From Vision to Reality:
The Practices Deployed in the Struggle for a Master-planned Community ‘Sustainability Showcase’

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

Geoffrey Binder
Bachelor of Arts (Social Sciences),
Bachelor of Architecture (Honours First Class)

School of Global Studies, Social Sciences and Planning
College of Design and Social Context
RMIT University
August 2011
Declaration

I certify that except where due acknowledgement has been made, I am the sole author of this thesis; the work has not been submitted previously, in whole or in part, to qualify for any other academic award; the content of the thesis is the result of work which has been carried out since the official commencement date of the approved research program; any editorial work carried out by a third party is acknowledged; and ethics procedures and guidelines have been followed.

Geoffrey Binder
August 2011
Acknowledgements

The sociologist could well make his or hers Flaubert’s motto: “To write well about the mediocre.” (Bourdieu & Wacquant 1992, p. 221)

This thesis takes as its subject a tool to help builders select materials. This ‘everyday’ activity, as a topic, fell into my lap. It seemed at the time to be a prudent starting place for the research as it hopefully would not stir up concern within the organisation that I was studying, VicUrban. This mediocre, or perhaps more accurately, mundane issue contained the germ of what would become this thesis. Just as the Eco-selector fell into my lap, so did the opportunity to be involved in this research project. For this I am eternally grateful to my supervisors Associate Professor Dave Mercer and Professor Tony Dalton and to the applicant who managed to talk his way out of the project! During my studies Dave gave me the space to follow my ideas; Tony offered me the structure that I needed. I must also thank those people at VicUrban who agreed to and supported my work.

One cannot work on a thesis without the support of those that are nearest and dearest to you. I am doubly blessed by my wife and partner, Associate Professor Jennifer Boldero, who not only helped create the space and time but also supported me while doing this work, and who also, as a nasty positivist, has been a great editor and foil to my tendency to streams of consciousness. Other people who helped me by providing feedback on drafts were Associate Professor Adrian Howe (not a positivist), Jenny’s colleague, Professor Nick Halsam (of unknown but likely dubious philosophical orientation) and my friend Gillian Roberts. I must also thank the students whose space I shared who were always willing to have a coffee and a chat. Our conversations ranged from theory to politics, and about the trials and tribulations of being students. Special thanks as well to Dr Rod Fawns whose Ginger Group at the University of Melbourne welcomed me to their weekly meetings where theory and drafts where presented and critiqued.

I hope that I have managed to live up to Flaubert’s motto. If I have, it will be the smallest part of the effect that Pierre Bourdieu’s work has had on my thinking. For most of my life I have felt like a bit of flotsam that occasionally and perhaps too rarely sprouted a rudder. Bourdieu invited me to consider the idea that river is also within me and that my agency, this work, is my paddle.
Contents

Declaration .................................................................................................................. ii
Acknowledgements .................................................................................................... ii
Figures ......................................................................................................................... vii
Tables ........................................................................................................................ viii
Abbreviations ........................................................................................................... ix
Summary ...................................................................................................................... x

Chapter 1 Introduction ......................................................................................... 12
  1.1 The case study – innovation for environmental sustainability ....................... 12
  1.2 Structure ........................................................................................................... 4

Chapter 2 Historical and contemporary frameworks for Aurora and the Eco-selector ................................................................. 12
  2.1 Why Aurora? Responding to environmental change ....................................... 12
  2.2 A brief history of the present: establishing post-colonial land-use practices .......... 14
  2.3 Moderating practice: regulating profit and dis-ease ....................................... 17
  2.4 Differing histories and practices: MDA +URLC = VicUrban ................................ 20
  2.5 Conclusion ....................................................................................................... 22

Chapter 3 Using innovation to understand change ............................................ 25
  3.1 Introduction .................................................................................................... 25
  3.2 Defining innovation and its use ........................................................................ 26
  3.3 Macro-level effects ......................................................................................... 29
  3.4 Meso-level effects on innovation .................................................................... 33
  3.5 Micro-level effects ......................................................................................... 35
  3.6 Innovation within comparable affluent western worlds’ building industries ...... 39
  3.7 Schumpeterian innovation ............................................................................. 48
  3.7.1 Political forces and innovation .................................................................... 54
  3.8 Lessons from Schumpeter ............................................................................... 55
  3.9 Conclusion ....................................................................................................... 60

Chapter 4 Theorising change: the importance of practice ................................... 64
  4.1 Introduction .................................................................................................... 64
  4.2 Master–planned communities: a confluence of practices .................................. 66
  4.2.1 Conceptual incursions: attempts at modifying planning practice ................. 71
Appendix 8: The Flip-chart ................................................................. 368
Appendix 9: The Eco-score card........................................................... 386
Appendix 10: Aurora, first seven stages ........................................ 400
Appendix 11: Nominations for the Green Building Council’s Timber
           Expert Reference Panel......................................................... 402
Appendix 12: Correspondence between the Victorian Association of
           Forest Industries and RMIT University’s Centre for Design
           .......................................................................................... 405
Figures

Figure 1 Relationships that defined and affected the practices used for the development and implementation of the Eco-selector ................................................................. 10

Figure 2 Model of recursive cultural adaptation: possible responses to a change in a niche ................................................................. 92

Figure 3 Extract from 2002 draft Flip-chart ............................................. 124

Figure 4 Extract from the Eco-selector: a Guide to Materials Selection, April 2006 ................................................................. 143

Figure 5 View across rooftops at Aurora showing ‘whirlybird’ vents on both tiled and steel roofs ....................................................... 160

Figure 6 Colonial meets Californian Bungalow at Aurora ................. 164

Figure 7 ‘Contemporary’ styling at Aurora ......................................... 164

Figure 8 Suburban culture alive and well at Aurora: ‘Muscle Car’ and ‘McMansion’ ................................................................. 165

Figure 9 Housing Industry Association GreenSmart Accreditation Certificate, Burbank display home ........................................ 166

Figure 10 Typical Solar hot-water booster installation ....................... 167

Figure 11 East-facing three-panel solar hot water booster ............... 168

Figure 12 West-facing single panel solar hot water booster .............. 169

Figure 13 Aerial photograph taken over Aurora ............................... 169

Figure 14 Recreation & BBQ facilities with photovoltaic array on pavilion at Aurora ................................................................. 171

Figure 15 Water sensitive design at Aurora: permeable surfaces and swales ................................................................. 175
Tables

Table 1 The competency/practice distinction ................................................. 62
Table 2 Typical land development industry professional and delivery services firms .............................................................................. 67
Table 3 Total lot–sales and Roxburgh Park lot sales 1991–2 to 2004–5 ................................................................................................. 105
Table 4 HIA Housing 100 Report: Victoria’s largest 20 builders market share comparison ............................................................................. 190
Table 5 Codes used to clarify interviewee quotes ............................................ 360
Table 6 VicUrban total lot sales and Aurora total lot sales 2004-5 to 2009-10 ........................................................................... 367
### Abbreviations

<table>
<thead>
<tr>
<th>Abbreviation</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>AHURI</td>
<td>Australian Housing and Urban Research Institute</td>
</tr>
<tr>
<td>APAI</td>
<td>Australian Postgraduate Award Industry</td>
</tr>
<tr>
<td>APM</td>
<td>Aurora Project Manager</td>
</tr>
<tr>
<td>APMT</td>
<td>Aurora Project Management Team</td>
</tr>
<tr>
<td>ARC</td>
<td>Australian Research Council</td>
</tr>
<tr>
<td>BAM</td>
<td>Building Assembly Materials</td>
</tr>
<tr>
<td>CI</td>
<td>Critical Incident</td>
</tr>
<tr>
<td>CfD</td>
<td>RMIT University’s Centre for Design</td>
</tr>
<tr>
<td>DLA</td>
<td>Docklands Authority</td>
</tr>
<tr>
<td>ENGO</td>
<td>Environmental Non-Government Organisation</td>
</tr>
<tr>
<td>ESD</td>
<td>Environmental Sustainable Design</td>
</tr>
<tr>
<td>FSC</td>
<td>Forestry Stewardship Council</td>
</tr>
<tr>
<td>GBCA</td>
<td>Green Building Council of Australia</td>
</tr>
<tr>
<td>IP</td>
<td>Intellectual Property</td>
</tr>
<tr>
<td>IPA</td>
<td>Industry Partner Agreement</td>
</tr>
<tr>
<td>ICT</td>
<td>Information and Computer Technologies</td>
</tr>
<tr>
<td>LCA</td>
<td>Life Cycle Analysis</td>
</tr>
<tr>
<td>MCMC</td>
<td>Merri Creek Management Committee</td>
</tr>
<tr>
<td>MDA</td>
<td>Melbourne Docklands Authority</td>
</tr>
<tr>
<td>MORCA</td>
<td>Model of Recursive Cultural Adaption</td>
</tr>
<tr>
<td>MPC</td>
<td>Master-Planned Community</td>
</tr>
<tr>
<td>PT</td>
<td>Positioning Theory</td>
</tr>
<tr>
<td>SEAV</td>
<td>Sustainable Energy Authority of Victoria</td>
</tr>
<tr>
<td>SNA</td>
<td>Social-Network Analysis</td>
</tr>
<tr>
<td>ULC</td>
<td>Urban Land Council</td>
</tr>
<tr>
<td>URLC</td>
<td>Urban and Regional Land Corporation</td>
</tr>
<tr>
<td>VAFI</td>
<td>Victorian Association of Forest Industries</td>
</tr>
<tr>
<td>VNHT's</td>
<td>Victorian Native Hardwood Timbers</td>
</tr>
<tr>
<td>ZPD</td>
<td>Zone of Proximal Development</td>
</tr>
</tbody>
</table>
Summary

This thesis examines the struggle between historically-defined land use and building practices and innovation for an environmentally sustainable master-planned community (MPC). Since 2002, the Victorian government’s land development agency, now called VicUrban, has, in the name of providing market-place leadership, been planning for and recently building a ‘sustainability showcase’, the Aurora Estate. Situated on the edge of Melbourne’s northern growth corridor, it will provide 8000 homes and is due for completion in 2023.

In particular, the thesis examines the practices of VicUrban and their ‘stakeholders’ to see how these affected the planning and development of the Eco-selector, a tool that was initially used to help the builders select more sustainable building materials, but was dropped from the requirements for building at the estate after being used for two years. Thirty-nine semi-structured interviews and a range of related documents were analysed. A multiparadigm (Lewis, MW & Grimes 1999) approach to theory was used to not only understand the nature of practice, but also agency. The key theories that are used are Bourdieu’s (1977) theory of habitus, Wittgenstein’s (1958) insights into meaning and rules, Vygotsky’s (1965) theory of socio-cultural development, James’ (1890) psychological insights into habit and Gibson’s (1979) theory of affordances. These are brought together to create a new theory of innovation, the model of recursive cultural adaptation (MORCA),
which proposes that practices drive both the resistance to, and the
pursuit of innovation for environmental sustainability.

The main findings of the research are that innovation for
environmental sustainability in a MPC takes place against a
background of existing practices, that changes which are built on
existing practices are easily implemented, that proposed changes
that require the development of new practices are rejected and
that in circumstances where changes are not enforced, earlier,
unsustainable practices are reverted to. The successes and failings
of Aurora are affected by the nature of the practices that are critical
in visioning, developing, and implementing, what is at least initially, a
comprehensive program of sustainable urban design.

The MORCA successfully accounts for the outcomes at Aurora and it
also addresses discrepancies within the innovation literature. It is a
new practice-based reconceptualisation of the structure/agency
debate within the social sciences arguing that social structures
define practice while also being the springboard for agency.
Practices are the enactment of adaptations to the socio–physical
niches inhabited and modified by humans. Practice, as a unit of
analysis, brings into the analytical frame the ecological, cultural and
political dimensions of human existence, all of which have to be
addressed if an environmentally sustainable future is to be created.
Men (sic) make their own history, but they do not make it just as they please; they do not make it under circumstances chosen by themselves, but under given circumstances directly encountered and inherited from the past. The tradition of all the generations of the dead weighs like a nightmare on the brain of the living (Marx & Engels 1852, p. 9).

(W)hat exist in the social world are relations – not interactions between agents or intersubjective ties between individuals, but objective relations which exist "independently of individual consciousness and will," as Marx said (Bourdieu & Wacquant 1992, p. 97).

Chapter 1  Introduction

1.1 The case study - innovation for environmental sustainability

This thesis examines how innovation for environmental sustainability happens within the volume housing sector in Melbourne, Australia. In 2003 the Victorian State Government, hereafter referred to as the State, created a new land development agency, VicUrban, which amongst other tasks has responsibility for enacting the government’s policies on environmentally sustainable urban design (ESD). It and its predecessor, the Urban and Regional Land Corporation (URLC), have planned and, since 2008 sold house and land packages at their Aurora Estate, on Melbourne’s northern fringe (see Appendix 1).

Aurora and a tool to help the builders’ select more environmentally

---

1 The volume housing sector is responsible for sale of land and building the majority of new homes on Melbourne’s suburban fringe. Although the building industry is predominately made up of single person and small businesses, this part of it is dominated by 10 to 15 companies.

2 This thesis does not problematize ‘environmental sustainability’ or ‘environmentally sustainable design’ or any related normative assumptions. These terms are primarily operationalized through their use by the agencies and individuals that participated in the research.
sustainable materials, the Eco-selector, make up the case-study explored by this thesis. The period covered by the research is from 2002 until 2010 – from initial planning through to the first 450 houses being built, at which time the effectiveness of the vision for Aurora and the Eco-selector could be assessed (see Appendix 2 for a timeline of key dates).

Both VicUrban and the URLC promote Aurora – an 8000-home master-planned community (MPC) – as a market-leading, innovative, environmentally sustainable showcase which sets a new benchmark for the land development industry. It is due for completion in 2030, occupies 630 hectares, of which 135 are to be open space and has a projected population of 25,000 people. Aurora’s initial brief responds to multiple issues including passive solar design, energy efficiency, embodied energy, biodiversity, CO² emissions, toxicity, recyclability, waste management and water use/reuse. Furthermore, urban design issues such as integrated public transport, walkability, community amenities and increased densities were also included in the planning. The proposed aesthetics for the estate is ‘contemporary’ while also being sensitive to the unique historical and environmental aspects of the site. The need to create ‘community’ was also considered, with plans for items ranging from permanent art installations through to an ultra-high speed community intranet – so-called ‘fibre-to-the-home’ (see Appendix 3 for a list of features). Broadly speaking, many of these features are within the rubric of ‘new-urbanism’, the North American movement that reacted against car-centric urban sprawl. However,
Gleeson (2005) argues, using the example of Canberra, that the car has not dominated Australian planning as much as it has in the USA and many of the principles codified in new urbanism have been evident in ‘good urbanism’ for a long time. Nevertheless, many of the features listed for Aurora have not previously been specified on this scale.

Although the URLC and VicUrban set their sights high, assembling a long list of ESD and other features, there is a question as to whether Aurora has been as successful as planned. Some proposed features did not make it into the built fabric of Aurora, for example, extending the suburban railway line – a key service for mitigating against car-centric suburban life. Others were tried and failed, like water-sensitive urban design features called rain-gardens, while some have struggled to be correctly installed, like the solar-hot water boosters. However there were unexpected successes with some suppliers modifying their products so that they would meet the selection criteria for inclusion in the Eco-selector. At a general level – for those builders who stayed at Aurora, as some left, the tool can be considered a conditional success – the builders met the requirements and procured more sustainable building materials. This thesis explores some of these failings, near-misses and successes.

The range of outcomes at Aurora attests to the difficulty of moving from an idea to an outcome. This gap is referred to as the theory/practice divide (Sherman & Torbert 2000). It is evident in the gap between the insights and knowledge produced by
environmental science and actual change (Hamdouch & Zuindeau 2010). This contradiction is at the centre of change for environmental sustainability and is the central question of this thesis. It is addressed by asking: how did the practices of the stakeholders affect the ideas and outcomes for greater environmental sustainability at Aurora? It does this by critically engaging with the concept of practice to understand the innovation process and to develop a new model that explains the phenomenon. The secondary research questions, explored in turn from Chapters 2 through 7 are; what are the historical underpinnings for contemporary land use practices; what is innovation, how does it happen and what are its effects; can a theoretical model of innovation be developed that can account for the different types of innovation; how was a vision for Aurora and the Eco-selector created, modified, and what effect did this have on the initial planning and early implementation of project; what led to some changes for greater environmental sustainability being accommodated while others failed to materialise; and, what led to significant opposition to proposed change of practice?

1.2 Structure

To understand current land-use practice, Chapter 2 examines its historical underpinnings. I argue that the dispossession of the

---

3 The practices examined do not include those of the home buyers at Aurora – a critical element for actual improvement in environmental sustainability. Improvements in the thermal performance of dwellings alone will not result in reduced energy use. Ultimately these improvements can only assist households become more efficient users of energy in their day-to-day use of dwellings (Rees 2009).
Aboriginal peoples established a fundamental contradiction that affects contemporary land-use. This is expressed in attempts to ameliorate the damage done to the environment and people by the pursuit of profit. The State has attempted to regulate this contradiction through building and land-use laws and policies and by creating VicUrban and its predecessors. As an example of the expression of contemporary land-use policies, Aurora and the Eco-selector can be seen as an attempt to straddle this contradiction. Although neo-liberal Government policies require VicUrban to compete against private-sector land-developers, it nevertheless is required to lead the market by enacting the State’s policies on environmentally sustainable urban design. It does this via innovation. As such, understanding the nature of innovation is critical for understanding what the URLC and VicUrban set out to achieve, the processes they used and their successes and failings.

Chapter 3 reviews the analytical frameworks used to understand innovation. It examines how innovation is defined, how the term is used and what is the nature of the phenomenon. Engaging with this literature has led one analyst to conclude that ‘the most consistent theme found in the organisational innovation literature is that its research results have been inconsistent’ (Wolfe 1994, p. 405, original emphasis). However, although there are inconsistencies and, indeed, contradictions in this literature, there are three discernable levels of factors implicated in innovation. First, there are macro-level factors that address sociological questions. For example, is innovation a localised or a diffuse phenomenon? The second,
identifies meso-level factors that are concerned with the location of innovation and examines the types of organisational relationships that foster or hinder it. Third, micro-level factors address behavioural and attitudinal issues and how these impact positively or negatively on innovation. As well as the inconsistencies found by Wolfe (1994), I find inconsistencies and contradictions between and within the three levels which, in a bid to resolve them, Peter Schumpeter’s (1934; 1939; 1950) influential theory of innovation is examined.

Innovation is central to Schumpeter’s economic theory (1934; 1939; 1950). He uses it to resolve a problem in classical economics regarding the nature of growth, which posits that markets should be stable, finding an equilibrium between supply and demand. He calls this the ‘circular flow’ of every day activity (Schumpeter 1934, p. 3). The problem he identifies with this model is that it does not account for growth. He borrows from Marx and Engels (1848) the idea of creative destruction to resolve the problem of equilibrium by arguing that innovation is the means by which new products or processes succeed in the market while simultaneously ridding it of the old (Schumpeter 1950).

Schumpeter (1950) identifies a key attribute of innovation, specifically that it is resisted because of people’s routines and habits. I also argue that this is a key aspect of the phenomenon. However, his analysis posits individualistic ‘super-human’ entrepreneurs who, as the drivers of innovation, work to counter everyday normal activity. In contrast, Von Hippel (1988) argues that innovation can be a social
process – that groups with a shared purpose can and do pursue innovation collaboratively and en masse. This social, rather than individualistic understanding of Schumpeterian economics, I argue, puts groups rather than individual differences at the centre of the innovation process. The question that this raises is what is it about a particular group that makes it pursue innovation or resist it?

Schumpeter’s argument that professional practice resists innovation is developed in Chapter 4 which builds on the idea that innovation is a social process. I develop a new model of this phenomenon by foregrounding the nature of social practice (referred to hereon as practice). Like Schumpeter, Schön (1992) argues that professional’s actions are dominated by an intuitive technocratic rationality – ‘knowing-in-action’ (p. 56) – automatically applying proven solutions as a matter of course. However, although these theorists argue that practice resists innovation, neither adequately resolves the nature of agency – the motivation required to achieve change.

A more in-depth analysis of practice is provided by Bourdieu (1977; 1990; 1998), who argues that people’s practices – their dispositions – are unconscious expressions of social structures. Habitus thus, is the subjective experience of objective social structures. As such, people’s social positions define their actions. However, Bourdieu is criticised for being deterministic – people are locked within their habitus (Jenkins 1982).
Like Schumpeter and Schön, Bourdieu fails to adequately explain agency – the mechanism that drives agency and innovation. To address and then resolve this problem, I use a multiparadigmatic approach to theory–building (Buchanan & Bryman 2007). This process utilises complementary theories and insights drawn from a range of disciplines. I use ideas from anthropology, evolutionary biology, philosophy, psychology and sociology. The primary theories used are Bourdieu’s (1977) theory of practice, Wittgenstein’s (1958) insights into use and rules, Gibson’s (1979) theory of affordances and Vygotsky’s (1965; 1978) theory of socio-cultural development. I use these perspectives to develop a model of recursive cultural adaption (MORCA) which locates innovation as a force for adapting practice. The model proposes that:

- Successful innovation is dependent upon the development and maintenance of a shared vision.

- Existing practices will readily change provided the proposed innovation is easily accommodated, that is, it fits existing practice.

- Threats to existing practices will be defended against change which politicises the innovation process.

- Once implemented, an innovation requires vigilance until such time as the practice has become knowing-in-action.
The first two propositions are tested respectively in Chapters 5 and 6. The second two are tested in Chapter 7. The data that are collected by way of document analysis and interviews conducted with 39 people who were directly or indirectly involved in the development and/or implementation of the Eco-selector is used to construct the story of the development and effects of the tool.

Although studying the Eco-selector was originally conceived of as the starting place for this research, it has become the primary focus. The initial interviews ‘snowballed’ revealing historical, contractual, accidental and political relationships that were the conduit for the practices of the various actors. The primary relationships, illustrated in Figure 1 are those between VicUrban, RMIT University’s Centre for Design\(^4\) (CfD) and the Aurora builders. This group is a function of VicUrban engaging the CfD to create the Eco-selector to modify the practices of the builders. However, once drafted, the Eco-selector itself came to have agency as it engendered responses that were not sought by those developing the tool. These secondary, incidental relationships led, for example, product suppliers changing their practices so that their products could be specified for Aurora. This included a door manufacturer removing a rain-forest timber trim. Other incidental relationships included those of ‘third-parties’, such as architects, who, although having nothing to do with the Aurora project, nevertheless sought out the Eco-selector so that they could adapt their practices for use on unrelated projects. Similarly, the

\(^4\) The CfD specialises in research into design and environmental sustainability.
tertiary relationships are those that were engendered by the Victorian Association of Forest Industries (VAFI), the timber industries’ peak representative body in the state, intervening in the development of the tool in a bid to protect what they perceived as a threat to their members’ practices.

The fourth type of relationship, shown in Figure 1, is historical – these are VicUrban’s predecessors. The URLC and the MDA ‘live on’ or ‘haunt’ VicUrban as adapted practices that animated the new organisation – providing its culture. These, then, are also practices that have affected Aurora and the Eco-selector. Professional practices animate an organisation. For example, the CfD, are not typical profit-driven consultants, but academics. Hence, the ‘way’ the CfD operated uniquely affected how they related to the other

Figure 1 Relationships that defined and affected the practices used for the development and implementation of the Eco-selector

The fourth type of relationship, shown in Figure 1, is historical – these are VicUrban’s predecessors. The URLC and the MDA ‘live on’ or ‘haunt’ VicUrban as adapted practices that animated the new organisation – providing its culture. These, then, are also practices that have affected Aurora and the Eco-selector. Professional practices animate an organisation. For example, the CfD, are not typical profit-driven consultants, but academics. Hence, the ‘way’ the CfD operated uniquely affected how they related to the other
‘stakeholders’ in developing the tool. It is these ‘ways’ or practices that define the nature of the outcomes.

Chapter Eight reviews the research findings. It examines the utility of the MORCA by revisiting the innovation literature. The structural, locational, and behavioural/attitudinal issues that are said to impact positively or negatively on innovation are re-evaluated in light of the model. The strengths and weaknesses of the model are explored and further ways of testing it are suggested.
Chapter 2  Historical and contemporary frameworks for Aurora and the Eco-selector

This chapter explores the underpinnings of current land-use practices in Melbourne. It addresses the question, what are the historical underpinnings for contemporary land use practices? It does this to locate the particular practices that were used to pursue innovation for environmentally sustainable urban design (SUD) at Aurora. I argue that Aurora responds to the growing global awareness of environmental degradation and also to the particular Australian contradictions that emerged as a result of colonisation – the dispossession of the Aboriginal peoples. The attempts of the State to address these contradictions are examined, including tracing the creation of State enterprises, such as VicUrban in this case, which via innovation, is charged with delivering market-priced lots and housing while also addressing SUD.

2.1 Why Aurora? Responding to environmental change

The affluent world has, via globalisation, largely displaced the immediacy of its urban industrial pollution and slums to the developing world’s burgeoning cities (McMichael 2000). Internationalised capital, seeking cheaper labour, less strictly-regulated states and worldwide markets is likely making social and environmental problems worse (Borghesi & Vercelli 2003). Nevertheless, globalisation reinforces the idea, illustrated by human–
induced climate change, that local actions can have planet-wide effects. In response to this, the United Nations Agenda 21 program encourages local-level action (United Nations 1992). Agenda 21 builds on the United Nations’ earlier report, Our Common Future, which urges economic development to become ‘sustainable to ensure that it meets the needs of the present without compromising the ability of future generations to meet their own needs’ (Brundtland 1987, p. 24). This concern with environmental sustainability has, in Australia, seen it become a mainstream issue (Lothian 2002), with all major political parties and levels of government now having policies that respond to the human impact on the planet.

Aurora can be seen as a government-led response to the internationally recognised problem of environmental degradation, such as global warming. Australia’s increasing greenhouse gas emissions, combined with the residential sector using approximately 8% of energy production (ABS 2008b) sees the building and land development industry being challenged to be more ‘sustainable’. Consumption, production, and cultural practices are all implicated in, not only the problem of environmental sustainability, but also the solution, that is, living without negatively affecting the ecology of the planet (United Nations General Assembly 2002). Land-use practices, thus, are a key to environmental sustainability. As such, let us then start at the beginning of Melbourne’s contemporary land-use practices – the clash between the practices of the local Aboriginal people, the Koori, and those of the colonial invaders.
2.2  A brief history of the present: establishing post-colonial land-use practices

It is somewhat ironic that Terra Australis – the unknown land of the south – hypothesised by Aristotle and Ptolemy many centuries before it was ‘discovered’ should effectively remain unknown even after colonisation by the north. This is evident in the fact that the pre-existing Aboriginal land-use practices were ignored, derided and negated by foreigners preoccupied with Victorian morality and the quest for profit. Yet, prior to the ‘founding’ of Melbourne, Australia, in 1835 the local Koori peoples, as did all Aboriginal Nations, maintained an intimate and interrelated spiritual, social and economic relationship with the land that had sustained them for tens of thousands of years. These profoundly sustainable practices were threatened and undermined by disrupting the housing, production, consumption and cultural systems that underpinned them.

The new colonial authorities and the laws they enacted not only sought to corral and discipline free and highly successful cultures but also set in place mechanisms to introduce and legitimise radical new alien practices, specifically those of 18th and later 19th century capitalism (Sandercock 1990; Attwood 2000; Troy 2000). For example, one of the first land-use proposals made by Governor Phillip in 1788 for a utopian plan of Sydney was that housing lot sizes be 150 by 60 feet – slightly larger than what eventually became in Australia the ubiquitous suburban quarter-acre block (Marsden 2000). In 1837 the first task of colonising Koori land that would become Melbourne was to survey and subdivide what was up until
then, communal. The lots were then quickly auctioned, creating a land market where one had not previously existed. Moreover, this immediately gave rise to an economic boom that generated extreme land speculation and profiteering. For example, three lots that initially sold for £136, sold three years later for £10,000 (Cannon 1967, p. 12). As such, privatising the land created not only the means by which rents could be extracted from what was previously free but also land speculation for profit.

However, the utopian inclinations of a reformist middle-class operating out of their analyses of what was wrong with places that they had come from – predominantly the United Kingdom – stood counter to a more base, simple pursuit of profit. This contradiction was, and remains, a central feature of disputes regarding land-use. This resulted in early housing and land-use regulations being ineffective, undermined, and far from what would have then been considered then, best practice (Marsden 2000). For example, in 1851 the Building Act (Vic) 1849 applied only to central Melbourne, leaving the burgeoning suburbs and huge tent cities that were erected to accommodate 100,000 immigrants drawn to the gold-rush, unregulated. Similarly, other early provisions to control buildings, such as the Health Act (Vic) 1854 and an amendment to the Local Government Act (Vic) in 1915 authorising councils to set standards, were piecemeal or not utilised (Bowman 1981). This led to council by council, colony by colony and, after the creation of the Commonwealth of Australia in 1901, State by State variance of building regulations. It was not until 1990 that Australia had one set
of building regulations, the Building Code of Australia (BCA), which addresses health, safety, fire, access and egress.

There was, however, early unanimity regarding who had responsibility for the control of land-use. In 1835 the English Crown proclaimed Australia *terra nullius*, a land belonging to no one. This legalised the dispossession and infantilisation of the Koori and other Aboriginal peoples by classifying them as fauna. This was a two-fold negation. First, Aboriginal spiritual, cultural and economic practices were undermined by stealing the land that underpinned their life. Second, the legitimate discourses regarding land-use and housing were limited to, on the one hand, middle-class morality and on the other, their pursuit of profit. As such, the negation of Aboriginal practices rarely generates widespread discourse that speaks directly to colonisation\(^5\). Thus, the parameters for legitimate debate regarding land-use and housing are limited to middle-class concerns. The effect of these contradictions and negations of practice and discourse are not only still felt today by Aboriginal people trapped at the margins of mainstream culture but define our current norms for land-use and housing.

The socio-economic disruption of Koori culture provided the means by which the Crown could extract rents from Melbourne’s initial

---

\(^5\) It is noteworthy that the companion books produced by the Urban and Environment Program at the Australian National University, *Settlement: a history of indigenous housing* and *A history of European housing in Australia*, cited herein, have different publishers. The first is published by a relatively small local specialist publisher, Aboriginal Studies Press, while the other is published by Cambridge University Press – one of the largest academic publishing houses in the world. The exclusion of Aboriginal issues from dominant discourse continues.
industry – wool produced for the profit of English mills. The pastoral industry was soon displaced as the primary generator of profit in the 1850s by a gold rush. This accelerated the development of Melbourne which boosterists would come to proclaim the ‘Paris of the South’ (Otto 2009, p. 13). However, the unfettered use of the land by industry, combined with ineffective means to remove and treat sewerage, saw industrial and human effluent running through the creeks and rivers of Melbourne, which, in a parody of its burgeoning reputation as a metropolis, was labelled ‘Marvellous Smellbourne’ by visiting English journalists in the 1880s⁶. This pollution was responded to by a reformist middle-class preoccupied with the ‘immorality’ of the working-class who were trapped in urban slums (Barrett 1971).

2.3 Moderating practice: regulating profit and dis-ease

As noted, 1880s Melbourne was characterised by an economic boom which saw rapid and profitable land speculation. This was accompanied by the excesses of favour, nepotism and profit which saw fortunes won and lost by investors (Cannon 1967). A crash led to economic stagnation that lasted into the next century. Regulations controlling land use and pollution were deployed to mitigate against inner-city slums by defining minimum lot sizes and setbacks (Dodson & Gleeson 2007). In 1922 the Metropolitan Town Planning Commission Act (Vic) came into effect to deal with both

---

moral/aesthetic and, because of a miasmic rather than germ theory of disease, worrisome health-problems (Freestone 2007).

The State used two strategies to counter the profiteering by the housing market. First, in 1938, it created the Housing Commission of Victoria that took an active role in slum clearance (Sandercock 1990). Second, in 1975, at the behest of the Commonwealth government, the Victorian Urban Land Council (ULC) was established to take an active role in the production of housing lots to counter oligarchical forces – ‘profit-gouging’ resulting from a small number of land developers – by influencing the supply and demand cycle through significant and timely land sales (Troy 1978). However, this role was to change. Dalton (1999) argues that the State’s role in the provision of housing was wound back and by the 1990s, neo-liberal policies saw the privatisation of many state-held assets and functions. This affected the role and function of the ULC. In 1998 the ULC, by then the Urban Land Authority, was corporatised. This transformation was accompanied by a new name, the Urban Land Corporation. The next step in the evolution of the organisation in 2001 saw it given a broader mandate and renamed the Urban and Regional Land Corporation (URLC) – the initial planners for Aurora. The URLC interpreted its role as promoting:

> best practice in urban and community design and development having regard to links to transport services and innovations in sustainable urban development. We will also seek to contribute to improvements in housing affordability throughout Victoria (Urban and Regional Land Corporation 2001, p. 5).
Still maintaining an active role in the production of housing lots, the State responded to growing community concern regarding climate change by directing the URLC to lead – via innovation – the urban land market towards environmental sustainability. By 2003 when the URLC became VicUrban as a result of an amalgamation with the Melbourne Dockland Authority (MDA), it was an established force within the market. For the previous 10 years it had maintained land sales equal to approximately 11 percent share of the total market (Urban and Regional Land Corporation 2003). This has now changed. The State’s land developer, VicUrban, no longer publishes its market share but they do report the number of lots sold in their annual reports. In 2009/10 they sold 802 lots (VicUrban 2010) while the total for Melbourne was 28,741 (Spatial Analysis & Research 2010). Hence, VicUrban had 2.8 percent of the market and can no longer be viewed as a moderator of oligarchical forces. Although the organisation attempts to address housing affordability, it does this using the same methods that it uses to position itself as a leader in ESD – via innovation to deliver exemplar projects – rather than direct market intervention.

Hence, VicUrban’s commitment to innovation is central to understanding not only how the organisation positions itself within the market but also how it goes about its business. It is noteworthy that the creation of VicUrban was not merely an ‘evolutionary’ step within the historical trajectory of the ULC/URLC but a hybridised body that came to include the MDA, the statutory body that oversaw a post-industrial redevelopment of part of Melbourne’s docklands. As
such, two different organisational cultures came together with their associated practices and were given the task of delivering ‘sustainable urban design’, as set out in the Urban Development Authority Act (Vic) 2003 and in the aspirational policy guideline, Melbourne 2030 (Victorian Department of Infrastructure 2002). This mission was not alien to the ULRC. Although its primary role was to moderate the land market, in 2002 the organisation began to engage with issues regarding environmental sustainability, through its Smart Living policy, and housing affordability, through demonstration projects in partnership with private and community organisations (Urban and Regional Land Corporation 2003). This amalgamation and the bringing together of the different organisational cultures happened at the same time as Aurora and the Eco-selector were being planned and developed. As such, two potentially difficult processes, had to be managed simultaneously.

2.4 Differing histories and practices: MDA +URLC = VicUrban

The URLC delivered multiple projects at various stages of development at any one time. Its model of delivery was project management. This requires small in-house teams to buy-in the expertise, such as urban design and engineering, which are needed to develop and sell housing lots. However, the MDA had a singular focus, namely the Melbourne Docklands. It was also more concerned with issues of design than the URLC. From 1992 it was required to historically evaluate, assemble the land, master-plan, tender and oversee the site’s development. Furthermore, the site
was not without controversy. The development of the Melbourne Docklands was devoid of public consultation and led to public lands being used for private gain (Long 1996; Dovey & Sandercock 2002). It was also the site of several contentious proposals. In 1987 it was suggested as a possible site for a ‘multi-function polis’ – a high-tech residential, leisure and technology park. The scheme was eventually abandoned after it was awarded to Adelaide due, in part, to racism generated by the fear that the MFP would be a Japanese enclave – the project was a joint venture between the Australian and Japanese Governments. In 1998 another contentious, and later discarded suggestion for the site, was the ‘Grollo Tower’. With a proposed height of 678 metres it would have been the world’s tallest building. Derided for being a “‘mine’s bigger than yours” boy’s game’ ... it acted ‘as a lightning rod for public criticism of the larger planning process’ (Dovey & Sandercock 2002, pp. 92-3). Thus, the MDA was subjected to considerable political pressure. Its CEO, who would go on to lead VicUrban, had a reputation for steely resolve having arguments with Premier Jeff Kennett and several major property developers (Mayne 2005).

In contrast to the controversy surrounding the development of the Docklands, the URLC had none of their projects subject to this sort of public scrutiny. Although, in 2001, as Economou (2002) notes, the URLC was subject to some controversy, this was regarding the probity of appointing a friend of the then Premier, Steve Bracks, to head the organisation. The resulting scandal was resolved when the appointee resigned. As a result, although the pre-amalgamation
organisations were similar, in as much as they both engaged in urban development, their different histories, scope and the nature of their projects, as well as differing methods of delivery, gave them unique cultures that had to be brought together with their amalgamation in 2003.

Organisational cultures can be conceived of as the agglomeration of disparate normative practices or, simply, ‘the way things are done around here’. For example, the practices of marketing are different from engineering which, in turn, are dissimilar to those of designing. Each profession interprets problems differently (Schön 1992) and, as a result, suggests and lobbies for its own desired outcomes (Howard-Grenville 2006). These are then filtered through and by managerial decision-making and politicking. For example, the MDA had a ‘design-led’ approach to rejuvenating the Melbourne Docklands, although many of the suggested but not implemented schemes, were little more than a seductive diversion that effectively clouded over the significant public interest and design issues of the site (Dovey & Sandercock 2002). Nevertheless, like the URLC, the MDA was an early developer of an environmental sustainable design (ESD) guideline to evaluate developers’ proposals for the site (VicUrban 2006c).

2.5 Conclusion

Although the URLC and the MDA were broadly similar in as much as they both developed land and had a burgeoning interest in ESD, they nevertheless had quite different ways of delivering their
respective projects and attracted very different levels of scrutiny. Amalgamating these two sets of organisational practices heightened these differences as struggles for power took place within the new organisation. The context for Aurora, thus, at the macro-level, included having to straddle the structural contradictions of land/house development within Melbourne while, at the meso-level, the organisation had to realign and establish a ‘new’ organisational culture. As such, at the micro-level the actors had to respond, not only to the new organisation’s mission but to the uncertainty and change associated with the amalgamation. For example, there were two CEO’s but VicUrban would only need one.

Thus, there are a multitude of levels of forces – those at the macro-, meso- and micro-levels – which affect typical land development. As the example of the lack of controversy experienced by the URLC regarding its projects attests, generally speaking, land development happens as a matter of course – there is a balance between the three levels that allows for the professionals involved to simply go about their business, as usual. However, should one or more of the levels change, as the example of the Melbourne Docklands with its change from public to private ownership and use illustrates, controversy and uncertainty ensue. This process of change and its effect on outcomes includes the raison d’être of VicUrban – to innovate for ESD. Before we can examine how these forces affected the process and outcome for Aurora and the Eco-selector, we must understand the nature of innovation. The next chapter reviews the
innovation literature to define the term, understand its use and nature.
Chapter 3 Using innovation to understand change

3.1 Introduction

Chapter 2 argued that the pursuit of profit and the reactions to environmental and social degradation are the central contradiction at the heart of land use and housing-supply in Melbourne. From the 1850s the State periodically attempted to ameliorate the worst effects of this contradiction by way of regulating building practice and the land and housing markets. With the advent of Thatcherism and Reaganomics in the 1980s there was a marked reduction in the willingness of many governments of developed western states, including Victoria, to deploy interventionist measures to manage the adverse effects of free-market exploitation. However, although neo-liberalism has been ‘buried’ several times, most recently after the global financial crisis, it is unlikely to be superseded in the near future (Crouch 2011). As such, the policy framework for land development continues to rely on market forces to deliver ‘products’ rather than ensuring affordable and environmentally sustainable homes.

VicUrban, working within this framework, attempts to resolve the contradiction of land-use by seeing its role as an innovator – creating better homes that, via demonstration, will result in the rest of the market following them towards greater environmental sustainability. This leads to the question what is innovation, how does it happen and what are its effects? This chapter addresses this question by reviewing both the broader and building industry-specific innovation
literature. The definition of innovation, how the term is used and how it is understood are examined. The review identifies three levels of factors – the macro, meso and micro – that are argued to affect the pursuit of, and resistance to, innovation. However, as Wolfe (1994) argues, there are contradictions and inconsistencies in the literature. To start to resolve these, Peter Schumpeter’s (1934; 1939; 1950) early and influential model of innovation is critically explored.

3.2 Defining innovation and its use

Although the etymology of innovation is innovare, meaning to renew, current usage broadly defines the term as the modification of a practice or the introduction of something new (Kline & Rosenberg 1986). However, this sometimes creates confusion between invention and innovation, with the former being the creation of something new, while the latter is concerned with new use or the modification of an existing product or process. For example, using sustainable urban design principles in a sector, such as land development, where they were not previously used is an innovation. This is different from the invention of those principles and their codification, which was driven by an environmental movement that has its roots in the 1950s and 1960s. As such, it is not uncommon for the innovation literature to be confounded by a concern for the lack of corporate research and design (R&D) that might focus on invention rather than examining the process of modifying existing practices (see Kivimaa 2008).
The failure to come to terms with the nature of innovation means that sometimes it is not defined at all or treated as a ‘black box’ (Landau, Rosenberg & National Academy of Engineering 1986; Balaguer et al. 2003; Nelson, Mowery & Fagerberg 2005). At other times it is treated uncritically – necessarily ‘good’ – rather than analysing who may benefit or lose from an innovation, such as the deployment of automation in a craft industry (Schumpeter 1939).

Sometimes innovation is defined circularly, innovative policy reform will produce innovative outcomes (Aarts, N. Van Woerkum & Vermunt 2007) or defined in a post-hoc fashion – identified as being innovative because it is later judged as being successful (Barlow 1999; Gann 2000).

‘Innovation’ is also used politically. For example, as organisations that are encouraged by Governments to seek funding from industry, Universities may have a vested interest in calling for more R&D (West 2001). Similarly, some academics have argued that land developers and builders must ‘innovate’ to achieve change in a desired direction, such as becoming more environmentally sustainable (Barlow 1999; Burdock et al. 2001; Dewick & Miozzo 2002; Crabtree 2006) or more customer-focused (Barlow & Ozaki 2003). ‘Innovation’ is used politically when it is seen as a means of questioning politico-economic frameworks, such as the legitimacy of ‘shareholder’–user–pays systems or ‘stakeholders’ whereby any group that is affected by a decision might have a voice. For example, it has been used as a means of defending against Thatcherism and Reaganomics and as a panacea for the USA’s economic woes (Miles, Snow & Miles 2007).
These varied (mis)uses of the term are expressed in seemingly contradictory research findings and claims, which, at the least, mean that innovation ‘is a complex, multi-phased activity, moving from initiation to adoption and implementation’ (Pierce & Delbecq 1977, p. 27). There are significant discrepancies and widespread disagreement in accounts of the nature of innovation (Lewis, LK & Seibold 1993). Indeed, Wolfe (1994) argues that the contradictions and resultant confusion is because of an attempt to theorise multiple phenomena as a unitary concept.

However, multiple ontologies and their respective methodologies, rather than the nature of innovation, may be the problem. According to the social constructivist critique of knowledge production (Hacking 2002), the methodologies used in research profoundly affect the results. Both the researched objects and outcomes are socially constructed by the particular theories used (Ferraro, Pfeffer & Sutton 2005). Crucially, as some constructionists point out, descriptive, seemingly atheoretical research presents a priori and possibly hegemonic constructs rather than prescriptive research which, having an overt theory, suggests particular and critically transparent solutions. Descriptive research, particularly when it is unreflexive, that is, normative, can perpetuate reductive understandings. Although reductionism has, at the human-scale7,

---

7 At the micro– sub-atomic and macro– cosmological scales physics has had to abandon reductionism and has moved to relational understandings, so much so, that the observer is now considered to be part of what can be observed at the quantum level. This collapses classical physics idealisation of matter while ushering in the concepts of acausality and discontinuity. For example, photons are both particles and waves – depending upon the observation made (Mehra 1987).
been an extraordinarily powerful tool in the physical sciences, enabling the creation of powerful technologies, its use in the social sciences is problematic at best, tending to produce atomised individuals rather than socially-located and defined group-members (Verschuren 2001). Thus, it is perhaps unsurprising that reductive research which analyses the minutiae of the innovation process, for example, the effect of 14 variables on each of 3 stages, proposes an ‘additive linear model’ (Pierce & Delbecq 1977, p. 34) is then counterposed by evidence for non-linear complexity in the innovation process – that the innovation process is not neatly ordered, proceeding from one step to the next (Pelz 1983).

Nevertheless, although the literature suggests that innovation is a particularly ‘complex and elusive phenomenon’ (Scott-Kemmis et al. 2005, p. v), research into the factors that foster or hinder innovation falls into three, sometimes overlapping levels. First, there are macro-level factors. For example, is innovation a continuous or discontinuous phenomenon? Does it cause iterative or quantum change? Is it facilitated or hindered by the state? Second, there are meso-level factors, such as organisational relationships. Third, there are micro-level factors such, as behaviours and attitudes. Are certain traits implicated in the pursuit of innovation? The literature examining these three types of factors is explored next.

3.3 Macro-level effects

A wide range of topics and models have been proposed to come to terms with what is described as both an ubiquitous yet, elusive
At the macro-level, is innovation best understood as incremental, that is continuous, or radical – discontinuous? For example, incremental models include ‘Best Practice’ (Brannan et al. 2008) and the Continuous Improvement Maturity Model (Jørgensen, Boer & Laugen 2006). Or, is innovation best understood as a radical break, so-called ‘creative destruction’, an overturning of existing practice (Schumpeter 1934; 1939) or, as some argue, both (Ettlie, Bridges & O’Keefe 1984; Dewar & Dutton 1986).

Harty argues that innovation can be categorised into two modes: ‘bounded’ where the implications of innovation are restricted within a single, coherent sphere of influence, and ‘unbounded’, where the effects of implementation spill over beyond this (2005, p. 512).

Harty’s case study focuses on the effect of information technology – 3D computer-aided design (CAD) – on the construction industry. He suggests that the effects of 3D CAD is an example of exogenous innovation while most innovation in the construction industry is endogenous. However, it is not clear if these two modes identify different phenomena or whether the same underlying process is operating at a different scale. This distinction between bounded and unbounded innovation begs the question, where is the boundary? For example, European Union policies for environmental sustainability often refer to regions. However, what should define a region’s boundary is far from clear having biotic, social, and economic implications (Pohoryles 2007). A related question to that of the boundary is inter-organisational diffusion – where an innovation spreads, like the use of 3D CAD in the construction
industry. However, although there is a range of benefits associated with 3D CAD, including producing visual representations for clients, higher degrees of precision and computerised fabrication, some innovations spread even though their benefit is moot. For example, the process of firm ‘downsizing’ – terminating employees – is known to be inefficient yet paradoxically, was widely taken up (O’Neill, Pouder & Buchholtz 1998).

Others have questioned the role of the state. It is argued that developing economies can benefit from government intervention while advanced ones should be left free to the vagaries of the market (Mahmood & Rufin 2005), the state being confined to ensuring low economic inflation and a ready supply of research and training facilities and graduates (Landau & Rosenberg 1986). However, argue others that the state is vital for innovation within advanced economies to manage global markets (Griffiths & Zammuto 2005) and that the state’s role should depend on an evaluation of its speed to act – slow when compared to business – and whether its legislative power is needed (Spencer, Murtha & Lenway 2005).

The state is, nevertheless important for the creation of national innovation systems (NIS). Innovation always requires experimentation and thus, is inherently risky. ‘Innovation is always, therefore, both ‘inefficient’ (activities must be undertaken that will probably fail, and yield little or no value) and risky’ (West 2001, p. 24). Thus,
A national innovation system must therefore include some means to mobilize these resources, some means to allocate them to risky undertakings, and some means to assess the progress of the innovation projects, and cut those with unacceptably low prospects of success (West 2001, p. 25).

The key to managing risk is diversification. This means bring three sectors together, businesses, not-for profit organisations (knowledge producers like universities) and financial institutions to share the risk. The need for an NIS, thus highlights the multiplicity of factors necessary for innovation. This complexity is picked up by others.

It is argued that the lack of an effective NIS holds back Melbourne and Sydney from being classified as creative cities (Berry 2005). Although these cities score well on most of the indices identified by Florida (2002), on two – innovation and technology – the scores are not as high. Creative cities, it is argued, are the key for future economic success in a globalised world as they attract members of the, so-called, creative – economically productive – class (Florida 2002). However, the factors that contribute to this classification include, from a policy perspective, ephemera such as the presence of bohemians and non-heterosexuals. However, it also includes factors that are addressed by more traditional policy realms, such as the number of higher-degree holders and amount of ethnic diversity. Although Melbourne and Sydney score highly compared to USA cities on these indices, the question remains as to how a poorly-scored city does not either become economically stagnant or what measures it could undertake to make itself an attractor of the creative class and become a (prosperous) centre for innovation?
Nevertheless, clearly the facilitators of innovation are numerous. However, although there are various components to such a system, there is, nevertheless, an overarching feature – learning – the generation and transference of knowledge between and within the parts (Balaguer et al. 2003). Learning is not simply didactic – it has been argued that the urban fabric of a city can be conceived of as a place, through learning, of radical transformation and innovation (McFarlane 2011). This argument is consistent with the idea that learning can be a site of political struggle between those seeking change and those resisting it (Freire 2005).

In summary, the arguments of these researchers indicate that innovation is relational as it is affected, for better or worse, by the state. However, the contradictory findings regarding the diffusion of innovation do not help resolve its nature – if it is relational, then what is it about the relationships that facilitate innovation or resist it? Furthermore, the diffusion of innovations like ‘downsizing’ suggests that more than purely rational decision making can affect their spread. Thus, innovations can have a life of their own, a seemingly irresistible effect. Furthermore, the environment for innovation – including a bohemian culture and sexual diversity – can be important, again adding weight to the idea that innovation is a relational and social phenomenon.

3.4 Meso-level effects on innovation

The macro-level debates underpin those about the next level of factors, the meso-level. This level addresses the organisational
context of, and for, innovation. However, the distinction between macro- and meso-level factors, although analytically useful, is not clear. Innovation has been sought at the government-to-government level to achieve reform, in for example, federated states such as Canada (Johns, O’Reilly & Inwood 2006). In Australian local governments, strategic information networks were more important than an individual’s position within the organisation for innovation (Considine & Lewis 2007). Other factors that affect the diffusion of innovations within companies include the persuasiveness of the actors, in particular their ability to communicate the likely benefits of change compared to the status quo (Harrisson & Laberge 2002). Similarly, the success of networks is affected by whether the aims of the elements of the network coincide (Dewick & Miozzo 2004).

Leadership, thus, is implicated in innovation, however, it is a neglected topic as much of the research focuses on the positions within, and structures of, the networks, missing their inherent dynamism and how they are orchestrated (Dhanaraj & Parkhe 2006). Other factors that affect innovation include an organisations’ culture. Intangibles, such as its norms, ways of doing and standards act to define the bedrock for innovation as is the contestation of ideas (Garcia-Lorenzo 2006). Another two intangibles that have affect interorganisational collaboration are embeddedness and involvement, that is, commitment to the project leads to the transference and development of knowledge (Hardy, Phillips & Lawrence 2003).
To summarise, informal, as well as formal networks, are important for innovation (Marceau 1999). However, their success is affected by other factors such as the structure of the industry, firm size and the nature of the products as do a company’s capacity for sharing risk, accessing new markets and technologies and sharing skills and knowledge, although barriers include external disruption and inter-firm conflict (Pittaway et al. 2004). Thus, broadly based leadership across a network of agents is important for innovation. These factors, while affecting interorganisational collaboration, also fall into the third level of factors – the micro-level. These are explored next.

### 3.5 Micro-level effects

At the micro-level, psychological phenomena are examined to understand innovation. In its most individualistic conception, Felin and Foss (2006) argue that the individual is, ipso facto, the unit of analysis. They say, ‘organizations are made up of individuals, and there is no organization without individuals’ (p. 3). The point they are making is that, for example, discussion of NISs reifies innovation rather than seeing it as particular activities carried out by particular purposeful actors. They ‘furthermore argue that theory-building should be founded on rational choice theory rather than on theories of individual behaviour, which is reactive, routinized, etc’ (p. 5). As such, people’s deliberations, choices and actions, that is their causal effect, is the factors that Felin and Foss posit are at the heart of organisations and thus, innovation. These arguments will be assessed in Chapter 8.
Other micro-level factors have been identified that affect innovation. These factors broadly fall under the heading of competencies and include attitudes and responses to innovation by individuals, groups and how people respond to particular or changing contexts. Individual attributes include creativity and entrepreneurship (Schumpeter 1934; 1939; Glynn 1996; Mostert 2007; Watson, E 2007), being open to new ideas and sustaining them (Ross 1974), the role of tacit knowledge (Howells 2002) and how people’s roles, positions and self-definitions affect their responses (Considine & Lewis 2007). Also implicated in innovation are actors’ freedom and readiness to take risks (Lassen, Gertsen & Riis 2006), persuasiveness (Harrisson & Laberge 2002), and whether strong leadership does, or does not, foster innovation (Benn, Dunphy & Griffiths 2006). Group factors include active group learning (London & Sessa 2007), cooperation (Alves et al. 2007) and collaboration (Kaltoft et al. 2006; Middel, Boer & Fisscher 2006).

Contextual factors can straddle the meso- and micro-levels and function as a relationship between people and their contexts (Woodman, Sawyer & Griffin 1993). These include environments that are systemically complex (Mittleton-Kelly 2006) and those that change. For example, performance-based rather than prescriptive building regulations are said to encourage innovation – leaving individuals and companies to decide how to meet targets defined by the state (Greig 1992; Krozer & Nentjes 2006). However, others argue that ‘a smaller government sector, better legal structure and security of property rights, as well as less regulation of credit, labour
and business tend to increase entrepreneurship’ (Nyström 2008, p. 269). Other contextual factors include ‘nonhuman materials and technologies’ (Lovell 2007, p. 2500). The onset of a crisis can also drive innovation (Benn, Dunphy & Griffiths 2006; Krozer & Nentjes 2006).

Other somewhat less-tangible conditions are argued to affect how people engage with innovation, such as the ‘right’ time vis-à-vis wider debates that may facilitate or retard opportunities (Dudley 2005). Similarly, the ‘readiness’ of organisations (Holt et al. 2007) and industry (Crabtree & Hes 2009) are said to be important. Cross-cultural differences can affect diffusion of innovation (Kedia & Bhagat 1988). Democracy within a company, it is argued is also important. There needs to be free and open decision-making ‘based on a system of political, social and civil rights and obligations within a framework of legitimate authority, parallel to the system that exists in the wider society’ (Coopey & Burgoyne 2000, p. 869). This political aspect of the innovation process is highlighted by the parallels between social movements, such as the civil rights protests and actions in the USA and technological innovation, such as Sun-Microsystems quest to establish their Java software as a standard. Both movements feature, to a greater or lesser degree, similar attributes. For example, frameworks need to be established to define the nature of the problem and its solution. These facilitate the creation of networks of actors that can be mobilised. These then are used to challenge and change obstructive institutional structures. Furthermore, the success of the movements is affected by their
ability to establish their legitimacy. Thus, conflict and the use of power are central features of social movements and innovation and as such, depend on the success of the political strategies deployed by the actors (Hargrave & Van de Ven 2006).

In summary, there is an extensive literature focusing on innovation that presents numerous arguments for a variety of factors that include individual differences, contexts, structures and the nature of the activities that affect innovation. However, the nature of the phenomenon and exactly what drives it remains, at best, an open question, and, more often than not, it is treated in the literature as an opaque black box (Landau, Rosenberg & National Academy of Engineering 1986; Nelson, Mowery & Fagerberg 2005).

The literature suggests that innovation can be a function of seemingly countervailing factors. Are all, or a set of them, implicated in innovation, and if so, which ones and why? Or is the phenomenon so ubiquitous or complex that it is beyond a parsimonious understanding? If this is the case, what is to be understood by arguments that call for greater innovation within a particular industry? Nevertheless, researchers, such as Barlow and Ozaki (2003), argue that innovation is necessary in the building sector so that it can be improved. The next section reviews the literature on innovation within the affluent western world’s building and land development industry.
3.6 Innovation within comparable affluent western worlds’ building industries

Like Australia, contemporary British housing has been criticised for its poor environmental performance and low quality. It is argued that this is due to it being a consumer rather than a producer of innovations. To address this ‘failing’ ‘radical change’ in housing supply through greater competition and ‘lean production’ – the combination of the best of craft and industrial techniques has been called for. From this perspective, the state has a role in providing appropriate taxation, R&D and training, but substantive change can only come by companies being more proactive through greater employee empowerment and better communications. Moreover, they need a better understanding of the market through, for example, focus groups (Barlow 1999, p. 39).

Thus, only if innovation should remain ‘absent’ from the sector should the state regulate, for example, for greater energy efficiency. As such, the key to getting improvements is through better customer relations: ‘much depends on the industry and its collective ability to acquire the knowledge which can help it form effective relationships with its customers’ (Barlow 1999, p. 40). Furthermore,

(t)he firms which are most adaptable and best able to develop an organisational culture which promotes learning and innovation are the ones which will survive. Firms which remain wedded to traditional competitive strategies are likely to leave the market or find themselves subject to takeover (Barlow 1999, p. 40).

Arguments like these address macro-, meso- and micro-level factors. At the macro-level the overarching problem is framed in terms of the
diffusion of innovation – the building industry is not subject to innovations that have occurred in other sectors. Thus, there is an implied boundary condition present, although its nature is not clear. Furthermore, role of the state should be one of general support – the same for any sector of the economy – although, as a last resort, it may be required to regulate.

The thrust of these arguments is at the meso–level – the role of individual companies. The problems are communication and employee empowerment. However, the more fundamental issue is marketing – the interaction between companies and their customers. This relationship is the means by which companies improve products by addressing their client’s needs but it also ensures the ongoing success of the company by keeping it competitive. Although specific micro-level factors are not specified, contextual issues, for example, organisational learning and leadership are implied.

These factors fit within the overarching framework of neo–liberal economics which have, as a central tenet, the idea that a properly operating free market will ‘automatically’ meet customers’ needs. As such, the ‘problem’ is a failure to meet the markets’ needs and the ‘solution’ is to meet them. However, Barlow (1999) did not offer a substantive reason for this supposed failing, simply calling for the industry to just do it better.

This call for innovation to remedy particular problems is a common argument in the building innovation literature, as is identifying the
‘shortfalls’ that are hindering change such as ‘there are neither economies of scale nor learning effects’ and that there are constraints on innovation caused by ‘severe price competition... and regulation’ (Pries & Janszen 1995, p. 44). However, others argue that the industry’s failure to address sustainability is because of a lack of regulation (2009). A preponderance of economic analyses ‘see’ the industry as being in need of new products, processes, and/or organisational form, (Bowley 1966; Greig 1992; Barlow 1999) and that it needs, more often than not, greater resources (Nelson, Mowery & Fagerberg 2005).

In response to neo-liberal frameworks there has been a so-called paradigmatic change, brought about by considering environmental sustainability (Van Bueren & De Jong 2007). This includes the advent of performance– rather prescriptive–based regulation. There has also been a shift from staged to life-cycle assessment and efficiencies being sought at a systems, for example, city–level, rather than individual buildings. Furthermore, the environmental sustainability of existing rather than just new buildings is being considered as are social and economic issues rather than focusing on just the physical and ecological aspects of the environment.

However, institutional policies – macro-level factors – have not been aligned with this shift. It is argued that up until the 1980s policy prescriptions were linear in their responses – problems and solutions being assessed and responded to within a cause-and-effect paradigm. Furthermore, the building sector is said to like this –
operating happily within a prescriptive regulatory framework. This means that being told to change from ‘X’ to ‘Y’ suits the industry. However, the problem is that there is a ‘lack of clear criteria or methods for distinguishing what was sustainable from what was not’ (Van Bueren & De Jong 2007, p. 547). Under neo-liberalism’s market-based and voluntary proscriptions R&D for environmental sustainability was effectively privatised and limited, leading to the development of a range of tools to measure environmental performance, such as the USA’s Leadership in Energy and Environmental Design (LEED) and the UK’s Building Research Establishment’s Environmental Assessment Method (BREEAM).

This means that the industry no longer has the certainty and direction afforded by prescriptive regulation (Van Bueren & De Jong 2007). Furthermore, the nature of the industry, at the meso-level, also mitigates against widespread innovation for environmental sustainability as it is made up of numerous companies, most of which are medium to small in size. For example, in Australia 99 percent of the people employed within the construction industry are sole traders or small businesses (HIA Economics Group 2010). The structure of the industry also mitigates against whole of life consideration – builders and demolition companies are remote chronologically and in their respective functions – it is likely impossible to plan construction techniques so that the buildings will be demolished in an environmentally sustainable way in, for example, 60 or 100 years time. Thus, straddling the meso- and micro-levels, is the issue of multiple ‘principle agents’ within the industry. Each of the
many professions engaged within it have ‘disparate goals and interests’ (Van Bueren & De Jong 2007, p. 550).

The problem of multiple agents is also additive – for example, the benefits of correct solar orientation of a house depend on earlier decisions regarding the layout of an estate – and this too depends on the normative precepts of the industry. As such, in Australia, traditional free-standing homes dictate the sort of questions and answers that may be asked to create greater environmental sustainability – immediately negating the consideration of efficiencies that might be gained from medium density housing.

Van Bueren and De Jong (2007) conclude that the barriers to environmental sustainability in the building sector include macro-, meso- and micro-level factors. The solutions they propose to this problem include doing more research into what is happening both before and after a project. The knowledge gained from this research should then be directed towards setting policy targets and interventions that use a variety of legal, economic and voluntary mechanisms. They also highlight the need for leadership at a governmental and institutional level, through, for example, exemplar projects. Furthermore, they argue that policy-making needs to be more process-oriented. This requires the participation of a variety of actors so that their diverse views can be incorporated into the policy. This would entail negotiating knowledge rather than attempting to gain agreement on one ‘truth’. The process of negotiation needs to be fluid – determined by the stakeholders
rather than defined beforehand. In this process, the policy professional’s main task is to manage the process rather than determine the scope of the enquiry into the particular problem at hand, as well as determining its solution.

The problem with process-oriented policy development is that it does not account for the effects of power. For example, communicative planning theory is process-oriented and seeks to get stakeholders involved in urban and regional planning. Many have argued that it fails to meet its stated aims, often because those involved in the development of the proposals do not have the power to enact them, or if they do, may change their minds (Tewdwr-Jones & Allmendinger 1998; Fainstein 2000; Huxley & Yiftachel 2000; McGuirk 2001; Brand & Gaffikin 2007).

The gap between the aims of process-oriented policy and its failure is evident in other fora. For example, some argue that the industry has a poor understanding of environmental sustainability (Van Bueren & De Jong 2007). Yet others find that there is significant interest within Melbourne’s building industry (Thomas, Okraglik & Pollard 1996). Nevertheless, as of 1995, there was almost no change in practice. Furthermore, those few companies that have policy addressing environmental sustainability tend not to implement it. The remedy for this dilemma is again framed by neo-liberalism – innovation for environmental sustainability will not occur unless there is significant consumer demand or incentive/regulation, neither of which, is likely. Thus, to make the industry more environmentally
sustainable, it is argued, the public and the industry need to be educated and trained (Thomas, Okraglik & Pollard 1996). However, the failure of the building industry to innovate is not unique. Others argue that at the broader level ‘there is a gap, very significant and persistent, between the diffusion of the (sustainable development) SD discourse – which is remarkably significant – and the practical application of SD’ (Hamdouch & Zuindeau 2010, p. 434).

In summary, there is a gap between theory and practice. This is evident in the lack of uptake of ESD ideas by the housing and land industry. Responses to this gap are often framed in moral terms – the ‘problem’ is that the industry is ‘failing’ to deliver environmentally sustainable housing and it must change – it must innovate. Yet, the nature of what needs to change is disputed. Neo-liberal economic theorising frames particular responses – the market needs to be made to work ‘properly’ or individuals need to be (re)educated (Greig 1992; Thomas, Okraglik & Pollard 1996; Bryant & Wells 1998; Clark 2001; Office of Energy Efficiency Natural Resources Canada 2005). Yet, paradoxically, in the Australian context, building industry members claim that they are innovative. They bring to the market larger, more luxurious houses that have been constructed by a sector that has shifted from craftist to Fordist production techniques (Greig 1995). However, bigger and more luxurious houses are not necessarily seen as being ‘good’ from the perspective of a green middle-class intelligentsia. Innovation for environmental sustainability

---

8 A 5 page advertorial for A.V. Jennings in the Residential Developer Magazine 2008
thus has political implications. On the one hand is an industry characterised by businesses that innovates to deliver what they believe their customers want⁹. On the other hand, a scholarly critique concerns itself with factors other than home theatres, granite bench-tops and an en-suite bathroom for every bedroom, instead being focused on issues such as reducing greenhouse gas emissions. Furthermore, the scholarly critique does not speak with one voice, but many. As such, there is a lack of agreement regarding the nature of innovation and furthermore, there seem to be countervailing forces affecting it. Assuming that innovation for environmental sustainability can be pursued deliberately, which of the conditions identified in the literature are necessary for it to be achieved? Clearly there is a need to develop a theoretical framework that makes sense of these contradictions and inconsistencies (Wolfe 1994). I now turn to a recent meta-analysis of the literature that attempts to find the basis from which a comprehensive theory of innovation might be built.

Crossan and Apaydin’s (2010) meta-analysis of the organisational innovation literature examines the similarities and differences across a number of variables, including theory. Of the papers examined, approximately one-third were classified as theory papers, but only six percent of these were classified as empirically-based theory-building. Furthermore, the theories used were disparate and often limited in their applicability to either the macro–, meso– or micro–level of

⁹ That this rationale may be delusional is taken up in Chapter 5 where the role of myth is explored in innovation.
analysis. However, they did identify several groups of theory – the top three being learning and knowledge management, network theories and economic theories.

Only four percent of the sampled papers had a clear focus on the process of innovation. There was no overarching framework for the determinants of innovation nor was there a well-tested model that spanned levels. They did, however, confirm:

Mahdi’s (2002) finding that even the latest innovation models failed to consistently explain findings across and even within sectors. The author argues that intra-sector differences are due to the path-dependent and iterative nature of the innovation process, thus a proper model should adopt an evolutionary approach and allow equifinality\(^\text{10}\) (Crossan & Apaydin 2010, p. 1164).

Crossan and Apaydin’s ‘review did not reveal a strong unifying theory of innovation which could operate across levels’ (2010, p. 1177). Nevertheless, they did find some meso-level theorising that might bridge macro- and micro-level phenomena. These are network, learning, and knowledge theories. They also point to recent developments in practice- and praxis-based theories as potential steps towards a theory of innovation. These are explored in Chapter 4. However, before these ideas are examined, an earlier and influential theorising of innovation is examined as it addresses issues pertinent to practice and praxis – Joseph Schumpeter’s (1934; 1939; 1950) seminal works.

\(^{10}\) Equifinality refers to the possibility of a particular end being achieved by multiple means.
3.7 Schumpeterian innovation

One of the earliest and most significant engagements with the concept of innovation was that of Joseph Schumpeter (1934; 1939; 1950). He placed the phenomenon at the centre of his model of economic development:

The changes in the economic process brought about by innovation, together with all their effects, and the response to them by the economic system, we shall designate by the term Economic Evolution. ...the intention (is) to make the facts of innovation the basis of our model of the process of economic change (Schumpeter 1939, p. 83).

Schumpeter deploys innovation to approach the problem of supply and demand in classical economics, the principles of which suggest stasis rather than growth. Schumpeter calls this the circular flow, the steady, ‘every-day’ activity of a market. Innovation is the process that destabilises a market’s circular flow and in so doing, generates growth. Schumpeter proposes that by bringing new products or processes to market, already existing ones are displaced because they lose their ability to compete and unless these too become the subject of innovation, they will stop being marketable. Once an innovation is integrated into a market a new equilibrium is established which, in turn, will be subject to further innovations. He refers to the instability caused by innovation as:

... industrial mutation – if I may use that biological term – that incessantly revolutionizes the economic structure from within, incessantly destroying the old one, incessantly creating a new one. This process of Creative Destruction is the essential fact about capitalism (Schumpeter 1950, p. 83, original emphasis).
Importantly, Schumpeter defines a dialectic between the activities that define circular flow on the one hand and those that revolutionise the market, innovation, on the other. The circular flow involves the habituated everyday activities of business which are normative, defining the-way-things-are-done.

... in the accustomed circular flow every individual can act promptly and rationally because he (sic) is sure of his (sic) ground and is supported by the conduct, as adjusted to this circular flow, of all other individuals (Schumpeter 1934, p. 79).

Furthermore, echoing earlier ideas of the Pragmatist philosophers, John Dewey (1922) and William James (1925), Schumpeter argues that

...all knowledge and habit once acquired becomes firmly rooted in ourselves as a railway embankment in the earth. It does not require to be continually renewed and consciously reproduced, but sinks into the strata of subconsciousness. It is normally transmitted almost without friction by inheritance, teaching, upbringing, pressure of environment (Schumpeter 1934, p. 84).

Habits, not only create path dependencies, but they also operate 'subconsciously'. These behaviours have a normative effect, forming the basis for an organisation’s or industry’s culture. For example, for developers of master-planned communities, circular flow affords standard specifications of typical, outer-suburban offerings – so called ‘spec’ homes. They are ‘the way things are done around here’ (Bolman & Deal 1997 p. 231). According to Schumpeter, normative activities within a market place, such as producing and selling standard spec homes are like swimming with the stream where one is aided and abetted by the mores of habituated activity all purposefully directed towards a particular end. For example,
there is a system of interdependent practices that is required to build spec homes. These include legal, financial, construction, and design practices. Although the modern spec home is a relatively new urban form, the practices required for its existence have a historical underpinning that pre-dates its dominance in cities like Melbourne. As such, the flows of habituated daily activity are a function of precedents established over ‘hundreds and thousands of years... (having) eliminated unadapted behavior’ (Schumpeter 1934, p. 80).

This adaptation is both positive and negative:

The very nature of fixed habits of thinking, their energy-saving function, is founded upon the fact that they have become subconscious, that they yield their results automatically and are proof against criticism and even against contradiction by individual facts. But precisely because of this they become drag-chains when they have outlived their usefulness (Schumpeter 1934, p. 86).

Innovation is the means by which this resistance to contradiction and ‘facts’ can be changed. Drawing on Darwin’s (1859) evolutionary theory of natural selection, Schumpeter (1934) asserts that acts of innovation are akin to ‘spontaneous change... within the system’ (p. 82). However, just what is producing the change remains unclear in his work.

Counter to everyday normative unconscious activity is the conscious struggle for change. If circular flow is akin to swimming with the stream, assisted by the habituated activity of other swimmers, innovation is akin to trying to change the direction of the flow and entails swimming against the stream, fighting against what, under
typical circumstances assists the activity, for example, other professionals involved in spec-home production.

What was formerly a help becomes a hindrance. What was a familiar datum becomes an unknown. Where the boundaries of routine stop, many people can go no further, and the rest can only do so in a highly variable manner (Schumpeter 1934, p. 80).

Thus, Schumpeter (1934) provides a basic framework for understanding the process of innovation vis-à-vis its dialectical relationship to habituated activity. To explain how this relationship is driven, to change, for example, from the provision of standard spec-homes to environmentally sustainable ones, he turned to entrepreneurs who he saw as being responsible for carrying out the task of innovation. He states that the task of management is to be concerned not so much with maintaining the circular flow but dealing with the uncertainty of change. The certainty engendered by habit, even if misplaced, is opposed by the impossibility of knowing all of the likely factors, data and details of what can and needs to be done to effect change. Although Schumpeter suggests a dynamic context for innovation, including

the social conditions, the knowledge of the time, and the horizon of each individual or each group. New possibilities are continuously being added to the existing store of knowledge (Schumpeter 1934, p. 79),

he nevertheless sees entrepreneurship in an almost mystical way.

Even with the best of planning
the success of everything depends on intuition, the capacity of seeing things in a way which afterwards proves to be true, even though it cannot be established at the moment, and of grasping the essential fact, discarding the unessential, even though one can give no account of the principles by which this is done (Schumpeter 1934, p. 85, original emphasis);
It is, therefore, more by will than by intellect that the leaders fulfil their function, more by "authority," "personal weight," and so forth than by original ideas (Schumpeter 1934, p. 88).

Hence for Schumpeter, a wilful, intuitive leap of faith is the hallmark of entrepreneurship. The task of effective entrepreneurs, or in contemporary green parlance, ecopreneurs, is to apply their unique, albeit unqualifiable skills to deal with the resistance to change engendered by the circular flow:

Surmounting this opposition is always a special kind of task which does not exist in the customary course of life, a task which also requires a special kind of conduct. In matters economic this resistance manifests itself first of all in the groups threatened by the innovation, then in the difficulty in finding the necessary cooperation, finally in the difficulty of winning over consumers (Schumpeter 1934, p. 87).

Thus, for Schumpeter, there are two types of people in the world, those who happily engage in, and are protective of, the activities of the circular-flow, and those who work against it in the name of growth. The task of the entrepreneur is to conquer resistance to change. Schumpeter argues that there are three specific sources of resistance – market competition, getting people ‘on-board’ by convincing them of the merit of the proposed change, and marketing the innovative product or process. Schumpeter states, first,
Resistance may consist in simple disapproval—of machine-made products—for instance—in prevention—prohibition of the use of new machinery—or aggression—smashing new machinery (1939, p. 97).

Second, the existing services that are available to assist entrepreneurs in their task may be inflexible:

lenders readily lend for routine purposes; labor of the right type is available for them in the right place; customers buy freely what they understand (1939, p. 97, emphasis added).

Third, people may be wary of the new:

(C)onsider the possibility of setting up a new plant for the production of cheap aeroplanes which would pay only if all people who now drive motorcars could be induced to fly (1939, pp. 97-8).

However, exactly why these resistances manifest is unclear. Putting aside the problem that the aeroplane example raises— that a successful innovation depends on instantly creating a mature, mass-market—Schumpeter defines resistance as inflexible existing conditions and a fear or disapproval of the new. He provides no compelling rationale that might explain the significant difficulties that change engenders. As a result his explanations of the reasons for resistance are unsatisfactory. Although there may be inflexible conditions in a part of a market, more often than not there are high risk-takers who, for a price, will deliver services or products that others will not. Indeed, it is hard to conceive of a market that does not operate without companies who make it their business to develop proposed innovations and who are protected from the possible failure by extracting high returns, having a large customer base, or a diverse portfolio of business that allows them to defray risk.
As for a fear or disapproval of the new, Schumpeter’s example of machine-smashing ignores the history of industrialisation. Organised labour in the 18th and 19th centuries, such as the Luddites, destroyed industrial machinery not out of a ‘preference’ for earlier fashions or a fear of the new but to protect workers’ conditions. These acts were political – designed to hold back innovation so that workers could maintain the craftist quality of their working conditions and control over their own labour.

3.7.1 Political forces and innovation
Schumpeter’s failure to see the effect of industrial politics as a legitimate aspect of the change process is reflected in the arbitrary defining of ‘externalities’ and what legitimately might be used to count as either ‘supply’ or ‘demand’. Two problems arise from theorising innovation from the perspective of supply and demand. First, by definition, one is necessarily limited to defining solutions that stay within that particular market. As such, in the context of getting the building industry to be more environmentally sustainable, the supply-side ‘solution’ is that home buyers need to be educated so that a demand can be created that builders will ‘naturally’ meet. When, inexplicably, the industry shows no evidence of change, the only alternative to relying on the ‘market’ to deliver sustainability is to regulate. However, as Thomas, Okraglik and Pollard (1996) note, this requires political leadership, which to date in the Australian context, has been minimal. Second, within the confines and circularity of supply and demand rhetoric the building industry is delivering what the ‘market wants’ – larger houses for fewer people per household.
Yet, there is evidence that the building industry is aware of environmental issues (Thomas, Okraglik & Pollard 1996; Hertin et al. 2003) and that at least some land developers want change (Brockie 2008). However, this is extremely slow.

Thus, the economic assumptions relied on in the literature leave environmental sustainability out of the equation. Herein lays the critical weakness of an economic analysis of innovation for environmental sustainability. If the question is approached in terms of supply and demand, environmental needs are not part of the equation. Triple bottom line (TBL) accounting tries to bridge this gap by factoring in the environment and the community (Elkington 1998). However, even if we ignore the fact that TBL is quite problematic (Norman & MacDonald 2004), it is at best, just one step along the way towards sustainable capitalism (Elkington 2004). Furthermore, there is little evidence to support the notion that TBL has been implemented by the building industry (Thomas, Okraglik & Pollard 1996; Myers 2005).

3.8 Lessons from Schumpeter

Although Schumpeter does not lift the lid of the ‘black box’ of innovation, he identifies key attributes of its nature. He shows clearly that innovation occurs within the context of existing practice. However, he wants to restrict these practices to the circular flow of everyday business activity by proposing that acts of innovation happen within a market. Clearly, this idea is flawed as other ‘externalities’ affect any and all innovations as ‘markets’ are subject
to a variety of constraints, including regulation, policy and public opinion.

In modern western economies, such as Australia, as the example of Koori land given in Section 2.2 shows, markets are established and bounded by legislation, regulation and the common law. The business of the housing industry is defined by statutes and policies regarding land use and acquisition, planning controls, building regulations, standards and professional registration. Historically, these statutes and policies have been derived from, and are an expression of, particular political struggles that have been won and lost or have reached stasis. The tensions within this legal system enable and constrain the market or, more accurately, the activities of particular practitioners.

Thus, Schumpeter’s analysis is limited by treating markets as neatly bounded, being made up of their own unique set of buyers and sellers. To again use his metaphor of the stream, he did not take into account that the swimmers and water are contained within an embankment which can be thought of as being a stratified container, whose parameters define the entire system. The bedrock of the stream is legislation, upon which are layered, for example, regulations and policies. Each of these layers contributes to the performance of the overall system and is capable of enabling change via innovation. For example, the routes that the swimmers must follow can be altered, thus forcing existing practice to adapt to the new conditions. Industry advocates understand this relationship
and often lobby for the status quo or against what they perceive as ‘bottle necks’ (Housing Industry Association 2004; 2009a; 2010; Housing Industry Association & Australian Window Association 2010) as they know that an alteration to the ‘embankment’ – the regulatory framework – will cause innovation, albeit not driven by their pursuit of profit. As such, proposed or actual policy change is potentially as effective at generating innovation as might a market.

Although Schumpeter (1939) acknowledges the role of some of these factors, he treated them as nuisance ‘externalities’ that (in keeping with free-market dogma) distort what would otherwise be a perfect machine. Schumpeter also fails to make the connection between acts of innovation and normative practice. He sees these as separate functions with different aetiologies. On the one hand is the mass of humanity going about their business while, on the other, is the flash of brilliance of the entrepreneur. This error is predicated on the assumption that social phenomena can be understood by breaking them down into discrete components. In Schumpeter’s case, the unit of analysis is the individual. This sort of reductive theorising leads to the problem of the contradictory findings of Pelz (1983) and Pierce and Delbecq (1977), discussed in Section 3.2, and to the conclusion that an effective entrepreneur is simply a ‘gifted’ person. This micro-level factor, like other such phenomena assumes that leadership is a function of particular individual competencies. However, there is little evidence that supports such an assumption (Carroll, Levy & Richmond 2008). Manseau (2005) argues that ‘rarely is the act of innovation an individualistic dynamic’ (p. 49). There is
evidence to suggest that innovation is not limited to Schumpeterian entrepreneurs (von Hippel 1988; Lakhani & von Hippel 2003). Yet it is noteworthy that in the context of contemporary concerns with environmental sustainability the term ecopreneur has been coined (Pastakia 1998; Isaak 2002; Schaper 2005). This reinforces the nostrum that change is driven by zealous individuals rather than being ‘understood as an inherently messy and complex institutional process, which cannot be reduced to the psychology of entrepreneurial personalities’ (Beveridge & Guy 2005, p. 666).

Von Hippel (1988) locates innovation in the relationship between users and suppliers, as did Schumpeter, but he reverses it - customers are not necessarily the consumers of innovations but can be the source. The fundamental difference between Schumpeter’s analysis and von Hippel’s is that the latter proposes that innovation is a function of the relationships active in the innovation process rather than being defined by the roles of those involved. For von Hippel, these relationships are a function of benefit – what he calls ‘the functional source of innovation’ (von Hippel 1988, p. 3). He demonstrates how users actively engage in the innovation process. He identifies ‘lead users’ – those who are ‘ahead of the pack’ in their usage and feedback to the supplier – who play a vital role in some innovation processes. For him, innovation is not about the entrepreneur ‘on a white charger’. Rather, innovation develops from a complex relationship between users of particular services or products and manufacturers or suppliers. Furthermore, such
relationships do not just result in the ‘tweaking’ or fine-tuning of a product but are a source of new products and processes that lead users require, assisting in making their work-life better. Von Hippel’s research shows that

Major product innovations in some fields, such as scientific instruments, are almost always developed by product users. In sharp contrast, product manufacturers are the developers of most of the important innovations in some other fields, and suppliers in still others (von Hippel 1988, pp. 4-5).

Although von Hippel does not examine other relationships that might contribute to (or hinder) innovation, he nevertheless finds greater complexity than Schumpeter by considering a process that does not have price as its driver. There are other examples of innovation that do not operate within a price-driven economic framework. For example, the Open Source software movement develops computer operating systems and programs that are free and available to anyone (Moody 2001). Here the relationship that is generating innovation is user to user. These sources of innovation are beyond the explanations of economic theory. Lakhani and von Hippel argue that the reasons for this type of behaviour include:

(1) a user’s direct need for the software and software improvements worked upon; (2) enjoyment of the work itself; and (3) the enhanced reputation that may flow from making high-quality contributions to an open source project (2003, p. 923).

Furthermore, they find that for people providing free web-based support for an Open Source product learning was the key reason for their participation. Other reasons that users engage in Open Source projects range from being committed to the idea of free rather than
proprietary software through to personal status and simply because there is a need for the code (Lakhani & Wolf 2002; reported in Lakhani & von Hippel 2003).

3.9 Conclusion

As we have seen, innovation is a complex and poorly understood phenomenon. The literature is inconsistent and contradictory yet, innovation is a widely discussed phenomenon. Schumpeter’s (1934; 1939; 1950) economic theory creates a central place for innovation. It is the means by which everyday practice is transformed through Creative Destruction which enables economic growth. His analysis identified a key attribute of innovation – that change is resisted because of habit. However, by locating the resistance/innovation dialectic within a typology of persons, he proposed a fundamentally individualistic paradigm in which people are conceived of as either being members of a majority who are sheep-like or a minority, entrepreneurs, who have near-magical powers that enable them to be the harbingers of innovation.

However, von Hippel (1988) demonstrates, using the example of user-to-user innovation that non-market based relationships can and do, lead to significant change. By showing that innovation happens outside the economic supply-and-demand paradigm he highlights the importance of social relationships and activities that are valued for non-financial reasons. Clearly, the desire to learn and extend one’s abilities is a key to understanding innovation.
Although the business sector needs to know about innovation, as it is clearly implicated in profitability and survival (Garud, Hardy & Maguire 2007), inquiry through individualistic and economic paradigms has led to a failure to come to terms with Schumpeter’s insights into the role of habit while leaving the question of what motivates innovation unresolved. There is a lack of resolution and coherence between the meso-, macro-, and micro-level factors. Furthermore, as noted, there are sometimes contradictory research approaches and findings. These discrepancies not only confound our understanding of innovation but also, crucially, if change for environmental sustainability is to come about, then frameworks are needed that can be deployed effectively.

Practice–based theory has been suggested as a way to bridge the macro–, meso– and micro–level factors that are implicated in innovation. Importantly, it potentially resolves the individualism of Schumpeter’s leaders of innovation, entrepreneurs. Carroll, Levy and Richmond (2008), find little empirical support for assertions that individual competencies explain leadership and argue that practice theory may be a way to move beyond methodological individualism. Table 1 lists the distinctions that they found between competency and practice based theory.
Table 1: The competency/practice distinction (Carroll, Levy & Richmond 2008, p. 366)

<table>
<thead>
<tr>
<th>Competency</th>
<th>Practice</th>
</tr>
</thead>
<tbody>
<tr>
<td>Rooted in objectivism</td>
<td>Explicitly constructionist</td>
</tr>
<tr>
<td>Individual level of analysis</td>
<td>Inherently relational and collective</td>
</tr>
<tr>
<td>Quantifiable and measurable</td>
<td>Discourse, narrative and rhetoric</td>
</tr>
<tr>
<td>Unanchored in relationship and context</td>
<td>Situated and socially defined</td>
</tr>
<tr>
<td>Privileges reason</td>
<td>Privileges lived or day-to-day experience</td>
</tr>
<tr>
<td>Assumes intellect predominantly</td>
<td>Incorporates embodiment and emotion</td>
</tr>
</tbody>
</table>

As such, the development of practice–based theory offers an opportunity to address many of the contradictions and inconsistencies within the innovation literature explored in this chapter. However, while practice–based theory frames phenomena in terms of a constructionist framework, is relational, uses situated phenomenon such as discourse, privileges everyday activity and engages with embodiment, the means by which these elements cohere is yet to be resolved.

The next chapter sets out a series of arguments that establish a practice–based model of innovation – the model of recursive cultural adaptation (MORCA). This is done using a multiparadigmatic approach to theory development (Lewis, MW & Grimes 1999). Bourdieu’s (1977; 1990; Bourdieu & Wacquant 1992), theory of practice, in particular his concept of habitus, provides a foundation for the MORCA. However, his theory has been criticised for being deterministic. To resolve this problem the philosophical insights of Wittgenstein (1958) into the nature of meaning and rules
are examined. These, in conjunction with Gibson’s Theory of Affordances (1979), propose a contingent, useful reality which, when understood through the socio-developmental psychology of Vygotsky (1965; 1994) provides an embodied relational context for development and change.
Chapter 4 Theorising change: the importance of practice

4.1 Introduction

Chapter 3 explored how macro-, meso- and micro-level factors were implicated in the process of innovation. However, which factors are necessary and whether they act independently, or in conjunction, is not understood. Indeed, as we saw the findings reported in the literature are inconsistent and it was also suggested, perhaps unsurprisingly, that there is also a lack of theoretical coherence. Nevertheless, practice and praxis have been suggested as theoretical frameworks that might account for the impact of macro-, meso- and micro-level factors. Certainly, Schumpeter (1934; 1939; 1950) developed an economic theory that placed innovation at its centre. However, his account is problematic. Although he identifies an important feature of innovation – the attempt to change existing habitual practice – his theory of entrepreneurship is individualistic in as much as ‘super-humans’ who are said to drive innovation are conceived of as being both intuitive and powerful enough to introduce new products or processes by fighting against the resistance of those caught in, and wed to, the ‘circular flow’ of everyday activity. This explanation does not account for the fact that innovation can be social and driven by non-economic factors, for example, by a desire to learn and create. Indeed, there is evidence of non-economic innovation, which is inconsistent with Schumpeter’s model. Thus, this raises the question,
can a theoretical model of innovation be developed that can account for the different types of innovation? This chapter addresses this question by focusing on the nature of practice.

The model of innovation developed in this chapter suggests a reconceptualisation of the circular–flow – everyday practice – by proposing that this phenomenon not only potentially acts to resist innovation but can, under particular circumstances, also be its driver. As such, the nature of practice is the key focus of this chapter. Of central concern is to create a relational rather than individualistic understanding of entrepreneurship. This model – the model of recursive cultural adaptation (MORCA) – proposes that innovation is driven by attempts to extend existing practice that, simultaneously can engender resistance deployed to preserve threatened practice.

To begin, I examine the practices used and embedded within the production of master–planned communities (MPC’s). Next, using a multiparadigm approach (Lewis, MW & Grimes 1999) I present the arguments that underpin the MORCA. This is presented in four parts. First, to address the gaps in Schumpeter’s (1934; 1939) and Schön’s (1992) models, discussed in Section 3.7 and 4.2 respectively, the nature of practice is explored. Central to this analysis is an exploration of Wittgenstein’s (1958) idea that meaning is derived from use. Second, Bourdieu’s (1977) theory of practice is reviewed. Although he sought to resolve the agency/structure problematic, the mechanism that he used to address the question of agency or motivation – cultural capital – is seen as being economistic and
reductive and fails to resolve the criticism that he is deterministic. Third, addressing the issue of agency and motivation, the relationship between Bourdieu’s concept of habitus and habit is considered. James’ (1890; 1925) foregrounding of habit, Gibson’s (1979) theory of affordances, Vygotsky’s (1965; 1978) theory of socio-cultural development and Wittgenstein’s insights into rules are then used to suggest a practice-based resolution to the structure/agency problematic whereby practice is seen as being supra the individual, yet embodied. This leads to the MORCA which proposes that practices are adaptations that we ‘naturally’ follow and defend and seek to extend. Following this, the practice/method used for the research is discussed.

4.2 Master-planned communities: a confluence of practices

There are two sets of interrelated practices that affect MPC’s. First, there are the primary or first-order practices deployed to finance, design, build and sell ‘products’. Table 2 list the professional and delivery services used in typical land development in Victoria, Australia.
Table 2 Typical land development industry professional and delivery services firms (Charter Keck Cramer 2006)

<table>
<thead>
<tr>
<th>Developer</th>
<th>Professional Services</th>
<th>Delivery Services</th>
</tr>
</thead>
<tbody>
<tr>
<td>Site:</td>
<td>Engineering:</td>
<td>Civic Construction:</td>
</tr>
<tr>
<td>identification/</td>
<td>Civic</td>
<td>Roads &amp; paths</td>
</tr>
<tr>
<td>acquisition</td>
<td>Hydraulic</td>
<td>Drainage</td>
</tr>
<tr>
<td>Project management</td>
<td>Traffic</td>
<td>Sewerage</td>
</tr>
<tr>
<td>Sales</td>
<td>Surveying</td>
<td>Utilities installation:</td>
</tr>
<tr>
<td>Marketing</td>
<td>Urban design/Master planning</td>
<td>Gas</td>
</tr>
<tr>
<td>Administration</td>
<td>Landscape design</td>
<td>Telecommunications</td>
</tr>
<tr>
<td>Finance</td>
<td>Statutory planning</td>
<td>Electricity</td>
</tr>
<tr>
<td></td>
<td>Strategic planning</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Market research</td>
<td>Demolition &amp; clearing</td>
</tr>
<tr>
<td></td>
<td>Valuations</td>
<td>Earthworks</td>
</tr>
<tr>
<td></td>
<td>Legal</td>
<td>Excavations</td>
</tr>
<tr>
<td></td>
<td>Sustainable development</td>
<td>Construction</td>
</tr>
<tr>
<td></td>
<td>management</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Heritage/archaeologist</td>
<td>Land decontamination</td>
</tr>
<tr>
<td></td>
<td>Environmental science</td>
<td>Land rehabilitation/</td>
</tr>
<tr>
<td></td>
<td>Sales</td>
<td>revegetation</td>
</tr>
<tr>
<td></td>
<td>Marketing</td>
<td>Landscaping</td>
</tr>
<tr>
<td></td>
<td>Communication</td>
<td></td>
</tr>
</tbody>
</table>

In addition to these practices, in cases where developers, such as VicUrban, sell house and land packages, there are also the services provided by building companies. These include the numerous building trades, product and materials purchasers, architects and surveyors. All of these practices have to be efficiently coordinated so that the substantial financial costs borne by the developer, from conception through to the time that they are generating a sufficient cash-flow, are minimised. The ‘bottom line’ of any business requires profitability that is at least equal to the safe investment of their
capital in a bank. Maintaining an adequate rate of return on investment creates substantial pressure to use ‘tried and true’ solutions rather than potentially time-lengthening and risky innovations. This structural pressure against innovation is also evident in the nature of professional practice.

Each profession and trade is underpinned and guided by tacit knowledge (Sternberg & Horvath 1999). Schön (1992) argues that this tacit knowledge is a ‘knowing-in-action’ rather than a merely technocratic rationality. Furthermore he argues that tacit knowledge, while difficult to articulate, is the basis upon which professionals discern ‘right’ and ‘wrong’. Consistent with Schumpeter’s concept of the circular flow, these tacit knowledge’s are expressed as ‘systems of intuitive knowing (that) are dynamically conservative, actively defended, (and) highly resistant to change’ (Schön 1992, p. 61). Furthermore, Schön argues that the majority of practitioners’ professional identity is dominated by technocratic rationality – a narrow problem identification – the process whereby a professional comes to understand the task at hand. The expertise that this generates, because it is specialist and in-depth, means that it is partial rather than holistic.

Tacit–based knowing–in–action lends itself to standard problems, such as planning, designing and building a typical MPC. In these circumstances each of the professions and trades can happily co–exist as each, in–turn, delivers their solution in a ‘time–worn’ fashion. However, if the problem is novel and requires the development of
non-standard solutions, the accompanying uncertainty can lead to conflict (cf. Rogers 2004). Hence, the regulation, demarcation, and resultant professional identity associated with these roles suits the deployment of standard solutions. Thus, technocratic rationality mitigates against the development of potentially risky innovative proposals that may be demanded by governments, for example in medicine, for greater efficiency, responsiveness and adaptability (Horder 1992).

If habitual practice dominates the professions, how do these mutate to accommodate innovation? Schön (1992) calls for the development of reflection-in-action, that is, the creation of a moment within the knowing-in-action where the other-than rational instrumentalism of everyday practice might be consciously considered. However, the nature of reflection-in-action – everyday practice – is unclear. It is defined more by what it is not – rational instrumentalism – than by what it is. Schön’s call for reflexivity is similar to Schumpeter’s (1934; 1939) individualistic rendering of entrepreneurship in as much as both theorists place the individual at the heart of the problem. Where Schumpeter suggests all is dependent on intuitive power, Schön points to the ‘art’ of the coach, that is, the ability to see possible improvement in existing practice. However, the nature of this process remains unknown. For example, Schön calls for psychological studies to uncover the mechanisms and for the training of a new breed of academics to teach reflection-in-action so that practitioners can better respond to the demands of society and reclaim an era when professional
were held in high regard. As such, there is a need to develop ‘an integrated theoretical framework for reconstructing the essential nature of practice’ (Rawson 2001). This challenge is addressed in Section 4.3 after consideration of the second set of practices that affect the development of MPCs – those that contextualise professional practice – referred to, herein, as second-order practices.

Second-order practices are those not directly employed in the production of MPCs but which nevertheless, set the boundary conditions for first-order practices. These include the fundamental defining attributes of land-use in Melbourne and the imposition of private property followed by ameliorating the worst excesses of environmental and social degradation (see Chapter 2). These macro-level factors fall under the rubric of social structures – the relationships that define the conditions for the practices of particular epochs.

As a result, embedded within the practices that create MPCs are tendencies that reproduce existing gender, environmental and class relationships (Brion & Tinker 1980; Coleman & Watson 1985; Banion & Stubbs 1986; Watson, S 1988; Madigan, Munro & Smith 1990; Blair et al. 2004; Costley 2006). For example, the housing affordability crisis sees the traditional first-step on the home ownership ladder – fringe suburban development or apartments in medium density areas – now out of the reach of many people in pursuit of the ‘Great Australian Dream’. Yet, this dream has particular ideological and
political effects that stem from a lack of alternative tenure arrangements (Kemeny 1977). This mismatch between an idealised myth and an actualised reality is also evident when considering the effect of the planning ideas that underpin MPCs.

4.2.1 Conceptual incursions: attempts at modifying planning practice

MPCs can be seen as an outgrowth of the utopian Garden City movement that sought to address the 19th century middle-class concern for London’s sprawl, overcrowding, pollution and poor health by providing geometrically arranged self-contained satellite towns of fixed sizes (Howard 1902). Although MPC’s are not satellite towns, the idea that the urban fabric can be planned for particular (middle-class) socially-desirable outcomes is an issue that runs through mainstream planning theory, including New Urbanism (Talen 1999), the principles of which were incorporated into much of the planning for the Aurora Estate. However, at their worst these idealised communities and villages are commercialised fictions that deny historical realities (Huxtable 1997) and can act to foster ethnic and economic enclaves (Gleeson 2004; Clarke 2005; Gleeson 2005; Gwyther 2005). The commodification of ‘community’ runs the risk of mythologising some idealised halcyon understanding of the term rather than embracing the diversity of modern society (Rosenblatt 2005). Although it is not within the scope of this thesis to engage in the debate about whether New Urbanist MPCs are inherently flawed or whether they lead to ‘good’ planning outcomes (Ellis 2002), there is evidence that there have been some gains made in the shift
towards sustainable urban design (SUD) with the implementation of increased dwelling densities and building near public transport. Nevertheless, Crabtree (2005) notes that although some onsite food growing, energy production, and waste management systems have been showcased,

little is being done to institutionalise or normalise these through Australia's housing system. Similarly, concerns about the social sustainability of housing identify the need for mixed, flexible tenure and dwelling types, with again little uptake despite evidence of demand (Crabtree 2005, p. 332).

She demonstrates that we know what to do to deliver SUD – the ideas and the technologies exist – however they are not being adopted across the board.

This gap between an ideal and its implementation is found throughout academic planning and housing discourses, including architecture. For example, the ‘problem’ that the early 20th century modernists sought to address was the severe shortage of accommodation caused by the rapid growth of European cities that resulted from industrialisation. In 1925, Le Corbusier, a leader of this movement, responded to overcrowding by proposing the bulldozing of much of central Paris to erect 60 storey vertical ‘villages’. This idea, aesthetically embodied within the international style, was taken up across the West to a greater or lesser degree and more recently, in the developing world where high-rise living in cities has become ubiquitous. In Melbourne during the 1960’s this model was adapted by the Victorian Housing Commission to provide housing to
those who could not afford to enter the private market. However, the lofty spiritual and ethical aims of the modernists failed. The Commission flats, as they became known, resulted in highlighting the city’s pre-existing housing apartheid and became enclaves of welfare dependency and social segregation. Planning, thus, is suspended between a modernist sensibility whose validity is problematic and a post-modern reality posing serious challenges to planning’s underlying assumptions (Beauregard 1991, p. 189).

This modernist sensibility can be seen in the planning for Aurora. It too is a response to the ‘problems’ of its time, using a New Urbanist framework which attempts to address community, environmental, and economic considerations. Yet, as will become evident (see Chapters 5, 6, and 7) there is more to achieving the goals for Aurora than simply creating a ‘shopping list’ of desirable features. The modernists sought to better the living conditions of the masses and failed. The planners of Aurora sought to address pressing environmental concerns. However, the question of whether they have succeeded remains.

As discussed in Section 3.6, the problem of the divide between idea and outcome is a feature of the innovation literature – often underpinning calls by academics for greater innovation. This problem also has been identified in the broader environmental sustainability literature that, likewise, is trying to come to terms with the gap between environmental science and political action (Blowers, Boersema & Martin 2007). Given these seemingly
intractable gaps, is environmentalism, like modernism, doomed (Gunder 2006)? Of central concern here is the nature of political change. Contemporary politicians seem to be unable to implement the called-for change even when the, then recently-elected, Prime Minister of Australia said in a speech delivered to the United Nations Framework Convention on Climate Change held in Bali, that ‘we believe that climate change represents one of the greatest moral, economic and environmental challenges of our age’ (Rudd 2007).

One must conclude that change is not simply a failing of political leadership – Prime Ministers, it would seem are not necessarily able to usher in the changes that they claim are needed. As such, like the problem of innovation, examined in Chapter 3, the difficulty in achieving environmental sustainability spans the political (macro), professional (meso), and issues relating to individual identity (micro) levels.

From Section 4.3 through to 4.4 arguments are presented in support of the idea that practice links these three levels – macro, meso and micro – and that it is at the heart of the process of innovation. Furthermore, it was central to the vision, creation and production of Aurora and the Eco-selector. Moreover, the organisations involved, through practice, were both historically established and provided the means by which actors sought to defend and extend their practices. As discussed in Section 3.6, practice theory has been identified as a possible way through the contradictions and uncertainties in the innovation literature examined in Chapter 3.
However, it is yet to cohere into a comprehensive set of precepts – a theoretical system (Reckwitz 2002). Nevertheless, as a way of addressing an apparently complex phenomenon such as innovation, Lewis and Grimes (1999) argue that: ‘Multiparadigm approaches aid exploration of particularly complex and paradoxical phenomena’ through the use of ‘disparate theoretical perspectives’ (p. 672). As such, to enable the consideration of the complexities of innovation, several complementary theories and insights are drawn from complementary strands of anthropology, evolutionary biology, philosophy, psychology and sociology to develop the MORCA. These are considered after the nature of practice is considered.

4.3 The nature of practice

The concept at the centre of MORCA is practice. Reckwitz (2002) identifies its theorising as one of four cultural theories that have emerged over last 40 years. The key developers of practice theories are ‘Bourdieu, Giddens, late Foucault, Garfinkel, Latour, Taylor, (and) Schatzki’ (p. 245). Cultural theories offer an alternative conception to homo economicus – the figure rendered by classic and neo-liberal economic theories of social phenomena which propose individualistic purposefulness, self-interest and causal effects. Schumpeter’s (1934; 1939) entrepreneurs are of this type. Counter to this agentive account of human nature is the structural one of homo sociologicus – where social phenomena are explained by collective norms, values and rules by which ‘social order is then guaranteed by a normative consensus’ (Reckwitz 2002, p. 245). According to...
Reckwitz both genus are conceptually inadequate in as much as they both ‘dismiss the implicit, tacit or unconscious layer of knowledge which enables a symbolic organization of reality’ (2002, p. 246). Given the significant role of the implicit, tacit or unconsciousness in professional practice, bringing this into the analytical frame is vital.

Practice theories situate themselves between the unconstrained free will of homo economicus and the social determinism of homo sociologicus by proposing that action can be explained and understood as

the symbolic structures of knowledge which enable and constrain the agents (who) interpret the world according to certain forms, and to behave in corresponding ways. Social order then does not appear as a product of compliance of mutual normative expectations, but embedded in collective cognitive and symbolic structures, in a ‘shared knowledge’ which enables a socially shared way of ascribing meaning to the world (Reckwitz 2002, pp. 245-6).

Thus, people act in accordance with the shared meanings that result from the way the social world is ordered and embedded within them. Practice theory differs from the other cultural theories by not subsuming the social in ‘mental qualities, nor in discourse, nor in interaction’ (Reckwitz 2002, p. 249). Rather practices are:
routinized type(s) of behaviour which consists of several elements, interconnected to one other: forms of bodily activities, forms of mental activities, ‘things’ and their use, a background knowledge in the form of understanding, know–how, states of emotion and motivational knowledge. A practice – a way of cooking, of consuming, of working, of investigating, of taking care of oneself or of others, etc. – forms so to speak a ‘block’ whose existence necessarily depends on the existence and specific interconnectedness of these elements, and which cannot be reduced to any one of these single elements (Reckwitz 2002, p. 250).

The idea of a ‘block’ of elements illustrates the complexity of a practice and that, as a unit of analysis, it is multifaceted. However, at the heart of any practice, the thing that unites the various elements of the block, is use.

4.3.1 The use of practice

Wittgenstein’s (1958) central thesis is that use defines meaning. His private language argument proposes that a word without a social–use cannot exist – it would be meaningless gibberish. As such, a word has no intrinsic or essential meaning but is defined by its a priori agreed use and in the context of new words, again – agreement as to its meaning. Similarly, Gibson (1979) argues that our perception of the physical world is also derived from use. Again, this is a relational phenomenon – we perceive the ground as solid not because of its essential solidness11 but because we have feet we can stand on it – the ground affords standing. As such, the practice of walking is relational – it is the relationship that evolved between the movement of human bodies and the ground. Should either fail – loss of a limb or

---

11 Quantum physics proposes that matter is mostly the space between sub–atomic particles – ‘solids’ are an illusion that at the human scale seems real.
quicksand – then the practice of walking is no longer possible or useful. If we reconsider the elements of Reckwitz’s block, each one can be seen to stand or fall on the basis of the test of use. Practices that have high use–value will flourish – like communicating via computers – while others that come to have no use, will perish – like human sacrifice to appease the gods. Practices, thus, are relational. They are derived from the uses afforded by the relationship that all organisms have with their environment. The practices of land development can only exist within a particular context or set of relations. For example, private property, profit and the ‘Great Australian Dream’ are all necessary for the particular practices that exist to deliver MPCs.

4.3.1.1 Practice as useful innovation

Use has at its base survival – practices are adaptations – the socially–derived means by which humans have not only sustained life, but also forged relationships with gods and goddesses. Homo sapiens’ gift for use is built on recursiveness. To go from using a stone as a blunt club to inventively engineering it through chipping to create a sharp edge was a recursive innovation – the latter being built upon the former. This underwent further invention/innovation cycles, such as that enabled by learning how to create copper–alloys, such as bronze, so that sharper and more durable edges could be forged. In this example, the practice of stone–tool making includes the embodied skill of striking flakes from a suitable stone with a hammerstone. Furthermore, the practice requires having a conception of a sharp tool, having one or more purposes for that
tool, and, perhaps, an economic use of the tool as an item of exchange. The tool-maker, however, does not need to know the molecular structure of the stones nor a mathematically proven understanding of the forces that need to be applied to strike flints to create an edge. All they need is the practice derived from observation and trial and error, that is, their attentive recursive engagement with the 'problem' – this, by definition, is learning.

The tool-maker’s understanding of the process may include a theory of releasing the hidden form of the tool from the stone, such as that proposed by Michelangelo who described sculpture as releasing the figure within. However, the veracity of such theory is moot – a prehistoric tool-maker ‘knows’ as a truth that a tool has been released from its encasing – their theory is proved by the fact of creating the tool. In this framework, knowledge is not an object – a reified truth – but is, as Wittgenstein (1958) argues, knowing how to go on. This practical logic is akin to Bourdieu’s (1998) ‘feel for the game’ (p. 25) – the condition resulting from habitus – the subjective embodiment of the objective conditions of reality which he calls fields of activity. These crucial terms are explored next.

4.3.2 Bourdieu’s theorising of practice: field, habitus, forms of capital, and the problem of agency

According to Bourdieu (1977), all activity takes place within a field. Fields define objective social conditions. They are teleological in as much as they have particular histories, define current conditions and, using a sports’ analogy, through rules determine tomorrow’s (likely)
game. Thus, they are supra-individual – they exist regardless of particular ‘players’. They are systems of social positions that are governed by power relations, such as that between a footballer and an umpire or between a judge and a barrister. Particular fields have particular rules – an orthodoxy – that define rewards; forms of social, economic and cultural capital that agents compete for. The location of the agents and their power on the field is determined by how well they are positioned as competitors for these various forms of capital.

Fields reproduce themselves through **habitus** – Bourdieu’s key term for theorising subjectivity – the embodied experience of the field. Social structures through habitus are in the body and these determine the principles governing individual actors. Furthermore, by acting in accordance with these structures, we reproduce them, setting the standard for others. Moreover, we do this without deliberate thinking. This lack of deliberate, consciously motivated action produces what Bourdieu calls ‘the feel for the game’ which can also be described as ‘the way things are done around here’ (Levitt & March 1988). Thus, social **mores** are embedded in practice.

**4.3.2.1 Driving habitus: capital(s)**

Bourdieu’s theory of habitus has been criticised for being deterministic because it proposes that behaviour is rule-bound and path-dependent (Jenkins 1982; Swingewood 1984; Szwartz 1997; Mouzelis 2007). Nevertheless, the idea that habitus plays a large part in behaviour accords with Schumpeter’s (1934; 1939) analysis of the
circular flow and Schön’s (1992) knowledge–in–action. The problem that all three theorists face is similar – how is habitus, the circular flow or knowledge in action transformed? What is the nature of change? These are critical questions if Schumpeter’s conception of the entrepreneur and Schön’s conception of reflection–in–action are to be resolved as social rather than individual attributes. As such, resolving the nature of motivation is a key component for resolving the problem of agency.

Bourdieu (1977; 1988; 1998) addresses the motivation for agency through a ‘dog–eat–dog’ struggle for cultural capital, specifically, the rewards managed within the field in which particular practices take place. For example, he argues that academics compete for cultural capital by, among other things, the acquisition of titles, honours, fellowships and the kudos afforded by publication in prestigious journals (Bourdieu 1988). As a result, individuals who ‘play the game well’ are rewarded through the endowment of this cultural capital, which is defined and managed by the field itself. In addition, he developed a taxonomy of capital that, as well as cultural, also includes social capital – those individuals with whom particular actors have social relationships, for example, ‘old boy’s clubs’ and economic capital – finances that can be used to increase an individual’s cultural and social capital. However, social capital, rather than being a motivator, is more akin to creating opportunities for accessing fields (Foley & Edwards 1999). Economic capital, as noted above, enables the pursuit of other forms of
capital. Cultural capital, hence, is the most important of the three types for accounting for day-to-day motivation and agency.

Interestingly, one of Bourdieu’s (1977; 1988; 1989) aims is to debunk homo economicus – that people through rational consideration choose to maximise benefits. Yet, while habitus displaces rationality as the key driver of behaviour, his use of capital is still an economistic understanding of motivation – it is ‘a resource which yields power’ (Calhoun 1993, p. 69). Furthermore, because individuals are locked into a battle for cultural capital they are ‘prisoners of the structures of domination’ (Callinicos 1999, p. 295). Bourdieu’s account not only makes domination inevitable but leaves unresolved the question of what motivates people who do not aspire to the heights of their profession or those who labour, as many women do, in fields devoid of exchangeable cultural capital, such as domesticity. He resolves this particular problem by naturalising habitus. For example, women are conceived of as being unaware of their condition. As such, the differences between women’s and men’s habitus are due to their sex. Silva (2005) argues that this means that ‘Women, like the working class, are cast on the side of nature, whereas men are on the side of culture’ (p. 96). Men are the bearers of cultural capital while women are ‘naturally’ motivated by biology. This is not to say that gender cannot be theorised by cultural capital but that the theory needs substantive development – beyond Bourdieu’s normative account of women’s behaviour. This means that Bourdieuan motivation sees humans as being subject to their biology or pitted against each other, unable to escape the determinism of
capitalism’s dynamic – the anarchic pursuit of profit (Marx & Engels 1919).

However, habitus can be reconceptualised so that it is neither deterministic nor unable to fully account for women’s experience and that a reductive taxa of capital is not needed to explain motivation (see Section 4.3.6). Furthermore, I will argue, that habitus affords agency by providing the motivation for action when there is an opportunity to extend or defend one’s practice. Moreover, the conditions required for agency are social, that is, conditional on a perceived change in one’s context. Thus, motivation is not simply a matter of competition between individuals but is the result of a particular ecology of circumstances in which individuals find themselves (such as those explored more fully in Chapters 5, 6 and 7). By considering how and why habitus, or practices, are acquired, the conditions necessary for their acquisition, the nature of motivation and an understanding of the relationship between structure and agency can be gained. These issues are considered next.

4.3.3 Habit and habitus

Habit is central for understanding behaviour but it is also radically social (James, W 1925), yet, mainstream sociology also has ‘forgotten’ its earlier consideration of habit (Camic 1986) as has economics (Waller 1988). However, the concept is undergoing resurgence. For example, since the late 1990s the role of habit has been considered by such diverse fields as economics (Díaz, Pijoan-
Mas & Ríos Rull 2001; Hodgson 2010), environmental behaviour (Matthies, Kuhn & Klöckner 2002; Gregory & Leo 2003; Knussen & Yule 2008), health education (Aarts, H, Paulussen & Schaalma 1997; Saba & Di Natale 1998; Kremers, van der Horst & Brug 2007), information systems (Limayem & Hirt 2003; Cheung, C & Limayem 2005; Liao, Palvia & Lin 2006), media studies (Rosenstein & Grant 1997; LaRose, Lin & Eastin 2003), organisational studies (Cohen 2007), medicine (Reach 2005), neuroscience (Everitt & Robbins 2005; Yin & Knowlton 2006) and political science (Gerber, Green & Shachar 2003). If James is correct in identifying the centrality of habit, it has a role whenever human behaviour needs to be taken into account, including during innovation for environmental sustainability in a MPC.

4.3.4 The acquisition and use of habit: niches and affordances

In Section 4.3.1 it was argued that innovation is a recursive process, an iterative development whereby an invention, because of its use, modifies an existing practice. Habits, too, are recursively formed. They are acquired from birth and are driven by survival – the need to ‘fit-in’ and eke out an existence – they are adaptations to one’s social and physical milieu.

Practices are ‘taught’ or transmitted by those who are ‘qualified’, that is, practised ‘experts’ who, through the example of their own lives/practices, ‘teach’ individuals everything necessary for ‘survival’. This includes what to eat and where to sleep, what is safe and what is not, and what to wear, value, aspire to and deride. The relationship between the novice and the socio–physical world,
however, is not didactic. Individuals act on, and are acted on, via the niche in which they are both immersed and constructed by. The idea of a niche, or social ecology, has parallels to Bourdieu’s fields in as much as they help locate the relative positions of actors and macro-level factors that define the possibilities of life in those spaces (Abbott 2007). These relationships – a person’s niche – define the parameters of their existence by providing a set of affordances or opportunities for action. Again, it is use that is at the heart of this concept:

The theory of affordances rescues us from the philosophical muddle of assuming fixed classes of objects, each defined by its common features and then given a name. As Ludwig Wittgenstein knew, you cannot specify the necessary and sufficient features of the class of things to which a name is given. They have only a "family resemblance." But this does not mean you cannot learn how to use things and perceive their uses. You do not have to classify and label things in order to perceive what they afford (Gibson 1979, p. 134 original emphasis).

Gibson’s ‘affordances’ are a function of the relationship between an organism and its environment. A ledge at knee-height affords sitting. We do not need to classify it as a chair for us to use it as a seat. Similarly, behaviour affords behaviour. A request to ‘pass the salt’ affords the response of salt being passed. Just as the ledge does not cause us to sit, neither does the request cause the salt cellar to move. Both situations are potentials that become resolved via use. In the example of the ledge, a desire to rest makes it a seat. As for the salt being passed, a want of salt and the willingness of another person to do as he or she is bidden are necessary to cause the behaviour. Thus, in the context of behaviour, causality is conditional.
Thus, behaviour is social regardless of whether it is elicited via passive or active conditions. This dialectical relationship is at the heart of Vygotsky’s socio-cultural model of development, which is discussed next.

4.3.5 The zone of proximal development: a space for change

Vygotsky (1965; 1978; 1998) proposes that development and learning require a zone of proximal development (ZPD). This space arises when the ‘student’ has a need to learn and there is a ‘teacher’ present to provide the lesson. As such, and in keeping with the theory of affordances, learning is not passive. Rather, it involves the student and the teacher creating a space – a niche – in which learning may occur. Furthermore, learning and development are additive. For example, walking necessarily comes before running, just as single words precede sentences. However, because development and learning take place relationally, all parts of the system need to be active before learning can occur. As such, the ability of the learner and the teacher are both implicated in a ZPD, that is, both must be ready and able to fulfil their role.

The implication of Gibson’s (1979) theory of affordances is that both the organic and non-organic aspects of the environment have the potential for use. As such, a ZPD can arise whenever there is a change in the niche. Practices can be learnt from anyone or anything with which we have a relationship. Thus, the objects that we create, such as tools, can be said to afford use and as Latour (1987) argues, agency. From this relational perspective, innovation is
not, as Schumpeter (1934; 1939) argues, the result of individualistic heroism but is an outcome of use within a dynamic system. Thus, innovations are adaptations to practices. They function as changes in relationships. They denote a change in use.

4.3.6 The psychological effect of practice

The process of adaption is costly in that it requires an investment of time and energy. As James (1925) notes habits are formed via repetition. At first the activity being learned is difficult as it requires strong concentration. However, through repetition the task becomes easier and eventually becomes automatic. At this point concentrating on the task is redundant. Furthermore, we ‘know’ that we can undertake it without thinking about it – this is Schön’s (1992) knowing–in–action. This engenders faith in our abilities. As Wittgenstein (1958) argues, although we may doubt, we tend not to:

But that is not to say that we are in doubt because it is possible for us to imagine a doubt. I can easily imagine someone always doubting before he opened his front door whether an abyss did not yawn behind it, and make sure about it before he went through the door, … but that does not make me doubt in the same case (Wittgenstein 1958, p. 39, Original italics).

Everyday life is full of moments where we might doubt but do not. However, the capacity to doubt, to question and to take action is ever–present. Habits free us to use our cognitive capacities for other tasks while simultaneously doing something complex, like driving a car. As such, habits are not unconscious but are a conscious, that is, they are active in the present but do not require conscious deliberation.
The acquisition of a habit and the aconsciousness that this process engenders, thus, accounts for the unconsciousness that Bourdieu (1998) attributes to habitus. This also addresses the primacy of habit in James’ (1890; 1925) work. We are not unconscious automata, yet we do act in habitual ways that do not require active deliberation. As such, acting in faith is how we live unless there is a change in the niche, that is, the relationships within which we are enmeshed. Such a change elicits consciousness and the resources freed up by habit are then used to meet the challenges of the change.

Thus, habit and habitus allow for agency. Not only do they free up cognitive resources that allow us to perhaps, daydream, they also ensure that the situations that we experience are, because of habit, manageable. Furthermore, they also free up the resources that might be applied to developing and extending practice. Being practised experts not only adapts us to our niche but also purposefully orients us. Nevertheless, the things that we have been adapted to do yesterday, we are likely to do today and tomorrow. Herein is the mechanism of Schumpeterian circular flow. Habit and habitus create path–dependency and faith. However, they also provide the potential for action. Practices are rules–to–act, but they are not necessarily determinant. A Wittgensteinian analysis of the nature of rules shows that they are step–wise, the knowing what to do next (Sharrock & Dennis 2008). Moreover, ‘next’ is conditional. A condition is the state of the socio–physical relationships at the time, the state of a dynamic niche – a world in flux that is constantly
emergent – seething with complementary and contradictory practices.

As well as faith, practice engenders value. Because the acquisition of practice is resource-intensive, that is, costly, it is defended if threatened. Change and innovation take place against this background of defended practice. We are all wed to ‘this is the way things are done around here’, the ‘here’ being the Bourdieuan field(s) on which we ‘play’. Should two or more practices be played out on the one field, such as having architects, and in the case of Aurora, a land developer, practice on two fields – one is valorised by an arts élite primarily concerned with aesthetics, the other by a green cognoscenti concerned with defining and protecting ‘sustainable architecture’ (Owen & Dovey 2008). Such a situation, when it occurs within a particular architectural practice, is likely to lead to conflict as these two sources of different cultural capital set up contradictory goals. Under such circumstances, conflict is not a function of the lack of values, such as not caring about the environment, but contradictory values that arise out of different practices.

An ecological understanding of practices as adaptations to a socio-physical niche makes Bourdieu’s (1977; 1988; 1998) competition for cultural capital redundant as the driver of motivation. This is not to say that competition for cultural capital does not occur. It is the practico-logical behaviour necessary for the maintenance of social and cultural stratification. However, a more parsimonious account
of practice–as–adaptation means that we can understand why there are people who do not aspire to reach the heights of their profession by seeking cultural capital and why fields, such as domesticity, exist without it. The acquisition of cultural capital is but one set of practices that allow a person to ‘fit’ a field. Fit does not demand competition. Rather, competition is ‘the way things are done around here’. As long as an adaptation remains useful, change need not occur. For hundreds of thousands of years human culture was relatively stable. Humans, such as the Koori before colonisation, through their practices, were in harmony with their environment. Conversely, capitalism creates a competitive habitus that, currently, produces rampant consumerism and over-consumption. This does not preclude future epochs in which social structures facilitate a democratic and sustainable existence. Rather than people being ‘naturally greedy’, social structures create, through practice, a particular consciousness (Marx 1904). Furthermore, people pursue the interests defined by their practices. This frees innovation from economics. Innovation can happen in any system provided change is sought and well received. This explains why von Hippel (1988) finds innovation in non-economic contexts.

4.3.7 The nature of change

Practices are constant. They are normative in that people will be trained to do things tomorrow as they were done yesterday. Furthermore, people value their existing practices and defend them
if they are threatened. Yet they do change. This occurs when a niche is disrupted.

The potential for change takes place within the continuously–emergent nature of experience. We constantly deal with flux, that is, the changes in the relationships in which we are embedded. A change in one’s niche gives rise to awareness and we evaluate the situation and act on the basis of our practices.

There are three ways of responding to a change (see Figure 2).
Figure 2 model of recursive cultural adaptation: possible responses to a change in a niche

First, we can use our existing mastery to manage the situation. We rely on existing practice and ‘get by’ and simply refuse to change. Under such circumstances the perception of the shift in relationships is exogenous – this engenders externalising the change – it is their fault. Under these circumstances path-dependency is maintained – I’m all right, thanks. The second type of response occurs when our practice falls short. In this situation the change is beyond our practised expertise, but the gap is small. This is where step-wise
change can happen. The proposed change is one that is in keeping with existing practice and allows for improvement. When a change requires the development of an existing practice, a person is likely to engage with the challenge. Under these circumstances, the practice is modified recursively. This is the idea of building a better mouse-trap. Furthermore, as the system is relational – all of the parts are interdependent – the ‘doing it better’ may be sought rather than being simply a response to an externality. Thus, we may pursue or willingly adapt to perceived better solutions to existing practices. Although practices are inherently conservative in that they are valued, they are also potentially dynamic, open to doing ‘it’ better.

The third response to a challenge to existing practice arises when the social conditions are such that our practices are totally inadequate. Under such circumstances, our existing practices, because they are valued, will be defended. Thus, the natural response to such a situation is to defend one’s existing practices and try to modify the situation so that they can continue to be used.

This is not to say that the inadequacy of a practice necessarily means a defensive response. Although defensiveness is likely, the possibility also exists for a leap of faith that leads to learning a new practice. The conditions necessary for such a change are those present when there is a crisis of such magnitude that the defence of a practice is not possible. However, we cannot know in advance that the proposed new practices will work. As such, their acquisition demands a quantum leap, a jump into the unknown. Hence, under these circumstances, propositions for change can only be
suggestive, in that they may or may not lead to new practices being adopted. To summarise, existing practices may be defended or, under certain circumstances, modified or abandoned. Moreover, in cases where there has been an agreement for radical change, if new practices do not replace old ones relatively rapidly, the old ones will re-establish themselves because they already have ‘proven’ value. Life demands that we ‘go on’ and, if a new practice is not useful, we will revert to the ‘valuable’ old one. Practice, thus, can be modified recursively to produce a cultural adaptation.

4.3.8 Features of innovation proposed by the MORCA

As a model of innovation, the MORCA proposes that:

- Existing practice will readily change provided the proposed change is easily accommodated, that is it fits existing practice.

- Threats to existing practices will be defended against change. This politicises the change process.

As rules are contingent, they are subject to potential revision. What once justified an adaptation may stop being persuasive and lose its legitimacy. As such, until a new adaptation has become business–as–usual there is the potential for its reversal. Also, the things that may be used to justify a change are not causal. We need to be convinced of the merits of a proposed change and this may take
some time. From the perspective of the model, this generates a further two propositions regarding innovation:

- That successful innovation is dependent on the development and maintenance of a shared vision. A successful vision projects existing practice into the future. Under such conditions there is the potential for a practice to evolve.

- Once implemented, innovations require vigilance until such time as modified practice becomes knowledge–in–action.

The utility of this model is explored by considering a case–study, that is, the development of the Eco-selector and planning for Aurora in the next three chapters.
Chapter 5  Visions: Aurora and the Eco-selector

5.1 Introduction

Chapter 4 presented a new model of innovation, the model of recursive cultural adaptation (MORCA). It responds to contradictions and inconsistencies in the innovation literature that arise from a lack of theoretical coherence (Crossan & Apaydin 2010). Furthermore, fundamental issues such as, whether innovation is driven by gifted entrepreneurs or is it a social phenomenon, are evident. The question of leadership is addressed in this chapter by examining how was a vision for Aurora and the Eco-selector created, modified, and what effect did this have on the initial planning and early implementation of project? by examining the means by which Aurora, and the Eco-selector (Appendix 4) were conceived. As discussed in Section 4.4, the narratives presented in this chapter, and in the next two, are constructed to ‘make sense’ of the interviews conducted and documents gathered during the research project. Furthermore, this understanding is the product of the dialectical relationship between the researcher and an evolving conceptual framework that eventually crystallised in the MORCA.

It is noteworthy that the narrative\textsuperscript{12} of the development of the Eco-selector is not without contradictions. For example, there were differing opinions held by those closely involved in the development

\textsuperscript{12} The method used and methodological issues addressed by this thesis are examined in Appendix 5
As these differences were uncovered, an attempt was made to resolve these contradictions. However, probing for the ‘truth’, either during or after an interview, sometimes turned out to be elusive, mythical or impossible because truth is a weapon deployed in the name of defending or extending one’s actions or beliefs (i.e., practices). As such, different practices have different ‘truths’. These differences are reflected in how people position themselves and others in a bid to legitimate their practices. This problem illustrates the interplay between practice and the visions for Aurora and the Eco-selector. However, these visions were not idealised fantasies but ideas for change that were rooted in the practices of the ‘visionaries’ responsible for their articulation.

The concepts of **habitus**, **agency** and **affordance** are used to reveal the practices that affected the development of the Aurora and the Eco-selector by demonstrating how habitus, our socially-derived predispositions, drive us to promote or oppose change/innovation. Furthermore, habitus is implicated in the reconstruction of the events as told by the interviewees, constructing the past to ‘fit’ with habitus. Habitus is the spring-board for agency. It provides the strategies that people can deploy to extend or defend their practice. However, agents are not free to change existing practices. First, practices are bounded by macro- and meso-level factors. Second, others, depending on the nature of their habitus, will act to support the proposed change or, if they perceive it as a threat, will work to defend their interests. Agency, thus, is political; it is a foray into
occupied territory. As the development of the Eco-selector demonstrates, innovation engenders a battle, not so much as Schumpeter (1934) suggests, because people are stuck in a rut, but because they value their existing practices.

Affordances are opportunities for change against a background of existing practice. They are the possibilities that conceivably can be extrapolated from one’s habitus. However, they are not figments of the imagination. Affordances are relationally–defined opportunities to engage with socially–defined others and things – they are the potential–uses generated by a niche. As a niche, the URLC had historically established ways of innovating. These practices, at a particular point in time, were enacted. This led to the creation of the vision for Aurora and the Eco-selector – this process is now examined.

5.2 The vision for Aurora

The vision for Aurora established a set of goals including addressing sustainable building materials which would in turn afford the development of the Eco-selector. In business parlance ‘visioning’ is part of a strategic–planning process where long–term goals are set, often by a few senior managers, which are all too often directed towards ‘motherhood’ statements about valuing customers or a commitment to quality, yet, fail to achieve their stated goals (Collins & Porras 1998). Conceiving of the planning for Aurora and the Eco-selector in this sense glosses over the political nature and organisationally defined affordances that shaped an evolving vision.
5.2.1 Initial vision(s): Why Aurora?

Two quite distinct stories ‘explaining’ the vision of Aurora were uncovered. The first permeates VicUrban and is based on the idea that the location of the site presented water engineering problems that opened the door to the idea of an environmentally sustainable MPC. VicUrban’s General Manager, Mark Alan (MA), said,

the driver (for Aurora) was largely this notion that there was no sewer(age) treatment, or there was no sewer, therefore we had to build in... (a) sewer(age) treatment plant that then presented the opportunity of recycled water to the project. And it seems to me that... in an inspired way, there had been a whole lot of targets or goals set for this project that... the guys, having said they’re going to fly to the moon, had to find a way to make work. And I’m not uncomfortable with that, I think it’s to their great credit that they did that13.

In this version of the vision the site’s material constraints – connecting it to Melbourne’s sewerage system – set up a logic for sustainability. If you are treating waste water, then why not reuse it? If you are localising utilities, such as water treatment, then why not energy generation? This ‘thin–edge of the wedge’ type argument then, apparently, opened the door to other environmental sustainability issues such as sustainable building materials, good public transport, walkability, and localised community facilities.

By contrast, the other version of events cast the nature of the land and how it relates to Aurora as an environmentally sustainable showcase quite differently. This version identified the concurrence of particular external and internal practices that affected the vision.

13 Mark Allan, General Manager Project Planning and Design, VicUrban, interviewed 07/03/07
This included pressure brought to bear by local eco-politics and the internal culture of the ULA/ULRC regarding the challenge of ‘going one better’.

For the ULRC, Aurora was the ‘next step’ or, perhaps more accurately, a leap in demonstrating ‘leadership’ within the land development sector. The ULA/ULRC saw its role as a market leader in the evolution of MPCs. Its Roxburgh Park development (see Appendix 1), 1992–2005, was, as far as the ULRC was concerned, an industry benchmark. It was the first MPC to address the needs of a notional community even if that ‘community’ was narrowly conceived. Schools, shops and community facilities were planned for. It also addressed issues of environmental sustainability and affordability through their smaller ‘smart blocks’, on-site storm water management via 14 artificial lakes, parklands, and bicycle paths. Furthermore, in 1993 Roxburgh Park was the location for Australia’s first demonstration ‘green-home’ intended for the volume housing market, even though it was not successful in the ‘marketplace’ (Okraglik & Pollard 1995; Sibley, Hes & Martin 2003).

Nevertheless, Roxburgh Park was not without its critics. Johnson (1994) argues that the development continues the history of dispossession of the Koori people. It does this by failing to meet the needs of ethnic and sexual minorities because it was ‘designed solely for young families with mothers at home’ (Jackson 1998, p. 9). This leads to a homogenised community rather than one that reflects

---

14 Roxburgh Park is located approximately 5 kms due east from Aurora and 27 kms due north of Melbourne’s CBD.
the diversity of Melbourne as a whole. Nevertheless, from the perspective of the URLC it was a resounding success that, in due course, should be built on. As the Bryce Moore (BM), the acting General Manager of the URLC at the time, said,

Roxburgh Park had been the trendsetter in the industry. It had been the industry benchmark ... and (we) had the view that the URLC ought to be the industry trendsetter ... (so) we looked at the opportunities, basically through a review of the (URLC’s) project portfolio\(^\text{15}\).

As a result of this internal review in 2000 the ULRC made a strategic decision to look for opportunities to develop a parcel of land in Melbourne’s northern growth corridor which, with Roxburgh Park nearing completion, was a location that they wanted to stay in. From the outset, the URLC, and probably any land developer considering sites in the Port Phillip and Western Port water catchment, would have been aware that although the local water company, Yarra Valley Water, had a licence to discharge partially-treated water into the catchment any attempt to increase flows would have been strongly resisted. The well-connected and influential Merri Creek Management Committee (MCMC), a conservation, rehabilitation and advocacy group with members including the six local municipal Councils\(^\text{16}\) and their sister organisation, the Friends of Merri Creek, would have opposed any further neutralification of the creeks.

\(^{15}\) Bryce Moore, ex General Manager, URLC, interviewed 05/09/08

\(^{16}\) Darebin, Hume, Moreland, Whittlesea and Yarra City Councils plus Mitchell Shire Council.
In 2000, before the ULRC purchased the first of 14 land-holdings which make up the land for Aurora, this potential for political resistance from the MCMC was known. From the outset it was understood that sewerage would have to be handled on-site.

As such, the idea of being a setter of industry benchmarks was crucial for the genesis of Aurora. As one benchmark project was winding up, another needed to be initiated. BM, drawing on his earlier experience of being the Project Manager of the Roxburgh Park estate, set the tone for Aurora. He said,

> Back... (in) 1988, (I was) asked to be the Project Manager for Roxburgh Park by the then CEO of the ULA, as it was (known) at the time. I was given a vision for this model suburb and basically told to go and do my darndest\(^\text{17}\).

The vision was that Roxburgh Park needed to be a quantum leap above the, then current, standards in land development. Ten years later, when it was felt that it was time for the next jump, or, step-change, the Acting-General Manager, told the Aurora Project Manager to ‘do her darndest’. BM said,

> this fitted with our portfolio strategy. In terms of... an aspiration for sustainability, or a better community, ...and that was (our) organisational strategy too. It was... (a) leadership benchmark,... (and an)... organisation(al) benchmark. ... (It was a) commitment to doing better than last time, just continuous improvement.

\(^\text{17}\) ibid
Roxburgh Park was the flagship. It had been the one that was setting all the trends, ...we were building community. We... piloted... and put into common practice some of our approaches to community building, approaches to develop funded-infrastructure, approaches to water-cycle management. And... our sense was, my sense was, it was time for a step-change. ...[The] projects in the other corridors were... all embracing th(e)... elements of what had been done in Roxburgh Park, but it was time ... (to) start from scratch and, and create a step-change\textsuperscript{18}.

Hence, the vision for Aurora was that it would be, as Roxburgh Park had been, the new ‘industry benchmark’ that would ‘cause’ the rest of the market to follow. This idea, that the industry follows market trends if those trends are seen as being more profitable, is a powerful constraining and enabling perception that operates within the land development industry. BM said,

\begin{itemize}
  \item [(You have to)] mak(e) the industry or the market, sit up and say, hey, look at us, we’re the best.
  \item [(What is)] the market take-up? Is it selling 300 lots a year? (If) it sell(s) 300 blocks a year (that) would be probably (be) regarded as a minimum for it to be noticed. Is it selling 500 or 600 lots a year? Is it successful in the marketplace? Roxburgh Park ... sold 570 in its first year ... and traded through(out) its life at ... between 400 and 600 lots a year. ... (It) was a marketing success as well as setting the benchmark ... for all ... master plan communities\textsuperscript{19}.
\end{itemize}

This is consistent with Schumpeter’s (1934) argument that innovation is the driver of growth. The nostrum here is that if a project clearly out-performs its rivals, it will be emulated and cause a shift in practice. VicUrban also follows this ‘guiding principle’ by defining its role as leading the industry with demonstrably better products. Indeed, when the ULA reported their initial sales projections for

\textsuperscript{18} ibid
\textsuperscript{19} ibid
Roxburgh Park they forecast 800 lots per year (Urban Land Authority 1991).

However, there is a paradox here. Although Roxburgh Park was a leading estate, being the first MPC of its kind, an investigation of its sales’ performance indicates that the rest of the market ‘followed’ for reasons other than ensuring market-share. The figures in Table 3 are the Roxburgh Park sales’ figures, as well as the total lots sold, from 1991 to 2005, the period that the ULA and its successors were marketing the estate. The figures were published in the relevant Annual Reports. Unfortunately, yearly data on the performance of their estates were omitted from 1997 onwards, coinciding with the ULA’s transformation into a State–owned corporation in 1998. Hence the 1997–2000 calculations are based on the assumption that Roxburgh Park sales maintained approximately 25 percent of the overall sales of the organisation, which it had done in the preceding four years. The year 1992 was not a full year of sales and has been omitted from the calculations so as not to skew the results. The ABS census data from 2001–2006 have been averaged for that five–year period. The assumptions regarding the average performance for 1997–2000 and the ABS data are supported by VicUrban’s Annual Report (2004) that noted that 5071 lots had been sold since inception. This figure is close to the 5092 estimated in Table 3.
Table 3 Total lot sales and Roxburgh Park lot sales 1991-2 to 2004-5 (sources, ULA, ULC, URLC, and VicUrban annual reports, and ABS data)

<table>
<thead>
<tr>
<th>Reported period</th>
<th>Total Lots Sold</th>
<th>Roxburgh sales (estimates)</th>
<th>Percentage</th>
</tr>
</thead>
<tbody>
<tr>
<td>ULA</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>1991–2</td>
<td>1977</td>
<td>± 54</td>
<td>2.7</td>
</tr>
<tr>
<td>1992–3</td>
<td>1802</td>
<td>476</td>
<td>26.4</td>
</tr>
<tr>
<td>1993–4</td>
<td>1577</td>
<td>414</td>
<td>26.3</td>
</tr>
<tr>
<td>1994–5</td>
<td>1248</td>
<td>268</td>
<td>21.6</td>
</tr>
<tr>
<td>1995–6</td>
<td>1094</td>
<td>275</td>
<td>25.1</td>
</tr>
<tr>
<td>1996–7</td>
<td>1338</td>
<td>(332)</td>
<td>24.85</td>
</tr>
<tr>
<td>ULC</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>1997–8</td>
<td>1515</td>
<td>(376)</td>
<td>24.85</td>
</tr>
<tr>
<td>1998–9</td>
<td>1867</td>
<td>(463)</td>
<td>24.85</td>
</tr>
<tr>
<td>1999–2000</td>
<td>1870</td>
<td>(464)</td>
<td>24.85</td>
</tr>
<tr>
<td>URLC</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>2000–1</td>
<td>1898</td>
<td># (394)</td>
<td></td>
</tr>
<tr>
<td>2001–2</td>
<td>2156</td>
<td># (394)</td>
<td></td>
</tr>
<tr>
<td>2002–3</td>
<td>1852</td>
<td># (394)</td>
<td></td>
</tr>
<tr>
<td>VicUrban</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>2003–4</td>
<td>1277</td>
<td># (394)</td>
<td></td>
</tr>
<tr>
<td>2004–5</td>
<td>887</td>
<td># (394)</td>
<td></td>
</tr>
<tr>
<td>Totals:</td>
<td>22358</td>
<td>5092</td>
<td></td>
</tr>
<tr>
<td>Means:</td>
<td>1490</td>
<td>387</td>
<td></td>
</tr>
</tbody>
</table>

# According to the ABS census there were 1972 new houses built in this period. This is equivalent to a mean of 394.
± Omitted from calculation of average sales

Table 3 shows that Roxburgh Park never came close to the 800 lots per year forecast by the ULA. Indeed sales were poor during 1995–6. The ULA attributed the poor results to the organisation redefining its role by doing more redevelopment and a slump in the market (Urban Land Authority 1995; 1996). The mean sales figure, excluding 1992, is 387 which is well below the ‘leading the market’ 500–600 per annum figure suggested by the Acting–General Manager of the URLC, quoted above. This puts Roxburgh Park in his ‘being noticed’
category, but does not seem to justify the assertion that it created irresistible market pressure caused by its rate of sales.

However, what is crucial here is not the power of ‘truth’ – the effect of the actual sales – but myth. The URLC positioned itself as leading the market-place through innovation. This ‘knowing’ framed and legitimated the decision to launch the organisation in the direction of creating the next benchmark that would, in turn, lead the industry. Furthermore, this continued to drive the Aurora project up until the amalgamation with the Melbourne Docklands Authority (MDA) in 2003. The practices and culture of the URLC were transformed by the practices of the MDA which would come to dominate the new organisation, VicUrban.

A significant difference between the URLC and VicUrban was the adoption of ‘design-led’ management (de Mozota 2003; Beverland & Farrelly 2007). For VicUrban this meant that they periodically subjected their projects to ‘VicUrban’s University’ whereby immanent practitioners gathered and critiqued their proposals. As such, VicUrban believed they were more holistic in their approach to design by setting their own vision rather than sharing the process with consultants. This point of difference between the URLC and VicUrban saw the ‘URLC’s’ Aurora project revised and ‘made’ VicUrban’s. This change resulted in the ULRC being positioned as quixotic by the new organisation. MA said,
you know, ... perhaps (it’s) not the way you might sit down traditionally and plan a project. ... (S)ome (of the people) that ... came after them were probably questioning, gee, did these guys know what they were doing when they ... set these project challenges? ... (And) having set those real challenges, they then had to find a way ... of building a spaceship to get up (there)20.

This positions the URLC’s Aurora project as not only atypical or odd but also possibly as incompetent – ‘did these guys know what they were doing’? Given the social location of the speaker, a senior manager at VicUrban, this speech–act implies that they now use ‘proper’ planning methods, not some wild flight of fancy or a near foolhardy attempt to ‘fly to the moon’21.

This example of legitimating one set of practices at the expense of another suggests an inversion of what is typically considered to be the relationship between thought and action. Here discourse legitimates practice rather than being its alleged driver. This suggests that discourse is a second–order phenomenon. Discourses are constructed ‘truths’ that are used to make an activity/practice understandable and legitimate. As such, and in keeping with the MORCA, this suggests that action is not dependent on discourse but that discourse depends on actions.

This also suggests that the explanation of Aurora’s vision as a function of an ‘engineering solution’ helped account for the ‘problem’ that Aurora was not a design-led project, that is, it was not ‘us’, but other.

---

20 Mark Allan, General Manager Project Planning and Design, VicUrban, interviewed 07/03/07
21 Mark Allan, General Manager Project Planning and Design, VicUrban, interviewed 07/03/07
This resulted from the phenomenon of practices tending to be self-legitimating. Design-led ‘was’, (i.e., without doubt) better than project-led because that is what the MDA/VicUrban did. The conundrum that this created was that Aurora while other was also ‘ours’ – it was both the URLC’s and VicUrban’s benchmark project. As such, Aurora was positioned as almost foolhardy, yet inspirational, ‘flying to the moon’. It is telling that MA felt a need to address this dissonance by finishing the anecdote with ‘I’m not uncomfortable with that’22.

As such, at the meso-level the vision for Aurora was affected by the amalgamation of the URLC and the MDA. Nevertheless, the overarching macro-level politico-economic position and self-positioning of the organisations roles remained, that is, being wed to the nostrum that the land and housing market is led by their innovations (see Appendix 6 for an analysis of VicUrban’s sales performance). This now, at the micro-level, given voice and meaning by VicUrban’s management.

5.2.2 ‘Doing their darndest’: The URLC

Regardless of the actual effect of Roxburgh Park’s sales on the market, from the project’s inception in 2000, the URLC’s Aurora Project Manager (APM), Jill Lim (JL), headed up a small team of four URLC workers who formed the Aurora Project Management Team (APMT). JL felt that,

22 Mark Allan, General Manager Project Planning and Design, VicUrban, interviewed 07/03/07
We were pretty empowered (by) ... the pure agenda to lead and improve things. ... (W)e were... stepping beyond normal boundaries but I felt that was our role to do that\textsuperscript{23}.

This attitude came about because the Acting URLC CEO gave the APM a clear directive to redefine what a MPC could be. This was reinforced by their sense that the URLC’s role was to enact Government policy by leading industry. They had to create a new and better MPC. If they did not do it, no one else would. JL said that they interpreted their mission as trying to ‘be as truly (environmentally) sustainable as possible’\textsuperscript{24}.

The URLC’s eventual brief for Aurora included higher densities, six–star energy efficient houses – the then State mandate was five–star\textsuperscript{25}, smaller lots oriented to maximise solar access, on–site co–generation of electricity, extensive on–site water and sewerage management and reuse, using more sustainable materials and minimising waste in the building process. The brief also called for the pre–existing environmental and cultural histories of the site to be investigated and where appropriate, rehabilitated. Furthermore, new–urbanist principles were used to design Aurora. Thus, ‘town centres’, permeability for cyclists and walkers, and public transport were considered. This meant that schools, shopping centres, recreational areas and parklands were designed at the master–plan level (see Appendix 3 for a list of features). All of this was to be done within the paradigm of a typical privately–funded, –designed and –built MPC.

\textsuperscript{23}Jill Lim, Aurora Project Manager, URLC, interviewed 14/10/08
\textsuperscript{24}ibid
\textsuperscript{25}Six-star came into effect in 1/5/2011
The practice of land development within the URLC meant that most of the expertise for the design of Aurora (or any other estate) came from outside. The 60 staff employed at the URLC either supported or delivered their core business of land development using a project management model. As such, the role of the Project Managers and their teams was to find and manage a group of consultants by overseeing and vetting their ideas and suggestions by evaluating them against what they considered viable, given their assessment of the ‘marketplace’. In a typical land development scenario, the team of consultants would be assembled using a tender process. As discussed in Section 3.2, professionals deploy standardised solutions to the nominal problems they encounter (Schön 1992). As such, fairly standardised solutions that can be ‘taken off the shelf’ are the norm. However, Aurora was not going to be a typical MPC and the first task was to let the consultants know that. JL, through her knowledge of consultants with whom she had worked in the past, as well as asking for tenders for a new sustainable estate, according to BM,

searched out for... the brains that were going to assist, ... develop... (and) or expand... the vision and turn... (it) into a reality. ...(S)he... appointed a consultant team and... took them all off on a love–in and... built the aspiration with them and... they all... came back from that committed to the task26.

26 Bryce Moore, ex General Manager, URLC, interviewed 05/09/08
Another member of the APMT, Anne Jolic (AJ), said this meant that

we started off with a consultant team who... really did share the vision, it was their vision. It wasn’t just VicUrban’s ... . It was very much about... allowing a group of professionals to do their best work... and... really stretch. (C)onsultants don’t get the chance to do something like this27.

I still think it is amazing that... two years into the (Aurora) project, the Directors of the consulting firms (rather than their employees) are still sitting every Friday morning at your project team meeting. And it’s because these people genuinely wanted to be part of it. ...(T)hat just doesn’t happen with normal projects28.

The Aurora project provided the consultants with a unique opportunity. For the first time they were being asked to turn what they believed to be ‘best practice’ into an actual project. JL said,

things like ... recycling, ...and six star, ... the transit–oriented design, ... walkability, ... permeability, (etc.) All (of them) came up very quickly. ... I think the ideas were easy to come up with. ... (C)onverting them into implementation, ... that is the hard (bit). (For example,) we wanted to extend the railway–line, but boy, was that tough. (T)he costing... was just ... too ... prohibitive (b)ecause of the level crossing issue. (W)e had to go under... (roads, the price) was ridiculous. It was ... over $100 million29.

The consultants were primed, waiting for an opportunity to put into practice what they had learned about environmental sustainability in their training and professional development and which, until Aurora, they had not had the opportunity to design on such a scale. It is noteworthy that the list of features for Aurora was ‘easy to come

27 Anne Jolic, Project Officer, APMT, interviewed 07/02/07
28 ibid
29 Jill Lim, Aurora Project Manager, URLC, interviewed 14/10/08
up with’. The difficulties were implementing them, especially with organisations not committed to the vision.

Asked if the rail authorities and other relevant government departments had gone to the ‘love–in’, JL replied ‘no, that it was restricted to the consultants’\textsuperscript{30}. However, it might have been useful to have had, she said,

a second workshop ... out of town ... where people can just focus on Aurora, with the key people. ... (That) would have been a good idea, ... (four or) five months down the track. ... (O)nce we had our initial thoughts down, so there was something to work with\textsuperscript{31}.

As such, dealing with other government agencies would prove to be a major task for JL. She said,

I don’t think I had any difficulty getting ... agreement (on) ... the major concepts. (When we got) ... to the detail ... there’s always a level of conservatism when people are moving out of the norm into a new area and you just felt you were constantly having to talk up ... and explain the vision. (I’ld)... say, right, yes, this one is going to force you out of your comfort zone, you(‘ve) got to work, you(‘ve) got to deal with that, and face it. It’s not going to be your everyday tick–a–box and you’ll feel comfortable. (W)e’re asking you to push your boundaries and step outside your normal comfort zone. This isn’t the norm. So I found most of my energy was in ... (s)pending my time just talking to ... all the various people within all the various ... government agencies that had to be involved. ... Just constantly explaining, trying to win them over\textsuperscript{32}.

Here, JL points to the problem of getting broad agreement for an idea, yet, at the level of fine detail resistance emerges. Again, this highlights the gap between discourse and practice. Furthermore, it

\begin{flushright}
\textsuperscript{30} ibid  \\
\textsuperscript{31} ibid  \\
\textsuperscript{32} ibid
\end{flushright}
raises the issue of a shared vision. The Aurora consultants demonstrated their commitment to the project through the principals’ ongoing attendance at meetings which typically are mundane and attended by junior staff. However, for stakeholders that were not party to the vision, while there may have been in-principle agreement actual implementation was met with resistance. These stakeholders formed two groups. There are those, like the consultants, who saw Aurora as an opportunity to explore ideas that they wished to pursue. These people were excited by the opportunity to extend their practice. The second group, while agreeing with an ideal, nevertheless, had difficulty with actual change. These people required constant coaxing. The first group can be conceived of as being primed and ready to utilise the affordances set up by the ULRC. The second one, however, while agreeing in principle with the head-line ideas, remained reluctant to go beyond their existing practice, adopting a conservative stance towards actual change. Crucially for the first group, a desirable and seemingly achievable goal was offered to them.

5.3 Conditions for an Eco-selector-like tool: a confluence of environmental practitioners

While the APMT worked with a team of about 25 consultants on Aurora, other government agencies and private companies were working on different environmental sustainability projects concerned with buildings and building materials. For the development of the Eco-selector, an important activity was the EcoHome project at the Cairnlea estate in the outer-western suburb of Deer Park in
Melbourne (see Appendix 1). This project was supported by the URLC (and its successor, VicUrban), Metricon Homes, the Building Commission, Origin Energy, City West Water, Melbourne Water, Sustainable Energy Authority of Victoria (SEAV), Hassell Architects and RMIT University’s Centre for Design (CfD). This project examined the implementation of sustainable urban design principles in a conventional suburban ‘spec’ home. The house was designed and built and continues to be evaluated for its environmental performance (Rahman, Patnaikuni & De Silva 2007).

The EcoHome project afforded an opportunity for the people who would be responsible for initiating the Eco-selector to meet. Dr. Dominique Hes (DH) of the CfD, who would lead the Eco-selector project, presented the EcoHome to the APMT at the URLC. At this meeting DH was briefed as to ‘what they were doing for energy efficiency, what they were doing for water, and we discussed what they could do for materials.

At the same time, Barton Williams (BW), another key figure in the Eco-selector development, was consulting the URLC in his role as the Manager of the SEAV’s Energy Smart Building program. (BW would go on to have a significant effect on VicUrban’s ESD policies as an employee there.) In his view, the Energy Smart Building program was developed to help builders address the issue of energy consumption through better design. BW said,

34 Dr. Dominique Hes, EcoSelector Project Manager, CfD, RMIT University, interviewed 04/12/06
[The business …] focus was energy [efficiency] and encouraging the volume builder industry to achieve higher standards. … At the time embodied energy was not considered a core part of SEAV business although I differed in that view.35

I … understand… how energy (is) connected to … [our wider environment including] materials manufacture. … So, it wasn’t (to difficult to) say, okay, [… the building industry] needed a tool [that connected the two]. […] The industry wasn’t necessarily [explicitly] saying, ‘we need this’, it was just simply a recognition [from experience, training, and anecdotally] that … industry requires tools for change. [This …] (was) part of … (my) training … in the Masters of Environmental Science, …(to) recognise(e) that part of your role is intervening at the appropriate times, with tools (to) [assist positive] … change. (T)his view … predominately (comes from) … my training in Systems Thinking. … […] … (I) would say people like Frank Fisher … and other (educators) were certainly … influential (i)n (helping) me to think that way, and therefore com(e) up with … a tool such as the Eco-selector36.

Thus, during this period at least three organisations, the CfD, the URLC and to a lesser degree, the SEAV coaxed by BW, were thinking about the need for a tool to help volume builders select more sustainable building materials. As such, the issue of innovating for environmental sustainability in the building sector can be seen to be a social rather that individualistic concern. Furthermore, as a key advocate for the Eco-selector, BW saw the need as one that the sector was not pursuing of its own accord. Nevertheless, he and other actors did see the need and pursued it. As such, from the perspective of the ‘market’ this push for innovation is both exogenous and endogenous. It was driven by industry members,

35 Barton Williams, Business Manager Design and Sustainability, LandCorp, personal communication, June, 2007
36 Barton Williams, Senior Sustainability Advisor, Environment, VicUrban, interview 23/02/07
whom, however, can be considered a fifth-column in that they sought change for environmental sustainability rather than profit.

5.3.1 Initial vision for a materials selector

The initial conception for the materials’ selector was that it would be an easy-to-use tool. AJ said,

my expectation was that it would be more of an educational tool, it was about bringing builders along on the (sustainability) journey a little bit. ... I think we did bombard them. ... (W)e’re going to be six star, you’re going to have to do this, houses are going to have to be contemporary, there ... (was) lots of innovations in there, ... even the {relationship between the house and the lot}c (was innovative), ... (W)e were in the early days (of) talking about house and land packages. {This was also new for the builders.} ... (S)o it was an integrated development. {S}o t{here was no notion of buying land and someone being able to build their own house. }... (I)t was very different, all of it. And I think that I saw (the Eco-selector) as, ... let's also do this. We have gone this far, let's ask them to do this as well and see what happens37.

However, although there were many difficult aspects of the project, the Eco-selector, BW said,

was, amongst all the sustainability things that we had ... to work through, (this) was actually the simplest thing to do. (For example,) when you’re dealing with a water authority who has never built a recycling plant, it’s new to everyone and there’s always technical concerns, or how clean the water will be, and you’re not only dealing with the technicalities of implementing something like that, you’re dealing with a mind-shift, dealing with the people in the water authorities to make them feel comfortable. ... (E)veryone’s a bit risk averse. (When you are)... doing something new, no one wants to make that final decision because it’s left on their shoulders38.

37 Anne Jolic, Project Officer, APMT, URLC, interviewed 07/02/07
38 Barton Williams, Senior Sustainability Advisor, Environment, VicUrban, interview 23/02/07
It is noteworthy that while JL had to deal with professional inertia around other issues, that is habitual practice, the builders did not baulk at the proposal for the Eco-selector having, at least initially, considered the URLC’s offer to come into a ‘sustainability showcase’, a good idea. They were working hard to deal with the six-star designs and the idea of selecting more sustainable building materials seemed quite achievable. JL said,

at the time (there was) a lot of other processes that we were trying to do, (like six star), (plus) we were trying to get all our product [houses] approved (and we) had deadlines in relation to releasing them for launch. (There was a lot) of information to absorb at the same time, (and) so probably there wasn’t sufficient … time and understanding to actually absorb it all … 39.

As such, there seems to be an immediacy effect here. The builders, preoccupied with more pressing design issues, were not concerned about specifying more environmentally sustainable materials. However, as the analyses presented in Chapter 7 show, the issue would become critical once the design process was over and construction of Aurora began. Thus, the CfD did not have to address stakeholder concerns and were able to develop the Eco-selector, as guided by the URLC.

5.3.2 The development process

The various bilateral discussions about building materials led to BW arranging for the SEAV to grant $5,000 to recommend sustainable materials for Aurora. He also put on the table the idea that they needed to look at a range of issues. JL said,

39 Jill Lim, Aurora Project Manager, URLC, interviewed 16/02/07
Barton was very adamant that... (he) just didn’t want energy looked at, but he wanted other things looked at, and so, in developing the proposal, we did a little brainstorm about what the most important elements were in materials... (which) ended up being energy, toxicity, biodiversity, and resource use, i.e. recyclability, and that was built into the proposal\textsuperscript{40}.

In interview, BW said,

I felt that there was a need for a tool that would allow the volume [...] building industry to very clearly define what ... an environmentally friendly material (is), and what the minimum standards would be, and where they could get those materials\textsuperscript{41}.

The brief for the guide was that it provide the builders with information about the environmental benefits of more sustainable building materials, where to source them and whether there was a cost difference compared to conventional materials.

The process of developing the guide was two-fold. First, a panel of experts within the field of sustainable materials and energy use was assembled. This group of five people, led by DH, discussed what was required and quite quickly came up with a framework. One of the groups’ members, RMIT University Adjunct Professor Alan Pears (AP) said,

\textsuperscript{40} ibid
\textsuperscript{41} Barton Williams, Senior Sustainability Advisor, Environment, VicUrban, interviewed 23/02/07
we had the discussion, and as usual, I had my agenda, which I put and they all seem to think was a good idea (for) ... developing this fairly simple concept. Because of the (history of) controversy (with) ... the timber industry and the concrete industry and all those kinds of things, there were questions about how you could deal with that ... without too much politics getting in the way. ... (T)here was some ... (direction) from ... (the URLC), like, let's not get into too much detail, let's focus on some big things, so (that) it was ... achievable.... And so ... I made the suggestion that ... we do it ... like recipes. ... (I)f you're going to build a slab floor here's the materials you need, and if you use these ones your meet our green criteria, basically. [So, effectively we were not making judgements about whether a slab or timber floor was preferable, we were just showing how you could do better whichever option you wanted to do – energy ratings and other factors would drive those decisions.] And, ... having had my experiences with a number of green buildings, I was very strongly of the view that we should also have the names of the suppliers and their phone numbers, ... (b)ecause our experience was that if the contractor has to make more than one phone call it won't happen. So there were a number of quite specific criteria in my mind about how you could make something like this (so that it) would actually be used. So I was feeding that kind of perspective into the workshop that we had42.

This meeting, utilising the expertise of those present, worked through the main components of a typical house and then attributed to each one of four sustainability criteria that had already been specified. These were embodied energy, toxicity, biodiversity and resource–use. The components were then categorised accordingly and better products sought. Similar to the short time taken by the APMT to generate the vision, that is the list of features, for Aurora, this group quickly settled on the features for the Eco-selector. These examples highlight the way in which practices are ‘pregnant’ with potential for change. Each of the professionals and experts that were asked to consider innovating for environmental sustainability

---

42 Adjunct Professor Alan Pears, RMIT University, interviewed 14/12/06
'knew’ what was needed – they nevertheless needed a venue for this to be expressed. Thus, context, in this case meso-level organisational factors are critical for enabling the development of a practice. The URLC proved this venue – they changed the niche in which these people found themselves and they responded accordingly.

The next stage was to build the list of the available products and to organise a show-case of these so that the builders could meet the suppliers/manufactures and learn about these more sustainable products. This task was performed by Margaret Bates (MB), who had been doing an internship at the CfD as a part of her studies in a Masters in Environmental Science degree. However, getting the information that she needed from the manufacturers was not a straight-forward. MB said,

It seemed quite simple in some ways. Although I don’t like cold-calling, you have to be clear what you’re asking for, and (work out) what sort of questions will lead you to where you want to go. ... (T)he difficulty is when you’re asking for samples and certain types of information, you end up ... (in) marketing and sales... when what you need is more technical, or the possibility of engaging in a more technical discussion. ... From there it was really learning (about) what were the things that I needed to be aware of, or needed to question further. (U)sually (I would go) to Dominique (Hes) ... saying, this is the response. And she would ... (tell me that I) ... need to ask about this (other issue) as well. Then you’d go back and call them again and try and get more information43.

---

43 Margaret Bates, Research Consultant, CfD, RMIT University, interviewed 12/12/06
Asked how long it took her to develop the skills to get the information that she needed and not be side-tracked by sales and marketing, MB responded,

Probably, six months to a year, and even then you can ... (still) get tripped up. It is not necessarily deliberate on their part. So much is dependent on your own knowledge of ... the issues ... in a broader environmental sense, or a broader industry sense. ... I don’t know how ... you could learn that deliberately. It’s almost ... incidental, (the) thing(s) that you find out about it. (For example,) you ... (discover that) company ... (X has) changed their processes, and(/or) ... streamlined this, or they’ve changed (that). ... (This) then has implications for (the completeness of the information gathered from other manufacturers). ... (This made me think,) maybe I should ask those other manufacturers, are they doing the same thing, ... are they considering (a) take-back policy, or recycling, or packaging? It ... highlighted (that) ... maybe I should check back (on the earlier information that I gathered because) I didn’t ask them (the same questions), ... I didn’t know to ask them44.

On an micro-level this is an example of the recursive nature of the development of a practice. Using trial and error MB developed the strategies necessary to get the information that was needed regarding the products. Yet, finding out about the environmental performance of the products was doubly difficult because MB not only had to learn what and how to ask but also she had to contend with the fact that many of the manufacturers and suppliers were not used to supplying such data and sometimes simply did not know the answers. Chain-of-custody, where a product can be tracked from extraction to manufacture to market, is an important tool for ensuring sustainable timber products (Wallis et al. 1997). However, it is not widely practised by the majority of the building products

44 ibid
industry. Hence, it is often impossible to know with certainty that a product is what it purports to be. However, this is not to say that MB found the job unrewarding, she said,

I think the highlights have been ... my own learning about materials, about what builders (and manufactures) are dealing with; ... talking with (them) and learning from them. I have enjoyed quite a few of the conversations that I've had with different people, and finding out what their highlights and difficulties are ... in either trying to get their product into the market, or educating people about their product. ... (Another) highlight ... (is when we have caused) manufacturers (to) ... change... a component of their product. (For example.) to ... (use) plantation timber or recycled timber45.

I asked her if this was referring to the example of Corinthian Doors, a company who modified one of their ranges so that it would comply with the Eco-selector, and she replied,

Yes, ... (a rainforest–timber trim,) it was only 5% of the door, but ... they removed that. And also (a) builder remove(ed) the rainforest timber flooring options from their palette of materials that customers (could choose)46.

MB’s experience highlights two phenomena. First, she welcomed new information regarding something that she was already interested in even if obtaining it was difficult. This is an example of how practice acquisition is motivated. In MB’s case, similar to the example of open-source software (see Section 3.8), this was motivated by an enjoyment of pursing her interests and learning. Second, her sense of achievement was derived from the change in a manufacturer’s practice. The purpose of the Eco-selector is to engender change. As such, if an agent such as MB is engaged in

45 ibid
46 ibid
activities that result in change, they feel good – it is rewarding to know that one’s agency has an effect. Victories, however small, are important for maintaining the struggle.

The information that MB gathered was used to identify ‘benchmark’ products – the best that were then available. Once there were a sufficient number of products, an allowance was made for future product development and inclusion in the Eco-selector by having a manufacturer or supplier apply directly to the CfD. The CfD would then evaluate the submission and make an assessment based on the defined criteria.

In keeping with the idea that the role of the guide was to educate the builders, two workshops were conducted where manufacturers could showcase their products to the Aurora builders. DH saw these workshops as a highlight of the project, although she thought that they could have been more successful had the building company’s product-specifiers been present in addition to the Principals.

5.3.3 Vision (nearly) realised: The flip-chart (Intentions and Methods)
In December of 2002, the first version of the materials guide for Aurora was produced. It was designed to be an educational tool and became known as the flip-chart (see Appendix 7). The information was also made available as a website. In 2004 the flip-chart would be superseded by the Eco-selector and the website discontinued because ‘three quarters of the builders did not have
The flip-chart was visually designed to facilitate easy-use (see Figure 3).

Figure 3 shows that the products considered the most environmentally sustainable were presented on a green background to facilitate quick identification. A builder could flip to the relevant section, have their eye drawn to the preferred product by its colour.

---

Dr Dominique Hes, Lecturer, Faculty of Architecture, Building and Planning, University of Melbourne, personal communication 13/11/08
identify the environmental rationale, get an approximate cost variation and be provided with the name and telephone number of the supplier. The flip-chart was regarded by its developers as a resounding success. AP said,

I’ve had an ongoing interest in trying to produce tools that are appropriate and effective for the context that they are in. So I’ve developed web-sites, ... the Australian Building Greenhouse Rating scheme, you know a whole range of stuff. ... (O)ne of my areas of interest is actually producing tools that are going to work for people. So I was very keen on the idea that it should avoid the politics, but it should provide a very clear and easily followed pathway for a builder to know what they had to do, ... how to do it, where to get the materials and the right products, and know that they were ... meeting the requirements... . I’ve never been in a position to know how well (the Eco-selector) was applied, but my impression is that ... it was a very successful tool...48.

The idea of providing the builders with a ‘clear pathway’ – information that could be easily followed – was what both the URLC and the CfD saw the task as being one whereby existing information would be gathered and turned into an easy-to-access guide for the builders. However, the project-brief and ad hoc reports regarding the tool spoke of a Life Cycle Analysis (LCA) or, more usually, just the acronym LCA. LCA is usually understood to mean a quantitative measure of a product’s embodied energy that may include ‘cradle to grave’ data. Thus, although a document was titled, Development of an Embodied Energy and LCA Framework, there was never the intention for the project to be so rigorous.

48 Adjunct Professor Alan Pears, RMIT University, interviewed 14/12/06
Nevertheless, the exercise in information–gathering, reformatting and dissemination was reflected in the modest budget and in the methods used by the CfD. The initial $5,000 that the SEAV had contributed was supplemented by up to $10,000 to be spent on an as–needs basis. A post–workshop report–cum funding request highlights how the process developed and how the proposed budget was believed to be more than adequate:

We propose a $10,000 retainer program where we will invoice every 3 months based on the hours spent talking to builders, organising further workshops, and developing the guide. This could be settled by an MOU49 or an exchange of letters. We do not envisage that all the $10,000 will be required but this will allow a structured resourced framework to develop the project. Tasks that will be carried out as needed:

- talking to builders – hotline
- adding and updating the guide
- answering questions
- working with the government stakeholders on the toxicity and biodiversity issues
- working with manufacturers
- workshops as needed
- developing and maintaining the website50

It is noteworthy that the fourth dot–point indicates that the CfD knew that the PVC (toxicity) and timber (biodiversity) industries would need ‘working with’, validating AP’s concerns regarding the political nature of what they were doing. But this awareness was not sufficient to avert the coming conflict (see Chapter 7).

It is the opinion of the current Director of the CfD, Professor Ralph Horne, that the development of a full commercial LCA–based tool

49 Memorandum of Understanding
50 Outcomes from the workshop_final.doc
involving the appropriate industry, government, and non-government stakeholders would have required a budget in the order of $500,000 to one million dollars. Furthermore, the basic tool, as supplied, should have had a budget of $50,000 and $200,000 would have been appropriate to develop an extensively peer-reviewed and industry-linked tool with selector-level information\textsuperscript{51}.

Although no reason for the discrepancy between the actual, $5,000–$15,000 and ‘more appropriate’ $50,000 figures appears to exist, considering the CfD practices suggests that this occurred because:

\begin{quote}
The Centre for Design promotes sustainability through research, consulting, and capacity building through active dissemination and professional development (Centre for Design 2011).
\end{quote}

The CfD is not a typical provider of professional services to the building industry driven by profit. Rather, in keeping with their location within a university, they provide research and education about (environmental) sustainability. Macro-level factors such as the role that Universities play in society as well as meso-level organisational factors such as establishing University centres to respond to, and influence industry can be seen to effect the way the agents within the CfD saw their role and how they responded. Even though the CfD and other such centres have to generate income, this is not the primary driver of the organisation. The MORCA proposes that practices – subject to appropriate affordances – are self-extending. Thus, the CfD, as did the other consultants working

\textsuperscript{51} A/Prof Ralph Horne, Director, CfD, RMIT University, private correspondence May 2008.
on Aurora, responded to and adopted as their own the vision afforded by the URLC. As the practico-logic of the CfD is to research and educate (rather than sell professional services) it is perhaps not surprising that they took on the job without fully costing it and, furthermore, interpreted it as an exercise in information-gathering (i.e., researching) and dissemination (i.e., educating).

Indeed, a substantive report from the CfD to the URLC, summarising progress to-date in 2003 noted:

This materials selection framework is a qualitative method for identifying and recommending environmentally preferred products. Other than using a full LCA to develop an environmental rating method there are no quantitative methodologies available. In addition using a full LCA can take up to 1 month per product if done to the ISO standard, which is recognised in this context as commercially non-viable. Embodied energy is quantitative but its use as an indicator has significant problems, for example you could build your home out of rare hardwoods from remnant rainforests and still have a very low embodied energy outcome. The methodology used here has therefore combined the quantitative embodied energy figures with expert opinion on resource consumption (recycling and efficiency), toxicity and biodiversity52.

This was an atypical use of the term LCA. It was invoked to draw attention to the fact that products can be conceived as having a life and that at particular stages of that life environmental problems may emerge. Furthermore, LCA is not a complete solution, as the above example of the house made of rare or remnant timbers, suggests. As such, the method used to rank the materials listed in the Eco-selector was to use expert opinion to judge the performance of

the products. DH said that they set out to ‘identify ... the highest impacts over the life cycle, based on (the opinions of) an expert group’\textsuperscript{53}.

The assumption here is that experts, because of their knowledge, have the ability to identify the worst aspects of a product’s ‘life-cycle’, even if that product had not been subject to a formal life-cycle analysis. Thus, the term LCA, is being used here as a short-hand way of acknowledging that the products were evaluated holistically. This assumes that an expert, by definition, knows most, if not all, that is to be known about their area of expertise. However, the problem with such a method is that experts are known to disagree. Although there is no evidence that there were significant disagreements within the expert panel, as a method, such decision making means are not without criticism (see Finnveden 1999). For example, other experts (see Chapter 7) have opposing views on the environmental sustainability of harvesting native timbers.

As noted above, the people responsible for the Eco-selector project, thus far, saw their task as information-gathering and sharing which would facilitate better communication between the builders, architects and building product manufacturers. A comprehensive LCA was not possible. Reflecting the macro- and meso-level factors that position the CfD and centres like it, DH said,

\textsuperscript{53} Dr Dominique Hes, Lecturer, Faculty of Architecture, Building and Planning, University of Melbourne, personal communication 13/10/08
Everything I do is about … bringing information at the right level. … So that people can choose (and) make their own decisions … with some certainty\textsuperscript{54}.

However, the project had a tension within it that, somewhat presciently given the future transformation of the tool, was articulated in the mid-project report of February 2003. It included the following guidelines:

\begin{quote}
To provide guidance to the builders.
\end{quote}

And that,

\begin{quote}
Builders that participate in this housing project will be required to adhere to a strict set of sustainable building design guidelines\textsuperscript{55}.
\end{quote}

Thus, the tool potentially had two different purposes. The first was to provide guidance – education and advice – while the second was to set a strict set of guidelines, that is, rules. However, the view of the APMT and the CfD was that the primary function of the flip-chart would be consistent with the ‘provide guidance’ purpose, that being educational. The tool was seen to be a resource that builders could use to select materials that were more sustainable than those they normally used. This purpose informed the design for the flip-chart. Nevertheless, there was also some consideration of how to ensure that the builders used it:

\textsuperscript{54} Dr Dominique Hes, EcoSelector Project Manager, CfD, RMIT University, interviewed 04/12/06

\textsuperscript{55} Outcomes from the workshop_final.doc
Through the use of the MCT\textsuperscript{56}, a benchmarking protocol could be developed. For example, in the first year the requirement may be to select 10 materials from the table which are viable environmentally preferable alternatives. This could increase annually as more viable materials become available and builders become comfortable with their use. It is suggested that a time–efficient reporting framework will be developed to help contractors and builders account for the MCT material they use\textsuperscript{57}.

As for enforcement:

Compliance with these requirements needs to be easily assessed. URLC could provide in house pre application approval. Self–certification and Documentation to be provided by builders. The builder and, where appropriate, subcontractors could fill out a compliance form to be lodged with URLC, the compliance form could be a 1–page fax–back sheet. A third party could provide random checking of compliance\textsuperscript{58}.

The issue of compliance recognises that there needed to be a means by which the ULRC could know if the tool was, in fact, being used. This is the core issue that drives the next iteration of tool – when it recognisably changed from the flip-chart to the Eco-selector.

To summarise, the Eco-selector project addressed, intentionally or otherwise, two related phenomena. The first was the way the builders thought about environmental sustainability. This was a micro–level intervention – the CfD and URLC sought to educate the builders and this manifested in the design of the flip–chart. The second phenomenon is that of changing the actual practice of building houses. It was this, meso–level, organisational focused issue,

\textsuperscript{56} Material Choice Table
\textsuperscript{57} Development of a Materials Selection Framework, CfD URLC Materials Guideline: Report 28.01.2003
\textsuperscript{58} ibid
only partially addressed thus far, which started to re-shape the vision for the Eco-selector when URLC and the Docklands Authority merge to form VicUrban on August 1, 2003.

5.4 Changed practices, control and a wavering vision

As noted above, the ‘vision’ for Aurora was constructed with and embraced by the consultants engaged on the Aurora project. This was a function of how the URLC managed its projects and their interpretation of their role as needing to have a ‘benchmark’ ESD project. The leadership style within the organisation, at least for the ‘benchmark’ projects, can be summarised as encouraging people to ‘do their darndest’ within the constraints of having to operate at a profit.

The amalgamation of the two organisations resulted in the CEO of the MDA becoming the CEO of VicUrban. This meant that the style of management that had led to Aurora’s consultants creating a shared vision, which included embracing the educational agenda of the CfD for the Eco-selector, changed. BW said,
I think the URLC ... did some fantastic work and they did have some ... very good people. [...]

... run by [...] project [managers,] directors, (and) general managers; ... development people. People with [predominately] engineering ... or ... accounting backgrounds. They didn’t [generally] have design backgrounds and so they would tend to engage [...] consultants ... (who) ... provide[d] them with the expertise [...] they were looking for. ... (Although they) ... [prepared] design controls and follow(ed) through with them, ...[t]hey were more interested in the development of [infrastructure ...] and community work. ... [T]hey did some fantastic work ... but it was a different ... structure. ... [T]he decisions about design, [and] sustainability, (came down to) what ... caught their eye, [and] off they went. Whereas the Docklands group ... [were] driven by a design, ... environment ... and ... commercial focus. ... (S)o, it was a bit more balanced, and [...] possibly] ... that [integrated] model was ... [an] attraction ... [for] the merger... to [...] encourage] the URLC, to[wards ... a [...] more consistent approach to design and sustainability59.

Again, a VicUrban employee positions the ULRC as somewhat inferior to the MDA being dominated by engineers and accountants rather than designers. This shift from project–led to design–led practices, according to a VicUrban employee requiring anonymity who witnessed the transition,

59 Barton Williams, Senior Sustainability Advisor, Environment, VicUrban, interviewed 16/03/07
was one of the real struggles that many (URLC) people ... found difficult, and that's why many left. But also ... John (Tabart, the first CEO of VicUrban) has a very different (management) style to (Bryce Moore, the last CEO of the URLC) ... who seemed to be actually far more inclusive. (He was) ... less aggressive, more collaborative in the way he made decisions and also more empowering in many ways. He allowed people, like Jill (Lim to) ha(ve) a huge amount of say in how the project (evolved). ... (W)hereas John (Tabart) was very much, 'what I say goes', he had a much more dictatorial style. But it worked. ... John (Tabart was) ... very strong but also very ... supportive too. So even though it was a dictatorial style, it was ... a very ... supportive dictatorial style. ... (Bryce Moore) probably had a much more healthier, ... more inclusive and collaborative management style. ... (But, regarding who would be the next CEO) I think the aggressor was the one who came out on top60.

As such, from the perspective of the URLC staff, a new way of visioning and managing projects was ushered into the new organisation, which suited BW. He said that working under CEO John Tabart,

I had a fantastic ride, ... (E)pecially in the environmental and design (areas. The) ... environment (area) in particular, (was) ... not (one) ... that, Mark Allan (the Design and Environment manager) ... [... specialised] in. (S)o I was able to really drive that [area] ... and really take a leadership role, (especially) with the (Sustainability) Charter. So, (there was an) ... opportunity, (that I) [tried to make]... the most of ... [... encouraging] innovation, certainly in the environmental and design (areas) [... including enabling] six star [... performance in our new subdivisions]61.

The design-led approach saw an immediate review of the Aurora project in 2003. From the perspective of several URLC staff, this process would ‘tame’ Aurora. For example, the proposal for co-generation of electricity was dropped. Other, design-led decisions

---

60 Anonymous VicUrban employee
61 Barton Williams, Senior Sustainability Advisor, Environment, VicUrban, interviewed 16/03/07
were made that, from the perspective of environmental sustainability, were not optimal. For example, mandatory solar hot-water boosters were not allowed to be seen from the street (see Section 6.4.1). As such, under VicUrban, environmental sustainability came second to what was positioned as a more holistic design-approach which fore-grounded aesthetics.

5.4.1 Fractured visions: External projections and internal camps

The aestheticising of Aurora meant that one of the possible major points of difference that the estate might have used to market itself, its environmental sustainable credentials, was downplayed. ESD could have been used to project the vision: ‘look at me, I’m the future, here today’. This is marketing to create a new niche. For Bryce Moore (BM), the ex-acting CEO of the URLC, if the goal was to create a new benchmark, then,

I would have done everything within my power to ... make a bigger splash. I would have ... opened that project by the extension of Edgars Road into the site, ... rather than coming in from the side and having it (seem) off the beaten track.

it was ... (like saying) to the market, ‘come and buy this' rather than there being a real attempt ... to sell it62.

This criticism of the marketing of the estate, even though VicUrban promotes it as its sustainable urban design ‘flagship’ (VicUrban 2010), was also made by one of the building companies at Aurora, Burbank Homes' David Borg, who said,

62 Bryce Moore, ex General Manager, URLC, interviewed 05/09/08
...it’s been an (ongoing) issue ... for a long time. (Yet it’s) a very big story to tell to the general public, but they don’t know about it because they’re [VicUrban] not pushing it. You’re getting a lot of the other developers, like Stocklands and Delfin, and they’ll promote whatever thing, whatever they’ve got on the estate, whether it’s the lakes, or whether it’s the amenity, or whatever it might be and it’s just (that) every estate’s got that. (W)hereas Aurora’s got a lot of other ... initiatives that they can promote but they’re not getting it out there ... on television or whatever, to the masses. ... (T)here are people that ... go there to have a look at the estate but are they wanting to live there, you know? That’s the problem, we want them to want to live there and not just visit it ... and move on. ... I think (that as VicUrban) ... (a)re sort of ... associated with the government that ... they’re very ... cautious in how they promote themselves63.

This failure to clearly market a point of difference was a source of tension within VicUrban. Senior Development Manager, Peter Stephenson (PS), who left in 2008, jointly led the Aurora project and was responsible for feasibility, marketing, sales and community. He said,

we are not giving the market what they want. We’re trying to be higher–than–mighty. ... (S)ome people would say we’re being extremely arrogant64.

In the absence of a clearly articulated point of difference, many features of Aurora were perceived as an impost. For ‘land–developers’ like PS,

...development is speculation. It’s nothing more, it’s nothing less. As a developer we are speculating on what we think the market wants. We are speculating on a product that the market will accept and an absorption rate that the market will bear.

63 David Borg, Design & Drafting Manager, Burbank Homes, interviewed 18/04/07
64 Peter Stephenson, Senior Development Manager, Aurora Project Management Team, VicUrban, interviewed 28/02/07
(T)he reality is you’ve got ... (to) keep trying to satisfy the market. ... (But) by the same token, you’re trying to lead the market, whatever the hell that means. The tension ... is that we’re ... we’re a developer who’s got this baggage, ... who’s got this agenda that’s not a developers agenda. ... And therefore we’re trying ... to do things that (are) ... not based purely and simply on us speculating against the market\textsuperscript{65}.

For PS, this tension was manifest within the organisation of VicUrban.

In fact, there (are) ... parts of this organisation whose job is to create the tension, to distract everyone off the game. ... (T)here are some ... (who) take great pleasure in it. There are some that don’t even know they’re doing it. ... (T)here are some who do it because they don’t know better. There are some who do it because they ... just don’t get it; they don’t understand the development game. And some get it. (But) some do it because they ... believe they are higher and mighty, and they want(1 to) ... save the world. There’s ... a complete (range including) ... zealot(s and) ... do-good(ers)\textsuperscript{66}.

PS’s ‘knowledge’ of how markets operate meant that he did not understand how the issues of sustainability related to the playing–of–the–game, or the practice of land development. For him, there needed to be a simple point of difference between Aurora and other offerings in the market. He said,

\begin{quote}
Aurora has got (the) third pipe. Put up the flag. ... (But,) okay, it’s (a) ... big project. It’s such a big project we’re go(ing to) have two flags. We’re go(ing to) put (in) ... fibre to the home. And maybe we’ll even put up a third flag; we’re go(ing to be) ... six star. ... And then I would have said, okay, they’re our marketing heroes. And (if) we’ve got all those other things, they ... (have to be) all market–focused. ... (W)e only do (those) ... if it gives us revenue. We’ve got these two (or three) big things; they’re our point of difference. And then everything else we do, ... every initiative ... (is) because it’s generating revenue or sales velocity or, or market position. ... And that’s what I would do.
\end{quote}

\textsuperscript{65} ibid
\textsuperscript{66} ibid
But ... what we’ve got is (an accumulation) over (the) seven years of this project being acquired, ... conceived, ... visioned and revisioned, (where) ... we’ve said that, (and) we’ve said this, and then we’ve said (the other), (A)nd the(n) next week we’ve said, oh, this, and (then) we’ve said this. (So,) ... actually, now we’ve got ... 35 flags sticking up there. ‘This is Aurora’; it encompasses all these major things. We’re go(ing to) deliver on all of them. And it’s just too hard for our partners, not just the builders, it’s too hard for ... the council. It’s too much for them to ... digest. It’s certainly too hard for the market to digest, they ... don’t put value on a number of these things. So what I would have done is, I would have said, there’s recycled water, there’s ... fibre to the home and here’s a standard five star estate and we would ... (have had only) land sales ... on the base model. (This would create) ... some volume and we would have been on the ground two years earlier ... because we wouldn’t have had so much ... difficult(y) getting the typologies right, and we would have just been selling land. And then, as we moved on we would have had to create another flag (be)cause the...(market) would have been ... (slowing) and (so) we’d pu(t)... up six star......and then we’d pu(t)... up (the) environment... and we’d create ... a wetlands district and we’d create a this and we’d create a that; you(’d) evolve it. But instead we just kept inventing new things. Oh, it’s ... another three months, and another idea. Stick it up. Promise it. We’ve got... (to) incorporate it, ... it just adds complication. ...(B)uilders, you’ve got...(to) do that. ...(W)e’ve got... (to) change our morals. ...(W)e need to change our lots. We need to change the subdivision, add six months, redo everything, more consultant fees. (It was)... paralysi(ng). That’s ... my very critical ... analysis of ... the curse of Aurora67.

Although, on paper, PS was aware of the goals for Aurora when he was employed to share the leadership of its development he, nevertheless, approached this using land development practices. He said,

67 ibid
I was employed at VicUrban as a senior development manager for the Aurora project. ... I came ... from another development company ... for a number of reasons but the main (one) ... was ... that I wanted to work with a number of people and they (happened) ... (to be) involved in Aurora (as well as some) ... other projects. ... (S)o my role there has been, ... (with) Theo (Della Bosca) ... (to be the) leaders of the team, from a development point of view anyway. Even though I had my concerns about ... working for a government organisation ... and (second) ... the very aspirational objectives of the Aurora project which, from a cursory glance and from the summaries provided to me, I thought, shit, that’s ... a very hard task; there’s a bit of ... dreamland there68.

Clearly, by the time PS came to be involved in the Aurora project the vision was neither shared nor understood by everyone who was working on it. He felt that the project had been corrupted by ‘zealots’ and ‘do–gooders’ and that, as a result, there was no clear point of difference for Aurora in the market. A strong marketing of the project, that tied the ‘35 flags’ together, may have given him a sense of what Aurora was about, and, perhaps more importantly, as BM noted above, sent a clear signal to the ‘market’ and the industry, that this is what the new benchmark is. Thus, with the loss of continuity of URLC leadership, due to the amalgamation Aurora was managed in a style that failed to let the team know that, as was the case under the URLC, as JL said, ‘empowered ...with the pure agenda to lead and improve things69. And that their job was to ‘... step...beyond (the) normal boundaries’70.

For PS the normal boundaries of land development were under threat, rather than being extended for the better and this was an

68 ibid
69 Jill Lim, Aurora Project Manager, URLC, interviewed 14/10/08
70 ibid
organisational problem – VicUrban had lost its way. VicUrban’s Internal Communications Manager, Emma Harding, also was aware of divisions within the organisation. She said,

(The) Docklands (Authority) ... is still ... a stand-alone entity within VicUrban. ... I wouldn’t have thought it would have that much impact... (Perhaps) it’s the (organisational) complexity? ... (For example), if you ... want(ed) to do ... focus groups ... across this organisation, you would have to do a heck of a lot to really get a cross-section because there’s so many different (groups). ... (Y)ou’ve got ... project managers, ... subject matter experts, ... community specialists, ... sustainability specialists, ... functional support, ... sales, marketing; it’s so complex. ... (Y)ou’ve ... constantly got this tension. ... You know, if you’re an advertising agency ... you pretty much know you’re thrown in with all your creative (types) and everyone’s working towards ... (the same goal); ... (you) know why you’re there and what’s expected... (But) there’s so much going on here ... – it’s diverse (and not necessarily complementary). ... And, ... maybe we just need to be comfortable with that and acknowledge (if) 71.

As such, the organisational complexity of VicUrban was, at least in part, responsible for the gulf between the ‘land–developers’ and the ‘environmentalists’. These ‘camps’ within VicUrban meant that those responsible for ESD, the design area, were doing ‘their’ job, but that the people like PS and another Aurora Project Manager, Theo Della Bosca (TDB), who were ‘developers’, did theirs. These differing practices, because they were unreconciled, were a source of conflict. According to an informant requiring anonymity, JT’s managerial style was dictatorial. As such, these sorts of contradictions were suppressed – staff were told to do particular things, although they could determine how to do what they were bidden. This is pertinent for the development of the Eco-selector as it

---

71 Emma Hardy, Internal Communications Manager, VicUrban interviewed 30/03/07
explains the way in which the scoring assessment feature was added to the tool.

5.5 Transforming the vision for the Eco-selector

Under JT, scoring assessment was a ‘proven’ feature of the MDA’s ESD Guide (VicUrban 2006c). According to BW,

the ESD guide was ... the first exercise in [...] attempting to] measure (the) environmental performance (of building) ... projects in [...] Docklands. (It) ... was very successful (and) gave VicUrban [...] confidence that ... [...] scheme [like this] work[...] [I]t [...] encourages] the industry to aim for higher measures, [...] of which VicUrban could] audit, ... manage, ... control, and [...] seek] compliance72.

The ESD guide utilised the scoring assessment model found in similar tools already developed in, for example, the UK and the USA, respectively, The Building Research Establishment Environmental Assessment Method (BREEAM) and Leadership in Energy and Environmental Design (LEED). Although objectification does not necessarily escape the problem of subjectivity which it purports to resolve (Bowker & Star 1999; Boyne 2006; Dupre 2006), the process of assigning numbers on a scale to legitimate performance, without taking into account the fact that the scale may be cardinal, nominal, ordinal, interval or ratio, or being clear as to how it is being used, is cause for scepticism. Moreover, although the nostrum articulated by MA – ‘if you don’t, or can’t, measure it, ... you can’t manage it’73 – can be criticised, the fact remains that this pervaded

72 Barton Williams, interviewed Senior Sustainability Advisor, Environment, VicUrban, 01/03/06
73 Mark Allan, General Manager Project Planning and Design, VicUrban, interviewed 07/03/07
VicUrban and shaped the work practices and requirements. The CfD was aware of this issue. AP said that ‘in terms of the points scoring mechanism,) ... I ha(d) my reservations about that part of it, ... because [l] know ... how rubbery ... (such) numbers (can be)’.

Although the scoring system was known to be a problem at an intellectual level, the CfD did not put the future of the Eco-selector at risk by refusing to incorporate the change. Two factors likely affected this decision. First, although the change contradicted the educational habitus of the CfD, this probably was countered by a desire to extend their environmental sustainability practice. Although the change was not good, it was not bad enough to risk cancelling the project. Second, there was the unresolved issue of ensuring the builders compliance.

Thus, to ensure that the builders did in fact use the materials specified in the flip-chart, it was transformed from an educational tool into the Eco-selector, a planning–approval requirement that sets scores to measure the sustainability of the products used in Aurora’s houses and gardens. Like the flip-chart, but with the added consideration of landscaping, the house is broken down into six ‘elements’, each of which has a nominal score that must be reached:

<table>
<thead>
<tr>
<th>Element</th>
<th>Score</th>
</tr>
</thead>
<tbody>
<tr>
<td>Floor structure</td>
<td>20</td>
</tr>
<tr>
<td>Framing</td>
<td>10</td>
</tr>
<tr>
<td>Wall cladding</td>
<td>20</td>
</tr>
<tr>
<td>Roof cladding</td>
<td>15</td>
</tr>
</tbody>
</table>

74 Adjunct Professor Alan Pears, RMIT University, interviewed 14/12/06
In total, a minimum of 80 points is required. Like the flip-chart, the Eco-selector is a series of spread-sheets, one for each of the six elements, that lists approved products. Information for each product, or sub-element, is provided, including its generic name, environmental benefit, trade name, the telephone number and the name of the company that supplies it, an indicative cost evaluation against standard products (less than, equal to, or greater than) and the point(s) scored for the use of that product (see Figure 4).

![Figure 4 Extract from the Eco-selector: a Guide to Materials Selection, April 2006](image)

Each proposed house at Aurora requires a report, the Eco-Scorecard (see Appendix 8), which lists the Eco-selector products selected by the builder and shows that the house meets the minimum score. This total is obtained by adding the scores of the six Eco-selector divisions, that is, each house element. Points are awarded based on
the type of material selected and this must make up at least 90 percent of the total ‘element’. The materials scoring provide the mechanism for increasing the level of sustainability. Higher numbered materials have greater environmental sustainability. Implicit in the scheme is that, all things being equal, a house that scores 100 points is more environmentally sustainable than one scoring 80. However, this assumption was re-evaluated by CfD staff who concluded that the tool was limited in its ability to be effective if the scores were periodically increased to force greater environmental sustainability. Nevertheless, it is within the tool’s capacity for the 80-point minimum to be raised to 100. This has happened at two more recent VicUrban projects.

In keeping with the flip-chart, as well as the lists of products, each of the six divisions is prefaced with a summary page of the particular problems associated with that element and a series of ‘hints’ for being more sustainable. As such, the flip-chart’s basic format and educational purpose was preserved, and the scoring assessment method was ‘bolted on’.

Thus the micro-level educational function was preserved but a meso-level function was added. The tool now was a part of the planning approval process. The addition of the scoring assessment was a crucial turning point for the Eco-selector in 2004. Not only did it mean that the builders would be compelled to use it but also that the change drew the ire of the timber and PVC industries because they felt that the Eco-selector actively and systematically
discriminated against their commercial interests. As long as the flip-chart was aimed at the micro-level and notionally educational, the industry bodies could not mount a legitimate complaint. At best, they could have argued that the flip-chart lacked ‘balance’ and, unless they were prepared to attempt to censor the publication, which the timber industry had done once before and failed (Walters 2003), all they could do was counter what they perceived as environmental ‘propaganda’ with their own information. However, once the Eco-selector became compulsory for planning approval at Aurora, traditionally used products had to be replaced. An 8,000-house project represents substantial economic activity for all of the industries involved, trillions of dollars in turnover at current rates. For the parts of the timber industry involved in native timber extraction, their share was potentially under threat and there was also the possibility that the Eco-selector may set a precedent for the rest of the industry. It is this threat that engendered significant challenges to the Eco-selector, explored in Chapter 7, from these vested interests.

5.6 Conclusion

The visions for Aurora and the Eco-selector was driven by the near mythic beliefs of the URLC regarding its role in the market. These beliefs arose from their previously established practices which provided the raison d'être for the new project. Creating the visions was easy. The consultants were primed, waiting for an opportunity, that is, an affordance, such as that provided by the URLC’s decision
to design their next benchmark project. However, the vision for Aurora and the Eco-selector changed with the introduction of a new management regime that promoted the nostrum, ‘if I can measure it, I can manage it’. Several factors led to the vision being diminished, these include design-led management and the positioning of Aurora as both ‘other’ and ‘ours’. This promoted a schism within VicUrban between ‘zealots’ and ‘developers’. The effects of this rift and how the Eco-selector was implemented are explored in the next chapter which examines the effectiveness of the visions for creating and embedding innovation for environmental sustainability.
Chapter 6  Embedding change

6.1  Introduction

Chapter 5 argued that the visions for Aurora and the Eco-selector arose from pre-existing practices – the URLC’s belief that it led the market via an earlier exemplar – their Roxburgh Park estate. Furthermore, people’s commitment to the visions was a function of pre-existing practices and thus, affected the way an agenda for change was pursued. However, a commitment to Aurora’s objectives was not sufficient to ensure ongoing engagement with the project – builders left that found it either too difficult or financially unviable. The visions were also affected by the amalgamation of the URLC and MDA. The newly formed VicUrban adopted design-led, rather than project-led managerial practices. This changed the way in which the standards for the Aurora project would be set.

The visions were critical for both the initial and continuing impetus for innovation for environmental sustainability. Not only did the shift in organisational context for the project see it revised but also divisions within VicUrban emerged that resulted in significant disquiet. These subsequently led to changes that were not in keeping with maximising the ESD credentials of the project. To expand the analogy used by Mark Alan (MA), VicUrban’s General Manager of Project Planning and Design, if the URLC’s brief for Aurora was like ‘trying to fly to the moon’, then, if the ship needed to be redesigned to carry one rather than three astronauts, then so be it, the moon
was still being aimed for. However, PS, an Aurora Project Manager, felt that there was not one ‘moon’ being aimed for, but several – for him there were ‘35 flags’ being flown at Aurora. The lack of a unifying vision made the list of the proposals for Aurora seem like too many unrelated ‘things’ to market. Furthermore, given PS’s role as a Project Manager, he was involved in making decisions about the success, or otherwise, of the implementation of the proposed innovations.

This chapter explores the transition from the visions for Aurora and the Eco-selector to actual change in practices. The MORCA proposes that this period of flux is a time when change can happen but existing practices may hinder or thwart it. As such, this chapter asks, what led to some changes for greater environmental sustainability being accommodated while others failed to materialise? This question is answered by exploring a number of features of Aurora and the Eco-selector. It also examines the specific conditions under which two of the builders left Aurora. Furthermore, it looks at the effect of localised change – the Aurora Estate – in an industry that is geared towards repetitive processes across multiple sites that adheres to a normative framework. It is noteworthy that the contradiction between business-as-usual and change for greater environmental sustainability saw six of the original ten builders at Aurora leave the project.
6.2  Easy change, but...

One of the builders at Aurora, Greg Zuccala (GZ), the Director of Zuccala Homes was pragmatic regarding the Eco-selector, he said,

(A)s any builder would be, (I'm) ... skeptic(al of) ... anything new ... but ... we found that we could achieve the points in each category without too much issue75. (F)inding th(e) alternate materials (wa)s not an issue. ... (T)he biggest issue was ... administrative... . (P)utting th(e) processes in place for (compliance)76.

Although GZ provides a ‘textbook’ illustration of the conservative nature of habitus, he indicates that the change required by the Eco-selector, that is finding and using preferred products, was easy. Replacement products and materials were easy to source. Thus, the tool provides the required information and the scoring mechanism worked. As such, as a means of modifying typical building practices, it was successful. However, there were administrative difficulties. Demonstrating compliance was difficult as VicUrban wanted proof that the materials specified were in fact used at Aurora. The initial mechanism proposed was to have the builders supply their invoices for the materials that they purchased. This posed two challenges for the builders. First, they had to implement new administrative systems to meet VicUrban’s requirements. This was the difficulty referred to by GZ, above. Second, the builders had to manage sensitive commercial data – prices for goods typically vary depending on the number of items purchased. Companies that are able to negotiate lower prices have an advantage that they prefer not to share with.

75  Greg Zuccala, Managing Director Zuccala Homes, interviewed 06/05/08
76  Ibid.
their competitors. This issue became a serious problem, one that contributed to Devine Homes, one of the largest builders in Australia, leaving the project after building and selling six homes. Michael Battistella (MB), their National Design Manager, said,

The biggest, hardest, (most) frustrating part of this ... was to ... produce invoices to show that’s what went in. There was no way this business was go(ing to)... do that and they made that clear. (W)e’d like to assume that there wouldn’t be too many builders that would offer invoices because you don’t give out what you’re paying. Now, you can block (out the) prices, ... (but) you could miss one too. Suddenly the rate (that you are paying is) out there (and) it doesn’t take long (for) ... the Boral brick rep(resentative to get) ... an irate phone call from (another customer wanting to know why) ... he’s paying 20 cents per 1000 more. ... So, ... we said, ... as a public company ... we’re happy to be ... audited and we’re ... happy to put in writing that ... we are committed ... and will abide by the guide(line)s and open (our books) ... as often as you want – we... suggest(ed) quarterly. (T)here wasn’t any resolution about ... that (before) ... we pulled out. (It) was another stumbling block (that) ... combined, (led to) ... the national GM (saying) ... this is just all too hard, ... we’re out77.

It is noteworthy that Devine Homes suggested an audit process to resolve the problem. Although they left Aurora before this issue was resolved, the suggestion could have provided an opportunity for an innovative solution to this problem. However, an auditing process would have meant VicUrban going beyond the typical practices of developers, which does not include regulating or monitoring works, even though the organisation probably has the required skills needed in its finance and accounts department personnel. However, typical practice within most organisations is for bookkeepers and accountants to manage the organisations’

77 Michael Battistella, National Design Manager, Devine Homes, interviewed 04/02/08
finances rather than being involved in direct service provision. As such, an opportunity for a potentially innovative solution to the problem of checking invoices was missed.

The sensitive question regarding the accidental disclosure of prices was compounded by Devine Homes’ existing accounting procedures. VicUrban’s Theo Della Bosca, (TBL) an Aurora Project Manager, came from Devine Homes. He said,

when I ... was leaving ... (I had) a discussion ... with ... some of the estimating staff ... about ... how they might be able to comply with (providing invoices). ... (T)hey indicated to me that they wouldn’t comply with it; ... or, couldn’t; ... because of the way their administrative systems were set up. ... (A)ll the invoices ... went to Queensland and they ran a fairly tight ship, (so) ... there was one chap who was responsible for processing invoices and ... he probably didn’t have the wherewithal, ... nor the time to ... ensure that the invoices were managed (to provide verification)\textsuperscript{78}.

Thus, for Devine Homes it was not the idea or use of more sustainable building products that was a problem, rather it was their internal procedures that would be insurmountable. Yet for VicUrban, as MA points out, their ‘... concern was not with the price being paid. Our concern was to find a mechanism by which we could (know) ... that the material ... specified was, in fact, used\textsuperscript{79}.

Eventually the problem was solved by the Whittlesea City Council, who has responsibility for checking compliance with the Eco-selector. They use ‘certificate(s) or letter(s) of compliance from the

\textsuperscript{78} Theo Della Bosca, ex Devine Homes Project Manager, interviewed \textit{18/11/07}
\textsuperscript{79} Mark Allan, General Manager Project Planning and Design, VicUrban, interviewed \textit{09/02/08}
supplier saying the materials that were used w(ere) from (, for example,) a (particular) forest\textsuperscript{80}.

Although the proof of purchase issue was eventually settled, the question of purchasing different materials for at least one builder remained a problem. Dreamline Homes, the smallest of the original companies at Aurora, in principle were happy to use more sustainable products and had no significant concerns with demonstrating compliance. Their leaving Aurora relates to the way the industry is structured.

One of the features of the volume housing industry is that builders negotiate contracts with preferred suppliers. Although the Eco-selector provides information regarding who can supply these, the builders have pre-existing contracts with suppliers. Scott Hamond (SH), the proprietor of Dreamline Homes, said,

\begin{quote}
the easiest way \(\text{(was)}\) to \(\text{(use)}\) ... the preferred supplier on the selector. ... But it would have meant ... that we would have had to change most of our suppliers. ... \(\text{I)t was just a}\ ... \text{headache... (because)} \ ... \text{most of the time we're under contract. ... (Y)ou sign 12 month contracts to get the best possible price, (but) ... at the end of the day you've got... t(o) renege on ... that. ... (Y)ou can get out of it ... if (they) can't supply the product we require. ... But then that \{new\} supplier can name his price, can't he? So that was an uncertainty for us and there \(w(ere)\) just too many uncertainties.... \(W)e were already over budget, \(\text{(and)}\) ... the Eco-selector, ... we believed, \(\text{(would)}\) force the budget even higher\textsuperscript{81}.
\end{quote}

\textsuperscript{80} David Stokes, Building Inspector, Whittlesea City Council interviewed 11/08/08
\textsuperscript{81} Scott Hamond, Dreamline Homes, interviewed 01/04/08
Furthermore, prices based on the economies of scale that are available to larger companies are not available for small builders like SH. As such, from his perspective, he argued,

{VicUrban} would be better off ... working with suppliers before they start(ed) designing the houses. ... {VicUrban could have} ... walked in ... to a supplier and said this is what we’re going to be doing, it might be 12 months, two years down the track, (get ready)\textsuperscript{82}.

In this instance, a ‘level playing field’ for SH would mean an estate-wide approach to materials rather than relying on the purchasing power of the individual builders. However, just as VicUrban’s practices does not accommodate Devine Homes’ suggestion of an audit to verify compliance with the Eco-selector, neither do they have the ability to readily step beyond other typical practices of land developers. They have no experience negotiating the price of building materials. Nor do they necessarily know what materials are needed. Also, the practices and profitability of volume-building are intimately bound up in this task. To remove the selection and costing of materials from their business, again, requires a radical realignment of current practice, risking a defensive rejection by larger builders who use their buying power to gain a price advantage. Nevertheless, the Eco-selector does contain a three-point guide to pricing – less-than, equal-to, or more-than – so there was information for the builders to help them through this issue. However, it was more immediate financial issues that would cause Dreamline Homes to withdraw from Aurora. SH said,

\textsuperscript{82} Ibid.
(We were told) that there was going to be ten of the largest builders in Victoria and two local builders. (We were one of the two local builders. We were the smallest builder only doing about 20 houses a year. We were assured that Aurora was going to be for second and third homebuyers because of the recycled water, the energy efficiency and all the rest of it, as the (extra) costs (meant) that first homebuyers probably wouldn’t be able to get into the estate. We didn’t realise that we would be paying for (a lot of) the designing and research ourselves. The trouble was we were so small. I put on a draftsman and he spent two to three days a week purely on developing housing for that estate. We did that for two years and at the end of the day it just became too costly for me. Initially it was (supposed to be) a 12 month process, but it dragged out to two years, (and then) to two and a half years. And obviously for a small bloke like myself, absorbing those sort of costs, just wasn’t (possible). I found it very fascinating but I felt cheated. Initially there were always deadlines and if you didn’t meet (them, it) was (implied) that you wouldn’t be accepted into the estate. So were sort of pushed along. At the end of the day, I ended up thinking it was a rort. That they were using the builders to finance the research and development of the estate. And, obviously the bigger companies have the resources to do that, whereas the small builders don’t. I felt privileged initially that they allowed a small builder to go in there. (But I think we were there) so they didn’t seem to be just giving it to the big boys. So, two small local builders were involved, {VicUrban} can use that sort of thing (because it looks good if local businesses are involved). (But) I don’t think we (added) any significant value to them. (Although) we went (at it) like a bull at a gate. Everything that they wanted we delivered on time, until we realised, after about 12 months, that no one else was busting their arse getting all this stuff in, so why should we? (Having said that,) I believe that they were fair (to) us but they were (not) structured to suit small builders. (That) the thing that tipped it over was they turned around and said, (that we had to deliver) house and land packages under $350,000. So that just blew me out of the water. (We were thinking) $350 to 450,000 and were designing homes (accordingly.) we had (suspended) concrete slabs over the top of the garages (for) balconies and things like that.

SH added:

83 Ibid.
(A)nything different ... or challenging in building. ... that's what I like. ... (T)hat was my initial attraction. ... (T)he fact that we were go(ing to install),... grey water, ... fibre optic cables, ... and different systems ... for the lighting ... to save power. ... (T)he whole lot was interesting ... (at) a personal level. But,) (f)rom a business (perspective,) it was one of the worst mistakes I've ever made. ... it cost me over $70,000 in wages, ... (and) that's without my time. ... (I)t probably effected the turnover ... of the company (by) tens of thousands (of dollars), (b)ecause we were forever waiting ... for it to start ... (A)t that stage we had ... a draftsmen, ... two supervisors, ... an estimator, ... myself, ... my wife, and sales people ... all sitting there84.

Hence, Dreamline Homes’ ‘failure to innovate’ was not, as Schumpeter (1934) suggests, because SH was wed to existing practice nor because of his ‘attitude’ to ESD – he relished the prospect and challenge of becoming an environmentally sustainable builder. However, his commitment to the idea was not sufficient to keep him at Aurora. The insurmountable issue for him was that the company was not large enough to weather the longer than anticipated development period and the changes in the scope of the project that coincided with VicUrban’s creation – to make the houses more affordable.

Although Dreamline Homes, Devine Homes and two other builders85 left Aurora early, before its launch in October 2006, the rest of the builders, for a time, remained and thus, managed to resolve the problems that these builders could not. Some would continue to struggle with the demands of the estate, others would comfortably settle in and a late entrant to the estate, JG King, would, surprising

---

84 Ibid.
85 Metricon and Wincrest Homes also left, but were not interviewed for this research
Sonya Rezo (SR), an Assistant Development Officer at Aurora, hit the ground running. She said,

JG King … came on board) … when we had a free space – they … were the last to come in. (It) was surprising, they’ve been one of the more successful (builders) out here … . (A)t the time JG King was only just coming into the Melbourne market. I think they were more a country builder (and) … not (established) …in Melbourne. … I can’t recall exactly (how) the relationship (was established). … I’m not sure if it was Barton {BW} or, someone … like that, … knew Natalie King and … encouraged them …to … (c)onsider Aurora. … (DKO, our) architect(ural) consultant(s) … worked … with all the builders … to understand … the … design (requirements). (JG King) … grasped it fairly quickly. … (I)t … took them no time at all, where (the) others … took over twelve months for them to get the designs … set and final(ised). … (JG King came in) …almost at the end {of the design development process that all of the other builders had gone through}. … And, they were one of the first to … start construction. … (T)hey just embraced it fully. … (T)hey were … totally committed, … I know that outside of Aurora, … they’ve got a demonstration 7–Star home … (in) … Bendigo or Ballarat. … (T)hey’re really embracing the {whole question of environmental sustainability}86.

Clearly, JG King was well–positioned for environmentally sustainable, volume–house building. They ‘fit’ the Aurora model and quickly adapted. This willingness to engage with the ideal of ESD was evident in other companies too. Even the companies that withdrew, like the smallest builder, Dreamline Homes, were engaged with the challenges presented by becoming more environmentally sustainable. So too were Devine Homes. MB said,

---

86 SR, Assistant Development Manager, Aurora Estate, VicUrban, interviewed 11/08/08
our guys were pretty good, ... they ... did a lot of research ... planning the display {houses. For example, when they looked at the energy efficiency of the air-conditioners} ... they (found out that you needed) commercial sized ducting, (which would not) ... go through (standard) double-story floor joists {– they are too big}. ... (T)he frustrating part was ... that ... other (builders were) ... installing air-conditioning (with) standard ducting, (inefficiencies) ...like that were raised, (a)nd there was a whole lot of head scratching going on. (The question was,) ... how did it get through ... (when) everything’s apparently audited, (a)nd inspected? (Although) ... the unit’s ... (are nominally) efficient, ... (it’s) really a small part. You’re losing (efficiency if) ... the piping (is incorrect). ... And ... it’s not ... VicUrban(‘s) fault. Everyone, ... (except the air conditioning experts) from the guys ... employed to do ... audit(s), or ... spot check(s), (and) the site check(s), ... were ... all part of it. ... I don’t think they knew87.

What MB is pointing to is a fundamental flaw in the normal practices of domestic building construction. Floor joists effectively determine the space between the ceiling of the ground floor and the floor of the first floor. This dimension is determined by the structural requirements calculated by the engineers, combined with the consideration of cost-effectiveness, which typically means a smaller gap is cheaper. This space is normally 200 – 250 mm – limiting air-conditioning ducts to similar sizes. A commercial-sized duct – necessary for maximum efficiency of the total system – is between 500 – 600 mm (or larger). Although this sized duct could be used in a domestic setting, it would alter the way the house looked either through the use of a suspended ceiling or by having the ducting visible.

87 Michael Battistella, National Design Manager, Devine Homes, interviewed 04/02/08
The problem here is the multitudinous and disparate nature of professional practices deployed in the Australian housing sector. Even for a large company, like Devine Homes, reconciling the demands of energy efficiency – in this case the air-conditioning system, with current building practice, the depth of floor joists – was, and remains an anomaly.

6.3 Best products, no thanks, compromise, yes please.

The Eco-selector scoring is weighted towards products that are considered more environmentally sustainable than those typically used by volume house builders. The assumption underlying this method is that the builders will tend to select products that maximise the ease of reaching the total score. One such product is concrete roof tiles that have recycled content. They attract 10 rather than the 5 points allocated for all other components listed in the roof section. However, a large concrete tile manufacturer does not produce ones with recycled materials suggested an alternative. GZ said that,

manufacturers and suppliers ... were keen to get involved with such a big developer ... and adapt ... their products (to) ... comply (with the Eco-selector). ... (For example,) our roofing supplier, Monier-Wunderlich ... didn’t ... use any ... recycled concrete in their cement tiles. ... (T)hey suggested the use of a roof vent to help with the ... airflow. ... So they thought outside the box a little bit and ... came up with that idea specifically for ... Aurora. That’s (now) current practice (and) ... included in the ... Eco-selector88.

As such, a wind-powered roof ventilator (hereafter referred by their common name – Whirlybird), which are a small additional cost, were

88 Greg Zuccala, Managing Director Zuccala Homes, interviewed 06/05/08
specified to make the roofs more ‘sustainable’. On hot days roof spaces can reach 60°C. Whirlybirds are designed to extract this hot air. However, the temperature of a roof space has a minimal effect on the comfort of the living spaces provided the roof has no inadvertent thermal bridges like an air gap or other conductor, connecting the roof and living space and has properly installed standard ceiling insulation (Queensland Government 2004). As such, their benefit is moot. Furthermore, even if the actual lack of benefit is ignored, as DB of Burbank Homes noted, Whirlybirds have a limited application:

it was ... put on flat roof homes, which don’t ... need it. ... (And) It doesn’t really work on a tiled roof ... because there’s already ventilation (between) ... the tiles. (Whirlybirds) should (only) be ... (used) on Colourbond® (steel) roofs.

Figure 5 shows that whirlybirds were installed on both metal and tiled roofs by at least one91 of the builders, en masse. Not only is this ‘solution’ of questionable merit, because of the operation of scoring system of the Eco-selector, its use mitigates against the specifying of products that are better for the environment. The Whirlybirds provide 5 points of the minimum 15 necessary for the ‘roof cladding’ section. Compulsory insulation provides a further 5 points and the use of either standard concrete tiles or metal cladding meets the target. Although the Eco-selector encourages the specification of concrete

---

89 Colourbond is a proprietary steel roofing product
90 David Borg, Design & Drafting Manager, Burbank Homes, interviewed 18/04/07
91 VicUrban sells the land at VicUrban to the individual builders in sections that have several adjoining lots. As such, Figure 1 may be the work of one or more of the builders.
tiles that have recycled content by awarding them 10 points, there is no incentive to specify them. Even when the Eco-selector was made more rigorous for another VicUrban project, requiring 100 points instead of the 80 required at Aurora, the roofing section remained the same – having a bias towards the use of Whirlybirds at the expense of specifying products of actual environmental benefit.

Figure 5 View across rooftops at Aurora showing ‘whirlybird’ vents on both tiled and steel roofs, photograph taken January 2010

The example of the Whirlybirds illustrates the creativity that can be applied to develop a solution during a transitional period, or in terms of the MORCA, a ZPD, where existing practice are challenged and modified. Unfortunately, although becoming a new practice, this solution did not address the purpose of the Eco-selector. As such, the roofing section of the tool seems to have failed to shift current building practice in the direction of greater environmental sustainability.
The adoption of Whirlybirds at Aurora met the desire of the supplier, Monier–Wunderlich, who did not want to make a new product – a concrete roof tile with recycled content. However, this was not the sole reason for their implementation – there were a confluence of practices that together made this ‘solution’ viable. The suggestion of improving the roofs thermal performance was ‘successful’ because it used volume builders and contracted roofing plumbers existing standard processes. Furthermore, the solution dovetails with a commonsense understanding of heat in the roof cavity and its effect on reducing the need for cooling. The mass take–up of Whirlybirds, illustrated in Figure 5 demonstrates the repetitive tendencies demanded by the economic constraints of the volume housing market. However, there is evidence that venting a roof space has a negligible effect on making a home more comfortable (Queensland Government 2004). Nevertheless, this is not enough to negate the practice or the commonsense that underpins it, or to reduce the use of existing processes to craft a solution. Even though the decision negated the rationale of the Eco-selector, Whirlybirds are now a ‘legitimate’ part of it and used extensively at Aurora.

Another example of an Eco-selector specified ‘best’ product not being used was Ortec’s Durra wall–panels. They are a non–load bearing internal walling system made from compressed straw. They have low embodied energy, are recyclable, have good thermal and sound insulation properties and are cost–effective as they are self–supporting and pre–finished. Yet, they have not been used at Aurora. It seems likely that the reason for this is that the processes
and practices needed to use it were too ‘foreign’ when compared to typical volume house building practices.

To use the Durra panels would have meant forming a relationship with a new supplier, hiring new tradespeople to install them or retraining existing contractors. Furthermore, other trades and professions would be affected. For example, the engineers would have to deal with loads being transferred only via external walls or by adding internal structural columns that would either have to be hidden or visually expressed, creating an atypical aesthetic. Framers would have to adapt to the new structural system and the painters may find the surface of the strawboards presented unknown challenges. Carpenters would have to use different fixing systems for the cabinets and doors and electricians would need an alternative to wall cavities to run cables to light switches and power outlets. These challenges show the interrelatedness of the various components of a house: changing one component can have far-reaching repercussions for other trades and professions.

The breadth of the potential flow-on effects is compounded by the risk associated with offering for sale a house whose aesthetics are different. Standard timber and plasterboard walls are 110 mm thick and look solid even though they are hollow — being two 10 mm plasterboard sheets separated by a 90 mm timber frame. However, the Durra panels are solid but because they are only 50 mm thick they may evoke a sense of flimsiness because they have a narrow profile compared to normal walls. Using this product would produce
other changes to the aesthetics of a house. The doors and architraves would be different as would the skirting boards and cornices. Negative detailing – where shadows are used to resolve joints rather than hiding them behind a moulding – maybe needed. Such detailing requires, at least at first, more exacting execution. This means taking greater care that, in turn, demands more time which adds to the cost of the house. It is not until the use of the new product becomes a standardised process that it becomes easy, and importantly for volume house builders, a fixed cost.

As an innovation for environmental sustainability Durra panels ‘tick many boxes’ – they are made from renewable sources and are recyclable. Yet, in the context of the volume-housing sector their use requires a thorough review of what a volume built house ‘should’ look like. However, although aesthetic norms are not universal or fixed, proposed changes are filtered through VicUrbans’ and the builders’ organisational norms and in particular, what they believe the ‘market will bear.’

6.4 The effect of aesthetics

VicUrban determined that they would not stray too far from the aesthetics of typical MPCs in Melbourne. Although they sought to make Aurora ‘contemporary’, as Figure 6 shows, this seems not to exclude houses that reference the historical aesthetics of the Federation style (1890–1915) – in the contrasting white rendered and strapped upper section of the facade – and the Californian Bungalow style (1915–1940) in the arrangement of the roof–gables
and entrance from a porch. Facade designs, such as this are common throughout MPCs around Melbourne, conforming to and reproducing suburban aesthetic norms.

Figure 6 Colonial meets Californian Bungalow at Aurora, photograph taken January 2010

This is not to say that some of the houses at Aurora are not contemporary in their aesthetics. Figure 7 shows a house under construction that has none of the faux historicism in that of Figure 6. Yet, what both of the examples, shown in Figure 6 and Figure 7 share is the usual MPC norms regarding scale, size and facilities.

Figure 7 ‘Contemporary’ styling at Aurora, photograph taken January 2010
Although Aurora’s predicted ecological footprint resulting from its houses’ construction, maintenance, occupation and use is 53% lower than conventional 5-Star housing, its overall footprint is only 9% lower (Hurley, Horne & Grant 2007). In part this is because, as Figure 8 shows, note for example, the second refrigerator in the garage, Aurora’s denizens are likely to maintain a highly mobile car-based consumer lifestyle typical of usual suburban life which means that items used to calculate the ecological footprint, such as food, goods, services and mobility, will not change.

6.4.1 (Hiding) technology

Aurora expresses and markets environmental sustainability primarily through the technologies deployed. For example, one of the builders, Burbank Homes, that has embraced the idea of building environmentally sustainable homes, displays its Housing Industry Association (HIA) GreenSmart accreditation, (see Figure 9) which lists, reproduced below, the green features of the house:

![Figure 8 Suburban culture alive and well at Aurora: ‘Muscle Car’ and ‘McMansion’, photograph taken January 2010](image-url)
6–Star energy rating

- R2.5 insulation to ceiling and R1.5 to external walls
- Thermally improved aluminium window and door frames
- North–south and east–west cross ventilation to assist with summer cooling
- Pergola and shade screens to west side
- Verandah overhang provides shade to north side
- Sealed exhaust fans in wet areas to reduce drafts
- Draft seals to windows and external doors
- Energy efficient (5–Star rated) reverse–cycle air conditioning system
- Gas boosted solar hot water system
- Eco–friendly plantation timber frame
- Eco–friendly low embodied energy bricks
- Insulated waffle pod concrete slab floor using recycled concrete
- Low emission paints and timber stains
- AAA–rated tapware, shower roses and toilet cistern
- Class A recycled water supply for internal and external use
- Environmentally friendly site management practices implemented during construction.

Figure 9 Housing Industry Association GreenSmart Accreditation Certificate, Burbank display home, photograph taken May 2009
One of the outcomes of this technological focus in the delivery of ‘sustainability’ is that it is hidden from the homeowners. This hiding of environmentally sustainable features by ensuring that the aesthetics are ‘normal’ has led to some less than optimal outcomes. As mentioned in Section 5.4, all Aurora homes are required to have solar–boosted gas hot water. Figure 10 shows 22 house roofs at Aurora. All of the north–facing installations have 2 boosters, being the optimal direction for them to face. The house in the bottom left of the figure is an exception, having three panels facing east, probably due to the roof not having a northern face wide–enough for mounting boosters.

![Image of Aurora homes with solar boosters](image)

**Figure 10** Typical Solar hot-water booster installation, aerial photograph, Jan 1 2009, source Google Earth
In a bid to preserve a typical MPC aesthetic for the streetscapes, VicUrban decided that the boosters are not allowed to face the street. In an estate like Aurora that uses a near-square grid for the street layouts, this means that approximately one-quarter of the houses are required by the Aurora Design Guide to have the booster on the roof’s east- or west-face. The east-facing booster in Figure 11 like the exception in Figure 10 has three panels to make up for the sub-optimal solar orientation.

However, the example shown in Figure 12 has one single west-facing panel, which indicates that the builder has not implemented the system correctly.

Figure 11 East-facing three-panel solar hot water booster, photograph taken January 2010
Figure 13 is an aerial photo showing the houses in Figure 11 and Figure 12 numbered 3 and 4 respectively. Because the houses face north they all have either east– or west–oriented panels. As already noted, House 3 has three panels, but House 2 has none, and the remainder of the houses in the street have one or two.
The result of VicUrban’s Design Guide prohibiting houses in streets facing north having solar-boosted panels correctly oriented has led to three sub-optimal outcomes. First, for some houses there is a 50% increase in the cost and embodied energy associated with three instead of two panels. Second, for others a single panel without an optimal orientation is deemed sufficient. Third, sometimes, the solar booster – a compulsory feature of Aurora houses – is missing.

Although the examples of the missing boosters and the installation of a single panel are inconsistent with the Aurora Verification Manual (VicUrban 2006a), the error is not simply that of the builder(s). Had VicUrban not decided to make a ‘designerly’ decision to ban correctly-oriented panels to preserve a streetscape, the builders would not have had to make house by house decisions regarding the placement and number of panels. Furthermore, the aesthetic rationale is questionable – it privileges an architect’s two-dimensional drawing of the front elevation of the house, which as Figure 11 and Figure 12 show, does not stop prespectival reality – the boosters can be seen from the street. The problem that this created is that the builders are expected to be experts in the design and implementation of solar panels (and a myriad of other determinants of environmental sustainability) while their expertise is not in ESD, but the converse – building large cheap houses. Volume housing practices depend on repetitive standard solutions to manage costs and quality. Their practices are not geared towards on-site decision making but to Fordist linear construction systems where teams of
contractors, in turn, do their predetermined tasks and then leave for their next job.

The contradiction at the heart of VicUrban, discussed in Section 5.4.1, between the ‘developers’ and the sustainability ‘acolytes’ is reflected in the outcomes at Aurora. On the one hand is the typical faux historicism, shown in Figure 6 found across Melbourne’s MPCs and on the other hand, expressed in the pavilion as shown in Figure 14 where sustainability can be clearly read in an eco-technic, –centric aesthetic (Guy & Farmer 2001).

This contradiction acts to put a brake on the rate of innovation at Aurora. The ‘what the market will bear’ conservativeness of the developers and volume house builders conceive of change in terms of a marketing edge, as PS said, to have one to three ‘heroes’ that are a point of difference within a competitive market-place. This

Figure 14 Recreation & BBQ facilities with photovoltaic array on pavilion at Aurora photograph taken January 2010
one–step–at–a–time approach stands in stark contrast to that represented by the pavilion in Figure 14 – fought for by BW – whose inverted roof and visible solar panels gesture towards a new way of living. The pavilion, because it is not a typical MPC rotunda, signals a shift in lifestyle. It visually proclaims energy self–sufficiency and a reduction in green–house gasses while simultaneously suggesting an inversion of the status quo with its ‘upside–sown’ roof that also suggests a ‘big–tick’ for sustainability in its profile.

Initially there were other quite visible signs of environmental sustainability at Aurora. As a part of storm water retention and mitigation management each house was to have a rain garden. These retention ponds were planted out with reeds and other flora to filter the water collected, that would then be released, partially treated and slowly, reducing peak flows into the storm water system.

However, as Devine Home’s MB notes, there were problems with the design of the rain gardens:

We had various landscapers and horticulturalists look at th(em)... and (got) ... various opinions ... (but) ... they (either) don’t understand what (VicUrban) want, or (they thought that the)... design doesn’t apply (to these circumstances). But, th(en another) consultant said, yes it does. So, I think they’re learning ... too92.

An innovation, such as a rain garden, because it is not an established practice, by definition, is an uncertain solution. Unsurprisingly, the experts did not agree and until a system is tried

92 Michael Battistella, National Design Manager, Devine Homes, interviewed 04/02/08
and proven, they are unlikely to. This led to a review of the idea.

Burbank Homes DB said, they

  don’t work very well. … The general public don’t like them. … (T)here’s a cost issue, (and) … they take up too much of the backyard. … (M)aybe a long thin garden bed up against the fence line … might be a better scenario than this big … pond that’s in the middle of your … minimal backyard93.

Similarly Whittlesea City Council’s DS noted:

the … rain gardens. … never took off. I (don’t) think there’ll be (any) more rain gardens from this stage onwards. … (T)hey wanted to put big rain gardens in people’s back gardens and we (Council) said that they can’t … because of the … proposed depth. …(T)hey could undermine footings or foundations of … the house or the garages … on the… adjoining propert[y]… . And, I … think … the people who move… in, they(’ll) probably decide … (that they) could do better things with … (the) garden than have this thing ...94.

The ‘problem’ then was not merely one relating to the merits of the water engineering, but was tied up with how the rain–gardens might affect the use of back yards. If they simply did not work, it would be strange to suggest a better solution like ‘a long thin garden bed up against the fence line’, as DB did. Like the examples of the solar boosters and the failure to use the Ortec panels, norms, in this case those around the size and use of backyards, prevailed.

The era of typical housing lots being a quarter of an acre (approximately 0.1 ha) ended long ago. Aurora, as do most fringe developments attempt to achieve densities of 15 residences per

93 David Borg, Design & Drafting Manager, Burbank Homes, interviewed 18/04/07
94 David Stokes, Building Inspector, Whittlesea City Council interviewed 11/08/08
hectare. This, combined with a tendency to have largely ornamental front yards determined by estate-wide covenants or regulations that define house set-backs from the street, means that the available space in backyards, which are typically used for children to play and for entertaining, are becoming smaller. This tendency of norms to have a dominant effect on outcomes is also evident in how other water-sensitive design features were implemented at Aurora. Figure 15 shows an example of the relationship between the houses and the street at Aurora’s first display village. The depressions in the nature-strips\(^\text{95}\) are called swales and are designed to hold rainwater that can be slowly released into the storm water system. Figure 15 also shows an example of how the materials and landscaping used in the garden and pathways are permeable, again aiding the control of rainwater by allowing seepage rather than causing runoff that has to be managed elsewhere.

\(^{95}\) In suburban Australia, ‘nature strips’ are typically grassed areas that act as a buffer between the road and the footpath. They are the property of local governments and typically have trees planted in them.
Figure 15 Water sensitive design at Aurora: permeable surfaces and swales, photograph taken May 2009

However, as can be seen in Figure 8 and Figure 11 the houses that were built after the first display village, do not have swales on these streets. The patchwork landscaping design in Figure 15 has been transformed into surfaces being treated in a more normative way, that is, as neatly bounded monochromatic areas, each readily identifiable by suburban standards and use. Gone too is the blurring of the typical suburban front-yard, seen in Figure 15 where there are two ‘footpaths’ and unclear lot boundaries. As shown in Figure 8 and Figure 11 there is no doubt, because of the normative precepts established and used throughout stand-alone housing in Melbourne’s suburbs, what the functions and property rights are, such as ornamental council-owned nature strips and clear demarcations between neighbouring properties that amplify ownership and responsibilities. Thus, the overall effect of the demise of ‘obvious’ sustainability features at Aurora, such as swales,
combined with decisions to minimise the evidence of changes for environmental sustainability, is to allow for the tendencies of yesterday, through every–day practices, to be expressed and dominate rather than be challenged.

Even building companies at Aurora that have embraced ESD, like Burbank Homes,96 feel the need to tread carefully regarding how they market it. DB said,

the only way that people will … accept (these changes) … is (if) they don’t have to pay extra for it. If you (charge) … them … an extra $5,000 or $6,000 … they won’t go for it. So you have to market it differently for people to accept it and that’s what we’ve learnt. And with Aurora, because we’re selling fixed price packages they don’t see that extra cost. (Customers) … (a)re … just looking at whether they qualify for the overall package price and in turn they’ve got all these benefits. (T)hey’ve got the fibre–optic (cable), … 6–Star (energy efficiency) … the third pipe (with recycled water), … they have all these other things … that VicUrban are promoting. … (A)t the end of the day all they’re looking at is the overall price as to whether they can afford it or not, but if you … break (the price) … down, it would be hard {to sell}97.

This (non-)‘marketing’ of sustainability by making its cost ‘invisible’ to the consumer in a particularly price–sensitive market overcomes one of the objections mounted by interests within the development industry that see environmental sustainability as a non–core aspect of business or, as expressed in Section 5.4.1, by the habitus of land development, as bad business – counter to ‘sensible’, that is, typical

96 Their Future Range, being one of four that they market across Melbourne, is their most environmentally sustainable. Currently these houses rate at 7 Stars and make up over half of their annual sales. Personal communication David Borg, Manager, Projects Division, Burbank Homes 3/3/11
97 David Borg, Design & Drafting Manager, Burbank Homes, interviewed 18/04/07
– every day – land development practices. This is in keeping with the general tendency at Aurora to try to keep the estate’s environmental features ‘low key’ – in keeping with normal suburban aesthetics and life.

The problem of how existing norms prefigure choices is one that the builders had to manage in a variety of instances. Some builders succeeded, some gave up and as the example of the solar-boosters attests, others struggled. The examples discussed, thus far, can be seen to have been implemented, or not, as they are clearly visible. However, the majority of changes initiated by the Eco-selector are hidden, like the concrete slabs on which the houses are erected. These changes require faith in the systems deployed to ensure that the builders complied with the requirements of the tool. These are addressed next.

6.5 Compliance – the procedure

The Eco-score card (see Appendix 8) was the mechanism that was developed for the builders to account for their minimum 80 points set by the Eco-selector. However, not only were points awarded for using the recommended materials, but the score card also deducted between 15 and 5 points if ‘C’ rated products were used, these being a range of rainforest timber products and polyurethane varnish.
The Whittlesea Council building inspectors were responsible for ensuring the Eco-selector was complied with. However, as DS, one of the Council’s inspectors noted, for them,

verification inspect(ion) was totally new. ... (T)here... (are) two inspectors ... in the council and one of them, because of the workload, will ... spend most of their time ... (at) Aurora... . 8000 houses, (each requiring) seven verification inspections, is 56,000 additional inspections on top of the ... normal workload98.

Ad hoc bilateral discussions between VicUrban, the builders, the CfD and the Council were conducted to develop the compliance procedure. This mechanism was used not only to define the new processes but also became a way of checking existing procedures. The CfD’s MB was the first point of contact for the builders if they needed help. She said, regarding one builder who was having difficulty getting a floor up to specification,

I was suggesting different things to (consider) ... that maybe he hadn’t thought of, like checking the formwork, because (you can get) ... five points for that ... . (H)e was ... pleased ... (when) he ... found out that they were using approved timber, ... (a)nd ... that they were unconsciously doing a good thing99.

This ‘unconsciously doing a good thing’ illustrates the relationship between environmentally sustainable outcomes and habit. Sustainability, in this example, is not a matter of values, but practice, even if this is not intentional.

98 David Stokes, Building Inspector, Whittlesea City Council interviewed 11/08/08
99 Margaret Bates, Research Consultant, CfD, RMIT University, interviewed 12/12/06
Initially there was a need to help the builders come to terms with the Eco-selector. This was done by SR at Aurora who worked with DH of the CfD to assess the completed scorecards. SR said, ‘if ... required, (we would help the builders gain) ... more of an insight (regarding) ... what they had to do’\textsuperscript{100}.

Once the builders had resolved any difficulties that they were having, the scorecards were sent to the Council. By the time the building work started in earnest DS noted,

There’s two parts of the verification process. One is visual (, the physical inspection) and the other is (the) paperwork\textsuperscript{101}.

Although initially there were some problems to work through due to the repetitive nature of the volume–building sector, eventually the procedure became routine. SR noted,

it was only late last year, {2007,} ...that the process became a lot easier. ... (I)t took a while even for the City of Whittlesea to understand the process, ... it took at least two years ... for that process to be fully understood\textsuperscript{102}.

However, after this period of flux, SR said,

\{Now, when we get the\}... scorecards from the builders, (we) evaluat(e) them ... ourselves, because generally (speaking), they’re regurgitating (the same information). ... You’ve got ... the same homes ... (being) rebuilt throughout the whole estate\textsuperscript{103}.

\textsuperscript{100} Sonya Rezo, Assistant Development Manager, Aurora Estate, VicUrban, interviewed 12/02/07
\textsuperscript{101} David Stokes, Building Inspector, Whittlesea City Council interviewed 11/08/08
\textsuperscript{102} Sonya Rezo, Assistant Development Manager, Aurora Estate, VicUrban, interviewed 12/02/07
\textsuperscript{103} Ibid.
This is an example of how the innovation process goes from difficult to easy once the practice has adapted to the new requirements. The innovation, thereafter, is business-as-usual.

6.5.1 Beyond compliance and back

On paper, at least, the builders were able to meet the 80-point requirement set by the Eco-selector, with many, initially, exceeding it. SR said that, ‘most of the builders ... achieved way over 100 points’\textsuperscript{104}, and BW said ‘one achieved about 130’\textsuperscript{105}. Yet, as SR noted, ‘there is one particular builder who achieves the minimum and ... doesn’t really think it’s necessary ... to go past that’\textsuperscript{106}.

The tendency for all but one of the builders to exceed the requirements of the Eco-selector by between 25% and 60% indicates that it was either easy to achieve the 80 points or that, at first, some of the builders sought to maximise their scores through a widespread application of the guide.

However, exceeding the target of 80 points by a large margin was short-lived. DS noted,

\begin{quote}
we see now that when the builder has achieved 20 (points), six months ago (or) two years ago he was achieving 30, 35 and he’s brought it back down to the bare {minimum}\textsuperscript{107}.
\end{quote}

\begin{thebibliography}{9}
\bibitem{104} Ibid.
\bibitem{105} Barton Williams, Senior Sustainability Advisor, Environment, VicUrban, interviewed 23/02/07
\bibitem{106} Sonya Rezo, Assistant Development Manager, Aurora Estate, VicUrban, interviewed 12/02/07
\bibitem{107} David Stokes, Building Inspector, Whittlesea City Council interviewed 11/08/08
\end{thebibliography}
As such, in the early stage of implementing the Eco-selector, as a mechanism for changing the behaviour of the builders, it was more successful than might be expected of a ‘minimum standards’ tool. However, once it became a standard procedure, the level of environmental sustainability, as measured by the Eco-selector, fell. Once the tool became ‘business-as-usual’, it stopped being a tool for change and became a bureaucratic aspect of the planning approval for houses built at Aurora. Although having environmental sustainability as ‘business-as-usual’ is a desirable outcome, clearly there was a missed opportunity during the transition period (i.e., the ZPD). It was during this phase – when building started in 2004 – that the builders were learning and as it transpires, exceeding the expectations of the Eco-selector’s designers. This time would have been an ideal opportunity for VicUrban to gather the builders together to share their experiences and re-negotiate the target.

Nevertheless, from VicUrban’s perspective, given they set the benchmark at 80 points, the Eco-selector is a ‘success’. However, this is tempered by concerns regarding verification and that builders, for a number of reasons, left Aurora. These issues are explored next.

6.5.2 Voluntary verification

There are several issues regarding the verification process at Aurora. These include enforcement, the use of materials and products not covered by the Eco-selector and proof of compliance. The inspectors at Whittlesea Council are aware that they have no power to enforce the Eco-selector requirements. DS said, ‘we have no
ability to enforce something on builders that’s not a mandatory requirement under the building regulations {in the Building Code of Australia (BCA)}108.

The BCA is the primary mechanism for defining standards applied to buildings. Historically, its focus has been to ensure safety of building structure, fire, access and egress. More recently, energy and water use have been addressed through the 5– and now 6–Star requirements. However, the current provisions do not address materials. As such, the use of Eco-selector to specify materials and many of the other features of Aurora houses are not covered. This means that from a legal standpoint, as DS points out,

{verification is something that they are volunteering to do. … (C)ouncil (can not) … say, ’you didn’t cure your slab for 56 days’. (All that) … we (can) suggest… (is) that they go and speak to their own engineer and get their opinion. (Was their) … engineer aware that you’re using fly ash and slag in the concrete? If so, (are they) happy with the curing time? … (v)erification is something that they are volunteering to do. … (C)ouncil (can not) … say, ’you didn’t cure your slab for 56 days’. (All that) … we (can) suggest… (is) that they go and speak to their own engineer and get their opinion. (Was their) … engineer aware that you’re using fly ash and slag in the concrete? If so, (are they) happy with the curing time? {Although structural failure of the slab could be an outcome of the curing time being too short,} …(w)e cannot stop (the) work. {Similarly} {i}f somebody was going to (affix the) plaster(boards) and didn’t have any insulation in the walls, we cannot put a stop work notice on the job because it’s not part of the regulatory requirements. (If it was in) … the legislation, we (would) have the ability to stop them. So {we’re sort of} a toothless tiger. … (So, I) … ha(ve) to try and get the cooperation of the supervisors and the other people (on site). (If we stick with the plastering example,) … today the (house) frame (goes up,) tomorrow (the) … plasterers (arrive). {Is there insulation} … in between the frame? We don’t know. {Now,} … plasters can go and work in …other estate(s), anywhere, anytime. … If they front up to a job in Aurora and the insulation’s not in, well they lose a days’ pay because they can’t do their job. So, …it is an inconvenience for them to go through this process109.

108 Ibid.
109 David Stokes, Building Inspector, Whittlesea City Council interviewed 11/08/08
As well as the problem of voluntary verification, a further issue is that the entire building did not need to meet the Eco-selector requirements. As such, many other materials that are used are not necessarily ‘more’ environmentally sustainable than standard products because they do not need to be. VicUrban are well aware of this problem, SR pointed out,

if the... (builders a)re ... using a ... front door,... and (it’s) primarily front doors (that might) contain (some) ... rainforest timbers, or outside decking, (and they do) not specify it in their (Eco-scorcard), ... we can’t really control (it). (U)nless they specify (it), ... and unless you’re on their back ... ensur(ing) ... rainforest timbers (are not in the) ... front door, there’s no way ... of ... making sure that it’s not being used110.

She elaborated,

each construct(ed section) ... is fairly broad. ... (T)hey can ... achieve their minimum 20 points (for) ... that section ... quite easily. But they’re leaving out ... a whole lot of stuff which they may ... still be using, ... undesir(able) materials ... that ... they’re not showing on the document. {For example} ... when (they) are (reporting on) doors (they) may not (include) the front door. {Because they only have to specify that 80% of an element has been used}, ... they could exclude the front door, ... (S)o that’s where ... (the Eco-selector can) fail. ... (A) builder can (provide) ... an invoice from Corinthian (Doors) which (just) includes the internal doors, (a)nd that’ll (meet) ... the requirements111.

110 Sonya Rezo, Assistant Development Manager, Aurora Estate, VicUrban, interviewed 12/02/07
111 Ibid.
Furthermore, the problem was not just of possible concern – a known unknown – TDB said, ‘there (were) … a few homes that … didn’t achieve (80 points), … or they didn’t use the specified materials’\textsuperscript{112}.

Not only was the Eco-selector effectively voluntary due to the lack of any ability to demand compliance, the ability of the Council to do the inspections was hampered by the fact that they only do statutory inspections on some houses at Aurora. The remainder, as DS notes, are done by private surveyors,

Of the eight builders, only five get their building permits through council. Three of the builders get their permits through private building surveyors. And while I’m doing the mandatory inspections required under the building regulations I can (also) keep a close eye on the Eco-scorecard requirements of those five builders. But we’re a little more isolated when it comes to the three builders who have their building permits issued through private surveyors. … (T)hat’s an issue … as, (some of the) … builders seem to think that (since) we have our own inspectors … there’s no need for somebody else to come in. So I had to win them over, (let them know) … that I’m not looking at anything structural. I’m just looking at the Eco-scorecard related issues\textsuperscript{113}.

Here then, the 1990’s macro-level neo-liberal transformation of local government implemented by the State Government under the leadership of Jeff Kennett, has an effect on innovation for environmental sustainability in MPCs. This privatised many services that were once the sole responsibility of local government – including the certifying of building standards. Now, either a local council inspector or a private surveyor can do this work. As such, it is

\textsuperscript{112} Theo Della Bosca, Aurora Project Manager, VicUrban, interviewed 16/02/07

\textsuperscript{113} David Stokes, Building Inspector, Whittlesea City Council interviewed 11/08/08
a matter of good will that the council inspector is allowed to come on-site, as they have no statutory role. Thus, micro-level interpersonal communication became critical. DS said,

I deal with the people on the ground, the supervisors and the trades people. And they are ... very cooperative and helpful. The problem... is that ... some builders have a tremendous turnover of supervisors. So when you get new supervisors in the estate, they are not aware of and never heard of verifications. (E)specially supervisors who ... get their building permits through private surveyors, ... (like) JG King or Simonds. They are two big volume builders and their supervisors (start working at Aurora and) they know nothing about verification so VicUrban and myself have to sit down and go through the whole induction process. ‘In this estate we require (several extra) inspections ... and ... this is what you’re required to do.’ ... (Now, t)heir job’s to get in, build it and get out and (having to) wait for council or somebody to come and have a look before we plaster or before we pour concrete or before we cover the frame may not be very convenient for them. So, ... it takes them a while to get used to the system of verification and the agreements between the(ir) bosses ... and VicUrban ... .

When you have 8000 houses being built we can’t ... monitor every house and say, ‘what are you doing next?’ ‘What stage are you up to?’ They must notify us\textsuperscript{114}. The on-site building supervisors, thus, became a key to ensuring the effectiveness of the verification process. TDB said,

... I think it primarily depends on the person in the organisation who’s actually responsible for it and ... how passionate they are, ... or how much they ... understand... . And then there’s the whole issue of staff turnover ... which has a ... significant impact ... because there’s necessarily a higher degree of knowledge required to do everything at Aurora. ... (S)o, ... you lose that critical knowledge all too frequently\textsuperscript{115}. Here again, the issue of vision, examined in Chapter 5, is pertinent.

Up until an innovation has becomes embedded in everyday

\textsuperscript{114} Ibid.
\textsuperscript{115} Theo Della Bosca, Aurora Project Manager, VicUrban, interviewed 16/02/07
practice, micro-level factors such as passion and knowledge are critical for maintaining the vigilance necessary to oversee the transition phase. The high turnover of building companies’ staff as well as the mobility of construction workers who may be assigned to one or more of the multiple estates that the larger builders build and sell homes meant that, as SR said,

the smaller builders like Zuccala Homes and Melitas Homes that, generally, ... have the same construction team ... (So you don’t have the issue of ... the(m) not knowing (what is expected at Aurora). ... Where(as) ... the larger builders ... have numerous different construction teams at work (out) here or throughout Melbourne.\textsuperscript{116}

However, SR’s point about the relationship between the size of the companies and the longevity of the supervisors is not clear cut. In regards to 3 builders at Aurora – all of which are in the top 10 in the state – she said,

Burbank had the one supervisor ... for ... two years. ... JG King have recently changed but Gino ... was out here ... for a good six months. ... that’s (the) standard, ... (about) a six month period ... prior to changeover. ... When you’re talking about a couple of weeks (between changing supervisors) there (seems to be) an underlying issue. ... (M)aybe (it’s) a Simonds ... personnel issue. (It’s) very frustrating. ... (W)e’ve ... had three (new) Simonds supervisors come in. ... I... called them last week and asked them to come in and have an induction session ... so we can run through what the requirements are. And the response ... was they take their instruction(s) from their construction managers so ... (they)’re really not interested until it comes from ... (their management). So, (I have to) go...to my (VicUrban) managers (who) ... need to go and get in touch with Simonds managers...\textsuperscript{117}

\begin{flushright}
\textsuperscript{116} Sonya Rezo, Assistant Development Manager, Aurora Estate, VicUrban, interviewed 12/02/07
\textsuperscript{117} Sonya Rezo, Assistant Development Manager, Aurora Estate, VicUrban, interviewed 11/08/08
\end{flushright}
It is likely that Simonds’ failure to manage the critical interface between their office-based management and on-the-ground contractors made their withdrawal from such a specialised estate inevitable. However, although the effect of company size on the longevity of supervisors is not clear, the issue of the workers on the ground knowing what to do is. It is likely that the incorrect installation of the solar-booster, examined in Section 6.4.1 was a function of this problem. Although Burbank Homes have embraced the challenges of ESD, they have also have this problem. DB said,

the building industry … has a high) changeover (rate) of staff and … information (regarding verification) needs to be transferred across from staff to staff. … (I)nitially there was (a) training period (explaining all of the aspects of Aurora). … (B)ut the (re’s been no) … further … consultation or training sessions … to keep people up to scratch. It’s very rare these days to … have people that’ll stay for ten years in a company – they’ll stay for two years and move on. (For example, a new) … estimating and purchasing manager … will change (our) … suppliers because they’ll start negotiating with different companies. … (T)hat will effect our Eco-selector … (if the new manager) … doesn’t know about (the pre-approval process)118.

The issue of construction staff mobility and turnover is compounded by a lack of good quality building supervisors in the volume housing sector who, as noted above, have a pivotal role. MB of Devine Homes said,

---

118 David Borg, Design & Drafting Manager, Burbank Homes, interviewed 18/04/07
I’d like to see … building companies (training) apprentices and bringing them through, (because) … they’ll become good supervisors. And … that’s what … (we) lack… . … (F)or a while there, (during) the boom, a supervisor was potentially anyone\textsuperscript{119}.

Training, however, establishes the standard practices of a trade and can be used to introduce new practices on an as–needs basis. The Eco-selector, as an innovation bringing about a change in practice, requires initial training but it also requires ongoing training until such time as the practice is standard. However, the irreconcilable problem here is that because the Eco-selector is not used by the entire sector, the practices that it facilitates will remain non–standard and specialised. The building industry relies on its ability to deploy skilled workers to do defined tasks at fixed costs to keep time–frames under control. Staff turnover and mobility are facilitated by the industry deploying these standard solutions across multiple sites. This ‘one–size–fits–all’ approach keeps costs in check by enabling the precise budgeting for each aspect and component of a volume–built house. This is why TDB said,

\begin{quote}
(V)olume home building … is about … economies of scale – it’s about … those sorts of arrangements. … (Aurora) is … quite a boutique … proposition for a volume homebuilder\textsuperscript{120}.
\end{quote}

The question of economies of scale clearly was a factor in Dreamline Homes decision to leave the Aurora, discussed in Section 6.2.

\begin{footnotes}
\item[119] Michael Battistella, National Design Manager, Devine Homes, interviewed 04/02/08
\item[120] Theo Della Bosca, Aurora Project Manager, VicUrban, interviewed 16/02/07
\end{footnotes}
However, what effect this factor had on the larger firms is not as clear. The next section examines this question.

6.6 Quitting Aurora: a matter of size?

Of the ten original builders that began the planning and development process for Aurora, as of 2009, there were four remaining at the estate, three of which were amongst the 10 largest builders in the state (see Table 4). It is noteworthy that three of the four companies that left the estate were also in the top 10, with two being the largest builders in the state. Hence, the fact that a company is large does not seem to dictate their initial interest in or maintaining their presence at the estate. However, all of the builders that left the estate improved their number of ‘starts’ – the sale and commencement of building of a house – whereas of those that remained, one improved, one remained the same and the other had fewer starts. As such, overall, the gross economic activity of those that remained appears to be worse than those that left. However, this interpretation requires some caution. Of the other builders in the top 20, the performance of six improved whereas six declined. Thus, there are factors other than the problems that the Aurora builders faced that affect a company’s performance. Nevertheless, the development and use of non-standard practices may have had a deleterious effect on the performance of those companies that remained at Aurora.
Table 4 HIA Housing 100 Report: Victoria’s largest 20 builders market share comparison (Housing Industry Association 2009b)

<table>
<thead>
<tr>
<th>Rank</th>
<th>Company</th>
<th>Starts</th>
<th>2008/09</th>
<th>2007/08</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Metricon Homes#</td>
<td>1794</td>
<td>1650</td>
<td></td>
</tr>
<tr>
<td>2</td>
<td>Simonds Group#</td>
<td>1606</td>
<td>1186</td>
<td></td>
</tr>
<tr>
<td>3</td>
<td>Porter Davis Homes</td>
<td>1342</td>
<td>1105</td>
<td></td>
</tr>
<tr>
<td>4</td>
<td>Hickory Developments P/L</td>
<td>1114</td>
<td>133</td>
<td></td>
</tr>
<tr>
<td>5</td>
<td>Henley Properties</td>
<td>1050</td>
<td>1150</td>
<td></td>
</tr>
<tr>
<td>6</td>
<td>Denis Family Homes</td>
<td>873</td>
<td>820</td>
<td></td>
</tr>
<tr>
<td>7</td>
<td>Burbank Homes*</td>
<td>869</td>
<td>715</td>
<td></td>
</tr>
<tr>
<td>8</td>
<td>J.G. King*</td>
<td>828</td>
<td>994</td>
<td></td>
</tr>
<tr>
<td>9</td>
<td>L.U. Simon Builders</td>
<td>702</td>
<td>1259</td>
<td></td>
</tr>
<tr>
<td>10</td>
<td>Devine Group#</td>
<td>466</td>
<td>352</td>
<td></td>
</tr>
<tr>
<td>11</td>
<td>Carlisle Homes</td>
<td>422</td>
<td>265</td>
<td></td>
</tr>
<tr>
<td>12</td>
<td>Hamian Homes</td>
<td>309</td>
<td>245</td>
<td></td>
</tr>
<tr>
<td>13</td>
<td>Multiplex Limited</td>
<td>297</td>
<td>317</td>
<td></td>
</tr>
<tr>
<td>14</td>
<td>Orbit Homes Group#</td>
<td>288</td>
<td>236</td>
<td></td>
</tr>
<tr>
<td>15</td>
<td>Hotondo Homes</td>
<td>277</td>
<td>333</td>
<td></td>
</tr>
<tr>
<td>16</td>
<td>Frenken Homes</td>
<td>225</td>
<td>163</td>
<td></td>
</tr>
<tr>
<td>17</td>
<td>Hometec Industries</td>
<td>216</td>
<td>141</td>
<td></td>
</tr>
<tr>
<td>18</td>
<td>Hermitage Properties P/L</td>
<td>215</td>
<td>272</td>
<td></td>
</tr>
<tr>
<td>19</td>
<td>Zuccala Homes P/L*</td>
<td>202</td>
<td>202</td>
<td></td>
</tr>
<tr>
<td>20</td>
<td>G.J. Gardner Homes</td>
<td>187</td>
<td>189</td>
<td></td>
</tr>
</tbody>
</table>

# Builders that withdrew from Aurora
* Current Builders as of January 2010

The builder that stayed at Aurora and improved its performance was Burbank Homes, the 7th largest builder in the state. Environmental sustainability had been on its agenda before Aurora. Nevertheless, DB said,
Aurora ... lifted it an extra notch. ... It originally started with considering the implementation of 5-Star ... because the government made it compulsory. ... We had to start reporting on all our products. And we did that all upfront. So we were prepared for the change.

Burbank responded to the State’s regulating for energy efficiency as they believed it was an opportunity to engage with the question of environmental sustainability more fully. They recognised that there was a need to bring appropriate expertise into the company. DB said,

we employed someone full-time (and) we’re Green(Smart) accredited. ... The person that we have employed used to be the SEAV ... he’d been with them for 12 years, so brought a lot of experience with him.

Thus, for Burbank, like JG King, discussed in Section 6.2, who starts reduced in 2009, innovation for environmental sustainability is a part of how they want to position the company in the long term. Burbank Homes’ ‘Future Collection’, builds on what they learned at Aurora and is their most successful of four ranges that they market across the state, are rated 7-Star and currently account for 53 per-cent of the company’s total sales and ‘helped Burbank maintain their numbers in a difficult market’.

---

121 David Borg, Design & Drafting Manager, Burbank Homes, interviewed 18/04/07
122 Sustainabile Energy Authority of Victoria, now Sustainability Victoria.
123 David Borg, Design & Drafting Manager, Burbank Homes, interviewed 18/04/07
124 David Borg, Manager Projects Division, Burbank Group of Companies, private correspondence, 3/5/11
For the companies like Burbank that have adapted to the building requirements at Aurora, regardless of the potential for non-compliance, the process has become operationally standard as have other processes. For example, VicUrban’s requirement to see the invoices for the materials was replaced by suppliers providing letters that said that they were supplying specified products to the builder. However, SR was not sure that this was beneficial. She said,

a lot of the builders, unfortunately, ... treat it as just another process. ... (W)e ... see... that in (how they) ... provid(e) ... their supporting documents for the ... materials. ... (S)ometimes it’s) ... just a regurgitated letter, ... the same letter for every job. (It seems that) ... it’s ... being treated very blasé. It’s ... just another process that they have to go through125.

Hence, for the builders, as DB noted,

it’s now ... just another document...that goes into our approval process through a contract administrator who doesn’t understand it. They ... (ensure) the paperwork (gets) through the ... approval process..., but it’s ... not reviewed126.

The idea that standardised processes are potentially a problem is also reflected in how SR initially dealt with the demands of working on Aurora, prior to being convinced of its merits. She said, ‘I didn’t let myself get too involved in it. It was a process for me’127. This is a defensive understanding of process as a means of keeping something at arm’s length by not ‘really’ engaging with the issue at hand.

125 Sonya Rezo, Assistant Development Manager, Aurora Estate, VicUrban, interviewed 11/08/08
126 David Borg, Design & Drafting Manager, Burbank Homes, interviewed 18/04/07
127 Ibid.
These attitudes towards process are political. They position it as being mindless. This is akin to the normative understanding of bureaucracy – that it has its own life that can get in the way of good outcomes. However, the example of the builder who was using environmentally sustainable products but did not know it (see Section 6.5), illustrates that a habitual or ‘bureaucratic’ processes, while not requiring conscious engagement, can, nevertheless, benefit the environment. Using other than rainforest timbers for the formwork when constructing a concrete slab is a good environmental outcome regardless of whether it is a ‘choice’ or simply business-as-usual.

The ideal of procedures being transformed so that a non-sustainable ‘way of doing business around here’ can be replaced with a more sustainable one, is reflected in the experience of a SR who reported that when she started at Aurora she did not accept... all (of) the change(s). ... (I)t took me a while because it just wasn’t the norm. And I guess it's ... a matter of educating everyone. ... (I)t took me a long time to accept it. I was actually resistant to it because I’d worked on an estate for ten years before coming out here and I was fully (committed to that). ... The way that we were promoting that estate, that’s ... (what) I based my lifestyle on, ... I kept bringing up past experiences and, (saying) ... ‘this is why this works so much better’ and ‘we should be doing this, not (that). ... (I)t did take a while, ... but now I’m converted!128

SR’s experience of going from having typical developers attitudes to more sustainable ones suggests that meso-level factors such as

128 Sonya Rezo, Assistant Development Manager, Aurora Estate, VicUrban, interviewed 12/02/07
organisational aims and culture have an effect on micro-level factors such as values and attitudes to her work. However, it is noteworthy that that SR, in a private conversation said that her recent purchase of a home in another MPC was not overtly environmentally sustainable – other considerations dominated her decision. This suggests that values and attitudes do not dictate behaviour – practice – but that they are context dependant. At work, SR was a convert, at home, she was normatively suburban.

The idea of being ‘converted’ was also expressed by Devine Homes’ MB when talking about how the zeitgeist is changing.

(1t’s) how we educate ... people ... (a)nd bring them along for the ride. ... (E)veryone’s green at the moment. ... Everyone’s doing their little bit. ... (1t’s) funny ... watching my little nieces (being shown) ... by their mum how to bring the bucket (to collect the) ... water (from) ... the shower. ... (And them saying), ... ‘here mum, water plants, bucket’. ... (1t’s) normal now. (A)nd, ... I think (my) part is (to) ... start spending time and focus on offering a more efficient house, full stop. ... (D)ouble–glazing aside, ... how (can) we build brick ... and lightweight cladding (to) ... make th(em) more efficient?\textsuperscript{129}

However, ‘conversion’ is not an endpoint. It is a step. For MB the existing forms used by the volume building industry, to wit, brick and lightweight cladding, are the bedrock from which greater efficiency is wrought. The question posed by such an attitude is whether these materials and systems need to be totally reconsidered if we are to get our consumption in the West down from around 8 gha (cf., Hurley, Horne & Grant 2007) to 1 gha per person. As discussed

\textsuperscript{129} Michael Battistella, National Design Manager, Devine Homes, interviewed 04/02/08
above, thus far, ‘very’ environmentally sustainable products, such as the compressed straw walling system, are yet to be used at Aurora. Furthermore, even the use of ‘more’ sustainable products like the concrete roof tiles that have recycled content, can be derailed by ‘good’ intentions.

6.7 Unexpected negative consequences

Any proposal for innovation for environmental sustainability is determined by the assumptions that underpin it. MB assumed that existing forms, like brick veneer, will continue to be the starting point from which greater efficiencies are found. Similarly, VicUrban’s following of the URLC’s shift towards smaller lots, which is in keeping with calls for greater urban densities to mitigate against ‘sprawl’, inadvertently creates unique problems for MPCs like Aurora. GZ said,
The size (and) shape of the allotments has... (had) a big effect {on the cost and materials used}. ... (T)hey’re smaller... narrow lots... (S)o you’re building a home... which is... long (and) narrow. ... (T)hat makes for inefficient construction. ... (T)he cheapest thing to build is a... box. ... (If you) build a square ten metres by ten metres... you’ve got 100 square metres. ... (If you build... a house five metres by 20 metres it’s also 100 square metres but you’ve got... 50 linear metres of wall as opposed to 40... So... you’ve got 25% more cost in wall area... fascia,... gutter, ... bricks, ... framing,... plaster, and everything else. ... (T)hat’s very significant and I think it’s something that a lot of people don’t... realise.

This 25 percent additional cost does not only mean that Aurora houses are not as competitive as they might be on other estates but also that the way sustainability is operationalised, like the examples of Whirlybirds and solar hot water boosters, are sub-optimal solutions.

Similarly, GZ noted that,

the benefit of... doing the training with (the)... SEAV, (through)... VicUrban, was that... there are all sorts of smart ways to achieve 6-Star, rather than just adding high tech bulk insulation, etc. ... (I)t’s a matter of placing your windows in a certain position in relation to your eaves (to) have correct shading). ... (T)hat can make substantial differences to your (star) rating. But... if you shift your windows down from the eaves there’s... a cost because... you’ve got... put,( for example, brick) infill over (the) window, ... rather than having (the window abut the) eave. ... (Y)ou... (have to then)... have 600 (mm) eaves instead of 450’s. ... So all those little things... come with a cost attached to them.

130 It is interesting that, although GZ is aware of the cost/materials differentials between square and rectangular footprints, nevertheless, his builders’ habitus automatically excludes from consideration the most efficient geometrical form, a circle, which can surround a 100 sq mtr area using 35.45 linear metres of wall, a 14% saving over a square. Buckminster Fuller’s Dymaxion House exploited this economy but never made the transition from invention to innovation. Furthermore, such considerations only tend to be of relevance to stand-alone dwellings as medium and high-density housing share walls and floor/ceilings between apartments which are more efficient than stand-alone dwellings.

131 Greg Zuccala, Managing Director, Zuccala Homes, interviewed 06/05/08

132 Ibid.
From GZ’s perspective, the result of these changes and constraints is that:

It probably costs $15,000 more to build the equivalent house at Aurora than it does somewhere else but the redeeming factor at Aurora is that ... the blocks are smaller, they’re priced competitively, and so the whole house and land package is compensated. So, we can’t ... (take) an Aurora house and build it in another estate because it would be $15,000 more expensive, ... and be uncompetitive. So, ... the designs ... are Aurora specific.\(^{133}\)

But as he points out, Nevertheless:

... (Aurora) is cheaper to buy ... than anywhere else in the surrounding area ... (b)ecause the price of (the) land ... more than (offsets) ... the (extra) cost of construction. ... The overall package is attractive for people to buy. ... If it wasn’t, ... it doesn’t matter how many features are in the land, it wouldn’t take off.\(^{134}\)

The constraints imposed through VicUrban pursuing ‘sustainability’ by creating smaller, rectangular lots – all but two of the 427 lots designed for the first 7 stages of Aurora are rectangular (see Appendix 9) – is compounded by the trend of increasing house sizes. Australia now builds, on average, larger houses than any other country in the world (James, C 2009). This means that house-to-lot ratios are decreasing, not only putting pressure on features like rain gardens, (see Section 6.4.1) but also limiting the morphological options available given the normative beliefs of builders about what the ‘market will bear’.

\(^{133}\) Ibid.

\(^{134}\) Ibid.
6.8 Unexpected positive consequences

As well as unexpected negative consequences such as the constraints imposed by the lot sizes, there were unintended positive ones that resulted from the Eco-selector. Architects use their own research to find sustainable building materials. So, when Dan Khong (DK) started working at VicUrban and discovered the Eco-selector he thought (it) would just be very useful for architects in practice, who don’t necessarily have time to go through all of the various options. (I)t ... brought ... things down to ... a summary. (So) I passed it on to some people who I knew would be interested in it, ... to see what they thought and they were positive about it too... (I)t’s extremely useful if there is ... a person or a simple book ... to use within an office. ... (M)ost people in those offices are beyond the point where they have a lot of time ... to research any topic really. So, it ... seemed like a very, very useful document. {Some questions regarding sustainability are very complex.}...(T)he one I always thought that was ... fascinating was ... (the) use of treated pine versus ... red gum, or ... some other kind of durable Aussie hardwood. ... How do you weigh that up!? ... I think that there is ... no perfect way of weighing it up135.

DK’s example of treated pine versus a native hardwood shows that he was engaged with questions regarding environmental sustainability and that these questions did not necessarily have clear answers. Nevertheless, he sees the answers provided by the Eco-selector as being of immense use. DK frames the problem of architects finding appropriate materials as one of being ‘time–poor’. Just as the builders want to be able to apply standard procedures, so too do architects. However, rather than finding answers for themselves, the Eco-selector allows for an easy adaptation of practice, leaving them free to address typical architecture problems.

135 Dan Khong, Senior Urban Designer, VicUrban, interviewed 16/02/08
If an architect can select from a sustainable pallet of materials then they do not need to think about sustainability and can concentrate on the feel and look of the building.

This example of the Eco-selector’s take-up by a group of practitioners that had nothing to do with Aurora or in its development, shows how it affords further change in practice. As such, considered from this perspective, the tool had agency. Practices, thus, are both supra- and intra-individual. People like BW and DH deliberately pursued innovation in ESD. Such individuals are akin to Schumpeter’s (1934) entrepreneurs in as much as they are actively pursuing change over a long period. But DK, does not fit this model. DK, in this instance was the vector, the means by which the innovation was transmitted. However, the diffusion of the Eco-selector was dependent upon, as were the consultants who created the vision for Aurora and the tool, being primed and ready. The architects who embraced the tool did so because of their pre-existing practices – an interest in ESD – which saw them eager to utilise what was afforded by the tool. As such, the fit between existing practice and innovation is crucial for the diffusion of innovation. Similarly, as discussed in the next section, a lack of fit, acts to retard this diffusion.

6.9 Living Aurora

The selection and use of materials in Australian homes is not limited to the initial construction of the house. Australians spend billions of dollars annually on home renovations. In 2005–6 the amount was
$5.7 billion (ABS 2008a). For at least one of the denizens at Aurora this expenditure to improve and personalise their home started immediately. SR dealt with the situation where,

the client wanted to install the rainforest timber decking. ... (A)nd there’s really no way that we can say no. ... (A) lot of the clients ... have chosen or are asking to install their own floor coverings after handover (from) the builder. ... (W)e find it hard ... to say no because if they’re achieving the 6-Star, the builder’s still achieving his requirement in relation to (the Eco-selector)...There’s no (way) to say, no. ... (Y)ou have no control over ... what they’re using. ... I’m not ... sure {that a design covenant over the estate would help.} I think it’s ... (about) educating ... the public, (similar to) ... (what) we’ve done (with) the builders. ... (B)ut that’s hard as well. That would need to be done (during) ... the sales process, ... educating them ... about the use ... of these types of materials ... and what we’re doing. A copy of the Eco-selector ... is not provided as a marketing tool, but ... in the pavilion (there is information) about the use of environmentally friendly materials. ... (B)ut, ... unless you’re educated, ... (and) fully up to speed with sustainability and ... really concerned ... (y)ou’re not ... go(ing to) know.  

SR falls back on the idea that information is the key to change for environmental sustainability. As such, she said,

---

136 Sonya Rezo, Assistant Development Manager, Aurora Estate, VicUrban, interviewed 11/08/08
... I was surprised when I was speaking to that client ... (who) wanted to use Merbau timber\textsuperscript{137} for the decking. ... I was trying to give her a little bit of background as to why ... we shouldn’t be using it and she said, ‘... (W)hy did I buy in Aurora then?’\textsuperscript{138} And I’m thinking, well, (surely) ... the whole reason you bought in Aurora (is) because ... it’s a sustainable estate or ... that you ... care about the environment? Or, ... was it just based on price? ... (I)t surprised me. ... I thought people were coming here (because) ... it’s the first estate of its size that’s really caring about the environment. ... But then you get your other clients who are on the other extreme. They’re really ... concerned ... and want all the information they can (get)\textsuperscript{139}.

In a similar vein, SR said,

\textit{(W)e mandate the use of ... ceiling fans and ... shading devices. ... (E)very) week I... get a couple ... of clients who’ll ... ring ... or email me requesting the removal of ceiling fans or shading devices because all they see is the additional cost. ... (T)hey) ... don’t particularly like them, (and want to know) why (they are) ... being forced to have them? (S)o, ... you need to educate them (about) ... the benefit(s), ... and slowly but surely they ... accept them. .... (I)t’s the same (with the) rain gardens\textsuperscript{140}, ... (T)hey’re an expensive item. (And, in the absence of education, I have) no doubt (that) some people will ... choose ... to have them filled in, ... unfortunately. But all you can do ... is try (to) ... educate those people ... (because) it’s not just ... another cost imposition. ... It’s actually a benefit to the environment\textsuperscript{141}.}

As well as the problem of viewing sustainable features as ‘optional extras’ and not embracing a sustainability ethos, there is the issue of knowing how to use sustainable features, like cross-ventilation for

\textsuperscript{137} Merbau, an imported timber sourced from Papua New Guinea and Indonesia, which is not harvested sustainably (Cheung, SP, Chung & Stark 2007). Merbau is widely available in Australia and is highly regarded as a long-lasting, attractive and cheap timber that is especially suited to outdoor use.

\textsuperscript{138} The client eventually decided to use Merbau for her deck.

\textsuperscript{139} Sonya Rezo, Assistant Development Manager, Aurora Estate, VicUrban, interviewed 12/02/07

\textsuperscript{140} Rain gardens were eventually dropped as a feature.

\textsuperscript{141} Sonya Rezo, Assistant Development Manager, Aurora Estate, VicUrban, interviewed 11/08/08
cooling rather than turning on the air–conditioning. VicUrban’s MA, aware of this problem said,

(A)nother thing we could ... do better ... would be ... (a) manual for ... operating a ... a 6–Star home. ... I think ... that needs to be developed because ... 6–Star energy rating has its limitations ... in terms of how a household actually operates. ... How do ... you ... actually drive behavioural change (to get a) ... more sustainable ... running of the house? 142

These examples illustrate the gap between an existing habitus, such as that of typical suburban life, and the need to transform it so that it is environmentally sustainable. Even though the material conditions for Aurora homes are more environmentally sustainable, this alone does not alter practice. However, for VicUrban’s MA and SR this means educating people. To this end, the IT infrastructure that is packaged with a home at Aurora includes a community intranet that has been put to this use. SR said,

...we have series of ... guidelines on the... (Aurora Intranet) which are being (used). ... (P)eople (are) refer(ing) to them when ... they ... (speak) to us, ... (the community development worker), ... once a month ... ha(s) a coffee–and–chat session (for) ... all the residents. ... (T)hey ... have ... guest speaker(s). (For example), ... they had ... a landscaper who came in to give some advice on landscaping your backyard, (building on) the theme(s) (that we’ve used for the) ...front gardens ... . (There’s a) newsletter... that goes out as well, (that might include a) good news stor(y).... or some handy hints (on) ... reducing your energy consumption 143.

This sort of message, however, has a limited effect on habitual behaviour. A person’s response to a message is affected by their

142 Mark Allan, General Manager Project Planning and Design, VicUrban, interviewed 09/02/08
143 Sonya Rezo, Assistant Development Manager, Aurora Estate, VicUrban, interviewed 11/08/08
pre-existing attitudes (Petty et al. 2005). As such, a person already interested in environmental sustainability is predisposed to further messages about ‘being green’. As the example above regarding the homeowner wanting to install Merbau timber decking shows, a person who does not have such an interest is likely to ignore the message. Given VicUrban’s tepid marketing of Aurora’s environmental sustainability credentials, the above examples suggest that such messages are not likely to fall on particularly receptive ears. As such, in keeping with Aurora visually expressing a typical suburban life-style, people who live on the estate who are not environmentally aware will, in all likelihood, live as they would in any other outer Melbourne suburb. Nevertheless, what people expect of a new home on Melbourne’s fringe has changed over time. GZ said,
when I started out building … our (family) business has been (going) … for 51 years. … I started building with Dad 25 years ago (and) we were building for first homebuyers almost exclusively. (These were) very basic house(s), no floor coverings, no window furnishings, no light fittings. (When) … we’d hand over a key to a young couple … they were wrapped just to have a house. Now you hand over with all the bells and whistles and if there’s a spot on the wall they’ll come down on you like a tonne of bricks. So the consumer’s … perception has changed dramatically. … (With) consumerism (and) … prosperity, … they want to be a part … of the whole process. … (In) the past you built a house, you present them with a product and the product was all that mattered. Now … the process, … (is) almost more importantly than the product. (Customers want to be involved in the whole) process, … (of) signing up for a home, selecting their home, their colours, and (be involved) throughout the whole construction process. If there’s no communication there – input from them or feedback from the builder … keeping them informed – (then) regardless of how good the product is, regardless of whether it’s delivered ahead of schedule or on time, they won’t build with you again unless that process is correct. So, you’re dealing with a whole different … mindset… .
And houses … (featuring) sustainability come into it these days. … (Is) it a sustainable house? That’s good – sustainable – that’s a bonus. That’s … like a cherry on top. … I don’t think it’s become, at this stage, (an) … underlying requirement. Perhaps it will, but not at this stage. Affordability is still the overriding … factor. … (It’s) … up to the government with people like VicUrban to make sustainability … more important … but bearing in mind the affordability side at the same time. … That’s why it’s been … legislated. (However, they want their) plasma TV’s that use a lot of energy, people don’t care as long as they get to watch (TV) … in comfort. (And) that’s their perception of … Australia and how it should be. … (We’re) becoming a lot more like American culture … and I think that’s unfortunate144.

The shift that GZ refers to from building a basic unadorned house to one that has got all the ‘bells and whistles’ is, from his perspective, driven by a change in Australia’s culture. He links economic affluence to energy–hungry consumption. Importantly, and contrary to VicUrban’s preference for engendering change in the residents

144 Greg Zuccala, Managing Director, Zuccala Homes, interviewed 06/05/08
through education, GZ points to a less thoughtful change process. To believe, as MA and SR do, that change can be brought about via education is contradicted by their own experience – the Merbau decking example – and the cultural shift that GZ points to. Nevertheless, both GZ and VicUrban share an overarching habitus and belief in the constraints and opportunities of the market. Price is a primary consideration of the home-builders and –buyers. Thus, engaging with issues of environmental sustainability is undermined by the focus on ‘what the market will bear’. It is perhaps not surprising that Aurora has attracted buyers who have not intentionally considered environmentally sustainable living. These buyers want ‘bells and whistles’ not products or ways of life that they do not practice.

6.10 The Future: practices embedded and resisted

This thesis argues that change can be difficult if, for example, greater energy efficiency is not in keeping with pre-existing practice. MB, reflecting on such a change, said,

\[(\text{Once})\ I\ \text{thought\ 5(–Star)}\ \text{was\ difficult,\ (but)\ suddenly\ (it)\ became\ easy.\ \ldots\ 5(–Star)\ \text{is\ not\ only\ normal,\ it's\ ...\ easy.\ \ldots\ (I)t\ becomes\ automatic.\ \ldots\ (For\ example,\ we've\ got\ a\ design\ that's)\ just\ under,\ four\ point\ something\ stars.\ (Okay,)\ \ldots\ \text{whack\ that\ in\ there,}\ \text{double–glaze\ that,\ done,}\ \text{when\ it\ used\ to\ be,}\ \text{oh\ my\ god,}\ \text{another\ (double–glazed)\ window,}\ \text{another}\ \$1,000\ \text{or}\ \$2,000.\ \text{But\ it's\ just\ normal\ now,}\ \text{it\ happens\ every\ day}^{145}.\]

In keeping with idea that innovation, like the mandating of 5–Star energy efficiency, established a new norm, so too the changes that

\[^{145}\text{Michael Battistella, National Design Manager, Devine Homes, interviewed 04/02/08}\]
have been made at Aurora have become normal – standard procedures. SR notes,

(T)he verification (processes for) ... 6-Star, ... the (design) controls we have on colour selections, ... and everything else (are set). So, ... (the) builders now have (staff with) specified roles to take care .. of th(ese), ... (w)hich now works a lot better. ... (T)he builders now use it as ... a standard product; ... the struggles have all gone146.

The newly–established procedures create their own new ‘business–as–usual’ which, just as the pre–innovation condition had its own natural conservativeness, engenders a desire for stability. BW also noted the effect of this. He said,

the feedback that we get from the builders is that they are quite comfortable with it. They are ... saying don't change it, please don't change it, ... this is a new thing that ... you've introduced and ... it's working. And, although we struggle(d) with it, we struggle with change per se, in the building industry. (I)t hasn't been a huge problem for us147.

However, this new ‘business as usual’ is fragile. The boutique nature of Aurora combined with the mobile and stratified nature of the workplace mean that there is an underlying tension for the builders to revert to industry– rather than Aurora–standards. GZ said,

Would I build a 6-Star home as opposed to a 5-Star home? If I had a choice, I wouldn’t do it. No, ... it’s a matter of whether the costs outweigh the benefits or the other way around148.

146 Sonya Rezo, Assistant Development Manager, Aurora Estate, VicUrban, interviewed 12/02/07
147 Barton Williams, Senior Sustainability Advisor, Environment, VicUrban, interviewed 23/02/07
148 Greg Zuccala, Managing Director, Zuccala Homes, interviewed 06/05/08
From a pragmatic business position, GZ noted that, ‘... it’s not efficient to build the type of home we’re building out there’\textsuperscript{149}.

As such, the new practices at Aurora rely on an ongoing commitment by the builders to a niche product, which is counter to the repetitive nature of the industry.

### 6.11 Conclusion

This chapter has examined how innovation for environmental sustainability was taken up and embedded into practice at Aurora over from 2004 to 2010. Generally speaking, the objectives of the Eco-selector were easily met. It appears that builders were able to use the tool to replace less sustainable products with more sustainable ones. Nevertheless, some of them found the requirement too difficult and quit the estate. These problems stemmed from the demands of other practices within the companies. Verification was, and remains a significant issue. At first the builders were asked to provide commercially sensitive information to show that they were purchasing the materials specified. This requirement was superseded by a voluntary system validated through letters from suppliers attesting to the provenance of products. A comprehensive verification process is also hampered by a lack of authority on the part of the council inspector required to check if the specified materials were, in fact, used. As such, the method used to demonstrate proof of use is flawed.

\textsuperscript{149} Ibid.
From the perspective of the MORCA, while a practice is undergoing transition (i.e., a ZPD is active) outcomes are uncertain until such time as the adapting practice has become knowledge-in-action. An openness to change was evident in the early surpassing of the Eco-selector targets. However, as the change became concrete—knowledge-in-action—the builders fell back to simply complying with the minimum standards set by the Eco-selector. This practice-based understanding of change explains how Whirlybirds were used to solve a possibly nonexistent problem, namely that of hot air in the roof. Nevertheless, as new embedded practices they are used as a matter of course. Other processes, like that of fitting the solar hot water boosters, are an ongoing problem because the variance in orientation and number of required panels defies the norms of volume house building in as much as they require a house-by-house analysis rather than being a typical Fordist standard solution that is applied across multiple estates.

The use of typical processes to build the houses at Aurora is mirrored in the normative understanding of Melbourne’s outer-suburbs. These norms mitigate against the introduction of rain gardens, a feature no longer specified at Aurora. They also are evident in the demise of other water-sensitive urban design features, like the swales integrated into the early nature-strips. Crucially, the solutions that were adopted or cobbled together and those that failed did so as a result of normative professional and cultural practices coming to the fore.
The energy and commitment to the vision for Aurora and the Eco-selector, examined in Chapter 5, were dampened by the time the actual building of the houses commenced. The exception to this is the late entrant into the estate, JG King, who, having already embraced ESD, easily managed the requirements of Aurora. The MORCA proposes that having such a vision is a critical element for overcoming normative practice, that is, ‘business as usual’. The diminution of this vision meant that the failings documented in this chapter did not matter ‘enough’ to be corrected or fought for. Struggle, as a feature of innovation, not only led some builders to leave the estate but continued to be a problem for those companies that remain because Aurora, as a boutique proposition, demands the deployment of different practices when compared to those typically used by the volume housing sector. This is particularly problematic for those companies that do not have continuity of building supervision which acts to ensure Aurora specific procedures are implemented.

The failure to maintain the vision also meant that more radical suggestions within the Eco-selector were not taken up. The norms regarding MPCs and the houses built there, work against such change. Such norms, for Devine Homes MB, mean that the future of ESD is to achieve greater efficiency from lightweight brick veneered homes. This vision leaves no room for products such as the Ortec compressed-straw wall system because its use requires a change in the practices of many of the trades and professions involved in the design and construction of the houses. Furthermore, these changes
would alter the houses aesthetics, creating uncertainty about how potential buyers might be respond to them. Of course, the problem of how such obviously environmentally sustainable dwellings might be received by buyers is, from the perspective of the MORCA, tied directly to whether they share such a vision.

There were, however, unexpected positive outcomes arising from the Eco-selector. The using of it by architects who had nothing to do with the estate is indicative of the tendency for practices, in this case those used in ESD, to create new affordances. From this perspective, the Eco-selector has agency in as much as it had an effect on practice that its designers did not intend. As such, this diffusion of innovation can be seen as a function of practice and the agency of the tool itself.

The next chapter further explores the agency of practice, but not from the perspective of the struggle of the builders or the non-deliberate effects that arose from attempting to embed innovation for environmental sustainability at Aurora. It addresses responses to Eco-selector that perceived it as an outright threat. These practices, represented by the Victorian Association of Forest Industries, were involved in the extraction and selling of Victorian native hardwood timbers, products whose use was actively discouraged by the tool.
Chapter 7  Defending practice

7.1  Introduction

The last two chapters explored two tendencies. One was VicUrban’s and RMIT University’s Centre for Design (CfD) change agenda directed towards the goal of greater environmental sustainability at Aurora than that typical of MPCs. The other was the normative practices deployed by the building and land development industries that enable the profitable production of outer-suburban housing estates. The tension between these two tendencies meant that while the Eco-selector was nominally successful – the builders who remained at Aurora past the planning phase complied with it – there were nevertheless, builders who left because they were unable or unwilling to adapt. The visions for Aurora and the Eco-selector were implicated in the successes of the estate, such as the ease with which a builder, who was a late entrant into the estate, was able to quickly comply. However, the transition to VicUrban from the URLC saw the vision change and this allowed for less than optimal decisions and solutions being made on-site. For example, features, such as water-gardens, were dropped. Similarly, the example of the Whirlybird roof air vents is one of an innovative solution crafted to ensure compliance with the intention of the Eco-selector, yet this had little or no environmental benefit.

Chapter 6 also explored the effects of the practices that drove the Eco-selector on those that it targeted, the builders. However, the
example of the architects who eagerly adopted the tool suggests that innovations do not just affect those at whom they are aimed. Although the target practices of the designers of the Eco-selector were those of the builders’, nevertheless, as a tool designed to achieve ESD, its reach was determined by its use. Thus, non-Aurora professionals responded to this affordance – the ability to engage with the selection of materials that are more environmentally sustainable – and embraced it.

These examples highlight the social and migratory nature of practices – they readily adapt to an innovation when there is an opportunity of a better way of doing something. However, the MORCA proposes that the converse is also true – that innovation is resisted when perceived as a threat to existing practice. This chapter explores resistance to innovation by asking the question, what led to significant opposition to proposed change of practice? It does this by examining why and how the Victorian Association of Forestry Industries (VAFI), the peak state-wide body that represents the interests of the timber sector, respond to the Eco-selector? Furthermore, it examines the way the CfD defended itself against VAFI’s response.

7.2 Engendering resistance

In section 5.5 it was argued that the creation of VicUrban shifted the purpose of the flip-chart from being educational to a compulsory planning requirement – this changed the orientation of the tool from a micro- to a meso-level intervention. However, the educational
element was not excised, it remains. For example, page 6 of the Eco-selector (see Appendix 5) includes references to two websites that the builders can use to check the sustainability of various rainforest timbers. However, both of these sites have relatively complex ways of obtaining information when compared to the idea of putting ‘information at the builders’ finger tips’ which informed the overall design of the flip-chart. As such, the Eco-selector became more ‘complex and sophisticated’ but failed to take into account the fact that some builders ‘do not have access to the internet’ or are disinclined to use it for the purpose of researching environmentally sustainable timbers. This eroded the likely educational effectiveness of the tool. Crucially, however, the change from micro- to meso-level focus – making the tool a planning requirement – meant that it could have a greater affect than had it remained simply educational – all of the builders had to use it, rather than use it as they saw fit.

The Eco-selector’s definition of ‘approved timber’ – certification by a third party – meant that wood-products derived from Victoria’s forests did not initially qualify in 2004, as VicForests had not completed an Eco-selector recognised certification process. This involved meeting the requirements of either the industry supported Australian Forestry Standard (AFS) or the environmental non-government organisations (ENGO’s) preferred Forest Stewardship Council (FSC).

150 Andrew Walker-Morison, Personal communication 22/10/08
151 Dr. Dominique Hes, Lecturer, Faculty of Architecture, Building and Planning, University of Melbourne, personal communication 13/11/08
Perhaps unsurprisingly, the timber industry reacted to what they perceived as discrimination against their products. They maintain that they harvest Victorian Native Hardwood Timbers (VNHT’s) in an environmentally sustainable way. This sense of discrimination was probably amplified when it became evident that the maximum number of points achievable for a suspended timber floor was less than the minimum requirement of 20 (see p. 11-12 Appendix 5). It is likely that this was a drafting oversight as the Eco-scorecard – the means by which the builders report on their Eco-selector choices – shows that a suspended timber floor can attract the necessary 20 points minimum score (see p. 4 Appendix 8). However, the Eco-scorecard was not published as it was an internal working document for the builders. As such, it is unlikely that VAFI or other timber industry representatives saw it.

VAFI defended what they perceived as a threat to the practices of some of their members, drawing on their long history of fighting ‘greenies’, by responding to the Eco-selector in three ways. First, they sought inclusion of VNHT’s in the tool. Second, they argued that as VicForests, the government agency responsible for marketing VNHT’s, was in the process of being certified, in the interim, VNFT’s should be included. Third, VAFI set out to undermine the credibility of the tool by attempting to undermine the bone fides of its author, the CfD. These strategies are explored next.
The first evidence of VAFI’s opposition came in early 2005. Dr. Alistair Woodard (AW), a timber industry researcher and advocate said,

I was ... at a lunch at the Kindred Industries Group meeting ... (of) the Housing Industry Association. ... Minister (Candy) Broad came to speak. ... (S)he was ... (the) Minister for Housing, and ... mentioned that ... they had just entered into a MOU152 with VicUrban to do low-cost ... affordable homes.153 ... I pointed out to the Minister during ... questions afterwards, that ... VicUrban used a guide called Eco-selector (which) we had only just seen ... and said that ... from a timber industry's point of view we had real concerns. ... (A) Government department responsible for developing low-cost homes ... had a guide whose approved timber list did not ... recognise the timber owned by ... the Government who managed ... and controlled it, who was the steward of the forest and who ... looked after the commercial harvesting of it. ... (W)e were really concerned, that if builders had to meet the guide that (the houses) wouldn't ... be as affordable ... (had you) use(d) your own locally grown product154.

The political nature of AW’s response is evident in the way he positions VicUrban as a government department. He attempts to include it in a pan-governmental enterprise that is, and should be, concerned with, and subject to, the pursuit of housing affordability and certainly not act against the use of the government’s own, apparently ‘affordable’, timber. However, VicUrban is best described as a quasi-autonomous non-government organisation (often referred to as the acronym, QANGO). Although VicUrban was constituted via an act of parliament (Victorian Urban Development Authority Act 2003), it is governed by a board of directors and

152 Memorandum of Understanding
153 Dr. Alistair Woodard, Director, Wood Products Victoria, interviewed 28/03/07
154 ibid
operates more in keeping with an incorporated company. Nevertheless, VicUrban does enact some government urban planning policies and does engage with the issue of housing affordability, albeit, on an ad hoc basis.

The nature of the relationship between VicUrban and government, as AW notes, is one that is negotiated. In this example, the relationship is given expression by an MOU – a Memorandum of Understanding. Rather than being a ministerial directive, an MOU is a contract-like document that typically spells out the commitment of the parties to a common goal it can also be used to define the provision of a service, usually in exchange for money. Nevertheless, AW sets out to change the Eco-selector by putting pressure on VicUrban via the State Government. Then Minister Broad suggested writing to the Minister responsible for VicUrban, John Lenders, which AW did. Three strategies were eventually deployed by forestry interests in an attempt to change the Eco-selector.

7.3.1 Strategy One – seek inclusion

The first strategy was to ask for the inclusion of VNFT’s in the Eco-selector – the tool lists particular products and the VAFI wanted their members’ timbers included. As such, following correspondence with VicUrban’s General Manager of Project Planning and Design, Mark Alan (MA), and their Project Director, Sustainability, Environment, and Urban Design, Barton Williams (BW), a submission from VicForests (VF)
and the Timber Promotions Council\textsuperscript{155} (TPC) was made seeking the inclusion of VNFT’s and to have them categorised as ‘highly recommended’.

As the Eco-selector identified biodiversity as the key criterion for judging timber, the VF and TPC submission responded specifically to this point. They also respond to the other three sustainability criteria because, in their view, timber performs well against any sustainability measure and should, as such, be assessed against any and all criteria.

This approach would turn out to be an irreconcilable difference between the views of the timber industry advocates and the methodology deployed by the CfD. The CfD did not attempt to compare products or materials. It identified the worst aspects of each element or product and then looked for replacements that best addressed the problem. For example, timber-framed windows were not judged to be better or worse than aluminium. However, if timber was specified, the ‘best’ timber should be used, ideally that which is plantation–sourced or certified. Similarly, aluminium that contained recycled content was preferred to that containing only virgin material. The timber industry representatives insisted that their products were better across the range of criteria than any other products and that it was ‘a perverse outcome’\textsuperscript{156} & \textsuperscript{157} that they

\textsuperscript{155} The Timber Promotions Council was set up by the Victorian Government to market, promotion, and educate around the use of timber. The organisation was wound up in 2005.
\textsuperscript{156} Tricia Caswell, Chief Executive Officer, VAFI, interviewed 26/03/07
should be excluded. Nevertheless, on the basis of the explicit method defined by the Eco-selector the most problematic environmental issue regarding timber was biodiversity.

The VF/TPC submission’s argument for the inclusion of VNHT’s was rejected on the basis that the inclusion of products in the Eco-selector was determined on a product-by-product basis. The CfD reserved the right to follow the procedure that they had developed. Manufacturers or suppliers, seeking inclusion of their products, were required to provide data to support their meeting the criteria set out in the Eco-selector. As such, this strategy failed.

7.3.2 Strategy Two – seek recognition

The second strategy used by VAFI was to ask that the Eco-selector be amended to recognise products that were ‘in progress towards certification’. This argument relied on the assumption that should an organisation be undertaking the process of certification they are, by definition, either good or on the path to becoming good environmental citizens. As such, their products should, in the interim, be recognised as meeting the certification criteria. At the time, there were concurrent separate processes in train to finalise the development of the AFS standard and the Eco-selector. Furthermore, the Eco-selector did specify that products with either AFS or FSC certification schemes as sufficient criterion for approving timber (see page 6 Appendix 5). As such, a supplier could expect

---

157 Dr. Alistair Woodard, Director, Wood Products Victoria, interviewed 28/03/07
that should they submit an FSC or AFS certified product for inclusion in the tool, it would be accepted. The request for ‘interim recognition’ was put by a representative of the Department of Primary Industries (DPI), the Government department responsible for forestry, at a meeting with VicUrban in March 2005.

The outcome was that the DPI forwarded documentation to VicUrban that supported the inclusion of products ‘in progress’ towards certification. They cited ENGOs’ support for such a ‘step-wise’ approach to minimise potential economic ramifications against ‘good corporate citizens’ who were making the transition to more sustainable outcomes.

However, there was a problem with the process of developing the AFS. From its initiation in 2000, it had widespread community support. However, the participating ENGO’s abandoned the process in 2002 claiming that it was a sham (The Wilderness Society 2005). Up to this point, ENGO’s had supported AFS in-principle and as such, the CfD was happy to support the scheme. This is why AFS was included when timber certification was mentioned in both the flip-chart and Eco-selector. However, when the ENGO’s withdrew their support, the CfD was left to conclude that AFS no longer had the support of significant community interests, which meant that there could be no certainty that concerns regarding biodiversity had been resolved to the satisfaction of all of the stakeholders. This point was included in the CfD’s response rejecting the DPI’s request for interim recognition.
The CfD’s reason for not including VNHT’s in the Eco-selector was not accepted by the protagonists and resulted in the dispute escalating. This would embroil VAFI, VF, TPC, DPI, the Department of Sustainability and Environment, Sustainability Victoria, the Building Commission of Australia, the Green Building Council of Australia (GBCA), the Minister for Housing, the Minister for Major Projects, The Premier of Victoria, VicUrban, and the CfD.

The strategy to seek recognition seemed resolved when, in late 2006, VF timber was AFS-certified. As VNHT’s were approved timbers in the Eco-selector, they could now be submitted for inclusion in it. However, because the ENGO’s had abandoned the development process for AFS in 2002, the lack of stakeholder support saw the workers who had responsibility for the Eco-selector at VicUrban attempt to remove AFS-certification. This aligned them with another organisation promoting sustainable best practice, the GBCA, which also, at that time, did not recognise AFS–certified timbers.

Similar to the original vision for Aurora and the Eco-selector, the GBCA’s Acting Executive Director Green Star, Robin Mellon said,

> What we’re trying to do is reward and encourage best practice. … (W)e’re trying to (get) … the industry, but also projects, to … aim high, to aim (to) … minimis(e) environmental impact, but also (to aim) for best practice in Australia.158

In keeping with other tools that use a quantified approach to measuring improvements in environmental sustainability, the GBCA

---

158 Robin Mellon, Acting - Executive Director Green Star, GBCA, interviewed 19/03/08
operates their Green Star rating tools by awarding ‘stars’ on the basis of the number of credits that can be awarded for using sustainable building materials. Their Mat-8 ‘Sustainable Timber’ credit provides up to two points if environmentally sustainable timbers are used. Until recently, the GBCA’s focus was mainly on office buildings. Six stars is their current maximum rating, with both the City of Melbourne’s ‘Council House 2’ offices and the recently constructed 5000-seat Melbourne Convention Centre being six star buildings. It is noteworthy that, as a result of the Convention Centre striving for six stars, the Laminex Group produced an FSC-certified timber veneer panel that is the first of its kind available to the wider market. This provides support for the strategy of the GBCA to have projects ‘aim high’ as it results in innovation for environmental sustainability.

In late 2007 the GBCA announced a review of the Mat-8 credit. The review was initially expected to finish in the first quarter of 2009 (Green Building Council of Australia 2008). In keeping with the political tensions caused by the use, or exclusion, of VNHT’s, the GBCA’s review raised concern amongst ENGO’s who feared the timber industry was attempting to ‘water-down’ Mat-8. This fear appears well founded. AW nominated himself and 12 of the other 38 nominees for the review panel, of which three were appointed to the eight-member, plus independent chair, committee. Of the remaining five positions, one appointee, John Kerin, is on the record as saying there is no evidence of biodiversity issues resulting from forestry (Kerin 2002). As the question of bio-diversity is a key concern to ENGO’s, one can assume that Kerin is likely to be a timber industry
rather than ENGO supporter. As such, the committee was balanced between pro-industry and ENGO interests. Indicative of the seriousness with which timber industry representatives took the review, an analysis of the nominations shows that had the appointments been made on the basis of the number of nominations received, pro-timber industry interests would have secured 75% of the positions (see Appendix 10). This strategy of attempting to dominate a committee was also used by timber industry representatives during the development of the AFS (The Wilderness Society 2005). In November 2009 the GBCA finished its review of Mat-8 and deemed AFS-certified timber acceptable.

The review of Mat 8 highlights the highly political nature of proposed change. However, the outcome, like all change processes, can have both direct and indirect results. For example, while the overt focus of the Mat-8 review was on future GBCA Greenstar awarded projects that would have to meet the new standard, nevertheless, an unrelated body, VicUrban, was affected by the review’s outcome. VicUrban’s CEO wrote to the DPI in early 2008 stating that, although the Eco-selector currently recognised AFS and FSC certification, they were awaiting the outcome of the GBCA review. The implication was that should the GBCA not recognise AFS neither would VicUrban. The outcome of the review, thus, was that VicUrban committed to using AFS–certified timber even though the scheme continued to lack ENGO support.
7.3.3 Strategy Three – undermine

The third strategy that VAFI used was to call into question the bona fides of the CfD and their work on the Eco-selector. In February 2006 they wrote to the CfD regarding their ‘Concerns over the Methodology of the Centre for Design at RMIT’. The letter’s ‘concerns’ included a ‘lack (of) intellectual rigour, objectivity and transparency’ in the CfD’s ‘methodologies’. It cited, as ‘a recent example’, the Eco-selector, whereby the CfD had rejected the inclusion of VNHT’s on the basis of biodiversity concerns. They went on to claim that the ‘assumptions’, ‘principles’ and ‘methodologies’ that were used to decide which products should be included in the Eco-selector were difficult to ascertain and that the decision to exclude their products was unfounded.

However, VAFI – as would have anyone that read the Eco-selector – would have been aware of the method used by the CfD. The document clearly specifies this (see page 5 of Appendix 5). This was also included when the CfD wrote in July 2005, responding to the VF and TPC request for inclusion of VNFT’s that an expert group decided the benchmarks for the products against one of four sustainability criteria. Furthermore, during the course of the disagreement, reasons were provided by the CfD as to why biodiversity was an unresolved issue – the lack of ENGO support – and as such, why they would not recommend keeping AFS–certified timbers in the Eco-selector.

---

159 Letter dated 24/02/2006 from VAFI to the CfD.
VAFI refused to accept the decision of the CfD and set about discrediting them. The letter of 24/02/06 was ‘cc’d’ to RMIT’s Pro-Vice Chancellor (Research) and the Head of School in which the CfD was located, no doubt to put pressure on the CfD to reverse its decision. However, the letter failed to raise any substantive methodological concerns and made spurious accusations (see Appendix 11 for the correspondence between VAFI and the CfD).

Furthermore, the method, that is, the rationale for the expert panel, and its deliberation process are not critiqued. Paradoxically, given the breadth of the criticism, at the same time VAFI were using and citing the CfD’s research in their report The Environmental Impact of Building Materials: Victorian Native Forest Timbers (Woodard & Iskra 2006). As such, the ‘truth’ of the CfD’s competence, in this instance, is not at the service of a principled intellectual critique but deployed to bolster VAFI’s political position – they were happy to use the CfD research that supported their position but derided the CfD when their work was not in keeping with VAFI’s agenda of protecting the practices of their members. Although there is a possibility that the use of CfD research and the criticism of it happened independently of each other within VAFI, this is unlikely. VAFI is a small organisation and furthermore, Woodard and Iskra’s (2006) report has a two-page covering letter titled ‘Forward and Call for Action’ written by VAFI’s then CEO, Tricia Caswell (TC), the signatory of the letter of 24/02/06 that attempted to smear the CfD.
7.4 Under siege: the timber industry protagonists

For the timber industry representatives this was a fight that, it appears, they would go to any lengths to win. Michaels (2008) argues that the issue of the quality of science involved in policy arenas is one that is commonly used to create doubt by vested interests. An example, that helped define the context for the battle, described herein, is that of the development of the Regional Forestry Agreements (RFA’s) which drew considerable criticism. The RFA’s emerged ‘from bitter, politically difficult, debates on the future of Australia’s forests’ (Kirkpatrick 1998) and in the context of Western Australia, failed to achieve the needed democratic capacity-building (Hillier 2003). This question of democratic participation is a critical distinction between the FSC and AFS schemes. As mentioned above, the process for developing the AFS was abandoned by the ENGOs that were participating in it. However, in FSC, they participate fully.

Although the RFA process was notionally scientific, the research used was not beyond reproach and the processes put in place to address discrepancies in the findings resulted from polarised debates (Horwitz & Calver 1998). These agreements failed to resolve the conflict over forest management (Kirkpatrick 1998; Lane 1999). Furthermore, the forestry industry felt that they had given a lot of ground, with conservation reserves increasing from 13% to 16% of Australia’s forests and a concomitant decrease in the forests available for wood-
production by approximately 12% (Montreal Process Implementation Group for Australia 2008).

Although the criticisms of the science used by the competing interests regarding the RFA’s are more substantial than those made by VAFI about the CfD’s methods, they nevertheless, highlight how ‘science’ is used to legitimate one’s own and critique others’ position. For example, VAFI CEO, Tricia Caswell, said,

I don’t think anyone can … tell me easily and scientifically ... why ... forestry ... has such an impact on biodiversity if it’s fabulously done. (There are) … lots of really good forestry practices these days. And … Australia is right up there. (The forest industry is) … scrutinised like hell, it’s made a huge amount of progress, it’s so regulated you can’t move. (It’s) much more regulated than the production of almost any other material\textsuperscript{160}.

Similarly, referring to the initial VF and TPC submission that argued for the inclusion of VNHT’s in the Eco-selector, VicForest’s Director Strategy and Planning, Pat Groenhout (PG), said,

\textsuperscript{160} Tricia Caswell, Chief Executive Officer, VAFI, interviewed 26/03/07
(W)e did that (to) ... put... forward ... a scientific basis for inclusion of sustainably harvested native forest from Victoria. ... At that stage we weren't actually certified ... but we've been (AFS) certified subsequently. ... (T)he Eco-selector ... was driving towards having only plantations or FSC certified forests, and that ... was ... a problem because FSC's only one of two ... certification schemes that operate within Australia. ... (A)nd in fact there are no ... FSC-certified native forests of any note in Australia anyway. (A)nd finally, ... forestry, particularly native forestry in Australia operates within such a strict ... institutional framework including ... regulations (at the) Federal (and) State (levels, and has) ... processes like forest agreements, etcetera, etcetera. ... (T)here should be no reason for (VNFT's) to be excluded on the grounds of not being sustainable161.

Forestry has gone through more change ... than any other commodity in Australia162.

AW also was adamant that they have ‘the facts’ to support their practices. He said,

(T)he green groups use... one simple message, or a couple of simple messages, with a lot of visual theatre, ... (and) stay away from the detail. And the timber industry has (said), ‘no, we know our product is ... environmentally ... good.’ We have got ... science to show it. And (we) always tried to argue the science and always lost. Because when the cameras are rolling, when I throw a bit of red dye on you and go ‘that's possum blood’, (t)hat is worth a billion words compared to all of those bloody scientific documents that I can throw up here that no one is going to wade through163.

And ... so, ... we are more than happy for the science to be used to determine the regulation, because we reckon (we can deal with) the science164.

However, AW also bemoans the effectiveness of science in the face of what he describes as emotive theatre put on for the mass–media.

161 Pat Groenhout, Director Strategy and Planning, VicForests, interviewed 08/05/08
162 ibid
163 Dr. Alistair Woodard, Director, Wood Products Victoria, interviewed 28/03/07
164 ibid
AW clearly feels that the forestry industry is the victim of emotive media manipulation. Yet, as these quotations illustrate, the charge of emotiveness is not confined to the green groups. The words ‘fabulous’, ‘scrutinised like hell’, ‘it’s so regulated you can’t move’ and ‘all those bloody scientific documents’ attest to the passions that are aroused by these issues for timber industry representatives. The other forestry industry interviewees, with the exception of Michael Spencer, the CEO and Secretary of FSC Australia, used similar language and arguments. These representatives also had a similar sense as to how they were represented in the mass-media.

There is a paradox in the position put by AW and TC. Irrespective of the moves to remove AFS certification from the Eco-selector as a result of the ENGO’s withdrawing support in 2002, it, nevertheless, was included from the beginning and this appears to escape them. For example, PG says that the Eco-selector ‘was driving towards only plantation or FSC certified forests’. This is incorrect. Why then did the timber industry representatives almost uniformly have similar accounts? Although we must approach recollections from memory with caution because they are reconstructed rather than ‘played back’ (Loftus & Palmer 1974), the question remains, why did PG reconstruct these events in this light?

This thesis argues that habitus is historically acquired and predisposes us to act in particular ways. Section 4.2 shows that professional practice is, thus, oriented. As such, habitus organises our understanding – predisposing our receptiveness to some ideas and
not others – while also predisposing our responsiveness to reporting events. Remembering is a profoundly cultural-historical phenomenon (Brockmeier 2002). Furthermore, as research into people’s ability to recall the detail of a car accident shows, people fill in details like there being broken glass when, if fact, there was none (Loftus & Palmer 1974). Thus, recollections are (re)constructed to fit a priori assumed conditions. To have a ‘world-view’ is to have a constellation of historically-derived experiences on which understanding is built and critically, filtered. Moreover, a world-view, like PG’s, acts as a dispositif (see Foucault 1980) – an apparatus that is a disposition – that acts bi-directionally – not only mediating experience but also engagement with the world, including recalling past events.

In this light, PG’s failure to ‘remember’ that the Eco-selector nominates AFS certification becomes explicable. He, like the majority of the timber industry people interviewed, felt under siege by ‘emotive’ ‘media manipulating greenies’ who were ‘hell bent’ on destroying their industry. TC said ‘some [E]NGO’s … are opposed to all certification because they basically want no industry from native forestry at all’165.

As such, the habitus of the timber industry is profoundly defensive. Any perceived ‘attack’ on the industry is going to be understood through this lens. AW said, reflecting on the method used by the CfD to judge materials,

---

165 Tricia Caswell, Chief Executive Officer, Victorian Association of Forest Industries, interviewed 26/03/07
So one of the first decisions that (the CfD) made was ask what is the critical issue for that particular material. So for paint, it’s off-gassing – toxicity. ... And timber, ... the critical issue is biodiversity. So, ... that immediately puts a particular spin on the way that ... material is going to be appraised. ... Well, I straight away hear (this as)... green groups views on native forest harvesting.\footnote{Dr. Alistair Woodard, Wood Products Victoria, interviewed 28/03/07}

Hence, the Eco-selector was immediately perceived as having an ENGO agenda. From this perspective, one of the expert panel members’ work-history inadvertently validates this concern. TC said,

Andrew ... Walker ... -Morison, ... His key is Wilderness Society. ... (T)here (is) ... no reason to believe that he would (make) ... any adjustments whatsoever to his key beliefs. ... (P)art of the(ir), ... campaigning techniques and ... strategy was to get people into key places.\footnote{Tricia Caswell, Chief Executive Officer, VAFI, interviewed 26/03/07}

She elaborated,

... there’s the factual basis of the ... key ... issues. (By that, I mean, ... I don’t think that the issue that they’re interested in is biodiversity. I think it’s about native forestry. Its ... become (environmental) canon that you should not have native forestry in this country, (b)ecause ... (it) is so easy to campaign around. ... And so, ... the people who’ve designed th(e Eco-selector) come from the Wilderness Society, that’s their whole raison d’

Andrew Walker-Morison (AW-M), an architect, had worked on the now superseded Wilderness Society’s One Stop Timber Shop – a web-based resource for Architects and other specifiers wanting to find second-hand and environmentally sustainable wood products. In TC’s eyes, this sort of work taints him. She implies that AW-M’s work for the CfD, including as their Manager of Sustainable Materials

\footnote{Tricia Caswell, Chief Executive Officer, Victorian Association of Forest Industries, interviewed 26/03/07}
Program from 2004-2007, is part of some sort of ENGO conspiracy directed towards undermining the VNHT industry.

Similarly, PG said,

a lot of the conservation groups (have) ... their basic funding models built on campaigning about forests ... – that’s where they get all their money. ... (S)o even though you might have an informed conversation ... with one of those people and they say to you, ‘well, ... actually we don’t think that forestry’s that bad anymore, but you know, we need it, it’s our ... horse. It’s ... where we get all our money from’169.

Several timber industry protagonists offered similar ‘off-the-record’ rationales for why they were the victims of a sustained attack from ENGO's in general and the Wilderness Society in particular. From their perspective, the ENGO's were locked into stopping all logging of native forests because the community that financially supported them would withdraw their funding should the ENGO's ‘rightly’ back down. A further reason offered for the attacks was, again, mentioned by several industry representatives. For example, PG said,

the reasons why ... timber is targeted over and above other products (and) ... other commodities ... in materials selectors ... (i)s ultimately because there’s ... a strong influential conservation movement which doesn’t want to see native foresting (and) harvesting in Australia. And they’ve been very successful ... with their marketing of that170.

What seems to escape TC, PG and their allies is the contradictions in their position. They argue that ENGO’s like the Wilderness Society,

169 Pat Groenhout, Director Strategy and Planning, VicForests, interviewed 08/05/08
170 Pat Groenhout, Director Strategy and Planning, VicForests, interviewed 08/05/08
have a no-forestry agenda. Yet, at the same time, they argue that ENGO’s are ‘in it’ for the money. If this is the case then they have a vested interest in the status quo and logically, thus, would not want to see the issue of VNHT being resolved. As long as the issue was current, funding would continue to flow. This contradicts the TC’s assumption that AW-M had some sort of hidden agenda to enact in the CfD. Furthermore, the ENGO’s withdrew their support for the development of AFS in 2002 which is at the same time that the idea for a materials selector for Aurora, which eventually became the Eco-selector, was initially being discussed. If AW-M was as TC alleged, the means by which CfD decisions could be affected to the detriment of the harvesting of VNFT’s, then the inclusion of AFS certification – the scheme supported by the timber industry – in the flip-chart and the Eco-selector is inexplicable.

In summary, from the perspective of most of the timber industry representatives, they were being attacked by a known foe and they set about defending themselves. Furthermore, they had developed elaborate, if flawed, theories about why they were under attack. This defensiveness against a threat to practice illustrates the political nature of innovation – one person’s improvement, in this case in the selection of more environmentally sustainable materials, is a threat to another’s livelihood. However, this is not simply a micro-level response. Although particular actors deliberately pursue their agenda’s, these were established by changes in meso-level factors. Making the Eco-selector a planning approval requirement set the need and context for VAFI’s response. Had the tool remained aimed
at the micro-level – educational – the events that followed would have been different. Defensiveness, thus, is not as Schumpeter (1934) theorised, an unwillingness to change because people are wed to business as usual (see Section 3.7) but a response to a threat to practice. The next section sheds further light on Schumpeter’s ideas by exploring how the ‘entrepreneurs’, especially some CfD staff, were also not immune from responding defensively when VAFI raised the question of methodological rigour regarding the development of the Eco-selector.

7.4.1 Under siege: the CfD

As reported in Section 4.4, a standard set of open-ended questions was used for the interviews. Some interviewees, notably a number of the forest industry people, did not follow the structure afforded by the questions. These interviewees had a story to tell regardless of what was asked. One other interviewee, while using the structure provided by the questions, nevertheless, revealed a clear agenda. This was the interview with AW-M. By the time he was interviewed in March 2007, much of the fight between VAFI and the CfD had subsided. Of note, the CfD had weathered the attack on its credibility in February 2006. Responding to the standard opening question regarding how people came to be involved in the project and asking what their role was, AW-M said,
... (T)he project, ... was originally ... developed as I understand it, ... by Dominique (Hes), working with VicUrban. ... I was pulled in as somebody that could assist with the panel review process. (T)he methodology was a Delphi-type process\textsuperscript{171}.

AW-M, thus, immediately raised the issue of the methodology – one of the central criticisms raised by VAFI. Furthermore, while the Delphi method is mentioned in various documents that describe the Eco-selector project, no other member of the CfD or the expert panel assembled for the Eco-selector project had until then, mentioned it.

Describing the process that the CfD used to develop the Eco-selector, in February 2007, that is after VAFI’s attack, BW said,

There (are) aspects (of) the methodology of assessment that ... we all ... question... . But, that is something we recognize and we are working towards improving. ... (A)t the time, the quality of information in terms of LCA was ... [... controversial and involved. ... It was easier to apply] expert judgement ... base(d) ... around th(e) four criteria ... that a group of [...] industry specialists] came up with. [...] that was how we started to ... work out the assessment. [It was the best that we could do at the time.]

(W)e knew that [it] was ... rough science. ... (W)e knew we’d have to improve and we are in the process of improving, ... (b)ut we had to come up with something. We had to start from somewhere. ... [...] [...] (W)e ... recogni(sed) that ... the assessment methodology ... would need to be improved over time.

[... Consequently] VicUrban is part of the BAMS\textsuperscript{172} project, ... Building Assembly Materials ... research project, which is ... looking at establishing a very clear ... assessment methodology... . [When completed VicUrban would hopefully] use that assessment methodology in the selection of materials ... that is consistent across the board. ....

\textsuperscript{171} Andrew Walker-Morison, CfD, RMIT University, interviewed 21/03/07

\textsuperscript{172} Building Assemblies and Materials Scorecard. A multi-organisational group that is exploring an industry wide tool for selecting environmentally sustainable building materials.
In the interim, there have been discussions about how we might improve the methodology assessment, in the medium term. We have been talking about using the Adelphi model, which Andrew (Walker-Morison) knows a lot more about than I do. We acknowledge that the model we've got at the moment is rough science, the Adelphi model is a bit more refined, and will allow more science to be involved in the assessment process. That would be an interim measure, while we go through the BAMS. However, we haven't made a decision whether we go down that path or not, because really, at the end of the day, what we have got at the moment, is holding us in good stead.  

There are two points that need addressing here. The first addresses BW's relationship to the Eco-selector. He said,

[173 Barton Williams, Senior Sustainability Advisor, Environment, VicUrban, interviewed 23/02/07]
the Eco-selector came about ... when I was working at Sustainability Victoria, then known as ... the Sustainable Energy Authority of Victoria. ... I was the manager of the Energy Smart Building program ... (which was focused on) ... assisting the volume ... building industry ... achieve(e) much better energy efficiency outcomes, (for) ... their hous(es). ...(O)ne of the things that I recognized was that ... materials had a very large energy component (of) building construction but there was very little information out there to assist the building community (– letting them know) ... how they could achieve energy ... conservation through the specification of environmentally friendly materials. (There was) ... the EcoSpecifer ... but that didn’t really provide the guidance that the building community needed. So, I ... came up with the idea of the Eco-selector. I felt that there was a need for a tool that ... very clearly defined what ... is an environmentally friendly material, ... what the minimum standards would be and where they could get those materials. So, that was ... really the ... genesis of the Eco-selector. I then went through the process of ... crafting ... what I required (and) ... what I thought I needed (from the) ... tool. ... I approached ... RMIT’s, Centre for Design, ... prepar(ed) a brief, and ... establish(ed) the fundamental framework (for how) ... I (wanted) ... the tool ... to operate. We then proceeded, ... myself, Dominique Hes, Tim Grant, Alan Pears and Andrew Walker-Morison (then) ... really craft(ed) out how (the ideas) ... could come about. So their role was really to come up with (the) materials that would meet certain criteria. (We) ... established what (the) ... core criteria would be. And (they were) ... toxicity, ... resource consumption (and) bio diversity\textsuperscript{174}.

BW claims responsibility for the overarching conceptualisation of the Eco-selector. In this passage he uses the personal pronoun ‘I’ 11 times and uses ‘we’ once to acknowledge the role of the rest of the expert panel. In the quotation preceding this one, he uses the personal pronoun ‘we’ 15 times, and ‘I’ once. However, there is a difference between his use of ‘I’ in the first and the second quote. In the first, his use of ‘I’ is not to claim ownership but to separate himself from the person responsible – AW-M’s knowledge of the ‘Adelphi’

\textsuperscript{174} ibid
method. In the second quotation, BW uses ‘I’ to claim responsibility for creating the basic framework for the Eco-selector.

Studies of the use of the personal pronoun ‘we’ show that it is used to communicate the relationship of the speaker to a community (see Íñigo-Mora 2004). Clearly, in the second quotation BW is positioning himself as the leading agent responsible for the initial conceptualisation and framing of the tool. However, in the first quotation, regarding the problems of the method used – that became an issue because of VAFI’s complaint – BW is distributing responsibility amongst the group.

Like PG’s (re)construction of the failings of the Eco-selector, explored in Section 7.4, BW’s account of his role and responsibilities is shown to be a contextual social reconstruction – a fluid, in the moment ‘making sense’, rather than a mechanical uncoloured retelling of what ‘actually’ occurred. Furthermore, ‘memory’ of contentious events is often disputed, can shift over time and is implicated in the positioning of victims and victimisers (Neumann 2000). In BW’s first quotation, he is sharing the responsibility for any perceived failings that might be attributed to the method used for the Eco-selector. In the second one he is positioning himself as the lead agent – the person most responsible for the tool. The difference between the quotations is that the first is a reflection on something that was contentious while the second is not. Thus, he is free to claim his success in developing and delivering the tool.
The second point to examine stems from BW’s positioning and understanding of the ‘Adelphi’ method. In this version the ‘Adelphi’ process is something to be considered as a possible next step on the way to the BAMS tool, which will be more closely aligned to a full LCA. However, he does not say that it was the method used, but one that they might use in the future. BW is so removed from the concept, that he misnames it, ‘Adelphi’ rather than ‘Delphi’. This suggests that while he knew something of the term, it was not one with which he was intimately familiar or had used. There are two other accounts of how the Delphi methodology relate to the methodology used to develop the Eco-selector. Before moving on to them, it will be useful to define the method:

Its object is to obtain the most reliable consensus of opinion of a group of experts. It attempts to achieve this by a series of intensive questionnaires interspersed with controlled opinion feedback. … The technique employed involves the repeated individual questioning of the experts (by interview or questionnaire) and avoids direct confrontation of the experts with one another (Dalkey & Helmer 1963, p. 458).

Hence, the technique is designed to obviate the problem of having experts who disagree. For example, in the context of talking about the problems of LCA being a relatively new methodology, TC said,

(W)e called a meeting of life-cycle analysts in New York. There were 30 people in a room and none of them agreed; … it’s a new methodology\(^{175}\).

The Delphi method is designed to move beyond the differences that might be expressed in a face-to-face meeting, such as the one

---

\(^{175}\) Tricia Caswell, Chief Executive Officer, VAFl, interviewed 26/03/07
experienced by TC. It does this by carefully controlling the flow of information that the group use to come to a decision:

Four key features may be regarded as necessary for defining a procedure as a 'Delphi'. These are: anonymity, iteration, controlled feedback, and the statistical aggregation of group response (Zanoli, Gambelli & Vitulano 2007, p. 70).

Of course, the method can also be used to facilitate decision making when the experts are located remotely from one another and to obviate ‘group-think’, where experts ‘are deeply involved in a cohesive in-group, when the members’ strivings for unanimity override their motivation to realistically appraise alternative courses of action’ (Janis 1972, p. 9). However, for the development of the Eco-selector, there was no suggestion that either of these two considerations needed to be accounted for by the method that was used.

Specifically, DH said that the method used for the Eco-selector,

was that we ... basically sat around a table, and ... we said, what were the most important impacts, (the) things that we should look at? (And) ... for different materials there are different key things. So, for example, concrete is very much about resource use and ... embodied energy. Whereas for paint it’s very much about toxicity and timber is very much about biodiversity. So we listed the main materials and we determine(d) what the priority areas for those materials were. And then we ... looked at ... (the) leading materials within those categories. So, for example, when we looked at the best concrete types, we didn’t look at toxicity issues, we looked at embodied energy and recyclability. When looked at the best paint types, we didn’t look at recyclability or embodied energy, we looked (at) ... the least emitting.
So, that … was … a workshop, which from memory … had Tim Grant, Andrew Walker-Morison, Allen Pears, myself, Helen Lewis, and possibly Margaret Bates. … We just sat around a table, we came up with material types, what categories they were in, for some materials such as concrete and bricks, we actually had embodied energy figures. … And so it was quite easy176.

As such, regarding the four key features of a Delphi method, the process used was not anonymous or iterative nor did it utilise controlled feedback or statistics to aggregate the findings. Up until the interview with AW-M the description of the method used to develop the Eco-selector was consistent with BW’s account of his role. The process was characterised by a sense of what was required for the tool which was fleshed out at a productive and convivial meeting of the expert panel. This account is in accord with the process of developing the original vision for Aurora (see Section 5.2.2). Here too, the process of bringing forward the ideas that people have for an innovation is fast and easy.

Thus, there was a contradiction between what I had understood the Eco-selector methodology to be after interviewing several CfD and expert panel members – the harnessing of the expertise of people in or known by the CfD – and AW-M’s suggestion that it was something more ‘methodologically legitimate’, the Delphi method.

Trying to resolve this with DH produced several insights. From her perspective, the method used was ‘Delphi-like’. She supported this

176 Dr. Dominique Hes, EcoSelector Project Manager, CfD, RMIT University, interviewed 04/12/06
by referring me to Finnveden’s (1999) comprehensive review of LCA methodologies, including qualitative panel methods:

In a Dutch study (Anonymous, 1991, Annema, 1992) the starting point was normalised characterisation results. The application of weighting factors was then done in a Delphi-like process. In the weighting, members of the steering group representing industry, government, environmental groups and some independent persons from universities and scientific institutes were involved. The process was a four-step approach. The aim of the first step was to gain a common understanding of the importance of the impact categories and of facts that were included in the environmental profiles. One basis for the discussion was a framework in which different aspects of the different categories were defined such as whether the impact is only on humans or ecosystems or both, the degree of scientific uncertainty, the degree of reversibility of the impact, the scale of the impact, the timing of the impact and other issues. The second step of the process was a first assessment of the weighting factors. Each member confidentially did this step. In the third step, the results were presented to the members who continued the discussions. The fourth step was a second assessment. The process was then continued until a ranking had been produced (p. 27 DH’s emphasis).

Although the first of the four parts of the reported study, emphasised by DH, was very similar to what the expert panel did, this was not the method per se but the first step. This, plus the other three steps, although described as ‘Delphi-like’, meets much of what defines the method (Zanoli, Gambelli & Vitulano 2007). It was iterative, exhaustive, in part was conducted anonymously and had some controlled feedback. It is also noteworthy that the steering group had a diverse, potentially hostile membership and this provides the rationale for using the method.

DH insisted that the method used to develop the Eco-selector was Delphi-like. When working for PRé Consultants in the Netherlands
from 1997-98, she came across the Delphi method and knew that it was used to in relation to expert panel decision-making. This was the model that she had in mind for the Eco-selector project. As such, her habitus includes a ‘feel-for-the-game’ of creating tools for environmental sustainability – using an expert panel was sufficient – it was aligned to her experience at PRé Consultants. The fact that the actual method was not objectively Delphi or even Delphi-like, does not stop the term being used by a fourth person, the Director of the CfD, Professor Ralph Horne (RH), who had his own understanding of the method and how it related to the Eco-selector. He said,

I reviewed all CfD projects after I joined as Director in February 2005. As part of that process I suggested we recognise and document the methods used – including in Eco-selector. Since it is based on expert opinion, the Delphi method was the term I suggested to provide a quick description of the methodological underpinning. I cannot recall the precise chronology of events right now, but there is no doubt that the term was used after the initial version of Eco-selector was developed – but not necessarily as a direct reaction to VAFI. As regards the method itself, my view of the initial project was that it was developed on shoestring funding and that it could have been a more rigorous process if VicUrban (or others) had been able to fund (it) accordingly. I think a brave attempt was made with very few resources to ‘benchmark’ best practice using a mixture of literature review and an expert panel.

This short hand way of using the term is indicative of the variety of ways it was understood and used within the CfD. For example, while the term was in the minutes of the first meeting of the expert panel, it was omitted in the report provided to the URLC that included a

---

177 Dr. Dominique Hes, Lecturer, Faculty of Architecture, Building and Planning, University of Melbourne, personal communication 13/11/08
178 A/Prof Ralph Horne, Director, CfD, RMIT University, personal communication 27/10/08
description of the method used by the panel, which was that the panel members provided their expert opinion.

Although it seems that a Delphi-like method was gestured towards, the method used was not in accordance with standard definitions (Finnveden 1999; Zanoli, Gambelli & Vitulano 2007). Although this account resolves DH’s story, the timing of the use of the term, attested to by RH and BW, stands in stark contrast to AW-M’s claim that a Delphi method was used.

A likely reason for AW-M’s position is that he felt a need to respond to the attack by VAFI by bolstering how the method used in the development of the Eco-selector might be perceived. He said,

(T)he idea of a Delphi approach is that you … round robin a series of research questions and hypotheses, or answers to people that are considered credible stakeholders, or experts. And they peer review each other’s considered opinions, and from that, you develop … recommendations, findings, or whatever the research question is. … (T)he Delphi model … is considered to have some sort of methodological rigour\textsuperscript{179}.

This description resembles elements of the definition of a Delphi method; a round robin is iterative, and there is peer-review, although not anonymous. AW-M went on:

So (Delphi provides an) … answer within a very tight … timeframe. (It allowed for) … some very complex questions about materials, … selection, (and) specification, … to (be addressed) … by us(ing) a series of people … to review the research questions\textsuperscript{180}.

\textsuperscript{179} Andrew Walker-Morison, CfD, RMIT University, interviewed 21/03/07
\textsuperscript{180} ibid
This part of AW-M’s explanation seems to be the opposite of what might be expected when the Delphi method is used. Being iterative, it is time-consuming. He seems to be making a link here between the smoothness and speed of the actual process at the meeting of the expert panel with his understanding of the method. Although this is understandable, it does not explain why he raised the issue of methodology when responding to question 1 in the interview. Neither does it explain the gap between his definition and the way the other members of the expert panel described what they did.

AW-M’s concern for ‘methodological rigour’ appears to have resulted from the attack by VAFI that disputed the quality of the work being done by the CfD. Both VAFI and AW-M are responding defensively – in response to a perceived threat to their practices. This sort of emotional response in the defence of a practice caused by the fight between VAFI and the CfD was experienced by some of the other people involved with the Eco-selector. VicUrban’s Environment Project Manager, Karan Deegan (KD), was the worker responsible for the tool at VicUrban. After discussing the contentious nature of the Eco-selector, specifically its impact on some primary industries, like timber, we turned to the difficulties that she had faced. She said,
There’s been two types of difficulties. First, ... is the emotional difficulties in working with (the Eco-selector) and learning more about the impacts that particular materials have, ... This has come about ... through ... my dealings with Centre for Design and ... learning a lot more ... about the massive impact that material selection has. ... I had a sense of it previously ... and therefore I was really interested, but then actually getting into the details – ... not ... the statistics but the actual (impacts). I mean ... seeing things on the news like the mudslides because of the deforestation. That drives the issue home ... further and becomes something that you ... become frustrated with (and) you ... realise, you’ve just got to work harder... . The second difficulty has been understanding from VicUrban ... the intent ... (of) the (Eco-selector) ... – what level of change they are after? ... I think people in senior management don’t understand the tool, (they) don’t necessarily understand the breadth of the issues that this document’s trying to address. (So we’re) not getting clear direction on how to evolve the document, to better address the issues. (We do) ... not know ... how far to push minimum requirements. So therefore, I’m left ... making a decision (when) ... I don’t know ... (VicUrban’s position). There’s two ... (pieces) of knowledge that you need to make that decision. You need to understand VicUrban(‘s position) and you need to understand the tool, and I don’t know if any one person (within the organisation) knows that. So it’s been difficult to get ... clarification on how to evolve the tool. ... (N)o one’s made the decision on wh(at) the end goal of the tool is ... 181.

Again, highlighting the importance of a clear and articulate vision, examined in Chapter 5, the effect of KD’s personal vision for the Eco-selector is that it motivates her and that she wants to help address the environmental degradation that that she has been disturbed by. As such, the success of the tool is important to her. This leads to her second ‘difficulty’. She does not feel that senior management articulate a clear vision of how they see the Eco-selector’s role. However, the lack of perceived ‘articulation’ may have been that senior management did not share KD’s vision for the tool. As

---

181 Karen Deegan, Environment Project Manager, VicUrban, interviewed 18/11/07
examined in Section 6.3, transitionary phases are unavoidably uncertain. Certainty comes from habitual practice. A disturbance of practice, like an innovation, is going to reduce certainty and can only be bolstered by a clearly articulated vision – to know that the uncertainty is alright as long as there is progress towards the stated goals. Although VicUrban management respond to VAFI’s demands by aligning their decision to the GBCA’s review of the Mat 8 credit, discussed in Section 6.3.2, senior management, good to their word, agreed to recognise AFS when it was incorporated into the GBCA credit, regardless of the fact that it did not have the support of ENGO’s. This was felt as a lack of understanding on the part of management by KD.

7.4.2 AFS vs. FSC post the Eco-selector

The question of the lack of ENGO support for the use of VNHT’s, even with AFS certification, may be resolved if VicForests achieves FSC certification, a process that they were pursuing in 2008 and hoped to have completed by the end of that year. PG said, 

> the main reason for us to pursue FSC certification at this point is (because of) … market pressure … (from) two of our largest customers (for) … their domestic and export markets. (T)here’s a lot of pressure from their customers for them to have … an FSC certified product.\(^{182}\)

Regardless of the market pressure, three years later VicForest timbers are yet to be FSC-certified. Nevertheless, should they become certified this would appear to be a win-win scenario for the ENGO’s

---

\(^{182}\) Pat Groenhout, Director Strategy and Planning, VicForests, interviewed 08/05/08
and the industry. Furthermore, should a certification scheme that has wide stakeholder support be adopted, this would have the potential to ‘de-politicise forestry’ (Crawford 2006, p. 24).

However, as examined in Section 6.4, there is serious distrust on the part of the industry. PG said,

> the risks ... are the way in which ... some stakeholders to FSC use the process to generate commercially unviable changes in practice and ... for us, for example, the pressure is to reduce the area of forest that we harvest. Now, we’re operating in an environment where there’s (been) significant reductions in the ... area harvested over the last 15 years and ... consequently, the volume. So, ... for us ... that’s a no go area – we ... simply can’t do that. And ... we would argue that there’s no reason to because we operate within one of the worlds strictest forest management regulatory environments and ... there’s (a) ... history ... of reductions ... in the tenure base and the amount of wood available to the market. ... (A)n...further (reduction) will be detrimental to the industry so we ... argue, ... that’s a no go area for us\(^{183}\).

Thus, on the one hand there are the market forces that PG speaks about and on the other, his, and other industry representatives’, fear that FSC will be used against them. If the worst fears of the forestry representatives are realised, the ENGO’s will not be satisfied until all native timber extraction in Victoria ceases.

### 7.5 Conclusion

This chapter shows that within the dialectic of innovation for environmental sustainability – business-as-usual versus changing a practice – resistance and defensiveness are not as Schumpeter (1934) suggested, a simple function of people wed to everyday

\(^{183}\) ibid
practice resisting the will of the entrepreneur (see Section 3.7). In this case study, resistance is also seen in the entrepreneurs – the CfD staff who had to defend and legitimate their actions. The fight with VAFI and other forestry advocates was inadvertently engendered by the Eco-selector becoming a planning requirement rather than being an educational tool. This shift was brought about by a change in management of the Aurora project and the Eco-selector resulting from the creation of VicUrban.

As such, this example demonstrates an interplay between micro- and meso-level factors. These include the educational intent, planning requirements, organisational amalgamation, changes in managerial style, and critically – vision and leadership – an organisational ‘permission’ to pursue greater environmental sustainability and staff – already primed – who could passionately pursue the change agenda. However, this agenda was perceived, rightly or wrongly, as a threat to the practices of some of VAFI’s members. The resistance on the part of VAFI and its allies is fuelled by a history of community activism regarding forestry conservation dating back to the 1970s (Penna 2003). The animosity felt by these people is so great that they perceive conspiracies are being mounted by the Wilderness Society to affect the work of the CfD. The contradictions within VAFI’s position include constructing a foe who wants to eliminate the industry’s practices of harvesting VNHT’s. Yet, the Wilderness Society is allegedly motivated to maintain the fight so that it can secure its funding. Similarly, while there was a question of the ability of VNHT’s to be used at Aurora, as AFS was
included in the Eco-selector, any company could have submitted a product to be assessed for inclusion. It is somewhat ironic that AFS timbers were technically approved from the outset and that any question as to their being accepted was resolved in 2009 through the GBCAs Mat 8 Credit review. Yet, as of April 2011, no manufacturer has submitted an AFS-certified product for inclusion in the tool. As such, the economic harm that VAFI was fighting against seems to be, like their construction of a Wilderness Society conspiracy, illusory. It is also noteworthy, that since mid-2010 the Eco-selector is being phased out at Aurora neither is it being used at other VicUrban estates. It appears that with BW and KD leaving the organisation, there are no longer people there championing environmentally sustainable materials.

LCA has the potential to provide a ‘level playing field’ for understanding the environmental impact associated with products and assemblies used in building and construction. The idea of an industry decision support tool was pursued by developing the Building Assemblies and Materials Scorecard (BAMS) project with funding from the Victorian Sustainability Fund. Partners were VicUrban, GBCA, Department of Sustainability and Environment (DSE), and three interested local government councils – Moreland, Port Phillip, and Manningham. The partners expected a decision support tool that provides a comprehensive inventory of building assemblies and products rather than a partial list of some products that are limited to the needs of certain sectors of the building industry. As the Eco-Selector evolved because of the pursuit of and
resistance to change, so too the BAMS project has been similarly affected. Although a detailed investigation of BAMS is not within the scope of this thesis, the CID’s Assistant-Director, Dr. Usha Iyer-Raniga who manages the project noted that the interest in it has waxed and waned depending on the personnel representing the organisations involved. Troublingly, she noted that many critical staff in VicUrban and DSE have moved on. Without the project being driven or championed by government or industry, it may languish. However BW’s wish to see the Eco-Selector taken up by industry, nevertheless, does have some validity in as much as BAMS would not have come about, had the EcoSelector not developed in the way that it had. The intervention of the forestry industry created the political pressure necessary to kick-off BAMS. The crucial question is what organisation will provide the necessary vision to progress it?

---

184 Private conversation with Dr Usha Iyer-Raniga 19/10/10
Chapter 8 Conclusion

8.1 Introduction

The relationship between the pursuit of profit and middle-class attempts to ameliorate the worst effects of social and ecological exploitation combined with a growing global awareness of human impact on the ecology of the planet, such as climate change, means that all sectors of the economy, including housing, are responding to the need for greater environmental sustainability. However, there is a gap between the knowledges produced that exposes this problem and the implementation of actual changes in unsustainability (Blowers, Boersema & Martin 2007). Although the damage being done can be seen as an effect of capitalist exploitation, the fact remains that it is the ways that people live – their practices – that have to change. This is the central problematic of this thesis – what is the role of practice in the pursuit of environmentally sustainability design (SUD) of a master-planned community on Melbourne’s northern fringe.

The case-study was the Aurora estate and the Eco-selector, a tool designed to help the builders at Aurora choose more environmentally sustainable building material which were developed by the States’ land development agency, the Urban and Regional Land Corporation (URLC), later called VicUrban when it amalgamated with the Melbourne Docklands Authority (MDA). Aurora was the URLC’s and became VicUrban’s benchmark
‘sustainability showcase’, brought about by innovation. It is by innovating for SUD that the organisation believes that it affects the ‘market’ – putting pressure on other land developers to meet, if not surpass, what it has successfully delivered. The land development industry is structured horizontally – multiple professionally defined-companies are engaged to work on specific projects, the scope of which is determined by land developers. These professional practices – how they respond to innovating for SUD – are thus, central to the development and implementation of Aurora and the Eco-selector. As such, the primary research question that the thesis asked was: ‘how did the practices of the stakeholders affect the ideas and outcomes for greater environmental sustainability at Aurora?’

The thesis responded to this question by reviewing the literature on innovation which was found to be contradictory and ‘consistently inconsistent’ (Wolfe 1994). Nevertheless, factors that are said to affect innovation were identified at the micro-, meso- and macro-levels. In response to the lack of a coherent theory of innovation (Crossan & Apaydin 2010) and in response to the question, can a theoretical model of innovation be developed that can account for the different types of innovation, in Chapter 4 a new model was developed. The model of recursive cultural adaptation (MORCA) reconceptualises Bourdieu’s habitus (1977) to address its determinism. The model was used to analyse the data that was collected for the research. Thirty-nine interviews and several
hundred documents formed the basis of the examination of the case-study, presented in Chapters 5, 6 and 7.

This chapter briefly reviews the extant literature in the light of the data that was examined by the three secondary questions regarding the vision, implementation and resistance to innovation for SUD. The limitations, future research and implications of the research are discussed.

8.2 The innovation literature

Chapter 3, examined the question, what is innovation, how does it happen and what are its effects? Although the literature suggests that there are a variety of factors that are implicated in the innovation process that traverse the micro-, meso- and the macro-levels, how these might relate to each other and how much effect they have is unknown. The review of these factors found that there is a lack of accepted theory that can account for the phenomenon of innovation (Crossan & Apaydin 2010). At the conclusion of this chapter I argue that apparent ‘contradictions and discrepancies’ found in the literature are resolved by defining innovation as the modification of an existing practice. This however, raises two questions. What is the nature of practice and what is necessary to transform it?

In the case of Aurora and the Eco-selector, the practices to be changed were those of the builders. These are the normative standards applied by the volume housing sector on Melbourne’s
fringe. These practices are enabled by macro–meso– and micro–level factors. The macro–level establishes the fundamental precepts that underpin land development in Melbourne. The possible practices, afforded by the history of colonisation discussed in Chapter 2 which examined the question, what are the historical underpinnings for contemporary land use practices? These are defined by particular property rights, exploitation of land and people and middle–class attempts to ameliorate the worst impacts that resulted from a quest for profit. This sets up a dialectic – between the pursuit of profit and attempting to ameliorate its worst effects – that defines the limits and opportunities for land use practice. Thus, answers to questions at this level regarding the nature of innovation – is it bounded (Harty 2005) or is it radical or discontinuous (Schumpeter 1934; 1939; Jørgensen, Boer & Laugen 2006; Brannan et al. 2008) – depend on the nature of the struggle engendered by the contradiction at the heart of land use at a particular point in time. Put simply, innovations that are profitable are likely to succeed while those that focus on interests of the exploited are less likely to. For example, the diffusion of information technologies is driven by profit and is, accordingly, rapid while the spread of environmental sustainability is fought for on a case–by–case basis such as with Aurora. Hence, the question of the role of the State (Landau & Rosenberg 1986; West 2001; Berry 2005; Griffiths & Zammuto 2005; Mahmood & Rufin 2005; Spencer, Murtha & Lenway 2005) is not simply empirical – should the State foster (Schumpeterian) innovation, that is involve itself with economic growth, or should it
regulate to mitigate against environmental and social exploitation. This is a political question regarding the appropriate use of the states resources and power. If creating environmental sustainability is critical then the State needs to use its power to regulate to ensure appropriate standards that define acceptable practice are set. The current 6-Star standards are a step in this direction. However, under current neo-liberal policy frameworks, further change is likely to be slow and possibly, may be rolled back by more conservative parliaments. Furthermore, the success and failings documented by the research demonstrate the spasmodic nature of change for environmental sustainability in this sector. As such, if substantial innovation is to occur then regulation is needed.

Nevertheless, the struggle for greater environmental sustainability continues, shifting international and local policy developments, including those in Victoria, to provide, for example, VicUrban and its predecessor, the URLC, with a mandate to lead the market towards SUD. However, macro-level conditions, in particular neo-liberal constraints that require governments to ‘fairly’ compete with business, mean that they have to operate within the constraints of standard business practice. This defines the way VicUrban has to conduct its business – the meso-level factors that it uses to deliver SUD.

The literature suggests a number of meso-level factors are implicated at this level in innovation. For example, networks clearly had a role in the development of Aurora and the Eco-selector. Work
on the projects involved a number of organisations and people. Furthermore, while the projects were being developed these relationships provided the impetus for the innovation agenda. However, those people that did not share the visions were not as supportive. For example, the URLC’s JL had to spend a lot of her time getting other stakeholders over the hurdles put in place by their own practice. In keeping with the findings of Dewick and Miozzo (2004), those organisations that had aligned practices – be they informally or formally defined (Marceau 1999) – were crucial for defining and driving the projects.

The question of leadership was not, as Schumpeter (1934) argues, simply a matter of having gifted and visionary entrepreneurs (or ecopreneurs) but was afforded by the URLC giving ‘permission’ for innovation for ESD to be explored and pursued. Thus, at an organisational level, the ULRC’s ‘proven’ history of leading the market by innovation was crucial for providing the circumstances under which Aurora could be conceived and developed. However, this leadership changed with the creation of VicUrban, irrevocably altering what the possible outcomes could be.

Pittaway et al. (2004) point out that innovation is inherently risky. In this case study, the risk, although created by the URLC and VicUrban innovating, was born by the builders. As such, it was not shared but defrayed. The builders ‘managed’ this in a clear-cut manner – 6 of the original 10 left the estate by 2009 – up to three years after the launch of Aurora. Their existing practices either were too important
to them to change or, as was the case of the smallest builder, the financial burden caused by the long development period was too great. As such, from VicUrban’s perspective, there was minimal risk. However, this was not the result of a strategy adopted to share risk; rather it was a result of how the industry is structured.

The final set of factors said to be important for innovation are those at the micro-level. Felin and Foss (2006) argue that the individual is the central factor in innovation and that rational choice theory should be the means by which theories of innovation should be constructed. There is no doubt that the development and implementation of Aurora and the Eco-selector were carried out by purposeful individuals. Furthermore, the resistance that these actors encountered was, likewise, the behaviour of particular actors. However, to believe that these people were motivated by rationally evaluating and choosing to act in particular ways is to ignore the effects of both the habitual and emotional aspects of self. The MORCA addresses these elements. It proposes that individuals are historically and socially constructed through the niche in which they find themselves. This is an evolutionary adaptation whereby culture, as practice, mediates the expression of life. Humans are not, as Felin and Foss argue, homo economicus nor are they homo sociologicus, fixed by the social world – the MORCA proposes that humans are homo utilitas – defined by and reproducers of practices that are useful and as such, valued. Furthermore, contemporary practices, as they are oriented towards ideas of biological evolution and social change as opposed to historically earlier fixed and stable
conceptions of life, seek ‘improvement’. Contemporary practices generate yearning rather than satisfaction – to compete is to want. This orientation sees people pursuing change to extend their practices. Thus, micro-level factors – competencies – are at the service of practice. Being entrepreneurial (Schumpeter 1934; 1939), creative (Glynn 1996), being open to new ideas and sustaining them (Ross 1974), as well as any other factor will be found in the process of innovation if it is useful for pursing an extension of practice.

Furthermore, a person’s power is critical for, as the URLC’s General Manager BM did, creating an opportunity for innovation to happen. Thus people’s roles, positions and self-definitions affect their ability to respond to innovation (Considine & Lewis 2007) as does their persuasiveness (Harrisson & Laberge 2002), ability to cooperate (Alves et al. 2007) and to collaborate (Kaltoft et al. 2006; Middel, Boer & Fisscher 2006) – all may be important, depending on their effectiveness. The point is not which of these is necessary in and of themselves, but how effective they are in situ. Context, thus, is a critical component of the innovation process. As such, it was the ‘right time’ for the URLC and VicUrban (Dudley 2005) and the organisation was certainly ‘ready’ (Holt et al. 2007). However, the same could not be said of the builders as an industry (Crabtree & Hes 2009) – the innovation of SUD agenda was not theirs. As for factors, such as the democracy of company’s culture (Coopey & Burgoyne 2000), the example of the URLC’s process of generating the vision indicates that this may not be as critical as providing people with the freedom to act. However, VicUrban’s managerial
approach demonstrated that underlying differences were disruptive rather than resolved – a democratic way of resolving these tensions may have produced better outcomes and may have also seen fewer people leave the organisation. It is this question of resolving political differences – conflicting practice – that Hargrave and Van de Ven (2006) consider. They find that frameworks need to be established to define the nature of the problems and their solutions. They argue that this facilitates the creation of networks of actors that can be mobilised. This proposition is supported by how, in the course of the dispute between VAFI and the CfD and VicUrban, both ‘sides’ marshalled support for their position in a bid to influence the outcome.

Politics links the macro– meso– and micro–levels of the case-study which, from the perspective of the MORCA, can be theorised as being practices that are vying for the right to do as one has previously done and to, when possible, modify one’s practice so that things are better or easier. Practices are expressed in heterogeneous social spaces – multiple practices can and do contest the same space. VicUrban, as did the URLC, afforded SUD. However, within VicUrban this was contested territory where differing practices vied for dominance. The ‘developers’ within the organisation did not agree with the breadth of change that was being proposed. This resistance, aligned with the normative precepts that maintain the status quo within the volume land and housing industries meant that the outcomes for Aurora varied. These examples show that practices vie for the same space. In the case of the rain gardens the
practices of water-sensitive urban design were not able to overcome the normative use of Australian suburban back yards. Furthermore, these norms were not defended by the prospective home buyers, but by the professionals – an inspector, builder and developer. Thus, practices, as the carriers and transmitters of norms, are not limited to particular types of atomised individuals but classes – those people that ‘know’ – through their own (shared) practice, what outer-suburban life is like.

The role of practice was central to understanding the innovation processes that were used to develop Aurora and the Eco-selector. These were explored through three secondary questions that examined how practices are used to create and maintain a vision, embed change and the nature of resistance affects innovation for SUD.

8.3 Research questions

8.3.1 The vision

The question how was a vision for Aurora and the Eco-selector created, modified, and what effect did this have on the initial planning and early implementation of project, was explored in Chapter 5, examined the process and role of creating visions for Aurora and the Eco-selector. The process was found to be a practice within the URLC that was periodically used to position it as a market leader. As such, this was not an idealised process whereby one or two individuals ‘decided’ that Aurora was simply a good idea, but the way the URLC conducted its business – it was time to
innovate for SUD because their previous ‘benchmark’ project, Roxburgh Park, was approaching completion. This practice – having the staff ‘doing their darndest’ to innovate – proved to be infectious. The URLC created an affordance – in terms of the MORCA, a zone of proximal development (ZPD) – an opportunity that was embraced by the consultants who eagerly developed a comprehensive list of features for the estate. This relationship – between practices and their context – was crucial not only for how the initial visions were created and developed but how they changed as a result of the URLC and MDA amalgamating in 2003 to create VicUrban. The new organisation’s vision was different and Aurora was recast to fit design-led and quantitative management practices. These changes were a function of the CEO determining particular policies and practices as well as being a response to the tensions within the organisation between the ‘developers’ and those pursuing the environmental sustainability agenda. As predicted by the MORCA, the multiple and contradictory practices within VicUrban vied for dominance. These affected the outcomes for Aurora and the Eco-selector.

As well as the relationships between managerial and professional practices of the URLC and VicUrban, there was a tendency to adhering to the normative rules of the industry. Other crucial practices were those of the builders who, while initially agreeing to participate in the development process, would have their own struggles regarding their adherence to existing practice, or its transformation through implementing innovations for SUD.
8.3.2 Embedding change

The next research question, what led to some changes for greater environmental sustainability being accommodated while others failed to materialise, revolved around the implementation of the innovations. Chapter 6 examined the affect of the innovation process on the builders – whose practices were the overt target of the reforms proposed by the URLC and in turn, VicUrban. It examined which innovations were successful and those that were not. Believing that Aurora and the Eco-selector were good ideas did not ensure that all of the original builders remained. Some left during the development phase and others after they had built and sold houses at the estate. Some encountered cost concerns caused by the longer than usual planning phase. However, more interestingly, there were internal organisational practices that hindered change, such as those of Devine Homes inability to deal with the question of verifying that they had used the materials specified by the Eco-selector. Furthermore, there were structural impediments, such as the privatising of building inspections that worked against setting up the verification system.

The implementation of the innovations varied. Nevertheless, consistent with the propositions of the MORCA, changes that fitted within existing practice were implemented. These included substituting materials that simply required ordering something different from a supplier. The majority of the materials listed in the Eco-selector fit this description and at this level, the tool was
successful. However, the MORCA proposes that changes that would require a significant shift in practice are not likely to be accepted. Again, consistent with the model, the environmentally sustainable Durra straw wall-panels were not used at Aurora even though they attracted high points in the Eco-selector. Other features, such as the rain gardens, also failed to be implemented partly due to entrenched practices, but also because of their perceived effect on suburban life – what a backyard ‘should’ be. Other features, like the solar booster panels, were inconsistently deployed. This was due to the decisions that were made that worked against providing the workers with standardised practices that could be used on any and all houses.

Interestingly, during the process of change – when a ZPD was active – creative solutions came to the fore. These included alternatives procedures for ensuring validation of the products specified and the installation of the Whirlybirds. However, although the merit of these solutions is questionable, this period of flux was also a time when most of the builders surpassed the 80-point target set by the Eco-selector by up to 65 per-cent. Nevertheless, this opportunity was not exploited and once the implementation of the tool became standard, the minimum requirements were adhered to.

8.3.3 Resistance to innovation

The final research question, what led to significant opposition to proposed change of practice, examined the issue of resistance to innovation. The MORCA proposes that practices that are
threatened engender resistance. Chapter 7 examined the ways in which the Victorian Association of Forest Industries (VAFI) responded to what they perceived as a threat to the practices of their members. This example is one in a history of disputes between this industry and individuals or organisations that they perceive to be ‘greenies’ – those who, timber industry representatives argue, are determined to stop all logging of Victorian native hardwood timbers. As such, a ready-made group of assumptions and theories were brought to bear on the genesis and legitimacy of the Eco-selector. This defensive response engendered defensiveness on the part of the CfD who sought to deflect the criticisms of VAFI. This example shows that resistance to innovation is not as Schumpeter (1934) suggested, a function of being path-dependant, but a political response engendered by a defence of practice – by both sets of protagonists.

It was not just the timber industry representatives who had pre-existing assumptions as to the nature of the politics of innovation for SUD. The expert panel members deliberately crafted the initial version of the tool – the flip chart – in a way that would minimise a political response. AP was aware that vested interests would not like what the tool was setting out to achieve. Had the educational aim of the tool been maintained the VAFI would not have been able to respond as they did. However, should the CfD had been able to keep the focus of the tool at the meso-level then its effectiveness would have, in all likelihood, been reduced. The tool needed to have a meso- or macro-level institutional affect to ensure the changes were implemented. The fact that the tool was not fully
successful was a function of the challenges, changes and attacks that it was subject to. These were political problems that were engendered by leaving ‘the market to decide’ on SUD rather than the State. The building companies that left the estate did so because there was an alternative to staying – the rest of the industry is not subject to the extra ‘boutique’ requirements of Aurora. Regulating for SUD means that such ‘exit strategies’ are not possible – practice must change.

The questions that were developed to understand innovation for SUD at Aurora deal with particular aspects of what was a comprehensive list of features (see Appendix 3). As such, the scope of the current study is necessarily partial. The next section explores the limitations, future research and implications of the findings.

8.4 Limitations, future research and implications

Although this study did not set out to go beyond the involvement and effect of stakeholders practices, some data came to light regarding the behaviour of the denizens of Aurora. It is their practices that are critical for achieving greater environmental sustainability. A post-occupancy study would be necessary to resolve this question.

This case-study is limited by several factors. First, VicUrban, as was its predecessors, are QANGOs. As such, they are not representative of the land development industry. Furthermore, qualitative research methods, such as those used herein, are necessarily narrow in their
focus; even if they provide ‘rich’ data. Only some of the builders were interviewed – others may have a different understanding of Aurora and the Eco-selector. Similarly, other stakeholders such as other consultants as well as the Premier of Victoria’s Office were not interviewed. Some data were not ‘first-hand’. For example, problems and successes with manufacturers have been identified, but representatives from these companies were not interviewed. As such, it is possible that the data are too narrow or specific to be generalisable.

The other weakness of the current study is the MORCA has only been evaluated by one case-study. Given the constraints mentioned above, this potentially limits its applicability. As such, the MORCA needs to be critically evaluated. There are assumptions that it makes that need to be questioned. For example, are practices as historical as suggested? A longitudinal study that tracks a practice over time could see if it is as stable as suggested by the model. The MORCA also proposes that there are different types of innovation – step-wise and quantum. The successful innovations at Aurora and those engendered by the Eco-selector were step-wise – shifts that fitted existing practices. As a result, the model has not been validated by an example of a radical innovation – where a shift in context was such that existing practice could not adapt requiring the development and implementation of a new one. The MORCA proposes that a practice that has undergone a cycle of innovation can, nevertheless, revert to an earlier version of the practice. As of mid-2010 the use of the Eco-selector to specify building materials has
stopped\textsuperscript{185}. What effect the discontinuation has had on the practices of builders that successfully used it is unknown. Have their practices been irrevocably modified or will they revert to their pre-Eco-selector state? The MORCA would suggest the latter, especially in light of the boutique nature of Aurora.

The central precept of the MORCA is that \textit{useful} practices define the nature of the current conditions of the land development and housing industries. Furthermore, innovation, by definition, is the modification of an existing practice – a disruption of business-as-usual – which may, depending on the habitus of the persons affected, be perceived and responded to either positively or negatively. Thus, there are several implications that can be derived from the model regarding innovation for SUD.

A proposed or actual change of practice is necessarily political unless all of the stakeholders concerned are in agreement. However, this is unlikely as practices are not universal – they are defined by multiple heterogeneous contexts. As such, developing formal and informal networks to collaborate on and support a proposal is important for generating sufficient pressure to overcome resistance. This requires a well articulated vision. Knowing ‘why’ and ‘what’ are necessary to motivate and direct the actors who have to pursue the change. As the implementation of an innovation can take a long time, it is vital that this vision is maintained. Actors may come and go. In particular, new actors need to understand why

\textsuperscript{185} Steven Peters, Development Manager – Environment, Project Planning & Innovation, VicUrban, Personal communication 28/4/2011
and what is being done, otherwise they may perceive the innovation as a nonsense or threat to their practice.

When an innovation is being developed and deployed – while a ZPD is active – there is a state of flux. The ‘rules’ are, at that time, suspended as people engage with their niche, not as aconsciously practitioners but as mindful agents. Setting the Eco-selector target at 80-points was arbitrary – as many such ‘rules’ are. However, before becoming a new rule, feedback from the experiences of those experimenting with the change can be used to renegotiate the desired outcomes. As well as being a time where greater gains can be made, transitional periods are also times of risk – if the CfD had considered the extent to which products like the Durra straw wall panels would radically alter the practices of volume house building, this product may not have been included in the Eco-selector. However, had the builders been protected from the risks associated with exploring and experimenting with this product it could start to be used in the volume housing sector. If radical innovation for environmental sustainability is to be sought then the risks inherent in innovating need to be shared. This means funding that is directed towards exploring the affects of potential innovation, rather than particular outcomes. It may be that what at first seems like a good idea does not result in the desired outcome. Failure needs to be acceptable. Thus, blanket calls for more R&D for innovation are misplaced. What is required is a focus on the role and adaptation of practice. As such, if the building assemblies and materials scorecard project, the potential successor to the Eco-
selector, is to eventuate, then the project will need funding and crucially, the people involved will need to create a well articulated, shared and maintained vision.

There are two particular competencies that are useful for innovating for SUD. The first is to see the problem of a lack of SUD as a social problem rather than an individual one. By viewing innovation as a question of modifying practice – what people do rather than what values they have – becomes the focus of investigation. Focusing on individual's values suggests strategies for change that rely on changing what they think rather than what they do. An example of this, examined in Section 6.4.1, was the home owner that sought advice regarding the use of Merbau timber for a deck. Educational material, directed towards changing her 'mind' – her values – proved fruitless. Such an 'educational' strategy leads one to conclude that they owner was either 'mad' or 'bad' – neither of which helps to engender SUD. To believe that SUD is a matter of values individualises change and risks an all too common moralising of the issue – there is some deficit in the person that needs correcting. This sort of strategy also begs the question, if SUD is dependent on changing people's values, then how, in a heterogeneous world is this to be achieved?

The second competency addresses the problem of aconsciousness or as psychologists call it, mindlessness (Langer 1989). The MORCA proposes that we attend to changes in our niche when a practice is disrupted. To be mindful is to develop strategies for attending to
small differences that would otherwise be ignored. These differences from what would otherwise be expected from following a rule exist as potential disruptions that fail to disturb the practice enough to engender awareness. Nevertheless, they are opportunities for change. To be mindful is to attend not only to potentials for change, but also to the fact that rules are often arbitrary – the crystallisation of an earlier ‘good enough’ but useful adaptations.

Finally, the MORCA sets up a new and comprehensive way to conceive of and address SUD by being a ‘fully-fledged social theory of innovation’ (Fairweather et al. 2009, p. 17). Furthermore, innovation is not merely the provenance of economics. It is the mechanism that humans use to modify and adapt to the niches in which they are embedded. The model shows how these niches are defined by macro-, meso- and micro-level factors. Practices are adaptations to the niches in which they are expressed. This offers a new way of conceptualising the agency/structure problematic. Niches are defined in part by social structures – they define the rules for the game. However, they are also defined by practiced agents that create and respond to affordances that arise through a change in a relationship. This evolutionary conceptualisation of practice is a comprehensive theory of not only innovation, but of stasis – practices that are stable are by definition holistic – a balance between the needs of the organism and its niche, which for humans includes the biosphere and sociosphere. This is why social justice is critical for a comprehensive response to unsustainability. Capitalism’s anarchic use of power has disturbed the ecology of the planet, we need to
democratise it and wield it so that we can again be sustainable, as
humans were for hundreds of thousands of years.
References


Insight 'City Limits' 2008, Television, SBS, Australia, 26/02/08.


Felin, T & Foss, N 2006, Individuals and Organizations: Thoughts on a Micro-Foundations Project for Strategic Management and Organizational Analysis, DRUID, Copenhagen Business School, Department of Industrial Economics and Strategy/Aalborg University, Department of Business Studies.


HIA Economics Group 2010, Small Business in the Construction Industry and Its Linkages with the Economy, Housing Industry Association, Campbell ACT.


Horder, J 1992, 'This Issue. Why Does Interprofessional Collaboration Matter?', *Journal of Interprofessional Care*, vol. 6, no. 2, pp. 94-5.


Housing Industry Association 2009a, *Submission by the Housing Industry Association to Planning the Adelaide We All Want: Progressing the 30 Year Plan for Greater Adelaide*.


James, W 1925, *Talks to Teachers on Psychology: And to Students on Some of Life’s Ideals*, Henry Holt and Company, New York.


Johns, CM, O'Reilly, PL & Inwood, GJ 2006, 'Intergovernmental Innovation and the Administrative State in Canada', *Governance*, vol. 19, no. 4, pp. 627-49.


Langer, EJ 1989, Mindfulness, Addison Wesley, Reading MA.


Mostert, NM 2007, 'Diversity of the Mind as the Key to Successful Creativity at Unilever', *Creativity and Innovation Management*, vol. 16, no. 1, pp. 93-100.


Appendix 1: Map locating Aurora (Melway 2009)
Appendix 2: Key dates for Aurora and Eco-Selector
2000 URLC decides to look for a site to build a showcase environmentally sustainable MPC

Late 2000 Land Purchase begins

Dec 2002 Materials selector mid-project report

Dec 2002 Draft flip-chart materials selector

Feb 2003 Materials workshop for Builders

July 2003 2nd Materials workshop for Builders

Aug 2003 merger takes effect between Docklands Authority and the Urban and Regional Land Corporation

June 2004 flip-chart transformed into the Eco-Selector and Eco-score card drafts - AFS and FSC certified timbers included as ‘approved’.

Feb 2005 Minister for Housing, Candy Broad suggest VAFI write to Minister for Major Projects, John Lenders regarding the Eco-Selector affecting the affordability of housing.

March 2005 meeting responding to the CfD’s selection criteria, VicForests and the Timber Promotion Council argue for the inclusion of Victorian Native Forest Timber in the Eco-Selector.

May 6 2005 VicForests and the Timber Promotion Council request that the Eco-Selector be amended to include ‘Victorian Native Forest Timber’

July 2005 The CfD writes to VicUrban responding to the VicForests/Timber Promotion Council submission noting that the submission does not resolve the issue of biodiversity to the satisfaction of some ENGO’s and scientists.

Aug 2005 VicUrban to DPI Victorian Forest Products are not banned, but their use is not considered best practice and is not recommended. The CfD is not of the view that the biodiversity issue is resolved by the documentation provided by the TPC.

Oct 2005 Australian ENGOs condemn the process of AFS certification.

Nov 2005 DPI meets with VicUrban and puts on the table the idea that the Eco-Selector should be amended to include ‘in progress towards certification’ for Victorian Timbers. Notes from the meeting prepared by DPI state ‘In closing, Mark summarised the outcomes of meeting: 1) that VicUrban agreed to include Victorian native forest timber in the Eco-Selector guide’.
Nov 2005  DPI raises lack of progress
Dec 2005  DPI provides VicUrban with documentation supporting the inclusion of Victorian timber because they were ‘in progress towards certification’ for AFS.  
2005/6  Devine Homes pulls out  
Feb 2006  DPI follows up Nov 2005 meeting  
Feb 2006  VAFI writes to the CfD noting their concern with the methodology used in the Eco-Selector  
Mar 2006  CfD says that the Wilderness Society supports neither a stepwise approach nor AFS certification, and that the majority of NGO’s support FSC.  Furthermore, while the WWF supports a step-wise approach in general, it does not support AFS, nor do the majority of ENGO’s.  Advises VicUrban not to endorse AFS.  
Aug 2006  DPI Secretary and VicUrban CEO meet to discuss getting ‘in progress towards certification’ for AFS  
Aug 2006  VicUrban, DPI, DSE & BC agree to independent review panel to assess the relative merits of AFS and FSC  
Sept 2006  CfD investigation of Eco-Selector going to 100 points - which is feasible but higher targets would necessitate a re-developing the tool  
Nov 2006  DPI follows up Aug 2006 meeting  
Oct 2006  VicUrban launches Aurora  
Dec 2006  VicForests are certified AFS  
Dec 2007  GBCA announces review of Timber Credit  
Jan 2008  VicUrban confirms that AFS and FSC are currently approved, but that they are awaiting the review of the GBCA timber credit.  
Nov 2009  GBCA Review finalised – AFS certification approved  
June 2010  Eco-selector phased out of Aurora and no longer used at other VicUrban estates
Appendix 3: Aurora list of features
<table>
<thead>
<tr>
<th>Environmental Sustainability</th>
<th>Lilac Pipe delivering Class A recycled water; Water Sensitive Urban design; Recycled water will allow access to irrigation water year round making Aurora less drought affected; Mandatory 6-star energy ratings; Sustainable building materials; Solar Orchards to be incorporated into open spaces to offset street-light electricity requirements; Community Power; Use of energy efficient street light globes; Builders mandated to provide energy and water efficient appliances within the home; Community waste recycling; Raingardens.</th>
</tr>
</thead>
<tbody>
<tr>
<td>New Urbanist Design</td>
<td>Most homes will be within 800m of local destinations (schools, community centres, local shops); All homes approximately 400m from a bus stop, and the majority of residents within 800m of retail centres and train station; Bike and footpath network; Walkable street design.</td>
</tr>
<tr>
<td>Reserves</td>
<td>Around 160 hectares of the development will be retained as public open space, including protected areas of environmental significance, local, neighbourhood and district parks; Habitat Conservation; Indigenous vegetation used in streetscape and park landscaping &amp; rejuvenation of flows to Edgars Creek; Recycled water will allow access to irrigation water year round making Aurora less drought affected; Local parks located approximately 200m from most dwellings; Neighbourhood parks located within 400 to 500m of the majority of dwellings.</td>
</tr>
<tr>
<td>Transport</td>
<td>Public Transport; Bike and footpath network.</td>
</tr>
<tr>
<td>-----------------</td>
<td>---------------------------------------------</td>
</tr>
<tr>
<td>Education</td>
<td>5 schools planned including public, Catholic primary and secondary; The first state primary school is planned to be open by 2008; The first Catholic primary school is also planned to be open in 2008; Nearby schools include Epping Primary School, Epping Secondary College, St Monica’s Catholic regional Secondary College.</td>
</tr>
<tr>
<td>Health</td>
<td>Nearby to the Northern Hospital.</td>
</tr>
<tr>
<td>Shopping</td>
<td>Epping plaza is 6 minutes from Aurora, although there are two mixed use town centres planned within the development.</td>
</tr>
<tr>
<td>Community facilities</td>
<td>Fibre to the Home to promote ultra-broadband connectivity with the development, wider community and globally; Community Intranet (Life Long Learning and Education); Heritage Values to be retained and valued where possible Community activity centres; Aurora Town Centres and Community Hubs; Economic benefits associated with energy efficiency and recycling initiatives.</td>
</tr>
<tr>
<td>Employment</td>
<td>Cooper Street Employment Precinct.</td>
</tr>
</tbody>
</table>

(Some features can be categorised across multiple groups)
Appendix 4: The Eco-selector
Introduction

The Eco-Selector is provided to assist builders and designers choose environmentally preferred materials to fulfill a component of the building controls for Aurora. The eco-selector is based on assessments made on the main impacts of the materials that make up a home. According to this analysis, the materials in this guide are minimising some aspect(s) of embodied energy, resource consumption, and toxicity and/or biodiversity impacts when compared to standard materials.

This guide demonstrates the availability of environmentally improved materials. It is not comprehensive and we invite manufacturers to submit other products for inclusion if they meet these criteria. Details should be faxed to the Centre for Design at RMIT University for assessment, on

(03) 9639 3412

October 2004
Disclaimer

The content of this Guide is provided for information only. The basis of the Guide is expert judgement supported by research.

The Centre for Design at RMIT University makes no claim as to the accuracy or authenticity of the content of this publication and does not accept liability to any person for the information or advice provided in this publication or incorporated into it by reference.

The Centre for Design does not accept any liability for loss or damages incurred as a result of reliance placed upon the content of this publication. The information is provided on the basis that all persons using this publication undertake responsibility for assessing the relevance and accuracy of its content.

Contact details for suppliers were current at the time of publication (March 2004.)
Guide for Builders

Overview

The purpose of this document is to assist builders and designers to comply with the materials requirements in the Design Controls for Aurora. A minimum number of 10 materials with a combined ‘ECO-Score’ of 80 points will need to be specified in order to have the building design approved by the Design Review Panel. A minimum number of points must be specified from each building element type:

- Floor structure – 20 points
- Framing – 10 points
- Wall cladding – 20 points
- Roof cladding – 15 points
- Fittings and finishes – 10 points
- Landscaping – 5 points.

The Guide’s main aim is to help architects, designers, builders and specifiers shortcut the materials sourcing process. Its broader aim is to help create a more sustainable physical environment by increasing the use of environmentally preferable materials.

Additional product information is available on the Eco-Specifier (www.ecospecifier.org) website. The site contains free information on 100 eco-preferable products or if you subscribe to the website, over 900 products become available. The Eco-Specifier has however created its list of products based upon a different set of criteria to the Eco-Materials Selector.
Guide for Builders

ECO-score card

Builders are required to complete the Eco-score card which accompanies this document. This will demonstrate how you have complied with the requirement for specification of environmentally-improved materials.

Invoices must be provided to VicUrban for confirmation that materials specified in the approved design drawings have been used in the actual building. Builders failing to do this will attract fines as set out in the Builder Agreement entered into with VicUrban.

Random checks will be carried out to ensure that builders are complying with the materials component of the design controls.

If substitution of materials is necessary due to supply chain difficulties, the substituted materials must have the same ECO-Score as the material it replaces. If this is not possible and the resultant total ECO-Score is less than the approved design, other materials must be specified from the Guide so that the house design’s total ECO-Score is still 80.

Please note: For credit to be given, the material has to be used for 90% of the building element involved.

Methodology

Materials have been included in the ECO-selector because they are minimising some aspect(s) of embodied energy, resource consumption, toxicity and biodiversity when compared to standard materials. Weightings have then been applied to material categories.

A. Highly recommended (high positive weighting):

A high positive weighting indicates that the product is highly recommended for the following reasons:

• Can significantly reduce environmental impacts
• Have little or no cost premium
• Fit with standard industry practice; and/or
• Are innovative, leading edge products.

B. Recommended (low positive weighting)

A low positive weighting indicates that these products also have potential to reduce environmental impacts and should be used wherever possible.

C. To be avoided if possible (negative weighting)

These products are widely recognised as having high environmental impacts and substitute materials are available.

Cost indicator

There is a column to give a general indication of the cost as compared to cost for standard product.

Less than the cost of a standard product

- Saves money
= Approximately equivalent to the cost of a standard product
+ Costs more than a standard product
Definitions

Approved timbers must meet one of the following criteria:

- Third party certified - Forest Stewardship Council or Australian Forestry Standard
- Plantation softwood or hardwood
- Recycled; or
- Bamboo. Builders must provide satisfactory documentary evidence from suppliers to support claims about third party certification, plantation-grown or recycled.

Approved insulation

Preference is for insulation that has some recycled content (e.g. recycled polyester) or is made from natural fibre or with a percentage of natural fibre. The main types are:

- Cellulose insulation (wet spray or coated)
- Cellulose-wool
- Recycled polyester batts
- Polyester batts
- Mineral wool batts
- Glasswool batts
(*sisalation needed)

For space-tight applications or where for other reasons these systems are not practical use:

- Air-cell thermal-reflective insulation
- Foil-board XPS rigid insulation
- Closed-cell rigid EPS insulation using no CFC blowing agents

As a general rule it is highly recommended to provide an air barrier between insulation products and the indoor environment to prevent migration by agents (such as formaldehydes) which may be irritants or allergens to sensitive individuals.

Embodyed energy is the amount of energy used in the raw material extraction, production of products and materials.

Passive Design is building design that addresses solar thermal considerations in order to reduce the need for mechanical heating or cooling.

Rainforest timber: for a list of rainforest timber species to avoid and their conservation status see either: www.cites.org or www.unep-wcmc.org

Recycled plastic products must meet the definition of ‘recycled’ in the Australian Standard for environmental claims (AS/NZS ISO 14021: 2000):

- It must be either pre-consumer recycled material which is material diverted from the waste stream during a manufacturing operation, or post-consumer recycled material which is recovered from households, commercial, industrial or institutional facilities.
- It excludes regrind which is capable of being recovered within the same process.

Thermal mass is the ability of a material to absorb heat. A lot of heat energy is required to change the temperature of high density materials like concrete, bricks and tiles. They are therefore said to have high thermal mass. Lightweight materials such as timber have low thermal mass.

Acronyms

<table>
<thead>
<tr>
<th>Acronym</th>
<th>Definition</th>
</tr>
</thead>
<tbody>
<tr>
<td>EE</td>
<td>Embodied energy</td>
</tr>
<tr>
<td>GJ</td>
<td>Gigajoule</td>
</tr>
<tr>
<td>VOC</td>
<td>Volatile organic Compounds</td>
</tr>
<tr>
<td>LOSP</td>
<td>Light Organic Solvent Preservative</td>
</tr>
<tr>
<td>CCA</td>
<td>Copper Chrome Arsenate</td>
</tr>
</tbody>
</table>
Floors Structure

The floor structure is a very important and essential part of a home. There are two types of floor structure systems: the ‘slab on ground’ and the suspended timber floor. Environmentally the issues with these systems are:

**Slab on ground:**
- Uses a lot of high embodied energy cement and steel
- Chemical termite protection leaches into the ground and contaminates it.
- By selecting the products in this chart you have the potential to reduce the Embodied Energy (EE) in the slab on ground system by more than half (i.e. from 1.4 GJ/m² to 0.6 GJ/m²). For a 150 m² home you are saving 95 GJ of energy or enough to power a home for over one year.

**Hints**
- 30% slag and/or fly ash in cement in most applications does not extend drying times
- Specify recycled aggregate to concrete suppliers
- Seek higher than 50% recycled/extender content cement—up to 90% can be achieved
- Insulate around slab edge and ensure compatibility with the termite protection system you are using
- Alcohol can be added to the top of the poured slab to help cure it and improve the dry time for high recycled content cement.

**Suspended timber floor:**
- Avoiding gluing of timber floors is recommended to enable recycling at end of life
- Chemical termite protection leaches into the ground and contaminates it
- Polyurethane pre-coat not as preferable as beeswax or nut oil coating.
- Requires substantial concrete for footings and extra bricks due to the extra building height
- Costs more energy to heat in winter (unless well-insulated) and requires more cooling in summer in Melbourne’s climate.

For the suspended timber floor by selecting plantation timbers you are reducing the potential impacts on biodiversity, and by selecting low EE concrete and bricks you will be reducing energy consumption and greenhouse emissions.

**Hints**
- Insulate under the floor
- Expose slab if you are using thermal mass for passive design

Please be aware also that formwork can contain hardwood rainforest timber often in a veneer over pine.
The following table is as a guide only. The concrete mix will depend on the engineering strength requirements of the design used. A mix can be designed with the following companies to suit your purposes.

<table>
<thead>
<tr>
<th>Element</th>
<th>Environment benefit</th>
<th>Product</th>
<th>Company contact</th>
<th>Cost</th>
<th>Score</th>
</tr>
</thead>
<tbody>
<tr>
<td>Slab on Ground</td>
<td>Concrete contains recycled aggregate and fly ash and slag. Reduced resource use and lower embodied energy. Reduced resource use and lower embodied energy cement due to use of recycled content. Contains up to 60% recycled aggregate (100% possible in some locations), 100% recycled water and up to 60% recycled content cement.</td>
<td>Green concrete</td>
<td>Boral</td>
<td>03 9508 7111</td>
<td>More than 50% recycled content cement may be + Recycled aggregate 10</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>% of recycled content and blended cement: 80% = 18</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>60% = 15</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Campbellfield Concrete</td>
<td>03 9357 3861</td>
<td>50% = 14</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>40% = 12</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>30% = 10</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Max score possible: 28</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Reduced resource use and lower embodied energy cement due to use of recycled content cement. Contains 100% recycled coarse aggregate, recycled content cement (fly ash) – whatever percentage specified by builder.</td>
<td>Concrete</td>
<td>Central Premix Concrete</td>
<td>03 9303 9112</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Reduced resource use and lower embodied energy cement due to use of recycled content. 100% recycled aggregate, 100% recycled water and recycled content slag cement as specified.</td>
<td>Concrete</td>
<td>Hansen Construction Materials</td>
<td>03 9274 3700</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Reduced resource use and lower embodied energy cement due to use of recycled content. 25% recycled aggregate, 100% recycled water and 30% recycled content fly ash cement.</td>
<td>Concrete</td>
<td>Hy Tec Industries</td>
<td>1300 550 499</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Reduced resource use and lower embodied energy cement due to use of recycled content. Contains up to 60% recycled content cement, 100% recycled aggregate, 100% recycled water, reduces waste as uses by product (pebbles).</td>
<td>Concrete</td>
<td>Ecomax</td>
<td>131 188</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Reduced resource use and lower embodied energy cement due to use of recycled content. Contains 100% recycled aggregate and 30% recycled content cement.</td>
<td>Ecomax</td>
<td>Readymix</td>
<td>131 188</td>
<td></td>
</tr>
</tbody>
</table>
Floors and Footings

The following table is as a guide only. The concrete mix will depend on the engineering strength requirements of the design used. A mix can be designed with the following companies to suit your purposes.

<table>
<thead>
<tr>
<th>Element</th>
<th>Environment benefit</th>
<th>Product</th>
<th>Company contact</th>
<th>Cost</th>
<th>Score</th>
</tr>
</thead>
<tbody>
<tr>
<td>Slab on Ground</td>
<td>Supplementary cementitious materials added (either fly ash, blast furnace slag, silica fume, or a combination of these). This reduces resource use and waste products and embodied energy. These additions can increase strength depending on % and application.</td>
<td>Slag Blend</td>
<td>Anacon laboratories (Pronto)</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>Blend 35 (35% slag)</td>
<td>03 9646 5520</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>Blended Cement (Blend of fly ash and slag up to 80%)</td>
<td>Cement Australia 03 9688 1920</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>Blended Cement concrete (up to 80%)</td>
<td>03 9676 0000</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Up to 40% slag/fly ash, or 10% silica fume. With 100% recycled aggregate</td>
<td>Supply powder:</td>
<td>Blue Circle 03 5241 8291</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>Slagment</td>
<td>Blue Circle 03 5241 8291</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>Triple Blend Fly ash</td>
<td>Blue Circle 03 5241 8291</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>Blended Cement</td>
<td>Blue Circle 03 5241 8291</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>Fly ash</td>
<td>Ash Development Association 02 4228 1389</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Fly ash Australia 02 9956 3861</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>Slag</td>
<td>Australian Steel Mill Services 02 4425 1000</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Australian Slag Association 02 4425 8466</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
## Floors and Footings

<table>
<thead>
<tr>
<th>Element</th>
<th>Environment benefit</th>
<th>Product</th>
<th>Company contact</th>
<th>Cost</th>
<th>Score</th>
</tr>
</thead>
<tbody>
<tr>
<td>Slab on Ground</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Recycled aggregate</td>
<td>Reduces raw material extraction by recycling. Can have variable strength quality. Check with supplier.</td>
<td>Recycled crushed concrete</td>
<td>Alex Fraser 03 9369 7388</td>
<td></td>
<td>10</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Boral 1300 650 564</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Fibre reinforcement in concrete</td>
<td>Alternative to steel reinforcement in concrete mix. Lower embodied energy.</td>
<td>BarChip Synthetic Reinforcing Fibre</td>
<td>Elastoplastic Concrete 03 9785 2055</td>
<td></td>
<td>1</td>
</tr>
<tr>
<td>Reinforcement</td>
<td>Reduces embodied energy and resource consumption by using up to 85% recycled content.</td>
<td>Mesh and bar products</td>
<td>One Steel 03 9357 8855</td>
<td></td>
<td>4</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Smorgons ARC 03 9279 5566</td>
<td></td>
<td>5</td>
</tr>
<tr>
<td></td>
<td>Reduces embodied energy and resource consumption by using 100% recycled content</td>
<td>Mesh and bar products</td>
<td>Vic Mesh 03 8795 6666</td>
<td></td>
<td>5</td>
</tr>
<tr>
<td>Chairs and mesh support</td>
<td>Reduces embodied energy and resource consumption by using over 50% recycled content.</td>
<td>Modfix reo chairs (100% recycled content)</td>
<td>Modfix 03 9586 7600</td>
<td></td>
<td>2</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Plastic reo support</td>
<td>Smorgons ARC 03 9279 5566</td>
<td></td>
<td>1</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Vic Mesh reo chairs (100% recycled content)</td>
<td>Vic Mesh 03 8795 6666</td>
<td></td>
<td>2</td>
</tr>
<tr>
<td>Membrane</td>
<td>Reduces embodied energy and resource consumption as has 100% recycled content</td>
<td>Slab membrane</td>
<td>Plastic Technology 03 9462 2011</td>
<td></td>
<td>1</td>
</tr>
<tr>
<td>Formwork</td>
<td>Less impact on biodiversity (no imported hardwoods)</td>
<td>Formply (hoop ply face)</td>
<td>Boral 03 9790 1790</td>
<td></td>
<td>5</td>
</tr>
<tr>
<td></td>
<td>Less impact on biodiversity (no imported hardwoods)</td>
<td>Formply (Radiata face)</td>
<td>Carter Holt Harvey 1800 335 293</td>
<td></td>
<td>5</td>
</tr>
<tr>
<td>Waffle pods</td>
<td>Reduced use of resources and use of waste material that would have gone to landfill otherwise</td>
<td>Used Tyres</td>
<td>Minibah Recycling 03 9799 6277</td>
<td></td>
<td>5</td>
</tr>
<tr>
<td></td>
<td>Resource use reduction and further reduction through a product made from recycled tyres</td>
<td>E-Pod concrete slab system</td>
<td>Ecoflex 02 4940 0178</td>
<td></td>
<td>5</td>
</tr>
<tr>
<td>Full waffle pod system</td>
<td>Reduced use of resources and use of waste material that would have gone to landfill otherwise</td>
<td>SlabTech system: Tyres System including reinforcement, membrane, etc</td>
<td>Neumann Steel 07 5589 9111</td>
<td></td>
<td>5</td>
</tr>
</tbody>
</table>
### Floors and Footings

**Slab on Ground**

<table>
<thead>
<tr>
<th>Element</th>
<th>Environment benefit</th>
<th>Product</th>
<th>Company contact</th>
<th>Cost</th>
<th>Score</th>
</tr>
</thead>
<tbody>
<tr>
<td>Waffle pods</td>
<td>Reduced use of resources (through the use of less concrete and sand in slab due to void formers)</td>
<td>One Slab</td>
<td>One Steel 03 9357 8855</td>
<td>=</td>
<td>2</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Polystyrene waffle pods (40% recycled content)</td>
<td>Foamex Manufacturing 03 9720 4200</td>
<td>=</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>Waffle pod slab system (polystyrene)</td>
<td>Relux Slabs 03 9509 9533</td>
<td>=</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>Polystyrene waffle pods</td>
<td>RMAX 03 9318 4422</td>
<td>=</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>Polystyrene waffle pods</td>
<td>Vic Mesh 03 8795 6666</td>
<td>=</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>ARC Pod (Polystyrene waffle pods &amp; beam spacers)</td>
<td>Smorgon Steel 131 557</td>
<td>=</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>Polystyrene waffle pods</td>
<td>Hunter Pod Supplies 02 4966 3959</td>
<td>=</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>Polystyrene waffle pods</td>
<td>The Waffle Pod People 02 9831 7762</td>
<td>=</td>
<td></td>
</tr>
</tbody>
</table>

**Suspended timber framed floor**

| Floors                    | Using plantation or recycled or FSC certified reduces impact on biodiversity | Radiata pine | Carter Holt Harvey 1800 335 293 | =    | 5     |
|                          | Using plantation, recycled or FSC certified reduces impact on biodiversity   | Radiata pine | Bunnings Building Supplies 03 9408 9100 | =    | 5     |
|                          | Using plantation timber reduces impact on biodiversity                        | Hoop Pine   | Hyne Wholesalers 07 4121 1211         | =    | 5     |
|                          | Imported timber from hardwood plantation in Brazil.                            | Lyptus      | Pine Solutions 132 321               | +    | 5     |
|                          | Imported plantation grown Sydney Blue Gum                                      | Lyptus      | Matthews Timber 02 9874 1666          | +    | 5     |

**Wood flooring and cladding**

| Wood flooring and cladding | Hard wearing and treated by environmentally preferred LOSPLOS P treated pine (rather than CCA treated) | The Pine Centre 03 9354 3665 | =    | 5     |

**Stumps**

| Stumps                  | Concrete stumps last longer, are naturally termite resistant and if recycled content cement used, has excellent environmental performance. | Concrete stumps | Various local suppliers | =    | 2     |

**Joists / bearers**

| Joists / bearers        | Composite I shaped beam which reduces resource use                            | Composite I beam with timber and steel | TecBeam 03 9794 8155 | =    | 5     |
|                        | Using plantation, recycled or FSC certified reduces impact on biodiversity    | Posi-STRUT                                  | Mitek P/L 03 9730 5555 | =    | 5     |
|                        | Using plantation, recycled or FSC certified reduces impact on biodiversity    | Posi-STRUT                                  | Gang Nail 03 9763 4444 | =    | 5     |
### Suspended timber framed floor

<table>
<thead>
<tr>
<th>Element</th>
<th>Environment benefit</th>
<th>Product</th>
<th>Company contact</th>
<th>Cost</th>
<th>Score</th>
</tr>
</thead>
<tbody>
<tr>
<td>Joists / bearers</td>
<td>Reduced biodiversity impact as products are plantation pine products with recycled content steel fittings. Company also recycles packaging.</td>
<td>Prefabricated Timber Wall Frames</td>
<td>Dahlsens 03 8831 8300</td>
<td>=</td>
<td>5</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Prefabricated Timber &amp; Steel Floor Trusses</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>Prefabricated Timber Floor Trusses</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>Prefabricated Roof Trusses</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Using plantation, recycled or FSC certified reduces impact on biodiversity however there can be low level emissions from the synthetic resins can be used in the production of LVL. Both products are designed to reduce resource consumption</td>
<td>I beam &amp; LVL.</td>
<td>Various suppliers</td>
<td>=</td>
<td>5</td>
<td></td>
</tr>
</tbody>
</table>

#### Termite protection

<table>
<thead>
<tr>
<th>Element</th>
<th>Environment benefit</th>
<th>Product</th>
<th>Company contact</th>
<th>Cost</th>
<th>Score</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Being a physical barrier there is reduced risk of chemical leaching, contamination and toxicity issues. Suitable for low allergen design.</td>
<td>Kordon termite barrier: Membrane with enclosed termiticide</td>
<td>Bayer Environmental Science - Kordon 1800 634 913 03 5336 0529</td>
<td>+ 5</td>
<td>5</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Stainless steel mesh around slab penetrations</td>
<td>Terminesh 08 9249 3868</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>Barrier to termite ingress</td>
<td>Granitgard 1800 032 549</td>
<td>+ 5</td>
<td>5</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Blockaid</td>
<td>Granitgard 1800 032 549</td>
<td>+ 5</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Being a physical barrier there is no chemical leaching, contamination and toxicity issues</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Being a physical barrier there is no chemical leaching, contamination and toxicity issues</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Brush on or gun in physical termite barrier. It is made from rubber modified bitumen and is water based and non toxic.</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
Framing

Almost all residential houses use either timber or steel for wall and roof framing. There are some environmental issues with both framing techniques.

Steel:
- Steel is very high in EE. Recycled content reduces this, although steel for house frames currently contains only a small proportion of recycled material.
- Steel is also less thermally efficient than timber, as steel can create a thermal bridge between internal and external elements, increasing heating and cooling energy use.
- On the positive side, steel is durable and recyclable at end-of-life.

Hints
- If you use steel ensure the detail of the roof and insulation deals with thermal bridging, eg strip of timber over the steel beam – if not this can reduce effectiveness of insulation by up to 30%.
- Use steel in structural situations only where plantation timber or composite elements are not suitable, i.e. long spans or when the timber member may be too deep dimensionally.

Timber:
- Timber framing can involve the use of non-plantation (i.e. biodiversity effecting) material.
- Timber has lower EE than steel.

Hints
- Ortech Industries’ Easiboard can be used to replace internal stud walls. It is not generally used in load bearing situations, and there can be issues with service access and finish. It has an extremely low EE, and walls can be erected cheaply and quickly.
- If you can use finger joined timber this allows you to use smaller pieces of wood and saves on resources.
- Specify recycled, plantation or third-party certified timbers
## Framing

<table>
<thead>
<tr>
<th>Element</th>
<th>Environment benefit</th>
<th>Product</th>
<th>Company contact</th>
<th>Cost</th>
<th>Score</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Steel framing</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>House Frame</td>
<td>High EE but durable, 20% recycled content and 100% recyclable</td>
<td>Steel house from ZINCALUME®</td>
<td>BlueScope Steel</td>
<td>5</td>
<td></td>
</tr>
<tr>
<td></td>
<td>High EE but durable and recyclable.</td>
<td>Steel house frame</td>
<td>Stratco Australia P/L</td>
<td>5</td>
<td></td>
</tr>
<tr>
<td>Thermal Spacer</td>
<td>Cuts energy and heat loss but is made from styrofoam</td>
<td>Deckmate thermal spacers</td>
<td>Aerodynamic Developments</td>
<td>5</td>
<td></td>
</tr>
<tr>
<td><strong>Timber Framing</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Studs, Noggins, Plates</td>
<td>This uses plantation timber, which is renewable and has less impact on biodiversity</td>
<td>MGP pine</td>
<td>All timber merchants</td>
<td>5</td>
<td></td>
</tr>
<tr>
<td>Beams</td>
<td>Resource reduction as this replaces standard beam with an 'I' shaped beam.</td>
<td>Hybeam made with Hyspan LVL</td>
<td>Futurebuild CHH</td>
<td>5</td>
<td></td>
</tr>
<tr>
<td>Structural framing</td>
<td>Plantation pine timber framing</td>
<td>Rhino Framing</td>
<td>Pine Solutions</td>
<td>5</td>
<td></td>
</tr>
<tr>
<td>Beams</td>
<td>Plantation pine timber</td>
<td>LVL Beams</td>
<td>Pine Solutions</td>
<td>5</td>
<td></td>
</tr>
<tr>
<td>Truss</td>
<td>Plantation pine timber</td>
<td>Truss</td>
<td>Bendigo Trusses</td>
<td>5</td>
<td></td>
</tr>
<tr>
<td>Various timber products</td>
<td>Plantation timber</td>
<td>CHH products</td>
<td>Bowens</td>
<td>5</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Plantation timber</td>
<td>Radiata pine</td>
<td>Peuker and Alexander</td>
<td>5</td>
<td></td>
</tr>
<tr>
<td><strong>Lintels</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Lintels</td>
<td>Uses recycled steel so lower resource</td>
<td>Steel lintel (Galintel)</td>
<td>Smorgons ARC</td>
<td>5</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Steel lintel Smorgons ARC use and EE</td>
<td>Galintel</td>
<td>McKerns Steel</td>
<td>5</td>
<td></td>
</tr>
<tr>
<td></td>
<td>This uses plantation timber, which is renewable and has less impact on biodiversity</td>
<td>Laminated Veneer Lumber</td>
<td>Carter Holt Harvey</td>
<td>5</td>
<td></td>
</tr>
<tr>
<td></td>
<td>This uses plantation timber, which is renewable and has less impact on biodiversity</td>
<td>MGP Pine</td>
<td>All timber merchants</td>
<td>5</td>
<td></td>
</tr>
<tr>
<td></td>
<td>This uses plantation timber, which is renewable and has less impact on biodiversity</td>
<td>Slash Pine</td>
<td>Hyne Wholesalers</td>
<td>5</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Plantation timber</td>
<td>Timberstrand LSL</td>
<td>Pine Solutions</td>
<td>5</td>
<td></td>
</tr>
<tr>
<td>Various timber products</td>
<td>Plantation timber</td>
<td>Radiata pine</td>
<td>Peuker and Alexander</td>
<td>5</td>
<td></td>
</tr>
</tbody>
</table>
Wall Cladding

The use of high EE products is discouraged, where possible, throughout the project. If they are designed to last a long time and to be very efficient this can offset the embodied energy. Environmental issues associated with cladding types:

**Bricks:**
- Fired clay bricks are very high in EE and their use as a cladding material should be minimised where possible.
- If you choose bricks from an efficient firing manufacturer, you can reduce the embodied energy from 10 – 25 GJ/1000 bricks to 5-5.5 GJ/1000 bricks.

**Hints**
- ✔ Using lime based mortars makes it easier to recycle at the end of life
- ✔ Buy pre scored bricks for more accurate splitting
- ✔ Store half bricks in one area for reuse
- ✔ Avoid use of raked mortar joint – use ironed or flush as this will make the wall last longer and stop moisture entering the wall
- ✔ Use second-hand or ‘seconds’ bricks where practicable
- ✔ Avoid using acid to wash bricks clean – use high pressure water instead
- ✔ Avoid painting brickwork

**Timber:**
- Suggested timber cladding, fibre cement sheet cladding and their derivative systems, considerably lower embodied energy if selected over brickwork.
- The main environmental issue is the impacts associated with harvesting timber from native forests.

**Rendered finishes:**
- Render finishes on a polystyrene substrate have some benefits, but at the expense of higher EE and reduced ability to recycle at end of life.
## Wall Cladding

<table>
<thead>
<tr>
<th>Element</th>
<th>Environment benefit</th>
<th>Product</th>
<th>Company contact</th>
<th>Cost</th>
<th>Score</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Insulation</strong></td>
<td></td>
<td></td>
<td></td>
<td>= 10</td>
<td></td>
</tr>
<tr>
<td>Thermal Spacer</td>
<td>Stops energy and heat loss but is made from styrofoam</td>
<td>Deckmate thermal spacers</td>
<td>Aerodynamic Development 1800 051 100</td>
<td>= 10</td>
<td></td>
</tr>
<tr>
<td>Bulk Insulation</td>
<td>100% recycled polyester</td>
<td>Thermowool batts</td>
<td>John Stubbs 03 9899 7876</td>
<td>= 10</td>
<td></td>
</tr>
<tr>
<td></td>
<td>100% recycled polyester</td>
<td>Insulation products made from wool or polyester</td>
<td>A&amp;A Discount Insulation 03 9315 6975</td>
<td>= 10</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Polyester and thermally efficient</td>
<td>Greenstuf-Autex</td>
<td>Available most hardware stores</td>
<td>= 10</td>
<td></td>
</tr>
<tr>
<td>Insulation</td>
<td>Low embodied energy due to recycled content</td>
<td>Polybat Insulation</td>
<td>Allied Woolmen Insulation Group Vic in 2004</td>
<td>= 10</td>
<td></td>
</tr>
<tr>
<td></td>
<td>National fibre, low emission</td>
<td>Higgins Jute Wall insulation</td>
<td>Higgins 03 97 444 102</td>
<td>= 10</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Stops energy and heat loss, significant recycled content</td>
<td>Glasswool Batt, blanket and noise board, foil insulation</td>
<td>Insulation Solutions 03 9797 1320</td>
<td>= 10</td>
<td></td>
</tr>
<tr>
<td>Wool batt</td>
<td>Non toxic</td>
<td>EcoBatt</td>
<td>4 Seasons Homes Insulation 1800 677 355</td>
<td>= 10</td>
<td></td>
</tr>
<tr>
<td>Insulation</td>
<td>Stops energy and heat loss</td>
<td>Various</td>
<td>Merino Insulation 1800 807 777</td>
<td>= 10</td>
<td></td>
</tr>
<tr>
<td>Glass wool insulation</td>
<td>Stops energy and heat loss</td>
<td>Glasswool thermal insulation pink batts</td>
<td>Tasman Insulation 03 9980 8900</td>
<td>= 10</td>
<td></td>
</tr>
<tr>
<td>Rock wool or glass wool insulation</td>
<td>Stops energy and heat loss</td>
<td>Bradford insulation</td>
<td>CSR Bradford 1800 023 380</td>
<td>= 10</td>
<td></td>
</tr>
</tbody>
</table>
## Wall Cladding

<table>
<thead>
<tr>
<th>Element</th>
<th>Environment benefit</th>
<th>Product</th>
<th>Company contact</th>
<th>Cost</th>
<th>Score</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Brick veneer</strong></td>
<td>100% Recycled plastic</td>
<td>Builder’s film</td>
<td>Plastic Technology 03 9546 2855</td>
<td>–</td>
<td>1</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Polyethylene Dampproof course</td>
<td>Cromfords 03 9397 3724</td>
<td>=</td>
<td>1</td>
</tr>
<tr>
<td><strong>Bricks</strong></td>
<td>Lower embodied energy compared to other bricks and efficient manufacturing process</td>
<td>Clay brick</td>
<td>Austral bricks (Nubrik) 03 9801 1122</td>
<td>=</td>
<td>15</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Boral Bricks 13 30 35</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Selkirk 03 9546 2855</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>PGH Bricks</td>
<td>CSR PGH 13 15 79</td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Concrete blocks</strong></td>
<td>Lower embodied energy than bricks and reduced amount of concrete used</td>
<td>AAC Hebel blocks</td>
<td>For distributors call CSR 1300 369 448</td>
<td>=</td>
<td>18</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>for first floor application with scaffold and jenny lift same or less cost to rendered and painted brickwork $5/m²</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Lowest embodied energy, about 1/8 of clay bricks</td>
<td>Concrete blockwork</td>
<td>C&amp;M 03 9305 3922</td>
<td>=</td>
<td>18</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>for first floor application with scaffold and jenny lift same or less cost to rendered and painted brickwork $5/m²</td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Recycled Bricks</strong></td>
<td>Reduced resource use through recycling and no chemicals used in cleaning process</td>
<td>Second hand and recycled bricks</td>
<td>Paddy’s Bricks 03 9687 2338</td>
<td>=</td>
<td>20</td>
</tr>
<tr>
<td><strong>Weather-board</strong></td>
<td>Less biodiversity impact and low resource consumption as it is recycled</td>
<td>Shiplap hardwood weatherboards in range of species</td>
<td>Shiver Me Timbers 03 9379 5993</td>
<td>=</td>
<td>15</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>* ask for recycled timber – company also supplies virgin timber</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Ply Sheet Cladding</td>
<td>Less biodiversity impact as it comes from a plantation</td>
<td>Ecopoly shadowclad</td>
<td>Carter Holt Harvey 1800 335 293</td>
<td>=</td>
</tr>
<tr>
<td></td>
<td>Weather-boards</td>
<td>Weatherboards coated with cement and sand but uses PVC fittings</td>
<td>Primeline weatherboards</td>
<td>James Hardie 131 103</td>
<td>=</td>
</tr>
<tr>
<td><strong>Steel Weatherboard cladding</strong></td>
<td>High EE but durable with 20% recycled content and 100% recyclable</td>
<td>Colourbond</td>
<td>BlueScope Steel 1800 022 999</td>
<td>=</td>
<td>5</td>
</tr>
</tbody>
</table>
## Wall Cladding

<table>
<thead>
<tr>
<th>Element</th>
<th>Environment benefit</th>
<th>Product</th>
<th>Company contact</th>
<th>Cost</th>
<th>Score</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Concrete and expanded polystyrene wall system</strong></td>
<td>High thermal performance due to insulating qualities. Need to specify high recycled content cement</td>
<td>THERMOMASS wall system</td>
<td>Composite systems 03 9824 8211</td>
<td>–</td>
<td>15</td>
</tr>
<tr>
<td></td>
<td>Insulative properties – high thermal mass. Need to specify high recycled content cement.</td>
<td>ICF Insulated concrete walling system with plastic formwork</td>
<td>ICF contracting 03 9846 4841</td>
<td>–</td>
<td>15</td>
</tr>
<tr>
<td><strong>Rendered wall system</strong></td>
<td>Good insulation qualities and resource efficient product – using Styrofoam and concrete</td>
<td>Unitex Thermal Wall System</td>
<td>Unitex 03 9706 5279</td>
<td>5</td>
<td></td>
</tr>
<tr>
<td><strong>Internal stud walls (nonload bearing)</strong></td>
<td>Low EE and a renewable material. Use of a waste product. Acoustic and thermal insulation properties.</td>
<td>Durras Panels</td>
<td>Ortech Industries 1800 805 919 03 9580 7766</td>
<td>–</td>
<td>5</td>
</tr>
<tr>
<td><strong>Steel wall cladding</strong></td>
<td>High EE but durable with 20% recycled content and 100% recyclable</td>
<td>Wall cladding made from COLORBOND® steel</td>
<td>BlueScope Steel 1800 022 999</td>
<td>5</td>
<td></td>
</tr>
<tr>
<td><strong>Fibre Cement Sheet</strong></td>
<td>Low EE and resource use reduction</td>
<td>Harditex</td>
<td>James Hardie 131 103</td>
<td>10</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>Linea</td>
<td>James Hardie 131 103</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>Primeline</td>
<td>James Hardie 131 103</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Lower EE and good energy efficiency.</td>
<td>James Hardie vertical cladding</td>
<td>James Hardie 131 103</td>
<td>12</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Low EE and resource use reduction. There is PVC in it.</td>
<td>Texturebase sheet</td>
<td>CSR 02 9844 7935</td>
<td>–</td>
<td>10</td>
</tr>
<tr>
<td></td>
<td>High emissions. Better insulating, is rendered so has higher EE.</td>
<td>Maclad System</td>
<td>Melbourne Acrylic Coatings 03 9558 5568</td>
<td>–</td>
<td>10</td>
</tr>
<tr>
<td><strong>Rendered wall system</strong></td>
<td>Lower EE than brick and masonry walls.</td>
<td>Rendaline</td>
<td>CSR 02 9844 7935</td>
<td>+</td>
<td>1</td>
</tr>
<tr>
<td></td>
<td></td>
<td>CMX wall system</td>
<td>James Hardie 131 103</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>Rendered wall cladding system</td>
<td>GRN Wallboards 03 9314 9966</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
Roof Cladding

There is very little environmental difference between sheet metal roofing and concrete tiles. The decision will depend on design issues.

The environmental issues are:

Steel Roofing:

- High embodied energy, but low maintenance and light weight (less supporting structure and transport), help to reduce its impact
- High recyclability at end of life

Tile Roofing:

- High embodied energy unless using concrete tiles;
- Industry standard for battens is hardwood (biodiversity impact)

Hints

✓ Use light colours for roofing to improve passive thermal comfort
✓ It is important to ventilate roof spaces if using dark coloured roofing
✓ If using tiles, select concrete tiles in preference to fired terracotta, for lower Embodied Energy
✓ Encourage alternatives to hardwood battens, especially for tile roofs
✓ Ensure compatibility with capture and use of rainwater – including design of gutters to limit leaf litter build-up and design of roof to minimise pipework to tank
## Roof Cladding

<table>
<thead>
<tr>
<th>Element</th>
<th>Environment benefit</th>
<th>Product</th>
<th>Company contact</th>
<th>Cost</th>
<th>Score</th>
</tr>
</thead>
<tbody>
<tr>
<td>Insulation</td>
<td></td>
<td>Bulk insulation</td>
<td>John Stubbs</td>
<td>03 9899 7876</td>
<td>=</td>
</tr>
<tr>
<td></td>
<td>100% recycled polyester</td>
<td>Thermowool batts</td>
<td>A&amp;A Discount Insulation</td>
<td>03 9315 6975</td>
<td>-</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Insulation products made from wool or polyester</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Polyester and thermally efficient</td>
<td>Greenstuf - Autex</td>
<td>Available most hardware stores</td>
<td></td>
<td>=</td>
</tr>
<tr>
<td>Insulation</td>
<td>Lower embodied energy due to recycled content</td>
<td>Polybat Insulation</td>
<td>Allied Woolmen Insulation Group</td>
<td>07 4948 1187</td>
<td>=</td>
</tr>
<tr>
<td>Insulation batt and blanket</td>
<td>Stops energy and heat loss</td>
<td>Glasswool Batt &amp; Blanket</td>
<td>Insulation Solutions</td>
<td>03 9797 1320</td>
<td>=</td>
</tr>
<tr>
<td>Insulation batt</td>
<td>Natural fibre, up to R2.5, fire retardant, requires no special fixing – standard screws</td>
<td>Higgins Jute Ecoblanket</td>
<td>Higgins</td>
<td>03 9744 4102</td>
<td>=</td>
</tr>
<tr>
<td>Wool batt</td>
<td>Non toxic, natural fibre</td>
<td>EcoBatt</td>
<td>4 Seasons Home Insulation</td>
<td>1800 677 355</td>
<td>=</td>
</tr>
<tr>
<td>Aircell insulation</td>
<td>Appropriate for smaller spaces</td>
<td>Aircell Insulation</td>
<td>Aircell Insulation</td>
<td>07 4155 1600</td>
<td>+</td>
</tr>
<tr>
<td>Insulation</td>
<td>Stops energy and heat loss</td>
<td>Various</td>
<td>Merino Insulation</td>
<td>1800 807 777</td>
<td>=</td>
</tr>
<tr>
<td>Glass wool insulation</td>
<td>Stops energy and heat loss</td>
<td>Glasswool thermal insulation pink batts</td>
<td>Tasman Insulation</td>
<td>03 9580 8900</td>
<td>=</td>
</tr>
<tr>
<td>Rock wool or glass wool</td>
<td>Stops energy and heat loss</td>
<td>Bradford insulation</td>
<td>CSR Bradford</td>
<td>1800 023 380</td>
<td>=</td>
</tr>
<tr>
<td>insulation</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
## Roof Cladding

<table>
<thead>
<tr>
<th>Element</th>
<th>Environment benefit</th>
<th>Product</th>
<th>Company contact</th>
<th>Cost</th>
<th>Score</th>
</tr>
</thead>
<tbody>
<tr>
<td>Cover for ceiling exhaust fans</td>
<td>Improves energy efficiency through self closing cover for exhaust fans. Recyclable. Saves up to 30% on heating and cooling costs</td>
<td>Draft Stoppa</td>
<td>Advantec SAM 02 6056 2822</td>
<td>= 5</td>
<td></td>
</tr>
<tr>
<td>Roof vent</td>
<td>Allows the roof space to cool reducing cost of cooling house</td>
<td>Acrylic Tilevent and Tilelite</td>
<td>AC Acrylic 03 9499 1282</td>
<td>= (30% trade price) 5</td>
<td></td>
</tr>
<tr>
<td>Concrete Tiles</td>
<td>Lower EE than baked tile but sealants can be toxic</td>
<td>Concrete tile</td>
<td>Various suppliers</td>
<td>= 5</td>
<td></td>
</tr>
<tr>
<td>Roof Tiles</td>
<td>High recycled content cement (80% slag) and lower EE than baked tile but sealants can be toxic</td>
<td>Concrete tile with recycled content cement</td>
<td>Alice Roof Tiles 03 5367 6212</td>
<td>= 10</td>
<td></td>
</tr>
<tr>
<td>Steel Roofing</td>
<td>Lower EE than baked tile, less material needed. Locally manufactured, 20% recycled content, 100% recyclable.</td>
<td>Zinc aluminium or colour coated steel</td>
<td>Various suppliers</td>
<td>= 5</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Roofing made from COLORBOND ® or ZINCALUME ® steel</td>
<td>BlueScope Steel 1800 022 999</td>
<td>= 5</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Roofing made from COLORBOND ® or ZINCALUME ® steel</td>
<td>BlueScope Steel 1800 022 999</td>
<td>= 5</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
Fittings and Finishes

Paint and joinery products are major causes of toxicity leading to poor indoor air quality. Where possible, alternatives have been suggested that produce less or no toxic emissions while still satisfying environmental and cost criteria. Environmental issues associated with fittings and finishes:

**Woods:**
- Formaldehyde emissions from MDF, plywood and particleboard are major contributors to airborne toxins in homes, although this off-gassing does diminish with time.
- Where possible, these materials may be sealed to reduce emissions, though this benefit only lasts as long as the seal remains intact.

**Hints**
- ✓ Low emission MDF options and alternatives are available.
- ✓ Use whole woods wherever possible.

**Finishes:**
- Oil based finishes will give off VOC emissions. This will affect the applier more than the home owner as it mostly dissipates in 1 – 6 months.
- Chemically sensitive people will be affected longer.
- Use natural oils or beeswax rather than products containing solvents or synthetics.
- Simple non-toxic finishes may be used to seal interior and many exterior woods.
- Acrylic render systems and non-toxic, durable paints for external walls are widely available and used in the industry. Many options are listed.

Rule of Thumb – the priority is to use mechanical fixings and minimise painting, then water-based finishes, glues, adhesives and paint where possible.

**Insulation:**
- The important thing is to use the right R value insulation.

**Hints**
- ✓ Make sure your insulation covers the space entirely
- ✓ Insulate roof right up to the edge of the ceiling (but stop insulation contacting the roof). A combination of foil under the roofing material with an airspace below it and bulk insulation on the ceiling works very well in Melbourne.
### Fittings and Finishes

<table>
<thead>
<tr>
<th>Element</th>
<th>Environment benefit</th>
<th>Product</th>
<th>Company contact</th>
<th>Cost</th>
<th>Score</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>External Paint</strong></td>
<td></td>
<td></td>
<td></td>
<td>+</td>
<td>6</td>
</tr>
<tr>
<td>Paint</td>
<td>Lower toxicity and less emissions. Very durable</td>
<td>Granital mineral paint</td>
<td>Keim distributor 02 9211 6644</td>
<td>+</td>
<td>6</td>
</tr>
<tr>
<td></td>
<td>Lower toxicity, less emissions. Plant and mineral based paint</td>
<td>BIO Paints Wall paint</td>
<td>Energy and Water Solutions 02 9519 0433</td>
<td>+</td>
<td>6</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Going Solar 03 9348 1000</td>
<td>+</td>
<td></td>
</tr>
<tr>
<td>Water-based paint</td>
<td>Lower toxicity, less emissions, water based less EE</td>
<td>Taubmans</td>
<td>Bristol 03 9518 0700</td>
<td>+</td>
<td>6</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Maxishield</td>
<td>Haymes 1800 033 431</td>
<td>=</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>Solashield</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>Murowash and Pentimento (limewash)</td>
<td>Murobond 02 9906 7299</td>
<td>=</td>
<td></td>
</tr>
<tr>
<td>Render</td>
<td>Lower toxicity less emissions, water based less EE</td>
<td>Acrylic Render</td>
<td>Dulux 132 377</td>
<td>+</td>
<td>6</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Granosite</td>
<td>Wattyl 132 101</td>
<td>+</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>Cement based and coloured renders</td>
<td>Rockcote 1800 267 737</td>
<td>+</td>
<td></td>
</tr>
<tr>
<td>Finish for brick, masonry, concrete and fibre cement</td>
<td>Acrylic paint, durable</td>
<td>Taubmans Outdoor Colour range Look and feel of render</td>
<td>Taubmans 131 686</td>
<td>+</td>
<td>6</td>
</tr>
<tr>
<td>Timber finish</td>
<td>Lower toxicity and less emissions. Stain needs reapplication</td>
<td>Organoil</td>
<td>Mitre 10 Advice line 136 310</td>
<td>+</td>
<td>6</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Bunnings Building Supplies – Epping 03 9408 9100</td>
<td>+</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>Uvex Exterior Timber Finish</td>
<td>Haymes 1800 033 431</td>
<td>+</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>Woodguard</td>
<td>Evergard Industries 03 9762 9588</td>
<td>+</td>
<td></td>
</tr>
<tr>
<td>Timber finish</td>
<td>Lower toxicity and less emissions. Very durable</td>
<td>Woodman’s specialised timber coatings</td>
<td>Victorian distributor 03 9762 9588</td>
<td>+</td>
<td>6</td>
</tr>
</tbody>
</table>
## Internal Paint

<table>
<thead>
<tr>
<th>Element</th>
<th>Environment benefit</th>
<th>Product</th>
<th>Company contact</th>
<th>Cost</th>
<th>Score</th>
</tr>
</thead>
<tbody>
<tr>
<td>Paints</td>
<td>Low toxicity paint, low emission</td>
<td>Range of limewash, acrylic, milk, mineral and silicate paints</td>
<td>Porters Paints 1800 656 664</td>
<td>+</td>
<td>6</td>
</tr>
<tr>
<td></td>
<td>i.d range: untinted = 99.7% VOC free</td>
<td>Wattyl 132 101</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Lower toxicity less emissions, water based paint</td>
<td>Breatheasy</td>
<td>Dulux 132 377</td>
<td>+</td>
<td>6</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Taubmans Bristol 03 9518 0700</td>
<td>+</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>Dubron Livos Australia 02 4782 9009</td>
<td>+</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>EcoStyle Rockcote 03 9308 7233</td>
<td>+</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>Ecosil Keim distributor 02 9211 6644</td>
<td>+</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>Organoil Mitre 10 Advice line 136 310</td>
<td>+</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>BIO Paints Going Solar 03 9348 1000</td>
<td>+</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>Auro paints Going Solar 03 9348 1000</td>
<td>+</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>Maxi Wash Solver Paints 03 9484 6100 (distributor Preston)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>Acrylic Trim Haymes 1800 033 431</td>
<td>+</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>Easy Washable Silk, Ceiling White, Acrylic sealer undercoat Haymes 1800 033 431</td>
<td>=</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Low toxicity paint Okos acrylic paints Oikos distributors 1300 303 802</td>
<td>+</td>
<td>6</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Low toxicity paint Acrylic paints Wattyl 132 101</td>
<td>6</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

## Timber and wood products

<table>
<thead>
<tr>
<th>Element</th>
<th>Environment benefit</th>
<th>Product</th>
<th>Company contact</th>
<th>Cost</th>
<th>Score</th>
</tr>
</thead>
<tbody>
<tr>
<td>Particalboard flooring</td>
<td>Pine plantation timber</td>
<td></td>
<td>D&amp;R Henderson 03 9768 3320</td>
<td>−</td>
<td>5</td>
</tr>
<tr>
<td>Floors</td>
<td>Plantation but transport distance is a negative impact</td>
<td>Hardwood (Oak, Oak Rustic, Mahogany Beech, Jarrah, Ash, Beech, and Nordic White)</td>
<td>Swedish company Tarkett 03 9764 1711</td>
<td>+</td>
<td>2</td>
</tr>
</tbody>
</table>
## Fittings and Finishes

<table>
<thead>
<tr>
<th>Element</th>
<th>Environment benefit</th>
<th>Product</th>
<th>Company contact</th>
<th>Cost</th>
<th>Score</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Timber and wood products</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Floors</td>
<td>Re-milled hardwood timber which is recycled and salvaged wood</td>
<td>Hardwood in range of species</td>
<td>Shiver Me Timbers 03 9397 5993 * ask for recycled timber – company also supplies virgin timber</td>
<td>-</td>
<td>5</td>
</tr>
<tr>
<td>100% recycled hardwood timber</td>
<td>Hardwood tongue and groove flooring</td>
<td>Nullarbor Forest Timber Industries 03 9484 9215</td>
<td>=</td>
<td>15</td>
<td></td>
</tr>
<tr>
<td>Regenerates quickly, as strong as hardwood</td>
<td>Bamboo</td>
<td>BT bamboo distributor: Riband floors 03 9888 5635</td>
<td>=</td>
<td>5</td>
<td></td>
</tr>
<tr>
<td>Regenerates quickly, as strong as hardwood</td>
<td>Bamboo</td>
<td>Living Choice Group 03 9546 6115</td>
<td>=</td>
<td>5</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Bamboo</td>
<td>Bamboo Australia 07 5447 0299</td>
<td>=</td>
<td>5</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>Style Plantation 08 9244 8888</td>
<td>=</td>
<td>5</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>Bamboo Floors Australia 1800 042 150</td>
<td>=</td>
<td>5</td>
<td></td>
</tr>
<tr>
<td>Regenerates quickly, as strong as hardwood</td>
<td>Bamboo (imported)</td>
<td>PlyBoo (USA company) <a href="mailto:PLYBOO@aol.com">PLYBOO@aol.com</a></td>
<td>+</td>
<td>5</td>
<td></td>
</tr>
<tr>
<td>Regrows quickly, as strong as hardwood. Laminate improves water resistance.</td>
<td>UPI Bamboo Flooring</td>
<td>Universal Polymers Australia 08 8241 7890</td>
<td>*</td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Lining</strong></td>
<td>Imported Forest Stewardship Council Plywood and Blockboard</td>
<td>E1 EcoCore Plywood and EcoCore Blockboard</td>
<td>Ecocore 02 9652 0187</td>
<td>=</td>
<td>3</td>
</tr>
<tr>
<td><strong>Timber and wood products</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Various timber applications</td>
<td>Independently third party verified plantation Vic Ash – lower biodiversity impacts</td>
<td>VicAsh FSC certified</td>
<td>Hancock, Druin West 03 5134 4377</td>
<td>=</td>
<td>5</td>
</tr>
<tr>
<td>Board and Ply</td>
<td>Exceeds Industry standard low emission and plantation timber</td>
<td>E0 board and Ply</td>
<td>Brims Wood Panels 03 9763 6700</td>
<td>=</td>
<td>5</td>
</tr>
<tr>
<td>MDF</td>
<td>Exceeds Industry standard low emission and plantation timber</td>
<td>E0 Alpine MDF – export only but could change with increased demand</td>
<td>Alpine MDF Industries 03 9663 5833</td>
<td>+</td>
<td>5</td>
</tr>
<tr>
<td>Hoop pine plywood</td>
<td>Plantation timber and low emission</td>
<td>Board and ply</td>
<td>Carter Holt Harvey 1800 335 293</td>
<td>3</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Brims Wood Panels 03 9763 6700</td>
<td>3</td>
<td></td>
</tr>
<tr>
<td>Pine particleboard</td>
<td>Pine plantation timber</td>
<td>Particleboard</td>
<td>D&amp;R Henderson 03 9768 3320</td>
<td>=</td>
<td>3</td>
</tr>
</tbody>
</table>
### Fittings and Finishes

<table>
<thead>
<tr>
<th>Element</th>
<th>Environment benefit</th>
<th>Product</th>
<th>Company contact</th>
<th>Cost</th>
<th>Score</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Varnish - interior</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Varnish</td>
<td>Low toxicity and therefore lower emission</td>
<td>BIO Varnish – Floor or All Purpose</td>
<td>Energy and Water Solutions 02 9519 0433</td>
<td>=</td>
<td>5</td>
</tr>
<tr>
<td></td>
<td></td>
<td>BIO Paints Varnish</td>
<td>Going Solar 03 9348 1000</td>
<td>=</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>Auro Varnish</td>
<td>Going Solar 03 9348 1000</td>
<td>=</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>Estapol water based wood varnish</td>
<td>Wattyl 132 101</td>
<td>=</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>Simply Woodcare Aqualac stain &amp; varnish</td>
<td>Haymes Paint 1800 033 431</td>
<td>=</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>Water based varnish</td>
<td>Bristol stores stock Feast Watson, Cabots, Intergrain</td>
<td>=</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>Water based varnish</td>
<td>Evergard Industries 03 9762 9588</td>
<td>=</td>
<td></td>
</tr>
<tr>
<td><strong>Plumbing</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Pipes</td>
<td>100% Recycled content</td>
<td>Polypropylene Stormwater Downpipe</td>
<td>PPI Corporation 03 9791 3700</td>
<td>+</td>
<td>3</td>
</tr>
<tr>
<td></td>
<td>49% Recycled content</td>
<td>Series 2000 Drainage Pipe</td>
<td>Hepworth Drainage 03 9874 0303</td>
<td>+</td>
<td>3</td>
</tr>
<tr>
<td></td>
<td>Lower embodied energy and toxicity, HDPE content</td>
<td>All water pipes</td>
<td>Reece 03 9347 4433</td>
<td>+</td>
<td>3</td>
</tr>
<tr>
<td></td>
<td>Recycled content, HDPE content</td>
<td>Flat pipe drainage system</td>
<td>Geofabrics 03 8586 9111</td>
<td>=</td>
<td>3</td>
</tr>
<tr>
<td></td>
<td>100% Recycled content HDPE content</td>
<td>The Green Pipe (ag pipe)</td>
<td>Recycled Plastic Technology 03 5480 7060</td>
<td>–</td>
<td>5</td>
</tr>
<tr>
<td></td>
<td>High recycled content HDPE pipe</td>
<td>Speckled pipe (alternative to Class2 concrete pipe)</td>
<td>Recycled Plastic Pipe 03 9804 7164</td>
<td>–</td>
<td>5</td>
</tr>
<tr>
<td></td>
<td>Recyclable HDPE content pipes</td>
<td>Iplex Wavin Drainage pipes</td>
<td>Iplex available from all plumbing centres</td>
<td>+</td>
<td>3</td>
</tr>
</tbody>
</table>
### Fittings and Finishes

<table>
<thead>
<tr>
<th>Element</th>
<th>Environment benefit</th>
<th>Product</th>
<th>Company contact</th>
<th>Cost</th>
<th>Score</th>
</tr>
</thead>
<tbody>
<tr>
<td>Plumbing</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Pipes</td>
<td>Recyclable PP content pipes</td>
<td>Black Max range</td>
<td>Iplex available from all plumbing centres</td>
<td>+3</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Recyclable polybutylene content storm water pipe</td>
<td>Stormwater pipe, Pro-Fit hot and cold</td>
<td>Iplex available from all plumbing centres</td>
<td>+3</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Recyclable PE content pipe</td>
<td>Pro-Fit hot and cold</td>
<td>Iplex available from all plumbing centres</td>
<td>+3</td>
<td></td>
</tr>
<tr>
<td></td>
<td>HDPE content pipe</td>
<td>RAUDRIL PE drainage pipe</td>
<td>Rehau 03 9587 5544</td>
<td>+3</td>
<td></td>
</tr>
<tr>
<td></td>
<td>PP content pipe</td>
<td>REHAU HT – PP Wastewater System</td>
<td>Rehau 03 9587 5544</td>
<td>+3</td>
<td></td>
</tr>
<tr>
<td></td>
<td>HDPE, PE and PP content</td>
<td>Various products</td>
<td>Bruce Peacock Plumbing 03 9772 4889</td>
<td>+3</td>
<td></td>
</tr>
<tr>
<td>Openings</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Windows (Aluminium)</td>
<td>Uses recycled aluminium</td>
<td>Windows</td>
<td>G James Glass &amp; Aluminium Pty, 03 9219 2077</td>
<td>=3</td>
<td></td>
</tr>
<tr>
<td>Windows (Timber)</td>
<td>Efficient resource use and energy efficient double glazed windows; wood sourced from pine plantations (Primex product only)</td>
<td>Energy rated Primex timber windows, Primex is treated with LOSP and can’t be stained,</td>
<td>Primex – Canterbury Windows 03 9558 5222</td>
<td>=5</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Efficient resource use</td>
<td>Windows</td>
<td>Pickering Joinery 03 5243 4166</td>
<td>=3</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Energy efficient</td>
<td>Tyrol tilt &amp; turn double glazed windows</td>
<td>Paarhammer 03 5368 1999</td>
<td>=5</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Recycled windows</td>
<td>Windows</td>
<td>Woodhill Timber Windows and Joinery 02 4228 8899</td>
<td>=5</td>
<td></td>
</tr>
<tr>
<td>Windows (Aluminium)</td>
<td>Recycled plantation rubber and 15-20% recycled aluminium content</td>
<td>Windows</td>
<td>Geelong Windows 03 5278 5511</td>
<td>=3</td>
<td></td>
</tr>
<tr>
<td>Windows (Aluminium)</td>
<td>Aluminium frame with recycled content, pre-primed and energy efficient glass</td>
<td>Sliding window</td>
<td>A &amp; L Windows 03 8786 0000</td>
<td>=3</td>
<td></td>
</tr>
</tbody>
</table>
### Fittings and Finishes

<table>
<thead>
<tr>
<th>Element</th>
<th>Environment benefit</th>
<th>Product</th>
<th>Company contact</th>
<th>Cost</th>
<th>Score</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Doors</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>External doors</td>
<td>Plantation timber used for frame instead of rainforest timber</td>
<td>Madison range only</td>
<td>Corinthian Doors 03 9794 1122</td>
<td>5</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Plantation timber Hoop pine Door</td>
<td></td>
<td>Finlayson’s Doors 07 3393 0588</td>
<td>=</td>
<td>3</td>
</tr>
<tr>
<td></td>
<td>Plantation timber Door</td>
<td></td>
<td>Lilley’s Doors 03 9878 3688</td>
<td>=</td>
<td>3</td>
</tr>
<tr>
<td>Doors</td>
<td>100% recycled timber Door</td>
<td></td>
<td>Nullabor Forest Timber Industries 03 9484 9215</td>
<td>=</td>
<td>3</td>
</tr>
<tr>
<td><strong>Floor coverings</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Matting</td>
<td>Hard wearing, natural fibres</td>
<td>Sisal, seagrass and natural matting that rolls like carpet or as a mat</td>
<td>Floorspace 03 9622 4455</td>
<td>=</td>
<td>5</td>
</tr>
<tr>
<td>Linoleum</td>
<td>Durable, natural materials, low toxicity</td>
<td>Marmoleum</td>
<td>Forbo Flooring 1800 224 471</td>
<td>=</td>
<td>5</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Linoleum</td>
<td>Tarkett Sommer Linosom 02 9634 7373</td>
<td>=</td>
<td>5</td>
</tr>
<tr>
<td>Cork flooring</td>
<td>Renewable source from a recycled product. Polyurethane cured</td>
<td>Cork and rubber flat sheet flooring</td>
<td>Comcork distributor 02 9555 2131 03 9544 2288</td>
<td>=</td>
<td>5</td>
</tr>
<tr>
<td></td>
<td></td>
<td>MJO Floating Cork floor</td>
<td>Premium Floors 03 9544 3911</td>
<td>=</td>
<td>5</td>
</tr>
<tr>
<td>Tiles</td>
<td>Recyclable and durable</td>
<td>Amtico Stratica tiles</td>
<td>Amtico 02 9415 0200</td>
<td>=</td>
<td>2</td>
</tr>
<tr>
<td>Ceramic tile</td>
<td>High EE but good thermal properties if exposed to sun</td>
<td>Ceramic tile</td>
<td>Various Suppliers</td>
<td>=</td>
<td>2</td>
</tr>
<tr>
<td>Floating floors</td>
<td>Timber alternative</td>
<td>HDF: Kronotex Laminate</td>
<td>Fowles Carpet 03 9644 9090</td>
<td>=</td>
<td>2</td>
</tr>
<tr>
<td>Carpet</td>
<td>Recycled carpet</td>
<td>Recycled carpet</td>
<td>Melbourne Carpet Recyclers 03 9545 6588</td>
<td>=</td>
<td>3</td>
</tr>
<tr>
<td>Modular carpet</td>
<td>Recyclable and uses less material than broadloom. Specify low VOC glues</td>
<td>Interface Modular carpet</td>
<td>Interface 1800 804 361</td>
<td>=</td>
<td>2</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Ontera Earth Plus Modular carpet</td>
<td>Ontera 03 9682 6412</td>
<td>=</td>
<td></td>
</tr>
<tr>
<td>Wool carpet</td>
<td>Natural material but not generally recycled in Australia</td>
<td>Feltex 100% wool, tufted loop range of carpets</td>
<td>Feltex 1300 130 307</td>
<td>=</td>
<td>2</td>
</tr>
<tr>
<td>Carpet</td>
<td>Durable</td>
<td>Woollen and nylon carpets</td>
<td>Godfrey Hirst 1800 630 401</td>
<td>=</td>
<td>2</td>
</tr>
<tr>
<td></td>
<td>No wet processing required.</td>
<td>Statron Yarn systems</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Fibre face and secondary backing materials made from natural fibres</td>
<td>Wool and wool blend range</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Carpet cushion</td>
<td>Carpet cushion made from polyurethane foam with 90% recycled content.</td>
<td>Carpet cushion</td>
<td>Dunlop flooring 1800 622 293</td>
<td>=</td>
<td></td>
</tr>
</tbody>
</table>
## Fittings and Finishes

<table>
<thead>
<tr>
<th>Element</th>
<th>Environment benefit</th>
<th>Product</th>
<th>Company contact</th>
<th>Cost</th>
<th>Score</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Miscellaneous</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Benchtops, lining boards, beams, window frames, joinery, and stair treads</td>
<td>100% Reclaimed and salvaged hardwood timber</td>
<td>Recycled timber</td>
<td>Nullabor Forest Timber Industries 03 9484 9215</td>
<td>=</td>
<td>3</td>
</tr>
<tr>
<td>Board suitable for furniture and kitchens</td>
<td>Pine plantation timber by product</td>
<td>DecoLine low pressure Melamine, various colours &amp; textures</td>
<td>D&amp;R Henderson 03 9768 3320</td>
<td></td>
<td>3</td>
</tr>
<tr>
<td>Benchtops</td>
<td>Hard wearing</td>
<td>Laminex</td>
<td>Laminex 132 136</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>Wilsonart Laminate</td>
<td>Parbury 1300 361 313</td>
<td></td>
<td>3</td>
</tr>
<tr>
<td>Cabling</td>
<td>Halogen free and fire performance cables – made from stiff mica glass tape</td>
<td>Pyrolex Ceramifiable cables</td>
<td>Olex Cables Australia 1300 556 539</td>
<td>+</td>
<td>10</td>
</tr>
<tr>
<td>Pre-finished board suitable for cabinetry &amp; furniture</td>
<td>Surface finish emits zero VOC emissions. Low formaldehyde grade MDF significantly exceeds industry standard for formaldehyde emissions.</td>
<td>Element™ E0 - Low formaldehyde MDF panel pre-finished with a zero VOC emission Climate™ powder coating. Available in a range of colours, finishes and sizes.</td>
<td>Climate Coating 1800 256 111</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
Landscaping

The careful selection of materials for landscaping can also minimise environmental impacts.

Environmental issues associated with landscaping:

**Timbers:**
The issues for timber used in pavers, sleepers and fencing are:

- Concerns about the chemicals in CCA (copper chrome arsenate) treated timber leaching into the soil and water table
- Concerns about the impacts of timber harvesting (e.g. old growth forests).

**Hints**
- Use plantation, recycled or third party certified timbers for decking
- Look for alternatives to CCA treated timber, e.g. Light Organic Solvent Preservative (LOSP)
- Use recycled sleepers

**Permeability:**
This is an issue as compacted soil under impervious surface can become inert and infertile. Impermeable surfaces such as asphalt and concrete also increase stormwater runoff and potential for localised flooding.

**Hints**
- Use permeable materials for driveways and paths

**Water Use:**
In Melbourne gardens consumer around 35% of the average household's annual water consumption. Water sensitive design and planting will help to minimize overall water use.

**Hints**
- Plant drought-tolerant plants
- Install a water tank
- Reuse grey water through approved diversion systems
<table>
<thead>
<tr>
<th>Element</th>
<th>Environment benefit</th>
<th>Product</th>
<th>Company contact</th>
<th>Cost</th>
<th>Score</th>
</tr>
</thead>
<tbody>
<tr>
<td>Fencing</td>
<td>Alternative to CCA treated timber</td>
<td>LOSP treated timber</td>
<td>The Pine Centre 03 9354 3665</td>
<td>= 5</td>
<td></td>
</tr>
<tr>
<td></td>
<td>100% recycled timber for fencing</td>
<td>Fencing</td>
<td>Fence busters 03 9725 3942</td>
<td>= 5</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Alternative to CCA treated timber</td>
<td>ACQ treated timber</td>
<td>Taylor Fencing 03 9764 3178</td>
<td>+ 5</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>ACQ treated timber fencing</td>
<td>Davids Timber 03 9794 4777</td>
<td>+ 5</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>LOSP treated timber fencing</td>
<td>Diamond Creek Fencing 03 9438 2946 0412 031 210</td>
<td>+ 5</td>
<td></td>
</tr>
<tr>
<td>Timber preservative</td>
<td>Copper treatment for wood (not as bad as CCA)</td>
<td>NatureWood ACQ (up to H3) treatment</td>
<td>Osmose 1800 088 809</td>
<td>+ 5</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Light Organic Solvent Preservative (LOSP) treatment for timber fencing (not to be used on posts that go in the ground)</td>
<td>Protim H3 LOSP treated timber</td>
<td>Osmose 1800 088 809</td>
<td>+ 5</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Tanalith E is rated to H4 (in ground applications e.g. fence posts)</td>
<td>Tanalith E</td>
<td>ITI Mark Mcfarlane State Manager 03 9392 8400 Craig Davies 02 8805 5000</td>
<td>+ 5</td>
<td></td>
</tr>
<tr>
<td>Sleepers</td>
<td>Recycled red gum sleepers</td>
<td>Sleepers</td>
<td>Various landscape suppliers, specify recycled</td>
<td>= 5</td>
<td></td>
</tr>
<tr>
<td>Mulch</td>
<td>Made from recycled green waste and saves water</td>
<td>Mulch</td>
<td>Soilpower 03 9408 4555</td>
<td>= 5</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Organic mulch reduces water use</td>
<td>Mulch 'n' feed</td>
<td>Debco 1800 657 598</td>
<td>= 5</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>Organic mulch</td>
<td>Evergreen Compost 03 9768 3635</td>
<td>= 5</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Recycled green waste</td>
<td>Recycled mulch</td>
<td>Tram Stop Garden Supplies 03 9435 1176</td>
<td>= 5</td>
<td></td>
</tr>
<tr>
<td>Element</td>
<td>Environment benefit</td>
<td>Product</td>
<td>Company contact</td>
<td>Score</td>
<td></td>
</tr>
<tr>
<td>-------------------------------</td>
<td>--------------------------------------------------------------------------------------</td>
<td>-------------------------------------------------------------------------</td>
<td>-------------------------------</td>
<td>-------</td>
<td></td>
</tr>
<tr>
<td>Decking</td>
<td>Alternative to CCA treated timber</td>
<td>ACQ treated timber decking</td>
<td>Davids Timber 03 9822 9344</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td></td>
<td>100% recycled plastic</td>
<td>Anti-skid Decking</td>
<td>Repeat Plastics 03 9739 6919</td>
<td>= 5</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Made from non-virgin wood and recycled plastic</td>
<td>Modwood Decking</td>
<td>Modwood Technologies 03 9462 4333</td>
<td>+ 5</td>
<td></td>
</tr>
<tr>
<td>Decking and beams</td>
<td>Plantation timber with copper content in the preservative</td>
<td>Preserveply and Norply</td>
<td>Norply 02 6632 2400</td>
<td>+ 1</td>
<td></td>
</tr>
<tr>
<td>Sleepers, decking and fencing</td>
<td>Less toxic timber treatment. Check source of timber</td>
<td>Tanalith E treated timber</td>
<td>Koppers 02 9954 5411</td>
<td>+ 1</td>
<td></td>
</tr>
<tr>
<td>Bench tops and Decking</td>
<td>Reclaimed and salvaged timber</td>
<td>Solid timber bench tops, decking, stair treads, skirting boards, posts and beams. Company also supplies virgin timber - Range of species.</td>
<td>Shiver Me Timbers 03 9397 5993 * ask for recycled timber</td>
<td>- 5</td>
<td></td>
</tr>
<tr>
<td>Pavers</td>
<td>Improves soil permeability</td>
<td>Rubber pavers</td>
<td>Permapave 07 3284 6841</td>
<td>= 3</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Uses concrete containing waste products to reduce use of new cement</td>
<td>Concrete pavers</td>
<td>Island Block and Paving Co 03 6398 2088</td>
<td>= 5</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Permeable paving system</td>
<td>Hydrapave Concrete permeable paving system</td>
<td>Boral 03 9681 9722</td>
<td>= 3</td>
<td></td>
</tr>
<tr>
<td></td>
<td>100% recycled timber</td>
<td>Red gum pavers</td>
<td>Fence busters 03 97253942</td>
<td>= 5</td>
<td></td>
</tr>
<tr>
<td>Paving Bricks</td>
<td>Improves soil permeability</td>
<td>Permeable bricks</td>
<td>Australbricks (Nubrik) 03 9881 3215</td>
<td>= 3</td>
<td></td>
</tr>
<tr>
<td>Driveway surface system</td>
<td>Improves soil permeability and reduces use of concrete</td>
<td>Grasspave</td>
<td>Atlantis Corporation 02 9419 6000</td>
<td>= 3</td>
<td></td>
</tr>
<tr>
<td>Lights</td>
<td>Use of solar energy reduces consumption of non-renewable energy</td>
<td>Solar powered outdoor lights</td>
<td>Solar Systems 1800 061 164</td>
<td>= 5</td>
<td></td>
</tr>
</tbody>
</table>
Appendix 5: Methodology – the practice of research
**Introduction**

Chapter 4, drawing on a range of theory proposed a relational model of innovation that is driven by practice. Existing practices fulfil particular uses defined by the relationship between organisms and their environment. These niches afford practices – habitual self-perpetuating emergent patterns of behaviour that are proven, valued and held in faith. The model of recursive cultural adaptation (MORCA), however, as well as potentially shedding light on the process of innovation, can be used to understand the practices deployed to do research.

All epistemologies/methodologies are founded on ontological assumptions regarding the nature of the thing being researched. Ontology inexorably leads to a set of epistemological claims regarding how that world can be known. Although it is possible to question the world without articulating ontology, this does not mean that there would not be implicit ontological underpinnings to that research. Indeed, one of the ontological claims made herein is that implicit values, beliefs, and faith underpin all human activity. This means that the production of research/knowledge, as a practice, has implicit assumptions and values too. As such, the researcher’s practices, which include the practices endorsed by their respective academic discipline, need to be brought into the analytical frame to see how they are affecting the process of knowledge-creation. If answers are prefigured by questions, then we must take into account
how and why the research question was put; we must critically engage with the methods used and the politics of particular research. Such an explication of method seeks to go further than transparency for the sake of scientific replication or to legitimate the research through a rendering of ‘acceptable’ practice, although these are issues that, nevertheless, are addressed by exploring the ethical and validation processes deployed. What follows is an exploration of the ‘doing’ of the research, the telling of which continues to engage with the theoretical and methodological oeuvre of Pierre Bourdieu.

The practice of the Planning / Housing studies discipline

Bourdieu’s theorising of practice suggests that much human activity is automatic. He also expressly addressed the practices of academics and showed how these reproduce class distinctions (Bourdieu 1988). However, of greater concern is that the production of knowledge is complicit in the social construction of reality. If this process happens, as the MORCA suggests, aconsciously, then research runs the risk of unwittingly not only maintaining, but increasing hegemony. This raises an ethical question, what is the use of the research (Forge 2008)? If a practice, research in this instance, is a function of the relationship between people and their contexts, then both of these features of practice need to be explored to understand why the particular objects and investigations are implicated in the research done for this thesis.
The discipline

Planning and housing studies are not ‘disciplines’ in the traditional sense. Their subject is relatively new compared to other university disciplines, such as philosophy and the natural sciences. As is the case of many professional areas of study, they have only recently found their way into undergraduate curricula and degrees dedicated to them are still few. These degrees tend to have a practical orientation, focusing on the ‘real world’ of planning practice and related processes. This practical focus is reflected in a great deal of planning and housing research that is primarily descriptive and often directed towards government policy. Indeed, the issue of governance has become a significant issue for housing and planning academics that, by and large, take at face value and engage in debates regarding ‘objects’ defined by the state. As such, planning theory tends to be supportive of the status quo, thus hegemonic (Law-Yone 2007).

Planning and housing research has been criticised for a lack of theoretical engagement (Kemeny 1992; March 2005), ethics (Marston 2008), and has been the subject of recent special editions of cognate journals that address these issues, (See Building Research & Information, issue 36 volume 6 and Housing, Theory and Society, issue 25 volume 3). The guest editors of the latter posed the question, how far had the discipline come since Kemeny’s critique? They concluded that,
while there has been a broadening of the theoretical palette from which researchers have drawn, there is little doubt that many of the tensions and political problematics that Kemeny highlighted remain evident. Within this retreat from grand theory, a potential advantage, has been matched by a growing tendency for research to be more concerned with contexts within which the capacity to be political may have become more muted. Finally, there is a continuing tension between thoughtful and time extensive work, which may be more likely to produce insights that go beyond local temporal and spatial boundaries, and the policy driven and political short-termism of much work. (Jacobs & Atkinson 2008)

A search of the Australasian focused journal, Urban Planning and Research from 1982 to February 2009, reveals five papers that directly address the relationship between social theory and planning (Gunder 2005; Jacobs 2006; Thompson 2006; Darcy 2007; Fopp 2008). Australian planning research is predominantly unreconstructed positivism. It is paradoxical that this descriptive research of planning and housing practice fails to theorise practice, ignoring ‘the need to embed theory and theorizing in the context of professional practice’ (Green & Schweber 2008, p. 650).

Bourdieu’s analytical framework immediately alerts one to the danger of ‘policy driven’ work, and ‘political short-termism’ because such research does not problematise its own practice or those of the actors they study. For example, much of the research that has been done by the Australian Housing and Urban Research Institute (AHURI), an organisation that this research was notionally attached to, is of this nature. This is not to say that these researchers are atheoretical. It is, however, that theory is not ‘front and centre’ of the research program. Indeed, I was told by my secondary
supervisor that the role of theory was to underpin research, rather than to be explicitly at its heart. Hence, the practice of research that I was encouraged to do was not reflexive nor would it necessarily incorporate theoretical insights or development. However, O’Neill argues that,

(a) language-consciousness about theory must guide an academic pathway to political impact. Most importantly it not only provides a link between politics, method and theory, it overdetermines their existence. Or, in the constructionist argument of Kemeny (with Jacobs and Manzi), we must be alert to, …the integral connection between the exercise or attempted exercise of power and policy definition. (Jacobs, Kemeny & Manzi 2003:432) (2008, pp. 175-6)

Unless the politics of planning is unearthed and engaged with, we inadvertently reproduce planning hegemony and risk being a party to out-right oppression (See Njoh 2009). Reflexivity, thus, has a politico-ethical role in identifying hegemony and, once identified, allows for political engagement by academics (Frangie 2009). A reflexive engagement with one’s discipline affords an opportunity for a radical openness and the possibility of transformation (Rhodes 2009).

The project: RMIT University’s practices meet Vic Urban’s

The Australian higher education sector, from the late 1980’s under the then Hawke Labor Government, has been subject to a series of reforms that can be described as neo-liberal. A user-pays’ ethos came to dominate policy discussion and reform and was used to usher in student fees. Industry was to contribute to research that it benefited from, encouraged by tax breaks (ironically, still a net
Although students had to pay even if the fees could be deferred, industry did not rush in with money for research. In 2001 a new grant scheme was introduced by the Commonwealth Government, administered by the Australian Research Council (ARC), to further encourage research jointly funded by, and conducted with, industry. This agenda has come to dominate the sector throughout the West and manifests in a research-model that has come to be termed Mode 2. Whereas Mode 1 draws on the ideal of one or more scholars freely pursuing their research interests with the unfettered support of their university, Mode 2 has come to signify trans-disciplinary work that is likely to be instrumentalist and probably jointly-funded (Gibbons et al. 1994).

Reflexive accounts, of even notionally successful Mode 2 research projects, indicate that they are nevertheless fraught. Mitev and Venters (2009) report how organisational scale, knowledge hierarchies, and institutional power shaped the findings of research into the design of an ICT\textsuperscript{186} system for improving sustainability within the UK construction industry. Hence, Mode 2 research has a different political life to Mode 1 because there is a multiplicity of interests that can affect the outcomes.

The research for this thesis was funded through an Australian Research Council Linkage Project that provided two Australian Postgraduate Award Industry (APAI) scholarships for up to three and a half years. Hence, it is axiomatic that as a Mode 2 research

\textsuperscript{186} Information and Computer Technologies
project, particular interests shaped this research. However, interests are not disembodied ideals. They are expressed in the practices of those said to be acting in their interest. The industry partner was VicUrban, the Victorian government’s land development agency. Although they are a statutory authority, as a corporate body they are notionally independent having a board, and have to provide a rate-of-return to the government. Thus their mission is to implement government policy regarding, for example, sustainable urban design, but nevertheless has to be profitable. This mission is enacted through bringing together several sets of practices, the effect of which is discussed in Chapter 4. Nevertheless, what is noteworthy, is that their practices are quite different from those of RMIT University and housing researchers.

Although it can be said that academics and land developers do not necessarily understand each other’s objectives and that this may cause misunderstandings, a hypothesis of this thesis is that the practices of each field have their own logic that propels them to play a particular ‘game’. As practice has its own logic, to ‘understand’ the practice of another is necessarily difficult and potentially can engender hostility. This is not to suggest that these fields are irreconcilable. Fields are not ‘pure’ and neatly demarcated – each of us has an identity and habits derived from habitus resulting from many fields. The people in VicUrban are not merely playing on the field of state-land-developer. Many have experienced the field of higher education and value knowledge and research. As such, there was enough experience of the field of
higher-education for VicUrban to set-up the necessary communication and eventual agreements with RMIT University to enable the project. However, they did not have the academic field as their raison d’être and sought to have the research done in a way that satisfied their particular interests. Although VicUrban can be said to have its own habitus, as it is a field, this does not mean that there are not other habitus at play within the organisation defining the workers, such as environmentalism. Similarly, each department within VicUrban brings, through its professional practices, its own logic and ‘views’ on how things should be done. Chapter 4 pointed out that developers, as do marketers, accountants, designers, etc., all bring to the organisation particular practices that orient the workers to see tasks and problems in particular ways. Crucially this also prefigures the solutions that each practice might see and lobby for. As Chapter 6 demonstrates, the developers thought that the scope for the Aurora project was far too broad, while the designers who had responsibility for advancing the ESD agenda sought to maximise these elements.

Unfortunately, the people at VicUrban who negotiated this research project had left the organisation by the time the two PhD positions were filled. Although there was still a commitment to proceed, there was not the same level of support. VicUrban rejected the person initially selected by RMIT University for the role that I would eventually fill. This is a significant intervention into a selection process that traditionally has been the preserve of academics. Thus, the opportunity for me to do this research was a function of the differing
practices/habitus affecting the project. The outcome of resolving the contradictions of these different practices highlights the political nature of these countervailing tendencies attempting to control a particular outcome.

**Negotiating practices**

The relationship between RMIT University and VicUrban was codified through an Industry Partner Agreement (IPA) that, among other considerations, governed the use of any intellectual property stemming from the research. Because the agreement between VicUrban and RMIT University is a contract, I was ‘required’\(^{187}\) to sign over any future intellectual property (IP) rights that I might have in the research to RMIT University. This is because of the way contract law works; legal practice includes the principle that as I was not a party to the contract, I could not be bound by it. Fortunately, the nature of the research was such that it was unlikely to generate the sort of IP where this might be an issue, such as with biotech or ICT research. However, should any commercial activity be derived from the research, I would be reliant on RMIT University to protect my interests. The IPA and a further agreement between VicUrban and I meant that any proposed publications needed to be submitted to VicUrban for their approval. This gave VicUrban the right to suggest changes which, should this arise, would mean negotiating the content of academic work to suit VicUrban. Two scenarios could have emerged. Either the relationship with VicUrban would need to

---

\(^{187}\) Had I not signed away my IP rights to RMIT University I would not have been able to do the project.
be ‘managed’ to avoid such a situation arising, or I would need to self-censor, based on my political appraisal of the material in question.

Although traditional ‘Mode 1’ standards, such as ‘academic freedom’ were potentially undermined by these relationships, fortunately, the issue of VicUrban objecting to what might be written never arose. There are two, possibly not mutually exclusive, reasons for this. The first is how VicUrban ‘managed’ this issue. Second, there is the possibility of my own self-censorship. I address these issues in turn by exploring what happened when drafts were sent to VicUrban.

During the project a co-authored book chapter was written (Dalton & Binder 2007). During the drafting we worked closely with my primary contact person at VicUrban, Barton Williams (BW), a member of the design department who had responsibility for environmental sustainability. During this process there was some negotiating, but this was regarding acknowledgement of BW’s work within VicUrban and his contribution to the chapter. There were no disputed ‘facts’ or political sensitivities that led to a request for a rewrite or omission. The other publications that were produced during the project: a single authored journal article and several conference presentations and publications were sent to BW, and on his leaving VicUrban, my new contact person, Kerry O’Neill (KO), none of which generated a comment. At the time, KO was more senior to BW and worked in the ‘community and affordability’ area of VicUrban.
To understand VicUrban’s insistence that it had the right to critique the publications, but then failed to, can be understood if we examine the practices that underpinned the demand that there be ‘reviews’ and contrast them with the practices of the persons deemed responsible for overseeing any publications. First and foremost, VicUrban’s in-house lawyer put the ‘right of review’ on the table. The practices driving the issue were legalistic. The lawyer was concerned with protecting VicUrban’s ‘rights’ vis-á-vis confidentiality, intellectual property, and potentially, reputation. At the time, it appeared to the RMIT University ‘team’, including myself, that attempting to fight this suggested provision was unlikely to be successful and, furthermore, would have been time-consuming. The project had started and further delays could have significantly hampered it. BW knew that there was a delay, but there is no evidence that he was involved in VicUrban’s deliberations regarding this issue. It is unknown whether BW or KO saw the need or were, in fact, instructed to read the drafts with a view to any potential political or confidentiality issues. Of course, it may be that they did check the work, but from their perspective, there were no problems. Whether any critique of VicUrban contained in those works or this thesis merited their concern is again, unknown. Nor is it known what might have happened should a lawyer have read them.

It is likely that the reason that the work was not ‘checked’ was because an organisation depends upon, and is a function of, the practices/habitus that it generates, its corporate culture and the practices/habitus of the people working there. Professional
practices do not have the same logic, each has its own ‘sense of the game’. Within VicUrban there are architects, planners, lawyers, marketers, land developers, engineers, administrators, accountants, etc., each whom has a ‘sense of the game’ that is different from the other. These differences are compounded by the disconnect between the theorised practices that are taught in professional courses and the actual practices demanded by individual firms and professional bodies. It is no accident that people often comment on the ‘theoretical’ nature of professional degrees, complaining that they lack ‘real world’ application. This is because the second method of acquiring the ‘know–how’ of a profession requires being immersed in the field, subjected to the routines and practices that define the activities of that profession. Each requires learning the practices and being enculturated in the habitus.

All of the professions listed above, plus others, define the relationships that are required for the development of land. As well as defining the functions within a land development organisation, they define the necessary functional relationships with other fields. For example, a developer needs financial expertise within the organisation and relationships with lenders to access capital. Also, land developers need to access a range of services that make land development possible, such as planning, engineering, designing, and building. Recent changes in the practice of some land developers means that they also may access anthropological and ecological services. This means that the practices of land development necessitate
relations with other fields, each with their own practices and Bourdieuan cultural capital.

As noted above, Mode 2 research disrupts the relationships and practices associated with traditional Mode 1 enquiry. The selection process to fill the PhD scholarships, thus, was not a simple function of the academic habitus reproducing itself. It was a negotiated ‘dance’ that, in a Bourdieuan sense, had to negotiate two fields – RMIT-University-academic and VicUrban-state-property-developer. The cultural capital at stake for RMIT was more significant than that which was at play for VicUrban – having an ARC linkage project disrupted or failing would have ‘cost’ RMIT more than VicUrban.

Research practices

After the intellectual property rights and confidentiality issues had been resolved, VicUrban provided a security-access card, computer login, and access to their officers, email, and electronic filing system. Although there was an agreement to use a ‘hot-desk’ once a week, visits were less frequent. This, in conjunction with not actively engaging with VicUrban’s work as an employee, meant that, although the research was ethnographic, it was not fully embedded in the organisation’s culture (Silverman 2006).

Given VicUrban’s sensitivities regarding the project, the issue of how to proceed was addressed strategically. Examining the question of inter- and intra-organisational relationships on decision-making processes was potentially charged. For example, as a business, inter-organisational relationships may include ‘commercial-in-confidence’
details. Similarly, the at the time, still recent amalgamation of the ULRC and the DLA that created VicUrban may have produced ‘camps’ within the new organisation, again, not something that management would necessarily have liked exposed to scrutiny. The research question demanded an engagement with these issues, but how to proceed?

Starting the project by looking at inter-organisational relationships meant that the nature of VicUrban’s culture would not be immediately scrutinised. An early briefing from VicUrban revealed that they were going to be using more sustainable building materials at Aurora. This seemed like a ‘safe’ place to start – looking at the relationships between VicUrban, RMIT University’s Centre for Design, the consultants contracted to design and provide the tool, and the builders whose behaviour it targeted. Engaging with a tool to help the builders select more sustainable building materials – the Eco-selector, seemed, at the time, uncontroversial. Furthermore, ‘building materials’ as an issue was aligned to my habitus derived from recently having completed a degree in architecture. However, what seemed to be a small research ‘entrée’ that would serve to establish a relationship with VicUrban, turned out to be the dominant focus; a microcosm through which both inter- and intra-organisational relationships or, in hindsight, what might be better termed practices, could be researched.
**Conducting the research**

Positioning Theory (PT) is a micro-ethnographic tool for examining discourse (Harré & Moghaddam 2003). The theory proposes that speakers inadvertently position themselves and others within a ‘local moral order’. Positions ascribed may include derogatory and/or supportive claims. Furthermore, they may seek to bolster the speaker’s position, or minimise it. As such, PT sensitises the researcher as to how speakers feel about their own and other people’s power. Discourse, thus, can be used to understand power from the perspective of the speaker. This subjective rendering illuminates relationships, including intra- and inter- organisational ones, through the everyday talk of actors. As such, the interviews were conducted to capture discourse as ‘naturally’ as possible.

Open-ended questions were used to provide the interviewees with the opportunity to tell their story (Binder & Price 1977). This technique was used because it addresses the post-modern problematic of the subject/object, which stresses the need to hear voices that are silenced by the objectifying gaze. To mitigate against the power of objectification, it was important to allow people to tell their stories, rather than have to provide responses to the researched objects. This also allowed for a semi–grounded approach to theory building (Glaser & Strauss 1967). This allowed for a ‘making sense’ of the data informed by the simultaneous theoretical investigations that resolved as the MORCA, reported in Chapter 4.
Thirty-nine semi-structured interviews were conducted. Thirty-two plus three follow-up interviews were directly related to the Eco-selector. The remainder were general in nature that provided background information. In all, 32 people participated. (See Appendix 6 for a list of interviewees).

All of the interviews that were conducted used the following open-ended questions:

1. Can you tell me how you came to be involved in the Eco-selector and what your role has been regarding it?
2. Who were the other people involved in the development of the Eco-selector and what were their roles? Who had the most effect on the outcomes?
3. What were your expectations for the Eco-selector, and were these met?
4. From your perspective, what have been the highlights of your involvement with the Eco-selector? What have been the difficulties?
5. What do you perceive as the strengths and weaknesses of the process of developing the Eco-selector?
6. Can you relate to me an incident that had a great deal of significance for you in your dealings with the Eco-selector?
7. I am interested in the important relationships that you have which have shaped your attitudes to the Eco-selector. Who did you speak to, directly or not, about the Eco-selector that helped you define your attitudes towards it? (For example, you may have had discussions with other people directly involved in the Eco-selector and or with friends, colleagues or other people not formally involved, but, who nevertheless helped you with your thinking about the Eco-selector.) Please name the people who have been the most important or prominent in your conversations about Eco-selector and briefly state why.

Two of the questions provided little data. First, Question 7 was constructed to enable a social–network analysis (SNA; Crossley 2006) of the relationships that affected the development of the Eco-selector. A SNA maps the actor relationships, shows key nodes, communication flows, and blocks, (i.e., what they do) (Latour 1996). However, the question produced almost no data. As such, this
descriptive rather than relational and predictive\textsuperscript{188} method was abandoned.

Question 6 was constructed to enable the reporting of critical incidents (CI) which are used ‘to create a functional description of an activity’ (Butterfield et al. 2005, p. 477). CI comes out of a long history of research that dates back to USA armed services research during WWII (Flanagan 1954). It has been used extensively in numerous disciplines, including organisational and industrial research (Anderson & Wilson 1997). The use of a CI is not a rigid method, it

does not consist of a single rigid set of rules governing such data collection. Rather it should be thought of as a flexible set of principles that must be modified and adapted to meet the specific situation at hand (Flanagan 1954, p. 335).

This technique involves asking an interviewee to tell their story regarding a particular event. As such, this method is particularly useful for a task like investigating the Eco-selector where practices need to be considered. It is also particularly suited to getting the views of different ‘stakeholders’ and what was of particular importance to the informant. The problem with positioning this question late in the interview was that in all cases the interviewee had already reported on what they felt was the CI in the earlier questions. As such, this question, like Question 7 elicited little data.

Before moving on to discussing the questions that did generate CI-type data, especially Questions 3 to 5, the rationale for including Questions 1 and 2 is discussed. The first question was to locate the person within the context of the development of the Eco-selector – what was their role and how or why were they involved? The second question was used to identify additional participants through snowball sampling (Goodman 1961). This helps to identify other key participants in the development process and ‘triangulate’ them. Although originally a quantitative research technique, snowball sampling is used extensively in qualitative research and in conjunction with Questions 3 to 5, generated most of the data presented in Chapters 5, 6 and 7. It is noteworthy that most of the interviewees embraced the opportunity to ‘tell their story’, with one person saying as we finished, ‘Great, ... that was nice talking about the Eco-selector’.

Critical incident research, thus, is a technique where the interviewee is not directed. The interviewee selects what stood out for them, while also affording them an opportunity to withhold information that they may not wish to share. However, this technique is not does not simply produce a stream of consciousness – a disparate series of individualistic subjective stories. The topic, the Eco-selector, sets the parameters for the initial response to the question which quickly turned into a conversation.

189 Karen Deegan, Environment Project Manager, VicUrban, interviewed 9/7/7
Silva and Wright (2009) conducted interviews to examine the cultural capital of housing in Britain and reported the following regarding ‘Jenny’s’ dream home:

Jenny: Ok. Well, more room. Lots more room. To store the clutter!
Interviewer: So it would be a purely kind of pragmatic, practical change if you...
Jenny: I quite like the Grand Designs as well, if someone would do it for me, minimalism is one, yeah. Some wood and steel and glass, yeah...
Interviewer: But if it was on a plate, and – somebody paid for it...
Jenny: Yeah, somebody to do the garden, I’d have to have a big garden. But not if it was left to me to do it. Main thing is extra room, extra bathroom, because we’ve just got the one (Silva & Wright 2009, p. 44).

Here, then, the interviewer, through conversation, is actively helping to construct the data by exploring the ideas as they emerge. The interviewer suggests Jenny’s desire for more room is pragmatic. Jenny corrects this by invoking aesthetics; minimalism. The interviewer then raises the question of cost (Jenny is lower middle-class), Jenny skirts this issue – not accepting being positioned as not being able to afford a ‘grand design’ and shifts the conversation to the doing of the work; who will do the garden, not her, and then she returns to the matter of what she wants, another bathroom.

In this snippet of conversation, Jenny and the interviewer negotiate how they perceive and wish to be seen by the other. Conversation is an emergent phenomenon. It is a social product where both speakers negotiate the topic, adding, correcting, positioning, exchanging, convincing, and leading the conversation. The interviews regarding people’s experience of the Eco-selector were,
similarly, emergent conversations. For example, I found myself agreeing with contrary arguments. When talking to forestry advocates, I accepted their arguments regarding the sustainability of timber and the legitimacy of their position. I was asked when interviewing a forestry advocate, would I use timber in my renovation? Yes, I exclaimed, and we both laughed.

However, when interviewing people with a strong anti-forestry position I found myself agreeing with their position too. Was it a good thing that native timbers were not being used at Aurora, of course it was! This may seem ‘dishonest’, but there is an alternative conclusion. The interviewer’s role is not to convince the interviewee of any ‘truth’. Furthermore, my part in these conversations was to acknowledge that the position that they were expressing was internally consistent. All of the interviewees spoke their truth; each ‘side’ was well-reasoned and heart-felt. As such, the interviewees were informed that I was interested in their stories; what did they understand, or more accurately, co-construct via the process of being interviewed, about their experiences?

Human experience is teleological. There was an unfolding, albeit, non-linear, ‘reason’ for the development of the Eco-selector and similarly to the way the research unfolded. The snowball sampling technique meant that the interview order was not ‘controlled’. As the CfD staff were easy to access because of pre-existing relationships – Dominique Hes, a person that has an important role in the development of the Eco-selector was involved in my selection for
the project. As such, this group of interviews was conducted early in the project. The reason that this is potentially important is that, taking on an already defined project and not having studied in the housing discipline, meant that my understanding of the Eco-selector and the related issues was informed by these initial interviews. Had the builders being interviewed first, rather than in the latter part of the research, the way my attitudes and theories evolved might have been different. Furthermore, it took time to become a competent Eco-selector-interviewer, a person that could direct the conversation towards relevant matters.

The interview process, thus, was as much about ‘gathering data’ as it was about making sense of how and why the Eco-selector came about. Part of the interview process was about validating formative ideas. Piece-by-piece a story emerged about the Eco-selector. As well as using later interviews to better understand earlier information, there was also the availability of VicUrban’s and the CfD’s files. This was a further source of information and a way of validating information gleaned from the interviews.

The process of making-sense of the issues was not restricted to the interviews and documents, but was also contingent on the development of the theory expressed in Chapter 4 being developed at the same time. These were not separate streams, but interactive, each shaping the other. As such, the theory contained in this thesis is not hypothetico-deductive nor is it grounded theory. Both of these traditions position the researcher as an omniscient overseer. In the
hypothetico-deductive paradigm, the role of the researcher is to test hypotheses against a particular theory. (The origins of the theory itself are either unstated or circularly assumed to be the product of the method.) The findings of such research are said to either support or refute the theory or one of its tenents. Although Popper (1959) and Kuhn (1996) attempted to resolve the logical problems of the method, the former arguing that hypotheses should be designed to refute a theory rather than support it, the latter claiming that shifting paradigms advance science, the problem of the role of the researcher remains.

Grounded theory can be seen as a further response to the ‘problem’ of science. Glaser and Strauss (1967) proposed a method whereby theories are devised once the data are gathered, coded, and categorised. Although this method may seem to resolve the ‘problem’ of grand theory, again the role of the researcher is ignored.

Bourdieu’s attention to practice provides an opportunity to consider the role of the researcher. This is not merely at the level of his or her naivety or brilliance, but a relationally constructed set of practices, many of which are implicit. The practice of doing the research enculturates the researcher, and the practices that were studied and engaged with provided the bedrock for the research. The result of these interactions was a dance choreographed by the ideas and voices encountered along the way.
Interview and document analysis

The pool of data that provides the basis for Chapters 5, 6 and 7 includes 37 audio recordings plus notes from two people who preferred not to be taped. The transcriptions totalled 32 hours and 26 minutes and generated over 300,000 words. On top of this, as noted, several hundred documents from VicUrban’s Eco-selector files and those of the CfD were collected and analysed.

Perhaps unsurprisingly, writing the story of the Eco-selector was accompanied by a strong sense of how the discourse would unfold. The data were not alien ‘bits’ that needed to be transformed, by statistics, or Nvivoed so that patterns might be identified and theories validated or made. There was no need to transform the data via a software solution as they had been processed, and recursively shaped my wetware.

The transcripts were reviewed while listening to the recordings. Themes and further questions were noted. Again, this process was a making sense of the development and use of the Eco-selector. The questions were, where possible, explored by going back to the key informants and documents.

As such, presenting the data as a narrative was a ‘natural’ structure. This has several advantages. First, it allows for a teleological rendering of the development of a tool. Second, it provides a way of allowing the voices of my informants to speak to the reader. Third,

---

190 Nvivo is one of the popular software packages for ‘analysing’ rich data, such as interviews. However, the user still has to identify the categories and themes for the program to sort against.

191 Cyber slang for the brain/central nervous system
the data chapters are driven by the meanings implied in the words of the interviewees.

Fourth, this provided two subsidiary means by which the data could be validated. Each interviewee was sent the excerpts from their interviews that would be used to ascertain that they were happy with what was being represented. Then, once the interviewee indicated that they were satisfied with the quotes, I sent the draft chapters those who wanted to read them, inviting their responses. It is noteworthy that one interviewee, a timber industry representative\textsuperscript{192}, at this stage withdrew their permission to use their quotes – not being satisfied with the context and meaning that I had constructed in Chapter 7. I responded to the reasons that he gave and offered to negotiate rewording the quotes, but his opposition was such that I had to remove them and any reference to this person. As a result of the withdrawal, I nevertheless revised the chapter, in particular its tenor.

The spoken word does not necessarily read well when transcribed. The sections of the transcripts to be used had to be made legible and to the point. However, it was important that the sections remained recognisable from the perspective of the respective interviewees. Table 5 shows the formatting convention used to provide readability and clarity.

\textsuperscript{192} It is noteworthy that the three people asked for an interview and refused were timber industry representatives (Department of Primary Industries).
Table 5 Codes used to clarify interviewee quotes

<table>
<thead>
<tr>
<th>Symbol</th>
<th>Use</th>
</tr>
</thead>
<tbody>
<tr>
<td>...</td>
<td>Deletion of superfluous words, such as repeats, ums, ahs, etc.</td>
</tr>
<tr>
<td>(text)</td>
<td>Text added to clarify the grammar or punctuation</td>
</tr>
<tr>
<td>{text}</td>
<td>Words added to clarify meaning</td>
</tr>
<tr>
<td>[text or deletion]</td>
<td>Changes made by the interviewee during the revision process</td>
</tr>
</tbody>
</table>

The act of writing the narratives, thus, proved a means by which this version of events could be ratified by further investigation. If there was a gap that I needed to explore, I could, and did invite informants to fill them. In one instance this engendered a discussion that provided a salutary lesson, reported in Chapter 7, regarding the multiplicity of meanings afforded by differing practices. Hence, the process provided yet another opportunity for a recursive engagement with the data, a building up of the story.

Fifth, a narrative allows for contradictions to laid bare. These could then be explored and theorised in an attempt to understand their nature. Hence there was a recursive relationship between earlier theorising, the crafting of the story, and the theoretical conclusions reported herein.

Sixth, although the interviewees have validated the story of the Eco-selector, it is not one that any of them could have written. Devising a narrative necessitates an authoring voice. In the terms of Positioning Theory, cited above, this story and indeed the whole thesis, is an elaborate positioning of the world and the researcher. Research
cannot be value neutral (Foucault & Gordon 1980). To resolve this tension and so as not to hegemonically construct the objects defined herein, the validation provided by the interviewees provides for the foregrounding of ethics. Ethics here means allowing the interviewees to have their voices heard. As such, the narratives are authored, but via a series of checks and balances.

**Conclusion**

This thesis argues that practice is fundamental to understanding activity. Bourdieau goes some way towards setting out a framework that explains the role of practice as a structuring structure. Culture ‘gets in’ to the body and, once in, disappears from awareness. Here then, is a sociology of social-structure that is not reified or idealised, but embodied. Through our practices we are classed, gendered, racialised, professionalised, etc. These practices predispose us to respond to the world in particular ways. This appendix sets out the context and the practices of the researcher, the organisations involved in the research so that these can not only be taken into account, but provide the basis for an ethical, rather than hegemonic construction of the researched objects.
Appendix 6: List of Interviewees
<table>
<thead>
<tr>
<th>Date</th>
<th>Name</th>
<th>Title/organisation</th>
<th>Notes</th>
</tr>
</thead>
<tbody>
<tr>
<td>24/1/6</td>
<td>Roger Hudson (RH)</td>
<td>Ex Urban Land Council deputy Executive Officer</td>
<td>Focused on how the ULA did its business</td>
</tr>
<tr>
<td>1/3/6</td>
<td>Barton Williams (BW)</td>
<td>Project Director, Sustainability, Environment, and Urban Design, VicUrban</td>
<td>Interview focus on VicUrban’s Sustainability Charter (My key contact at VicUrban.)</td>
</tr>
<tr>
<td>9/1/6</td>
<td>Marcus Spiller (MS)</td>
<td>VicUrban Board member</td>
<td>Interview focused on VicUrban’s relationship to the market and the State</td>
</tr>
<tr>
<td>31/3/6</td>
<td>Mark Allan (MA) [in lieu of John Tabart, the CEO, who was not available prior to his leaving VicUrban]</td>
<td>General Manager, Project Planning and Design VicUrban</td>
<td>Issues canvassed included the Sustainability Charter, performance assessment, its market, and role in public policy</td>
</tr>
<tr>
<td>4/12/6</td>
<td>Dominique Hes (DH)</td>
<td>Lecturer, Sustainable Architecture</td>
<td>Manager Eco-Selector project, Centre for Design, RMIT University</td>
</tr>
<tr>
<td>16/12/6</td>
<td>Alan Pears (AP)</td>
<td>Adjunct Professor, RMIT University</td>
<td>Member ‘Expert Panel’ Centre for Design</td>
</tr>
<tr>
<td>16/12/6</td>
<td>Margaret Bates (MB)</td>
<td>Research Assistant Centre for Design, RMIT University</td>
<td>Was a key informant.</td>
</tr>
<tr>
<td>19/12/6</td>
<td>Emma Hardy (EH)</td>
<td>Internal Communications Manager VicUrban</td>
<td></td>
</tr>
<tr>
<td>7/2/7</td>
<td>Anne Jolic (AJ)</td>
<td>Development Manager Delfin Lend Lease</td>
<td>Aurora project management team, URLC</td>
</tr>
<tr>
<td>Date</td>
<td>Name (Initials)</td>
<td>Role Description</td>
<td>Reporting Manager</td>
</tr>
<tr>
<td>-------</td>
<td>-------------------</td>
<td>----------------------------------------------------------------------------------</td>
<td>-----------------------------------------------------</td>
</tr>
<tr>
<td>9/2/7</td>
<td>Karen Deegan (KD)</td>
<td>Environment Project Manager, VicUrban</td>
<td>Reported to Barton Williams</td>
</tr>
<tr>
<td>12/2/7</td>
<td>Sonya Rezo (SR)</td>
<td>Assistant Development Manager Aurora Project</td>
<td></td>
</tr>
<tr>
<td>16/2/7</td>
<td>Dan Khong (DK)</td>
<td>Sustainability and Design, VicUrban</td>
<td></td>
</tr>
<tr>
<td>16/2/7</td>
<td>Theo Della Bosca (TDB)</td>
<td>Project Manager VicUrban</td>
<td></td>
</tr>
<tr>
<td>19/2/7</td>
<td>Jill Lim (JL)</td>
<td>Development Director (Vic) Lend Lease</td>
<td>Major Projects Manager (Leader Aurora project management team), URLC</td>
</tr>
<tr>
<td>28/2/7</td>
<td>Peter Stephenson (PS)</td>
<td>Senior Development Manager, VicUrban</td>
<td></td>
</tr>
<tr>
<td>9/3/7</td>
<td>Barton Williams (BW)</td>
<td>Project Director, Sustainability, Environment, and Urban Design, VicUrban</td>
<td></td>
</tr>
<tr>
<td>21/3/7</td>
<td>Andrew Walker-Morison (AW-M)</td>
<td>Manager Sustainability Materials Centre for Design</td>
<td>Member ‘Expert Panel’ Centre for Design</td>
</tr>
<tr>
<td>26/3/7</td>
<td>Tricia Caswell (TC)</td>
<td>CEO Victorian Association of Forest Industries</td>
<td></td>
</tr>
<tr>
<td>28/3/7</td>
<td>Alistair Woodard (AW)</td>
<td>Wood Products Victoria</td>
<td></td>
</tr>
<tr>
<td>30/3/7</td>
<td>Emma Hardy (EH)</td>
<td>Internal Communications Manager VicUrban</td>
<td>‘exit’ interview</td>
</tr>
<tr>
<td>18/4/7</td>
<td>David Borg (DB)</td>
<td>Manager Design, Burbank Homes</td>
<td></td>
</tr>
<tr>
<td>2/3/7</td>
<td>Dominique Hes (DH)</td>
<td>Lecturer, Sustainable Architecture</td>
<td>Follow-up interview</td>
</tr>
<tr>
<td>8/5/7</td>
<td>Barton Williams (BW)</td>
<td>Project Director, Sustainability, Environment, and Urban Design, VicUrban</td>
<td>‘exit’ interview</td>
</tr>
<tr>
<td>18/11/7</td>
<td>Mark Alan (MA)</td>
<td>Manager, Sustainability and Business Development</td>
<td>Barton’s superior</td>
</tr>
<tr>
<td>Date</td>
<td>Name</td>
<td>Position</td>
<td>Interview Type</td>
</tr>
<tr>
<td>------------</td>
<td>-----------------------</td>
<td>---------------------------------------------------------------------------</td>
<td>-----------------------------</td>
</tr>
<tr>
<td>18/11/7</td>
<td>Theo Della Bosca</td>
<td>Project Manager Devine Homes</td>
<td></td>
</tr>
<tr>
<td></td>
<td>(TDB)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>4/2/8</td>
<td>Michael Battistella</td>
<td>National Design Manager, Devine Homes</td>
<td></td>
</tr>
<tr>
<td></td>
<td>(MB)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>9/2/8</td>
<td>Mark Alan (MA)</td>
<td>Manager, Sustainability and Design, VicUrban</td>
<td>'exit’ interview</td>
</tr>
<tr>
<td>25/2/8</td>
<td>Rob Enker (RE)</td>
<td>Manager Sustainability, Building Commission of Victoria</td>
<td></td>
</tr>
<tr>
<td>4/3/8</td>
<td>Scott Hammond (SH)</td>
<td>Managing Director Dreamline Homes</td>
<td></td>
</tr>
<tr>
<td>18/3/8</td>
<td>Robin Mellon (RM)</td>
<td>Executive Director Geen Star – Acting Green Building Council Australia</td>
<td></td>
</tr>
<tr>
<td>6/5/8</td>
<td>Greg Zuccala (GZ)</td>
<td>Director, Zuccala Homes</td>
<td></td>
</tr>
<tr>
<td>7/5/8</td>
<td>Michael Spencer (MS)</td>
<td>CEO Forestry Stewardship Council Australia</td>
<td></td>
</tr>
<tr>
<td>8/5/8</td>
<td>Pat Groenhout (PG)</td>
<td>Director of strategy and planning VicForests</td>
<td></td>
</tr>
<tr>
<td>11/8/8</td>
<td>David Stokes (DS)</td>
<td>Building Inspector, Wittlesea City Council</td>
<td></td>
</tr>
<tr>
<td>11/8/8</td>
<td>Sonya Rezo (SR)</td>
<td>Aurora Project</td>
<td>Follow-up interview</td>
</tr>
<tr>
<td>12/8/8</td>
<td>Peter Rutherford (PR)</td>
<td>South East Fibre Exports</td>
<td>Ex Department of Primary Industries</td>
</tr>
<tr>
<td>5/9/8</td>
<td>Bryce Moore (BM)</td>
<td>Chief Operating Officer Delfin Lend Lease</td>
<td>Ex CEO URLC</td>
</tr>
<tr>
<td>14/10/8</td>
<td>Jill Lim (JL)</td>
<td>Project Director, Deflin Lend Lease</td>
<td>Aurora project management team, URLC</td>
</tr>
<tr>
<td>3/11/8</td>
<td>Karen Deegan (KD)</td>
<td>Sustainability and Design, VicUrban</td>
<td>Follow-up interview</td>
</tr>
</tbody>
</table>
Appendix 7: VicUrban’s lot sales
As the URLC did so to VicUrban claims that it leads the market by way of market success. Table 6 shows VicUrban’s total and the Aurora estate’s sales performance from 2004-5 till 2009-10.

Table 6 VicUrban total lot sales and Aurora total lot sales 2004-5 to 2009-10 (Source, VicUrban Annual Reports)

<table>
<thead>
<tr>
<th>Period</th>
<th>Total VicUrban</th>
<th>Aurora Lots sold</th>
<th>Percentage</th>
</tr>
</thead>
<tbody>
<tr>
<td>2004-5</td>
<td>887</td>
<td>33</td>
<td>3.7</td>
</tr>
<tr>
<td>2005-6</td>
<td>1039</td>
<td>104</td>
<td>10</td>
</tr>
<tr>
<td>2006-7</td>
<td>997</td>
<td>*202.5</td>
<td>20.3</td>
</tr>
<tr>
<td>2007-8</td>
<td>913</td>
<td>*202.5</td>
<td>22.2</td>
</tr>
<tr>
<td>2008-9</td>
<td>776</td>
<td>190</td>
<td>24.5</td>
</tr>
<tr>
<td>2009-10</td>
<td>802</td>
<td>261</td>
<td>32.5</td>
</tr>
<tr>
<td>Total:</td>
<td>5414</td>
<td>993</td>
<td>18.3</td>
</tr>
<tr>
<td>Mean:</td>
<td>902.3</td>
<td>*192</td>
<td>21.3</td>
</tr>
</tbody>
</table>

* Years that Aurora sales were not published in VicUrban’s Annual Reports. Data derived from direct communication with VicUrban that 605 lots had been sold from 2006-7 through to 2008-9.

* 2004-5 has not been included in calculating the mean as it was not a full year of trading.

VicUrban’s average sales were 902.3 lots. However, Table 3 shows a means annual sales figure of 1490 lots for the URLC, which if the final year is excluded to better reflect URLC, rather than VicUrban performance, 1651 is the average. This means that VicUrban’s sales rates are 55 percent of its predecessor’s. If one considers Aurora’s average sales of 192 houses per year, in the light of the discussion in Section 5.2.1 regarding the number of sales needed to create market leverage, then VicUrban’s ‘sustainability showcase’, its ‘new industry benchmark’, cannot be considered a force in the market place.
Appendix 8: The Flip-chart
INTRODUCTION

This flip chart is based on assessments made on the main impacts of the materials that make up a home. According to this analysis, the materials in this book are minimising some aspect(s) of embodied energy, resource consumption, toxicity and or biodiversity when compared to standard materials. In the cost column if the alternative is less expensive then we have given an indicative range of how much cheaper it is, similarly if it is more expensive. Zero means there should be no cost implication. If an option is coloured green it is the leading edge green product of the group.

Floor Structure:

Framing:

Wall Cladding:

Roof:

Fittings:

This guide demonstrates the availability of environmentally improved materials, it is not comprehensive and we welcome any manufacturers to submit their products for inclusion if they meet the specified criteria, fax to Centre for Design at RMIT University, 03 9639 3412.

December 2002

---

1 Embodied energy is the amount of energy used in the production, transportation and installation of products and materials.
Disclaimer

The content of this Guide is provided for information only. The basis of the Guide is expert judgement supported by research. The Centre for Design at RMIT University makes no claim as to the accuracy or authenticity of the content of this publication and does not accept liability to any person for the information or advice provided in this publication or incorporated into it by reference.

The Centre for Design does not accept any liability for loss or damages incurred as a result of reliance placed upon the content of this publication. The information is provided on the basis that all persons using this publication undertake responsibility for assessing the relevance and accuracy of its content.

Contact details for suppliers were current at the time of publication (January 2003)
The floor structure is a very important and essential part of a home. There are two types of systems: the ‘slab on ground’ and the suspended timber floor.

Environmentally the issues with these systems are:

**Slab on ground:**
- Uses a lot of high embodied energy cement and steel
- Chemical Termite protection leaches into the ground and contaminates it

**Suspended timber**
- Can use non plantation timbers which if they aren’t certified means they come from native forest, affecting biodiversity
- Chemical Termite protection leaches into the ground and contaminates it
- Requires substantial concrete for footings and extra bricks due to the extra building height
- Costs more energy to heat in winter (unless well-insulated) and requires more cooling in summer in Melbourne’s climate

By selecting the products in this chart you have the potential of reducing the Embodied Energy in the slab on ground system by more than half. That is from 1.4GJ/m² to 0.6 GJ/m². So for a 150m² home you are saving 95 GJ of energy or enough to power a home for over one year.

For the suspended timber floor by selecting plantation timbers you are reducing the impact on our biodiversity and by selecting low embodied energy concrete and bricks you will be saving Embodied Energy.

**Hints**
- Insulate around slab edge and ensure compatibility with the termite protection system you are using
- For timber floors insulate under the floor
- Allow plenty of curing time
- Expose mass if you are using thermal mass for passive design
- Specify recycled aggregate to concrete suppliers
- Seek higher than 50% extender – up to 66% can be achieved
## Floors & Footings

### Slab on ground

<table>
<thead>
<tr>
<th>Element</th>
<th>Environment benefit</th>
<th>Product</th>
<th>Company contact</th>
<th>Cost</th>
</tr>
</thead>
<tbody>
<tr>
<td>Concrete</td>
<td>Dilutes the cement by adding fly ash and slag by up to 50% reducing EE by over 50%</td>
<td>Envirocrete</td>
<td>Boral</td>
<td>Up to saving of 5%</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>03 9315 2555</td>
<td></td>
</tr>
<tr>
<td>Concrete</td>
<td>Dilutes the cement by adding fly ash and slag by up to 50% reducing EE by over 50%</td>
<td>Slagment</td>
<td>Blue Circle</td>
<td>Up to saving of 5%</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>03 5241 8291</td>
<td></td>
</tr>
<tr>
<td>Concrete</td>
<td>Dilutes the cement by adding fly ash and slag by up to 50% reducing EE by over 50%</td>
<td>Slag Blend</td>
<td>Pronto</td>
<td>Up to saving of 5%</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>03 9635 1333</td>
<td></td>
</tr>
<tr>
<td>Concrete</td>
<td>Dilutes the cement by adding fly ash and slag by up to 50% reducing EE by over 50%</td>
<td>Premix concrete</td>
<td>Local Mix</td>
<td>Up to saving of 5%</td>
</tr>
<tr>
<td></td>
<td>and uses recycled concrete aggregate</td>
<td></td>
<td>03 5248 2434</td>
<td></td>
</tr>
<tr>
<td>Others added as available 3/2/03</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Recycled aggregate</td>
<td>Reduces resource consumption by using over 40% recycled content; i.e., don’t need to quarry for stone.</td>
<td>Recycled crushed concrete</td>
<td>Alex Frazer</td>
<td>Up to saving of 5%</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>03 9369 7388</td>
<td></td>
</tr>
<tr>
<td>Recycled aggregate</td>
<td>Reduces resource consumption by using over 40% recycled content; i.e., don’t need to quarry for stone.</td>
<td>Recycled crushed concrete</td>
<td>Boral</td>
<td>Up to saving of 5%</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>03 9315 2555</td>
<td></td>
</tr>
<tr>
<td>Recycled aggregate</td>
<td>Reduces resource consumption by using over 40% recycled content; i.e., don’t need to quarry for stone.</td>
<td>Recycled crushed concrete</td>
<td>Blue Circle</td>
<td>Up to saving of 5%</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>03 5241 8291</td>
<td></td>
</tr>
<tr>
<td>Recycled aggregate</td>
<td>Reduces resource consumption by using over 80% recycled content; i.e., don’t need to quarry for stone.</td>
<td>Recycled crushed concrete</td>
<td>Local Mix</td>
<td>Up to saving of 5%</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>03 5248 2434</td>
<td></td>
</tr>
<tr>
<td>Others added as available 3/2/03</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Reinforcement</td>
<td>Reduces embodied energy and resource consumption by using over 50% recycled content</td>
<td>Mesh and bar products</td>
<td>Smorgons ARC</td>
<td>0</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>03 9279 5566</td>
<td></td>
</tr>
<tr>
<td>Others added as available 3/2/03</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Chairs and mesh support</td>
<td>Reduces embodied energy and resource consumption by using over 50% recycled content</td>
<td>Plastic reo support</td>
<td>Smorgons ARC</td>
<td>0</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>03 9279 5566</td>
<td></td>
</tr>
<tr>
<td>Others added as available 3/2/03</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Membrane</td>
<td>Reduces embodied energy and resource consumption by using over 50% recycled content</td>
<td>Slab membrane</td>
<td>Plastic Technology</td>
<td>0</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>03 9462 2011</td>
<td></td>
</tr>
<tr>
<td>Others added as available 3/2/03</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Formwork</td>
<td>Less impact on biodiversity (no imported hardwoods)</td>
<td>Formply (hoop ply face)</td>
<td>Boral</td>
<td>0</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>03 9790 1790</td>
<td></td>
</tr>
<tr>
<td>Formwork</td>
<td>Less impact on biodiversity (no imported hardwoods)</td>
<td>Formply (Radiata face)</td>
<td>Carter Holt Harvey</td>
<td>0</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>1800 335 293</td>
<td></td>
</tr>
<tr>
<td>Others added as available 3/2/03</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
### Slab on ground continued......

<table>
<thead>
<tr>
<th>Element</th>
<th>Environment benefit</th>
<th>Product</th>
<th>Company contact</th>
<th>Contact</th>
</tr>
</thead>
<tbody>
<tr>
<td>Waffle pods</td>
<td>Resource reduction (less sand and concrete needs to be used in slab)</td>
<td>Polystyrene waffle pods</td>
<td>Hunter Pod Supplies</td>
<td>02 4966 3959 0</td>
</tr>
<tr>
<td>Waffle pods</td>
<td>As above plus further reduction and use of waste material</td>
<td>Polystyrene waffle pods</td>
<td>The Waffle Pod People</td>
<td>02 9831 7762 0</td>
</tr>
<tr>
<td>Waffle pods</td>
<td>As above plus further reduction by using recycled cardboard</td>
<td>Cardboard</td>
<td>No manufacturers yet identified</td>
<td>0</td>
</tr>
<tr>
<td>Waffle pods</td>
<td>Further resource use reduction and use of waste material</td>
<td>Tyres</td>
<td>Minibah Recycling</td>
<td>03 9799 6277 0</td>
</tr>
<tr>
<td>Waffle pods</td>
<td>Further resource use reduction and use of waste material</td>
<td>Tyres</td>
<td>Visy Recycling</td>
<td>03 5229 6447 0</td>
</tr>
<tr>
<td>Waffle Pods</td>
<td>Resource use reduction and further reduction through recycling of tyres into the slab system</td>
<td>E-Pod concrete slab system</td>
<td>Ecoflex</td>
<td>02 4940 0178 0</td>
</tr>
<tr>
<td>Waffle pods</td>
<td>As above plus further reduction and use of waste material</td>
<td>Tyres</td>
<td>Neumann Steel</td>
<td>07 5589 9111 0</td>
</tr>
</tbody>
</table>

Others added as available 3/2/03

<table>
<thead>
<tr>
<th>Element</th>
<th>Environment benefit</th>
<th>Product</th>
<th>Company contact</th>
<th>Contact</th>
</tr>
</thead>
<tbody>
<tr>
<td>Termite protection</td>
<td>Being a physical barrier there is no chemical leaching, contamination and toxicity issues</td>
<td>Membrane with enclosed termiteicide</td>
<td>Kordon</td>
<td>1800 634 913 0</td>
</tr>
<tr>
<td>Termite protection</td>
<td>Being a physical barrier there is no chemical leaching, contamination and toxicity issues</td>
<td>Stainless steel mesh around slab penetrations</td>
<td>Termimesh</td>
<td>08 9249 3868 0</td>
</tr>
<tr>
<td>Termite protection</td>
<td>Being a physical barrier there is no chemical leaching, contamination and toxicity issues</td>
<td>Barrier to termite ingress</td>
<td>Granitgard</td>
<td>1800 032 549 0</td>
</tr>
</tbody>
</table>

Others added as available 3/2/03

### Suspended timber framed floor

<table>
<thead>
<tr>
<th>Element</th>
<th>Environment benefit</th>
<th>Product</th>
<th>Company contact</th>
<th>Contact</th>
</tr>
</thead>
<tbody>
<tr>
<td>Stumps</td>
<td>Last longer, are naturally termite resistant and if recycled content and cement used excellent environmental performance.</td>
<td>Concrete stumps</td>
<td>Various local suppliers</td>
<td>0</td>
</tr>
</tbody>
</table>

Others added as available 3/2/03

<table>
<thead>
<tr>
<th>Element</th>
<th>Environment benefit</th>
<th>Product</th>
<th>Company contact</th>
<th>Contact</th>
</tr>
</thead>
<tbody>
<tr>
<td>Joists/bearers</td>
<td>Using plantation, recycled or FSC certified reduces impact on biodiversity</td>
<td>Posi-STRUT</td>
<td>Mitek P/L</td>
<td>03 9730 5555 0</td>
</tr>
<tr>
<td>Joists/bearers</td>
<td>Using plantation, recycled or FSC certified reduces impact on biodiversity</td>
<td>Posi-STRUT</td>
<td>Gang Nall</td>
<td>03 9763 4444 0</td>
</tr>
<tr>
<td>Joists/bearers</td>
<td>Using plantation, recycled or FSC certified reduces impact on biodiversity</td>
<td>I beam &amp; LVL</td>
<td>Various suppliers</td>
<td>0</td>
</tr>
</tbody>
</table>

Others added as available 3/2/03
### Suspended timber framed floor... cont

<table>
<thead>
<tr>
<th>Floors</th>
<th>Using plantation or recycled or FSC certified reduces impact on biodiversity</th>
<th>Radiata pine</th>
<th>Carter Holt Harvey 1800 335 293</th>
<th>0</th>
</tr>
</thead>
<tbody>
<tr>
<td>Floors</td>
<td>Uses plantation, recycled or FSC certified reduces impact on biodiversity</td>
<td>Radiata pine</td>
<td>BBC Hardware 1800 333 378</td>
<td>0</td>
</tr>
<tr>
<td>Floors</td>
<td>Plantation but transport distance is a negative effect</td>
<td>Hardwood (Oak, Oak Rustic, Mahogany Beech, Jarrah, Ash, Beech, and Nordic White)</td>
<td>Swedish company Tarkett 03 9764 1711</td>
<td>+0-25%</td>
</tr>
<tr>
<td>Floors</td>
<td>Grows really quickly, as strong as hardwood</td>
<td>Bamboo</td>
<td>BT bamboo 03 9888 5635</td>
<td>$88 $115 laid</td>
</tr>
<tr>
<td>Floors</td>
<td>Grows really quickly, as strong as hardwood</td>
<td>Bamboo</td>
<td>Living Choice Group 03 9546 6115</td>
<td>$60-$80m2</td>
</tr>
<tr>
<td>Floors</td>
<td>Grows really quickly, as strong as hardwood</td>
<td>Bamboo Grown in Australia</td>
<td>Bamboo Australia 07 5447 0299</td>
<td>$77-96 incl GST</td>
</tr>
<tr>
<td>Floors</td>
<td>Grows really quickly, as strong as hardwood</td>
<td>Bamboo</td>
<td>PlyBoo (USA company) <a href="mailto:PLYBOO@aol.com">PLYBOO@aol.com</a></td>
<td>$75.60 unlaid</td>
</tr>
<tr>
<td>Floors</td>
<td>Grows really quickly, as strong as hardwood</td>
<td>Bamboo</td>
<td>Bamboo Floors Australia 1800 042 150</td>
<td>$68 p m2. $98 laid</td>
</tr>
<tr>
<td>Floors</td>
<td>Using plantation reduces impact on biodiversity</td>
<td>Hoop Pine</td>
<td>Hyne Wholesalers 07 4121 1211</td>
<td>0</td>
</tr>
</tbody>
</table>

Others added as available 3/2/03
Almost all residential houses use either timber or steel for wall and roof framing. There are some issues with both framing techniques.

Environmentally the issues with these systems are:

Steel:
- Steel is very high in Embodied Energy. A reasonable recycled content could reduce this, although steel for house frames does not currently contain a large proportion of recycled material.
- Steel is also less thermally efficient than timber, as steel can create a thermal bridge between internal and external elements, increasing heating and cooling energy use.

Timber
- Timber framing can involve the use of non-plantation (i.e. biodiversity effecting) material.
- If you can use finger joined timber this allows you to use smaller pieces of wood and saves on resources.

Hints
✓ If you use steel ensure the detail of the roof and insulation deals with thermal bridging, eg strip of timber over the steel beam – if not this can reduce effectiveness of insulation by 30%.
✓ Use steel in structural situations only where plantation timber or composite elements are not suitable, i.e. Long spans or when the timber member may be too deep dimensionally.
✓ Ortech Industries’ Easiboard can be used to replace internal stud walls. It is not generally used in load bearing situations, and there can be issues with service access and finish. It has an extremely low Embodied Energy, and walls can be erected cheaply and quickly.
## Framing

### Steel framing

<table>
<thead>
<tr>
<th>Element</th>
<th>Environment benefit</th>
<th>Product</th>
<th>Company contact</th>
<th>Cost</th>
</tr>
</thead>
<tbody>
<tr>
<td>House frame</td>
<td>This material has a high embodied energy &amp; resource use</td>
<td>Steel house frame</td>
<td>Lysaght 1800 800 789</td>
<td>0</td>
</tr>
<tr>
<td>House frame</td>
<td>This material has a high embodied energy &amp; resource use</td>
<td>Steel house frame</td>
<td>Stratco Australia P/L 08 8349 5555</td>
<td>0</td>
</tr>
</tbody>
</table>

Others added as available 3/2/03

### Timber framing

<table>
<thead>
<tr>
<th>Element</th>
<th>Environment benefit</th>
<th>Product</th>
<th>Company contact</th>
<th>Cost</th>
</tr>
</thead>
<tbody>
<tr>
<td>Studs, Noggins, Plates</td>
<td>This uses plantation so there is less biodiversity impact</td>
<td>MGP pine</td>
<td>All timber merchants</td>
<td>0</td>
</tr>
<tr>
<td>Internal stud walls</td>
<td>Low embodied energy</td>
<td>Easiboard</td>
<td>Ortech Industries 1800 805 919</td>
<td>0-25% more</td>
</tr>
</tbody>
</table>

Others added as available 3/2/03

### Lintels

<table>
<thead>
<tr>
<th>Element</th>
<th>Environment benefit</th>
<th>Product</th>
<th>Company contact</th>
<th>Cost</th>
</tr>
</thead>
<tbody>
<tr>
<td>Lintel</td>
<td>Uses recycled steel so lower resource use and EE</td>
<td>Steel lintel (Galintel)</td>
<td>Smargons ARC 03 9279 5566</td>
<td>0</td>
</tr>
<tr>
<td>Lintel</td>
<td>This uses plantation so there is less biodiversity impact</td>
<td>Laminated Veneer Lumber</td>
<td>Carter Holt Harvey 1800 335 293</td>
<td>0</td>
</tr>
<tr>
<td>Lintel</td>
<td>This uses plantation so there is less biodiversity impact</td>
<td>MGP pine</td>
<td>All timber merchants</td>
<td>0</td>
</tr>
<tr>
<td>Lintel</td>
<td>This uses plantation so there is less biodiversity impact</td>
<td>Slash pine</td>
<td>Hyne Wholesalers 07 4121 1211</td>
<td>0</td>
</tr>
<tr>
<td>Lintel</td>
<td>Using this instead of timber increases embodied energy but decreases impact on biodiversity</td>
<td>Galvanized steel lintel</td>
<td>Pryda 03 9706 5488</td>
<td>0</td>
</tr>
</tbody>
</table>

Others added as available 3/2/03
Wall Cladding

The use of high Embodied Energy products is discouraged, where possible, throughout the project. If they are designed to last a long time and to be very efficient this can offset the embodied energy.

Environmental issues associated with cladding types:

Bricks:
- Fired clay bricks are very high in embodied energy and their use as a cladding material should be minimised where possible.
- If you choose bricks from an efficient firing manufacturer, you can reduce the embodied energy from 10 – 25 to 5/5.5 GJ/1000 bricks.

Hints
- Using lime based mortars makes it easier to recycle at the end of life
- Buy pre scored bricks for more accurate splitting
- Store half bricks in one area for reuse
- Avoid use of raked mortar joint – use ironed or flush as this will make the wall last longer and stop moisture entering the wall
- Use second-hand or ‘seconds’ bricks where practicable
- Avoid using acid to wash bricks clean – use high pressure water instead

Timber:
- Suggested timber cladding, fibre cement sheet cladding and their derivative systems, considerably lower embodied energy if selected over brickwork. Many options are given in the chart.
- The main environmental issue is the use of sustainability certified (FSC) or plantation grown timbers

Rendered finishes:
Render finishes on a Polystyrene substrate have some benefits, but at the expense of embodied energy and recycled content.
## Wall Cladding

### Brick Veneer

<table>
<thead>
<tr>
<th>Element</th>
<th>Environment benefit</th>
<th>Product</th>
<th>Company Contact</th>
<th>Cost</th>
</tr>
</thead>
<tbody>
<tr>
<td>Dampproof course</td>
<td>Recycled plastic</td>
<td>Builder’s film</td>
<td>Plastic Technology 03 9546 2855</td>
<td>0</td>
</tr>
<tr>
<td>Bricks</td>
<td>Lower embodied energy and efficient manufacturing process</td>
<td>Clay brick</td>
<td>Nubrick 03 9801 1122</td>
<td>0</td>
</tr>
<tr>
<td>Bricks</td>
<td>Lower embodied energy</td>
<td>Clay brick</td>
<td>Selkirk 03 9546 2855</td>
<td>0</td>
</tr>
<tr>
<td>Others added as available 3/2/03</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

### Weatherboard

<table>
<thead>
<tr>
<th>Element</th>
<th>Environment benefit</th>
<th>Product</th>
<th>Company Contact</th>
<th>Cost</th>
</tr>
</thead>
<tbody>
<tr>
<td>Weatherboard cladding</td>
<td>Less biodiversity impact as it comes from plantation. Need to ensure plantation origin.</td>
<td>Baltic pine pre primed weatherboards</td>
<td>Various timber merchants</td>
<td>0</td>
</tr>
<tr>
<td>Weatherboard cladding</td>
<td>Less biodiversity impact as it comes from plantation. Need to ensure plantation origin.</td>
<td>H3 treated pine weatherboards</td>
<td>No suppliers yet sourced.</td>
<td>0</td>
</tr>
<tr>
<td>Weatherboard cladding</td>
<td>No biodiversity impact and low resource consumption as it is recycled</td>
<td>Recycled or Reclaimed timber</td>
<td>Shiver Me Timbers 03 9379 5397</td>
<td>0-25% more</td>
</tr>
<tr>
<td>Ply Sheet Cladding</td>
<td>No biodiversity impact and low resource consumption as it is recycled.</td>
<td>Ecoply</td>
<td>Carter Holt Harvey 1800 335 293</td>
<td>0</td>
</tr>
<tr>
<td>Others added as available 3/2/03</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

### Cladding

<table>
<thead>
<tr>
<th>Element</th>
<th>Environment benefit</th>
<th>Product</th>
<th>Company Contact</th>
<th>Cost</th>
</tr>
</thead>
<tbody>
<tr>
<td>Fibre Cement Sheet</td>
<td>Low EE and resource use reduction</td>
<td>Harditex</td>
<td>James Hardie 13 11 03</td>
<td>0</td>
</tr>
<tr>
<td>Fibre Cement Sheet</td>
<td>Low EE and resource use reduction but has some PVC.</td>
<td>Texturebase</td>
<td>CSR 02 9844 7935</td>
<td>0</td>
</tr>
<tr>
<td>Fibre Cement Sheet</td>
<td>High emissions. Better insulating, is rendered so has higher EE.</td>
<td>Maclad System</td>
<td>Melbourne Acrylic Coatings 03 9558 5568</td>
<td>0-25% more</td>
</tr>
<tr>
<td>Fibre Cement Sheet</td>
<td>Toxic dust but is stable when intact. Imported.</td>
<td>Trespa ‘Meteon’</td>
<td>Laminex Group 132 136</td>
<td>0-25% more</td>
</tr>
<tr>
<td>Rendered wall system</td>
<td>Rendered has higher EE but lasts longer</td>
<td>CMX wall system</td>
<td>James Hardie 13 11 03</td>
<td>+0-25% more</td>
</tr>
<tr>
<td>Rendered wall system</td>
<td>Low EE and resource use reduction</td>
<td>Rendaline</td>
<td>CSR 02 9844 7935</td>
<td>+0-25% more</td>
</tr>
<tr>
<td>Others added as available 3/2/03</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

---

**Floor Structure** | **Framing** | **Wall Cladding** | **Roof Cladding** | **Fittings & Finishes**
There is very little environmental difference between sheet metal roofing and concrete tiles. The decision will depend on design issues.

The environmental issues are:

Steel Roofing:
- High embodied energy, but low maintenance and light weight (less structure), help to reduce its impact
- High recyclability at end of life

Tile Roofing:
- High embodied energy unless using concrete tiles;
- Industry standard for battens is hardwood (biodiversity impact)

Hints:
- Colour coated steel roofing has longer life than zinc coated equivalent
- Use light colours especially if you are using steel roofing
- If using tiles, select concrete tiles in preference to fired terracotta, for lower Embodied Energy
- Encourage alternatives to hardwood battens, especially for tile roofs
- Ensure compatibility with capture and use of rainwater – including design of gutters to limit leaf litter build-up and design of roof to minimise pipework to tank
# Roof Cladding

## Roof Tiles

<table>
<thead>
<tr>
<th>Element</th>
<th>Environment benefit</th>
<th>Product</th>
<th>Company contact</th>
<th>Cost</th>
</tr>
</thead>
<tbody>
<tr>
<td>Concrete Tiles</td>
<td>Lower EE than baked tile</td>
<td>Cement tile</td>
<td>Various suppliers</td>
<td>0</td>
</tr>
<tr>
<td>Others added as available 3/2/03</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

## Steel Roofing

<table>
<thead>
<tr>
<th>Element</th>
<th>Environment benefit</th>
<th>Product</th>
<th>Company contact</th>
<th>Cost</th>
</tr>
</thead>
<tbody>
<tr>
<td>Roof cladding</td>
<td>Lower EE than baked tile, less material needed</td>
<td>Zinc or colour coated steel</td>
<td>Various suppliers</td>
<td>0</td>
</tr>
<tr>
<td>Others added as available 3/2/03</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
**Fittings and Finishes**

Paint and joinery products are major causes of toxicity leading to poor indoor air quality. Where possible, alternatives have been suggested that produce less or no toxic emissions while still satisfying environmental and cost criteria.

Environmental issues associated with fittings and finishes:

**Woods:**
- Formaldehyde emissions from MDF, plywood and particleboard are major contributors to airborne toxins in homes, although this off-gassing does diminish with time.
- Where possible, these materials may be sealed to reduce emissions, though this only lasts as long as the seal remains intact.

**Hints**
- Low emission MDF options and alternatives are available.
- Use whole woods wherever possible.

**Finishes:**
- Oil based finishes will give off VOC emissions, this will effect the applier more than the home owner as it mostly dissipates in 1 – 6 month
- Chemically sensitive people will be effected longer

**Hints**
- Use natural oils or beeswax rather than products containing solvents or synthetics.
- Simple non-toxic finishes may be used to seal interior and many exterior woods.
- Acrylic render systems and non-toxic, durable paints for external walls are widely available and used in the industry. Many options are listed.

**Rule of Thumb - the priority is to use mechanical fixings and minimise painting then water based finishes, glues, adhesives and paint where possible**

**Insulation:**
- The important thing is to use the right R value insulation.

**Hints**
- Make sure your insulation covers the space entirely
- Insulate roof right up to the edge of the ceiling (but stop insulation contacting the roof) A combination of foil under the roofing material with an airspace below it and bulk insulation on the ceiling works very well in Melbourne
## Fittings & Finishes

### External Paint

<table>
<thead>
<tr>
<th>Element</th>
<th>Environment benefit</th>
<th>Product</th>
<th>Company contact</th>
<th>Cost</th>
</tr>
</thead>
<tbody>
<tr>
<td>Paint</td>
<td>Lower toxicity less emissions. Very durable.</td>
<td>Granit mineral paint</td>
<td>Keim distributor 02 9211 6644</td>
<td>0-25% more</td>
</tr>
<tr>
<td>Paint</td>
<td>Lower toxicity less emissions, water based less EE. Cement based paint.</td>
<td>Taubmans Bristol</td>
<td>03 9518 0700</td>
<td>0</td>
</tr>
<tr>
<td>Paint</td>
<td>Lower toxicity less emissions.</td>
<td>Murobond</td>
<td>Murobond 02 9906 7299</td>
<td>0</td>
</tr>
<tr>
<td>Paint</td>
<td>Lower toxicity less emissions, water based less EE.</td>
<td>Acrylic Render</td>
<td>Dulux 13 23 77 Rockcote 1800 267 737</td>
<td>0-25% more</td>
</tr>
<tr>
<td>Timber Finish</td>
<td>Lower toxicity and less emissions. Stain needs reapplication.</td>
<td>Organoil Mitre 10 Advice line 13 63 10</td>
<td>0-10% more</td>
<td></td>
</tr>
<tr>
<td>Timber finish</td>
<td>Lower toxicity and less emissions. Stain needs reapplication.</td>
<td>Woodguard Evergard Industries 03 9401 2266</td>
<td>0-10% more</td>
<td></td>
</tr>
<tr>
<td>Timber finish</td>
<td>Lower toxicity and less emissions. Very durable.</td>
<td>Woodman's specialised timber coatings</td>
<td>Several suppliers Victorian distributor 03 9762 9588</td>
<td>0-20% more</td>
</tr>
</tbody>
</table>

Others added as available 3/2/03

### Internal Finishes

<table>
<thead>
<tr>
<th>Paints</th>
<th>Environment benefit</th>
<th>Product</th>
<th>Company contact</th>
<th>Cost</th>
</tr>
</thead>
<tbody>
<tr>
<td>Paints</td>
<td>Lower toxicity less emissions, water based less EE</td>
<td>Breatheasy Dulux</td>
<td>13 23 77</td>
<td>0-10% more</td>
</tr>
<tr>
<td>Paints</td>
<td>Lower toxicity less emissions, water based less EE</td>
<td>Taubmans Bristol</td>
<td>03 9518 0700</td>
<td>0-10% more</td>
</tr>
<tr>
<td>Paints</td>
<td>Lower toxicity less emissions, water based less EE</td>
<td>Livos Dubron</td>
<td>02 4782 6155</td>
<td>0-20% more</td>
</tr>
</tbody>
</table>

Others added as available 3/2/03

### Fitout

<table>
<thead>
<tr>
<th>MDF</th>
<th>Environment benefit</th>
<th>Product</th>
<th>Company contact</th>
<th>Cost</th>
</tr>
</thead>
<tbody>
<tr>
<td>MDF</td>
<td>Industry standard low emission and plantation timber</td>
<td>E1 Alpine Alpine MDF Industries 03 9663 5833</td>
<td>0</td>
<td></td>
</tr>
<tr>
<td>MDF</td>
<td>Industry standard low emission and plantation timber</td>
<td>Board and Ply Brims Wood Panels 03 9763 6700</td>
<td>0</td>
<td></td>
</tr>
<tr>
<td>MDF</td>
<td>Industry standard low emission and plantation timber</td>
<td>E0 Alpine currently only exported Alpine MDF Industries 03 9663 5833</td>
<td>0+25% more</td>
<td></td>
</tr>
<tr>
<td>Hoop pine plywood</td>
<td>Plantation timber and low emission</td>
<td>Board and ply Carter Holt Harvey 1800 335 293</td>
<td>0</td>
<td></td>
</tr>
<tr>
<td>Hoop pine plywood</td>
<td>Plantation timber and low emission</td>
<td>Board and ply Brims Wood Panels 03 9763 6700</td>
<td>0</td>
<td></td>
</tr>
</tbody>
</table>

Others added as available 3/2/03
## Plumbing

<table>
<thead>
<tr>
<th>Element</th>
<th>Environment benefit</th>
<th>Product</th>
<th>Company contact</th>
<th>Cost</th>
</tr>
</thead>
<tbody>
<tr>
<td>Pipes</td>
<td>100% Recycled content</td>
<td>HDPE, AS4130 Water Supply Pipe</td>
<td>PPI Corporation 07 3865 2300</td>
<td>0</td>
</tr>
<tr>
<td>Pipes</td>
<td>100% Recycled content</td>
<td>Polypropylene Stormwater Downpipe.</td>
<td>PPI Corporation 07 3865 2300</td>
<td>0-10%</td>
</tr>
<tr>
<td>Pipes</td>
<td>49% Recycled content, non PVC</td>
<td>Series 2000 Drainage Pipe</td>
<td>Hepworth Drainage 03 9874 0303</td>
<td>0</td>
</tr>
<tr>
<td>Pipes</td>
<td>Lower embodied energy and toxicity, non-PVC</td>
<td>All water pipes</td>
<td>Reece 03 9347 4433</td>
<td>0+20%</td>
</tr>
<tr>
<td>Pipes</td>
<td>Recycled content</td>
<td>Flat pipe drainage system HDPE</td>
<td>Geofabrics 03 8586 9111</td>
<td>0</td>
</tr>
<tr>
<td>Pipes</td>
<td>100% Recycled content</td>
<td>The Green Pipe (ag pipe) HDPE</td>
<td>Recycled Plastic Technology</td>
<td>0</td>
</tr>
<tr>
<td>Taps</td>
<td>Saves water and energy</td>
<td>Tap valves</td>
<td>Aqualoc 1800 781 994</td>
<td>0-10%</td>
</tr>
<tr>
<td>Others added as available 3/2/03</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

## Openings

| Windows (AL) | Use recycled aluminium                      | windows                          | G James Glass & Aluminium Pty, 03 9219 2077 | 0      |
| Windows (Timber) | Efficient resource use                  | windows                          | Primex – Canterbury Windows 03 9558 5222 | 0      |
| Windows (Timber) | Efficient resource use                  | windows                          | Primex – Pickering Joinery 03 5243 4166 | 0      |
| Windows (Timber) | Energy efficient                           | Tyrol tilt & turn double glazed windows | Paarhammer 03 5368 1999 | 0      |
| Windows (Timber) | Recycled windows                           | Windows                          | Woodhill Timber Windows and Joinery 02 4228 8899 | 0+25%  |
| Others added as available 3/2/03 |                              |                                  |                                   |        |

## Insulation

| Bulk insulation | 100% recycled polyester                       | Thermowool batts                 | John Stubbs 03 9899 7876          | 0      |
| Bulk insulation | 100% recycled polyester                       | Insulation products made from wool or polyester | A&A Discount Insulation 03 9315 6975 | 0-10%  |
| Bulk insulation | Polyester and thermally efficient            | Greenstuf - Autex                | Available most hardware stores     | 0      |
| Thermal break   | Stops energy and heat loss but made from Polystyrene | Deckmate Thermal Spacers | Aerodynamic Developments 1800 051 100 | 0      |
| Others added as available 3/2/03 |                              |                                  |                                   |        |

## Doors

| External doors | Plantation timber Hoop pine                  | Hollow core door                 | Finlayson’s Doors 07 3393 0588     | 0      |
| External doors | Plantation timber and reduced resource use   | Hollow core door                 | Lilley’s Doors 03 9878 3688        | 0      |
| Others added as available 3/2/03 |                              |                                  |                                   |        |
## Floor coverings

<table>
<thead>
<tr>
<th>Element</th>
<th>Environment benefit</th>
<th>Product</th>
<th>Company contact</th>
<th>Cost</th>
</tr>
</thead>
<tbody>
<tr>
<td>Wood flooring</td>
<td>Hard wearing</td>
<td>Sisal, seagrass and natural matting</td>
<td>Floospace 03 9822 4455</td>
<td>0</td>
</tr>
<tr>
<td>Lino flooring</td>
<td>Durable</td>
<td>Linoleum</td>
<td>Linosom Veneto SOMMER</td>
<td>0</td>
</tr>
<tr>
<td>Cork flooring</td>
<td>Renewable source</td>
<td>Cork and rubber flat sheet flooring</td>
<td>Comcork distributor 02 9555 2131</td>
<td>0</td>
</tr>
<tr>
<td>Lino</td>
<td>Durable</td>
<td>Marmoleum</td>
<td>Forbo Krommerie</td>
<td>0</td>
</tr>
<tr>
<td>Others added as available 3/2/03</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

## Miscellaneous

<table>
<thead>
<tr>
<th>Element</th>
<th>Environment benefit</th>
<th>Product</th>
<th>Company contact</th>
<th>Cost</th>
</tr>
</thead>
<tbody>
<tr>
<td>Decking</td>
<td>100% recycled plastic</td>
<td>Anti-skid Decking</td>
<td>Repeat Plastics 03 9739 6919</td>
<td>0</td>
</tr>
<tr>
<td>Lights</td>
<td>Long life fluorescent lamps, cuts emissions</td>
<td>Alto Lamp technology</td>
<td>Philips 02 9947 0325</td>
<td>0</td>
</tr>
<tr>
<td>Benchtops &amp; cupboards</td>
<td>Reclaimed and salvaged hardwood timber</td>
<td>Kitchen benchtops &amp; cupboards</td>
<td>Nullabor Forest Timber Industries 03 9397 5993</td>
<td>0</td>
</tr>
<tr>
<td>Cabinets</td>
<td>Recycled plastic</td>
<td>Flat sheet panels</td>
<td>Unimould 03 9369 8700</td>
<td>0</td>
</tr>
<tr>
<td>Others added as available 3/2/03</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
Appendix 9: The Eco-score card
Eco-Score Card
Selection of environmentally preferable building materials

April 2006
Introduction

A minimum number of 10 materials with a combined ‘ECO-Score’ of 80 points will need to be specified from the Eco-selector in order to have the building design approved by the Design Review Panel. A minimum number of points must be specified from each building element type:

- Category A 33 – strongly recommended
- Category B 3 – recommended
- Category C 7 – to be avoided if possible

For credit to be given, the material has to be used for 90% of the building element involved.

Please tick the following box if you have not specified rainforest timber for any of the building materials in the Aurora project (check www.cites.org or www.unep-wcmc.org for list of rainforest timber)

Title/name of design:
Lot:
Eco Score:
Name:
Organisation:
Signature: Date:
## Floor structure (20 Points)

<table>
<thead>
<tr>
<th>Application</th>
<th>Product Type</th>
<th>Category</th>
<th>Score</th>
<th>Tick if Specified</th>
<th>List your Suppliers</th>
<th>Tick if Invoice attached</th>
</tr>
</thead>
<tbody>
<tr>
<td>Slab on Ground</td>
<td>Concrete with fly ash/slag content cement: 80%</td>
<td>A</td>
<td>18</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Concrete with fly ash/slag content cement: 60%</td>
<td>A</td>
<td>15</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Concrete with fly ash/slag content cement: 50%</td>
<td>A</td>
<td>14</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Concrete with fly ash/slag content cement: 40%</td>
<td>A</td>
<td>12</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Concrete with fly ash/slag content cement: 30%</td>
<td>A</td>
<td>10</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>100% Recycled aggregate in slab</td>
<td>A</td>
<td>10</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Reinforcing steel - 100% recycled content</td>
<td>A</td>
<td>5</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Reinforcing Steel - up to 85%</td>
<td>B</td>
<td>4</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Alternative to steel reinforcement in concrete mix</td>
<td>A</td>
<td>1</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Reo chairs - recycled</td>
<td>A</td>
<td>1</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Membrane - recycled</td>
<td>A</td>
<td>1</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Formwork – approved timbers</td>
<td>A</td>
<td>5</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Waffle pods - polystyrene</td>
<td>A</td>
<td>2</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Waffle pods – recycled tyres</td>
<td>B</td>
<td>5</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Full Waffle pod system</td>
<td>A</td>
<td>5</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

**Category**

- **A** - strongly recommended
- **B** - recommended
- **C** - to be avoided if possible

### Optimum:
- Concrete with fly ash/slag content cement
- Recycled aggregate
- Recycled reinforcing
- Waffle pods
- Mechanical Termite barrier

### Examples of slab system achieving 20 points:

1. Concrete with fly ash/slag content cement: 30% + Recycled aggregate in slab
2. Concrete with fly ash/slag content cement: 60% + Reinforcing steel – recycled content
3. Recycled aggregate in slab + Formwork – approved timbers + Waffle pods – recycled tyres
## Floor structure (20 Points)

<table>
<thead>
<tr>
<th>Application</th>
<th>Product Type</th>
<th>Category</th>
<th>Score</th>
<th>Tick if Specified</th>
<th>List your Suppliers</th>
<th>Tick if Invoice attached</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Suspended timber framed floor</strong></td>
<td>Tongue and groove approved timber floor boards, nailed only and insulated (no glue)</td>
<td>✓ ✓ ✓ A</td>
<td>20</td>
<td>✓</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Floating floor (tongue and groove, board, ply or composite) approved timber</td>
<td>✓ ✓ ✓ A</td>
<td>5</td>
<td>✓</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Floor substrate: low emission particleboard</td>
<td>✓ ✓ ✓ A</td>
<td>5</td>
<td>✓</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Floors – imported rainforest timber*</td>
<td>X ✓ ✓ C</td>
<td>-15</td>
<td>✓</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Floors – imported hardwood from plantation</td>
<td>✓ ✓ ✓ B</td>
<td>2</td>
<td>✓</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Low emission particleboard with approved timber, or other non-timber flooring finish</td>
<td>✓ ✓ ✓ A</td>
<td>10</td>
<td>✓</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Concrete stumps - virgin</td>
<td>✓ ✓ ✓ B</td>
<td>2</td>
<td>✓</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Concrete stumps – recycled content</td>
<td>✓ ✓ ✓ A</td>
<td>5</td>
<td>✓</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Joists / bearers – approved timbers</td>
<td>✓ ✓ ✓ A</td>
<td>5</td>
<td>✓</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Wax finish</td>
<td>✓ ✓ ✓ A</td>
<td>5</td>
<td>✓</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Low emission varnish</td>
<td>✓ ✓ ✓ A</td>
<td>5</td>
<td>✓</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

**Category**
- A ✓ ✓ ✓ – strongly recommended
- B ✓ – recommended
- C X – to be avoided if possible

### Optimum:
- Tongue and groove approved timber floor boards
- Nailed only (no glue as glue makes it virtually impossible to recycle the timber)
- Low emission varnish
- Concrete stumps with recycled content
- Approved timbers (see ‘EcoSelector’ guide for definition)

### Examples of floor system achieving 20 points:
1. Floating floor (tongue and groove, board, ply or composite) approved timber + Wax finish + Termite protection – physical barrier + Concrete stumps – recycled content
2. Low emission particleboard with approved timber, or other non-timber flooring finish + Joists / bearers – approved timbers + Concrete stumps – recycled content
## Floor structure (20 Points)

<table>
<thead>
<tr>
<th>Application</th>
<th>Product Type</th>
<th>Category</th>
<th>Score</th>
<th>Tick if Specified</th>
<th>List your Suppliers</th>
<th>Tick if Invoice attached</th>
</tr>
</thead>
<tbody>
<tr>
<td>Suspended timber framed floor</td>
<td>Low emission polyurethane varnish</td>
<td>✓ B</td>
<td>5</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Polyurethane varnish</td>
<td>X C</td>
<td>-5</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Termite protection – physical barrier</td>
<td>✓ ✓ A</td>
<td>5</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Sub Total

**Category**
- ✓ ✓ – strongly recommended
- ✓ – recommended
- X – to be avoided if possible

**Optimum:**
- Tongue and groove approved timber floor boards
- Nailed only (no glue)
- Low emission varnish
- Concrete stumps with recycled content
- Approved timbers (see ‘EcoSelector’ guide for definition)

**Examples of floor system achieving 20 points:**
1. Floating floor (tongue and groove, board, ply or composite) approved timber + Wax finish + Termite protection – physical barrier + Concrete stumps – recycled content
2. Low emission particleboard with approved timber, or other non-timber flooring finish + Joists / bearers – approved timbers + Concrete stumps – recycled content
### Framing (10 Points)

<table>
<thead>
<tr>
<th>Application</th>
<th>Product Type</th>
<th>Category</th>
<th>Score</th>
<th>Tick if Specified</th>
<th>List your Suppliers</th>
<th>Tick if Invoice attached</th>
</tr>
</thead>
<tbody>
<tr>
<td>Steel framing</td>
<td>Steel with thermal breaks (e.g. timber, plastic or plaster strips, or insulation)</td>
<td>✓✓ A</td>
<td>10</td>
<td>✗</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Timber framing</td>
<td>Approved timber</td>
<td>✓✓ A</td>
<td>10</td>
<td>✗</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Rainforest timber</td>
<td>X C</td>
<td>-10</td>
<td>✗</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Beams</td>
<td>Engineered plantation timber beams</td>
<td>✓✓ A</td>
<td>5</td>
<td>✗</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Lintels</td>
<td>Recycled steel</td>
<td>✓✓ A</td>
<td>5</td>
<td>✗</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Engineered plantation timber beams</td>
<td>✓✓ A</td>
<td>5</td>
<td>✗</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Plantation timber</td>
<td>✓✓ A</td>
<td>5</td>
<td>✗</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Lintels from rainforest timber</td>
<td>X C</td>
<td>-10</td>
<td>✗</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Sub Total

**Category**

- ✓✓ A – strongly recommended
- ✓✓ B – recommended
- X C – to be avoided if possible

---

**Examples of framing system achieving 10 points:**

1. Steel with thermal breaks (e.g. timber, plastic or plaster strips, or insulation)
2. Recycled steel lintels + Engineered plantation timber beams
Wall Cladding (20 Points)

<table>
<thead>
<tr>
<th>Application</th>
<th>Product Type</th>
<th>Category</th>
<th>Score</th>
<th>Tick if Specified</th>
<th>List your Suppliers</th>
<th>Tick if Invoice attached</th>
</tr>
</thead>
<tbody>
<tr>
<td>Insulation</td>
<td>Approved insulation</td>
<td>A</td>
<td>10</td>
<td>✓✓</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Fibre cement sheet</td>
<td>Fibre cement sheet with approved insulation</td>
<td>A</td>
<td>10</td>
<td>✓✓</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Brick veneer</td>
<td>Recycled plastic damp-proof course</td>
<td>B</td>
<td>1</td>
<td>✓✓</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Low embodied energy bricks</td>
<td>A</td>
<td>15</td>
<td>✓✓</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Low embodied energy bricks with lime rich cement mortar</td>
<td>A</td>
<td>18</td>
<td>✓✓</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Recycled bricks</td>
<td>A</td>
<td>20</td>
<td>✓✓</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>ACC concrete blocks</td>
<td>A</td>
<td>18</td>
<td>✓✓</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Weatherboard</td>
<td>Recycled weatherboards</td>
<td>A</td>
<td>15</td>
<td>✓✓</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Fibre cement weatherboards</td>
<td>A</td>
<td>10</td>
<td>✓✓</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Low embodied energy fibre cement weatherboards</td>
<td>A</td>
<td>12</td>
<td>✓✓</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Non CCA - H3 treated pine weatherboards</td>
<td>B</td>
<td>8</td>
<td>✓✓</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Ply sheet weatherboards</td>
<td>A</td>
<td>10</td>
<td>✓✓</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Other cladding systems</td>
<td>Straw board panels</td>
<td>B</td>
<td>5</td>
<td>✓✓</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Rendered wall system</td>
<td>B</td>
<td>1</td>
<td>✓✓</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Category A✓✓ – strongly recommended  B✓ – recommended  C✗ – to be avoided if possible

Examples of wall cladding system achieving 20 points:

1. Insulation + Low embodied energy bricks
2. Insulation + Rendered wall system +
3. Insulation + Ply sheet weatherboards
## Wall Cladding (20 Points)

<table>
<thead>
<tr>
<th>Application</th>
<th>Product Type</th>
<th>Category</th>
<th>Score</th>
<th>Tick if Specified</th>
<th>List your Suppliers</th>
<th>Tick Invoice attached</th>
</tr>
</thead>
<tbody>
<tr>
<td>Concrete and expanded polystyrene</td>
<td>With recycled content cement</td>
<td>B</td>
<td>5</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>wall system</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Without recycled content cement</td>
<td>B</td>
<td>10</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Autoclaved aerated concrete</td>
<td>B</td>
<td>10</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>styrofoam/concrete/</td>
<td>styrofoam/concrete/render/walling system</td>
<td></td>
<td>5</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>concrete/render/walling system</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

**Sub Total**

<table>
<thead>
<tr>
<th>Category</th>
<th>A✓✓ – strongly recommended</th>
<th>B✓ – recommended</th>
<th>C✗ – to be avoided if possible</th>
</tr>
</thead>
</table>

**Examples of wall cladding system achieving 20 points:**

1. Insulation + Low embodied energy bricks
2. Insulation + Rendered wall system +
3. Insulation + Ply sheet weatherboards
### Roof Cladding (15 Points)

<table>
<thead>
<tr>
<th>Application</th>
<th>Product Type</th>
<th>Category</th>
<th>Score</th>
<th>Tick if Specified</th>
<th>List your Suppliers</th>
<th>Tick if Invoice attached</th>
</tr>
</thead>
<tbody>
<tr>
<td>Insulation</td>
<td>Approved insulation</td>
<td>✔️ ✔️ A</td>
<td>5</td>
<td>☐</td>
<td>☐</td>
<td>☐</td>
</tr>
<tr>
<td>Roof tiles</td>
<td>Concrete tiles</td>
<td>✔️ B</td>
<td>5</td>
<td>☐</td>
<td>☐</td>
<td>☐</td>
</tr>
<tr>
<td></td>
<td>Recycled content cement in concrete tiles</td>
<td>✔️ ✔️ A</td>
<td>10</td>
<td>☐</td>
<td>☐</td>
<td>☐</td>
</tr>
<tr>
<td></td>
<td>Terracotta tiles</td>
<td>✔️ B</td>
<td>5</td>
<td>☐</td>
<td>☐</td>
<td>☐</td>
</tr>
<tr>
<td>Steel roofing</td>
<td>Light coloured steel roofing</td>
<td>✔️ B</td>
<td>5</td>
<td>☐</td>
<td>☐</td>
<td>☐</td>
</tr>
<tr>
<td></td>
<td>Foil under roof if dark coloured steel roofing</td>
<td>✔️ B</td>
<td>5</td>
<td>☐</td>
<td>☐</td>
<td>☐</td>
</tr>
<tr>
<td>Roof vent</td>
<td>Roof vent</td>
<td>✔️ ✔️ A</td>
<td>5</td>
<td>☐</td>
<td>☐</td>
<td>☐</td>
</tr>
</tbody>
</table>

Sub Total

**Category**

- ✔️ ✔️ A - strongly recommended
- ✔️ B - recommended
- ✔️ ❌ C - to be avoided if possible

---

**Examples of roof cladding system achieving 15 points:**

1. Approved insulation + Light coloured steel roofing + Roof vent
2. Approved insulation + Recycled content cement in concrete tiles
### Fittings and Finishes (10 Points)

<table>
<thead>
<tr>
<th>Application</th>
<th>Product Type</th>
<th>Category</th>
<th>Score</th>
<th>Tick if Specified</th>
<th>List your Suppliers</th>
<th>Tick if Invoice attached</th>
</tr>
</thead>
<tbody>
<tr>
<td>Paint</td>
<td>Water based low emission paint</td>
<td>A</td>
<td>6</td>
<td>X</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Stains and oils</td>
<td>Low emission timber finish</td>
<td>A</td>
<td>3</td>
<td>X</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Timber and panelling</td>
<td>Low emission MDF – EO</td>
<td>A</td>
<td>5</td>
<td>X</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Approved timber plywood</td>
<td>A</td>
<td>3</td>
<td>X</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Pipes</td>
<td>Recycled post-consumer plastic pipe</td>
<td>A</td>
<td>6</td>
<td>X</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>80 - 100%</td>
<td>A</td>
<td>6</td>
<td>X</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Recycled post-consumer plastic pipe – less than 80%</td>
<td>B</td>
<td>2</td>
<td>X</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Polypropylene or polyethylene pipe</td>
<td>A</td>
<td>7</td>
<td>X</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Windows</td>
<td>Recycled aluminium 100%</td>
<td>A</td>
<td>4</td>
<td>X</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Recycled aluminium &gt; 20%</td>
<td>B</td>
<td>2</td>
<td>X</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Approved timber windows</td>
<td>A</td>
<td>5</td>
<td>X</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Tropical rainforest window</td>
<td>C</td>
<td>-5</td>
<td>X</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Western red cedar</td>
<td>C</td>
<td>-5</td>
<td>X</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

**Category**
- **A** ✔️ – strongly recommended
- **B** ✔️ – recommended
- **C** X – to be avoided if possible

**Examples of fittings and finishes combined to achieve 10 points:**

1. Water based low emission paint + Natural fibre flooring-sisal, seagrass, coir + Recycled post-consumer plastic pipe – less than 80%
2. Low emission timber finish + Approved timber plywood + Doors - Approved timber + Fittings - Approved timber
3. Halogen free and fire performance cables
<table>
<thead>
<tr>
<th>Application</th>
<th>Product Type</th>
<th>Category</th>
<th>Score</th>
<th>Tick if Specified</th>
<th>List your Suppliers</th>
<th>Tick if Invoice attached</th>
</tr>
</thead>
<tbody>
<tr>
<td>Doors</td>
<td>Approved timber</td>
<td>A</td>
<td>3</td>
<td>✓</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Low emission MDF</td>
<td>B</td>
<td>1</td>
<td>✓</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Doors containing rainforest products</td>
<td>C</td>
<td>-5</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Floor coverings</td>
<td>Natural fibre flooring- sisal, seagrass, coir</td>
<td>A</td>
<td>5</td>
<td>✓</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Linoleum</td>
<td>A</td>
<td>5</td>
<td>✓</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Cork tiles</td>
<td>A</td>
<td>5</td>
<td>✓</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Ceramic tiles</td>
<td>B</td>
<td>2</td>
<td>✓</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Rubber Tiles</td>
<td>B</td>
<td>2</td>
<td>✓</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Modular carpets</td>
<td>B</td>
<td>2</td>
<td>✓</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Wool broadloom carpet</td>
<td>B</td>
<td>2</td>
<td>✓</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Fabrics</td>
<td>Recycled polyester, wool or denim</td>
<td>B</td>
<td>3</td>
<td>✓</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Timber fittings</td>
<td>Approved timber</td>
<td>B</td>
<td>3</td>
<td>✓</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Cables</td>
<td>Halogen free and fire performance cables</td>
<td>A</td>
<td>10</td>
<td>✓</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Sub Total

**Category**

- **A✓✓**: strongly recommended
- **B✓**: recommended
- **C✗**: to be avoided if possible

**Examples of fittings and finishes combined to achieve 10 points:**

1. Water based low emission paint + Natural fibre flooring-sisal, seagrass, coir + Recycled post-consumer plastic pipe – less than 80%
2. Low emission timber finish + Approved timber plywood + Doors - Approved timber + Fittings - Approved timber
3. Halogen free and fire performance cables
### Landscaping (5 Points)

<table>
<thead>
<tr>
<th>Application</th>
<th>Product Type</th>
<th>Category</th>
<th>Score</th>
<th>Tick if Specified</th>
<th>List your Suppliers</th>
<th>Tick if Invoice attached</th>
</tr>
</thead>
<tbody>
<tr>
<td>Fencing</td>
<td>Non-CCA treated timber</td>
<td>✔️ ✔️ A</td>
<td>5</td>
<td>☐</td>
<td>☐</td>
<td>☐</td>
</tr>
<tr>
<td></td>
<td>Other approved timber</td>
<td>✔️ B</td>
<td>1</td>
<td>☐</td>
<td>☐</td>
<td>☐</td>
</tr>
<tr>
<td>Decking</td>
<td>Approved timber</td>
<td>✔️ B</td>
<td>1</td>
<td>☐</td>
<td>☐</td>
<td>☐</td>
</tr>
<tr>
<td></td>
<td>Recycled content decking</td>
<td>✔️ ✔️ A</td>
<td>5</td>
<td>☐</td>
<td>☐</td>
<td>☐</td>
</tr>
<tr>
<td>Sleepers</td>
<td>Recycled red-gum</td>
<td>✔️ ✔️ A</td>
<td>5</td>
<td>☐</td>
<td>☐</td>
<td>☐</td>
</tr>
<tr>
<td>Driveways and paths</td>
<td>Permeable materials</td>
<td>✔️ ✔️ A</td>
<td>5</td>
<td>☐</td>
<td>☐</td>
<td>☐</td>
</tr>
<tr>
<td>Pavers</td>
<td>Recycled pavers</td>
<td>✔️ ✔️ A</td>
<td>5</td>
<td>☐</td>
<td>☐</td>
<td>☐</td>
</tr>
<tr>
<td></td>
<td>Permeable pavers</td>
<td>✔️ ✔️ A</td>
<td>5</td>
<td>☐</td>
<td>☐</td>
<td>☐</td>
</tr>
<tr>
<td>Mulch</td>
<td>Recycled organics</td>
<td>✔️ ✔️ A</td>
<td>5</td>
<td>☐</td>
<td>☐</td>
<td>☐</td>
</tr>
<tr>
<td>Lights</td>
<td>Solar powered outdoor lights</td>
<td>✔️ ✔️ A</td>
<td>5</td>
<td>☐</td>
<td>☐</td>
<td>☐</td>
</tr>
</tbody>
</table>

**Category**
- ✔️ ✔️ A = strongly recommended
- ✔️ ✔️ B = recommended
- ✔️ ✔️ C = to be avoided if possible

**Examples of Landscaping achieving 5 points:**
1. Non-CCA treated timber
2. Recycled content decking etc

**Total Score**

(Min 80)
Appendix 10: Aurora, first seven stages
Appendix 11: Nominations for the Green Building Council’s Timber Expert Reference Panel
Nominations for the Timber Expert Reference Panel (TERP):

The GBCA received nominations for 24 people as potential participants in the TERP. These nominations were received from a combination of GBCA Members and individuals who participated in the stakeholder workshops as well as individuals who submitted written feedback.

The following table summarises the nominations received:

<table>
<thead>
<tr>
<th>Name</th>
<th>Organisation</th>
<th>Number of Nominations Received</th>
<th>Nominated by</th>
<th>Apparent Affiliation(s) to Timber Industry</th>
</tr>
</thead>
<tbody>
<tr>
<td>Alistair Woodard</td>
<td>TPC Solutions</td>
<td>2</td>
<td>David Angus-Boral Alistair Woodard</td>
<td>2</td>
</tr>
<tr>
<td>Andrew Dunn</td>
<td>Timber Development Association</td>
<td>1</td>
<td>David Angus</td>
<td>1</td>
</tr>
<tr>
<td>David Baggs</td>
<td>Ecospecifier</td>
<td>1</td>
<td>David Baggs-Ecospecifier</td>
<td>0</td>
</tr>
<tr>
<td>Chris Taylor</td>
<td>Independent (Timber PHD Candidate)</td>
<td>4</td>
<td>Chris Barnett Anna Lindstrand-Architectus Andrew Walker Morison Luke Chamberlain-Wilderness</td>
<td>0</td>
</tr>
<tr>
<td>Ronald Green</td>
<td>Marketing Manager-CHH</td>
<td>1</td>
<td>Ronald Green</td>
<td>0</td>
</tr>
<tr>
<td>Genevieve Scarfe</td>
<td>Lend Lease</td>
<td>1</td>
<td>Anna Lindstrand-Architectus</td>
<td>0</td>
</tr>
<tr>
<td>Michael Spencer</td>
<td>FSC Australia</td>
<td>2</td>
<td>Michael Spencer Anna Lindstrand-Architectus</td>
<td>0</td>
</tr>
<tr>
<td>Jana Blair</td>
<td>WWF Australia</td>
<td>1</td>
<td>Jana Blair</td>
<td>0</td>
</tr>
<tr>
<td>Juel Briggs</td>
<td>Briggs Veneers</td>
<td>2</td>
<td>Alistair Woodard David De Jongh -NAFI</td>
<td>2</td>
</tr>
<tr>
<td>Prof Mark Burgman</td>
<td>University of Melbourne</td>
<td>2</td>
<td>Alistair Woodard Lisa Marty</td>
<td>2</td>
</tr>
<tr>
<td>Dr Neil Byron</td>
<td>Productivity Commission</td>
<td>3</td>
<td>Alistair Woodard David De Jongh Lisa Marty</td>
<td>3</td>
</tr>
<tr>
<td>Tricia Caswell</td>
<td>Caswell &amp; Associates</td>
<td>1</td>
<td>Alistair Woodard</td>
<td>1</td>
</tr>
<tr>
<td>Hamish Crawford</td>
<td>Callum Pty Ltd</td>
<td>6</td>
<td>Alistair Woodard Mark Edwards, David De Jongh, Lisa Marty, Stephen Mitchell, Andrew Wilson</td>
<td>6</td>
</tr>
<tr>
<td>David De Jongh</td>
<td>NAFI</td>
<td>1</td>
<td>Alistair Woodard</td>
<td>1</td>
</tr>
<tr>
<td>Name</td>
<td>Affiliation</td>
<td>Count</td>
<td>Affiliations</td>
<td></td>
</tr>
<tr>
<td>-----------------------------</td>
<td>--------------------------------------</td>
<td>-------</td>
<td>------------------------------------------------------------------------------</td>
<td></td>
</tr>
<tr>
<td>Simon Dorries</td>
<td>EWPAA</td>
<td>1</td>
<td>Alistair Woodard</td>
<td></td>
</tr>
<tr>
<td>Dr Douglas Head</td>
<td>Australian Solar Timbers</td>
<td>2</td>
<td>Alistair Woodard, David De Jongh</td>
<td></td>
</tr>
<tr>
<td>Dr Rod Keenan</td>
<td>University of Melbourne</td>
<td>4</td>
<td>Alistair Woodard, Mark Edwards, Lisa Marty, Andrew Wilson</td>
<td></td>
</tr>
<tr>
<td>Dr Glen Kile</td>
<td>Forest &amp; Wood Products Australia</td>
<td>4</td>
<td>Alistair Woodard, Mark Edwards, Andrew Wilson, Roberts Cindy-PIRSA</td>
<td></td>
</tr>
<tr>
<td>Assoc Prof Greg Nolan</td>
<td>University of Tasmania</td>
<td>7</td>
<td>Alistair Woodard, Mark Edwards, David De Jongh, Lisa Marty, Stephen Mitchell, Andrew Wilson, Roberts Cindy-PIRSA</td>
<td></td>
</tr>
<tr>
<td>Richard Stanton</td>
<td>Australian Plantation Products and Paper Industry Council</td>
<td>1</td>
<td>Richard Stanton</td>
<td></td>
</tr>
<tr>
<td>Mr John Kerin</td>
<td>AM FTSE</td>
<td>4</td>
<td>Mark Edwards, Lisa Marty, CFMEU, Roberts Cindy-PIRSA</td>
<td></td>
</tr>
<tr>
<td>Rob De Fegely</td>
<td>Myoora Investments Pty Ltd</td>
<td>1</td>
<td>Mark Edwards</td>
<td></td>
</tr>
<tr>
<td>David De Jongh</td>
<td>NAFI</td>
<td>1</td>
<td>David De Jongh</td>
<td></td>
</tr>
<tr>
<td>Simon Dorries</td>
<td>EWPAA</td>
<td>2</td>
<td>Simon Dorries, Stephen Mitchell</td>
<td></td>
</tr>
<tr>
<td>Dr Fred Gail</td>
<td>University of Tasmania</td>
<td>1</td>
<td>The Green Building Network Australia</td>
<td></td>
</tr>
<tr>
<td>Tim Cadman</td>
<td>University of Tasmania</td>
<td>1</td>
<td>The Green Building Network Australia</td>
<td></td>
</tr>
<tr>
<td>David Lindenmeyer</td>
<td>ANU Fenner School of Environment and Society</td>
<td>1</td>
<td>The Green Building Network Australia</td>
<td></td>
</tr>
<tr>
<td>Prof Brendan Mackey</td>
<td>ANU Fenner School of Environment and Society</td>
<td>1</td>
<td>The Green Building Network Australia</td>
<td></td>
</tr>
<tr>
<td>David Cameron</td>
<td>Department of Sustainability and the Environment (VIC)</td>
<td>1</td>
<td>The Green Building Network Australia</td>
<td></td>
</tr>
<tr>
<td>Dr Bob Smith</td>
<td></td>
<td>1</td>
<td>Lisa Marty</td>
<td></td>
</tr>
<tr>
<td>Professor Ian Ferguson</td>
<td>University of Melbourne</td>
<td>1</td>
<td>Andrew Wilson</td>
<td></td>
</tr>
<tr>
<td>Prof Gordon Duff</td>
<td>CEO CRC</td>
<td>1</td>
<td>Andrew Wilson</td>
<td></td>
</tr>
<tr>
<td>Mr Brendan Jekin</td>
<td>MD Silva Systems</td>
<td>1</td>
<td>Andrew Wilson</td>
<td></td>
</tr>
<tr>
<td>Ms Kate Carnell</td>
<td>Chair CRC for forestry</td>
<td>1</td>
<td>Andrew Wilson</td>
<td></td>
</tr>
<tr>
<td>John Raison</td>
<td>CSIRO</td>
<td>1</td>
<td>Roberts Cindy-PIRSA</td>
<td></td>
</tr>
<tr>
<td>Patrick Beale</td>
<td>Dean of Faculty University of WA</td>
<td>1</td>
<td>Roberts Cindy-PIRSA</td>
<td></td>
</tr>
<tr>
<td>Jim Bindon</td>
<td>MD Big River Timbers</td>
<td>1</td>
<td>Jim Bindon</td>
<td></td>
</tr>
<tr>
<td><strong>TOTALS:</strong></td>
<td></td>
<td><strong>69</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td><strong>52</strong></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Percentage of Apparent Affiliation(s) to Timber Industry of total nominations received: 75%
Appendix 12: Correspondence between the Victorian Association of Forest Industries and RMIT University's Centre for Design
24th February 2006

Dr Ralph Horne  
Director, Centre for Design  
RMIT University  
GPO Box 2476V  
Melbourne, Victoria, 3001

Dear Dr Horne,

Re: Concerns over the Integrity of the Methodology of the Centre for Design at RMIT

I write to formally voice concern in relation to advice provided by your Centre about the use of building materials which we believe unjustifiably excludes Victorian native hardwood timbers from your EcoSelector Guide and other related tools. We believe such advice leads to negative impacts on recognition of native hardwood timber as an environmentally friendly material and negative outcomes for the natural environment.

VAFI is concerned that the Centre's methodologies lack intellectual rigour, objectivity and transparency.

A recent example is the submission in 2005 from the Timber Promotion Council and VicForests to have Victorian native hardwood timbers included in the VicUrban/RMIT Eco-Selector Guide to Materials Selection. Despite acknowledging the materials benefits in terms of the design criteria: embodied energy, resource consumption & toxicity, the Centre for Design rejected the application, stating “we do not feel the core issue of biodiversity impacts has been resolved” (letter to Barton Williams VicUrban 12 July 2005). No detailed explanation was given, nor were any specific examples of biodiversity concern provided. We would question whether the Centre for Design has the detailed expertise in the area of forest management and biodiversity to make such an assessment.

This decision is having significant financial impact on Victorian native forest timbers which are currently severely restricted in their access to major government residential and commercial projects.

The assumption, principles and underlying methodologies for selection in the Guide are also difficult to ascertain. Native timber materials do not figure anywhere in specifications promoted by the Centre for Design. We can only assume that native timbers harvested in Victoria are not supported by those who decide the Centre’s policy settings. We seek clarification regarding the methodology and science used to determine, this especially in terms of environmental outcomes.
In establishing the EcoSelector Guide and similar tools the Centre purports to provide independent, credible advice, effectively setting technical standards that can have far reaching implications. Accordingly, the Centre has an obligation to be rigorous, objective and transparent in its assessments and communications. In this instance, this does not appear to be the case.

Integrity and credibility are key to academic scholarship and the reputation of institutes such as the Centre for Design at RMIT University. Decisions made in the absence of these qualities can be highly detrimental to the materials and products assessed and to the very standing of the institute that makes them.

We request the opportunity to meet with you to discuss these important issues as a matter of urgency. My assistant Maritza Kefalianos will be in contact to arrange a time.

Yours sincerely,

Patricia J Caswell
CEO

cc Professor Alan Cumming, Pro Vice-Chancellor, RMIT
Professor Harriet Edquist, Head of School of Architecture and Design
Mr Tony McDonald, Chief Executive, Building Products Innovation Council
Dear Trish,

Re. VAFI 'concerns over integrity of the methodology of the Centre for Design at RMIT'

In your letter of 24th February and our meeting on March 7th you raised a number of concerns and accusations. This letter provides a formal response. The central point of your letter alleges that the work of RMIT University lacks rigour, objectivity and transparency. RMIT University is recognised as a leading University and research institution not only in Australia, but internationally. The Centre for Design at RMIT University is also recognised for the excellence of its research work internationally, having earned its reputation from almost 20 years of scholarly and cutting edge research. The Centre for Design at RMIT University understands clearly and practices rigour, objectivity and transparency, academic excellence and impartiality.

As part of our research activities we maintain extensive records and evidence for all our work, publish and obtain peer review regularly, and base all our research on recognised methods which we publish and make available as appropriate. In some instances, such as with parties for whom RMIT carries out research, data does not become public domain automatically. In your letter you allege that with regard to a recent RMIT response to VicUrban regarding biodiversity protection and timber recommendations that 'no detailed explanation was given, nor were any specific examples of biodiversity concern provided'. This is due to the fact that this information had been given in a previous document discussing the issue of biodiversity maintenance in forests, including the following from Australia's most recent Peak Environment Reporting Review, the State of the Environment Report 2001, from which we now quote:

"While Australia's forest management is better than many globally, the erosion of forest biodiversity remains a concern. The first State of the Environment Report (SOE, 1996) found biodiversity erosion to be one of the most pressing environmental problems in Australia. While agricultural practices such as land clearing were identified as by far the most destructive practices, forestry was also significant. Ten species were known to be at 'present or future threat of extinction' as a result of forestry practices (State of the Environment Advisory Council, 1996). The report found that 'commercial forestry affects far fewer regions than clearing or grazing and is strongly concentrated in the south-east and south-west. Its overall effects on biodiversity can, however, still be substantial because forests are richer biologically than other terrestrial habitats.' (State of the Environment Advisory Council, 1996). The more recent 2001 SOE report notes the implementation since 1996 of the Regional Forest Agreements (RFA's) but finds significant shortcomings in the approach noting that 'many biologically significant ecosystems and species have not been adequately protected and the efficacy of many forest management prescriptions remain to be determined', (Australian State of the Environment Committee and Environment Australia, 2001)." Source: (BDP Environment Design Guide Note 'Timber and Wood Products – Application and ESD-Decision Making' Nov. 2003.)

The level of scientific and stakeholder concern over the management of a range of wood products, both in Victoria and broadly in Australia, remains. In your letter you also allege that the Centre for Design at RMIT University wishes to prevent Victorian native hardwoods from being used as a matter of specific
policy. This allegation is without foundation, and the Centre does not have a policy position on this matter.

You also mention the Eco-Selector, a tool owned and operated by VicUrban, in which the Centre for Design had a major role during design and development. The methodology for the Eco-Selector is clear and objective. It was developed using internationally respected methodological conventions to identify ‘best practice’ environmentally preferable practices. Comprehensive methods statements are available freely in the Eco-Selector materials and from CfD at RMIT. It should also be noted that, while imported rainforest timber is expressly penalised under the VicUrban Eco-Selector, no such demerit applies to the use of native Victorian hardwood. The area of guidelines and policy on matters of environmental sustainability must ultimately balance the weight of evidence and scientific agreement, and broader community interests. With regards to the management of timber in Australia, there is a long history of stakeholder concern and public engagement, and it remains an area of public policy debate. Forests are a crucial community asset and not the preserve of any one sector or interest – as you personally will well understand, having previously occupied a leadership position in the environment and research sectors. We would welcome VAFI engaging scientists and stakeholders through robust research and positive engagement, rather than allegation and accusation. Indeed, such poor stakeholder engagement is indeed one of the reasons that uncertified Victorian hardwoods are not on the list of recommended best practice options, not only for the VicUrban Eco-Selector, but for national tools such as the Green Building Council’s Green Star tools that been officially adopted by, amongst others, the Victorian Government, for its best-practice projects.

RMIT University looks forward to positive engagement with VAFI in a productive and fact-based dialogue that progresses the level of understanding and knowledge in the important area of forest management in Australia and Victoria. We look forward to VAFI’s communication that it, too, wishes to abandon making unfounded allegations and instead practice productive and positive dialogue with the Australian research community.

Yours sincerely,

Dr Ralph Horne  
Director  
Centre for Design at RMIT University
10th April 2006

Dr Ralph Horne
Director, Centre for Design
RMIT University
GPO Box 2476V
Melbourne, Victoria, 3001

Dear Dr Horne,

I acknowledge the receipt of your letter of the 29th March 2006 and the assurances that you provide regarding the Centre for Design at RMIT. I also acknowledge that conversations so far from both sides have not been as constructive as they might have been, and I share your vision of positive engagement in the future in a productive and fact-based dialogue that progresses the level of understanding and knowledge in the area of forest management in Victoria.

In the spirit of such engagement we are keen to seek some further clarification. In response to our concerns that “no detailed explanation was given, nor were any specific examples of biodiversity concern provided” by the Centre to the 2005 submission from the Timber Promotion Council (TPC) and VicForests, you mention that this was “due to the fact that this information had been given in a previous document discussing the issue of biodiversity maintenance in forests”. Could you please provide us with a copy of the ‘previous document’. We remain keenly interested to understand these issues and the methodologies used in the assessment and conclusions.

In regards to the quote provided from the State of the Environment Report 2001, we are aware that the original TPC/VicForest submission addressed this statement in some detail citing a range of more recent sources (refer 2.4 & 2.5 attached). Are there more recently published specific scientific concerns that the Centre is aware of in terms of biodiversity issues in Victoria’s production native forests?

Much has happened in the last decade in terms of the development of methodologies, indicators and systems for assessing materials for their environmental qualities and impacts. There have also been very significant and continuous improvements in government policies, codes, audits, special protection zones controlling production forest management. VAFI is committed to such progress. We continue to press for the best managed production forests in the world and have made this clear to Government. To this end, we continue to work with a range of renowned scientific experts in this field. We would be keen to have your involvement and will be in touch to set up some discussions.

We look forward to your response.

Yours sincerely,

Patricia J Caswell
CEO

Attachment: copy of TPC/VicForest submission, pages 16,17

cc Professor Alan Cumming, Pro Vice-Chancellor, RMIT
Professor Harriet Edquist, Head of School of Architecture and Design
Dear Patricia Caswell,

Please accept my apologies for the delay in replying to your letter of 10th April. In the interim, I have had the benefit of ongoing engagement with VAFI through discussions with your Alistair Woodard.

Firstly, I welcome your acknowledgement and intent to engage positively in ongoing dialogue. While our financial and resource constraints as a full cost research Centre limits our availability for such dialogue, we also welcome this opportunity and will continue to pursue it as far as we can.

Secondly, with regards to the 'previous document' we are not able to release client communications per se, however the attachment following this letter identifies a number of relevant issues regarding biodiversity maintenance.

Thirdly, you ask about recent published scientific concerns regarding biodiversity in Victorian forests as expressed in the SOE 2001 report. We do not, however, feel that the issue exhibits a high level of scientific consensus, as per our comments below and the aforementioned attachment.

Finally, I would concur wholeheartedly that much has happened with respect to both 'sustainable' building materials specification and forest management systems over the past decade. Indeed, I expect ongoing change to be at least as rapid over the next decade, with specifiers and consumers increasing awareness and expectations of high quality, sustainable building product availability. In parallel, the Centre for Design at RMIT University and other research organisations will be undertaking new research to enable improved assessment of environmental impacts of building materials provision, and will seek to engage with stakeholders in developing and disseminating research findings accordingly.

As the international best practice 'bar' is raised, so we can expect ongoing rapid change in specification requirements. Clearly, it follows that decisions the Victorian forestry industry makes about commitments and actions now will have significant implications for its future markets in the decades to come, just as previous decisions are likely to have affected access in today's markets. While the Centre for Design claims no expertise in risk management and long term business planning, it is inevitable that attention paid to such areas by today's building products industries is increasingly important given these developments.

I and my colleagues at the Centre for Design at RMIT University look forward to ongoing positive dialogue in the joint endeavour to improve the environmental sustainability performance of building products.

Yours faithfully,

Ralph Horne
Attachment: Forest Management and Biodiversity

June 29, 2006

Forest management practices in Australia and in Victoria have drawn significant scientific and stakeholder concern. Norton (1996) argues that, due to the inadequacy of the conservation protected areas network and off-reserve management, many forestry practices are not ecologically sustainable. The rotations of logging currently used in most management plans are incompatible with the natural turnover of many eucalypt forests. The application of the clearfell method of logging to most eucalypt forests is made irrespective of a particular site's past biological legacy. It has been documented that clearfell logging differs significantly from natural disturbance events (Ough 2001) and Mackay et al (2002) claims that this is transforming the forest toward a uniform and simplistic forest stand structure. Lindenmayer and Franklin (2002) argue that this has severe implications for biodiversity conservation and Norton (1996) argues that it can take up to 2000 years for a regenerating clearfelled forest to regain its former stand complexity.

The Regional Forest Agreement process is sometimes presented as being recognized as both internationally and nationally being equivalent to or exceeding 'best practices' in 'sustainable forest management'. Dr Stephen Dovers (2003) has been quoted, for example, as stating: “The Regional Forest Agreement stands as the most well-funded and intensive resource allocation process ever undertaken in Australia.” However, the full quotation from the paper ‘Are forests different as a policy challenge?’ is highly critical of the RFA process. Dr Dovers comments: “...fights continue and the RFA’s have begun to collapse. Hopes that the RFA process would produce a conflict free future were misplaced for three reasons. The first reason relates to fundamental characteristics of Australian Forests. For a start, we do not have much forest and especially little of high productivity. The demand for use of low relief, high moisture and nutrient landscapes for timber, indigenous places, farming, urbanism, tourism and biodiversity far exceed the supply of these services.

Old growth forest, with its special amenity and biodiversity, is very scarce. Humans squabble over scarce things. And people like forests; they are beautiful, rich in life, fun to play in, and good for producing water and highly visible standing or cut down.

As a resource to manage, even for few uses, they live a long time and that is difficult. The second reason is that despite is length, breadth and depth, the RFA process had its faults, arising from poor process design in the rush of the moment and from the legacy of past decisions. In particular, it suffered from inevitable data shortages; conceptual and methodological challenges in integrating environmental, social and economic dimensions; deficiencies in public participation; lack of attention to private forests and plantations; and tension between 20-year resource allocation guarantees and the need for adaptive approaches in the face of complexity and uncertainty, poorly addressed by (prospectively) unclear monitoring and review provisions. The third reason is generic and obvious but often overlooked nonetheless. Thinking that one policy episode like the RFA process will achieve closure on any sustainability issue is a misguided quest for instant policy gratification.” (Dovers 2003 p20-21)

Several authors have also further elaborated on the shortcomings of the RFA process (Horwitz and Calver 1998, Slee 2001, Musselwhite and Herath 2005, Lane 2003, Brueckner and Horwitz 2005, Kirkpatrick 1998). Horwitz and Calver (1998) found that governments in the Western Australian RFA process were unwilling to acknowledge the existence of scientific disputation and Brueckner and Horwitz (2005) found that overseeing government department agency regarded conflicting understandings of forest ecology as ‘inferior’. In Victoria, significant forest habitat for threatened, endangered and critically endangered wildlife remains unprotected and subject to logging despite calls for protection (e.g. Dr J.M. Hero quoted in ‘Logs and frogs in battle of Baw Baw’, Claire Miller, The Age, December 5, 2004). The State of the Environment Australia 2001 Report (rather than the earlier 1996 version) regards this as an issue for forests generally under an RFA:

“Unfortunately, the RFAs do not provide a comprehensive coverage of the native forest estate as there are important areas that have not been assessed. Further, within the regions where RFAs were undertaken, many important conservation needs have not been adequately addressed. For example,
several biologically significant ecosystems and species have not been adequately protected, many
additions to the conservation reserve network have not been determined using the best available scientific
techniques, and the efficacy of a number of forestry management prescriptions remains to be determined.
The implications of these limitations for biodiversity conservation may be amplified since government
quotas on woodchipping were removed on signing of an RFA. Hence, the potential for the intensification
of wood-chipping in these regions on public and private lands has significantly increased.”
(Commonwealth of Australia 2001)

The earlier 1996 State of the Environment report found that: “Ten species were known to be at ‘present or
future threat of extinction’ as a result of forestry practices.” (State of the Environment Advisory Council,
1996) It is not made clear in the 2001 report that deleterious processes have been comprehensively
addressed. The Biodiversity Theme report updates this in the area of bird species only in Table 9. It
should be noted that the numbers correlated to forestry for confirmed or speculative bird extinctions has
not changed since the 1996 report.
(State of the Environment Report 2001 Biodiversity Theme Report p. 55.)

References

- Brueckner M, Horwitz (2005), The Use of Science in Environmental Policy: A case Study of the
  Regional Forest Agreement Process in Western Australia, Sustainability: Science, Practice &
  Policy, Fall 2005, Vol 1, Issue 2
- Dovers (2003), Are forests different as a policy challenge?, in Towards Forest Sustainability, eds
  Lindemayer D, Franklin J (CSIRO Press)
- Hamilton C, Macintosh A (2004), Taming the Panda – The Relationship between WWF Australia
  and the Howard Government, The Australia Institute
  Process in Western Australia, Australian Journal of Environmental Management – Vol 5, pp213-
  225
- Kirkpatrick J (1998), Nature Conservation and the Regional Forest Agreement Process,
  Australian Journal of Environmental management Vol 5, pp31-37
- Lane M (2003), Decentralization or privatisation of environmental governance?
- Forest conflict and bioregional assessment in Australia, Journal of Rural Studies 19, pp283-294
- Lindemayer D, Franklin J (2002), Conserving Forest Biodiversity – A Comprehensive
  Multiscaled Approach, Island Press
  Future Climate – A Forest Ecosystem Analysis, CSIRO Publishing
- Musselwhite G, Herath G (2005), Australia’s regional forest agreement process: analysis of the
  potential and problems, Forest Policy and Economics 7, pp579-588
- Norton T (1996), Conserving biological diversity in Australia’s temperate eucalypt forests, Forest
  Ecology and Management 85, pp21-33
- SAI Global (2005), Summary of Audit – Gap Analysis Report (Audit to AS4708: 2003 The
  Australian Forestry Standard)
- Slee B (2001), Resolving production-environment conflicts: the case of the Regional Forest
  Agreement Process in Australia, Forest Policy and Economics 3, pp17-30
- Standards Australia (2005), Preparing Standards – Standardization Guide No.1, Standards
  Australia
- White G, Sarshar D (2004), Responsible Purchasing of Forest Products, WWF
- Baillie J, Hilton-Taylor C, Stuart S (2004), IUCN Red List of Threatened Species, IUCN
- World Commission on Forests and Sustainable Development (1999), Our Forest, Our Future,
  Cambridge
- WWF (2005), Timber for Aceh – Timber Suppliers Contact Details