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Innovation and the City: Challenges for the Built Environment Industry

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July 2008

INNOVATION AND THE CITY: CHALLENGES FOR THE BUILT ENVIRONMENT INDUSTRY

City Futures Research Centre
Issues Paper No. 7
July 2008

This report was prepared for the Department of Innovation, Industry, Science and Research, July 2008

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978 1 74044 097 4

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National Library of Australia Cataloguing-in-Publication entry

Author: Pinnegar, Simon.

Title: Innovation and the city : challenges for the built environment / Simon Pinnegar, Jane Marceau, Bill Randolph.

Edition: 1st ed.

ISBN: 9781740440974 (pbk.)

Notes: Includes index.
Bibliography.

Subjects: City planning--Australia.
Urban ecology--Australia.
Sustainable urban development--Australia.

Other Authors/Contributors:
Marceau, Jane.
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Dewey Number: 307.16

CITY FUTURES RESEARCH CENTRE

City Futures is a University Research Centre dedicated to developing a better understanding of our cities, their people, the policies that manage their growth the issues they face, and the impacts they make on our environment and economy.

Based in the Faculty of the Built Environment, City Futures is interdisciplinary in outlook and activity. It draws on the skills and knowledge of those within the Faculty whose knowledge encompasses the physical and spatial aspects of urban living, as well as those in other Faculties in the University whose interests coincide with our focus on the city.

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City Futures will also strongly focus on the training of the next generation of urban research scholars through an active postgraduate research program. We are committed to expanding the skills and capacity of young urban researchers and to communicating the value of good research to those involved in making policies that impact on the city.

Together with colleagues in other institutions who share our focus and passion, City Futures is committed to research and training that will contribute to better urban outcomes for Australia and beyond.

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ACKNOWLEDGEMENTS

The authors would like to thank the workshop participants and the key stakeholders who gave their time and opinions freely during the course of the project. This report would not have been completed without their generous contributions.

A full list of those involved is given in Appendix 1.

The content of this report is nevertheless the responsibility of the authors. Any errors in fact or interpretation or omissions are solely their responsibility.



INNOVATION AND THE CITY: CHALLENGES FOR THE BUILT ENVIRONMENT INDUSTRY

Cities are the problem. Not one aspect of our national life can be seriously discussed in political, economic, industrial, social or cultural terms without reference to cities. At the very least, the problems we face in almost any area appropriate to government activity must be approached as part of the urban problem, if there is to be any worthwhile approach to them at all. And if they are not so approached, there is no possibility of even partial solution for them. (Gough Whitlam, 1972)

There is ... a central role to play by the Australian Government in relation to urban policy and in developing a national urban agenda. The Australian Government is able to provide leadership and put in place systems of governance to coordinate urban issues, and ensure that national policies facilitate sustainable urban practice (Sustainable Cities, House of Representatives Standing Committee, 2005)

We need to recognise that cities are Australia's future – in more ways than one (both domestically and internationally) and the built environment industry plays a leading role in this.

(Stakeholder interview, 2008)

Cities are our most profligate consumers of scarce resources and our worst polluters. Cities are the primary cause of climate change and are most at risk from climate change, but they also provide the solution to tackling it. It makes sense, therefore, to begin finding city-wide solutions to the problems of climate change. Solutions do exist. They have been implemented and shown to work. What is needed is the political will and the co-operation of all levels of government and the private sector to implement solutions on a broader scale (Jones, 2008)

Summary

Our towns, cities and the built environment industries that create, fund, manage and maintain them will need to respond to a number of drivers of change over the next generation and in doing so, reconcile a series of challenges. In part, the drivers of change will be ongoing: a continuation of issues that cities struggle to mediate, for example the challenges of housing affordability and social inclusion. However these are increasingly shaped and reinforced by our built environments demanding more innovative responses to sustainability and climate change agendas.

Movement towards more 'carbon constrained' economies presents both challenges and opportunities to our cities and our built environment (BE) industries, and ensuring that Australia takes a lead in understanding, facilitating and delivering sustainable urban change will be central to continued global competitiveness. Many of the changes likely to be seen will be incremental, but transformation in a number of areas will be required. Given the timescales involved in financing, designing and delivering the built environment, decisions made over the coming years will be fundamental in establishing frameworks for next generation best practice.

SEVEN DRIVERS, SIX CHALLENGES

This scene setting review takes a broad perspective with a deliberate focus away from specific technologies or industry specific barriers. Rather, drawing on both recent policy and literature discussions and interviews with key built environment thinkers and practitioners, it identifies a number of barriers and opportunities relevant to shaping innovation and competitiveness that are shared across the BE industry and our cities more widely.

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**Drivers of change
which will shape our
towns and cities**

- **CLIMATE CHANGE**
- **PEAK OIL**
- **DEMOGRAPHIC CHANGE**
- **URBAN DENSIFICATION**
- **SOCIAL INCLUSION AND SOCIAL EQUITY**
- **INFORMATION TECHNOLOGY**
- **GLOBAL COMPETITIVENESS**

Our built environment industries will need to understand the implications of these drivers. How they respond to the challenges faced will shape both cities' and their own competitiveness.

6

Challenges facing built environment industries and innovation policy

- **URBAN RETROFITTING**
- **MOVING TO SCALE**
- **INTEGRATING THE FINANCE CHAIN**
- **INTEGRATING THE DELIVERY CHAIN**
- **METRICS AND SHAPING BEHAVIOUR**
- **LEADERSHIP AND GOVERNANCE**

- **URBAN RETROFITTING:** Most of our built environment 20 years hence already exists, and in large part, preparing for the future is about retrofitting what we already have. Adapting our existing buildings, and retooling and restructuring our neighbourhoods will be central to meeting global, national and locally driven targets and avoiding vulnerable parts of our built form becoming stranded assets. Our vulnerable neighbourhoods will also need to be assisted by 'transitional arrangements' in order to ensure social inclusion and equity aims are facilitated and not exacerbated in moving towards carbon constrained cities.

- **MOVING TO SCALE:** Recognising that the drivers faced and necessary responses to the challenges arising occur across and between a variety of scales demands that the innovation debate moves well beyond the building footprint to thinking about how neighbourhoods and cities as a whole can prepare, adapt and maximise potential opportunities arising. This calls for innovation in the form of more informed, more effective urban governance models – at a scale where city function and structure can be considered in appropriately integrated terms – to provide clarity and direction within which all built environment stakeholders, including residents can respond.

- **INTEGRATING THE FINANCE CHAIN:** The terms of built environment financing, pricing and understanding value are changing. Investor demands, priorities and the challenge of split incentives (those investing in upfront innovation are often different to those derived benefits of that innovation) have, to date, acted as barriers to movement towards sustainable building practices. These are likely to transform into drivers of change. Sustainability reporting, corporate social responsibility and upturned understandings of 'risk' will require innovation in thinking and response. Many global companies are already spearheading change in these areas. The broader challenge will be for these shifts to be facilitated amongst all those involved in design, development and utilisation – of the built environment.

- **INTEGRATING THE DELIVERY CHAIN:** The complex and fragmented nature of the built environment's design, delivery and management chain over the life cycle of a building is an oft-cited barrier to innovative practice across the sector. The challenges and opportunities presented by climate change adaptation place further emphasis on the need for integration across sectors – and across the building cycle – if innovative practice is to be fostered in all parts of the delivery chain. Demand for more integrated practice requires new (and better use of existing) skills. Our education and research institutions need to lead the way in preparing future built environment professionals, and more effective models for research, industry and labour collaboration.

- **METRICS AND SHAPING BEHAVIOUR:** Movement towards new practice requires a better understanding of what those potential futures may comprise. A lack of robust, comparable, verifiable information, or at least consistency, across jurisdictions is currently seen as a significant barrier to transforming practice and behaviour. Innovative frameworks where metrics are agreed and shared need to be used to drive change, establish markets, create opportunities and act to shape organisational and consumer behaviour in proactive ways, rather than be seen as additional red tape and legislative burden.

- **LEADERSHIP AND GOVERNANCE:** Incentivisation and clear direction can help facilitate and steer technological advance to respond to these drivers and changes. In each, there is a role for policy leadership across the range of governance levels, and for greater coherence across these governance levels. Approaches are required to ensure that our cities in their entirety, all BE industries, and all Australians are supported in ways where innovation is fostered, competitiveness is maximised, and issues of social inclusion and social equity are fully integrated into foresight activity.

1. Introduction

1.1 PROJECT BACKGROUND

This briefing report was commissioned by the Department of Innovation, Industry, Science and Research to provide a short 'scene-setting' review of the drivers of change in the Australian built environment (BE) over the next 20 or so years and to provide an indication of the key innovation challenges facing the Australian BE industry as it moves to implement the Government's broad sustainability goals for Australia.

The specific brief for the project was as follows:

- To identify current and emerging innovation issues and challenges for the urban commercial and residential built environment that are relevant to the industry's growth and competitiveness and to policy makers;
- To assess what a "sustainable urban built environment" might look like in 10-20 years and how the Australian built environment industry may need to innovate to address the Government's policy agenda for environmental, economic and social sustainability.

The project was undertaken in May and June 2008 and comprised the following four components:

1. An initial internal workshop involving key staff members of the Faculty of the Built Environment, University of New South Wales;
2. A targeted literature and policy review, including international examples;
3. A series of key thinker/stakeholder interviews with identified industry leaders;
4. The preparation of this briefing note.

A listing of workshop participants and key industry stakeholders consulted is given in Appendix 1.

This introduction sets out some basic understandings and definitions that were adopted for the purposes of undertaking the project. The brief encouraged us to view the BE and the associated BE industry in its broadest form, and that sustainability was framed as a Triple Bottom Line (3BL) concept, including environmental, economic and social outcomes. This broad interpretation, and limited timescales to report, means that we were inevitably limited in our ability to canvass opinions across the full range of potential stakeholders. Our approach has been to pragmatically work within the immediate range of opportunities available to us, firstly by tapping into the body of expertise at UNSW itself, and then to approach key industry thought leaders identified in those discussions.

Over the course of our discussions, a range of similar issues – both in terms of drivers and the challenges faced in order to effectively respond - emerged, which we have attempted to summarise in the main body of this report. An overarching issue was recognition by all concerned that the built environment, and specifically the urban system, is hugely complex. It is part of and affects all our lives, including where and how we live, where and how we work and how we relax and undertake other aspects of our lives. As the physical container of the country's activities, it is therefore one of the most fundamental aspects of the nation's life. We did not expect to be able to unpack this complexity in any meaningful way in this exercise. However, we were concerned to explore the broad implications of change and sustainability and the broader need for innovation to meet the challenges of these changes.

Several themes emerged concerning innovation, the most dominant of which related to various aspects of the fragmented nature of the BE industry and the governance framework it operates within, and the need for greater integration within and between elements of the industry.

1.2 WHAT WILL A SUSTAINABLE URBAN AUSTRALIA LOOK LIKE IN 20 YEARS?

Perhaps the easiest of the questions to answer is what might a sustainable urban environment in Australia might look like in 2020? Put simply, it will 'look' pretty much as it does now, albeit with some additional higher density buildings in certain centres and nodes and perhaps some additional mass transit features, since rates of demolition and rebuilding are not enough to make radical changes. While it is important to recognise that much of the BE in Australia in 2020 will look much as it does now, looking the same does not have to mean it will function in the same way. The next 20 years may lead to, at most, a 25% difference in terms of changes and additions to the current built form, but the BE, in terms of residential and commercial constructions and associated infrastructure, will need to be operating very differently if we are to make it more sustainable.

The form of our cities will not change much over the next 20 years, but we need to focus on their structure so that they may operate more efficiently and therefore sustainably.

This represents the greatest challenge of all. Retrofitting our urban areas to move more sustainable outcomes is the most important change facing our urban areas and the built environment in particular. New building to meet sustainability targets will be relatively easy, however the key challenge lays in the difficult task of retrofitting existing poorly performing buildings and infrastructure. Changing how we use and behave within the built environment is a central component of this challenge.

1.3 DEFINITION OF THE BUILT ENVIRONMENT

Given the fact that the vast majority of Australians live in urban areas, with a large proportion in the major metropolitan areas, we took the term 'built environment' to correspond to a focus on the city region. While it does not exclude the role and function of smaller towns in the settlement system, the primary focus is assumed to be on the major city areas rather than the wide range of specific urban settlements across the country. The inescapable logic for this is that fact that climate change is now understood to have its greatest impacts on populations and economies in urban areas in Australia – no one we talked to indicated otherwise.

Overlaying all the concerns raised and issues canvassed in the report are the prospects of a changing climate and the drive towards a carbon constrained economy. Climate change is now the dominant paradigm within which our actions in the built environment will be articulated. As shall be discussed, other drivers are clearly apparent, however moves towards more sustainable, low carbon cities will provide the guiding framework within which these other challenges are likely to be articulated and addressed. This agenda will provide the key driver for change and innovation, and the drive to adapt to its impacts will be a shared concern, demanding a collective approach, between government policy, business activity and household behaviour.

The adoption of a triple bottom line (3BL) understanding of sustainability – environment, economy and society – means that our discussions, reflective of urban futures, will include not only the immediate physical built environment, including the technical aspects of the innovation in buildings and infrastructure, but also issues concerning the economy of change, governance and finance and the social and behavioural aspects of the transition to sustainability.

Since the city environment necessarily involves *interactions between people and between people and organisations* (residents and education, work and play as well as health and administrative organisations) altering the BE of the city involves altering these interactions. These interactions involve movements (transport) and use of energy and other resources. It is essential therefore for an approach to sustainability in the built environment of cities to involve changes not only to buildings but to the other elements of the city which determine how residents behave and interact. Reorganisation of the environment broadly conceived is thus a critical element of actions to make the BE sustainable and ensure the future viability of the different elements of the BE industry.

1.4 DEFINITION OF INNOVATION AND LINKS BETWEEN INNOVATIVENESS AND COMPETITIVENESS

Innovation is commonly defined as 'novelty of value in a market place'. The word 'market' can mean economic exchange or it can mean an informal 'market' of potential organisational and policy choices. The word 'value' usually refers to economic returns but can, and many argue must, be extended to include social and ecological (sustainability) value. Innovation is distinguished from invention

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because innovation is process, product or organisational change which is *in practice* and is different from what went before (new to the world, to the firm, to the organisation, by extension, to the society, including cities) and hence is proving its value already. Innovative refers to the processes and practices which encourage organisations, whether public or private, to take the risks associated with developing and bringing into practice novel ways of proceeding, novel products or novel organisational forms.

Innovations can be radical – new technologies or practices which change fundamentally the products or processes on offer – or incremental – simple developments of what is already happening in product, process or organisational arrangements. The latter is more common in most industries and most organisations. One of the challenges for the BE industry, and for government policy, will be to take on more radical innovations because the timescales we may be faced with to retool the city to meet sustainability targets are relatively short.

Innovation is now well established as a key component of industry development strategies and increased competitiveness for Australia's economy. Much attention so far in Australia has focused on innovation within industry, including primary activities and services. International attention has begun to recognise the effect of different spatial environments on competitiveness and the importance of regional and local innovation systems. These include a focus on the presence or absence and functioning of institutions (as in both rules of the game and actors such as universities) and public sector activities operating across those spatial scales.

1.5 CITIES, INNOVATION AND COMPETITIVENESS

Cities especially have come into analytical and policy focuses as they are major locations for business activity and significant influences on the wellbeing of their inhabitants. They are also seen as very important for innovation in many industries as the density, size of market, diversity of population and complex systems of production and services stimulate new ideas to fill existing or emerging economic, social and cultural needs and provide markets that are close by and often sophisticated and demanding. Innovation is thus linked to long term competitiveness. In addition, recognition of the causes and effects of climate change have pushed policymakers into focusing again on cities as the places where the complexity of the issues make policy development especially demanding. It is also recognised that cities represent the site where those challenges can be most effectively addressed.

Spatial and built environment issues have thus come to the fore in innovation, competitiveness and sustainability discussions.

Dealing with these issues means *innovation in cities* has come back onto the public agenda after several decades of neglect. Both policy and analytical attention, nationally and internationally has come to refocus seriously on what makes some cities innovative, and thus more competitive, while others lag behind (Cooke, 2007; Feldman and Audretsch, 1999; Lester and Piore, 2004; Sassen, 2005). Recent work in the UK (Marshall, 2008), for example, has indicated the elements of city competitiveness while Florida is well known for his focus on the 'creative class' as a driver of city innovativeness (2002, 2005). Very recent international work has delved further into the dynamics of city

development and the importance of this for the (sustainable) built environment and the infrastructure underpinning city capabilities. As we move forward, innovation in cities will be a key to understanding and developing policies for changing the impact of the built environment on climate change as important aspects of the ways in which modern cities operate will have to alter.

Issues will involve harnessing cities' innovative capacities and major players shaping the policies around, as well as constructing, the new built environment. Innovation will be needed in both the technologies and designs used for construction and development as well as the operation of residential and commercial built environment and in the policy arrangements which manage the process of city-wide change and shift its direction. Innovation will also need to be channelled towards sharing information and shaping new user behaviours.

1.6 DEFINITION OF THE BUILT ENVIRONMENT ('BE') INDUSTRY

Part of the question posed by the brief for this paper concerns the competitiveness and innovation capability of what is termed the 'built environment' industry. This is not a sector in the traditional Australian Bureau of Statistics classification sense because it involves numerous players, both public and private, who are seldom thought of as a single 'industry'. Indeed, the fragmentation of the industry is one of its characteristics. The joined-up nature and the broad spread of issues concerned when considering the best ways in which to make the BE sustainable make it desirable to find policy mechanisms which will enable players to come together in joint consideration of what needs to be done, the priorities for action, and the critical innovations (financial, organisational, technological, etc.) needed in transformation of both the built fabric and the regulatory and incentive systems acting on that fabric. The need for greater integration has been a recurring theme in our discussions. Moving towards sustainable built outcomes will be much harder without it.

Box 1: The built environment – a vital focus for innovation

- Buildings and occupants account for 23% of Australia's greenhouse gas emissions
- \$158bn spent on new construction in Australia in 2007
- Market value of Australia's homes: \$2.7 trillion
- Market value of Australia's investment grade commercial property assets: \$360billion
- 875,000 employed in construction

(Source: CIE/ASBEC, 2007; BEMP, 2008)

For the purposes of this paper, we understand the BE industry to be composed of a range of different players spanning the design, planning and construction phases of the creation and improvement of the BE as well as the operational and ultimately renewal phases. In the first, development and construction, phase we have land use and other planners (transport etc), urban designers and other regulators, developers and construction firms and the knowledge-intensive service providers standing within or behind their activities (architects, engineers, interior designers, IT specialists etc) as well as trades and other sub-contractors and personnel.

In the second, operational, phase where users are in place (residents, office workers, etc), the BE industry includes facilities managers, maintenance and repair personnel, building managers (and the strata plan executive committees that they serve). Legal and financial specialists as well as government regulators at a variety of levels attend each of these phases. To this list should be added the educational/training and research and consultancy providers specialising in the different elements of the built environment and the cities which have the BE as the fabric.

2. Drivers of Change in the Built Environment

The future is going to be much more pragmatic than the visionaries think. We need to focus on the things that can change in the next 20 years. (Stakeholder interview, 2008)

There is widespread agreement, arising in both our stakeholder interviews and from the literature, on the key drivers of change and the likely challenges facing the Australian built environment over the next twenty years. In this section, we have identified drivers and move onto challenges that need to be responded to in the next section. In reality, these drivers and challenges are closely interwoven, and therefore the distinctions are somewhat blurred.

2.1 SEVEN DRIVERS

The **drivers** identified reflect the factors which will act to increasingly shape our built environments and demand responses from all those involved in producing, maintaining, governing and using them. These drivers of change must be understood at a variety of scales, from that of the city system as a whole down to the neighbourhood and the individual building and its internal structure. To a large degree, these drivers are shared globally. Cities which act first and innovate will be best placed to lead both transitional arrangements and long-term sustainability frameworks.



drivers of change

- CLIMATE CHANGE
- PEAK OIL
- DEMOGRAPHIC CHANGE
- URBAN DENSIFICATION
- SOCIAL INCLUSION AND SOCIAL EQUITY
- INFORMATION TECHNOLOGY
- GLOBAL COMPETITIVENESS

A number of drivers identified can be considered 'continuing': accommodating and working with demographic change, pressures for urban consolidation and densification, and the need to address social equity and inclusion issues are matters that cities have historically needed to respond to. Others – most significantly a belated but now concerted recognition of the impact that climate change and the arrival of 'peak oil' will have on our built environment – present the guiding framework within which all drivers are likely to become increasingly aligned.

This movement towards 'carbon constrained'¹ (Garnaut, 2008a) cities will have significant repercussions on the nature of building and development, on how we value and price various elements of the city, and how we live in and use urban space. The impact of climate change on our built environment in many ways is

¹ A plethora of terms are used to describe the move towards a lower carbon economy. Low carbon, lower carbons, zero carbon, carbon neutral are commonly applied across a variety of spatial scales. 'Carbon constrained' is used in the recently published Garnaut Report. It provides an effective umbrella and shall be utilised in this report.

the least understood of all the potential drivers of change, both in terms of its likely scale and intensity, and also in terms of its likely cost and repercussion on households, business and communities, although there are some general predictions we can currently draw on. Reconciling ongoing drivers of change with new paradigm shifts associated with our shift away from carbon will be essential in overcoming barriers to change and will also act as key sites of innovation.

So how do the **challenges**, to be explored in section 3, distinguish themselves from the drivers? Responding to these drivers clearly defines the scope and nature of those challenges, however our focus moves to exploring how Australia and Australia's built environment industries can *respond* to the barriers faced as well as opportunities presented for innovation. Here, we do not dwell upon detailed technological matters – these are well rehearsed elsewhere, and are only part of the story. Rather, we focus on the arguably more complex challenges: issues of integrated spatial decision making, governance issues, institutional and organisational structures, and financing which will need to be reworked.

CLIMATE CHANGE

Recognition of the urgent need to adapt our cities to the likely impact of climate change is now widely recognised, as is the requirement for greenhouse gas (GHG) mitigation initiatives. This challenge is multifaceted. Our cities will need to prepare, adapt and retrofit in response to change. As with the rest of the economy, the impact on city economies of not acting now will be significantly greater if we continue under business as usual frameworks (Garnaut, 2008; Stern, 2006). Presently, there is a relative lack of publicly accessible information on the impacts of climate change on Australian built environments, with only limited incorporation of human settlement features in climate change models. It is thought the insurance industry has undertaken some modeling in this area, but this information does not appear to be publically available. Nevertheless, we do know that cities will be sites of significant impact, and will need to take a range of mitigation and prevention measures in order to address these.

Although pattern shifts are likely to vary across our major cities, climate projections point to higher temperatures, rising sea levels and Australia's already harsh climate acts as an immediate focus on extreme weather events becoming increasingly normal over the next century – more extreme wind events, hot days, intense flooding and drought conditions. The CSIRO and Bureau of Meteorology have projected increases in 35+C days for all capital cities under business as usual/no mitigation scenarios. By 2070 extreme weather days are projected to at least double in the major cities; for example Perth from 27 to 56, Adelaide from 17 to 34 and Melbourne from 9 to 21 (CSIRO/BOM, 2007). Projections for rainfall are less certain, but it is likely that trends towards a higher proportion of summer rain will increase evaporation with knock-on effects for stream and storm water flows (AGO/DEWR, 2007).

While current debate has understandably focused on potential impacts to rural Australia, its agricultural sector and natural habitat, shifting weather patterns will demand substantial shifts in the planning, design, operation and use of our cities. An engineering solution is only a partial one: preparing for and living with climate change will require a more *responsive* built environment, and one in

which residents adapt in terms of expectations and behaviours. In terms of meeting the challenge for built environment responsiveness, architects may be expected to seek passive design solutions rather than reacting through reliance on hermeneutically sealed structures; planners to have the remit and information to rigorously adopt 3BL principles; and landscape architects to take a lead role in transforming our parks, nature corridors and open spaces into climate regulators as much as amenity space. The collective task requires our built environment in general to move from being a resource drain towards being an energy generator, water and waste recycler and emissions mitigator.

PEAK OIL

Clearly tied to climate change, but with the added potency of short-term impacts on household budgets, the implications of the finite oil supplies and increasing political uncertainty over those supplies are now becoming clearer. Whether technological innovation can keep abreast of this, making less oil go further is a matter of considerable uncertainty. The price of oil may fall back from current peaks, but it is unlikely to fall to historically low levels, and may continue to escalate further in the future. Dealing with the escalating cost of oil will be one of the more immediate drivers of change in the BE. This is particularly relevant to the issue of patterns of mobility and accessibility within and between cities. Peak oil challenges the whole basis of the organisation of our cities as transport is such an important aspect of a city's structure, both in terms of city form and in the ways in which its functions are facilitated.

The impact is already being felt in the quantifiable shift to mass transit in our cities and the changing profile of the vehicle fleet as fuel efficiency becomes a factor in consumer behaviour. How far this will drive change in urban mobility patterns and freight movement remains to be seen but innovation in transport technology and, more importantly, transport policies, could speed this change in desired ways. However, radical changes in transport use are unlikely in the short or even medium term without substantial government intervention: as Garnaut notes, urban planning is one of a number of 'market failures' that will need to be addressed in the structural adjustment process (Garnaut, 2008b).

It would be a mistake to assume that we can achieve an appropriate adaptation to climate change simply by investing in transport infrastructure in our cities without simultaneously moving to change the distribution of activities within the city and supporting appropriate behavioural responses. In part, this involves reducing the degree of centralisation of the city, not only in terms of employment locations but in the whole array of networked services including water services networks, energy and IT services. We may also see significant efficiencies emerging in many of the area based services, such as social and cultural services, if they were less centralised than they now are. Most of these benefits could be obtained through innovations in institutional arrangements and governance.

DEMOGRAPHIC CHANGE

Most parties recognise the importance of accounting for the impact of continued population growth and associated demographic changes on the built environment. All current major city planning strategies are predicated on the assumption that population growth will continue, with a substantial input from

immigration. It is further assumed that average household size will continue to reduce (although this trend will slow down), with a greater proportion of households comprised of one or two persons and proportionally fewer families with children. The population will also continue to age, with an increasing proportion of Australia's total population made up of those in their retirement years.

Demographic change will also impact on employment and labour markets, particularly in terms of the location of new jobs, types of jobs, income and wage levels, and how this interacts with the supply of labour. Where will urban employment generation occur? What are the implications in terms of urban transport needs and the location of workplaces, be they commercial, retail or industrial? Incomes largely determine the capacity of households to afford housing, hence the central role of labour markets in the housing affordability equation.

The impact on housing demand, housing design, job requirements, services and infrastructure of these changes is understood in principle but not in detail. There is considerable uncertainty as to how these demographic trends will change urban consumption propensities. The impact of the intergenerational shift in wealth and the 'boomer bulge' about to move into retirement is also far from clear, as is, for example, housing and transport availability and affordability may feedback into changed behaviours among different cohorts of the urban population.

The changing lifestyle choices and behaviours of households over the next twenty years are also unclear. For example, despite trends towards smaller household sizes, rising wealth and changing expectations about the home has seen a significant increase in the consumption of space. As the recent DEWHA report into energy use in the Australian Residential sector notes, between 1990 and 2020, household numbers are forecast to increase by 61%, but over the same period, total residential floor area is set to increase 145%. All these factors will have incremental impacts on the demand for the built environment in all its forms. Unfortunately, much of our current city planning and the assumed trajectories of urban growth are predicated on overly simplistic understandings of future demographic change, housing and labour market change and mobility patterns. Assessing the compounding impact of climate change on these uncertain social trends can therefore be only highly limited at present.

URBAN DENSIFICATION

All the major city plans in Australia see higher urban densities as a key goal in ensuring the BE performs better in terms of environmental, social and economic outcomes. High density living, intensification of uses and focusing growth of homes and jobs in suburban Transit-Orientated Development (TODs) are considered important driving principles behind current urban land use planning in order to make the urban footprint more efficient and carbon constrained. This is a major challenge in itself. The retooling of our cities in this way will require a huge investment effort in terms of new transportation infrastructure, substantial rebuilding of the current urban landscape and major changes in the way urban business and populations move around our cities. We need to be much smarter in the way we densify.

The spreading of peak loads in the urban system, increasingly nomadic work practices, the changing structure and location of employment, continued income growth and changing life-styles and use of leisure time, among other trends, will intensify the pressure for change.

But they may also militate against change. Work and consumption patterns may increasingly 'dissolve' over the urban area via decentralisation into suburban locations. Moving people and jobs together into denser centres does not guarantee any *net* reduction in overall intra-urban movement. Engineering the city in this way will not necessarily lead to more sustainable outcomes: as current research has shown, high density buildings do not necessarily *perform* in a more sustainable way than low density (Randolph and Troy, 2007).

We will need a new typology of consolidation in suburban areas – different forms of building that are appropriate for suburbs and that make use of the large amounts of under-utilised land on smaller parcels. It may well be that a more sustainable future means households having to have more responsibility for their own water supply, their own management of waste flows and their own food supplies. Considerations around future urban form and function will also need to work alongside historical drivers for increased private space consumption. Yet moving towards carbon constrained cities may point towards people living in smaller accommodation – not an easy sell. It is here that behavioural adaptation factors – how households perceive and respond to changing urban conditions – will be as important, if not more important, than physical adaptations to the built environment.

SOCIAL INCLUSION AND SOCIAL EQUITY

If our built environment is to respond effectively to future challenges, commitment to building more socially equitable and inclusive cities must be integral to innovation agendas. Some households and businesses will be in a better position to adapt than others, most importantly through their ability to absorb the costs of change. The costs of doing so cannot fall unreasonably on the most vulnerable groups in society, and therefore understanding and managing the impacts of the transition to a sustainable built environment on affordability, social cohesion and potential for social disruption and conflict will be a major challenge. Participation, in the form of active civil engagement in the sustainability agenda, is no less important politically. Policies and programs to change the BE and our use of it need to be understandable, transparent and accountable to the wider population to ensure on-going political support.

Those in our middle suburbs and on the fringe may well become increasingly trapped in low quality built environments poorly located to respond to low carbon protocols.

In any change involving the re-organisation of the built environment, there will be winners and losers. We are starting from a base where current housing and planning policy frameworks are struggling to address issues such as housing affordability constraints. The move towards 'carbon constrained' economies has the potential to further exacerbate social disadvantage and housing unaffordability and this will have distinctive spatial implications for our cities. Middle and higher income households have re-colonised our cities' central suburbs and benefit from proximity to amenities, economic opportunities and are served by more effective public transit. Such households are also likely to be in a better position to adapt to price shocks, and retrofit properties to take advantage of energy efficiency and carbon-offsetting initiatives. On the other hand, lower income households have been increasingly constrained to older,

poorer quality, but by no means affordable, housing in suburban locations with poor access to employment opportunities and public transport (Baum et al, 2005; Randolph and Holloway, 2005; Dodson and Sipe, 2007).

Recent peak oil affects have highlighted the tight margins within which working family budgets operate; rising energy costs in general - whether ascribed to preparing for a carbon emissions economy or not - will be the next significant shock. In countries where energy costs are already significantly higher than current pricing in Australia, the concept of 'fuel poverty' has escalated up the political agenda. Again, this will disproportionately affect lower and moderate income households. Although homes in our newer suburbs are of more recent construction, any (and they remain relatively modest) gains in energy efficiency standards have been essentially offset by increases in space consumption (DEWHA, 2008). Our houses are arguably a lot bigger than they need to be, and whether 'masterplanned' or not, typically come together in neighbourhoods ill-prepared for future adaptation.

Particular constraints will be faced by lower income renters who are limited in the direct action they themselves can take to retrofit efficiency measures. Around 29% of households rent their homes (ABS, 2007); the proportion is higher in our major cities, and in some of our inner and middle suburbs, private renting may be the majority tenure. There is also limited impetus – especially at the lower end of the rental market where a household's housing choice is already reflective of constraint rather than choice – for landlords to invest in such improvements. Poor quality stock is likely to consolidate in areas of locational disadvantage, and any benefits of renewal, refurbishment and retrofitting over time to filter through to those most in need *last*.

INFORMATION TECHNOLOGY

Ten to twenty years ago, future visioning predicted a significant shift in our cities and how we would live work and play with the onset of the information age. Much has indeed changed: IT has greatly speeded the volume and intensity of communications between individuals, businesses and places in a way unthinkable a generation ago. It has permitted increasing separation of employment and economic functions in specialist locations, on a regional, national and international scale. It has stimulated the development of 'smart' buildings and promises much more in terms of 'self-adapting' buildings and potential benefits of helping to manage energy and water consumption for both buildings and neighbourhoods.

However the basic form and function of our cities have remained stubbornly unchanged. It is increasingly recognised that there are limits to how IT, in and of itself, can actually change the way the BE functions and performs. Indeed, while it has been a key to driving innovation, the actual response of our cities has perhaps been counter to early expectations. The role of cities as sites for exchange, creativity and communication has enhanced rather than dissipated. Our city centres continue to thrive as focal points, and the qualities of neighbourhood and public amenity have become ever more important. Many of the core drivers shaping how we live, and our expectations of where we live, are immutable.

Looking forward, it can be argued that IT will continue to play a fundamental facilitating role, and rather than transforming urban form *per se*, it will assist in the transition to sustainability in a number of ways. Firstly, the opportunities afforded by new information and communications technologies (ICTs) are transforming design practice and public engagement in development, as well as re-shaping government. Secondly, accepting the proposition that “*you make what you measure*”, the development of city metrics and spatial decision support systems have an important role to play in better understanding the complexity of the built environment and its capacity to respond to change. Thirdly, increasing scrutiny and environmental performance reporting requirements – whether to meet legislative, corporate or investment demands – are looking towards urban informatics to provide robust and internationally comparable metrics to build into reporting measures alongside standard auditing procedures.

GLOBAL COMPETITIVENESS

Australia faces the challenge of maintaining its economic position in a highly globalised market place. Our cities are at the centre of this competitiveness. Despite a focus on resource extraction as a key driver of the economy, economic activity is largely urban-focused and urban-directed. Export-oriented and knowledge-intensive services, the key growth job sectors, still seem to require city locations. The employment that supports these higher order functions is similarly city-focused. An increasingly mobile workforce at this level ensures that cities need to compete on the global stage, not only in terms of economic opportunities, but also in quality of life measures. ‘Liveability’ is big business, and cities are increasingly being measured through rankings provided by, for example, the *Economist* and *Mercer* that incorporate aspects of city living previously considered secondary, intangible or incidental. In terms of quality of life, Sydney and Melbourne in particular have traditionally competed well against global equivalents, in large part reflective of natural environment advantages. Adapting our cities to climate change without threatening their economic capacity will be a major challenge.

Maintaining and enhancing competitiveness will increasingly focus on demonstrating green credentials and innovation in sustainability measures. Leading global cities are leading the way: New York City’s Sustainability Plan, plaNYC (City of New York, 2006), promotes a ‘Greener, Greater New York’ with measures to chart a path for the city to adaptation and mitigate climate change central to the objectives. In a similar vein, but with more limited scope to act (as shall be discussed later), City of Sydney’s 2030 Plan outlines aims, objectives and mechanisms to position the city as ‘green, global and connected’ (City of Sydney/SGS, 2008).

Internationally, many cities are establishing their own emissions standards and energy, waste and water initiatives that exceed schemes and strategies in place or planned at the national level. As drivers of change in themselves, innovative cities are identifying and pursuing economic benefits to be gained by leading and pushing best practice rather than following or simply complying with minimum expectations. Cities with effective governance structures are using their powers to help shape and drive expectations and utilising these strengths to their competitive advantage.

3. Key challenges facing the 'BE' industry

Our seven drivers of change present significant challenges to the built environment industry in moving forward. They will clearly have significant implications for all sectors and interests, not only in terms of new responses and practices being required, but also opportunities to take a lead in shaping transition to more sustainable urban environments. However, these drivers also represent significant opportunities. Although much media discourse emphasises the costs of climate change adaptation, for example, counter arguments will stress the benefits that will arise through innovation; responding to drivers will be accompanied by significant investment and strong employment growth opportunities in the sector.

3.1 SIX CHALLENGES

Potential frameworks within which we can move forward and respond point to a number of challenges that cut across, and are relevant to, all of these drivers. That is, each driver does not give rise to a distinct challenge; rather there are shared barriers and opportunities working across all. Crucially, it is argued here that the challenges facing the BE industry are no longer predominantly technical ones. Technology does, of course, offer significant opportunity for further innovation, will play a key role in adaptation and mitigation strategies, and will feed through into the form and function of our built environments. However, we already have in place substantial technical know-how in terms of energy efficiency, waste and water management and adaptive, responsive built environments. Rather, our focus here is on the broader challenge to be addressed in responding to all these drivers and point to examples of good practice that may provide pathways to tackle these possible constraints. In all, six broad challenges – based upon our discussions with interviewees - are identified:

6

challenges

- URBAN RETROFITTING
- MOVING TO SCALE
- INTEGRATING THE FINANCE CHAIN
- INTEGRATING THE DELIVERY CHAIN
- METRICS AND SHAPING BEHAVIOUR
- LEADERSHIP AND GOVERNANCE

The big focus over the next 30-40 years must be maintenance and refurbishment. No regulation will create the impetus for bringing forward refurbishment, you must have fiscal incentives. (Stakeholder interview, 2008)

3.2 THE URBAN RETROFIT CHALLENGE

The 4th IPCC Report (2007) confirms that buildings represent the single biggest opportunity for greenhouse gas abatement globally, exceeding energy, transport and industry sectors combined. The large majority of our built environment twenty years hence already exists and performs poorly in sustainability terms. With annual new construction accounting for around 1.5% of all stock, our towns and cities are going to look fairly similar in 2025 to today. Although new buildings and development inevitably provide a focus for innovation, not least driven by enhanced building code requirements, expectations of financiers and increased awareness of the benefits of moving towards sustainable practice, they arguably present the easier end of the equation.

Technologies for adaptation and mitigation in new buildings already largely exist, and it is recognised that many of the outcomes of our cities over the next generation will be drawn from what we already know, or incremental advances on technologies and practices already understood. Research by CIE/ASBEC (2007) and McKinsey (2008) illustrate that significant emission reductions can be achieved using existing technologies at 'low cost'.

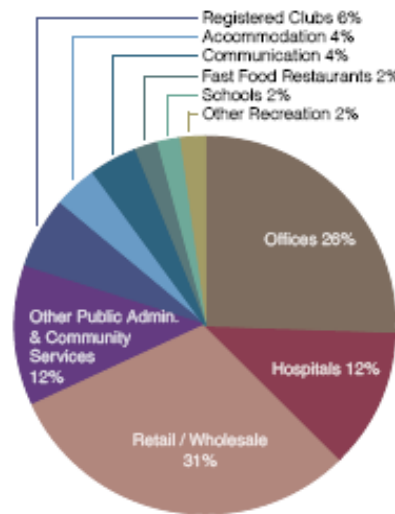
COMMERCIAL BUILDINGS

The development of new 'green exemplars', provides a focus for demonstrating future built environment standards and possibilities. They act as sites for evolving expertise in industry practice and shaping user expectations and behaviours. Certainly within higher-end commercial office development or major public sector commissions, there is strong internal dynamism within developer organisations, a client base open to innovation, and the evolving structure of financing and investment markets involved in such projects to stimulate and drive change. Incentives, regulatory frameworks and benchmarking tools such as Green Star developed by the Green Building Council of Australia (GBCA) have acted to consolidate interest at this scale.

Promoting and pushing advances in all new additions to the built environment must remain a key priority, however **the substantive challenge focuses on the resilience and adaptation of our existing buildings, infrastructure and neighbourhoods**. Our interviewees felt that Australia was lagging in this vital area. It is clearly expensive to retool existing form, and even with that investment, is unlikely to deliver benefits possible where climate change mitigation strategies are incorporated from scratch.

Davis Langdon (2008) argue that upgrading existing commercial stock will be a 'herculean' task due to cost constraints, design, and construction industry resource limitations. In order to achieve cuts of 40%, all existing commercial buildings will need to be upgraded to achieve an Australian Building Greenhouse Rating (ABGR) of 4.5 Star. Market drivers and carbon emissions trading are considered insufficient to drive refurbishment to this level, it is estimated that around \$4bn will be required over 12 years in the form of incentives or benefits such as accelerated depreciation.

Commercial building sector CO₂ emissions, by building type in Australia



The Commonwealth Government's Green Building Fund announced in the 2008-09 budget provides a useful starting point in meeting this challenge, providing a national approach that promotes sustainable design, technology, systems and generation measures for all buildings but particularly *existing* commercial office buildings.

RESIDENTIAL BUILDINGS

While the commercial sector presents a significant challenge, transforming our residential stock is going to be of a further magnitude. However, the residential sector has been less progressive in this regard, although the expansion and enhancement of requirements such as BASIX in NSW has stimulated greater energy and water efficiency in newly renovated homes. Unfortunately, potential benefits have been offset by increased space consumption, and demands for space cooling. Levers available to promote transition in existing privately owned homes are limited. Although building codes can establish minimum standards as part of major refurbishment activity, individual owner decisions regarding refurbishment, and the financial ability to act upon options, will inevitably result in a partial and unpredictable level of take up. In this context, innovative practice and use of incentives and benefits will need to be explored. It should also be noted that climate change may also reduce some costs, and make carbon-constraining technologies more effective in others (for example, reduced winter space heating costs, or improved productivity of PV), however the mechanisms required to stimulate innovation and change in our suburbs will demand new thinking.

RECONCILING TRIPLE BOTTOM LINE OBJECTIVES

Retrofitting also raises substantive social sustainability considerations. Adaptation inevitably takes place in districts, neighbourhoods and infrastructure networks that present a rather more complex picture when compared to new development outside the current urban footprint. As we retool the form, function and performance of the fabric of our existing cities, a triple bottom line approach will be crucial. Environmental performance measures will have to be considered

alongside urban design, social cohesion, affordability and quality of life measures. Challenges may focus on the balance between, for example, demolition or renovation of existing carbon-greedy homes and replacement with carbon neutral or indeed net energy generating forms.

Determining appropriate trade offs and acknowledging the value placed in our existing built environments will require substantial debate. The benefits of improved performance over the long term where new build takes place will need to be balanced by a consideration of the embedded energy represented in that existing built form. Will Green Bans evolve with a renewed agenda as we move towards the carbon constrained city?

3.3 MOVING TO SCALE

BEYOND INDIVIDUAL BUILDINGS AND SITE- BASED THINKING

The majority of an average individual's carbon emissions come from their use of shared infrastructure and services ... Reducing emissions is therefore not just about the design and management of individual buildings and individual behaviour but planning and designing for sustainability at the scale of neighbourhoods, cities and regions (CABE, 2007b, p.3)

The challenge of preparing our towns and cities for the future exposes a current gap in thinking about our built environments as spatially connected, complex systems. This spatial connectivity not only relates to the complexity of infrastructure, spaces, places and communities which come together to define the urban realm, but how urban form and function relate, impact and are shaped by factors operating across a range of spatial scales beyond towns and cities themselves. A coherent, integrated understanding of our built environment demands an approach which recognises the need for engagement across these scales – from global drivers to the regional scale, through to cities, neighbourhoods, buildings and the component materials of built form.

Getting our buildings to perform more efficiently and more responsively, as well as offer the living and working environments desired, is vital if our urban environments are to competitively respond to the challenges presented by sustainability and climate change agendas. However, focusing solely on the building risks obviates the harder challenge of fostering and integrating innovation across the range of spatial scales relevant to how our cities function. Innovation is required to take site-based responses further and provide frameworks that respond to the drivers of change at the scale at which they will be experienced (CABE, 2007a). We need to take advances seen in building technologies, financing and operation and move them 'to scale': citywide and neighbourhood mechanisms will be required to meet these challenges in a strategic fashion.

Understanding the importance of spatial scale as part of any innovation response will be key. For example, debate regarding movement towards a carbon constrained environment raises the question as to how such measures will be meaningfully utilised. Should carbon ratings be tied to the building or site, or should neighbourhoods or cities as a whole be measured, so that gains and opportunities in certain developments or sectors can offset those where transformation will be harder? Proposals for all new homes to be 'zero carbon' by 2016 in the UK (DCLG, 2006, UK-GBC, 2008) has prompted interesting debate as to how zero carbon is to be defined in spatial and temporal terms. What scalar considerations are required in terms of supply chains, waste

management etc? How will carbon offsetting or cap and trade mechanisms impact on other locations?

THE IMPORTANCE OF INTEGRATED SPATIAL PLANNING

Planning Policy Statement: Planning and Climate Change (PPS 10) ... describes how we expect spatial planning, regionally and locally, to help shape places with lower carbon emissions and fit for the climate they are likely to experience in the future. It sets out, in particular, how the location, siting and design of new development can contribute both to the reduction of emissions and delivery of zero carbon development, and to the shaping of sustainable communities that are resilient to the climate change now accepted as inevitable (DCLG, 2006)

Our built environment is clearly more than a sum of its parts and progressing towards sustainable urban futures will demand a more informed response that not only facilitates transition to a 'carbon constrained' city but one which does so in a strategically integrated way mindful of context as well as parallel drivers related to social equity and inclusion, and access and mobility issues. These are areas where the market alone has struggled to respond; and it is where policy development is both necessary but also particularly hard.

Although all built environment industries inevitably have a key role to play, and will need to adapt, it is argued that particular impetus will be placed on those stakeholders charged with working across a variety of spatial scales, which necessarily draw upon multidisciplinary skills, and who shape and preserve the BE with consideration to context, competing interests, economic realities and with reference to triple bottom line objectives.

This raises expectations of our planning system and the planners' role as strategic thinker, arbiter and regulator of urban areas. At one level, the planner's response will be shaped by ensuring climate change and sustainability considerations are incorporated into decision making frameworks and more fully integrated into regional and local planning considerations. However, the planning challenge moves beyond simply refining and retrofitting current practice. It involves a shift to an environment where planners will play an increasingly integrative role, and in providing leadership, certainty and locally informed and locally relevant regulatory and incentive measures. In ensuring a more adaptive and 'generative' built environment, urban landscape management and design will also become more significant as we redesign our suburbs, parks and open spaces to be more sustainable in terms of their environmental performance.

Examples of applying more integrated thinking are inevitably more straightforward in new global-leading developments such as Shanghai's Dongtan (**see Box 3**), but there are many examples internationally where urban regeneration activity has sought to develop co-ordinated responses through for instance maximising chances of co-location of living and work so as to reduce the need to travel. These make maximum use of public capacity for locating magnet infrastructure (hospitals, training institutions etc) that generate internal employment as well as encouraging businesses to relocate nearby and providing incubator and related facilities for new enterprises.

These renewed zones which work well and operate at the leading edge of both technologies and BE. These include such cities as Stuttgart, Hamburg, Barcelona, and Copenhagen. In Barcelona, for example, urban renewal of 22@Barcelona includes investment in 'mobile ready' service delivery infrastructure.

Box 3: Planning more sustainable urban futures: Dongtan

Dongtan will be the world's first eco-city built and designed with the aim of cutting carbon emissions. The key to making the city sustainable lies in understanding how transport, housing, energy and all other factors fit together and influence each other. Larger facilities such as hospitals, universities and theatres will be found in the city centre. Housing will be mixed with shops, post offices, schools, nurseries and healthcare facilities, meaning that facilities and energy provision can be local and centralised, reducing residents' ecological footprints.

A key element of the design is to change the use of cars; by placing people, employment and facilities close to each other, residents will be able to walk or bike to work, school or the local shops. All waste will be reused or recycled and there will be as little landfill as possible. Energy will be renewable and created in the city - houses will be designed for low energy use and will be fitted with solar panels, and wind farms will rise from open land in the city.

Based on extract from Head (2007)

THINKING AS A CITY, ACTING AS A CITY

The Mayor's goal is for London to demonstrate over the next years that a low carbon future is possible and that, indeed, it is the basis for maintaining a great, forward looking and successful world city (GLA, 2007, p. 25)

Cities around the world are building new governance structures to direct where they want their cities – and citizens – to be in a generation's time. This requires leadership to help integrate activities not only at the strategic level, but also in terms of their implementation and on-going management. The ability to deliver change in cities such as London has significantly improved since the creation of a single authority for the city and a single, strategic plan covering economic and social development and associated targets, mechanisms and outcomes. Paris now has a somewhat similar structure, with the Mayor holding overall authority over the *arrondissement* councils, who nonetheless retain appropriate roles in the management of their local communities.

Strategic integration at the city level has enabled broad impact decisions to be made, for example introduction of the congestion charge in London, and Velib bicycle scheme and soon-to-implemented electric car initiative in Paris. The low level of integration in Australian cities has been proved to be a major barrier to effective innovation in the provision of urban services. Sydney's Tcard may well have worked if the context around it had been redesigned first through the unification of Sydney's transport management and funding systems into a single body.

City-level integration also provides an effective framework in which leading global cities can retain competitive advantages and spearhead innovation, for example in developing ambitious responses to climate change adaptation challenges on the basis that integrated structures are in place (or can be put in place) that enables those frameworks to be delivered. New York (City of New York, 2007) and London (GLA, 2004; 2007) have been explicit in their planning goals for carbon reduction and the importance of climate change adaptation to their future direction and economies. Both have instigated dedicated units and established supplementary action plans to ensure necessary actions are taken at the appropriate spatial scale and that the impact of policy decisions across a breadth of spheres takes climate change implications into consideration.

By contrast, although Australia's major cities have recently prepared Metropolitan strategies to chart their direction over the next 20-25 years, there is significant concern that these plans remain tied – by virtue of constrained and poorly coordinated governance structures – to 20th century modus operandi. A number of our interviewees identified this limited integration, certainly when compared to leading world cities, as a core barrier to innovation in Australia. Despite enjoying many competitive advantages, our cities struggle to engage with core issues that will (and indeed are now) impacting upon their forward sustainability and quality of life.

The reality is that [Melbourne] 2030 was not an action plan. It was more a series of aspirations put out to the marketplace and community in the hope that someone would take notice. It lacks teeth. It is not a measurable plan of actions, timetables and funding for achieving specific goals ... An increasingly broad consensus is gathering around one idea in particular: a new metropolitan planning authority (The Age, May 2008)

'Spatial authority' is a crucial issue in this regard, with a fragmentation of urban governance structures hindering our cities capacity to function, deliver and fully realise their potential. Although a more innovative response is provided through *Sustainable Sydney 2030* (City of Sydney/SGS, 2008), forward delivery is likely to be curtailed by remaining tied to governance structures that are no longer suitable for the speed and breadth of task to be undertaken. It is no longer appropriate for the City of Sydney to comprise only the CBD and some adjoining suburbs since the issues to be resolved involve much wider areas that need to cooperate and act in concert both in planning and implementation.

3.4 INTEGRATING THE FINANCE CHAIN

How we price, fund, invest, seek return and then reinvest in, our built environment has a pivotal impact on the decision-making process and outcomes shaping our cities. Understanding the impacts of moving towards more 'carbon constrained' environments and the development of innovative funds for stimulating the transition to sustainable cities will be critical if the BE industry is able to deliver desired outcomes.

The costs and financing of both new construction and adaptations to the form and structure of the BE to accommodate reduced carbon emissions and climate change mitigation is seen as a particular challenge. This is especially so in terms of the pricing of risk, and therefore of finance for the BE, associated with this transition. The importance of moving towards integration over the life cycle of the built environment is crucial not only in helping articulate a better understanding of materials, energy use and waste represented in the production, use and dismantling of our towns and cities, but also in reworking our conceptions of value.

A LONGER TERM VIEW (a): WHOLE OF LIFE CONSIDERATIONS

A shift to whole-of-life costing has started to disrupt traditional accounting and financial return frameworks. As Davis and Langdon (2008b) note, the move away from financial models that focus on payback (capital cost reduction) towards lifecycle costing methods (longer lifespan, energy efficiency, reduced operating costs) is challenging traditional depreciation methods. These more sophisticated approaches incorporating sustainability, in triple bottom line terms and other less financially tangible factors, will need to be factored into development assessments, with long term sustainability returns contributing to the feasibility and risk assessment models. Development of these so-called

'value-based' methodologies will be a central site for innovation, and will impact across the working practices of all built environment industries.

Life cycle cost approaches estimate the cumulative environmental and social impacts of a building throughout its lifespan, from construction, to use, to demolition. Such frameworks place greater emphasis on longer-term value impacts of design and construction decisions, but inevitably face barriers against established building cost and financing structures where split incentives in terms of investment returns and ongoing interest find it hard to reconcile potential benefits (which are likely to accrue to another party) in the future. However, investment in technologies, materials and approaches that increase the sustainability credentials and performance of built form typically leads to higher upfront investment, leading to dominant perceptions that 'green' design and construction inherently costs more, with the 'payback' benefiting others.

THE PROBLEM OF SPLIT INCENTIVES

Such 'split incentives' create substantive barriers to innovation (GBCA, 2008; Reed, 2007; TEC, 2008). Considerable energy has been expended in demonstrating how the benefits of this additional upfront cost can be recouped over a relatively short period of time, and in some sectors, technological advances have brought payback timeframes increasingly within reach of standard investor-return profiles. The Green Building Council of Australia has proposed a number of measures that could stimulate the market to unlock the benefits of investment in innovation through incentives geared towards levelling the cost/benefit equation; for example through increasing depreciation and amortisation rates, fee waivers on DA lodgement fees, land tax abatements, rate reductions and stamp duty waivers for green-rated buildings.

Research has also sought to demonstrate the benefits of good, sustainable design whether in terms of improving employee productivity and wellbeing, meeting growing market expectations, ability to command higher rents (a 'willingness to pay'), or premium resale values. While the sharing of best practice will improve industry information and strengthen the business case, such acceptance remains within the context of existing financing structures and expectations. Over time, innovation is required to further progress emerging markets that aim to provide a framework where investment needs and sustainability requirements are mutually reinforcing.

PRICING RISK: CURRENT BARRIER, FUTURE MOTIVATOR?

Calls to reshape these economic decision-making structures highlight a conservative process driven by concerns regarding regulation, risk and insurance. Risk adversity can be attributed to the fragmented nature of all those involved in the process and a lack of willingness by both public and private sectors to take risks – political, economic and reputational – at a time when those risks need to be taken. In transcending these barriers, there is a need for leadership from those with greatest exposure, awareness and assuredness regarding innovative practice to help develop new approaches and promote confidence across the sector. As one of our interviewees noted, innovation requires development of the environment or sustainability as a market: as such, it can be understood, valued and incorporated into decision-making and financing processes.

For example, ARUP have identified the importance of their designers assisting partners move forward the financial and contractual structures of projects. In this regard, they have developed tools like the SPeAR assessment to respond to briefs that illustrate whole life cycle costing and minimise risk. Lend Lease and Origin Energy are working together to create new markets, developing a mechanism that will enable the global property industry to measure and sell carbon credits achieved through energy efficiency measures included in new or refurbished buildings. The scheme aims to provide a direct incentive to property developers and portfolio owners to pursue energy efficiency measures through building design.

There is a strong view, from both the literature and in our discussions, that factors currently creating current barriers to innovation may quickly transform into a fundamental restructuring of practice. Corporate social responsibility is likely to continue to provide significant impetus to investment portfolio expectations, where 'green' or 'sustainable' becomes the low risk rather than high-risk option. And although it is debated whether sustainable design and construction adds value, there are clear signals that the market is increasingly 'expecting' sustainability as the norm or benchmark. Thus buildings will need to perform to these standards, and it might be expected that those without sustainable features will command lower rents/prices and have accelerated levels of obsolescence (Jones Lang LaSalle, 2006; 2008). There is a clearly significant risk that a shift to different pricing and value parameters leads to not only individual buildings, but large components of our built environment, becoming a 'stranded asset' – worth less in market terms than it is on a balance sheet due to the fact that it has become obsolete in advance of depreciation (investorwords.com, 2008).

Similarly, where the pricing of risks associated with climate change move up the 'risk-chain' and the industry develops means of accurately measuring and pricing that risk, then insurance considerations may transfer from acting as a barrier to an incentive to promote innovative and adaptive behaviours. Carbon emissions trading schemes, irrespective of the form they take, will also have a transformative effect on built environment industries, in terms of how funding is sourced, costs allocated and development metrics overall.

A LONGER TERM VIEW (b): FUTURE FLEXIBILITY

Our built environments often live well beyond initial investment timeframes: they age, they respond to changing conditions, demands, requirements, markets, expectations and regulatory frameworks over time. Although it is difficult to envisage what demands might be placed upon form and function in 30 or 50 years hence, there is good rationale for assuming that change will take place and designing and developing buildings that are amenable to change. This is not necessarily a question of seeking to 'future proof' our built environments but acknowledging, preparing for, and facilitating future flexibility. For example, in a number of German cities, the floor heights in multi-storey car park construction are set to provide sufficient height to allow reuse of the structure over time for residential or commercial applications. Future flexibility in terms of anticipated infrastructure development and changing neighbourhood function is also being increasingly advocated and incorporated into local planning frameworks. In London, new developments need to consider and leave opportunities open to

connect to local generation systems, for example combined heat and power (CHP) provision (GLA, 2007).

A LONGER TERM VIEW(c): REALISING 'CIVIC' VALUE

As part of thinking about lifecycle conditions, a number of our discussants emphasised the importance of rethinking and reshaping how we understand the contribution of, and place value upon, the built environment more widely. This value is not simply based upon tangible economic return, or judgements based upon aesthetic distinction or functional purpose. It flows through into its broader social and civic contribution, it impacts on connectivity and mobility and quality of life. Barriers are faced when moving beyond individual building envelopes to a consideration where gains may not be simply economic, but tied to creating sustainable places (CABE, 2007b).

There are a number of competing challenges here. On the one hand, there are approaches (both rediscovered and novel) that seek to counter the disjuncture between short-term economic drivers and long-term commitment to place (see box 4). These include: models where return is offset through patient equity or long lived capital; partnership arrangements which extend across the 'incentives' divide; and where market leaders are increasingly building strategic advantage through investing in place rather than simply developing sites and moving on.

Box 4: Re-engaging with civic value?

- **Patient Equity:** In the urban context, 'long-lived capital' or 'patient equity' models have emerged in the US, where local organisations have come together in order to restore confidence in areas requiring investment in social and community infrastructure as much as economic renewal. Patient equity ties investor engagement into the longer-term sustainability and prosperity of the urban fabric. It signifies a return to real estate being considered as a long-term asset class, where the developer built to hold onto those projects for a long period of return (Richards, 2007).
- **Public Private Partnerships, Alliance Arrangements:** Split incentives can be tackled if a business plan and shared financial models exist between contracting parties. Public Private Partnerships (PPP) have had mixed success to date, and as a funding model have arguably failed to deliver the efficiencies and benefits originally anticipated. Nevertheless, there are a number of core principles that remain pertinent in driving innovation. Similarly alliance arrangements provide a mechanism for bringing together stakeholders in a collaborative approach where benefits and risks are more equitably shared ('pain share, gain share'). As a result, all parties have interest in meeting performance targets that extend beyond short-term profit margins.
- **Place Building:** Rather than simply responding to opportunities in a reactionary way when sites become available, companies are identifying the value of long-term sustainable input into particular locations or types of location. For example in the UK, Oakmayne (a residential developer) and Firstbase (an affordable housing provider), have developed innovative partnership models that focus on particular regeneration areas in inner London. Activity proposed across a range of sites over time in these areas promotes greater potential for the organisations to take an active role in creating sustainable communities.

On the other hand, such responses (and certainly the latter) may be seen to have negative impacts. There are concerns that current large scale master planned development approaches, with one 'owner' effectively controlling a large site for many years, may not be socially or economically sustainable in the longer term. For example in major retail developments, the pressure to minimise development risk through greater project control, the penchant for large floor

plates, pre-let tenancies to major chains, and an inward facing quasi-privatised public domain, is being questioned. Successful centres tend to develop more 'organically', with outward facing and inclusionary public realms and a permeable built form and public spaces. Innovation in funding products and methods that incorporate a wider concept of value to include broader civic and sustainability outcomes are needed to encourage a more distributed outcome on the ground.

3.5 INTEGRATING THE DELIVERY AND SKILLS CHAIN

The built environment needs to be viewed as a totality – an integrated system. It follows from this that the built environment industry has to be seen as a totality, not separated. (Stakeholder interview, 2008)

There is little doubt that one of the major potential drivers of change in the built environment will be the need for institutional and organisation reform. This issue cuts across many of the issues raised throughout this paper. The fragmentation of the industry as a whole (Hampson and Brandon, 2004; Vandenberg, 2007), of organisational structures, professional and trades groupings, governance structures and localised markets, for example, are a dominant characteristic of processes and practices that deliver built environment outcomes in Australia.

Multi-scale and often poorly connected legislative and regulatory frameworks present a major obstacle to integrated approaches and delivery of sustainable building practices. The planning, design, delivery, utilisation and ultimately renewal or revitalisation of the built environment involves a multitude of players. While different organisations and stakeholders come together on any given project or site, their business structure, timing and duration of interest, impetus, ability and preparedness to innovate will vary.

The separation of trades from professions, poor co-ordination between sectors, the small scale of localised building processes, the transfer of risk down the supply chain to those least able to manage this risk, and the reliance on traditional methods for the delivery of building and maintenance services with little incentive to innovate at the 'coalface', are all examples of the problems stemming from fragmentation (Loosemore, 2004). Achieving rapid and lasting change in this context is difficult. An agenda to drive the integration of the BE industry to better adapt is therefore a key issue in the transition to sustainability.

SHARING AND TRANSFERING INNOVATION ALONG THE DELIVERY CHAIN

The restrictive nature of current organisational structures and the complex, fragmented nature of the delivery chain act to hinder rather than promote shared approaches to development. It is often perceived that the industry, and certainly the construction sector, struggles to invest in research and innovative practice. In reality, significant innovations are regularly made by companies on a project by project basis, however mechanisms capture and passed onto other projects or the wider industry are relatively weak. Diffusion of innovation is also hindered by current R&D reporting frameworks. The need to demonstrate *continual* investment over time to benefit from fiscal benefits fails to reflect the project- rather than program-based nature of investment.

The complex pathways of the development process between initial design and implementation restrict the flow of new techniques, and the impetus for, and benefits to be derived from, doing things differently tend to be quite different at different stages of the delivery chain. With projects typically delivered through complex contracting and subcontracting arrangements, substantive challenges inevitably restrict advances in practice technologically or on the drawing board and the realities of compartmentalised delivery on the ground. Risk management is often a question of risk transfer, sending it down the procurement chain until it reaches a point of no resistance. With limited collective responsibility for the management of risks and opportunities throughout supply chains a tendency to simply continue tried-and-tested approaches is clear.

Such barriers are difficult to break down, however there is clearly a role for industry leaders to promote structures where transfer of new thinking and practice is assisted:

- Larger organisations, involved across the development process – have evolved and defined their market positions based upon access to wider ranging skill sets and an organisational culture focused on the multidisciplinary tasks of project delivery. Companies such as Lend Lease and ARUP have started to dissolve professional boundaries and are likely to employ social planners and psychologists alongside their traditional core disciplines. Within these structures, innovation has a greater potential for transfer, and importantly, an understanding of context within which that development is taking place, and its potential impact over time.
- The creation of expert teams, with knowledge iteratively gained through ‘project based’ experience, helps embed innovation within future practice. Lend Lease, responsible for delivery of the athlete’s village for the Sydney Olympic games, continue to lead innovation and have become global leaders in delivering complex urban renewal projects.
- Leading companies are better placed to influence their supply chains and to work more closely with the suppliers in order to meet their organisational objectives. Lamb (2007) reports on the draft sustainability supply chain management policy being put in place by developer Stockland, which will shape the prerequisites for doing business with the company. The aim is to help suppliers go through the same ‘greening’ process through promoting particular practices as well as highlighting those that they would seek to avoid.

CHAMPIONING THE SECTOR IN A JOINED-UP WAY

Fragmentation of the BE industry obscures the pivotal importance of the built environment to our everyday lives. In helping bring the different pieces of the jigsaw together, and in helping raising awareness of the collective goals of the sector in creating, shaping and maintaining the spaces in which we live, work and play, a case can be made for a joined-up ‘champion’. In the UK, the principal remit of the Government sponsored Commission for Architecture and the Built Environment (CABE) is to champion good urban design across all sectors – providing advice across commercial, public sector and residential building, and expertise in the creation of green and public space. While design-

led, CABA's contribution is increasingly rooted in its involvement across the decision-making cycle at a range of scales.

Many of our peak bodies are taking an increasingly active role in building links and promoting integration across professions and interests. For example, the Australian Sustainable Built Environment Council (ASBEC) provides a consultative forum on BE sustainability and seeks to provide a uniform industry response to the environmental and ecological issues that now face the industry. It works in collaboration with the three levels of government and professional and other peak organisations, to produce a prioritised action agenda for the future. There is potential for such a model to be further developed in order to raise awareness of built environment issues into the mainstream, and like CABA in the UK, provide a championing role for greater interest in, and build commitment to improving, Australia's built environment.

RETHINKING EDUCATION AND SKILLS TO PROMOTE INTEGRATION

Addressing the fragmentation within existing structures and delivery practice is clearly a long term challenge. How we educate and train future built environment professions and trades, and the routes we have to reskill those already in place, clearly performs an important catalyst for innovation. However, institutional structures and limited co-ordination across authorities act to hinder rather than promote diffusion of innovation. One of our discussants felt that TAFE built environment courses essentially remain structured around preparation for traditional 'artisan' trades. There is little incentive to deliver courses on innovative construction methods, for example. While specific skills remain vital, there is a strong case to be made for those skills sets to be enhanced. It also makes little sense that qualified trades personnel find it difficult to practice in different States due to the particular certification processes in each jurisdiction.

Similarly, universities should be at the forefront of promoting innovation through recognising the need to foster collaborative skills to address the multi-dimensional and highly complex challenges facing our towns and cities. Yet we continue to train planners, architects, engineers (civil, structural, environmental), urban designers, landscape architects, property developers and managers, construction specialists, facilities management and so on as 'bounded' professions, largely in isolation from each other. While neither realistic to suggest evolution towards a multi-disciplinary 'built environment' professional, a case can be made that shared skills should be fostered regardless of the specialism followed. Difficult issues look similar whether seen from the perspective of the civil engineer, earthworks contractor or architect, and often require 'generalist' attributes. Innovation is required in course and curriculum design to improve sustainable design and environmental management literacy and ensure integrated approaches to the creation of sustainable buildings, spaces and places.

In the UK, skills capacity has been identified as a bottleneck risking the delivery of more sustainable communities (ODPM, 2004), leading to the creation of the Academy for Sustainable Communities (ASC) as a 'national centre for delivering the skills and knowledge needed to make better places' (see **Box 5**

above). A focus on 'place' provides a forum for professionals, contractors, and community renewal experts alike to share understanding.

Box 5: Academy for Sustainable Communities (www.ascskills.org.uk)

The ASC was established in 2004 in response to findings by the Egan Review to lead a culture change in the promotion of sustainable communities. Their remit comprises:

- Building a reputation as the 'kite-marking' body and standard setter for skills and knowledge related to creating sustainable communities
- Establish flagship training programs
- Provide new practical learning opportunities via learning laboratories and national action projects
- Focus on sharing best practice and research in four key areas: skills gaps and labour shortages; community cohesion; low carbon communities and place making
- Build new bridges of understanding between public, private and voluntary sectors

ADDRESSING MARKET FAILURES IN INNOVATIVE RESEARCH

As Garnaut (2008a) notes, there are market failures in R&D and innovation activity, reflective of the inability of pioneering research, and investors behind that research, to capture the full value, and importantly the wider public value, of their innovations. In meeting this gap, there is a need for funding to support research and the development of new approaches, and this assistance is required throughout the innovation chain.

In terms of facilitating partnership working between industry, government and academia, a number of our interviewees reinforce views within the literature that greater incentives were needed to encourage enhanced expenditure and foresight activities. While CRC activity is supported, it was suggested that the structure of collaborative arrangements tends to restrict genuine participation between different private sector interests. Partnering arrangements between universities and one partner or group of partners act to hinder the sharing of ideas, information and opportunities across a wider breadth of industry players. One interviewee suggested that a substantive rethink on Intellectual Property (IP) rights was required in order to provide an effective mechanism that enables a timely delivery of new ideas. There is debate to be had as to whether universities should retreat from commercialisation imperatives and return to guiding objectives of advancement of knowledge for the 'public good'.

RESHAPING LABOUR

Initiatives to encourage innovation raise a number of important questions for the role and organisation of labour in built environment industries, particularly in terms of trades. Arguably a key aspect of the sector that is seen as an impediment to innovation – a fragmented employment base with a high prevalence of small scale companies - has benefited the sector in other ways. It has provided flexibility and enables responsiveness to the cyclical nature of markets. It has also been important in social inclusion and business development terms.

In seeking to address the inefficiencies created by industry fragmentation, 'direct' or in-company teams rather than subcontracting arrangements may provide a more coherent platform for on-going skills development. Knowledge

acquired through past project experience can be retained and moved forward. While these models can be seen as attractive, such arrangements are only likely to be feasible amongst market-leading operations. Yet suburban Australia has in large part been built out by smaller, family builders and contractors who, through local experience and context, have developed models that respond to the particular needs and found economic viability in areas where others have avoided. Without incorporation into wider policy consideration, their continued significance in the production and reproduction of our urban form, small companies are likely to struggle to adapt their processes and product to shifting demands. With the retrofitting of our older suburbs representing one of the hardest sustainability challenges to be faced over the next generation, innovations policy must think in both 'big, global' and 'small, local' terms.

In responding to the drivers facing our towns and cities, new jobs will be created and old ones will need to be evolved. Policy frameworks will need to reflect and help shape evolving labour market activities across all BE industries and present opportunities for proactive engagement between innovation agendas, industry and the Unions in developing shared goals for building a more socially equitable and sustainable Australia.

3.6 METRICS AND SHAPING BEHAVIOUR

A lack of robust, comparable, verifiable information, or at least consistency, is currently seen as a significant barrier to transforming practice and behaviour. Frameworks where metrics are agreed, shared and disseminated need to be created and supported. The key challenge is to ensure that demands for increased data and information are used to drive change, establish markets, create opportunities and act to shape organisational and consumer behaviour in proactive ways, rather than being seen as additional red tape and legislative burden. Public disclosure of sustainability indicators will be critical, enabling the market mechanisms needed to underpin much of the behavioural changes needed.

METRICS DRIVING BUSINESS BEHAVIOUR

Improved metrics are considered vital to all components of business change. As **box 6** below identifies, the demand drivers for increased performance reporting include:

- the investment community, where there is a growing expectation that corporate social responsibility (CSR) and sustainable practice should be the norm rather than exception;
- legislative and regulatory arrangements, which seek to provide clarity, certainty geared towards meeting broader targets within which organisations can work within;
- recognition by business themselves that sustainable practice is good and profitable; and,

- increased expectations of owners, lessees and facilities management that the BE should comply with best practice.

Commitment to monitoring and evaluating the performance of BE assets – particularly in the context of new and retrofitted developments that engage new technologies and approaches – will provide a vital resource where that information is shared with all players involved. In a risk-averse environment, the unknown effects of new methods are avoided on the basis of uncertainty. Setting measures and reporting on those measures provides a shared language whereby the benefits of new practice can be articulated and areas of responsibility clarified.

Box 6: Metrics and reporting requirements (based upon Jones Lang LaSalle, 2008, p. 4)		
Voluntary	Global Reporting Initiative (GRI)	GRI provides a Sustainability Reporting Framework and guidelines used by around 1000 organisations worldwide
	Carbon Disclosure Project (CDP)	CDP petitions organisations to publicly disclose their carbon emission performance.
	Australian Climate exchange (ACX)	National emissions trading exchange placing a market-based financial return on AGO accredited voluntary reductions
Investment	Dow Jones Sustainability Index (DJSI)	DJSI tracks the performance of leading sustainability-driven companies worldwide to provide investors with an independent benchmark based on 3BL criteria
	FTSE4Good Index Series	FTSE4Good measures the performance of companies that meet globally recognised corporate responsibility standards
	Australian SAM Sustainability Index (AuSSI)	AuSSI tracks the sustainability performance of the top sustainability driven Australian companies across all sectors.
Legislative	Energy Efficiency Opportunities (EEO) Act	EEO encourages energy efficiency by requiring businesses to identify, evaluate and report publicly on cost effective energy savings opportunities. (now streamlined with NGER)
	National Greenhouse and Energy Reporting (NGER) Act	The Act makes registration and reporting mandatory for corporations whose production or GHG emissions meet specific thresholds
	State based requirements (i.e. waterMAP in VIC, BASIX in NSW)	BASIX (NSW) ensures homes are designed to use less water and be responsible for fewer greenhouse gas emissions by setting energy and water reduction targets
Corporate	Annual reports	Organisations are increasingly required to provide reporting across performance, operational and corporate structures. Integrated reporting and analysis systems are likely to become the norm as global companies seek to manage and verify sustainability reporting
	CSR reports	
	Sustainability/Environmental reports	
Operational	Australian Building Greenhouse Rating (ABGR) scheme	ABGR is a computer software tool which enables buildings to measure their relative impact on the environment through the production of GHG emissions
	GreenStar	Greenstar rates a building in relation to management, health and wellbeing of occupants, accessibility to public transport, energy consumption, embodied energy, land use and pollution
	National Australian Built Environment Rating System (NABERS)	NABERS is a performance-based rating system for buildings, measuring operational impacts on the environment and benchmarks performance with peers. It incorporates ABGR.
	Lease agreements	Tenants and owners are entering into agreements regarding FM to ensure commitments through operation are upheld

Important challenges remain in terms of promoting information integration, consistency and interoperability. For example, there is a need to improve integration of product information into Building Information Modelling (BIM) tools and to improve life cycle inventory data to allow much greater capacity to design for sustainability across the full life cycle of buildings and neighbourhoods.

Information in decision making could significantly improve the capacity of State planning authorities to improve planning, regulation and enforcement. Poor measurement of BE outcomes across the urban system is endemic, with no comparable methods and data existing at the national scale. A number of our interviewees thought that information and target setting at the city level will also become increasingly important, especially with regard to environmental standards and outcomes, and with regular publically accessible reviews and evaluation to ensure transparency and accountability.

SHAPING CONSUMER BEHAVIOUR

We need a 'new Australian dream' - how is that to be manufactured, conveyed, resisted, adopted and appropriated? (Stakeholder interview, 2008)

Consumers need to be in the driving seat in moving to a sustainable built environment. Working with households and communities to move towards the transition to sustainability and managing demand propensities and patterns is likely to be one of the key issues that will need close attention in devising policies for sustainable BE outcomes. While we increasingly know how to build and modify the built environment to encourage lower energy and water use, without a significant change in consumer behavior in relation to resource consumption, mobility patterns and general household and business demand patterns, sustainability goals will not be achieved.

The implementation of innovative frameworks and incentives to encourage behavioural change are therefore central to the challenge of the transition toward more sustainable use of the built environment. To an extent, this will relate to resource pricing and government support and subsidy during transition. The critical issue of the affordability of the transition will come to the fore in this process, and with it, issues of social equity and inclusion. But it is also related to broader cultural and life-style dimensions as well as to the way information and educational messages are used to persuade consumers, both household and businesses, about their habits and expectations about water and energy use across a myriad of day-to-day activities.

At the level of popular culture and the need to engage the Australian community as a whole in revisioning the BE as a sustainable system, it can be argued that we may need a new 'Australian urban dream' no longer tied to the cottage on a quarter acre block. Such a vision will need to recognise that every city region is different and will have different adaptation trajectories given climate and context variations. Similarly, national frameworks for change and innovation will need to recognise and account for this variety. It will also need to be broadly bi-partisan to support a long term paradigm shift – or, more importantly, sufficiently flexible enough to accommodate a range of visions and cultural predispositions.

3.7 LEADERSHIP AND GOVERNANCE

Do we have a system of governance in Australia that allows us to make good decisions about sustainability? We need a place-based system of governments (Australia 2020 Summit 2008, p. 83). (Stakeholder interview, 2008)

Australia is highly-urbanised, and in near-desperate need of pioneering in sustainability - could this be an advantage, could we be an exemplar? (Stakeholder interview, 2008)

A common concern expressed by interviewees was the fragmented and disjointed governmental structures within which the BE industry operates. While it could be said that all industries confront the same structures of government in Australia, the very nature of its business and the multitude of players and scales at which the BE operates means that the industry interfaces government at all levels, from national to local. Consistency is required.

LEADING FROM THE FRONT

Almost without exception amongst our interviewees, it was stressed that national leadership is now needed to address the issue of driving Australian cities towards sustainable outcomes. The fundamental position our cities in the national economy justifies a strong focus of interest from Federal Government. Leadership is required in promoting integration, facilitating education and research, and driving an effective regulation, tax and subsidy framework to promote change. However, responsibilities for the BE are fragmented within national government itself, with a number of Ministers and departments having specific responsibilities for aspects of policy that impact on the BE (see **box 7**). Moreover, the variation in governance structures and relationships between States and Territories that influence the BE industry within their boundaries acts as a barrier to effective innovation across the range of challenges introduced in this report.

Box 7: Policy concern for our built environment – stretched across many portfolios

- Department of Climate Change
- Department for Innovation, Industry, Skills and Research
- Department of Infrastructure, Transport, Regional Development and Local Government
- Department of Families, Housing, Community Services and Indigenous Affairs
- Department of Environment, Water, Heritage and the Arts

To those involved in attempts to move our cities forward, coherent and practical strategies seem almost unattainable, in large part due to the vice-like grip of overly-complex, anachronistic and even contradictory urban governance systems in Australia (Stakeholder interview, 2008)

Leadership through the forthcoming carbon emissions trading scheme, the Energy Efficiency Opportunities (EEO) Act and the National Greenhouse and Energy Reporting (NGER) Act are acknowledged. Furthermore, as a lead procurer and consumer of the built environment, all levels of government enjoy a strong position to push innovation through 'setting the bar high'. Federal Government requires its buildings to perform to ABGR 4.5 or higher and local authorities can set industry leading targets in terms of procurement and operation of their own services. Interviewees suggested that government should use its mandatory powers to adopt sustainability principles, ensuring 3BL assessments are incorporated into all government BE contracts. PPP and alliance arrangements provide a framework for further innovation in this regard.

A critical issue advocated by our interviewees was the need for innovation in policy to create standardised frameworks for the industry to operate within. Planners need a common planning system with national planning standards and codes across the country. Similarly, national standards and codes for building, skills and training, information management, and a unified approach to setting environmental standards, such as water and energy efficiency and performance

targets, need to be backed by a national agenda. A shared standards framework for the BE industries could be developed by an integrated body charged with bringing all the various state and local based frameworks between the industry sectors together.

CITIES – EFFECTIVE GOVERNANCE AT AN EFFECTIVE SPATIAL SCALE

There should be a national agenda to plan for cities and population through establishment of a planning commission type organisation that sets goals and targets for cities. It is important that there be a re-engagement by the national government in planning for cities and examining the potential role of the Council of Australian Government and federal funding to drive change across jurisdictions. (Australia 2020 Summit, 2008, p. 64)

Beyond national government, the difficulties arising from state stewardship of our major urban regions are becoming increasingly apparent. This is an issue at the heart of how our major urban areas need to be managed and whether the State government structures and largely fragmented local government are relevant for today's cities. There is a general feeling the current tiered system does not *fit* the national spatial economy anymore. As noted previously, cities act as crucibles of change and opportunity. They need to be given appropriate governance structures not only to identify future challenges strategically but as a means to implement and deliver. Our cities have many advantages on the global stage, but our urban governance systems are being left behind by our competitors. Sydney, Melbourne and all our capital cities need to be given a platform to innovate. There is a perceived need for a collaborative approach between networks of cities on this issue, not open competition.

Australia has already begun to move towards more integrated discussion and learning among cities on an informal basis through the Capital Cities Mayors Forum and individual central city mayors, such as Sydney's, have begun to bring in surrounding suburbs to encourage concerted discussion and action in a wider arena. These moves are insufficient in themselves, but can be built on. The Rudd Government has already stated its intention to re-think the relative roles and powers of State and Federal governments. Discussion of cities and their governance should be a major part of this rethinking, as provision of health facilities, for instance, has to have a spatial element and take account of city development dynamics.

Similarly housing affordability policy is implicitly spatial and should be integrated strategically into ongoing city planning processes or risk the important potential social inclusion and economic synergies being dissipated. The recently announced National Rental Affordability Scheme (NRAS) seeks to stimulate the provision of 50,000 affordable rental properties over the next four years. Investors must rent properties to eligible tenants at 20% below equivalent market rates for the area. Clearly the aim is that this will have positive inclusion as well as affordability outcomes, but there is a need for the scheme to consider the spatial impacts of those outcomes. State/Territory contributions may take the form of discounted land, and this will inevitably impact on spatial rollout of the scheme. Institutional investment funds are also being encouraged, and here, a strategically integrated approach at the city scale will be required so that appropriate, sustainable solutions are provided where they are required, rather than simply consolidating provision in locations where the economic case may add up but social and environmental considerations do not.

A number of our interviewees suggested that a national cities strategy needed to be backed by infrastructure investment funds. These would need to move considerably beyond the scale of the current Solar Cities demonstration project. Rather they would target key urban infrastructure deficits with city transforming

projects – for example, ‘carbon constrained’ exemplars – building upon the principles of the Building Better Cities program in the 1990s. A number of major infrastructure projects per city could be established, insisting on highest sustainability standards, to stimulate innovation through competition, and expanding the best examples to provide a practical framework for a new national sustainable cities or BE agenda. Given that in many cases development control resides with local government, the inclusion of this tier into an active partnership with other levels of government will also be critical in driving forward a sustainability agenda across the built environment.

NETWORK GOVERNANCE

Although the need for leadership and appropriate urban governance at different spatial scales is advocated, an emphasis on governance as opposed to government is also reflective of a shift from hierarchical, public and representative structures to frameworks

4. Conclusions

Given the complexity of the built environment, and the breadth of the challenging questions posed for this report, it is inevitable that the issues raised above are broad brush in nature. In part, there has been a deliberate focus away from specific technologies, or industry specific issues: our aim has been to identify the key drivers and challenges which are relevant to shaping innovation and competitiveness across the BE industry and our cities more widely. Equally, in our discussions with key stakeholders, it was these bigger, crosscutting issues that continually arose. In this regard – although somewhat general – the challenges raised provide impetus to a number of concluding pointers.

- The Garnaut Report has necessarily focused on the national and indeed global picture. Our major cities – home to 85% of all Australians, and the urban form and function they represent – get only brief mention. In nearly all cases, our industry stakeholders are looking forwards to a more informed, integrated engagement with our cities by all levels of government. This is not to look to government to provide all the answers or all funding necessary to facilitate transition, but to provide leadership and necessary frameworks that will enable our cities to perform, innovate and remain competitive in the revised globalisation agenda – that of carbon constraint, adaptation and mitigation.
- The impetus for change is already there. Sustainability investment funds, corporate social responsibility drivers and changing interpretations of risk are likely to continue shifting the balance where sustainability becomes the expected market norm rather than novelty. Demand for new built form, and our existing built environments, will increasingly become assessed, priced and utilised in different ways based on changing expectations and values. Government can facilitate this shift through proactive use of tax and subsidy mechanisms, and making sure regulatory tools lead rather than hinder change.
- The easier components of what is a complex challenge will – to a certain degree – be carried through by this impetus. Promoting landmark ‘green’ commercial buildings is an important part of spearheading transition to sustainability, but these ‘pioneering’ sites must not detract from arguably much harder policy challenges: the question of moving sustainability to scale (to the neighbourhood level, to the city); retrofitting our existing built environment (most of which will still be with us in twenty years’ time and still provide the large majority of our urban form); and ensuring fairness in approach and assistance to those who will be adversely affected through transition.
- Although significant shifts are required to respond to all the drivers our built environments will face in the next twenty years and beyond, this paper has argued that intelligent incentivisation and clear direction can facilitate necessary technological advance to respond to these challenges. In each of these challenges, there is a role for policy leadership across the range of governance levels to ensure that our cities in their entirety, all BE industries and all Australians are supported in ways where innovation is fostered,

competitiveness is maximised, and issues of social inclusion and social equity fully incorporated. Major challenges are faced, however this paradigm shift represents a global steer that not only demands a review of how are our cities and built environment providers need to respond in terms of the risks faced, but also sets the agenda for us to think about where we want our cities to be and the quality of life they should strive to provide.

- In charting this transition, there are likely to be short term measures required to address immediate disparities, but also significant transitional arrangements over a longer-period as our built environment and communities adapt. The PM has recently advised that support will be there for households and businesses affected in Australia's response to climate change. A strong case is made for support to communities, neighbourhoods and cities to be added to this list.
- In meeting these challenges and responding to opportunities, the importance of integration becomes a central theme - across a variety of spatial scales; across the entire building/neighbourhood life cycle, across organisational practice; and across all levels of governance impacting on our built environment. The variety of partners involved in developing a new integrated approach to dealing with BE and hence city issues, and doing so in a timely manner, requires a new approach. Creating integration at the policy level will mean moving away from the 'technical' or single issue discussions, to developing an approach which can prioritise and integrate the actions of players of all kinds at all stages of the BE process as outlined in this report.



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Appendix 1

FBE WORKSHOP ATTENDEES

- Professor Bill Randolph – Director, City Futures Research Centre (Chair)
- Professor Peter Murphy – Dean, Faculty of the Built Environment
- Professor Martin Loosemore – Associate Dean (Research), FBE
- Professor Dao Prasad – Director, Master of BENV (Sustainable Development)
- Professor James Weirick – Director, Master of Urban Development and Design
- A/Professor Sid Newton – Program Head: Construction Management and Property, FBE
- Dr Katrina Simon – Senior Lecturer, Landscape Architecture; Presiding Faculty Member
- Dr John Mitchell – Senior Research Fellow, City Futures Research Centre
- Dr Denny McGeorge – Lecturer, Construction Management and Property
- Dr Simon Pinnegar – Deputy Director, City Futures Research Centre

LIST OF INTERVIEWEES

Maria Atkinson – Global Head of Sustainability, Lend Lease

Australia's leading developer. Lend Lease has long held the belief that a sustainable organisation is strategically and culturally committed to achieving economic development, social enrichment, and environmental protection. This commitment underpins an active and influential sustainability team, headed by Maria Atkinson. Lend Lease will provide particularly useful insight in terms of financing and management of risk associated with innovative markets. Maria attended the 2020 Summit.

Tristram Carfrae, Richard Hough, Colin Henson and Dan Hill, ARUP.

ARUP are global leaders amongst built environment professions on sustainability and response to climate change. Identifies solutions which recognise sustainability as a strategic advantage. As well as being at the forefront of sustainable design and engineering, they provide environmental and sustainability consultancy service and solutions at each stage of a project or business development.

Neil Evans – Managing Director, SMEC

SMEC, originally Snowy Mountains Engineering Corporation, is one of the leading engineering and development consultancies in the world. They have been providing multidisciplinary consulting services in engineering, project management, environmental science and development activities, SMEC has been engaged in assignments throughout the world for 30 years.

Rod Fehring – CEO Lend Lease Ventures; Chair, Australian Housing and Urban Research Institute.

In the role of Chief Executive Officer, Lend Lease Ventures, Rod is responsible for working with all Lend Lease businesses to screen and identify emerging technologies / ideas that could drive new growth; and actively invest in the transition of new technologies into new business streams. Rod Fehring has recently been announced Chairman of AHURI – Australia's leading housing research body.

Patrick Fensham – Director SGS Economics.

SGS Economics and Planning helps businesses and governments make successful policy and strategy decisions, seeking to contribute to good management and good governance in the public and private sectors. The specialist economics and planning consultancy has provided rigorous research, creative analysis of policy options provides advice on policy implementation. SGS recent led the consortium who prepared Sustainable Sydney 2030.

Warren Kerr – Director, Hames Sharley

Warren Kerr has 30 years design experience and is Director of Hames Sharley. He is a Visiting Professor at FBE, UNSW, a Director of CHAA, a Director of the Australian Council of Built Environment Design Professions and a past National President of the RAIA. Warren is the Chair of DIISR's Strategic Industry Leaders Group.

Dennis Lenard – Visiting Professor, Construction Management Group, FBE

Dennis Lenard has worldwide experience in the construction industry. He has lead a national research program for construction innovation and was President of the International Cost Engineering Council, an association of project management organisations from more than 40 countries, covering the construction, energy, petrochemical and gas industries. In the UK, he founded the Centre for Construction Innovation in Manchester. For two years up to September 2005 he was Chief Executive Officer of Constructing Excellence.

Ken Maher – Chairman, HASSELL

Ken Maher is the Chairman of one of Australia's leading architecture and urban design firms. As a founding member of the Green Building Council, its culture is founded in the stewardship of the land and the creation of sustainable places for people. Hassell are involved in many leading 'green' building projects in Australia and internationally. Ken is on DIISR's Strategic Industry Leaders' Group.

Patrick Troy AO – Emeritus Professor ANU

To know where we might be heading, it is good to know where you have come from. Pat Troy has extensive expertise on cities and current research interests in environmental sustainability issues tied to urban form, function and consumer behaviour. Pat was a participant of the 2020 summit.

Jennifer Westacott – KPMG

Jennifer is National Leader in Water and Environment for KPMG. Prior to joining KPMG she had 20 years experience in state government in Victoria and New South Wales at the senior executive and Chief Executive level. Jennifer has held the following positions: Deputy Director General, NSW Department of Housing; Deputy Director, NSW Department of Community Services; Executive Director, NSW Health Council; Director of Housing Victoria; Secretary Education and Training Victoria; and Director General of Department of Infrastructure, Planning and Natural Resources in New South Wales.