



Transitions

Pathways Towards Sustainable Urban Development

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Preface

The *raison d'être* for this book is to highlight the formidable challenges and vulnerabilities that confront Australia and its human settlements, while at the same time identifying sustainable solutions to these critical problems. The solutions will require fundamental *transitions* in many instances: to our urban infrastructures, our urban planning, to our institutions and, perhaps most of all, to ourselves in terms of our lifestyles and consumption patterns.

Australia's urban development will be an explicit focus for the book. 2007 marked the year in which most of the world's population would live in urban, rather than rural, environments—one of the key global transitions of this century. Australia was among the first countries to make this transition—in 1882. Urban settlements are now where the vast majority of Australians live, where 95% work, and where over 80% of the nation's GDP is generated. Their design, planning, construction and operation are fundamental to the productivity and competitiveness of the economy, the quality of life of all citizens and the ecological sustainability of the continent. Their current trajectory is, however, unsustainable.

For many Australians, there is no connection between the natural environment and the built environment. The nation has experienced 200 years of urban settlement and unfettered growth. The impacts of growth have begun to accelerate since the mid 20th century, and feedback loops related to environmental impact are only beginning to be felt—in domains such as water, energy, biodiversity and material flows, among many others. We are only beginning to develop the ability to understand and adapt to the limits of our environment. To date there has been a measure of profligacy in this respect, accentuated by the fact that Australian urban dwellers have long been disconnected from their natural environment. There is almost a complete disconnection between the city-dweller's consumption of manufactured products and an understanding of the environmental impact associated with the life cycles of those products. The metabolism of our cities is also on a collision course with the metabolism of their supporting ecosystems. The evidence for much of this can be found

in consecutive Australia State of Environment Reports (www.environment.gov.au/soe) and *Australia's Scorecard* (Newton 2007: which found materialism to be increasing, concern for environment declining and personal happiness flatlined). As well as in contributions to this book.

We also need to start thinking and planning outside of the paradigms that dominated 20th century urban development. The 21st century has ushered in both a carbon- and a resource-constrained world. Climate change, and especially the challenge of extremes in temperature, rainfall (or lack of) and sea-level rise, will demand new mitigation and adaptation responses. The good news is that there are solutions to these challenges. These solutions are outlined in Sections 2 through 10 of this book and cover technological, urban planning and behaviour change elements. Governments and the key urban utility and service agencies have, however, lagged in initiating the much needed transitions. It is argued in Section 1 that, to be sustainable, 21st century cities need to be able to appropriate from a pipeline of innovative technologies, products, designs and processes that can be substituted for those currently in operation that are beginning to show signs of failure. These innovations can be designated as Horizon 1, 2 or 3—depending upon the period of time required for implementation, the significance of the barriers to be overcome, and the magnitude of impact on sustainability performance that is expected to follow from widespread diffusion. To date, most H2 and H3 innovation in key areas such as water, energy, transport and waste management have been ignored or shelved. Short electoral cycles appear to be a major inhibitor to long term thinking.

There is an urgency for change in the manner in which planning for 21st century Australian cities needs to occur that has not been previously reflected in the actions of government and industry over the past decade and more. Several key inquiries have been held by the Howard federal government (House of Representatives Standing Committee on Environment and Heritage 2005, 2007) and submissions made to government by peak industry associations (CIE 2006) with no

tangible result. In part, this may be due to the fact that Australia's major capital cities are regularly rated by international agencies such as The Economist Intelligence Unit as among the world's ten most liveable cities, and that there is a measure of complacency, as well as pride, that our city managers and governments take from that. Liveability, however, does not equate to sustainability. The ecological footprints of Australia's capitals are all of the order of 7 hectares per capita—over three times the global average.

Despite the significance that the built environment in general, and cities in particular, has as a national asset (the built environment represents approximately 40% of Australia's total asset base; natural capital represents 33%), and despite their roles as economic engines and demographic absorbers, and the impact they have on the nation's environment, there remains no federal agency with the mandate and responsibility for providing strategic long-term direction for sustainable urban development across the nation. The vision and leadership displayed by US President John F. Kennedy in establishing the Department of Urban Affairs and Housing as a cabinet-level agency in January 1962—and which continues to this day—and when he stated '...we will neglect our cities to our peril, for in neglecting them we neglect the nation' (<http://home.att.net/~jrhcsc/jfk.html>)—is currently absent in Australia.

In such a vacuum, we saw an absence of a demand for new ideas, leadership and investment by the Howard federal government and state counterparts in major new transformational nation-building projects that are currently sitting as Horizon 2 and Horizon 3 opportunities in the pipeline of urban innovation. Cities are highly complex systems, yet there is comparatively little investment by government or industry in research designed to understand how they function and change. Given this knowledge vacuum, there has been a reticence on the part of governments to set targets for the performance of our buildings, urban infrastructures and cities, including how they are operated. All combine to inhibit transitioning to a more sustainable built environment.

The paradox is, however, that there is now a broad and diverse demand, from all levels of government, industry and the community for the

knowledge and guidance necessary to begin accelerating the transition to more sustainable urban development. Australians are *aware* that change is needed—but the link to *action* is missing. The convergence of the threats of peak oil, climate change, security of water supply, biosecurity, loss of biodiversity, decline in food supply relative to demand, to name just half a dozen—all of which will significantly impact cities, their industries and their residents—has intensified the demand for sustainable solutions. Australia has the expertise to chart pathways for this sustainability transition—witness the contributions by the 92 researchers, who are all leaders in their field, assembled for this book. But the expertise is fragmented. If ever the timing was right for a Co-operative Research Centre for Sustainable Cities (Australia invented this highly innovative CRC model for applied research), involving the three tiers of government, industry and research providers, it is now.

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SECTION 1

Transitions: An Introduction

A transition to more sustainable urban systems, in Australia and internationally, needs to occur in the first half of the 21st century given the problems and vulnerabilities that surround current trajectories of urban development. The key challenges relate primarily to the impacts of *unsustainable consumption and production*.

The next stage of urban environmental evolution—the *eco-city*—is introduced in Chapter 1. A transition to eco-city stage from the present consumption stage (developed cities) or production stage (developing cities), characteristic of a majority of cities worldwide, will require the adoption of sustainable development goals for cities akin to those associated with the *urban metabolism model*. The goals involve:

- using fewer resources more efficiently
- using wastes as resources
- restoring and maintaining urban environmental ecosystem quality
- enhancing human well-being
- implementing highly efficient and effective urban and industrial planning, design and management systems, and
- not confusing liveability with sustainability.

Current approaches for delivering urban water and energy systems, waste management, transport, planning and governance are neither appropriate nor sufficiently resilient in the face of 21st century challenges, which include resource constraints

(shortages of water, oil, agricultural land and food, selected materials), climate change impacts, and globalisation- and population-led development pressures (Sections 2 and 3).

Twenty-first century cities need to be able to appropriate a pipeline of innovative technologies, products, designs and processes that can be substituted when existing ones begin to show signs of failure. A *Three Horizons process of urban innovation* is introduced as being necessary for transitioning to a sustainable built environment. Horizon Two and Horizon Three (H2, H3) innovations in particular are those with the capacity for more fundamental urban transformation. Horizon 1 innovations, in contrast, are linked primarily to driving efficiencies in existing systems and technologies, providing societies with the temporal windows necessary for transitioning to the more sustainable H2 and H3 solutions. The latter feature in the set of transitions listed below:

- *Energy*: moving from highly inefficient centralised fossil-fuel-based systems to decentralised, distributed energy systems based on renewables (Section 5)
- *Water*: moving from wasteful and environmentally damaging centralised systems—that divert environmental flows, dam, distribute, use once and then dispose them to receiving waters—to integrated urban water systems that utilise wastewater and stormwater as substi-

tutes for potable water in gardens, laundries and toilets (Section 6)

- *Waste*: moving from the current extract-process-assemble-use-dispose paradigm to one where waste, once minimised, is seen as a resource stream for cradle-to-cradle and eco-industrial manufacturing processes (Section 7)
- *Urban systems*: must become more resilient and adaptive in response to the threats of climate change (sea level rise, flooding, heat and drought, bushfires), peak oil challenges and the need to recycle the city via smart redevelopment strategies that minimise sprawl, reduce automobile dependence and create healthier, more liveable and walkable mixed-use neighbourhoods
- *Urban governance* also needs to be appropriate for the planning and management of large, complex, culturally and economically diverse mega-metropolitan regions and their bioregions (Sections 4 and 8).
- *Human behaviour*: moving from lifestyles where materialism, indebtedness and consumption are

a dominant feature of urban society to lifestyles associated with smaller ecological footprints and a concern for community (Section 9).

The *barriers to transition* within existing urban systems and institutions are not to be underestimated. They are associated with path dependency, organisational inertia and a bunch of NIMBY attitudes. Barriers are identified and pathways to implementation of socio-technical innovation are explored in all Sections, but most explicitly in Sections 9 and 10 where focus is on a need for fundamental change in values, attitudes and behaviour among those in industry, government and community around issues of production and consumption.

Transformation of Australia's urban systems in the 21st century is possible. There **are** solutions for a sustainable future. But the window of opportunity for transitioning without significant dislocation and hardship is diminishing. There is an urgency to this whole process.

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