endorsed by council, gives a clear direction to all staff working across different departments in taking the strategy onboard and using it as a tool to embed climate change consideration into their work processes. In highlighting the benefits of having a specific climate change strategy, one interviewee stated:

> ... it needs that executive support like council support ... so, putting together into a strategy [climate change strategy] has proven really important for essentially using it as a tool of power to direct other staff members to participate in the actions. And to participate in helping to achieve those goals and looking for opportunities that we don't see listed in our Energy Savings Action Plan. So, I think quite a lot of actions that have gone on to achieve carbon emission reduction and in the adaptation phase like looking at different trials ... what are the actions that [have] actually been rolled out that have not even been listed in our action plan. Because they are opportunistic, or they come up [which] we had not planned for years ago. And so that happens because we have a policy that has this thing saying, "Council Approved" stamped on it that we can use it as a tool to embed that in different people's processes. (Council in Sydney's Central region, interviewee, 2016)

Conversely, councils that do not have either a definite climate policy or strategy, commonly deal with 'climate change' as part of their efforts to address 'sustainability' being one of the various elements of their Community Strategic Plan (CSP). Without having a specific climate change strategy, it is difficult to include the works that are carried out as part of the energy-saving measures into different department's workflow. Without council's executive support, it cannot give a clear direction to the staff across different

departments and fails to integrate required action into their different work processes.

7.3.3 Predominant adoption of energy-related mitigation measures

The range of different low-carbon measures identified in the survey are categorised into two distinct groups based on their direct connection to energy: i) 'energy-related' measures: energy efficiency, renewable energy, co-generation, fuel-switching, water efficiency, and ii) 'non-energy-related' mitigation measures: waste management, sustainable or 'active transport' (i.e. public transport, bicycle and pedestrian networks), and lifestyle and behaviour change. The findings from both the survey and interviews revealed an overwhelming preference for 'energy-related' mitigation measures among most councils (see Table 7.2).

Table 7.2: Distribution of councils based on adopted measures

Type of adopted measures		GMR (n=38)	Beyond GMR (n=37)	Distribution based on location & population						Total
				GMR			Beyond GMR			
				L	M	S	L	M	S	
Energy related	Energy efficiency	36	31	28	07	01	13	12	06	67 (93%)
	Renewable energy	29	28	25	04	-	11	11	06	57 (79%)
	Co-generation	09	03	08	01	-	03	-	-	12 (16%)
	Fuel-switching	14	16	13	01	-	08	05	03	30 (41%)
	Water efficiency	35	26	27	07	01	09	10	07	61 (85%)
Non-energy related	Waste management	35	28	28	06	01	12	10	06	63 (87%)
	Sustainable transport	25	17	19	05	01	08	07	02	42 (58%)
	Lifestyle & behaviour change	25	19	20	04	01	09	07	03	44 (61%)

* S: small (less than 15,000); M: medium (over 15,000 but less than 50,000); L: large (over 50,000), number of participants, n=71

Source: Author (Online Survey of Councils in NSW, 2016)

The overwhelming majority of the respondents (i.e. 93% of councils) used energy-efficiency measures along with other energy-related measures such as renewable energy (79%), co-generation (16%), fuel-switching (41%) and water efficiency (85%). Conversely, for non-energy related measures, most respondents (i.e. 87% of councils) used waste management, followed by lifestyle and behaviour change (61%) and sustainable or active transport (58%) (see Table 7.2).

When asked to rank the various energy- and non-energy-related measures adopted by their councils in order of preference, most respondents' selection showed an overwhelming preference for 'energy-related measures' over 'non-energy-related measures'. Table 7.3 illustrates the distribution of councils' preference for selected measures. It is based on the responses received on a 'Likert scale' (where 9 = most preferred and 1 = least preferred).

Table 7.3: Distribution of preference for various measures

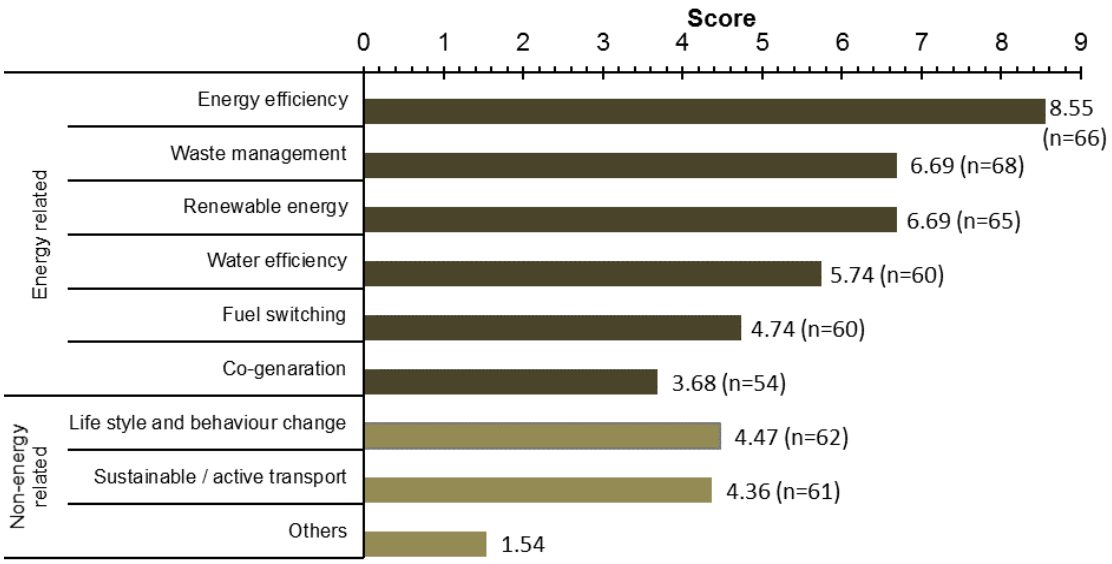
Mitigation measures		**Degree of preference** (9=most preferred; 1=least preferred)								
		9	8	7	6	5	4	3	2	1
Energy-related	Energy efficiency	77.3	15.2	1.5	3	1.5	-	-	-	1.5
	Waste management	16.2	14.7	30.9	17.6	8.8	8.8	2.9	-	-
	Renewable energy	4.6	50.8	9.2	10.8	6.2	4.6	7.7	4.6	-
	Water efficiency	-	13.3	18.3	23.3	25	10	3.3	1.7	1.7
	Fuel switching	-	6.7	13.3	16.7	16.7	10	18.3	11.7	1.7
	Co-generation	-	-	7.4	9.3	5.6	7.4	11.1	25.9	1.9
Non-energy-related	Lifestyle and behaviour change	3.2	1.6	12.9	11.3	16.1	19.4	17.7	17.7	-
	Sustainable/active transport	-	-	8.2	11.5	21.3	27.9	23	3.3	1.6
	Others	-	-	-	-	2.5	-	5.0	12.5	40.0

Number of participants, n=71

Source: Author (Online Survey of Councils in NSW, 2016)

The responses are organised into indicators (one indicator for each selected measure) and based on the statistical analysis of the number of responses, the mean score for each indicator is calculated (see Figure 7.2).

Figure 7.2: Indicators of preference for various energy- and non-energy-related measures



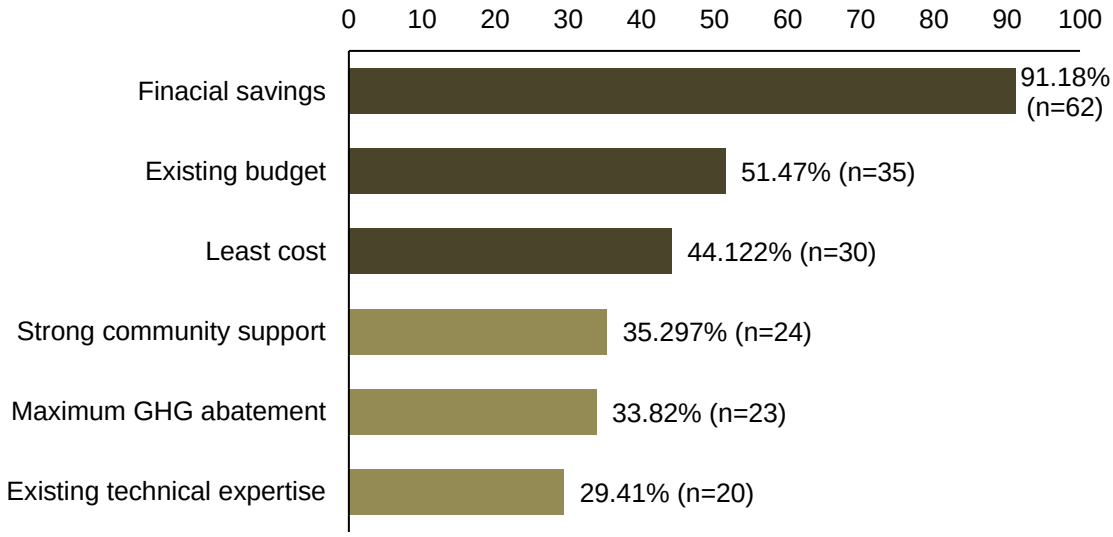
Source: Author (Online Survey of Councils in NSW, 2016)

Figure 7.2 shows indicators that illustrate a clear preference for 'energy-related' measures over 'non-energy-related' measures. The mean score for various measures (both energy- and non-energy-related) significantly varies between GMR (n=37) and Beyond-GMR councils (n=34) (5.50±1.17 vs 6.15±1.04, respectively, $p<0.016$). This variation is due to the GMR councils' preference for energy-related measures ($p<0.003$).

When asked about the criterion based on which adopted measures are selected by councils, respondents stated that the selection is based on consideration of multiple criteria — least cost, financial savings, existing technical knowledge, existing budget (i.e. available resources to implement

projects), strong community support, maximum GHG abatement (i.e. environmental outcomes) etc. However, among these criteria, financial consideration based on 'financial savings' (91.18%, n=62), 'existing budget' (51.47%, n=35) and 'least cost' (44.12%, n=30) are observed to predominantly dictate the council's choice of these measures (see Figure 7.3).

Figure 7.3: Council's criteria for selection of adopted measures



Source: Author (Online Survey of Councils in NSW, 2016)

Measures that are easy to implement are generally targeted first. Such measures are 'easy' because they are affordable, the required work involved is straightforward and payback periods are shorter. Often these are known as 'low-lying fruit'. However, projects are only considered when there are sufficient funds available through grants from higher levels of government and are rarely funded through existing council departmental budgets. Only a few councils are found to have internal revolving funds where the savings from projects are taken from the utility budget line of that facility and put back into the fund to finance future projects in their climate change action plan.

It is evident from these findings that the possibilities for cutting energy-usage, and consequently lowering GHG emissions, while at the same time securing substantial monetary savings, mainly motivated most councils to adopt 'energy-related' mitigation measures. Apart from financial considerations, other main reasons for councils' preference for 'energy-related' mitigation measures are federal and state government policies focused on energy and resource efficiency and funding for such programs as WASIP and ESAP, which necessitated participating councils to implement various energy-related efficiency measures.

Moreover, in the absence of any specific funding for climate change mitigation from either state or federal government, local government mainly leverages on state government's energy-related policies and limited funding available to support their climate actions. This means climate change mitigation at the local government level at present is mostly led by the dual objectives of reducing GHG emissions and energy consumption. As one interviewee explained:

> Energy efficiency and renewable energy are becoming a lot more economically viable and there has been a lot of emphasis on that area and some other things [policy support] the state has put in place have enabled [us] to undertake energy savings schemes and the small-scale renewable certificates, all those sorts of things. So, it's to our benefit to consider these things for our facilities to reduce our running costs, but because also we are local government and we own these assets and we will own them for long period of time, it's sensible to look at these sorts of stuff anyway. We are not a short-term business that is going to be in these assets for a short period of time. (Council in Sydney's North region, interviewee, 2016)

7.3.4 Mitigation activities mainly limited within council's operations

The mitigation part of most councils' climate change programs comprises two distinct GHG emissions-reduction components: one is reduction in council's own operations and the other is reduction in the household and business operations within the council's boundaries. The first is widely known as 'corporate reduction'[20] and the second as 'Community reduction'[21]. Councils are found to adopt a wide range of different low-carbon measures, which include both energy-related and non-energy-related measures in both components.

There are significant differences found between councils' targeting of the two components for mitigation in their policy measures related to climate change. While 71 per cent (52) of the respondent councils (n=73) targeted 'Council's emission', only 35 per cent (26) targeted 'Community's emissions' (see Table 7.4).

[20] **Corporate reduction** covers reductions of emissions from council-owned or council-managed facilities: i) council buildings, ii) council land (e.g. parks), iii) vehicle fleet, iv) street lighting and v) waste management.

[21] **Community reduction** covers reductions of community's emissions through actions such as: i) making new buildings energy efficient through the development-assessment process; ii) retrofitting of existing buildings in an energy-efficient way through government-funded schemes; iii) upgrading public transportation (improved connections, more coverage, integrated ticketing etc.), construction of safe bicycle and pedestrian routes or networks; iv) conducting energy audits, waste audits and environmental management systems for households and businesses; v) efficient waste management through reduction, recycling and treatment of waste.

Table 7.4: Distribution of councils based on targeted areas of adopted measures

	Category of Councils	**GMR** Councils (n=38)	**Beyond GMR** Councils (n=37)	Distribution based on location & population						**Total** (N=73)
				GMR			Beyond GMR			
				L	M	S	L	M	S	
1.	No specific target area	09	12	07	02	-	04	02	06	**21**
2.	Only Council's emissions	17	09	12	04	01	03	04	02	**26**
3.	Council's emissions + community emissions	12	14	11	01	-	06	06	02	**26**

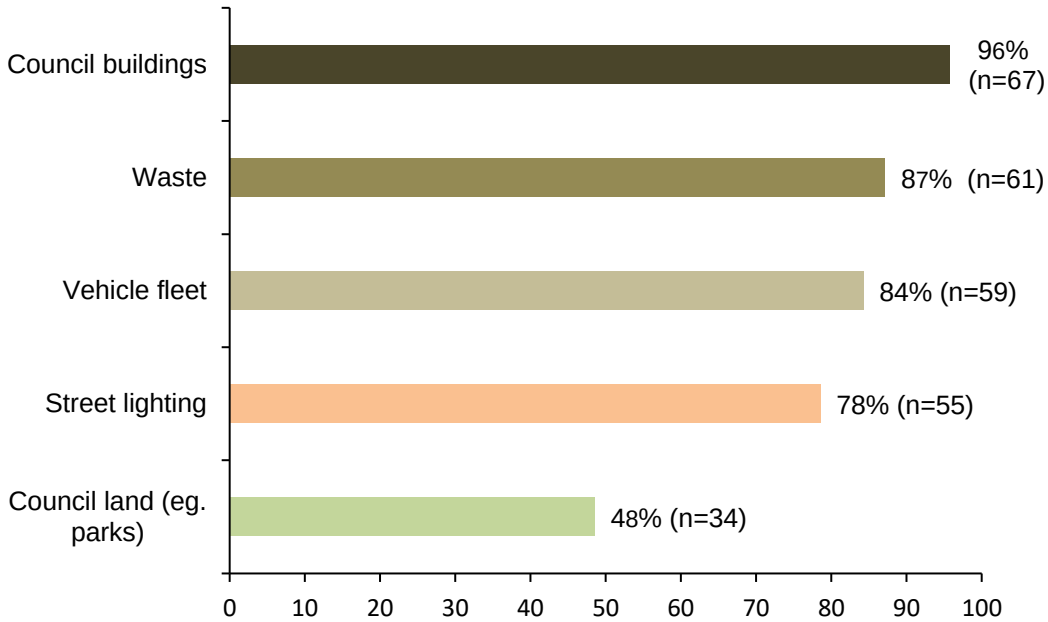
* S: small (less than 15,000); M: medium (over 15,000 but less than 50,000); L: large (over 50,000); number of participants, n=73

Source: Author (Online Survey of Councils in NSW, 2016)

When asked to specify the areas of operation where councils adopted various measures, it is found that these targeted areas cover mostly 'Council's emissions', which includes council buildings (96%, n=67), waste management (87%, n=61), vehicle fleet (84%, n=59), street lighting (78%, n=55) and council land, such as parks (48%, n=34) (see Figure 7.4).

The existing regulatory framework within which local government currently operates determines the extent of the powers and control councils can work out over specific areas or sectors within their jurisdictions (CoA, 2010; NSW Govt., 1993). While councils have efficient control over their operations and assets such as buildings, vehicle fleet, facilities and other assets to implement necessary measures to reduce their emissions, the same is not the case for emissions from the community.

Figure 7.4: Councils' targeted areas for adopted measures



Source: Author (Online Survey of Councils in NSW, 2016)

Councils typically have comparatively not much influence on their citizens' energy-usage patterns and a host of other areas like major land-use planning decisions, planning of transport infrastructure, energy supply, and dealing with the demand for energy. This limited authority causes frustration among local government policy-makers, as evident in one interviewee's statement:

> … I find that local government does not have that much planning control ... I think that's another push back! When I was drafting this document [climate change strategy] I was looking at different actions that we could do ... if I talk to the planners, the transport planners or transport engineers or the infrastructure people — they be like "Oh! That's with state government, our hands are tied ... we can't do anything ... that's state government, that's state government, that's state government!' So, any kind of change we want to make — a lot of the time, it's just 'That's not us, that's state government'. (Council in Sydney's metropolitan region, interviewee, 2016)

7.3.5 Overwhelming preference for climate- and energy-related benefits

As councils predominantly adopt energy-related measures over non-energy-related measures, when targeting the benefits from these measures the preference is overwhelmingly for 'climate- and energy-related' co-benefits (see Table 7.5).

Table 7.5: Distribution of councils based on distinct set of targeted benefits

Category of Co-benefits	GMR Councils (n=38)	Beyond-GMR Councils (n=37)	Distribution based on location & population						Total (n=64)
			GMR			Beyond GMR			
			L	M	S	L	M	S	
1. Only 'financial savings' (in addition to GHG reduction)	10	10	08	02	-	04	03	03	**20**
2. Multiple benefits (in addition to GHG reduction & 'financial savings')	18	15	14	03	01	05	06	04	**33**
3. Multiple benefits which include 'health benefits' (in addition to GHG reduction and 'financial savings')	07	04	06	01	-	01	02	01	**11**

* S: small (less than 15,000); M: medium (over 15,000 but less than 50,000); L: large (over 50,000); number of participants, n=64

Source: Author (Online Survey of Councils in NSW, 2016)

While all the participating councils (n=64) aimed for 'financial savings', just 17 per cent (n=11) targeted 'health benefits' alongside other benefits (such as GHG-emissions reduction, financial savings, clean environment, improved quality of life, increased productivity and employment growth) from their climate-change-related measures. When council's location and size are taken into consideration jointly, it is found that amongst the councils which pursued 'multiple benefits' (besides GHG reduction and financial savings) (n=44), large GMR councils (i.e. 45%, n=20) aimed for 'multiple benefits' greater than small Beyond-GMR councils (i.e. 11%, n=5). Of the councils that targeted 'health benefits' along with other benefits (n=11), 54 per cent (n=6) are large GMR councils and only one council (9%) is a small Beyond-GMR council (see Table 7.5).

When asked to rank council's preference for various targeted benefits from the various adopted energy-related and non-energy-related measures, most respondents' selections show an overwhelming preference for 'climate-related and energy-related' benefits (i.e. reduction in GHG emissions and financial savings) over 'non-climate and non-energy-related' benefits. Table 7.6 illustrates the distribution of councils' preference for selected benefits. It is based on the responses received on a 'Likert scale' (where 8 = most preferred and 1 = least preferred) (see Table 7.6).

Table 7.6: Distribution of preference for various energy and non-energy-related benefits

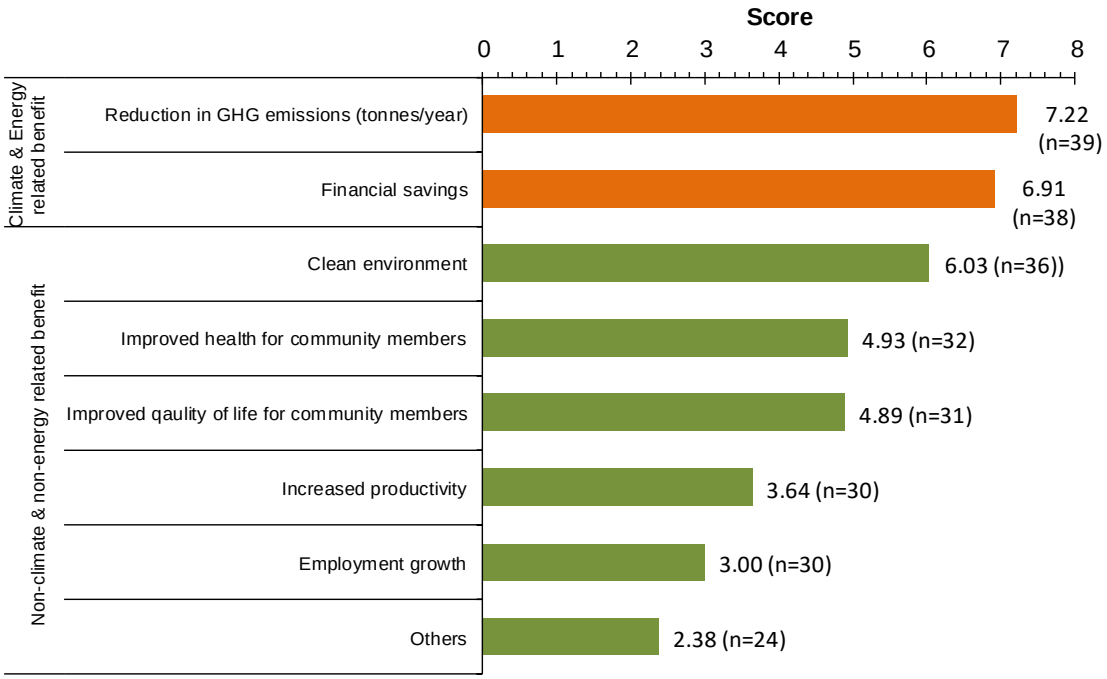
Co-benefits		% of responses based on degree of preference*							
		8	7	6	5	4	3	2	1
Climate-related & energy-related benefit	Reduction in GHG emissions (tonnes/year)	46.2	25.6	15.4	5.1	-	-	-	-
	Financial savings	16.2	14.7	30.9	17.7	8.8	8.8	2.9	-
Non-climate-related & non-energy-related benefit	Clean environment	4.6	50.8	9.2	10.8	6.2	4.6	7.7	4.6
	Improved health for community members	-	13.3	18.3	23.3	25.0	10.0	3.3	1.7
	Improved quality of life for community members	-	6.7	13.3	16.7	16.7	10.0	18.3	11.7
	Increased productivity	-	-	7.4	9.3	5.6	7.4	11.1	25.9
	Employment growth	3.2	1.6	12.9	11.3	16.1	19.4	17.7	17.7
	Others	-	-	8.2	11.5	21.3	27.9	23.0	3.3

* 8=most preferred; 1=least preferred

Source: Author (Online Survey of Councils in NSW, 2016)

These responses are organised into indicators (one indicator for each selected benefit) and based on the statistical analysis of the number of responses, the mean score for each indicator is calculated. Figure 7.5 shows these indicators, which illustrate a clear preference for 'climate-related and energy-related' benefits over 'non-climate-related and non-energy-related' benefits among both GMR and Beyond-GMR councils. The mean score of indicators for climate-related and energy-related benefits differs significantly from non-climate and non-energy-related benefits (6.41±1.95 vs 4.07±1.70 respectively, M±SD; $p<0.001$) and this difference is also observed among GMR and Beyond-GMR councils ($p<0.001$).

Figure 7.5: Indicators of preference for various energy-related and non-energy-related benefits



Source: Author (Online Survey of Councils in NSW, 2016)

Councils' overwhelming preference for a 'climate-related and energy-related' benefit over other benefits is explained in similar statements by the interviewees:

> … a lot of the way that we sell climate change adaptation or mitigation is through the financial benefits. Because for Council, in my 20 years of experience in local government, that's [financial benefits] always going to be the driving factor. Except for a few occasions, when a project's going to be exceptional, we've got a great grant, we can step up and use money to do other things. But often, we're fighting for a budget to do work, so always we are looking at what are the financial benefits, mostly. (Council in Sydney's West Central region, interviewee, 2016)

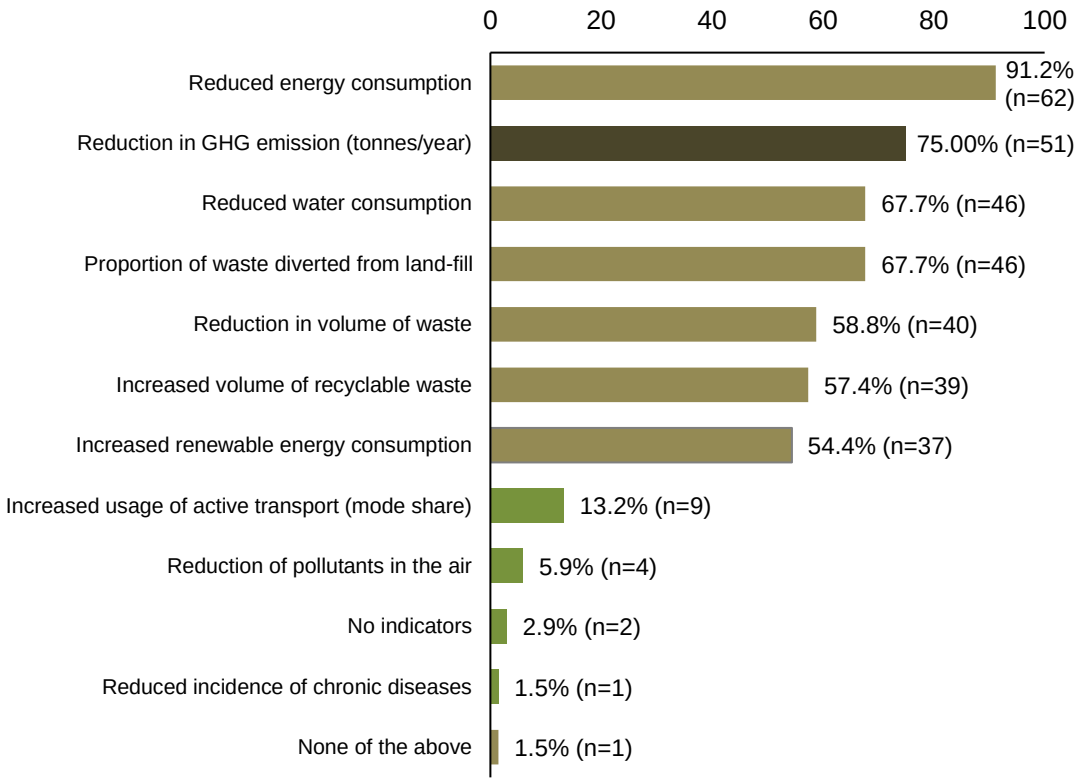
> It's cost-saving — it's always driven by cost-savings. There's not much point over-emphasising other benefits, which is why it's good to know it. It's good to try and quantify it if you can, but it's not necessary … it's not necessary in the argument for and against it, always. Unfortunately, you've got to justify the financial viability, which [is] most of the time by sharing cost-savings. (Council in Sydney's Central region, interviewee, 2016)

Councils' clear preference for some particular (quantifiable) benefits only suggests GHG emissions-reduction and its associated fiscal savings are considered as the main outcome from reduced energy use. The 'non-climate-related and non-energy-related' benefits that also result from these measures are not considered as part of the main outcome.

7.3.6 Indicators used to measure mainly climate-related and energy-related benefits

When asked about how councils measure the benefits from the different measures adopted related to GHG-emissions reduction, respondents selected a wide range of indicators. However, while a majority of the councils' selection includes various indicators to measure the 'climate-related and energy-related' benefits, there is a notable absence of indicators to measure the 'non-climate-related and non-energy-related' benefits that also result from these measures (see Figure 7.6).

Figure 7.6: Various indicators to measure climate-related and energy-related benefits



Source: Author (Online Survey of Councils in NSW, 2016)

Most councils use various resource-management software (e.g. 'NVG', 'Planet Footprint') to track various energy usages in different areas of council's operations (i.e. gas, electricity, water, fuel). Councils also measure emissions from land-fill, refrigerant gas leakage, using 'bio-diesel' (for their vehicle fleet), renewables (i.e. solar installation in council buildings) etc. Based on these data councils have developed their own set of indicators to calculate various 'climate-related and energy-related' benefits resulting from these measures in terms of GHG-emissions reduction, reduction in energy and water usage, volume of waste reduced, recycled and/or diverted (from land-fill) etc. However, most councils rarely collect data associated with 'non-energy-related' measures and develop that data into indicators to calculate the resulting 'non-climate-related and non-energy-related' benefits (e.g. health benefits from improved air quality, use of physically active modes of transport, enhanced 'liveability' or social benefits from creating more local jobs etc.).

In highlighting this difficulty of collecting such data one interviewee explained:

> … we're always looking for measurable and meaningful indicators, ways of measuring and reporting back to the council and community … and the essential measuring metrics have always been the difficult ones. We know you don't want to count the number of people attending our sustainability workshops, but generally, that's as deep as they (councillors and community) can understand, and we can't necessarily evaluate below that, even though we've tried to, because really what we're trying to do (through organising workshops for community) is create environmental ambassadors over a long period of time … In a way, we need to use some kind of reliable way of saying when we educate or engage, motivate people, what are they doing with

> them (knowledge)? Are they going home and saving $10 or $1 million? Are they retrofitting their house? Are they saving the resources that we are doing as well? And that's probably the important metric to try and establish, because then that extends the economic benefit, and it also shows the social value of what we're doing as well. (Council in Sydney's Central region, interviewee, 2016)

Almost all interviewees acknowledged that councils are aware of this type of 'non-climate-related and non-energy-related' benefit and its significance. However, the absence of reliable data, along with the apparent unquantifiable and uncertain monetary value of these benefits and absence of knowledge and skill to convert data into policy decisions, discourages them from considering these benefits in the policy process.

7.4 Consideration of health co-benefits in policy process

The findings discussed in the previous section revealed that while the co-benefits approach is adopted to some extent by local government in pursuing low-carbon policies, the focus is largely economic. Non-climate-related and non-energy-related benefits, which include significant human-health outcomes from improved air quality, use of physically active modes of transport, enhanced 'liveability' and the creation of local jobs, rarely enter climate-change-related policy discourse. This section focuses on exploring whether, how, and to what extent local government's climate-change-related policies consider the public health needs of their communities. As is explored in the analysis below, several factors have influenced limited consideration of health

in NSW local government's climate planning. Understanding these factors may help to plan, generate, and purposively promote health-related co-benefits in planning for climate change at the local government level.

7.4.1 Limited understanding of the links between climate change and health

The findings from both the survey and the interviews revealed that the link between climate change and health is not well understood by the policy-makers at the local government level. Addressing climate change at local government level has been broadly focused on mitigating the root cause of GHG emissions and adapting to the immediate impacts of climate change. To be precise, most NSW local government programs related to climate change, to date, have primarily been driven by the dual objectives of reducing GHG emissions and energy consumption. The health impacts of climate change and health co-benefits of various climate change mitigation measures are not well understood by the local government policy-makers in general; hence, health co-benefits are rarely considered in the climate-change-related policy-making process. When asked to clarify what prevents them from actively considering the health benefits that could result from such measures, one interviewee noted:

> Through our State of the Environment [SoE] report, we are reporting on our progress ... what actions we've undertaken. I am not directly measuring … when the data is available from the state government, I can get local government data around community energy use … Council has this plan, we're doing this. We've consulted with the community. We've run education

> workshops and 11 per cent of our houses have solar panels. We're the highest in Sydney two years ago, but I can't show a correlation. I can only report those things and … I could measure what council actions are, the indicators that I would use would come directly from here. Some of them are soft targets because if it's water quality or something, again, I can't show that my actions, Council's actions, are going to have a correlation to what we're measuring here because of the whole urban impact. There're the challenges about us selling the benefits of the actions that we undertake. It's something we strive for … but we can't measure them [health benefits]. If we could measure them, then how do I know? How can I demonstrate that my actions, my efforts, my resources, my dollars are linked directly to those benefits? Without that link, it's very hard to consider those [health] benefits. (Council in Sydney's West Central region, officer interviewee, 2016)

> I think if you ask, people would see these [health] benefits and know that they're there, yet these benefits are not there explicitly, I guess. So, as for why that is … it's probably, I mean … in our strategic planning documents we identify and report mainly the primary benefits [GHG-emissions reduction and financial savings] whereas what we actually need is a matrix or something in the back to show the cross benefits as well. So, I think it's not something that would be stretched too far or anything like that. It probably just hasn't really been mentioned. (Council in Sydney's West region, officer interviewee, 2016)

It appears that the health benefits of council's measures to respond to climate change are viewed as so complex and all-encompassing that it is difficult for local government policy-makers to establish the link between the implemented measures and perceived health benefits from such measures. As such, while

health benefits are acknowledged, they continue to be left out and not accounted for in council's policy-making process. Moreover, the utility of identifying and including health co-benefits is less attractive for council as health benefits are inherently less visible compared with the other readily quantifiable benefits like financial benefits and reduction of GHG emissions. In addition, most of the interviewees observed that undertaking comprehensive analysis of health-related co-benefits resulting from mitigation measures is usually outside the scope, effort level, time and cost authorised by councils.

7.4.2 Absence of state's direction for considering health in climate planning

Although the NSW state government recognised local government's roles as key actors in responding to the local climate change impacts, at present its policies related to climate change provide local governments with neither any direction regarding how to consider health in planning for climate change, nor any essential tools or required funds to undertake comprehensive studies of the health co-benefits resulting from such measures. While in the NSW Greenhouse Plan (NSWGHP) councils are deemed to be ideally positioned for providing a local response to the climate problem (CoA, 2010; NSW Govt., 1993), the findings indicate that the potential to address health issues in this context is rarely considered. This absence of direction from the higher levels of government is perceived by one interviewee in the following statement:

> No one is directing us [councils] to measure these [health] benefits. If someone would direct us like state government or federal government saying, "You guys need to do this", then we would. We would find a way, I guess. But we are not [getting any

> direction]. And I guess it's not something that seems to be happening in the space as well. Like not in the local government space but in any other real corporate sustainability reporting either. I am not saying them to equate 'health benefits'! ... but some measurable way that we could .... it's not happening! I think it's also a cultural thing as well. (Council in Sydney's Central region, interviewee, 2016)

In such a context, most local government policy-makers observe that public health benefits resulting from climate change mitigation are too far removed from their sphere of influence or benefit. This means that the focus of their climate change policy remains on reducing GHG emissions in a cost-effective way and targeting monetary savings from reduced energy use.

7.4.3 Capacity and jurisdictional limitations discourage active consideration of health

The majority of the interviewees identified councils' limited capacity and jurisdictional limitation as the two main reasons for not actively considering health in planning for climate change. Given the fact that the local councils work with very scarce resources within limited budget and there is no direct return from giving priority to health in planning, there is not enough incentives for councils to pursue health co-benefits. One of the interviewees clarified the position in this way:

> Many of the additional benefits that can or will accrue to the community are not the responsibility of local government [e.g. health, employment]. Even if the "monetary quantification" of these benefits was known or could be estimated, there is no return available to local government for prioritising our limited

> expenditure … we are so restricted on our budget, what we can do depends on our resources … which is staff, which is time, which is everything. I think State government can claim a closer link there. (Council in Sydney's West Central region, interview, 2016)

7.4.4 Economic assessment ignores health co-benefit in policy process

As discussed earlier, all policy measures at the local government are discussed and negotiated predominantly within an economic frame of reference. In such a context, non-energy and non-climate long-term benefits like health, which are not readily quantifiable, get side-lined in a policy discourse that emphasises the need for immediate quantification of results and direct outcomes. As one interviewee from one of the inner-city councils clarified further:

> It's [measuring health co-benefits] a challenging thing. But we acknowledge that yes, there is benefit in these things, but Council does not have the incentive, because it's not the kind of benefit, I mean, of Council's priority, given the framework within which Council is making decisions that's a "cold benefit" thing … here in Council the framework is mostly driven by financial terms. So, you don't have the incentive to pursue those [health] benefits. (Council in Sydney's Central region, interviewee, 2016)

> … a lot of the stuff we do might require a grant application ... so we have to write a grant application ... as part of some of the grant applications we have to produce economic analysis which looks at financial benefits we looked at … and again it's very complicated for the staff trying to do the economics or to put estimates on the value of the social or health outcome ... the

> things with financial viability in terms of payback or investment is easy to determine for us ... that makes sense ... but the social or health consideration of putting a renewable energy ... it shows leadership ... it promotes … but you can't really measure those benefits ... it's very hard to put a figure on. (Council in Sydney's Hunter region, interviewee, 2016)

7.4.5 Health co-benefits acknowledged qualitatively

Similar opinions were echoed by several council officers during the interviews. In the absence of adequate resources and incentives, as well as an appropriate mechanism for quantifying health co-benefits, councils acknowledge these benefits qualitatively, as one interviewee noted:

> … we don't have the incentive to put in the time and effort to actually quantify [health benefits], but that does not mean that Council does not consider it or find a value in [those benefits]. They might write a Council report about, you know, "Yes, we've paid X-amount of dollars to do this as free trial", which is something we are doing now and then we will just list it in the report that these are the benefits. But we don't actually quantify them in a financial way. We don't quantify them in any other way. For instance, we are doing a lighter-coloured road trial at the moment and working with a university to quantify the benefits of having a lighter-coloured road compared to asphalt and how does that impact on a really hot day. So, we are looking at the benefits in that way but in regard to integrated planning we are not reporting, we just report the carbon in regard to climate change. That is the only thing we just report on. (Council in Sydney's Central region, interviewee, 2016)

7.4.6 Methodological limitations for qualitative reporting of health co-benefits

In reviewing the councils that have climate change policies (n=41), it is found that only seven (17%) have specific plans that explicitly consider the health co-benefits of adopted mitigation measures. However, nearly all these councils qualitatively describe health co-benefits in their relevant policy documents by using icons, graphs, bullet points etc. Such graphical illustrations are used to provide visual description of the measures that are undertaken for their potential of improving local air quality, reducing obesity, improving community health, and creating a healthy built environment. While such visual descriptions provide a qualitative appraisal of these benefits, they lack any methodology as well as reference to supporting evidence for the claimed health co-benefits. Health co-benefits are also presented qualitatively beside quantitative matrices that analyse councils' various GHG emissions-reduction measures for their potential in cost savings. These observations are echoed in the comments of the interviewed council officers. As one interviewee said:

> Measuring those "non-monetary health benefits" … it's a difficult one and it's one that I am not sure that we as a council successfully measure that well. It's still like an evolving field. It's a bit like the issue of the active transport. There is a body of theories which says that if you make any area more attractive for pedestrians and cyclists that the local economy would benefit rather than having traffic going through the area. And that's an emerging body of evidence. But we don't necessarily at the local level yet really quantify some of those things. When we invest in cycle paths, we say that's good for people to get them out of their

> cars and there is a health benefit for it. It makes people happier, it gives people a sense of pleasure, it reduces the stresses of sitting in a traffic jam and but it's also maybe benefitting the local economy because people riding past may stop, shop and buy something … but we have not quite got there yet in terms of measuring the "non-monetary" side of things. (Council in Sydney's North region, interview, 2016)

7.4.7 Lack of quantitative health-related data and tools to consider health co-benefits

While the above issues identified by most of the interviewed officers provide some insights into why most councils rarely consider health co-benefits in planning for climate change, some interviewees also observe a growing awareness of the links between health and climate planning among local government policy-makers. They also observe a gradual shift towards more active consideration of health in local government climate planning. However, they pointed out that this evolving trend is constrained by a lack of health-related, robust quantitative data and appropriate tools to justify consideration of health benefits alongside other direct quantifiable benefits.

> … we need skills and tools. But if you look at the other thing about local government, we don't have people with the skills — not everyone has the mathematical or statistical brain to go … and then how do you do it and how do you equate the number of kilometres travelled with health benefits or environmental benefits? (Council in Sydney's Central region, interviewee, 2016)

> If you're going to say these [measures] have health benefits to the community, that's excellent, whatever it is around climate change policies! … but I'm not measuring those benefits, I don't

> have the capacity … this is the wicked problem! … I mean, the political inertia against all the measures we are trying to push at this climate change suggests it's not cost effective. It requires very large upfront investment. It's not market visible. But, simultaneously, we're avoiding the benefits which we cannot capture in monetary value, or we don't have the required means. (Council in Sydney's West Central region, interviewee, 2016)

Presence of such data can help to determine the monetary benefits of incorporating public health in planning for climate change. According to one interviewee, to overcome this challenge they are trying to gather as much data as possible from diverse sources:

> … what we're trying to do is capture as much data as we can so we get some information from healthy cities everywhere. We do a Well-Being Survey every two years, and there are also questions in our council's Community Survey around people's satisfaction with their overall health. Our survey people, they actually get data from New South Wales Health on obesity rates and things like that. And we're trying to feed all of that data in, and we also get some data from the ABS directly around people commuting to work, whether they're active in sport, whether they are active along bike tracks on the weekends, those sorts of things, and also the obesity. (Council in Sydney's Illawarra region, interviewee, 2016)

7.4.8 Health co-benefits are not 'real policy drivers'

When interviewees were asked to comment on whether possible incorporation of health co-benefits in the policy process would help accelerate uptake of low-carbon policies, most of them contended that using health co-benefits as a means to justify undertaking climate change mitigation policies would be

insufficient. Given that local government's current climate policy approach is focused primarily on reducing GHG emissions in a cost-effective way and targeting monetary benefits from reduced energy use, health co-benefits, in such a narrative, are not considered 'real policy drivers'. Other reasons identified for health co-benefits not being considered as 'real policy drivers' focused on the problems surrounding a dearth of reliable data both at local and national level, the indirect nature of health co-benefits, as well as Australia's present narrative around climate change and its approach to climate change mitigation policy. Moreover, in the current policy process, as health co-benefits are not planned for from the beginning, any health co-benefits resulting from the mitigation measures cannot be considered as an 'add on' later:

> … but they [health benefits] kind of, I suppose, any sort of non-monetary benefits [are] more just like "icing on the cake", I guess, rather than the real driver. So, the real driver is always the plan — the action plan. So, to gain anything it has to go into the plan from the beginning, like it has to be adopted by Council ... like the adaptation actions, they have to be in that plan or if you just come up with it later it might not work. (Council in Sydney's Central region, interviewee, 2016)

7.5 Conclusion

This chapter explored the main factors that motivate councils in NSW to engage in local climate action. It is evident from the findings that in the absence of any leadership from either federal or state government on climate

change, local priorities around climate change mainly motivate councils to engage in local climate action. The analysis has identified:

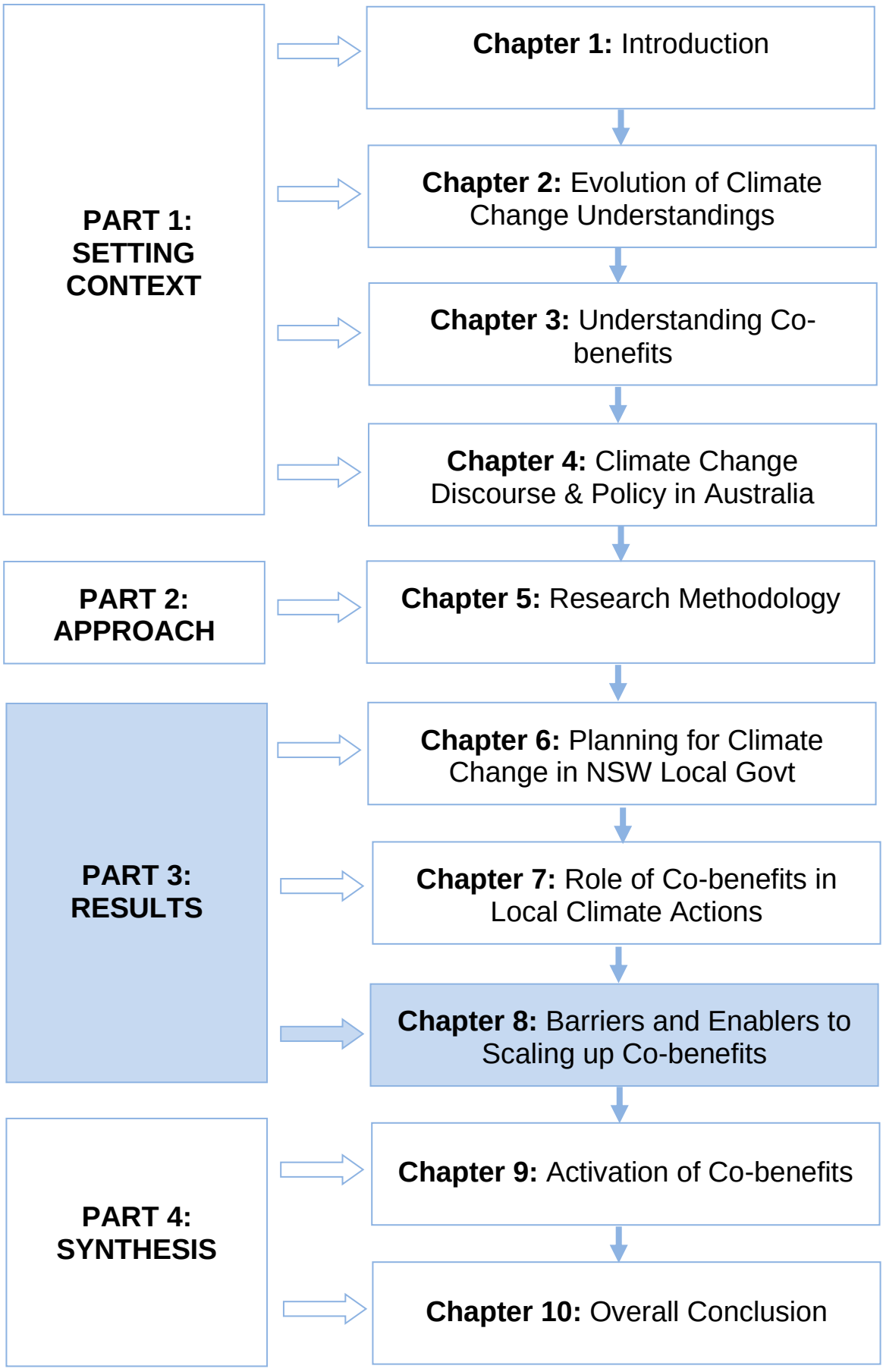
I. addressing the immediate climate risks faced by local communities;
II. capitalising on federal and state governments' energy and resource efficiency-focused policies and funding;
III. local political support and leadership; and
IV. the opportunity to capture certain tangible co-benefits from certain energy-related mitigation measures

- as main reasons why councils in NSW are engaging in mitigation activities as part of local climate action, the results also highlight the role of co-benefits as a powerful motivator for councils to pursue local climate action. While local government policy-makers are aware of the wide range of benefits that result from local climate action, yet their focus is limited to targeting certain 'readily quantifiable' benefits. They primarily focus on reducing the cost of GHG emission reduction together with the attainment of particular (measurable) financial benefits resulting from 'energy-related' emissions-reduction measures.

Constraints in pursuing various other benefits which either do not have any monetary value or their monetary value cannot be measured exclude wide-ranging environmental, social and health benefits from considerations in local government's climate change-related policy process. The resulting exclusion of the 'non-climate-related and non-energy-related benefits' comprise very significant and large group of health-related benefits. For example, such

benefits include health benefits resulting from improved air quality, use of physically active modes of transport, enhanced ‘liveability’ and creation of more local jobs from better planning of the built environment. While all of these have potential monetary savings for the health budget, they are not clearly taken into account in the policy decision-making process. Omission of these benefits from considerations in the policy process limits councils’ ability to attain full benefits resulting from policy measures related to climate change.

Based on the above findings, the next chapter will focus on identifying the main barriers and enablers to integrating these co-benefits in the local government policy process.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CHAPTER 8: BARRIERS AND ENABLERS TO SCALING UP CO-BENEFITS

8.1 Introduction

The results presented in the preceding two chapters illustrate that — despite having limited capacity, lacking control over key relevant policy areas, and not having any formal recognition of their role in the formulation of national and state climate policies — local councils in NSW are actively pursuing local climate actions. Such local government actions cover reducing the greenhouse gas (GHG) emissions of their operations as well as supporting their communities to reduce community emissions through promoting a range of enabling activities. Irrespective of the variations, for most councils in NSW, the activities that cover local climate action most typically serve other primary purposes, which also include the opportunity to capture certain co-benefits. These co-benefits play a powerful role in motivating councils to pursue local climate action, although most councils only target certain tangible or obvious co-benefits rather than the full range on offer.

This chapter presents critical analysis of these findings drawn together to identify the main barriers and enablers to integrating co-benefits in local government policies related to climate change. It has identified several critical issues that have contributed to this limited adoption of a co-benefits approach in NSW local government climate planning.

8.2 Barriers to co-benefits

8.2.1 Absence of an integrated climate policy framework

The results presented in Chapter 6 have revealed that Australia's current climate policies lack a whole-of-government approach to climate change. There are no clear federal or state policy directions regarding climate change for local governments, nor is there specific provision under the NSW Government's current legislative settings to integrate climate change considerations into local government operational processes.

Australia's present arrangements for climate governance and a policy framework do not pay much attention to the broader co-benefits of its climate policies. Within the current hierarchical governance arrangements, local government organisational, managerial and technical capacity is not adequate to respond effectively to emerging climate-policy-related issues such as co-benefits. Traditionally, local government responsibilities in Australia have been limited to providing a basic level of service to citizens (Painter, 1993; Bulkeley, 2000a). While consistent efforts to reform governance, finances, service delivery and reporting arrangements for local governments across Australia have been initiated, these efforts are targeted at accountability, financial efficiency, and service delivery (Jones, 2013). To date, no effort has been observed to support local governments in integrating climate change considerations into their operational processes (see Chapter 6). Typical of all Australian states, councils in NSW are facing critical policy gaps in their decision-making process regarding climate change, which severely restrict

their ability to consider and reduce GHG emissions, adversely affect their efforts to scale-up local climate action and discourage meaningful consideration of climate co-benefits in the policy process.

8.2.2 Lack of data and capacity to develop data into appropriate indicators

Lack of indicators

To assess climate policy actions, policy-makers need reliable indicators to measure and monitor the impacts of those actions. Indicators are developed based on relevant data that may help policy-makers to establish the connection between the climate policy actions and their associated co-benefits. The results presented in Chapter 7 reveal that at present few local governments in NSW have developed indicators against which the wider impacts of their climate policies and associated co-benefits can be measured. While most local governments use indicators of some form to measure various energy-related co-benefits, these are not standardised across different local governments and there is a notable absence of indicators to measure the non-climate- and non-energy-related co-benefits that also result from these measures. This is partly due to limited capacity and know-how. Most councils rarely collect data associated with non-energy-related measures let alone develop that data into relevant indicators to calculate the resulting non-climate- and non-energy-related co-benefits.

Gap in detail data

Local governments in Australia are facing major challenges in terms of collecting data to develop their individual GHG emissions inventories. While Australia has developed GHG emission inventories at national and state levels, at present there is no systematic and organised effort to compile GHG emissions within each sector of the economy or develop emission inventories at the local government level (AGO, 2006). To develop individual GHG emission inventories, councils would need to collect a wide range of data associated with the actual energy use, waste generation and other GHG-emitting activities of the communities within their jurisdictions. Due to the confidentiality of energy consumption information, as well as time and resource constraints, collecting such detailed data is difficult at the local government level. While at present there are number of sources like local government data sets, utility companies' data and Australian Bureau of Statistics (ABS) survey-data that could be used for measuring energy consumption at local government level and establishing GHG-emissions baselines, use of such sources is restricted due to irregularity, incompleteness or confidentiality (Hamilton, Kellett, & Yuan, 2008).

Past GHG emissions and abatement reporting

In Australia, the most organised, large-scale and nationwide GHG emissions-abatement program at the local government level ever undertaken was the Cities for Climate Protection Australia (CCP-Australia) program. The program was conducted by the International Council for Local Environmental Initiatives (ICLEI) in conjunction with the federal government from 1997 to 2009 (ICLEI,

2008; Bulkeley 2000a; Hoff, 2010). In total, 233 local governments across Australia participated in the program. Participating councils undertook various measures to reduce GHG emissions from their operations as well as their community's emissions. They were required to follow a 'five-milestone' approach to demonstrate their performance in this regard. On reaching Milestone 1 and Milestone 5, councils developed their individual GHG emission inventories and annually reported measures undertaken when they reached Milestone 3. The reporting model was appropriate for local government as it was designed specifically to consider GHG emissions from typical local government operations. It collected information about GHG emissions and abatement activities from participating councils, collated the information nationally and reported them annually. As the system used standard measures of reporting for all participating councils it was accurate, easily collectable and verifiable (ICLEI, 2008; Hoff, 2010; Graham, 2011). However, while various abatement measures incorporated in the program potentially had other indirect non-climate- and non-energy-related benefits besides GHG abatement, energy and financial savings, information about those indirect benefits was not collected in the reporting model. As a result, many of the tangible as well as less tangible benefits that resulted from the CCP-Australia program were ignored (Hoff, 2010).

ICLEI's model of reporting GHG emissions and abatement for local government was the first of its kind in Australia at a time when there was little action on climate change. Later, when the program ended due to the federal government's withdrawal of support and the enactment of the *National*

Greenhouse and Energy Reporting Act 2007 (NGER Act 2007), ICLEI's reporting model was no longer followed by local governments as it did not align with the requirements of the NGER Act 2007 (Graham, 2011). Since then there has been no systematic and organised GHG emissions and abatement reporting arrangement for local government in Australia (Pillora, 2010).

Reporting under the NGER Act 2007

Following the guidelines of the NGER Act 2007 and later under the *Clean Energy Act 2011*, local governments in Australia are only required to report their GHG emissions if those emissions cross the threshold of 25,000tCO_2-e (CoA, 2008). This means, unless a local government's GHG emissions cross the designated threshold or the local government voluntarily chooses to report, GHG emissions are not captured under the present Australian GHG emissions reporting arrangements.

Moreover, while the *NGER Action Plan Guidelines* recommend certain criteria to be followed in GHG abatement reporting, these are not relevant for local government. This is because both the NGER legislation and the *Action Plan Guidelines* were not specifically developed for local government (CoA, 2009). For example, the guidelines only recommend reporting the total amount of 'Energy' usage, converted to a standard unit of gigajoules (GJ). It does not recommend a breakdown of that total into the different types of energy sources reduced — i.e. electricity (kilo watt hours) or fuel (litres) (Graham, 2011). While totalling all energy sources might be useful for the policy-makers at the national level, such a reporting format has little significance for local

government policy-makers and it does not help them in their decision-making process related to climate-change policy. Totalling shows a lack of understanding of the local government context when designing climate policies and legislation at the national level.

Another example of a reporting criterion prescribed within the guidelines that does not reflect the local government situation is the field 'Action Category'. It asks to categorise GHG abatement actions as per nine listed categories. These listed categories fail to cover many local government GHG abatement measures. If this categorisation included local government's various GHG abatement measures, this criterion could help local government policy-makers track the effectiveness of their various abatement measures. In addition, the inclusion of such a reporting criterion to a mandatory national GHG emissions and abatement reporting system for local government could help provide valuable baseline information on various abatement actions. The collection of such information could help make evidence-based local planning decisions.

Market-based abatement reporting

Following closure of the CCP-Australia program, some councils have sought to fill the gap in GHG abatement reporting by outsourcing private companies to track various energy usages in different areas of their operations (i.e. gas, electricity, water, fuel etc.) (see Chapter 7). Most of these companies specialise in environmental data management, benchmarking, and reporting. Generally, councils pay them to collect utility data annually on their behalf. The assigned companies then organise the collected data into a preferred format

and develop benchmarks and various indicators as prescribed by the councils to assess the energy performance of specific council operations/assets. In providing such services, these companies fulfil the specific needs of individual councils, allowing them flexibility of reporting. While such a model takes into consideration the NGER legislation, the format varies widely across councils compared to ICLEI's standard model of reporting. Moreover, such reporting of abatement is voluntary, and not comprehensive as it reports only those abatement measures requested by the client council. Although there is potential to collect the information from individual councils' abatement reports to produce a collective local government GHG abatement report that would be useful at national level, such a report has not been produced to date. One element missing from this market-based abatement reporting is the field defined as 'Action Category' in the NGER guidelines. Inclusion of this field in the current abatement reporting format could help local government policy-makers assess the effectiveness of different types of local GHG emissions reduction measures (Graham, 2011).

No national reporting system

At present, no national GHG emissions and abatement reporting system for local government exists in Australia. Indeed, since 2008 after the closure of the CCP-Australia program, there has been no Australia-wide initiative either to introduce a framework, promote a network or follow consistent methodology to collect data on local government GHG emissions- and abatement-related activities, investments and savings (Storey et al., 2012). There is no direction and guidance from higher levels of the Australian government to local

governments for making decisions about any investment in GHG abatement-related programs or reporting on outcomes from such investment. As a result, local government climate-change-related actions remain detached from the national level efforts. To date, outcomes of local government climate actions have not been aggregated and/or reported nationally. In such a situation, the impacts — in terms of reducing GHG emissions and associated benefits of policies and measures implemented at the local government level and their collective impact on mitigating climate change at the national scale — are unknown.

This major gap in detailed data and councils' lack of technical capacity for analysing data are major barriers for councils in estimating relevant indicators that could be used for policy monitoring and assessing causation between the climate policy actions and the associated co-benefits.

8.2.3 Monetary considerations of 'quantifiable' benefits

The current nature of policy discourse at the local government emphasises the necessity for quantitative assessment of results and concrete outcomes. In such an environment, policy measures are bargained mostly in financial terms. Predominantly, economic assessment in the form of a 'business case' and cost-benefit analysis are considered as crucial input that informs councils' consideration of benefits from climate-change-related policy measures. However, this approach often dictates the exclusion of 'non-climate- and non-energy-related' benefits from consideration during the project-development phase (see Chapter 7). One argument commonly presented for the emphasis

on economic assessment was that usually the ensuing numbers are deemed objective and evidence based, which helps policymakers to justify their policy decisions. As one interviewee put it:

> … investment in mitigation is primarily seen as 'meeting a business case' … maybe reducing the 'operating overheads' of the building, for example its utilities, or maybe some driver in terms of efficiency … there is a need to demonstrate a 'business case'. Sometimes that 'business case' could be quite marginal. Only then do other 'non-monetary benefits' come into it. (Council in Greater Metropolitan Newcastle, interviewee, 2016)

This means that while certain quantifiable 'climate- and energy-related' co-benefits of climate-change-related policy measures are purposively considered, 'non-climate- and non-energy-related' co-benefits that also result from these measures are not considered, quantified, or even identified in the policy-making process related to climate change. Lack of reliable data, along with the apparent unquantifiable and uncertain monetary value of these 'non-climate- and non-energy-related' benefits and absence of know-how to convert data into policy decisions, discourage them from actively considering these types of benefits in the policy process.

Moreover, given the fact that the local councils work with very scarce resources within limited budget and there is no apparent direct return for councils from giving priority to pursue such measures, there is not enough incentives for councils to aim for these 'non-energy-related benefits'. As one interviewee explained:

> It's [i.e. measuring non-energy and non-climate benefits] a challenging thing. But we acknowledge that yes, there is benefit in these things,

> but council does not have the incentive, because it's not … council's priority, the framework within which the council is making decisions. And that's a 'cold benefit' thing … here in council the framework is mostly driven by financial terms. So, you don't have the incentive to pursue those benefits. (Council in inner-city Sydney, interviewee, 2016)

Councils' clear preference for these particular (measurable) benefits only suggests GHG emissions-reduction and its associated fiscal savings are considered as the most important outcome from cutting energy consumption. The 'non-climate- and non-energy-related' benefits that also result from these measures are not considered as part of the main policy outcome.

The resulting omission of the 'non-climate- and non-energy-related benefits' comprise very significant and large group of health-related benefits. For example, such benefits include health benefits resulting from improved air quality, use of physically active modes of transport, enhanced 'liveability' and creation of more local jobs from better planning of the built environment. While all of these have potential monetary savings for the health budget, they are not clearly taken into account in the policy decision-making process. Omission of these benefits from considerations in the policy process limits councils' ability to attain full benefits resulting from climate-change-related policy measures. It means climate change mitigation at the local government level in NSW at present is primarily driven by the twofold objective of reducing GHG emissions and energy consumption.

8.2.4 Local government's limited planning control

The limited authority and control given to councils over certain areas or sectors within the existing regulatory framework limits council's choice of mitigation measures. Moreover, this limitation confines councils' GHG abatement activities within their own operations, restricting councils' ability to extend GHG mitigation efforts to areas that are currently beyond their sphere of control. As the results from the survey show (see Chapter 6), the majority of the NSW councils' initiatives to reduce GHG emissions are focused on energy-related measures.

Non-energy-related measures — such as sustainable or 'active transport' (i.e. use of public transport, bicycle and pedestrian networks) or lifestyle and behaviour change — are less common among local governments' climate-change-related initiatives across the state of NSW. This limited utilisation of non-energy-related measures (particularly, active transport measures) is due to local government's limited regulatory control in the transport sector. As a result, local government's GHG abatement-related initiatives in the transport sector is limited to introducing a low-emissions vehicle fleet within their own operations. To reduce community GHG emissions in this sector, councils' initiatives are limited to changing their citizens' motorised travel behaviour through demand management. The few councils that are attempting to reduce their citizens' car dependency and to promote active transport are facing several barriers beyond their control. For example, Waverley Council has recently introduced measures to reduce their citizens' dependency on private car use. To this end, Council has increased and improved facilities and

services for walking, cycling and public transport (*Waverley Community Strategic Plan 2018–2029* and *Transport Policies 2017*). This includes encouraging use of public transport during special events and paying for the operation of bus services in new routes by State Transit during weekends and public holidays. With Council's support, State Transit is now able to operate the service cost-effectively. However, such positive efforts by Council is unable to reverse the rising trend of dependency on private car use. Despite Council's attempt to restrict on-street car parking through the *Development Control Plan* (DCP), it has been observed that on-street parking has reached saturation point. This problem has become even more challenging for Council given that state policy and guidelines, instead of discouraging private car use, often foster excessive levels of parking provision and facilitate increased car use. Unfortunately, this trend prevents Council from achieving its policy targets for increasing use of low-carbon modes of transport.

In attempting to explain how their council's limited authority and control over certain areas that are major sources of carbon emissions prevents it from taking appropriate measures to scale up its climate actions and capitalise on more benefits, one interviewee said:

> Probably the biggest factor really is the amount of control that Council can have over those decisions … something like transport, which is a major emitter. But Council really doesn't have much management or control over the road system or public transport. They recognise that as the state government's responsibility. So we can advocate, but we can't really have much direct control. The things that we do control are our own fleet. So we can do that. And then we've got some control over things like urban design and form. That can influence usage …

> and the construction and infrastructure to support that. But that's more in the long term, and the benefits come over a very long period of time. So I suppose there are lots of considerations. So often it's very much about the things where we have some operational involvement or some policy responsibility and involvement. And where we have some influence over the outcome. (Council in Greater Metropolitan Sydney, interviewee, 2016)

This limitation has a substantial bearing on the possible scaling up of a 'co-benefits approach' in local government's climate-change-related policy-making process. This finding confirms that local governments have limited control and authority in the sectors and assets where they can scale-up climate action with the potential of generating a wide range of co-benefits. It means to undertake such actions local governments need to collaborate with higher levels of government and other stakeholders, which would largely depend on the specific modes of governance arrangement (see Chapter 4).

These limitations also suggest that to extend the co-benefits approach beyond reducing energy consumption and saving money to include a broader range of environmental, social and health benefits resulting from low-carbon measures would involve actions in some policy areas like land-use planning, planning of transport infrastructure, and tackling the demand for energy, which would require deeper policy shifts and could even entail legislative changes (see Chapter 6).

8.2.5 Government's energy-saving policy focus

'Energy-related' measures are the most preferred mitigation measures over other 'non-energy-related' measures. The results show that financial

consideration based on financial savings, existing budget and least cost predominantly dictate a council's choice of mitigation measures. The possibilities for cutting energy usage, and thus reducing GHGs emissions, while at the same time securing substantial financial savings, are the main motivators for most councils adopting 'energy-related' mitigation measures. Apart from financial considerations, federal and state governments' energy-and-resource efficiency-focused policies and funding also influence councils' preference for 'energy-related' mitigation measures. As one interviewee noted:

> People in positions of policy-making and acknowledging these actions … you get a vibe … for instance, at the state level — the Office of the Environment and Heritage used to be very much focused on 'wider sustainability' including climate change. And then you get a new government in … and they changed things to be very focused on 'resource efficiency' — but only if you get a "12% return on investment"! So, for instance, the state government has a Resource Efficiency Plan, but they will only roll out actions if there is a "12% return on investment"! So, what that's indicating to me [is] that I can't do things with 'co-benefits' for health or community or social or other things, or just a benefit of helping that part of the economy grow … we support the 'solar industry' … or support the 'heat pump industry' or whatever it is … because that might not have a greater return on investment if we go with instantaneous gas or something like that … so that is favourable in a way that shows that they are focusing on it, but not favourable in a way, to say, that "it's only if you get a financial return", which is not very positive. (Council in inner-city Sydney, interviewee 2016)

This confirms similar findings from previous studies on local governments' climate actions (Fallon & Sullivan, 2014; Hoff, 2010; Urbis, 2010; Zeppel, 2011; Zeppel & James-Overheu, 2012) which suggests that while the

presence of higher-level policy and funding drive local climate action, the nature and type of such action is largely influenced by the objectives of funding that supports local government climate action. In this instance, the prevalent mitigation responses by councils are energy-related projects. This is a result of the principal funding source being aimed at ‘resource efficiency’ projects.

The above example demonstrates that local government climate polices are mostly designed to fulfil a higher level of the governments’ agendas. In such a hierarchical top-down policy approach, local governments focus on designing policies and projects that target individual investments with readily visible, short-term outcomes. This curtails local governments’ ability to develop effective policies and programs that could better address local priorities using local solutions. Given the federal government’s policy agenda is to encourage local response to climate change (CoA, 2010), both federal and state government policies and funding objectives should be more responsive to the needs of local governments, as well as their communities.

8.3 Enablers of co-benefits

8.3.1 Linking climate change to local issues

The results of this study demonstrate that local governments in NSW use a wide range of measures that result in GHG abatement. However, the non-climate-related co-benefits that are generated from implementing these measures act as primary drivers for councils in adopting these measures, rather than the objective of GHG abatement. Most councils consider these non-climate-related co-benefits as opportunities to link local issues (which are

already on the local agendas) with climate change issues, which help them to justify local climate actions.

However, not all councils are active in leveraging such co-benefits in 'localising' climate action. Many councils do not see climate change as something with which they should be concerned. They fundamentally view climate change as a global problem and the actions required to respond to climate change as a burden on the local economy.

Both the results of the survey and interviews show that co-benefits were not explicitly considered by the policy-makers when these initiatives were first conceived. Most of these initiatives were undertaken while responding to local needs such as reducing energy consumption, saving money, reducing local traffic congestion or boosting the local economy through investment in green technologies. While climate concerns have indirectly influenced local government policy-makers to undertake some of these initiatives, generally non-climate-related local concerns were the main drivers. For some of these initiatives, only when councils identified their significant contribution in reducing GHG emissions were those initiatives explicitly considered as part of councils' sustainability-related objectives. In some cases, during the project-development phase, policy-makers were not aware of either the GHG abatement potential or the potential financial benefits of these initiatives. Only later, when policy-makers were able to identify these potential co-benefits, were they incorporated along with the targeted direct benefits into those initiatives.

Similarly, federal and NSW governments' policies focused on energy and resource efficiency were the main drivers of local governments undertaking energy-efficiency-related projects, with which other non-energy-related objectives started to align once the primary benefits of saving energy and money were realised. These examples show the importance of establishing the links between different policies in achieving synergies and capturing co-benefits. Local governments' efforts to reduce GHG emissions in the transport sector through switching to cleaner fuels for their vehicle fleet may not have a large-scale direct impact on GHG emissions reduction. However, pursuing such a strategy under the 'Avoid, Shift, Improve' framework in the long run can support the diffusion of such technology and get old cars off the road. Similarly, local governments' efforts to change their citizens' private-car-dependent travel behaviour through demand management and promoting active transport should not only be assessed based on its impact on GHG abatement but also on its impact in shifting potential would-be motorists out of cars and into public transport.

The above cases demonstrate how purposively linking the climate change issue to local issues can help local governments formulate effective policies that can deliver both climate-related and other non-climate-related local benefits.

8.3.2 Presence of local policy entrepreneurs

A major influence behind the councils who are identified in this study for their leadership role in local climate action are some senior officials who, as policy entrepreneurs, play key roles in advancing the climate agenda and

demonstrate a sound understanding of how their council's policy process works. These councils have strong community support for undertaking sustainability and climate action, and these policy entrepreneurs utilise this support in framing successful climate policy proposals.

Among the councils that have general community support for pursuing sustainability but where local issues are regarded as more important than addressing climate change, it becomes difficult for councils to come up with an effective policy response. In such circumstances, it has been observed that local policy entrepreneurs use their ability to frame climate policy proposal in such a way to successfully address these more immediate local concerns.

These findings suggest that effective local climate action calls for local policy entrepreneurs who have a sound understanding of local issues and community concerns. They can help councils frame successful policy proposals by linking climate policy goals to local issues so that they are politically acceptable to their communities.

8.3.3 Local autonomy and governance

Local governments' authority and institutional capabilities are critical factors determining the extent to which local governments can advance the co-benefits approach in pursuing climate actions. The results presented in Chapter 7 show that within the existing regulatory framework local governments have little control over some policy areas such as land-use planning, transport, waste management, energy supply and addressing the demand for energy. These are critical areas where there are many

opportunities to generate large-scale co-benefits. Councils' limited authority in those areas prevents local government policy-makers from scaling up climate actions, which could generate a wide range of co-benefits.

In Australia's federal system of governance, policy levers to deal with climate change rest largely with the national and state governments; however, local governments, being nearest to the community, can take the lead roles in delivering both national and state climate policies. Local governments are at the appropriate level to realise co-benefits, mainly due to their proximity to the implementation phase of those policies.

However, to do so, local governments need autonomy in terms of developing their capacities and making decisions to implement actions towards co-benefits. The results show that local governments could be more effective in boosting co-benefits if federal and state government policies and funding would allow local governments flexibility in developing climate policy initiatives based on local needs and priorities. Under the present arrangements, since federal and state governments hold fiscal powers, local governments are unable to create required financial incentives (such as preferential tax treatments) or invest in programs targeting broader environmental, health and social benefits. For example, in the areas of waste management, there are many opportunities to advance the co-benefits approach and capture enormous co-benefits. However, while local governments are given the responsibility of managing waste, most of them do not have the required resources or technical knowledge to establish their own waste-management systems by themselves.

Therefore, within Australia's centralised government system, looking only at national and state government climate policies and funding support for local government does not give us a total picture of the policy and legal context within which the co-benefits approach could be developed at the local government level. To push the co-benefits agenda, the degree of decentralisation must also be considered. This is critical as it ultimately determines the level of autonomy local governments can exercise in utilising the resources available from higher levels of government to develop their own climate policies with a co-benefits approach.

8.3.4 Partnerships and collaboration

This study has found that partnerships and collaboration play important roles in informal adoption of the co-benefits approach by councils in their initial phase of climate-policy initiatives. This confirms the findings of available co-benefits studies, which suggest that through developing partnerships, local knowledge bases and institutional capacities can be improved, which in turn increases the possibility of achieving more positive climate policy outcomes through adopting the co-benefits approach (Puppim de Oliveira, 2013). Particularly, building local organisations and establishing cooperation with international organisations through them can contribute to raising awareness among councils and other stakeholders, generating financial resources and bringing in expert knowledge to develop and implement projects with co-benefits.

In Australia, this trend was first observed when some councils began to put the 'big global issue' of climate change onto their local agendas through

participation in the CCP-Australia program. This program provided a starting point for the concept of climate change to be introduced in Australia's local government policy discourse, with reliance on the support and best practice examples provided. The CCP-Australia milestones allowed councils to maintain momentum and provide justification for further resources to be provided for pilot projects. The program successfully demonstrated that climate change protection can be reconstructed as a local issue which can be resolved with local issues and priorities that can lead to cutting of GHG emissions. This means the program managed to synergise the climate-change-related policy goal with local-development objectives in taking up climate change actions that resulted in GHG abatement with significant co-benefits. Participation in the CCP program has been identified by the majority of the councils in this study as a major contributor towards laying the foundation for developing councils' next stage of climate change programs. As one of the interviewees noted:

> We did Cities for Climate Protection [CCP] program. We finished Milestone Six. In retrospect, a lot of the questions about our ability to manage the data, collection of the data — we developed through participating in the CCP program … but we finished that program when we reached Milestone Six. (Council in Inner-city Sydney, interviewee 2016)

The program provided a much-needed nationwide framework for the local governments to work collaboratively with one another on climate change actions. This helped to create a network between the councils through the participation in the program for sharing experiences and inspiring each other. The participating councils shared their resources collectively in operating the

program cost effectively, developing technical capacities and staff skills — which collectively contributed to achieving greater impact on reducing GHG emissions. As one interviewee explained:

> I guess, it [CCP-Australia] provided the support of having a framework that was well understood and that you could progress through, that councils tend to like programs where you can show results … there were the five stars and all that kind of thing, so you know, it's the milestones and the star ratings and that kind of thing which were helpful in terms of bringing out that competitive spirit between councils as well, but it was also good to be able to see clearly how you would progress … to have that support from ICLEI … for the first time, working out … What are our emissions? Where do we get this done from? How do we measure it? How do we report this? And then just being able to network with other councils to see, well, what are you doing? How could we do that? And easily find other councils that were at the same sort of level or space as we were in. (Council in Greater Metropolitan Sydney, interviewee 2016)

The success of CCP-Australia demonstrated that through leveraging international cooperation local governments could achieve greater positive outcomes through the co-benefits approach. However, it is not easy for local governments to gain such cooperation on their own initiatives alone, as such cooperation comes through multilateral and bilateral agencies in countries where national and state government support and coordination are necessary. In the case of CCP-Australia, this support came directly from the federal government providing funding of around AUD$13 million to establish a local body to coordinate and operate the program (Bulkeley, 2000a). This suggests that a permanent and duly designated local body needs to be formed that can be assigned the responsibility of sharing information and technical resources

and mobilising a network of government and non-government stakeholders from an international and, potentially, national or local stance (Puppim de Oliveira, 2013). The proposed network may comprise sub-networks based on levels of governance, specific sectors or necessary expertise to facilitate communications and collaborations easier-to-manage. Such sub-networks will help stakeholders access critical information about the institutions or organisations with related objectives, capacities and services. All these point to a collaborative approach to knowledge management, which is a key requirement to advancing the co-benefits agenda.

8.4 Conclusion

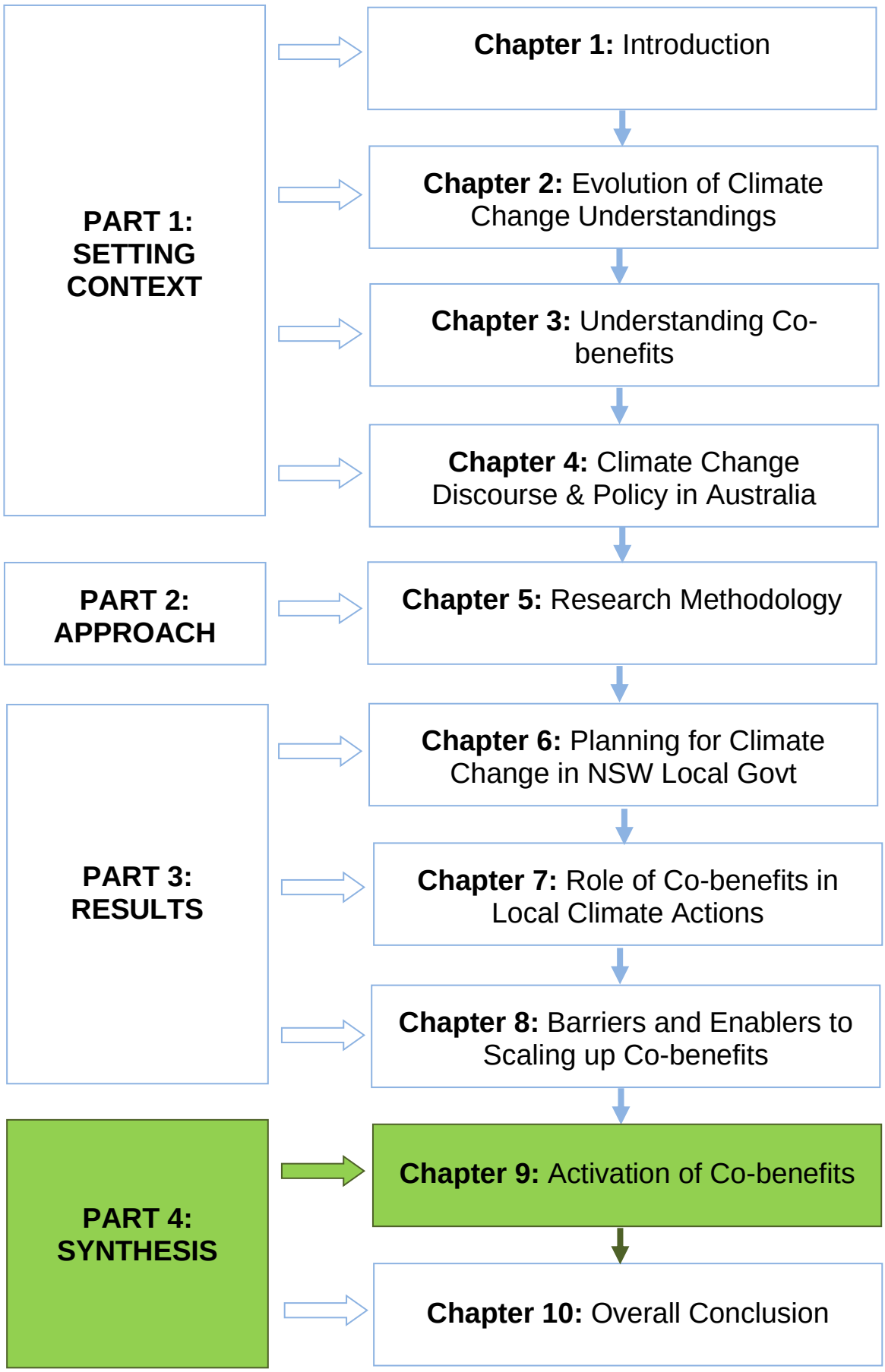
Based on the findings presented in the preceding two chapters, the analysis presented in this chapter has identified the main barriers and enablers to scaling up the co-benefits approach in the local government climate-change-related policy process. The main barriers to scaling up co-benefits in the local government climate policy process are:

i. absence of an integrated climate policy framework and legislative support from the state government;
ii. major gap in data and lack of technical capacity to develop data into reliable indicators;
iii. predominant considerations of monetary benefits based on economic assessment in the form of ‘business case’ and cost-benefit analysis
iv. local government’s limited power and responsibility;
v. federal and state governments’ energy-efficiency-focused policies.

The factors that positively act in local government's current approach to co-benefits are:

I. linking climate action to local issues;
II. local policy entrepreneurs' active role in framing policy proposals linking climate policy goal to local issues;
III. strengthening local government autonomy and governance in boosting their capacity for climate action;
IV. partnerships and collaboration in building institutional capacities, cooperation with international organisations and creating networks among councils.

With this identification of the barriers and enablers to co-benefits in mind, the next chapter will explore the possible interventions that can overcome these barriers and leverage these enablers to scale-up the co-benefits approach to climate action at the local government level in Australia.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CHAPTER 9: ACTIVATION OF CO-BENEFITS

9.1 Introduction

This This research has provided critical insights into the role of co-benefits in local government's climate change related policy decision-making process and has provided an opportunity to investigate the circumstances under which the co-benefits approach can be used. The research has shown how co-benefits help the local government sector pursue local climate action. While local councils have not formally adopted a co-benefits approach in their decision-making process, the results presented in Chapter 7 clearly demonstrate its presence, and the important roles some co-benefits play in motivating councils undertaking climate change mitigation measures.

However, the extent to which co-benefits can be achieved in a planned and purposeful manner is a complex combination of many underlying factors. Since the use of the co-benefits approach in designing climate policies is an emerging concept, there is limited understanding of the concept among policy-makers. They are not aware of the concept's profound policy implications as a paradigm that can simultaneously address climate change and other policy goals. All interviewed local government officials (n=15) involved in this study acknowledged their limited understanding of co-benefits. This is partly due to the notable absence of co-benefits in the government's policy discourse. The findings presented in Chapter 4 showed that apart from making rhetorical

statements on the desirability of broader economic, environmental and social benefits of climate change mitigation, consideration of these benefits has so far not been able to gain traction in Australia's climate policy discourse. Although the idea of climate co-benefits has been developing for nearly a decade (see Chapter 3), the findings presented in Chapter 4 show that there are no coherent co-benefit initiatives as such being implemented in Australia, nor are they present in government policy discussions. Since co-benefits are not explicitly mentioned or discussed, policy-makers find it difficult to identify co-benefits and avoid potential conflicts within existing policy and legislative frameworks (see Chapter 7). Furthermore, there are pitfalls in undertaking actions across sectors and levels of government, with the results presented in Chapter 6 showing that in practice there is no whole-of-government approach to climate policy.

A positive development in this regard is the explicit intention to capture broader benefits of climate change policies in the NSW Government's recently released *NSW Climate Change Policy Framework* (see Chapter 4). This intention certainly reflects a positive shift in the government's policy perspective and is likely to provide a basis for paying much needed attention to climate co-benefits in the state's climate change related policy measures in the future.

The purpose of this chapter is to recommend possible interventions that could intentionally promote and enhance co-benefits in the local government policy process. Based on the findings presented in the preceding three chapters (Chapters 6, 7 and 8), this chapter concludes the research by recommending

possible measures that could assist policy-makers for purposefully considering, planning, generating and integrating co-benefits in climate change related policy-decision-making in Australia.

9.2 A multilevel governance approach for climate change

My investigation reveals that there is a clear absence of a whole-of-government response to climate change and a lack of collaboration between federal, state and local governments to attain climate policy synergy. In such a context, local government initiatives to address climate change have been occurring mostly through the operation of disparate policies and programs, often detached from existing national and state governments' climate policies. This has some serious implications for local government climate actions. I now consider these as they have significant bearing on local government efforts in scaling up climate actions and delivering meaningful results.

9.2.1 Local government's limited capacity to respond to climate change

Firstly, the Australian government's institutional arrangements regarding climate change place limitations on local government's capability to respond to climate change. Local government's position as designated by the constitution within Australia's federal system of governance acts as a key determining factor of the policy-making capacity of local councils. Local government falls under the constitutional responsibility of state governments. State governments maintain a tight rein on local councils through enacting

their respective local government acts, which define the statutory powers, delegated responsibilities, and legislative authority of local government (see Chapter 4). These factors determine the type, shape and scope of climate change policies that local government can undertake. These constitutional restrictions potentially pose legal obstacles for local councils if they attempt to introduce regulations to incorporate climate change considerations into their policy and decision-making processes. This was evident through several cases where councils' attempts to address climate change through the development assessment process faced developers' challenges in the NSW Land and Environment Court and have not been effective (see Chapter 6).

9.2.2 Local councils are dependent on higher levels of government

Secondly, in the current arrangements, since policy levers to deal with climate change rest largely with the federal and state governments, local councils need to rely on higher levels of government, primarily on their respective state governments, to support their climate policy initiatives. The type of support local government receives, whether legislative, technical or financial, depends on the different modes of governance their respective state governments chose — whether 'enabling', 'provisional' or 'regulatory'. In turn, this determines the type of policy initiatives local government can undertake. The record of involvement of both the federal and state governments indicates an overwhelming preference for either enabling or provisional support instead of 'regulatory' support (see Chapter 6). The former types of support largely involve 'enabling' voluntary programs such as building the capacity of local

government through providing information and guidance, which do not require substantial resources. In contrast, there is a notable absence of the regulatory mode of support from state government that would demonstrate a more sincere commitment to climate action beyond enabling and provisional methods. In this way, the scale and reach of local governments' climate policy initiatives are reduced.

The findings of my research also show that the areas critical to local government for climate policy initiatives — such as urban planning, transport, energy-efficiency regulations, and renewable energy options — depend on support from higher levels of government (see Chapter 7). There have been no substantial attempts to support local government's climate policy initiatives in those critical areas where there is need for either change in the institutional settings or legislative support.

9.2.3 Absence of legislated emissions-reduction targets and regulatory frameworks

Thirdly, at the national level, the federal government's climate policy framework aspires to attain 'reduction of Australia's GHG emissions by 26 to 28 per cent below 2005 levels by 2030' to meet the terms of the 2015 Paris Agreement (CoA, 2015a, pp. 1-3). However, the federal government has neither legislated this target nor established institutional, market or regulatory frameworks to implement it across all sectors and levels of government (see Chapter 4). Neither the aspirational target nor the current set of voluntary emissions-reduction policies pursued by the federal government provides the

necessary impetus to state or local governments to generate effective climate policies that would reduce emissions to meet this target.

This is reflected in the NSW Government's recent *NSW Climate Policy Framework* which aspires to attain an 'aspirational objective' of 'net-zero' emissions by 2050 (OE&H, 2016a, p. 2). Nevertheless, the proposed policy framework has neither a legislated emissions-reduction target nor a supporting regulatory framework that would help it to achieve this objective (see Chapter 4). At the local government level, evidence suggests that the presence of legislation is an important driver for local climate action. The potential of local governments to be held accountable for decisions that do not consider climate change has been perceived as a driver for climate actions (see Chapter 6).

The absence of legislated national- and state-level targets for reducing emissions and a regulatory framework to enforce such targets are significant challenges for councils in effectively integrating climate change considerations into their decision-making frameworks (see Chapter 6).

9.2.4 Absence of required provisions in the planning legislation

Given the notable absence of an explicit objective or purpose regarding climate change in the main planning legislation — the *Environmental Planning and Assessment Act 1979* — NSW statutory provisions for strategic planning, environmental assessment and development evaluation are unable to perform any strategic climate risk assessment, or link climate risk assessment to a carbon-avoidance goal or an emissions-reduction target. Thus, the NSW

planning system fails to integrate climate change considerations effectively into its operational processes. Among other factors, a weak state legislative framework to limit GHG emissions and the absence of a policy framework for climate planning at the state strategic level are two major issues that need to be addressed urgently to enhance NSW local government climate actions. This is echoed aptly in the following statement by one interviewee:

> I think the other big challenge has been the planning system. The planning system in New South Wales is at least 10 years behind the Climate Summit! There is a mismatch between climate science and planning. To me the current arrangements for sustainable buildings in New South Wales are our handbrake on effective climate action and building better community in terms of resilience and low-carbon outcomes. I think the planning system has a lot of areas where it needs improvement. And that takes us into the whole world of incentives. (Council from North Region, interviewee, 2016)

Decision-makers in local government in NSW need guidance and stronger laws to achieve GHG emission reductions through the planning system. The absence of a unified approach to taking into consideration and cutting emissions through the planning system is a critical policy gap.

9.2.5 Shifting policy and fiscal constraints

The absence of any clear and overarching national and state policy direction for climate change discourages councils from committing limited resources into long-term planning for climate change. Amid prevailing uncertainty at both national and state levels, a recurrent problem is that national/state policies may change within a short period, which endangers councils' priorities, plans and programs. Such incident occurred several times with federal- and state-

funded programs, when shifts in government policy led to the abrupt termination of the programs. One example is the federal government's withdrawal of funding for the International Council for Local Environmental Initiatives (ICLEI)-based 'Cities for Climate Protection' program. A second example is the NSW government's halting of funding for the Waste and Sustainability Improvement Program (WASIP) (see Chapter 6). It is impossible for local councils to counter such changes with new strategies when fiscal resources are limited.

Thus, the review of policy documents, as well as the survey results and findings from the interviews, are consistent in identifying the need for clear direction from higher levels of governments as vital for enabling local government climate action. Given that, conventionally, local government actions in broader policy areas are defined significantly by the policies of the state government, local councils have valid reasons to look for support at higher levels of government on the issue of climate change. While state imposed compliance, and state and federal government assistance for local climate action can push local governments toward realising a common policy goal, without such compliance and assistance local councils are left alone to determine their responses to climate change on their own terms. This has significant implications for local climate action from the point of view of the local government policy-makers in pursuing local climate action.

Clear policy directions and support from higher levels of government would ensure a level playing field for all local councils, as they would not then need

to worry too much about risking or securing support from their communities when climate change is a politically sensitive issue in local politics.

Clear policy directions would also help councils avoid the same local policy debates around climate change. The statements of the interviewees also suggest that while higher levels of government direction are vital for local climate action, at the same time this should not be prescriptive. State or federal policies should offer local governments autonomy as much as possible to let councils customise local climate actions based on local needs, priorities and opportunities.

In conjunction with any condition for local climate action from higher level governments should come both financial and technical assistance, at the same time coordination of other supportive state or federal policies and funding streams. Under the current arrangements, since federal and state governments hold fiscal powers, local governments are unable to support climate actions from their limited budget. Local governments could be more effective in scaling up their climate actions if federal and state government funding allowed local government's flexibility in developing climate policy initiatives based on local needs and priorities.

9.3 Conceptual clarification and consensus on co-benefits

Conceptual clarification and consensus on co-benefits are prerequisites to advancing a co-benefits approach for climate action and policy (Puppim de Oliveira et al., 2013). Australian researchers, policy-makers and stakeholders

need to reach an agreement on a working definition of co-benefits that would be appropriate to the Australian context. At the very minimum, a clear account of the multiple benefits should be incorporated into the policy and/or project objectives and framework. A review of the major definitions of co-benefits (see Chapter 3) suggests that they are all based on a common understanding that policies that are clearly formulated to address climate or development objectives can result in wider benefits, which include both development as well as climate benefits. With this understanding in mind, an operational definition of the co-benefits approach could be developed. Such definition may be developed into a set of guidelines for developing policies and projects to make sure that the co-benefits approach is incorporated at the beginning (Castillo et al., 2007), thus laying the foundation for embedding climate change policies within an overarching framework of sustainable development strategies.

Endorsement of the definition by Australian governments will demonstrate to different stakeholders and the public an explicit commitment for embedding co-benefits in any development project. Moreover, this explicit recognition will encourage exploring potential links that may exist between different sectors, as well as providing incentives for investment in developing technologies, human resources, and research and development for the generation of scientific and technical knowledge about co-benefits relevant to the Australian context.

9.4 Developing and adopting a co-benefits framework

The findings of my research, as well as the literature review, suggest that the most obvious step to purposively consider, plan, generate and integrate co-benefits would be to develop and adopt an overarching co-benefits framework for Australia. A framework is required to assist policy-makers to devise policy objectives that can purposefully generate co-benefits by setting principles, target areas, and goals for the long-term that would serve as a foundation for policy actions. It would assist policy-makers to follow a consistent and analytical approach in policy-decision-making to attain the maximum net-benefit regarding climate, economic, social, and environmental dimensions.

Due to the absence of an overarching framework, Australian governments' climate policies and programs currently lack a multi-sectoral approach, synergy and coordination across various levels of government. Consequently, local government actions on climate change are generally driven by sectoral policies and projects towards service delivery without paying meaningful attention to co-benefits. The findings presented in Chapter 7 demonstrated that at present local government regulatory authority is limited in areas where there are opportunities to generate a wide range of non-climate- and non-energy-related benefits from cross-sectoral policies.

Formal adoption of a co-benefits framework would facilitate necessary reforms in the policy, regulatory and financing frameworks for local councils to incentivise and promote co-benefits. This would open avenues to strengthen

local government's autonomy and capacities in terms of better regulation and their effective enforcement, enhanced institutional coordination, integration of various policies across different sectors, reform in local government budget allocation process, better engagement with the community and stakeholders, awareness and advocacy, and promotion of innovations. These are critical ingredients of a supportive policy-making environment for adopting a co-benefits approach within local government policy context (Narender & Sethi, 2018).

9.5 A co-benefits framework for NSW local governments

The findings presented in Chapter 7 identified several priorities local councils in NSW are currently facing when considering climate change:

i) to address the immediate climate risks faced by local communities;
ii) to take advantage of existing higher level (federal and state government) policies and funding streams focused on energy and resource efficiency;
iii) to consider and garner local political support; and
iv) to target quantifiable co-benefits from energy-related mitigation measures.

These priorities influence local government's decisions for purposively favouring some co-benefits over others. My study found most targeted co-benefits are those that are readily identifiable, quantifiable, short-term, attributable, and opportunity-oriented. This suggests that promoting a priority-

and interest-oriented approach to co-benefits is likely to resonate well with NSW local government's current approach to co-benefits. This will provide necessary impetus for a head start in formal embracing of a co-benefits approach by NSW local councils, which could be improved upon through ongoing assessment.

However, to consider such an approach for promoting co-benefits, climate action planning first needs to be integrated at the local government level. In their current approach to preparing for climate change, local councils in NSW are not equipped for the task. Due to the absence of an overarching policy framework, local councils are unable to integrate climate considerations effectively into their operational processes. In the current situation, planning for climate change at the local government level is occurring ad-hoc through the operation of disparate policies and programs, often without any effective coordination and integration with other local government plans and policies (see Chapter 6).

United Nations Human Settlements Programme (2015) observes that planning for climate change is not a stand-alone process. Rather, it needs to be integrated with, and directly linked to, other socioeconomic, environmental, and physical planning processes across all government levels at local, regional as well as national level. Incorporating action on climate change into local government's planning processes, will make local government's response to climate change more effective. Adopting such integrated approach to climate action would require sharing of information and resources throughout various sectors and collaboration among different government

levels and stakeholders. In addition, such integration would warrant advancing the incorporation of climate policy goals and programs into other related local government plans and policies (UN-Habitat [United Nations Human Settlements Programme], 2015).

To address this gap, I propose a co-benefits framework that would facilitate linking local climate action planning with local councils' current priorities and goals in their *Community Strategic Plans* (CSPs). Operating within the proposed framework, NSW local government policy-makers would be able to develop detailed climate-action plans focusing on those priorities and goals to generate wider non-climate-related co-benefits. My proposed framework would provide a number of advantages for promoting the co-benefits approach within the existing Integrated Planning and Reporting (IP&R) framework. These are as follows:

- Since the goals in the CSPs are already endorsed by the community, a local climate action plan developed around these goals would likely get community support.
- As the goals in CSPs are generally supported by detailed strategy for actions, it would be easier for councils to align their climate action plan with these strategies.
- The goals identified in the CSPs are often closely related, cross-cutting operational areas where most councils have the organisational structure required to coordinate actions to achieve these goals.

In such a framework, policy-makers would be required to consider different policy options and assess their potential impacts simultaneously. By making comparison of the various impacts of different policy actions, councils would be able to make determinations on the most efficient and fair policy action based on evidence, for climate as well as non-climate local objectives. Such action would lead to the fulfillment of the local developmental goals, as well as the intended impact on both reducing GHG emissions and adjusting to the impacts of climate change.

An outline of the different parts of the framework is given below, followed by a detailed discussion of each part.

9.5.1 Overview of the framework

As research on the co-benefits of climate policies and related science is still evolving (see Chapter 3), it is not feasible to conceptualise an all-encompassing framework for a comprehensive evaluation of co-benefits. While the review of the literature has found many examples of methodologies and tools which are used to analyse various climate policies and their impacts, to date there has been no coherent attempt to organise these under a unified framework for utilising these resources systematically within a local government climate policy context (see Chapter 3).

My proposed framework aims to fill this significant gap by integrating and building on various approaches and methodologies that already exist. In particular, in devising the framework, I have adopted and synthesised various methods, tools and processes from the following:

i) *Guiding Principles for City Climate Action Planning* (UN-Habitat [United Nations Human Settlements Programme], 2015);

ii) *Cities for Climate Protection Milestone Guide* (ICLEI [International Council for Local Environmental Initiatives], 2008a);

iii) *Climate Action Planning Framework* (C40 Cities [C40 Cities Climate Leadership Group, 2018);

iv) *Climate Policy Evaluation Framework* (UNEP [United Nations Environment Programme], 2011);

v) *Co-benefits of urban climate action: A framework for cities* (Floater et al., 2016);

vi) *Urban Climate Action Impacts Framework – A Framework for Describing and Measuring the Wider Impacts of Urban Climate Action* (C40 Cities & Ramboll, 2017); and

vii) *Measuring the co-benefits of climate change mitigation* (Ürge-Vorsatz et al., 2014).

The purpose is to provide guidance to local government policy-makers to navigate, select and appropriately use available resources in order to identify, quantify and incorporate broader social, environmental and economic co-benefits of climate-change-related policies, which can then feed into existing decision-making frameworks.

The proposed framework is structured into four key phases as follows:

Phase 1: Developing a Climate Action Plan (CAP): This is the process for developing a detailed plan for action by local government to address

climate change. It describes the guiding principles to be followed in developing such a plan, outlines its key components and its role as an essential part of the framework that would link climate action planning with local councils' priorities and goals in the CSPs.

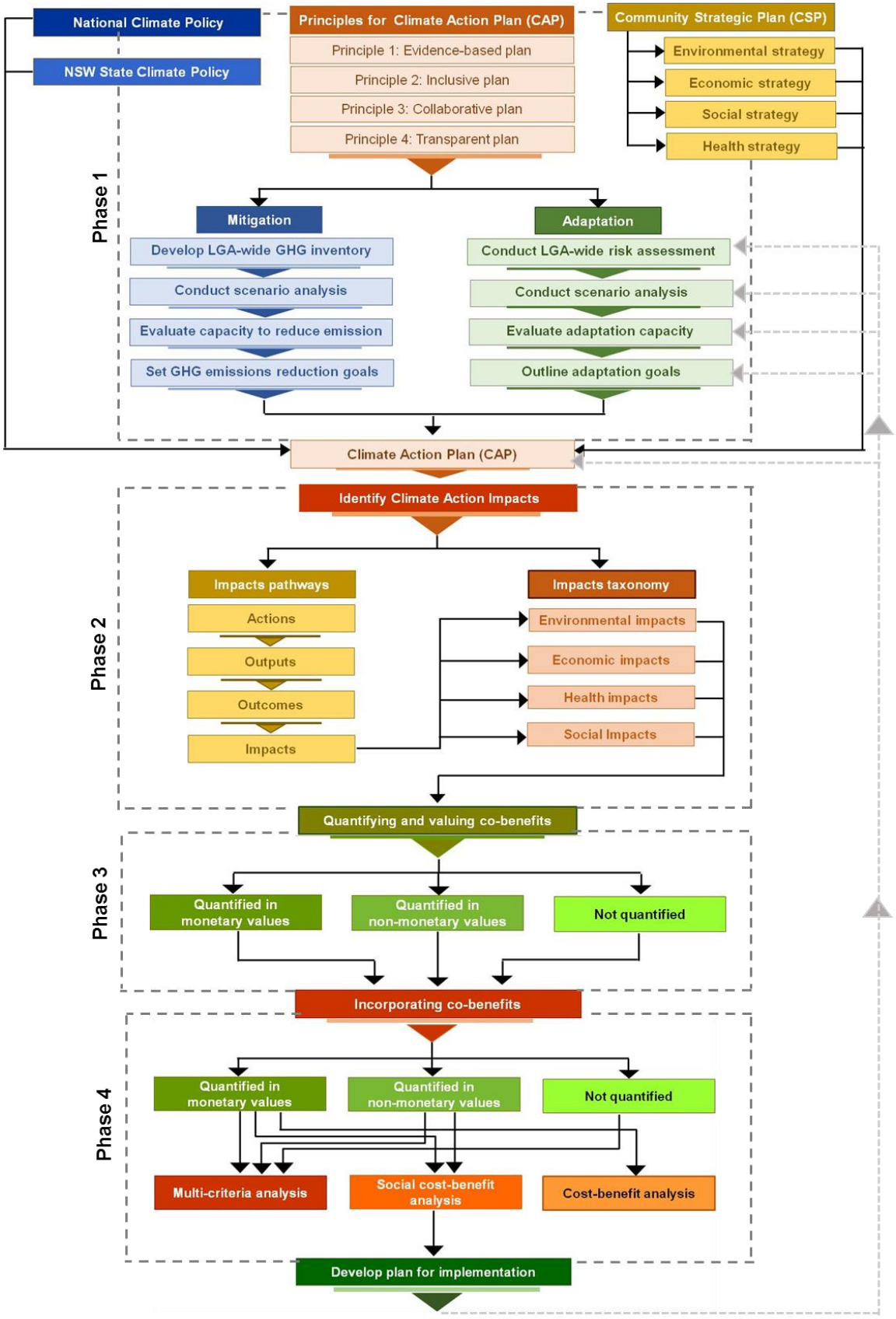
Phase 2: Identifying Climate Action Impacts: This is the process for identifying the links between various climate policy actions and their wider (non-climate) impacts. This phase is critical as it helps policy-makers to verify the climate policy impacts and their actual co-benefits.

Phase 3: Quantifying and Valuing Co-benefits: This involves quantifying the identified impacts of co-benefits to enable their integration into local government's existing decision-making frameworks.

Phase 4: Incorporating Co-benefits: This describes various methods available that could be considered for incorporating co-benefits of climate change policies into local government's existing decision-making frameworks.

Figure 9.1 illustrates the different phases of the framework with their associated components. While such an illustration is useful to explain how the proposed framework would operate, at the same time its limitations must also be acknowledged, as it is a simplified representation of a complex process.

Figure 9.1: A co-benefits framework for NSW local government



Sources: Developed from - C40 Cities and Ramboll, 2017; C40 Cities, 2018; Floater et al., 2016; ICLEI, 2008a; UNEP, 2011; UN-Habitat, 2015; Ürge-Vorsatz et al., 2014

9.5.2 Phase One: Developing Climate Action Plan (CAP)

In adopting the proposed framework, all local councils would be required to formulate and deploy a Climate Action Plan (CAP). It would be a strategic document, which would need to be aligned with their CSP and integrated with the Integrated Planning and Reporting (IP&R) framework (see Chapter 6). The aim is to establish policies and programs in alignment with the goals of the CSP to demonstrate how a council would deliver on its commitment of decreasing GHG emissions and adapting to the impacts of climate change. The plan also needs to be consistent with both Australia's national climate policy and the *NSW Climate Policy Framework* and its ultimate goal of attaining net-zero emissions by 2050. All councils need to follow some guiding principles in formulating a CAP, which are discussed below.

Guiding principles for developing a Climate Action Plan

While each local council may choose to take a different approach in developing its individual CAP, it will be required to adhere to four fundamental principles. These are based on the review of the following policy guidance and existing best practices:

i) International Council for Local Environmental Initiatives (ICLEI)'s *Cities for Climate Protection Milestone Guide* (ICLEI, 2008a);
ii) C40 Cities' *Climate Action Planning Framework* (C40 Cities, 2018);
iii) United Nations Human Settlements Programme (UN-Habitat)'s *Guiding Principles for City Climate Action Planning*) (UN-Habitat, 2015); and

iv) best practice examples identified from my survey (see Chapter 6).

The principles for developing a CAP are intended to serve as a common benchmark for local government-level climate action planning across NSW.

Principle 1: Evidence-based plan, centred on sound understanding of the evidence and the current local situations, comprising: baseline emissions, emissions trajectory, climate risks and local environmental, economic and social priorities and wider context (C40 Cities, 2018; ICLEI, 2008a; UN-Habitat, 2015).

Principle 2: Inclusive plan, which considers the wider environmental, social and economic benefits anticipated from executing the plan and ensures their fair allocation among the local population (C40 Cities, 2018).

Principle 3: Collaborative plan, which emphasises on good governance and proper coordination of the plan (encompassing its relations with national and NSW state climate policies and jurisdictions) and the need for active engagement with the community and businesses and clear transmission all through its preparation and execution processes (C40 Cities, 2018; UN-Habitat, 2015).

Principle 4: Transparent plan, with an implementation process for monitoring delivery, communicating progress and updating climate action planning in accordance with existing governance and reporting arrangements (C40 Cities, 2018; UN-Habitat, 2015).

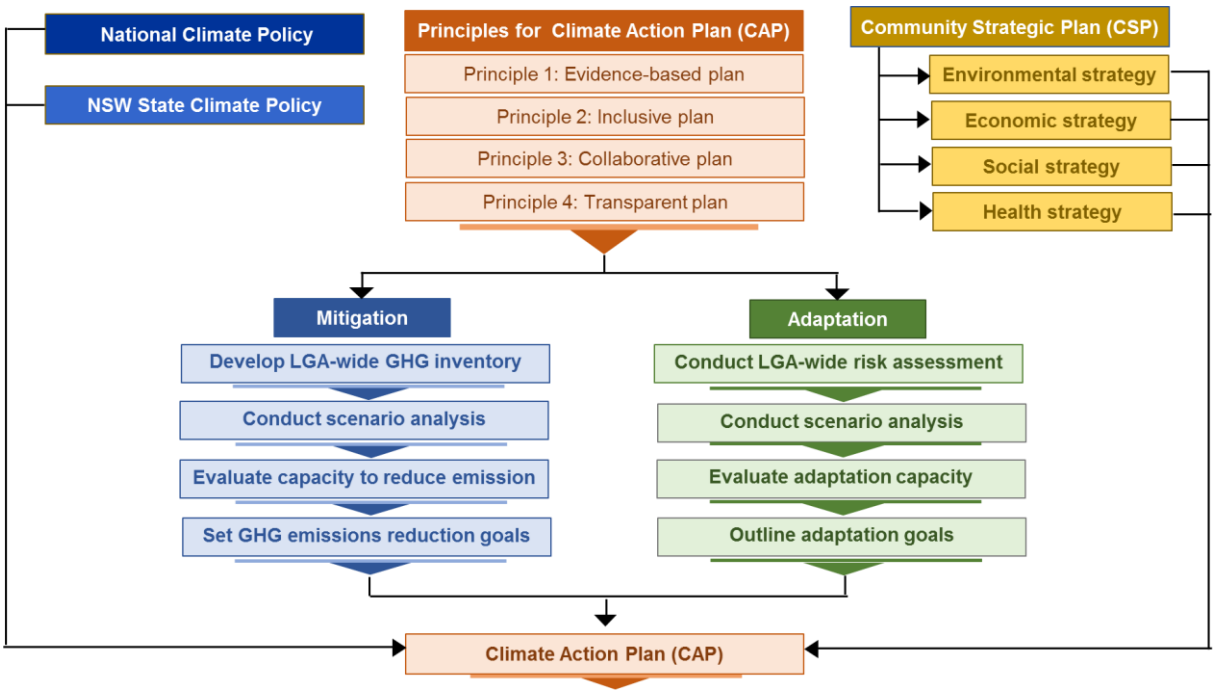
These are the fundamental principles on which the CAP will be developed. The various components of the CAP are discussed below.

Components of Climate Action Plan

The proposed CAP may consist of a single, comprehensive document or a set of complementary plans and policies. It may contain existing plans, in addition to new ones. There is no specified format for a CAP (Boswell, Greve, & Seale, 2012). Nonetheless, the review of existing guidance (e.g. ICLEI's *Cities for Climate Protection Milestone Guide;* C40 Cities' *Climate Action Planning Framework;* and UN-Habitat's *Guiding Principles for City Climate Action Planning*) and best practice examples identified from my survey, show that a CAP must include actions to mitigate as well as adapt to the impacts of climate change, which must be based on evidence — that is, developed on a sound understanding of climate change and informed by local knowledge (see Figure 9.2).

The proposed framework outlines the essential components of a CAP (Figure 9.2), followed by a brief description of these components and their relationship with each other.

Figure 9.2: Components of Climate Action Plan



Source: Adapted from UN-Habitat, 2015, p. 10

Develop LGA-wide greenhouse gas inventory: Regarding mitigation, all CAPs must have a GHG emission inventory as an essential element. Such inventory identifies the sources and records their GHG emissions within the local government area, usually for each year. Depending on the availability of national guidelines, all councils may follow the global standard Greenhouse Gas Protocol to report their emissions (e.g., Global Protocol for Community-Scale Greenhouse Gas Emission Inventories) (UN-Habitat, 2015). Complying with such international GHG emissions reporting protocols will facilitate comparison of the wider benefits of various climate actions transparently, this in turn, will permit local government's contributions to reducing GHG missions to be evaluated globally, thereby clearing the path to be aligned with national-level GHG emissions reporting.

Complementary to emission inventory, councils are required to develop detail strategies for cutting their emissions. These strategies are developed based on detail account of emissions recorded in the inventory to show a CAP's capability to meet its targets of cutting emissions. UN-Habitat's (2015) *Guiding Principles for City Climate Action Planning* sets out that all GHG emissions-reduction strategies comprise the following components:

- **Conduct scenario analysis:** Local government should project future emission trends in their jurisdiction based on different socioeconomic growth, and projections of climate change mitigation and conduct analysis of those projected scenarios. Such analysis provides the basis for setting GHG emission-reduction targets and identifying appropriate actions (UN-Habitat, 2015).
- **Evaluate local government capacity to reduce emissions:** Local government should evaluate its capacity of taking action to reduce emissions. To this end, efforts should focus on leveraging other present council policies, plans, and programs which relate to energy, environment, and urban planning. Such efforts may involve identifying policies, measures and programs that contribute to mitigating climate change, in spite of being planned to address other concerns (UN-Habitat, 2015).
- **Set GHG emissions-reduction goals:** Following assessment of the projected scenarios as well as evaluation of council's emissions-reduction capability, local government should set its short-, medium-, and long-term LGA-wide goals to reduce GHG emissions, and garner community support to achieving those goals. Local councils may follow international protocol

(e.g., the Greenhouse Gas Protocol Mitigation Goal Standard) when setting emissions-reduction goals to be compatible with international standard (UN-Habitat, 2015).

Conduct LGA-wide risk assessment: In terms of adaptation, all councils should undertake comprehensive climate change risk assessment to inform adaptation planning. At present, there are uncertainties in the projections of climate change impacts at both global and national levels, which have not been downscaled to the local scale. To fill this gap, councils can utilise local knowledge about local hazards, risks and vulnerabilities in making projections of climate change impacts. Based on such projections councils need to conduct LGA-wide comprehensive risk assessment which provide a basis for adaptation planning (UN-Habitat, 2015).

Complementary to the climate change risk assessment is the development of a risk management strategy. UN-Habitat's (2015) *Guiding Principles for City Climate Action Planning* sets out that all climate change risk management strategies comprise the following components:

Conduct scenario analysis: Councils need to analyse different scenarios of predicted impacts and establish the risk-level associated with each scenario. Such analysis will inform councils about possible options of adapting to the potential effects of climate change.

- **Evaluate local government adaptation capacity:** Councils should evaluate their capacity to address climate change impacts. Such

evaluation starts with an account of existing council policies, programs, assets, and organisational capacities. The focus should be on identifying existing council policies and programs which complement council's specific efforts to adapting to climate change, in spite of those policies and programs being planned to address other non-climate related concerns.

- **Outline adaptation goals:** Following analysis of the predicted impacts as well as evaluation of council's capability of adapting to those impacts, councils should outline short-, medium-, and long-term goals for adaptation. Such goals should thoroughly cover adaptation to all dimensions of the climate change impacts - physical, environmental, economic, and social (UN-Habitat, 2015).

Why is a Climate Action Plan important?

A Climate Action Plan serves councils as a much-needed tool for coordinating various actions across different council departments, other government agencies, stakeholders and community when executing climate change related policies and programs. By organising climate change, sustainability, green, and other related but diverse policies and programs, Climate Action Plan can reduce the difficulty and complexity of managing and implementing such disparate policies and programs. This supports to prioritise actions that need to be undertaken to reduce GHG emissions and acts as a roadmap for councils when implementing council- and community-wide policies, programs and projects. The CAP would be the fundamental element of the proposed framework, which would be integrated with the IP&R framework. Such

integration would allow councils to link their climate change related policies and programs with all council policies, strategies, plans and programs.

9.5.3 Phase Two: Identifying climate action impacts

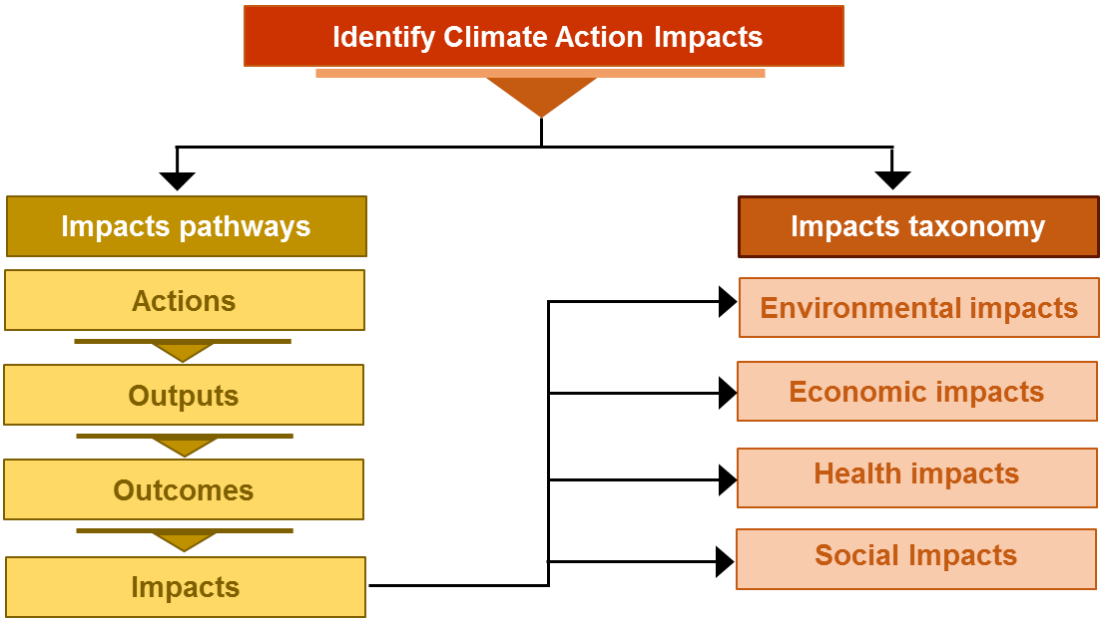
After developing a CAP, the next stage of the framework is to identify the impacts of the actions listed in the CAP. This entails identifying the links between local councils' various climate policy actions and their wider (non-climate) impacts. This highlights the need to adopt a multiple-objective/multiple-impact assessment approach where policy-makers will decide on the policy options based on the assessment of overall climate and non-climate net benefits. This will help local councils select actions that have the highest climate-related benefits, as well as the most substantial economic, social, health and environmental benefits. This information is vital for local government policy-makers to make decision that is evidence-based when delivering on a policy goal. This phase is critical because as I discovered in my research, the pursuit of the co-benefits approach in the local government context will only be feasible when policy-makers can verify the policy impacts and their actual co-benefits.

Theoretically, such an assessment would warrant a comprehensive analysis of all co-benefits of a policy. This means policy-makers need to consider the net welfare effect of a given policy, covering all possible effects that may result from its interactions with other policies. However, doing such an analysis would not be feasible in practice as it would be a heavy analytical burden on the local government policy-makers. Considering the magnitude and

complexity of the task, 'for a comprehensive appraisal of impacts, the keys are to identify the causal relationships and interactions among the impacts and to distinguish impact end points and intermediate impacts that influence other outcomes' (Ürge-Vorsatz et al., 2014, p. 560). Based on this understanding, the most practical way of identifying the impacts would be to adapt the impacts pathways methodology developed by the ExternE Project (External Costs of Energy - for the evaluation of the wider impacts of air pollution in the European Union) (UNEP, 2011). This procedure was further developed by C40 Cities Climate Leadership Group, which forms one of the key components (called 'Climate Action Impacts Pathways') of its 'Urban Climate Action Impacts Framework' (UCAIF) (C40 Cities and Ramboll, 2017, p. 36-40).

My proposed co-benefits framework adapts this impacts pathways methodology for identifying impacts of local government's climate action. It comprises two main stages: i) developing impacts pathways, and ii) developing impacts taxonomy (see Figure 9.3) which are explained in the following sections.

Figure 9.3: Identifying climate action impacts



Source: Collated and developed from C40 Cities and Ramboll, 2017, p. 25 & 40; UNEP, 2011, p. 49; Ürge-Vorsatz et al., 2014, p. 560.

Impacts pathways: Impacts pathways is a method used for identifying and illustrating how climate actions result in impacts. The method establishes the links between actions and impacts based on available evidence. It relies on the principle of 'intervention logic' and is intended to provide for the information required by the most widely applied policy appraisal tools like the cost-benefit analysis (CBA) and impact assessment (IA) (OECD, 2010b; UNEP, 2011; C40 Cities and Ramboll, 2017).

Structure of the pathways: Pathways establish the link(s) between action(s) and impact(s) through identifying four stages of a policy-intervention: *actions, outputs, outcomes*, and *impacts* (OECD, 2010b; C40 Cities & Ramboll, 2017). All four stages in a pathway are causally connected and each stage directly triggers the occurrence of the next. Table 9.1 describes each stage of the pathways.

Table 9.1: Stages of impacts pathways

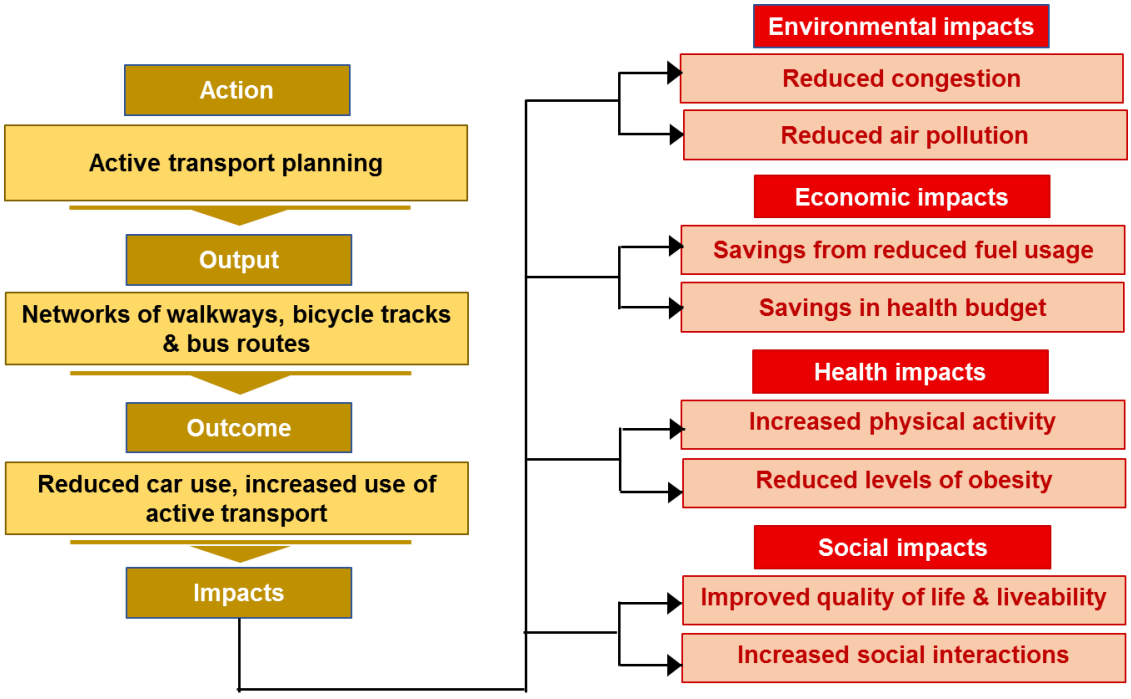
STAGES	DESCRIPTION	EXAMPLES
Action	Any policy intervention initiated by the actor that contributes towards mitigating climate change.	Planning for active transport modes - public transport, cycling and walking; improving energy efficiency in buildings; switching to renewable energy; implementing sustainable waste management plan.
Output (first link)	The product or physical manifestation of an action which is under the direct control of the actor, such as infrastructure, improved/new facility, new legislation or a financial tool.	Installation of public transport/bicycle or pedestrian networks; introduction of codes for improving energy efficiency in buildings; installation of waste recycling plants.
Outcome (second link)	The change caused by the output which is not under the direct control of the actor.	Increased use of active modes of travel and decreased use of private vehicles by local population; increased number of energy-efficient green buildings; increased volume of waste diverted from landfills for recycling.
Impact	The medium- or long-term effect of the outcome.	Reduced traffic congestion; reduced energy bills for households; reduced pollution and clean environment; increased physical activity and associated health benefits.

Source: Examples are from the online survey of NSW councils' climate actions (author) and adapted from C40 Cities & Ramboll, 2017, p. 40; OECD, 2010b, pp. 15, 28 & 33; Ürge-Vorsatz et al., 2014, pp. 556-558.

To help understand the process, Figure 9.4 shows a conceptual illustration of the application of the impact pathways using active transport planning as an example of policy action. It identifies different stages of the pathways based

on the possible impact chains and interactions that can happen following the implementation of such policy action. Local councils where heavy vehicular traffic is a grave concern for the community can focus on active transport planning (action) by building interconnected networks of walkways, bicycle tracks and bus routes (output). Such measures can reduce conventional car use (outcome) resulting in a range of impacts - reduced congestion and air pollution; savings from reduced fuel usage and health budget; increased physical activity and reduced levels of obesity; and improved quality of life, liveability and increased social interactions (see Figure 9.4).

Figure 9.4: Example - application of impacts pathways



Source: Developed from C40 Cities and Ramboll, 2017, p. 40; UNEP, 2011, p. 49; Ürge-Vorsatz et al., 2014, p. 560.

The pathways help to understand the links between actions and impacts in two ways: how one action in a particular sector results in multiple impacts across different sectors; and how multiple actions throughout various sectors might

lead to the identical impact. This understanding is critical to policy-makers for data-collection and developing appropriate indicators to quantify the variables (outputs, outcomes and impacts) for monitoring the implementation of an action.

Impacts taxonomy: Impacts taxonomy is a repository of categorised non-climate impacts of different climate actions. It is meant to identify specific non-climate impacts for particular climate action(s). The main purposes of the impacts taxonomy are to:

i) provide a comprehensive classification of all non-climate impacts of local government's climate-related actions and associated appropriate indicators to measure those impacts;
ii) provide a standard terminology to be followed by all local councils in sharing information about the wider impacts of their climate actions among themselves and with other experts and stakeholders;
iii) offer a common structure to be followed by all councils in assessing the climate action impacts; and
iv) focus data-collection on major categories of impacts to build a regional database of relevant information.

The taxonomy presented in Table 9.2 is based on my review of relevant co-benefits studies by leading international organisations (C40 Cities & Ramboll, 2017; IPCC, 2007a; Ryan & Campbell, 2012; Ürge-Vorsatz et al., 2014). It is intended to illustrate what a taxonomy of local government's climate action impacts could look like. It is not comprehensive as it does not cover all possible areas or policy-specific category of impacts from local government climate

action, instead it highlights some broad categories of impacts based on broad groupings of co-benefits which can be identified for policy action.

The taxonomy classifies local government climate action impacts into four broad categories: i) environmental, ii) economic, iii) health and iv) social. These categories are chosen since they cover all possible impact areas of local government operations. Therefore, they can embrace all possible and relevant non-climate impacts of local government's climate action (see Table 9.2).

Table 9.2: Example of a Climate Action Impacts Taxonomy

Categories	Description	Impact group	Specific Impact
Environmental impacts	Relate to all aspects of the quality of the environment covering 'health of the environment, species and ecosystems. This comprises types of impacts for different natural elements that are affected by human activities (species and ecosystems, air, noise, soil, light, water, temperature, and climate change)' (C40 Cities and Ramboll, 2017, p. 27).	Biodiversity	Biodiversity protection
		Air quality	Outdoor air pollution
		Noise	Indoor noise
			Outdoor noise
Economic impacts	Relate to all aspects of the economy focusing on 'economic prosperity and sustainability, innovation and competitiveness, employment and private wealth, as well as public budgets' (C40 Cities and Ramboll, 2017, p. 27).	Economic prosperity	Economic growth
			Productivity
		Employment	Employment growth
			Job quality
		Economic innovation	Innovation
			Local sector development
Health impacts	Relate to all aspects of human health (both physical and mental) which cover incidences of 'hazards to health (such as injury, traffic accidents and diseases) as well as improvements to the ability to live long and healthy lives (such as healthcare, healthy living, vaccination etc. related to premature mortality, cardiovascular and respiratory health and child health)' (C40 Cities and Ramboll, 2017, 28).	Physical health	Health hazards and death
			Disability
			Physical activity
		Mental health	Stress
			Dementia
Social impacts	Relate to residents' 'life quality and liveability, culture and institutions. The impacts in this category focus on social and political structures that affect people's lives, and their interaction with the environment' (C40 Cities and Ramboll, 2017, p. 27).	Quality of life and liveability	Housing affordability
			Housing availability
			Housing quality
		Social participation	Civic participation
			Community cohesion

		Good governance	Local democracy
			Evidence-based policy-making
			Transparency and accountability

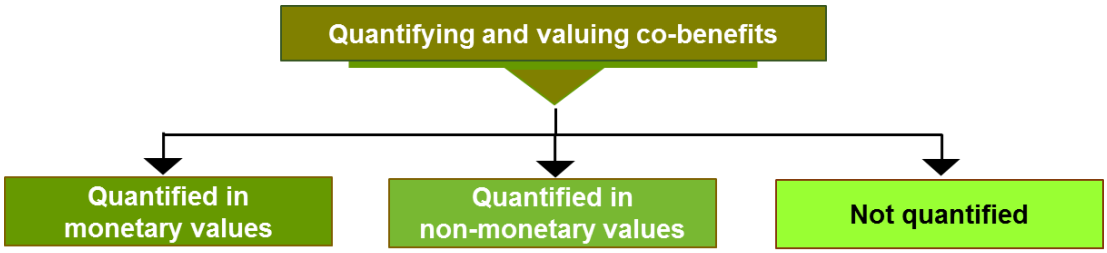
Source: Based on the common group of impacts identified in major co-benefits studies - C40 Cities and Ramboll, 2017; Floater et al., 2016; IPCC, 2007a; Ryan & Campbell, 2012 and Ürge-Vorsatz et al., 2014.

9.5.4 Phase Three: Quantifying and valuing co-benefits

Once all non-climate impacts are identified through establishing the links between climate policy actions and their impacts via causal pathways, the next critical phase of the framework involves quantifying those impacts into co-benefits to enable their integration into local government's existing decision-making frameworks.

Monetise impacts: In NSW local government's existing decision-making frameworks, valuation of any benefit from any policy action is predominantly assessed in monetary terms. This current practice demands that, for each of the co-benefits identified, a monetary value should be estimated (see Chapter 7). To address this requirement, first, the impact needs to be quantified in physical units before translating those units into a monetary value. To do this, it is required to distinguish between cases in which there exists a market for the benefits and cases in which no market exists (see Figure 9.5).

Figure 9.5: Quantifying and valuing co-benefits



Source: Developed from Floater et al., 2016 and Ürge-Vorsatz et al., 2014

When a market exists for the benefits, the value is simply the market price. For example, the value of an hour saved by a commuter is thus his/her hourly

wage. In cases where no market value exists for the benefits (e.g. averted tons of pollutants discharged, life years saved, reduced mortality, number of additional full-time jobs created, etc.), alternative valuation techniques must be employed (see Chapter 3 for detail).

However, in using these techniques, policy-makers must be careful of the trade-off between ease of estimation and accuracy. Further, economic valuation methods used to find monetary value for such impacts are often considered controversial (see Chapter 3 for detail). In such cases, when monetary value of an impact is currently not known or cannot be estimated, this framework recommends using appropriate non-monetary units of measurement for such impact as sufficient indicator for decision-making.

This thesis has identified the following critical issues for NSW local councils in measuring the impacts of their climate policy actions (see Chapter 8):

- There is a significant gap in readily available data to measure impacts.
- There is potential that these data may exist, but it is not at an appropriate scale and/ or not adequate for measuring the impacts.
- There is a clear demand from policy-makers for adopting a standardised approach to assessing the impacts across councils in NSW in order to make a sound business case for climate action.

To address the above issues, the proposed framework suggests adopting a standard measurement approach guided by two key questions:

1) What impacts can be measured now to make the case for climate action, based on the available data?
2) How can the gaps in data be addressed and what techniques can be adopted to measure the impacts more accurately?

After assessing the impacts based on the available data, appropriate indicators need to be developed to measure the targeted co-benefits. Indicators are 'indicative of data points' which assist policy-makers to 'assess the efficacy of actions and causation between the policy action and the co-benefits' (Floater et al., 2016, p. 45). Indicators are conveyed 'using metrics which define their units of measurement. For example, air quality is measured in the concentration of certain particles or molecules in the air, such as milligrams of particulate matters per cubic meter of air, or parts-per-million (ppm)' (C40 Cities and Ramboll, 2017, p. 17).

Table 9.4 shows some indicators used for the quantification of different non-climate benefits of various policy actions related to climate change mitigation based on my review of major co-benefits studies.

Table 9.3: Examples of indicators for measuring co-benefits of various policy actions

Policy goal	**Policy action**	**Co-benefits**	**Indicators** (examples)
Saving energy	Improve energy efficiency in buildings	'Cost savings to building owners and occupiers from lower energy bills' (Floater et al., 2016, p. 78).	Energy consumption per capita (Ürge-Vorsatz et al., 2014).
		'Reduced negative health impacts from improved air quality and increased thermal comfort' (Floater et al., 2016, p. 78).	Rate of vector-borne diseases; average healthy/productive years per capita (Ürge-Vorsatz et al., 2014); 'hospital admittances from extreme heat or cold events'; 'rate of winter and summer mortality resulting from persistent or extreme cold and extreme heat events' (Floater et al., 2016, p. 78).
		Improved indoor/outdoor air quality	Mean average exposure to PM2.5, SO2, NOx and other pollutants' concentrations (milligrams per cubic metre) (C40 Cities and Ramboll, 2017, p. 80).
		'Increased property value' (Floater et al., 2016, p. 78).	Price per unit of floor area
		'Increased local job opportunities in housing renovation/retrofit industries' (Floater et al., 2016, p. 78).	Employment rate; number of jobs created.
Reduce traffic congestion	Reduce private vehicle use	'Increased economic efficiency – less time spent in traffic jams and less public and private expenditure for automobiles and associated infrastructure' (Floater et al., 2016, p. 72).	Average travel times; 'vehicle kilometres travelled; accessibility metrics (to jobs, shopping, etc.) by automobile, transit, and non-motorised mobility' (Floater et al., 2016, p. 72).

Policy goal	**Policy action**	**Co-benefits**	**Indicators** (examples)
		'Improved air quality and reduced outdoor noise' (Floater et al., 2016, p. 72)	Mean average exposure to PM2.5, SO2, NOx and other pollutants' concentrations (milligrams per cubic metre); noise level due to traffic (dB) (C40 Cities and Ramboll, 2017, p. 80).
		'Reduced premature deaths and health problems' (Floater et al., 2016, p. 72).	Rate of respiratory diseases in population groups (Ürge-Vorsatz et al., 2014).
		'Reduced injury and mortality from road accidents' (Floater et al., 2016, p. 72).	Rate of fatal and non-fatal injuries due to accidents (Ürge-Vorsatz et al., 2014).
Support economic growth	Establish clean/green technology-based local businesses/industries	Increase innovation and investment	Number of patents created; public investment in R&D (C40 Cities and Ramboll, 2017, p. 78).
		Local sector development	Number of clean/green technology-based businesses/industries (Floater et al., 2016, p. 81).
		High rates of worker productivity	GDP per hour worked
		Increased local job opportunities	Number of 'green jobs'

Source: Compiled from C40 Cities and Ramboll, 2017; Floater et al., 2016; Ürge-Vorsatz et al., 2014.

9.5.5 Phase Four: Incorporating co-benefits into local government's decision-making frameworks

The findings presented in Chapter 7 reveal that, when assessing the benefits of climate-change-related policies/projects or programs using current decision-making frameworks local councils predominantly rely on cost-benefit analysis (CBA) as a policy appraisal tool. Since CBA is mainly designed to perform financial analysis, under this appraisal, councils' valuation of benefits is generally done on financial rather than welfare terms. In CBA, all anticipated benefits and costs of a policy action/project are identified and estimated before assessing if benefits exceed costs. Generally, if benefits surpass costs, the project is considered beneficial. However, in practice, local government policy-makers face several challenges, for example, how to measure the value of such benefits as improved air quality or health benefits resulting from policy measures promoting physically active modes of transport, and how to consider both the short- and long-term impacts of a policy.

In such an approach, the overall welfare effects of climate policies are rarely estimated or valued on a life-cycle basis, with wider environmental, social and health impacts of policies excluded from consideration. To overcome these shortcomings, there are three alternative assessment methods available which could be considered for incorporating wider co-benefits of climate change policies into local government's existing decision-making frameworks:

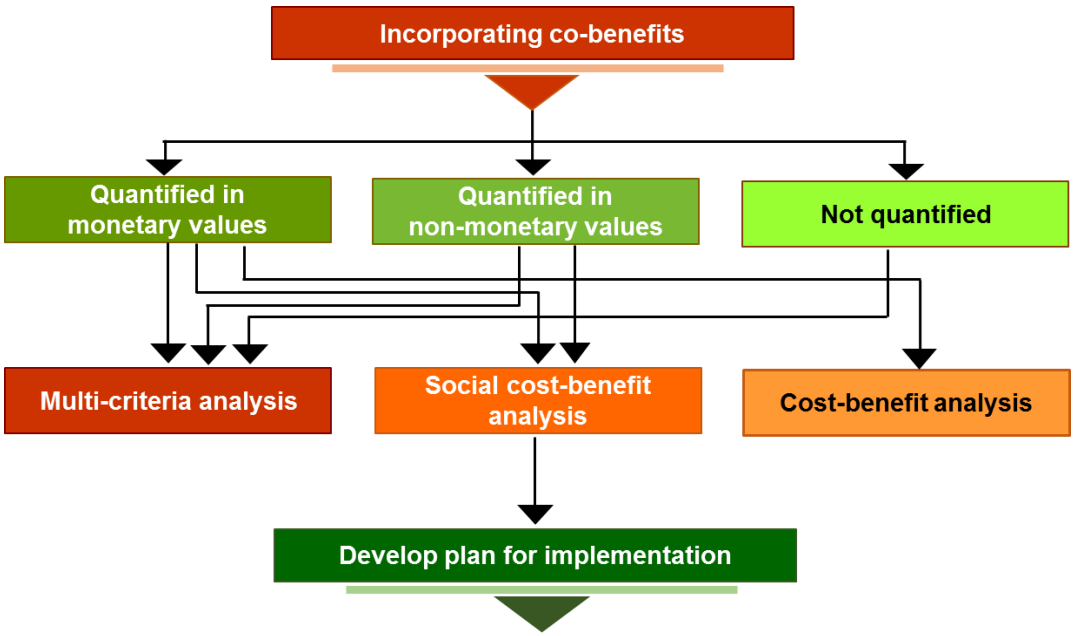
i) social cost-benefit analysis;

ii) integrated assessment modelling; and

iii) multi-criteria analysis.

A critical review of these methods has revealed each method has its own specific advantages and limitations (see Chapter 3). In this section, the possibility of adopting these methods as part of the proposed co-benefits framework for NSW local governments is discussed (see Figure 9.6).

Figure 9.6: Incorporating co-benefits into local government decision-making frameworks



Source: Developed from Floater et al., 2016; UNEP, 2011 and Ürge-Vorsatz et al., 2014

Social cost-benefits analysis could be a suitable alternative to financial cost-benefit analysis for assessing the impacts of local government climate policies. The CBA calculates the costs and benefits of a policy/project from the standpoint of a single actor (in this case local government), only the costs and benefits accruing to the local council concerned are considered. In comparison, 'social cost-benefit analysis aims at measuring the costs and benefits of a given project or policy from the perspective of society as a whole' (Ürge-Vorsatz et al., 2014, p. 572) (in this case the local government

jurisdiction and its community as a whole). The methodological specificity of social cost-benefit analysis requires it to rely on the quantification and monetisation of the non-market costs and benefits through various economic valuation tools. As pointed out in the previous section and discussed earlier, there are a wide range of arguments, ethical concerns and shortcomings related to the use of such tools for the monetisation of certain climate policy benefits for which currently no market exists (see Chapter 3). This is considered a major limitation of the social cost-benefit analysis method as it is unable to quantify and find value for certain climate co-benefits, which usually happen as non-market costs and benefits.

Integrated assessment modelling is widely used in large-scale mitigation policy analysis (see chapter 3 of the IPCC's fourth assessment report (IPCC, 2007) and chapter 6 of the IPCC's fifth assessment report (Edenhofer et al., 2014a). However, it relies on a cost-effectiveness system only, and so does not consider any of the benefits of climate change mitigation. The strength of the method lies in its ability to evaluate the cost of a policy based on physical as well as monetary units (see Chapter 3 in the thesis for details). However, the process is highly complicated as it requires a sophisticated and complex model, as well as a huge quantity of data, which is not suitable for the local government context where resources for decision support are very limited.

Multi-criteria analysis may be considered as the preferred climate policy appraisal tool among these three methods. It allows evaluation of the effects of a policy with multiple concurrent outcomes, which is compatible with a multiple-objective/multiple-impact assessment approach necessary for the

proposed co-benefits framework. The adoption of multi-criteria analysis as a tool of climate policy appraisal can enable local councils to value or quantify the wider environmental, social and health impacts of their climate policies, which is currently left unaccounted for in cost-benefit analysis. Multi-criteria analysis provides three main advantages over the other methods discussed here:

i) quantitative and qualitative information can be analysed together, which is essential for climate-change-related decision-making;
ii) allows consideration of the problems where quantitative information is not available or cannot effectively be estimated;
iii) incorporates stakeholders' preferences into decision-making through a process of weighting objectives (Böhringer, Keller and van der Werf, 2013; Milne & Boardman, 2000); and
iv) decision-making is informed by a structured process of deliberation and discussion (Munda, 2004).

All these aspects qualify multi-criteria analysis to be considered as the most appropriate policy appraisal tool available for policy-makers as part of the proposed co-benefits framework. Adoption of multi-criteria analysis would enable local government policy-makers to process qualitative information more meaningfully and achieve better policy outcomes. Moreover, the method of decision-making through a structured process of stakeholder deliberation is likely to resonate well with local governments' commitment to engaging communities in the policy development process which distinguishes it from its current decision-support tool - cost-benefit analysis.

9.6 Limitations of the framework

While it has been demonstrated how co-benefits could be identified, taxonomised, and potentially quantified, a proper evaluation of co-benefits and their incorporation into local government policy-decision-making processes is a challenging and potentially resource-intensive task. Overall, the methods discussed in the proposed framework often require extensive analytical work for comprehensive assessment of co-benefits. Evaluating each co-benefit and properly considering its interactions and integrating these into local government decision-making framework would require significant research endeavour even for a single policy/measure. This points to the need to:

i) develop simplified methods and easy-to-use toolkits that can assist policy-makers to assess particular co-benefits in their local situations without undertaking major research endeavour, and
ii) devise streamlined processes to incorporate co-benefits with the direct benefits of climate policy measures.

9.7 Conclusion

This chapter discussed the possible interventions that would be necessary to implement a co-benefits approach for climate action by the local government in Australia. Drawing on the findings presented in the preceding three chapters (Chapter 6, 7 and 8), it suggested the following as the key measures required to integrate co-benefits in local government's climate change-related policy-decision-making processes:

i. Adoption of an overarching co-benefits framework, at both national and state level, in consultation with local government.

ii. Agreement on an operational definition of co-benefits appropriate for the Australian context, which needs to be endorsed by the three levels of Australian government.

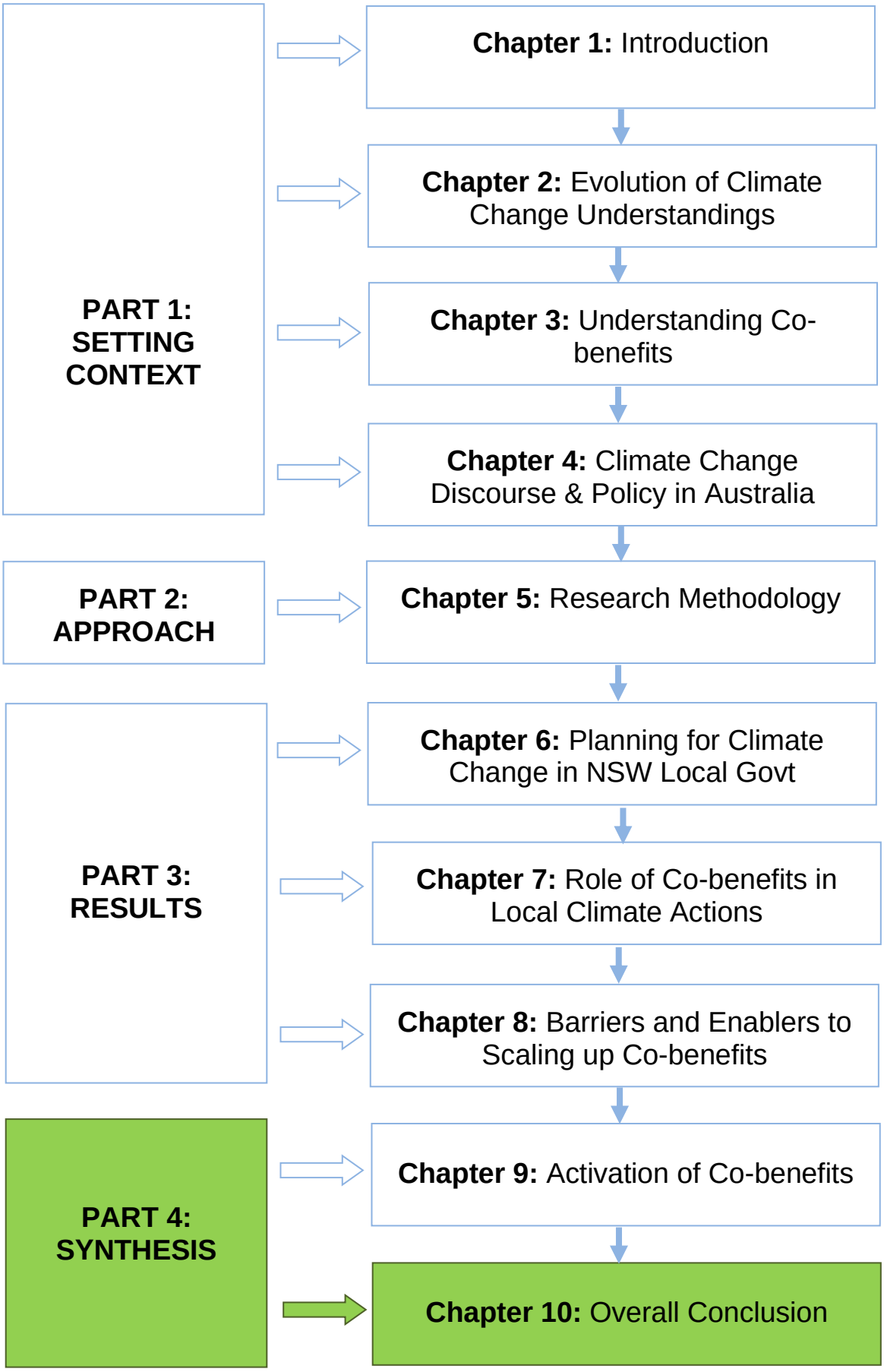
iii. Policy directions from state to local governments to facilitate necessary reforms in the policy, regulatory and financing frameworks incentivising co-benefits in the local government policy process.

To demonstrate how such a framework could be developed, a conceptual co-benefits framework for NSW local councils was proposed and its major stages and associated components outlined.

The proposed framework hopefully would provide local councils in NSW with an opportunity to align their climate policy goals with local development goals. By adopting the framework, local government policy-makers would be able to develop integrated policy programs that would have the most climate benefits, as well as the most substantial economic, environmental, health and social benefits.

The advantages of local government adopting such a framework would be substantial. If properly adopted, the framework would enable local government to expand its present practice of using co-benefits in targeting only energy efficiency-related fiscal savings to incorporating wider range of benefits that include various non-climate- and non-energy-related benefits of GHG

emissions-reduction measures. Among them are the largest and most important group of co-benefits that are related to human health and wellbeing. Incorporation of such broader benefits of climate policies in the local government's policy processes can significantly enhance policy outcomes. This, consequently, will accelerate the take-up of less-carbon intensive development policies and measures by the policy-decision-making community in Australia.


PART 1: SETTING CONTEXT
Chapter 1: Introduction
Chapter 2: Evolution of Climate Change Understandings
Chapter 3: Understanding Co-benefits
Chapter 4: Climate Change Discourse & Policy in Australia
PART 2: APPROACH
Chapter 5: Research Methodology
PART 3: RESULTS
Chapter 6: Planning for Climate Change in NSW Local Govt
Chapter 7: Role of Co-benefits in Local Climate Actions
Chapter 8: Barriers and Enablers to Scaling up Co-benefits
PART 4: SYNTHESIS
Chapter 9: Activation of Co-benefits
Chapter 10: Overall Conclusion

CHAPTER 10: CONCLUSION

10.1 General discussion

Co-benefits of climate change mitigation has led to a paradigm shift in our understanding of how to reframe climate change mitigation from 'burden sharing' to a growing extent of 'benefits sharing' — a move that was echoed in the 2015 Paris Climate Agreement. Article 6.4 of the Paris Agreement provides for a new mechanism by which governments and non-government stakeholders can support developing policies and projects that can simultaneously deliver GHG-emission reductions and sustainable development[22] (UNFCCC, 2015a, p. 7). The new mechanism indicates that policies and projects for GHG mitigation need to demonstrate that they will deliver co-benefits. A report by the Global Commission on the Economy and the Climate observes: 'more than 50% (or up to 90%) of the reductions in GHG emissions required to prevent temperatures rising above 2 degrees could be achieved through measures that are in the direct interest of countries undertaking them, once broader benefits of these measures other than GHG mitigation is taken into account' (Global Commission on the Economy and Climate, 2014, p. 10). This suggests approaches like co-benefits that better

[22] Article 6.4, (a) the aim is 'to promote the mitigation of GHG emissions while fostering sustainable development' (https://unfccc.int/sites/default/files/english_paris_agreement.pdf)

communicate the value of the climate policies beyond emission reductions can provide a more powerful argument for action on climate change and sustainable development.

This growing understanding of the significance of co-benefits has brought co-benefits from the periphery to the focus of climate change- and sustainability-related policy debate.

This thesis explores how the application of a co-benefits approach helps governments to frame climate change mitigation in a positive light to operationalise the broader economic, social, health and environmental benefits of low-carbon policies within the concept of sustainable development. The investigation focuses on the local government level, because climate change impacts are most keenly experienced at this level, there is greater opportunity for control of these impacts, and a range of non-climate-related co-benefits of climate change mitigation are available at this level.

This chapter reviews the main findings from the research reported in this thesis, followed by a discussion of the policy significance and implications of the findings. The limitations and the transferability of the research to settings outside Australia, particularly to the local government context, is discussed. Finally, the chapter concludes by highlighting the need for further research.

10.2 Overview of the main findings

The thesis started its investigation by exploring how the co-benefits approach has developed into a powerful paradigm for responding to the challenges of climate change. Tracing the evolution of science, global politics and policies around climate change, Chapter 2 presented the context within which the co-benefits concept gained global recognition among researchers, international organisations and policy-makers as a paradigm that has the potential to frame climate change mitigation in a constructive way.

Chapter 3 presented a critical review of available co-benefits studies in order to investigate the potential of the co-benefits concept and its practical application. The findings highlight the need for co-benefits research specifically focusing on the local government in order to expand the concept's practical application and increase its policy impact. It also identified the need to develop simpler methods and straightforward and simple to use toolkits that can assist policy-makers to assess specific co-benefits in local situations, and to develop simpler methodological frameworks to integrate those co-benefits in the existing local decision-support framework.

With this understanding, Chapter 4 presented a critical review of Australia's climate policy discourse to explore how a co-benefits approach could potentially be relevant in the current state of Australian climate policy for developing a stable and compelling national climate policy. The findings highlight the dominance of economic considerations over environmental ones in the discourses surrounding the development of Australia's national climate

policy. This prioritising of economic considerations has failed to reconcile economic goals and climate policy goals, which has impeded the development of a stable and credible climate policy in Australia.

Australia's current arrangements for governance defined by hierarchical, organisational, policy and legislative settings make it difficult to coordinate effective policy outcomes for climate change. While policy levers to deal with climate change rest mainly with the national and state governments, at present there is an absence of leadership and coordination by the national and state governments in this regard. This has contributed to a situation where, without any overarching framework, Australian governments' climate policy initiatives lack a multi-sectoral approach, synergy and coordination across various levels of government (see Chapter 6).

The study demonstrates local government's awareness of the links between climate change and other policy goals. It provides in-depth insight into local government policy-makers' perceptions about using a co-benefits approach to attain synergy between these goals and achieve multiple benefits. The results show co-benefits play a powerful role in motivating local councils to pursue policy measures related to climate change mitigation (Chapter 7).

However, at present, local government policy-makers' efforts are largely limited to establishing the link between climate change and economic goals. The primary focus on cost minimisation has largely limited climate policies' targets to reducing GHG emission costs, together with the attainment of energy-related monetary savings. This focus on monetary considerations,

together with constrained authority, absence of stable policy, legislative support and clear direction from higher levels of government, and lack of data and technical knowledge to assess non-climate- and non-energy-related benefits collectively, are contributing to this limited adoption of a co-benefits approach in local government's decision-making process related to climate change policy (see Chapter 8).

Consequently, wide ranging environmental, social and health benefits are excluded from considerations in local government's climate change related policy process. This results in exclusion of the 'non-climate- and non-energy-related benefits', which comprise very significant and large group of health-related benefits. While all of these have potential monetary savings for the health budget, these benefits are not explicitly considered in the decision-making process. Omission of these benefits from considerations in the policy process limits councils' ability to attain full benefits resulting from policy measures related to climate change (see Chapter 7).

In such a context, local government's actions on climate change are driven by sectoral policies and service delivery without paying much attention to co-benefits. The findings show that the areas critical to local government for climate policy initiatives (for example, urban planning, provision of transport infrastructure, health, managing energy demand, energy-efficiency regulations, and renewable energy supply options) depend on support from the higher levels of government. There have been no substantial attempts to support local government's climate policy initiatives in these critical areas where there is need for either change in the institutional settings or legislative

support. These have constrained local government efforts to enhance local climate action and have discouraged meaningful considerations of co-benefits in the policy process. This suggests that local government's powers and responsibilities in their operational areas and the assets where they can take policy action to generate co-benefits vary, and that actions and collaboration with higher levels of government and other stakeholders are required to scale up co-benefits approach in their climate policy measures (see Chapter 8).

Such findings imply that to extend a co-benefits approach beyond reducing energy consumption and saving money to include a broader range of environmental, social and health benefits resulting from low-carbon measures would involve actions in some policy areas like land-use planning, planning of transport infrastructure, and tackling energy demand that would require deeper policy shifts, which in turn could even entail legislative changes. A broader policy direction from state to local government is required to facilitate adoption of a co-benefits framework by local government. This will enable councils to more readily consider the non-climatic and non-energy-related benefits of low-carbon measures (see Chapter 9).

This thesis contributes a clearer understanding of local government's present use of the co-benefits approach in dealing with climate change. The research demonstrates that there are opportunities to purposively consider, plan, generate and promote a wide range of non-climate-related co-benefits in tackling climate change at the local government level. A systematic, planned and purposeful integration of these co-benefits in the policy process will help Australian governments develop policies and instruments that can generate

broader economic, social, health and environmental benefits at the same time, helping Australia attain local and global goals of sustainable development synergistically.

10.3 Policy implications of the findings

The following are the major policy implications of the findings from this study:

- Local government's climate-change-related policies in NSW are rarely analysed to investigate whether its emissions-reduction strategies also generate health benefits. This suggests a broader policy direction is required to link planning for climate change with health at the local government level.
- State government should mandate local councils to develop dedicated local climate change policies. As part of this, the state needs to provide adequate funding for conducting full health co-benefit analyses of the resultant climate policies. The challenge for such a task is the resourcing required for generating substantial public engagement programs and conducting cross-sectoral/multi-dimensional impacts analyses. However, the benefit of undertaking such a task is likely to more than compensate for the initial investment for this purpose. This will enable local councils to broaden their focus to consider health co-benefits in their climate policies, alongside energy-related benefits. This will also help local councils to expand its present practice of using co-benefits approach to climate action in targeting only energy efficiency-related fiscal savings to integrating wider range of co-benefits that

include various non-climate and non-energy-related benefits of low-carbon measures.

- The findings recognise a range of competing priorities local governments face when considering climate change. To enable climate action, local councils need to address these local priorities. These priorities influence local government's decisions for purposively targeting some co-benefits over others. The study found these co-benefits are mostly identifiable, readily quantifiable, timely, attributable and opportunity-oriented. This suggests a strategic, priority- and interest-oriented approach to co-benefits is required to integrate co-benefits, which will provide impetus for the formal endorsement of a co-benefits approach by local councils in climate change related policy decision-making process.
- Adopting a co-benefits approach local government can construct climate change mitigation as a local issue which can be reconciled with local priorities (i.e. energy efficiency and monetary savings) that reduce greenhouse gas emissions. However, the extent to which a co-benefits approach could be effective beyond the boundaries of local government is a critical question for further investigation. This is particularly relevant when scaling up the emissions-reduction targets and extending a co-benefits approach to include non-energy-related health benefits. Such scaling up of co-benefits approach to climate action would involve actions in critical policy areas such as land-use planning, provision of transport infrastructure, and tackling energy demand, which are

presently beyond the bounds of local government and would require deeper policy shifts and may in turn entail legislative changes.

10.4 Transferability of the research

The transferability of the findings of any co-benefits research based on a specific geographical jurisdiction may be restricted by the unique characteristics of that place and policy settings which encompass local economic, social and political conditions as well as specific governance arrangement, diverse institutional frameworks and associated varied challenges (Puppim de Oliveira et al., 2013). Since the research was conducted in the NSW local government context, drawing generic conclusions based on the findings is challenging. But at the same time, the findings are not only limited to NSW local government as they also reveal consistent trends comparable with similar studies conducted elsewhere. Together, those studies and my research contribute to an understanding of co-benefits in general.

The study design provided three specific data-collection methods (termed 'methodological triangulation'), which were used to complement each other and inform the different phases of investigation, thereby ensuring the dependability and credibility of the research. Investigations comprised three distinct phases: a comprehensive online survey, review of NSW local councils' climate-change-related policies and in-depth interviewing of council officers. The interviews, online survey and secondary data sources together provide a qualitative as well as quantitative picture of the factors that primarily influence local government policy-makers to act on climate change. While the survey

provides a quantitative overview of the factors that play key roles, the narratives generated from the interviews provide valuable insight into local government policy-makers' perceptions about the role of each factor for permitting local climate action, how these factors and the themes identified in the narrative act in combination, and what motivates or discourages them to consider different co-benefits in the policy decision-making process.

Coding the broad results of the interviews, the online survey and the review of councils' policies and regulations related to climate change identified five major themes under which all these factors are grouped. These are:

1) NSW local government's policy-making process
2) Prioritisation of climate change consideration
3) Consideration of co-benefits
4) Barriers and enablers to co-benefits
5) Activation of co-benefits.

The process of generating the narratives and identifying these themes helped to establish the case that each factor identified under each theme was important for considering co-benefits in the decision-making process related to climate change policy in the unique context of each local council in NSW. All interviewees consistently communicated a high level of agreement when emphasising the role and importance of these factors in the decision-making process, which validates the main findings of this research (see Chapters 6, 7, 8 and 9).

10.5 Limitations of the study

This thesis contains a total of three phases of methodological research exploration, which have a few limitations. Briefly:

- As already stated, this research was conducted within the local government context of New South Wales, Australia, from July 2015 to May 2016. This means the study has some limitations that are intrinsic to the unique characteristics of NSW and its policy settings.
- The selection of the local councils and interview participants from Sydney's Greater Metropolitan Region and rural and regional NSW means the findings largely reflect the interactions with the participants in a specific spatial and temporal context. Particularly, the interview outcomes are the product of specific interactions that might have been influenced by my own background and experiences, as well as those of the participants and circumstances.
- There is no way to guarantee that the information and opinions shared by the participants are reflective of the organisation they represent and not influenced by any preconceived personal biases about the topic. As a result, their statements are not necessarily insights into their respective local council's organisational attitudes, motivations or practices.
- In some cases, limited availability of and accessibility to certain local government policy documents and information that were considered critical for this study affected the scope of the investigation. Some

participants declined to share certain relevant documents and information, describing them as either ‘internal policies’ or ‘confidential’ and not for ‘public sharing’.

- Given the scarcity of local-government-specific co-benefits research and the implications this has for the deeper understanding of co-benefits, it can be argued that the aforementioned limitations and challenges of the study design are not significant for the validity of this research into an area that is in dire need of deeper understanding.

10.6 Future research directions

The following are recommendations for future research arising from the several study phases described in this thesis.

There is a clear need to systematically monitor and evaluate policies for the long-term and develop metrics that can combine various environmental, economic, social, health-related and other indicators for improving the effectiveness of a co-benefits approach. From this perspective, future co-benefits research should be directed towards developing an integrated research program along the following lines:

a) *Investigate local government programs where linkages between climate action and population health have been developed.* This thesis provided insight into local government policy-makers’ perceptions about targeting a broad range of non-climate and non-energy-related co-benefits in their climate change planning. Further research is needed

to investigate how some councils are working with their communities and health agencies to develop particular inter-connections between climate change and community health within their jurisdictions. Such research can contribute to greater understanding of the factors that establish linkages between planning for climate change and population health. In addition, detailed investigation of how local government's climate-related policies across Australian states are devised and implemented in practice would offer a more strategic, holistic and comprehensive understanding of the specific issues, motivations, politics and expertise that shape the development of these policies and their broader economic, environmental, social and health-related outcomes.

b) *Developing co-benefits assessment tool:* This thesis revealed a limited understanding among policy-makers about the 'co-benefits approach', particularly in terms of how to frame climate-change policies to include and quantify health-related co-benefits. The motivation behind a limited adoption of the co-benefits approach is currently driven by the monetary benefits to be gained from emission reductions, although the possibility for attaining improved air quality, improved health, enhanced 'liveability' and generating local jobs are also considered. However, these long-term benefits, which are difficult to calculate, get side-lined in an assessment process that requires immediate quantitative evaluation of results and direct outcomes. Accordingly, co-benefits research should focus on developing simplified methods and various assessment tools such as indicators, indices and calculators to help policy-makers

estimate, quantify and monitor health and other non-energy-related co-benefits of different policy interventions.

c) *Develop nationally applicable guidelines to standardise co-benefits calculation:* Federal and state governments, in consultation with local governments, should develop detail guidelines, examples of good practices and manuals for considering co-benefits in the local government sector and distribute those among local councils. This could serve as a checklist for identifying, quantifying and integrating co-benefits at the local government level. In this respect lessons could be drawn from international experiences that could be applied in the Australian context. For example, Japan and the United States of America formulated co-benefits guidelines for their local governments for conducting co-benefits evaluations (US EPA, 2011; Japanese Ministry of the Environment, 2009). In the USA, the Environmental Protection Agency's handbook provides local government a wide range of tools and tips for evaluating the co-benefits of energy efficiency and clean energy related programs utilising straightforward methods.

10.7 Conclusion

From the evidence presented in this thesis it may be concluded that at present climate policy initiatives at the local government level in Australia are predominantly focused on cutting the cost of GHG emissions reduction together with the attainment of particular (readily quantifiable) monetary benefits resulting from 'energy-related' emissions reduction measures. Constraints in pursuing various other benefits which either do not have any

monetary value or their monetary value presently cannot be readily quantified prevents wide ranging broader economic, environmental, social and health-related benefits from consideration in local government's climate change related policy process. The resulting exclusion of such benefits comprise very significant and large group of health-related benefits. Omission of these benefits from consideration in the policy process limits local government's potential of achieving optimal policy outcomes applying a co-benefits approach across multiple sectors from climate change related policy measures.

Main obstacles to incorporating co-benefits in the local government's policy process identified are:

i) absence of integrated policy framework and legislative support from the state government;
ii) major gap in data and lack of capacity to develop data into appropriate indicators;
iii) predominant monetary considerations of GHG emissions reduction benefits;
iv) local government's limited autonomy and role;
v) federal/state governments' energy-efficiency-focused policies.

The key measures that need to be considered to enhance a co-benefits approach in planning for climate change at the local government level are:

i) adoption of an overarching co-benefits framework by each tier of Australian government;

ii) agreement on an operational definition of co-benefits to be endorsed by Australian governments;

iii) policy directions from state to local governments to facilitate reforms in the policy, regulatory and financing frameworks incentivising co-benefits.

The above conclusions are made based on a comprehensive study involving multiple phases. It was conducted with rigorous research combining both qualitative and quantitative methods of investigation and multiple sources of data collection. This approach helped to validate the findings and ensured a stronger evidence base for the outcomes of this research.

However, it is worth noting that since the area of investigation was geographically limited to the councils in Sydney's Greater Metropolitan Region and rural and regional NSW, the transferability of the findings in the context of Australia as a whole may be somewhat limited. Despite this limitation, this thesis provides some valuable insights into local government's existing practice of applying a co-benefits approach in dealing with climate change. The findings of this thesis are also relevant for other tiers of Australian government as they could draw valuable lessons about utilising a co-benefits approach in developing their future climate policies. This will ultimately help the decision-making community in developing effective strategies for purposively considering, planning, generating and integrating co-benefits in climate change related policy decision-making process in Australia. Moreover, this thesis will provide direction and open new avenues for further research on climate co-benefits in Australia.

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