Chapter 2
The Global Shift to a Low-Carbon Economy

2.1 Introduction

Scientists have called for 80 % reduction of carbon in the global economy by 2050 in order to keep global warming below two degrees of pre-industrial levels (IPCC 2007, 2014).

Over 90 developed and developing countries, representing around 80 % of global GHG emissions, have now made pledges to reduce their domestic emissions (IPCC 2014).[1] Many of these countries have communicated their existing or proposed emissions reduction actions and measures that will assist them in achieving their targets. Carbon taxes and emissions trading schemes appear to be the most popular among developed countries with legally binding commitments (DIICCSRTE 2013b), while developing countries without binding commitments have, until recently, identified a range of other 'nationally appropriate mitigation actions' (NAMAs), such as energy efficiency, improved forest management and increasing the amount of renewable energy generation (IPCC 2014). However, various cities and provinces in China and India are now considering carbon taxes and trading schemes and have recently exerted greater global leadership by committing to reductions in GHGs that are based on considerable investments in renewables, electric train systems and greater efficiencies in their cities (Newman and Kenworthy 2015).

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[1] See http://unfccc.int/focus/mitigation/items/7169.php.

2.2 Tackling Emissions: The Front-End Versus End-User

While there are countless ways to tackle carbon emissions, action is commonly split between two broad areas of the economy—the 'Front-End' and the 'End-User' (Newman and Ingvarson 2012). The Front-End generally refers to emissions that are produced from activities that use fossil fuels directly, such as power generation, refining and large industrial practices. Emissions are thus targeted as they enter the economy. Policies focused on the End-User target carbon as it is used in buildings (homes and businesses), as well as emissions from the built environment related to transporting and servicing these land uses.

Table 2.1 below identifies the primary policies and mechanisms for targeting emissions at both ends of the economy, which can be voluntary or mandatory. Examples of these are provided within an Australian context, though are relevant to most cities, particularly in the developed world.[2]

Although the uptake of carbon policies around the world has been a relatively slow process, those that have been implemented have primarily targeted the Front-End of the economy. The reason for this focus is the greater ability to account for and regulate all the carbon entering an economy. This is the approach advocated by most governments, scientists and international NGOs working in the climate space. However, as demand for products and services comes from the End-User, it has become increasingly evident that a policy gap is emerging around the emissions associated with the consumer, which have been growing steadily in line with rising private energy and material consumption. Unsurprisingly, the majority of End-User consumers are located in cities.

Frustration at the inertia and inaction occurring within higher levels of government and at the international level has seen an increasing number of individuals, businesses, local governments and whole cities taking voluntary action to reduce their greenhouse gas emissions at the End-User level, particularly as this also generally leads to improved performance and a reduction in operational costs.

2.3 End-User Carbon Abatement

There has been a significant increase over recent years in individuals, businesses, local governments and nations taking voluntary action to reduce greenhouse gas emissions—mostly at the End-User side of the economy. The motivation for voluntary action may vary from an intrinsic desire to protect the planet and the environment, to promoting corporate social responsibility (CSR) or simply wanting to take a lead in progressing climate change mitigation, often spurred on by the lack

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[2] This book contains primarily Australian examples, in order to provide a consistent political and legal framework, particularly in relation to the development of a certification scheme.

Table 2.1 Front-End and End-User carbon mechanisms with Australian examples

Policies and mechanisms	Front-end examples	End-user examples
Regulation	• Mandatory emissions reporting, i.e. National Greenhouse and Energy Reporting Scheme (NGERS) • Renewable energy target (RET) • Clean coal requirements	• Building codes • Mandatory energy disclosure for buildings • Mandatory energy performance standards
Market-based instruments	• Emission trading schemes • Carbon tax • Other tax incentives • Clean development mechanism • Joint implementation	• Voluntary carbon trading • Carbon offset standards and carbon-neutral programs • Subsidies and rebates (e.g. solar panels, home insulation)
Moral pressure	• International treaties • Corporate social responsibility (large businesses and utilities)	• Carbon-neutral businesses, local government areas (LGAs) • Corporate social responsibility (CSR) • Green building council ratings • Other environmental rating schemes • GreenPower™, NaturalPower™
Infrastructure and services	• Smart grids • Renewables linked to grids • Public transport • Solar flagship program	• Smart meters • Electric vehicle plug-in facilities • Infrastructure for walking/cycling/transit • Green infrastructure for local developments • Power utility energy efficiency programs
Education	• Energy efficiency programs • Solar cities program	• Household sustainability audits • Travel smart programs • Living smart programs
R&D and demonstration	• Investment in carbon capture and storage (CCS) and clean coal • Solar flagships • Renewable natural gas	• Carbon-neutral communities • Design models for low-carbon planning and building of precincts
Visioning/ strategic planning/ governance	• Garnaut report and energy white paper • The Australian Federal government's energy efficiency plan	• Strategic planning • Clinton climate initiative • ICLEI cities • Coalition of Australian Governments (COAG) urban planning focus on reducing carbon

Adopted from Newman and Ingvarson (2012)

of action taken by governments worldwide (Rowell 2010). There are also households and businesses that can see distinct economic advantages in reducing their power and fuel consumption (Newton and Newman 2013).

End-User climate change action can take many forms. It can be simple, inexpensive measures such as behaviour change initiatives like turning off lights and cycling to work, or it can be more investment-oriented action such as purchasing GreenPower™ or investing in energy-efficient technologies (Newman et al. 2009).

Another voluntary emission abatement option that has grown significantly in popularity is the concept of carbon offsetting. Offsetting is based on the premise that carbon emissions from one activity can be effectively neutralised by investing in another low-carbon or carbon-free activity or carbon sequestration[3] in a different location, where it may be more cost-effective or practicable than reducing emissions onsite from the original activity (Stern 2006). The concept stems from the recognition that climate change is a global issue and greenhouse gas emissions have the same effect on the atmosphere wherever they are produced or abated (Garnaut 2008). One of the most common reasons for purchasing carbon offsets is to claim carbon neutrality.

Chapter 7 examines the rise in popularity of the concept of carbon neutrality as a way to voluntarily address climate change.

2.4 Using Cities to Lead the Decarbonisation Effort

As highlighted in Chap. 1, cities are making a major contribution to global emissions as well as a number of other global challenges. A question that is therefore explored in this book is: could the creation of zero-carbon or carbon-neutral cities and urban development be a mechanism for achieving the carbon reduction required to reach the global targets for 2050? Reasons for targeting cities and urban development are discussed in Chap. 3.

2.5 Recognising Carbon Reduction in Urban Development

This purpose of this book is to bring greater understanding around the total carbon emissions associated with cities and urban development in order to enable more accurate comparisons to be made, and subsequently, to create a process by which low-carbon or carbon-neutral developments can be recognised, certified and potentially rewarded for their carbon reduction.

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[3] Carbon sequestration involves activities that absorb carbon emissions from the atmosphere such as tree planting or more advanced systems such as biochar or sequestering CO_2 in marine sediments.

This book, therefore, seeks to better define what low carbon and carbon neutral could mean in the context of the built environment and has developed new ways of recognising it. Creating a standardised framework and approach to quantifying the carbon emissions arising from precinct-scale development is critical. It will not only help to make assertions more meaningful and comparable, but will also make benchmarks possible. Such a framework will be fundamental in determining the overall contribution urban development can have in addressing climate change and where reductions can be best achieved.

It is expected that the following mechanisms will help to encourage greater uptake of low-carbon and carbo neutral development: the creation of a new mechanism to certify and acknowledge the carbon reductions achieved within urban development; incentives to reward progressive developers; and processes to capture and distribute knowledge gained.

At the global scale, this is the first attempt to fully conceptualise carbon-neutral and various forms of carbon reduction within urban development in all of its characteristics. We have focused on Australia, which helps to provide a well-defined legal and political context for the carbon reduction activities. The Australian Federal Government has also shown leadership in recent years having developed carbon mechanisms at both ends of the economy (e.g. a mandatory carbon price mechanism[4] targeting the Front-End of the economy, and a government-endorsed voluntary carbon neutral certification scheme that recognises carbon abatement from End-Users).

However, when Australia's new Federal Coalition Government was elected in 2013 with Tony Abbott as Prime Minister, they began dismantling many of these carbon reduction initiatives. The world looked on with incredulity. While the Coalition Government's new set of policies—the Direct Action Plan—is generally considered to be a much lesser set of initiatives, it opens the door for an End-User scheme with potential to generate carbon credits from the built environment and low-carbon urban development. Under the previous scheme, this would have been seen as double counting. The possibility of creating a parallel end-user-based carbon certification scheme for the built environment will therefore be pursued in this book. Although this is not a new concept (the city of Tokyo has been trialling an emissions trading scheme for buildings and facilities—the first of its kind—since 2010),[5] the framework proposed in this book encompasses many additional sources of emissions.

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[4] This was an emissions trading scheme with a fixed price for 3 years, resembling a carbon tax. It has since been repealed and replaced with a new set of policies.

[5] See http://www.citiscope.org/story/2014/tokyo-carbon-market-office-buildings-all-cap-and-not-much-trade.

2.6 Conclusion

There are many schemes being developed to help create low-carbon futures. Any country has the opportunity to be seen as a leader in climate change mitigation and to compete in the global innovation stakes on decarbonising development, which is rapidly becoming a defining point for post-industrial, post-carbon economies. This is particularly significant for countries like Australia, considering its current urban form, which is based largely around low-density, carbon-intensive urban sprawl and inefficient infrastructure. Combining these two perspectives, i.e. urban development and decarbonisation, through an emissions trading scheme, therefore offers great potential for demonstrating how significant change can happen.

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