Chapter 1

Steering Sustainability: What, When and Why

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> How does ‘evidence’ speak to ‘power’? (Pawson 2006, 1)

> Climate change presents a unique challenge for economics: it is the greatest and widest-ranging market failure ever seen. (Stern 2006, Executive summary, i)

Introduction

Although the contributors to this collection write from an Australian perspective, the context within which they discuss urban sustainability – the issues, approaches and challenges – is global. They address two main challenges: understanding the forces leading to unsustainable social and environmental outcomes in advanced capitalist, urbanized nations and encouraging creative ways of moving society onto more sustainable paths. In this latter task, governments have a critical role as major consumers of resources, providers of infrastructure, and through powers to tax and regulate. Hence, one theme running through the book focuses on how researchers and policy makers can ‘speak’ to each other and how timely credible research can inform and improve policy formulation, implementation and evaluation.

The theme of intertwining the dialogues and respective activities of researchers and policy makers guided the practical process of developing this book. Senior policy makers and advisers of the Department of Sustainability and Environment from the State Government of Victoria, Australia, kindly agreed to read and comment on early drafts of chapters and to reflect on how they saw sustainability policy developing and impacting on the environment, economy and society. At a workshop held in mid-2006, departmental officers and authors discussed the issues, methods and implications raised in the various contributions. The aim was to produce a thoroughly practical policy manuscript facilitated by a dialogue in which authors and policy makers challenged one another to articulate what a ‘good’ sustainability policy is and how it is delivered most effectively.

Inevitably, differences of view and values emerged, both between and among the participating researchers and policy makers, resulting in a robust and informative debate that proved to be invaluable. On the day following the workshop the authors met as a group and exhaustively reviewed the insights gleaned from their exchange with the policy makers and worked through the changes suggested. Both workshops were critical in setting the direction for the production of the final chapters that

appear in this book. This approach has much to recommend it as a process for getting researchers and policy makers to speak and listen, and therefore understand each other.

Steer *What?*

The 'steering' reference in the title of this book reflects major changes in public policy development and analysis over the past twenty years in advanced capitalist nations. Neo-liberalism has emerged as the dominant policy paradigm, especially in the Anglo-democracies of Australia, Britain, the United States, Canada and New Zealand (Bell 2002). From this viewpoint, the role of government is to 'steer, not row', to set the legal and institutional framework within which 'the market' operates to allocate productive resources and to distribute the fruits of economic activity across the population and between countries and regions. What is clear, however, is that the challenge of steering economic and social development in productive, benign and above all *sustainable* ways is more complicated and difficult to achieve than the standard model of neoclassical economics proposes. Myriad 'market failures' intervene between rowers and navigators. The most obvious and – as the Stern quote above suggests – serious challenge is the complex, interacting set of effects resulting in long term, accumulating and irreversible climate change. Other failures are generated by negative externalities and distributional inequities associated with resource extraction, polluting activities, the abuse of political and market power and ecosystem breakdown.

Achieving sustainability requires a society to adequately deal with the full range of market failures facing that society, many of which will be cross-border and global in scope. In this context, Dovers (2006, 7) defines sustainability as 'the ability of human society to persist in the long term in a manner that satisfies human development demands but without threatening the integrity of the natural world'. He characterizes sustainable development as the capacity to deal with threats generated across four domains: diminution and degradation of resources; pollution and waste; ecosystem services; and 'society and the human condition' (Dovers 2006, 9). In each domain, deliberate government policy can help or hinder societies seeking sustainable development trajectories. However, due to the nature, scale, timing and scope of the threats posed, policy develops in a highly uncertain environment and, as such, is likely to be iterative, piecemeal and radically incomplete. Many of the processes driving economic, social and environmental change are complex in the technical sense and pertain to the operation of complex adaptive systems (Beinhocker 2006). Therefore it is impossible to accurately forecast their effects on the ground. This fact imparts an open-ended dynamic – a dose of 'fractal uncertainty' – to sustainability policy.

Why Steer, and *When*?

Many of the detrimental environmental impacts of human activities interact and form complex feedback mechanisms, with complex and synergistic long-term consequences that render attempts to steer outcomes even more difficult. Thus,

sustainability policy must deal with drivers and effects that cut across conventional boundaries of academic disciplines and national boundaries, that have long-term gestation periods and impacts, and that entail chronic uncertainty. This imperative follows from the fact that effects and impacts – such as extreme climate events – display what founders of complexity science call 'wild randomness' (Mandelbrot and Hudson 2004). Instead of being normally distributed around a clear median with 'small tails' – infrequent extreme events, such effects tend to follow 'a power law' – there is a much larger frequency of both very small and very large impacts. Hence, policy makers should expect more 'one in a hundred year' events. Although path dependent to a degree, these events cannot be accurately forecasted in advance but contingency response plans will lessen the scale of their impacts when they do eventuate. The aftermath of Hurricane Katrina in the New Orleans region is a sad reminder of policy failure in this respect.

Policy makers need to recognize the constraints placed on their capacity to influence events by the long time horizons over which effects unfold, the paucity of workable models and relevant data, and the sensitivity of outcomes to the initial conditions prevailing in any specific context. Such constraints are magnified by weaknesses in institutional systems. Most policy systems with which we are familiar are poorly placed to deal with either the lack of knowledge of likely outcomes over the longer term and the 'back-end loading' of many of those events. To the extent that the negative consequences of unsustainable current practices are concentrated in the middle-to-distant future, current policies are likely to be inadequate. The way in which advanced industrial countries build their housing systems is a useful example.

Market forces tend to focus the minds of both housing providers and residents on the immediate costs of accessing the dwelling, not on the lifetime costs of living in it. Indeed, a house is a physical asset with a long life, typically servicing a few generations. If the extra cost of building-in energy or water-efficient features and fittings adds significantly to the up-front purchase price, the market will ruthlessly weed out these initiatives, even though they might have repaid the residents in dollars and amenity many times over during the life of the dwelling as well as reducing the overall 'environmental footprint'. In circumstances of clear market failure, appropriate and well-targeted government interventions can make a positive difference – in this case, by providing positive incentives to house builders and residents to include environmentally sensible features or regulating to achieve the same outcome.

Some environmental impacts are so large and pervasive that they defeat the reach of any one government to address them through targeted, piecemeal policies. Global warming falls into this category. In this case, the appropriate response must be collective, involving contributions from government, industry and community organizations at the local, regional, national and international levels. Because of the cumulative, irreversible nature of the problem and the huge potential costs of getting it wrong, collective action will need to be 'front-end loaded'. The Executive Summary of the Stern *Review* (2006, i) has underscored the crucial importance of action, given the inertial build-up of greenhouse gases:

> The effects of actions now on future changes in the climate have long lead times. What we do now can have only a limited effect on the climate over the next 40 or 50 years. On the other hand, what we do in the next 10 to 20 years can have a profound impact on the climate in the second half of this century and the next.

Early collective action in such circumstances will not only reduce the eventual costs of greenhouse emissions over the long term but, according to the Stern *Review*, will also minimize the total costs of mitigation and adaptation entailed. However, the barriers to effective collective action at the various levels are immense. Barriers include the high transaction costs of reaching and implementing collective action, 'free riders' and the short policy horizons of governments locked into conventional electoral cycles.

Conversely, the scale and chronic uncertainty of some impacts can provide a strategic case for invoking 'precautionary principle' or 'wait-and-see' options. This requires policy makers to avoid or delay making decisions where the impacts are unclear until better intelligence is available to assess and manage the risks. Such an injunction runs counter to most approaches to public policy, which tends to implicitly attach a zero value/cost to potential effects that cannot be readily quantified and given a probability measure. Somewhat akin to the precautionary principle, the maxim of 'minimum regret' invites policy makers and others in the broader 'policy community' to place themselves at some distant time in the future and speculate on levels of regret if particular negative scenarios play out, and then to return to the present and choose a policy path that would give them the lowest cause to regret.

The issue of *when* governments should intervene in areas that have very long-term impacts is also intimately tied up with concerns over intergenerational equity – questions related to what we owe future generations. The original definition of sustainable development introduced by the Brundtland Report, *Our Common Future* (WCED 1987), explicitly raised this concern. Where the impacts are large, irreversible and long lasting, government policy interventions are required earlier rather than later to protect the rights of unborn generations. This essentially ethical prescription places a heavy burden on current governments, especially in view of the fact that unborn generations do not vote. The latter's interests are represented (tenuously) in democracies such as Australia only to the extent that today's voters and governments accept the responsibility for their future welfare and act accordingly.

New Policy Drivers

It is clear that climate change, and the issues surrounding it, will be a dominant factor in public policy in the coming decade. In addition to the specific problem of dealing with the effects of climate change, the following drivers, mostly mutually reinforcing, will concentrate the minds of policy communities around the world:

1. *Energy.* 'Peak oil', the point at which the known world supply of oil reserves has peaked and begins to decline, will pose increasing economic pressures on industrial and industrializing countries. The task of finding alternative energy sources and technologies will become more pressing. The nuclear energy

option has been raised as a means of combating greenhouse gas emissions, which raises massive problems for institutional systems, particularly national governments, concerning the storage of nuclear waste and threats of nuclear weapons proliferation and terrorism. The heavy dependence of many countries on relatively plentiful supplies of coal to generate the rapidly increasing global demand for electricity makes it difficult to bend policy in favour of more environmentally benign alternatives, especially in major coal-exporting countries, such as Australia. Debate over policy developments tends to oscillate between encouraging the exploitation of alternative energy sources and developing 'clean coal' technologies.

2. *Water.* In many countries the adequate and secure supply of water for agriculture, industry and dwellings is increasingly at risk. Water access, within and between countries, threatens to be a major cause of conflict. Water scarcity may force mass intra- and international migrations and require very large infrastructure investments for solutions such as long distance delivery and desalination. Policy systems will be massively challenged to respond in such conflicts. Overstressed river ecosystems are likely to collapse if adequate water flows are not maintained or regained, affecting other environmental and economic assets. Australia, as a dry, 'old' continent, is at the forefront of this particular challenge.
3. *Pollution.* Rapid industrialization continues to generate escalating volumes of pollution, given current technological trajectories traversed by the developed world and fast-growing econom, especially China and India. Instances include air pollution from motor vehicles, water pollution from industrial discharges and residential waste disposal.
4. *Population Growth and Ageing.* Population growth, particularly in the less developed countries, places increasing stress on fragile environmental and resource bases. The global population shows weak signs of stabilizing, a major hope being that increasing living standards in China and India will result in continuing falls in birth rates. Ageing populations in countries such as Australia place increasing and expensive demands on governments to meet the needs of older citizens – appropriate housing, mobility and leisure services but, above all, access to adequate health care.
5. *Health.* Besides aged care, governments will be faced with major challenges posed by current and possible future pandemics. AIDS and bird flu prefigure the potential scale and cost of such challenges and the difficulties of achieving effective international responses. Other diseases, such as malaria, tuberculosis and chronic eye diseases, are savage suppressors of economic and social development in underdeveloped regions.
6. *Poverty and Insecurity.* Widespread poverty in underdeveloped countries can deny such societies economic resources to engage in sustainable practices. Continued loss of forests, overexploitation of fishing stocks and pollution generated by overurbanization result partially from poverty. Successful efforts by countries like China to break out of poverty place different stressors on the environment, especially to the extent that they follow the natural resource-dependent technological path of advanced industrial nations. Increasing

insecurity in strategic areas threatens access to key resources, notably the Middle East and oil. It is difficult to see major advances in sustainability globally unless and until governments respond collectively to the problems of extreme poverty and insecurity.

7. *Financial Markets*. As the cost of unsustainable development rises exponentially, world financial markets are factoring in environmental risk when valuing the worth of businesses, reflected in cost and availability of insurance, the rapid growth of 'socially responsible investment', and shifts by investors towards companies that 'screen' positively on social and environmental grounds. As monitoring techniques, data bases and financial asset allocation become more sophisticated, companies that fail to move beyond 'greenwash' activities will bear higher costs of finance than more environmentally responsible competitors and bear increasing damage to their reputation (affecting sales).

The Urban Question

Many of the drivers and impacts noted above are associated with remorseless global processes of urban growth and concentration. For the first time in history, most people live in urban centres. There are more than twenty city-regions with more than twenty million inhabitants, most located in Asia. Current urbanization patterns impose unsustainable lifestyles on urban residents and unsustainable systems of resource use, transportation and waste disposal. 'Steering sustainability' really means dealing with the unwanted consequences of urban growth. This imperative calls for governments to improve the rate of urban metabolism, increasing 'good' life-sustaining outputs while reducing 'bad' outputs (such as pollution) and resource inputs. As in the Chinese example, this might entail government controls on immigration rates to the largest and most congested urban centres in favour of smaller centres.

Contributors to this book adopt a deliberate urban focus. More specifically, the focus is on the lived experiences of people in urban and suburban settings. They deal with a range of issues and approaches to improving sustainability 'on the ground' and argue for policy makers to steer people towards the mass adoption of more sustainable practices. Central themes running through the book include environmental democracy and the lifestyle (behavioural) changes necessary to achieve sustainable outcomes and holistic social learning. Each contributor identifies key sustainability principles and practices, frameworks, approaches and concepts for achieving sustainable housing and urban development outcomes. All the authors ask, in a constructive way: What policies and practices are most effective in enabling and forcing desirable social change, and what are the barriers that must be overcome to do so?

Transforming Cities

The book is divided into four sections. In Part 1 Transforming Cities, the contributors offer four overarching approaches to understanding the challenge of shifting urban

growth trajectories to more sustainable paths. Each contributor operates from a distinct perspective, highlighting implications for policy makers.

Newman (Chapter 2) focuses on what constitutes a sustainable residential urban form in a growing metropolitan region. Newman speaks at the level of national policy making and metropolitan-scale planning, drawing on his personal experiences as a senior adviser on sustainability policy to the Western Australian Premier and a stint as the New South Wales Sustainability Commissioner (2004–2006). He begins with Western Australia's framework for sustainability definition of sustainability, elaborating on its implications for housing, in terms of the framework's principles, which attempt to ground and operationalize complex and contentious concepts such as 'intergenerational equity'. Newman identifies car dependence as a critical area for action – a topic considered by Scheurer in Chapter 7 too – and categorizes housing within three urban planning and development patterns: walking cities, transit cities and automobile cities. Analysing city sprawl in these terms, he presents economic as well as equity and environmental arguments in favour of transit-oriented centres and walking city centres.

Downton (Chapter 3) introduces the concept of 'the ecopolis', defined as minimizing ecological footprints (biophysical) and maximizing human potential (human ecology) in order to repair, replenish and support processes that maintain life. He has been a principal practitioner specializing in ecological architecture and is a resident founder of the Christie Walk project, a sustainable urban residential demonstration model or 'urban fractal' in Adelaide, the capital of South Australia. Downton sees the ecological city as 'the next evolutionary step for urbanism' and presents three model demonstration projects, 'urban fractals'. Downton speaks at the grainy level of community-inspired action and as an architect/designer. Nevertheless, his contribution and strategy is neither parochial nor small-minded. In fact it offers a philosophical, social and historical 'big picture' perspective of how to address sustainability challenges. Thus, he elaborates on ten ecopolis development principles, presents seven aspects of the sustainable human ecological development process (such as bioregional 'placing' and biozoning), introduces a novel 'frogstick' measure (urban ecology checklist) and proposes four conditions for ecocities (seeing the city within its hinterland, integrating knowledge, cultural change for ecological sustainability, and urban fractals).

Copeman (Chapter 4) switches the gaze to the micro level. He offers a simple, straightforward and eloquent introduction to permaculture and how its principles and perspective can be applied in urban planning and policy making as well as at the grassroots level (where it originated and has been most evident). He defines 'permaculture' as a sustainable approach to living with nature through applying three ethical principles – care for the earth, care for the people, share surplus resources – and twelve design principles (that structure the chapter). His points are illustrated by examples, such as Brisbane's Northey Street City Farm, where he has worked since 1994. He emphasizes third way organizations, neither public nor private enterprises, but cooperatives, collectives and networks that support growth of food in cities and so on. Alternative technologies, managed at the grassroots, mimic and control nature to modest human ends.

More broadly, Copeman sees permaculture as a way to heal the historical separation of rural and urban forms: ‘by creating mosaics of housing, industry, shops, offices, farmland and bush right through and around cities, which would facilitate interesting and productive interactions at the boundaries of different areas, not only in the inner city but also in the suburbs and on the urban fringe.’ In this view, social diversity complements ecological stability. Permaculture has often been practised and perceived as a rural development but Copeman uses the community garden as an exemplar of *urban* permaculture while standing his ground that decentralization is an ecological necessity. In this way his vision can be distinguished from Newman’s and Downton’s.

Grant (Chapter 5) adopts an explicitly technical cast. He presents life cycle assessment (LCA) as a critical lens through which to track and interrogate sustainability outcomes. He defines LCA, outlining its short history and applications with respect to sustainable housing and urban planning. Grant introduces the notion of ‘environmental folklore’ to refer to the shared knowledge of understanding and working towards sustainability. He positions LCA as a system to evaluate the comparative potential and limits of strategies, activities and products to progress sustainability. LCA is proposed as a humanistic *science*, which helps ‘renew environmental folklore and provide more rational and responsive decision making in urban planning’.

Grant outlines a systematic approach to measuring the environmental impacts of manufacturing products and providing services and discusses its application in *Aurora*, a master-planned estate on the northern fringes of Melbourne, which aims to improve environmental standards and performance of suburban homes and households. Aurora is the focus or reference point for other contributors too – Dalton and Binder (Chapter 15) and Hurley and Mercer (Chapter 9). Compared with other chapters in the first part of this book, LCA appears very technical and limited in scope. However, Grant presents it as a set of overlapping techniques which, broadly applied, might offer a general and big-picture analysis of sustainability that can support effective government policy and improve environmental performance in both business and household sectors.

Collective Practices

The contributions to Part II Collective Practices focus on ‘fields’ of sustainability, such as water and waste. They provide overviews of contemporary challenges and discuss practical policies and strategies to address such challenges. A recurrent theme is the need for developing consistency and complementarities between individual and household-level sustainable practices and collective urban systems and infrastructure.

Pears (Chapter 6) examines non-transport (stationary) energy supplies and uses within an urban metabolism framework, which analyses inputs, outputs, dynamics and impacts. He highlights an integrated perspective arguing that, for instance, high-density settlements might economize on energy uses and costs but limit potential solar energy collection, storage and use and involve social disadvantages. Thus he

discusses policy options within a real world of urban lifestyles, technological and economic developments, analysing 'diversified solutions' which take into account the various stakeholders and actors: industry, planners and regulators as well as consumers. Pears argues for policy making to be open, flexible, adaptive and innovative while challenging lifestyle choices that demand high energy-use, such as the trend towards larger houses despite a decline in household size.

Scheurer (Chapter 7) addresses challenges associated with moving from car dependence, which Newman (Chapter 2) identified as the key barrier to urban sustainability. Framing his discussion in a supply–demand model, Scheurer argues for integrated solutions: innovative energy-saving and resource-saving technologies; well-planned and organized urban transport systems; and changes in transport practices at the level of individuals. He offers European models and solutions to transport dilemmas as options for Australian policy makers. He discusses types of travellers, i.e. travel practices, as well as forms of travel (such as bicycle riding), arguing that urban structures need to be examined, understood and developed as systems of mobility choices and limits.

While sustainability indicators and audits proliferate, Hyde et al. (Chapter 8) argue that there have been insufficient assessments of how well these tools assist policy makers to implement, monitor and evaluate their sustainability strategies. To promote an emerging debate, they examine building environmental assessment tools, which aim to contribute to the successful implementation of sustainability policies and initiatives in housing, identifying their assumptions, weaknesses and practical benefits. Hyde et al. offer examples from Britain and Australia. They argue that, in as much as building environmental assessment tools are able to accurately predict, measure and monitor sustainable buildings, they have a role in evidence-based policy making and usefully contribute to correcting and otherwise reforming policy and practices.

Hurley and Mercer (Chapter 9) make a comment applicable to other areas considered in this book, that 'know-how and technology available to save water and improve water quality are far in advance of the majority of practices'. Living in a 'fool's paradise', urban Australians have expected free plentiful water supplies but today face radical limits on domestic water use. For instance, the Victorian Government has a target of reducing Melbourne's water consumption by 75 per cent by 2015. Watering gardens, showering, washing cars and filling outdoor swimming pools are regulated or under scrutiny. Technology, household practices, water agencies, supplies and services must change to achieve reductions in water use. Hurley and Mercer emphasize the importance of community education, referring to Aurora estate innovations to reduce demand and improve sustainable domestic water supplies, as well as a range of social, regulatory and economic initiatives that represent models for future practices.

Eales and Donaldson (Chapter 10) outline the evolution of integrated waste management as a response to outdated landfill methods for dealing with urban waste. They focus on the 'waste hierarchy' – avoid, reduce, reuse, recycle, recover energy and dispose – as the heart of managing waste for sustainability. Again attention is drawn to the significance of education and actions at a household level for waste-management systems to succeed.

Community and Civil Society

The successful implementation of sustainability policies in urban areas relies heavily on the practices of individuals and households in the contexts of community learning and neighbourhood action. In Part III Community and Civil Society, the contributors analyse the complexities of creating sustainable communities, citizens for sustainability.

Whelan (Chapter 11) argues that urban futures will be determined through vigilant and resourceful action by residents' groups and environmentalists. His analysis focuses on community action with respect to planning and developments in Maleny and along the Gold Coast (Queensland). His contribution is unique in arguing that women have fulfilled a 'pivotal role' and that alternative economic exchange systems are significant. Whelan addresses conflicts that commonly arise between grassroots groups and local councillors and bureaucracies, revealing that we have few effective political processes to engage with and harness community energies already supporting sustainable developments. He concludes that permanent engagement and reform based on shared understandings and decision making is crucial to achieve sustainability.

Mike Hill and Lorna Pitt (Chapter 12) have been prominent political figures, especially in local government and specifically concerned with sustainable urban planning and design. Instrumental in turning a former inner suburban primary school into a showpiece sustainable housing development, Hill and Pitt summarize their experiences and challenges in creating WestWyck as an urban ecovillage for educational purposes. They detail the practical challenges of integrating energy and water efficient techniques and technologies, using recycled materials and addressing transport needs. In this 'market oriented' development, the neighbourhood community is an active concept involving rights and responsibilities to ensure that the local ecology, local community and local economy coexist in sustainable ways.

Work–life balances are intricately associated with economic activities that impact on the environment. Denniss (Chapter 13) points out that most Australians are working longer, earning and spending more, yet still want to increase consumption. He argues that less working and spending is likely to have a positive impact on the environment. A political adviser for years, Denniss is currently attached to the Greens Party national leader Senator Bob Brown. His approach is practical. Referring to the 'slow food movement', the 'simple living network', the 'buy nothing day' and so on, he suggests actions for individuals and community-based groups to alter the situation. Finally, Denniss lists fourteen policy options that federal, State and local governments might consider to support less work, less consumption and a more sustainable environment.

Potts et al. (Chapter 14) discuss ways of operationalizing UN Local Agenda 21 – 'global talk to local action' – drawing on experiences of partnerships between business, government, university researchers and communities. They define partnerships as 'tools that promote dialogue, cooperation and education across different sectors and stakeholders' with a specific utility for achieving sustainability and refer to two case studies to argue that universities can facilitate community-based sustainability by acting as independent brokers – scoping ways forward

and assisting in resolving conflicts between interested stakeholders. This role complements research advice, identifying, collecting and analysing appropriate information to enhance local understanding, knowledge building, and conducting trials of sustainability solutions.

Transforming Suburbs

Part IV Transforming Suburbs focuses specifically on issues related to sustainable housing: government as an agent for change, affordable sustainable housing, sustainable renovations ('retrofitting the suburbs'), policies and strategies to conserve nature in urban settings, and the sustainability aspects of high-technology 'smart' homes.

VicUrban is a State-owned land development agency involved with urban housing provision in Victoria. In the last decade housing sustainability performance and its measurement have become key concerns for such agencies. VicUrban has developed the Sustainability Charter, a performance-based planning initiative, which Dalton and Binder (Chapter 15) analyse in the context of a decline in housing affordability and difficulties with providing services for residents of low-density developments in sprawling suburban fringes. They identify three policy challenges: housing affordability, service delivery, and reducing the environmental impacts of low-density suburban developments. They identify a major weakness, public transport, over which VicUrban has little direct control, highlighting the agency's limitations and the need for holistic, whole-of-government approaches to sustainability.

Randolph et al. (Chapter 16) consider minimum environmental performance standards for new housing in the light of affordability to conclude that equity issues and affordability have lost out. This chapter is a plea to make housing affordability a central element of the housing sustainability debate and practice: 'Unless these two issues are tackled concurrently in policy development, we risk having to compromise both qualities – an outcome which undermines the triple-bottom-line equity aspirations of genuine sustainable housing.' The chief problem is that environmentally sustainable housing is costing more than traditional housing, which mainly excludes low-income households that will not benefit much from any 'trickle-down' effect.

Dalton et al. (Chapter 17) consider gaps in research and policies with respect to residential housing improvements conforming with and improving environmental housing performance standards. The authors review a series of 'important but uncoordinated initiatives' to identify questions inadequately addressed in the literature: Why do householders alter their homes? How concerned are they with improving the sustainability performance of their homes? How, and to what extent, are renovators informed about improvements for sustainability outcomes? Barriers to improving environmental features of alterations and additions to existing housing stock include limited information and hidden costs and benefits, complicating assessments of the economic benefits of environmental improvements and accentuating risk factors. The authors conclude that institutional change and focus is required to highlight the invisible potential of enhancing the sustainability of housing improvements.

Conservation is an urban issue in Australia, where settlement and subsequent urbanization has tended to develop along the coast, in areas of high ecological value, high biodiversity, dependable rain and fertile soil. Land incorporated into our sprawling cities has been virtually unmanaged for its ecological values. In line with international trends, and challenging the implied balance of outcomes in concepts such as environmentally sustainable development, Bekessy and Gordon (Chapter 18) argue that 'short-term economic gains consistently win over biodiversity concerns on a localized case-by-case basis'. Experts in preserving biodiversity have not contributed sufficiently to urban planning. Land requires integrated management across landscape and biological scales distinct from the socially created zones, powers and responsibilities of governments. To address the challenge of managing urban biodiversity – 'nurturing nature in the city' – the authors present a vision of 'Biodiversia', 'a suburb … designed with the preservation of biodiversity as a top priority'.

There is a long history of political and economic leaders hailing or following technological 'advances' to address challenges facing humankind. Through the first half of the twentieth century home automation (the robot) was viewed as a way to save effort and time on household chores and maintenance. During the second half of the century, home automation has been applied to reduce risks and to improve security, safety, comfort and entertainment in homes. Most recently, housing-related technology (such as water and energy meters) has been applied for sustainability ends. Such features have been integrated into smart designs and developments, high-tech and 'more sustainable' dwellings. Chapter 19, by Berry et al., gives a critique of the concept of the smart home from four perspectives: historically, the point of view of policy making, in the context of innovation and, finally, through a review of 'non-determinist ways of interpreting human–technology relations'.

In the concluding Chapter 20 Nelson returns to an holistic perspective: what are the principles, processes and practices that will steer sustainable urban futures?

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