Zero Net Emissions by 2020

City of Melbourne

A roadmap to a climate neutral city

Report prepared by Business Outlook and Evaluation for the City of Melbourne

Contents

A. The Strategic Framework

B. The Core Strategies

C. Strategy implementation

Part A - The Strategic Framework

1. Executive summary

Deeper goals need to be set if we are to stabilise global climate change. The City of Melbourne has taken on this challenge, developing a roadmap for the municipality to achieve zero (net) greenhouse gas emissions[1] by 2020, ending the City's contribution to global warming within 20 years. It is a strategy for the City of Melbourne and its commercial, industrial and residential inhabitants. The roadmap, known as the ***Zero Net Emissions by 2020*** strategy, is a natural extension of Council's Cities for Climate Protection and Greenhouse Challenge commitments and has been envisaged as a blueprint for other Asia Pacific Economic Cooperation (APEC) economies.

Zero Net Emissions by 2020 turns what seems a serious threat to the Melbourne's economy and way of life into an opportunity for economic growth, environmental improvements and social cohesion – a triple bottom line business equation. In doing so, the City of Melbourne can make a decisive contribution to positioning itself as a centre for productive, knowledge-based industries, with a quality lifestyle and environment. Profiling Melbourne as a centre for 'green productivity'[2] is the consistent theme of the Strategy.

The Strategy aims to use market mechanisms and appropriate regulations to influence the billions of dollars of mainstream business investment that will take place in buildings, plant and power generation over the next two decades. It envisages commercial, industrial and residential investment in superior energy-efficient design. Rather than add to the costs of doing business in Melbourne, the net result of such investment is to reduce operating costs and enhance Melbourne's business competitiveness.

Through consultations with key stakeholders, a detailed action plan has been developed, the key features of which are specified in the box beside.

Zero Net Emissions by 2020: the major initiatives

- **privately financed, world class green buildings[3],** catalysed by the City of Melbourne from the growing consumer and developer interest in green buildings;
- a **Centre for Greenhouse Expertise and Technology** to ensure local businesses have access to leading-edge design, to stimulate and support innovation in green energy and to develop service and technology exports – with a target of 10% p.a. growth;
- active marketing of a **'green productivity'** profile promoting Melbourne as a location for knowledge-based industries with high worker productivity and quality lifestyle, based on a local culture committed to the principles of sustainability, and having a built environment that delivers convenience, efficiency, health and security;
- voluntary **carbon trading market**, to allow businesses flexibility in their approach to emissions management, while preparing Melbourne for international carbon trading;
- **progressive strengthening of regulations** on energy performance requirements for buildings;
- a **'green supply chain'** to the City of Melbourne with progressively strengthening standards;
- stimulating demand for renewable and efficient energy through **City-led buying consortia**;
- a **pilot sequestration investment by the City in blue mallee eucalypts** as feedstock for renewable power generation, with eucalyptus oil as a by-product, leading to sequestration of 10% of the City of Melbourne's corporate emissions in 2005 and 50% by 2010;
- access for businesses to **investments in carbon sequestration projects**, linked to the emissions market, that deliver a sound financial return, with upsides in carbon trading credits, salinity credits and biodiversity credits.

[1] Greenhouse gases such as carbon dioxide, methane and nitrous oxide have been released into the atmosphere in increasing concentrations over the past 200 years as a result of human activity (eg. use of fossil fuels, deforestation). The result is increased heat trapping in the atmosphere known as the enhanced greenhouse effect, which will ultimately change global weather and climate (often referred to as climate change or global warming).

[2] Green productivity is the enhanced economic efficiency achieved through investment in knowledge-based industries and technologies that respond to consumer, shareholder and worker demand for improved environmental performance and social responsibility.

[3] Green buildings are defined as having minimum adverse impacts on the built and natural environment, in terms of the buildings themselves, their immediate surroundings and the broader regional and global setting. Put simply, they are designed to minimise the total environmental impact of their materials, construction, operation and deconstruction while maximising opportunities for indoor environmental quality and performance; saving money, reducing waste, increasing worker productivity and creating healthier environments for people to live and work. The use of the phrase Green Buildings is interchangeably used with other phrases such as ESD buildings and ecologically sustainable buildings in this Strategy.

The Strategy gains leverage from aligning the City of Melbourne's activities with State and Federal Government Greenhouse programs, and from tapping growing interest from the private sector in the development of a green profile. Building interest and support for the Strategy from stakeholders to achieve effective action is the decisive leadership challenge facing the City of Melbourne – far more important than technological issues. A sustainable business advantage through 'green productivity' in Melbourne will require the City of Melbourne to persuade its businesses, workers and residents to embrace and live the principles of sustainability.

1.1 Underpinning strategies

There are three core strategies underpinning the detailed action plan:

- **Leading edge design** - exploiting the natural cycle of rebuilding and refurbishing in Melbourne to improve design and thus achieve a 50% reduction in energy use of the City's residential and commercial building stock. Research shows that this figure is achievable at minimal additional capital cost or with good payback – indeed, the design measures will significantly reduce ongoing operating costs, thereby enhancing the City's business competitiveness.
- **Greening the power supply** - stimulating demand for renewable energy and energy-efficient power such as combined cycle coal gasification and fuel cells, as well as encouraging cogeneration and embedded energy supply, especially at industrials sites. These measures aim to increase the use of renewable energy to 45% of projected demand by 2020, and to achieve a 50% reduction in emissions from non-renewable resources.
- **Carbon sequestration**[4] - investment in carbon sequestration to offset remaining emissions, and stimulating investment in the regions of Victoria that are intimately linked to the City's economic viability, environmental impact and social equity. This strategy aims to sequester the equivalent of 50% of the City of Melbourne's own corporate emissions by 2010.

1.2 Integrating the Strategy

The three underpinning strategies create a variety of options and paths forward for the City of Melbourne, its business and private residents. Rather than seek to control or prescribe the choice between these options, the Strategy has three overarching initiatives that integrate the choices made by the various stakeholders. The first is the 'green productivity' profile that gives all stakeholders ownership of the goal of zero net emissions. The profile would enable active marketing of Melbourne as a location for knowledge-based industries, with high worker productivity and quality lifestyle.

The second is the introduction of a carbon trading market in Melbourne enabling businesses to become familiar with the practice of carbon accounting. A carbon trading market would involve allocating emissions permits under an emissions reduction program to participants and trading would occur when parties needed to trade surplus emission credits from other parties (vice versa) to meet their targets. Such a market would position the City of Melbourne and its businesses for eventual international trading in carbon credits. The market mechanism also maximises the choice available to participants and helps manage the uncertainties inherent in long-term planning. It will also minimise the administration cost of the Strategy and allow easy updating as changes occur in Australia's international business environment, local business practices, international, national and state regulatory frameworks, and technology.

The trading scheme would initially be voluntary, appealing to the growing interest among resident businesses in promoting themselves to staff and customers as environmentally responsible. As the market evolves, participation could become mandatory for all those in Council's supply chain and the supply chains of other participants.

The third integrating initiative is the proposed Centre for Greenhouse Expertise and Technology, synergising the disparate public and private sources of expertise already in the City, in Greater Melbourne and elsewhere in Victoria. The State Government will have a crucial role to play in such a Centre as many of the proposed initiatives will require collaboration with the State. Collaboration is proposed through Memoranda of Understanding with relevant agencies, and the crucial linkages are identified in the Strategy.

[4] Sequestration is the process of removing gases such as carbon dioxide from the atmosphere. Planting trees is one way of removing carbon dioxide (trees absorb and incorporate carbon in their wood, leaves and roots), capturing and storing carbon dioxide in oil wells is another. Oceans also naturally absorb carbon dioxide. The trees, wells and the ocean are referred to as sinks.

Transport and embodied energy are excluded from the scope of the Strategy because they are not able to be directly influenced by the City of Melbourne, make a relatively small contribution to the City of Melbourne's emissions profile and are being pursued by state and federal authorities through various programs. However, the potential exists to expand the scope to cover these elements in future: the expertise and commitment to greenhouse reductions that the Strategy engenders will naturally expand the City of Melbourne's vision and confidence in finding other solutions that improve all three components of the triple bottom line. Indeed, over time, the Strategy may evolve into a Strategy for a Sustainable City, rather than being confined to Greenhouse.

1.3 Cost of the Strategy

The cost to the City of Melbourne of implementing the Strategy is estimated at $1.75 million over the next 5 years, some of which can be financed under existing programs and through grants and co-funding arrangements with partners. In addition, the Strategy involves commercial investments of $576,000 in plantations over 5 years, $500,000 to seed the emissions trading market and a possible investment over the next two years towards the establishment of a Centre for Greenhouse Expertise and Technology (a public/private investment). All of these investments appear to offer good commercial returns and could be evaluated under the Sustainable Melbourne Fund, which would provide due diligence on the proposals. Alternatively, the City of Melbourne may be able to broker full private financing.

1.4 The Balanced Scorecard

The actions in this Strategy have been grouped according to a 'balanced scorecard' framework:

- financial benefits (e.g. investment, service exports, cost savings)
- business processes (e.g. carbon trading, supply chains, purchasing consortia)
- stakeholder management, (e.g. green profile)
- learning and growth (e.g. Centre for Expertise and Technology).

This framework enables investments and actions to be assessed not only in terms of their direct economic, environmental and social outcomes, but also in terms of how they build the City of Melbourne's long-term capability to improve its triple bottom line performance[5]. The result is a sustainable business matrix.

As with any long-term plan, there are major uncertainties in what lies ahead. This will mean that the Strategy will have to be regularly updated and some of the initiatives proposed will have to be amended or even dropped as further information becomes available. On a positive note, the uncertainties present major potential upsides. Technological change, the growing support for triple bottom line business, and increasing consumer support for 'mainstreaming' environmental issues, could all radically improve the outlook.

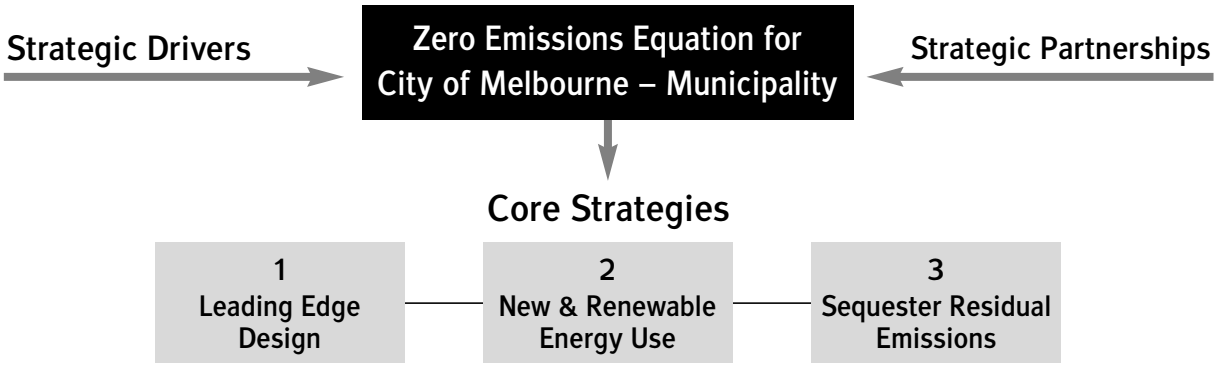
1.5 Seizing the opportunity

The opportunity identified in this Strategy for Melbourne must be seized soon. A City of Melbourne profile that integrates economic benefit with environmental and social gains will be hotly contested in future years by other Cities. This Strategy gives Melbourne a head start – if successfully executed this Strategy, will place the City of Melbourne as the first City in the world to establish a municipal emissions trading scheme, recognise and manage the impact of its environmental footprint into nearby ecologically fragile rural districts and adopt the stretch target of zero net emissions by 2020.

[5] Performance measured in terms of economic prosperity, social equity and environmental quality.

2. Business Strategy Map

The Business Strategy Map is the blueprint of this Strategic Plan. It links the vision and core strategies to specific project targets, balanced scorecard outcomes and triple bottom line deliverables.



Project Targets

City of Melbourne – the Municipality

4 500 000t	– 1 850 000t	– 925 000t	– 925 000t	– 800 000t	= Zero net emissions
Business as usual emissions 2020	50% emissions reduction through efficiencies gained from building design and 15% reduction from industry efficiency	Growth of renewable purchases	Double efficiency of non-renewable supply	Sequestration	

City of Melbourne – the Corporation

30 820t	– 9 240t	– 10 790t	– 10 790t	= Zero net emissions
Current Council emissions	30% reduction in energy use by 2010	Increase renewable purchases from 23% to 50%	Sequester emissions from remaining non-renewable energy (50% of 2010 energy use)	

Balanced Scorecard Outcomes

Financial Gain	Stakeholder Engagement	Market-driven Business Processes	Continuous Learning & Growth
Productivity gains; Attract investment; Service exports	Broad support for Melbourne's green brand	City emissions trading scheme; Regulatory change	Establish a global centre of expertise and technology

Triple Bottom Line Deliverables

Economic growth through green productivity	Shared community values; improved quality of life	Environmental improvements in the City & rural Victoria

3. Why aim for zero net emissions?

Key points

- The rapid growth of cities is creating major economic, environmental and social change, especially in the Asia Pacific region.
- The international community is still grappling with how to respond to the Greenhouse challenge.
- This Strategy affirms that the City of Melbourne wants to lead the way in finding solutions that turn these trends into an advantage.
- The result is a sustainable and quality future for City residents.

Achieving zero net emissions by 2020 is an ambitious task. However, it is a task that has been met with interest and intrigue. Stakeholders were engaged early in the project. These include the Department of Natural Resources and Environment, the Property Council of Australia, the Building Commission, the Australian Greenhouse Office, the Sustainable Energy Authority of Victoria, the Department of Infrastructure, CSIRO and the Docklands Authority. Their valued input has led to many of the actions recommended in this Zero Net Emissions Strategy.

3.1 Cities and globalisation

The issues and challenges that are taking place at a global level have set the scene for the zero net emissions strategy. These are having, or will soon have, a profound impact on the City, its residents and its tenants. As stated by Professor Lyndsay Neilson, Secretary of Victoria's Department of Sustainablity and Environment, in his book *Asian Urbanisation and the Impact on Australian Cities:*

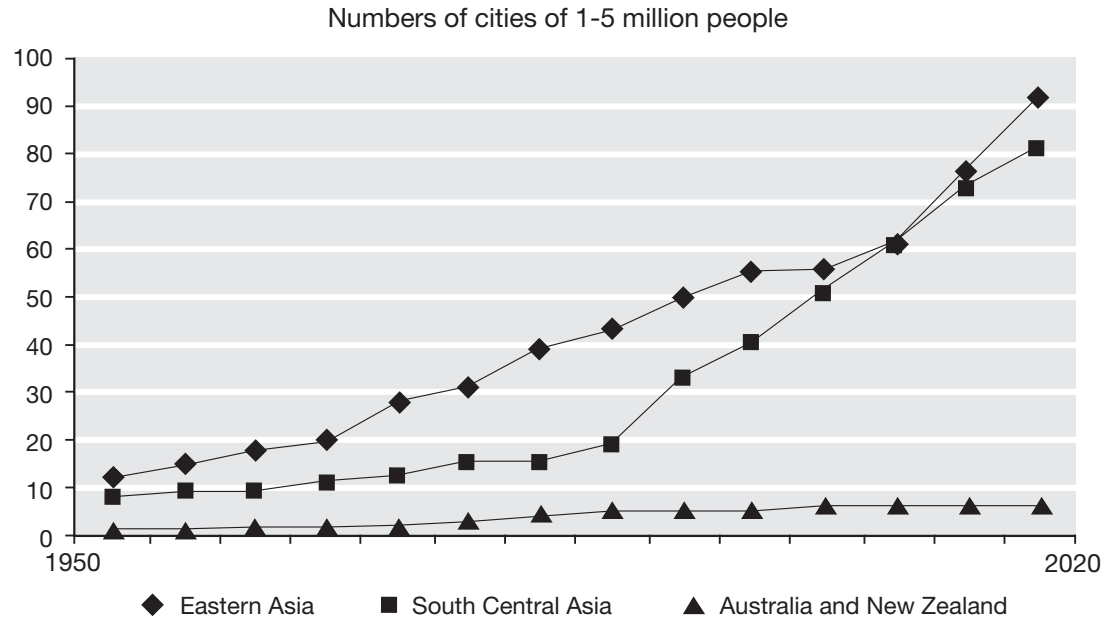
> *"Where city governments understand globalisation and set out to compete globally … they will make their cities attractive not only for investment, but as desirable places for the leaders of the knowledge-based' economy to live. … Cities need to revisit their processes for strategic planning, within a 15-20 year timeframe, addressing their economic, social and environmental future."*

Lyndsay Neilson also identified an extraordinary phenomenon in globalisation and urbanisation in our region: he observed that a city the size of Perth is added to Asia every week (see Figure 3.1).

The consequences of globalisation and urbanisation are profound:

- **Environmental problems** associated with urbanisation, including air quality, access to potable water, sewerage services, and industrial pollution are all escalating at an even faster pace than the growth of the cities.
- **Greenhouse gas emissions** are set to grow even more rapidly, as the people of these cities aspire to the standards of living of developed nations.
- On the positive side, **opportunities for Australia to export skills and technology** to manage these pressures are emerging. Asia is a particularly important market. The Asian Development Bank (ADB) is a key proponent of sustainable cities in the Asia-Pacific region, and spends around US $700 million a year on urban planning and development in developing countries in the Asia-Pacific region.
- The **nature of international competition** is changing. Cities around the world are now competing more than ever for corporate investment. The imperative for cities today is to develop a competitive edge to attract and maintain the investment dollar. As commercial entities, cities must focus on creating a competitive, productive, profitable environment for business investment to ensure future prosperity.

Figure 3.1 Globalisation and urbanisation



3.2 The Greenhouse Effect – the struggle for a global response

The Greenhouse Effect is a consequence of globalisation and can only be managed by a global response. However, the international community is still struggling with how to proceed. The City of Melbourne's response and contribution to global action is influenced by a number of factors including the following:

- **Australia's response to the Kyoto Protocol**[6] (contained in the 1998 National Greenhouse Strategy) and subsequent issues and **impacts surrounding Australia's stated intention to support the US and not ratify the Protocol**. Particularly, the impact on industry and trade.
- **Victorian State Government response to global warming** (contained in the 2002 Victorian Greenhouse Strategy) and their support for ratification of the Protocol.
- **Positioning of other Organisations and Governments** around the world in preparation for the imminent ratification of the Kyoto Protocol. Particularly, work on carbon trading models.
- **Climate change impacts that are predicted for Australia and Victoria**. Particularly, rural areas where the existing troubled ecological profile will worsen as land temperatures, and the incidence and length of drought conditions escalate.

Is it possible to proactively manage all these economic, political, and environmental variables? Many people are trying, and there are a number of emerging concepts and practices that the City of Melbourne has been closely following and contributing to. These concepts have informed the development of this Strategy. The concepts include:

- **Triple Bottom Line (TBL)**. Trend towards corporate financial, environmental and social responsibility reporting. Many organisations are now committed to reporting TBL deliverables and screening suppliers based their green credentials.
- **Natural Capitalism**. Recognising the cost pollution imposes on national economies, especially in environmental, health and quality of life terms. National economies have been providing a perverse subsidy to polluters. The 'polluter pays' principle is changing economic fundamentals and providing the impetus for advances in knowledge and technology that improve the control of industrial processes.

[6] The Kyoto Protocol is an international agreement that seeks to avert human induced global climate change. Agreement was reached on the Protocol in December 1997 under the 1992 United Nations Framework Convention on Climate Change, establishing reduction targets for developed countries. Australia's target is to limit greenhouse emissions growth to no more than 8% above 1990 levels by 2008-2012. The Protocol, expected to come into effect in 2003, will establish the first ever legally binding limits on greenhouse gas emissions produced by developed countries.

These trends are not without critics. Businesses are becoming increasingly concerned that the heeding of environmental objectives will compromise corporate responsibilities to shareholders. In the minds of some company directors, good corporate governance, including the obligations to minimise costs and maximise shareholder value, is inversely related to sustainability objectives. This view ignores the fact that there are many sustainability measures that actually improve long-term profitability.

Companies that have sought solutions to this dilemma have succeeded. A notable example is Shell (Royal Dutch Petroleum Company). After 18 months of research and stakeholder consultation for its first 'Shell Report,' the company added a fourth element to its triple bottom line reporting framework, titled 'managing our business'. This is an example of how triple bottom line reporting can be aligned to a company's responsibility to maximise shareholder value. The chemical industry's approach is another good example, it has reconciled profitability with dramatic improvements in environmental performance in the face of tighter environmental regulations being imposed. Many chemical plants now operate under closed loop production cycles, excluding only greenhouse gas emissions from their power sources.

3.3 A City accepting the challenge

Will ambitious environmental and sustainability objectives reduce the cost competitiveness and the profitability of Melbourne-based businesses? What if Melbourne doesn't act? How will the ratification of the Kyoto Protocol affect our City if we lag behind the rest of the world? And as others become more energy efficient, will Melbourne businesses be able to compete?

The City of Melbourne wants to lead the way in creating a sustainable future for its residents. It wants to anticipate the changes and forces of globalisation – economic, environmental and social – and use the tools of the knowledge age to turn these trends to its advantage.

The three core strategies outlined in this Strategy, leading-edge building design, greening the power supply and sequestering residual emissions, are not new. All three have been included in a package of solutions for emission reductions since Kyoto, and within the National and Victorian Greenhouse agendas. What is new is how the City of Melbourne intends applying these strategies throughout the municipality to achieve zero net emissions. The strategies will require consistency of application across industry sectors and the engagement of the community.

Each of the recommendations in this Strategy is a low-cost, market-driven solution, which will encourage the development of leading edge knowledge, technology and expertise.

The strategy emphasises market-driven, commercial solutions to keep business and household costs to a minimum, while at the same time reducing emissions. It also maintains responsible corporate governance throughout by ensuring that each strategy meets 'balanced scorecard' targets of financial responsibility, stakeholder engagement, market-driven business processes and continuous learning and growth. Through this, true triple bottom line deliverables are earned.

4. The Strategic Principles

The preparation, implementation and ongoing review of this Strategy is guided by nine key strategic principles. These principles provide a term of reference for ongoing strategy development and ensure that focus is maintained on the City's vision for 2020.

1. **Reduce Corporate greenhouse gas emissions**
2. **Help tenants reduce their own greenhouse gas emissions**
3. **Establish market solutions and maximise consumer and business choice**
4. **Create a shared strategic agenda with stakeholders**
5. **Remove legislative and taxation impediments**
6. **Improve understanding within the municipality**
7. **Ensure responsible measurement and reporting**
8. **Create a competitive edge for the City of Melbourne to attract business investment**
9. **Expand and share our vision – create templates for APEC**

The Strategy is a living report and will develop and evolve over time through an ongoing planning, communication and consultation process.

5. A 'Sustainable Business Matrix': a strategic planning framework

Key points

- A 'Sustainable Business Matrix' was developed to guide the planning and implementation of the Zero Net Emissions strategy. The Matrix uses the elements of balanced scorecard planning to create triple bottom line (TBL) deliverables.
- Options for action were also chosen to maximise:
  - leverage through alignment with other public and private resources,
  - competitive advantage for Melbourne businesses and the City of Melbourne,
  - consumer and business choice in the measures they wish to take, and
  - replicability to other APEC Cities.

The key to the long-term success of any environment strategy is to influence mainstream business strategy. The alternative is after-the-event environmental amelioration, which will always be a costly add-on.

The true strength of the TBL approach is the focus on holistic outcomes, where economic, environmental and social objectives are aligned and self-reinforcing, rather than in conflict with each other. This Strategy seeks to achieve alignment of the TBL objectives.

5.1 Translating the triple bottom line into tangible business planning

In 1999 Shell (Royal Dutch Petroleum Company) worked on this same issue. The company wanted to complete a TBL evaluation and report on their business performance. However, triple bottom line alone did not sufficiently cover all of Shell's corporate and day-to-day business management responsibilities. The company spent a good part of a year, trying to make triple bottom line reporting relevant to the business management principles it uses, which tends to follow a 'balanced scorecard'[7] approach.

The 'Shell Report' launched in 2000, resolved the issue by incorporating a fourth element in its triple bottom line analysis – 'managing our business'. It successfully aligned the triple bottom line approach with the four components of the balanced scorecard approach.

5.2 The 'Sustainable Business Matrix': a planning tool for the City

While the City of Melbourne could have used the Shell model, a more creative and effective approach was used for the development of this Strategy. The Strategy has been developed using a 'Sustainable Business Matrix', combining all three triple bottom line deliverables with all four balanced scorecard elements to achieve a truly holistic and responsible framework. Each strategy and action has been developed by considering how they contribute to the City of Melbourne's triple bottom line performance and how the City of Melbourne's performance against each strategy could be managed and measured according to the four elements of the balanced scorecard: financial responsibility, stakeholder engagement, efficiency-driven business processes, and the capture of learning and growth. The balanced scorecard elements have been redefined to fit with the objectives of this Strategy (see below).

By applying the Sustainable Business Matrix, the City's business imperatives were used as reference point to create strategies and actions that will deliver triple bottom line benefits. Figure 5.1 shows the framework of the Matrix, and the Matrix for the Strategy itself is shown in Chapter 10.

[7] The balanced scorecard measures not only a company's current financial performance, but also the investment in future wealth creation. It thus measures company performance according to four key elements: financial, customer, internal business process, and learning and growth. While the balanced scorecard approach (on the surface) neglects social and environmental elements, it provides an excellent system of overall business management that drives the corporate strategic agenda throughout an organisation.

Figure 5.1 The Sustainable Business Matrix

Business → / Sustainability ↓	Financial Management	Stakeholder Engagement	Market-Driven Business Processes	Continuous Learning & Growth
Economic Prosperity				
Social Responsibility				
Environmental Quality				

The definition of each of the elements in the Matrix is as follows:

Triple Bottom Line definitions[8]:

- **Economic Prosperity**: Aiming to improve the physical, financial, human and intellectual capital of an organisation.
- **Social Responsibility**: Addressing social, ethical and cultural issues including public health, skills, education, equity and accessibility. Expand the capability of people to work together for a common purpose. Develop virtues of trust, loyalty, honesty and dependability.
- **Environmental Quality**: Aiming to improve the natural wealth of life and preserving the ecosystem affected by our operations, and through ecosystem renewal, repair and replacement.

Balanced Scorecard definitions[9]:

- **Financial benefit**: This element identifies the financial objectives (as distinct from the economic objectives of the triple bottom line) in terms of earning a positive financial return on the resources invested in this Strategy.
- **Stakeholder Engagement**: This element identifies how key stakeholders will be engaged, defines stakeholder core contributions and identifies the outcomes that will be delivered.
- **Market-driven Business Process**: This element defines the market-driven business processes that will be employed to achieve the objectives. It also identifies the integration of current business processes in the City to deliver outcomes more effectively.
- **Continuous Learning & Growth**: This element drives learning and growth objectives to enhance organisational systems and process, and community development and capabilities.

[8] From *Cannibals with Forks*, John Elkington, 1997.
[9] From *The Balanced Scorecard*, R.S. Kaplan, D.P. Norton, 1996.

Part B - The Core Strategies

6. Core strategy one: Leading-edge design

6.1 Overview

Energy use in residential and commercial buildings accounts for 95% of the greenhouse gas emissions from the municipality. Improving energy efficiency of buildings through leading-edge design represents the primary means of energy demand management. The target for this Strategy is a 50% reduction in building energy use.

Rapid growth of the City population in recent years could increase energy consumption faster than projected, and make the target difficult to achieve. However, the rapidity of change could also work in the Strategy's favour, because it could create higher rates of rebuilding and refurbishment. Moreover, the economic case for energy efficiency is improving and the emerging link between green buildings and comfort, health and productivity, creates an even more powerful imperative for change.

False perceptions and commercial inertia often present barriers to the construction of energy-efficient buildings. These can be overcome by demonstration, skills development, better business systems and information resources, and by stimulating market demand as part of profiling Melbourne as a centre for 'green productivity'.

Key actions

City of Melbourne actions

- Create a showcase out of Council's administration building by 2004
- Facilitate tenants/developers into consortia to invest in landmark green building developments
- Accelerate approvals for green buildings and environmentally sustainable development (ESD) features
- Introduce mandatory energy modelling for buildings greater than 5,000 sq m
- Introduce a procurement scheme for green offices
- Establish a green building learning hub as part of a Global Centre of Greenhouse Expertise and Technology
- Fund design charettes for new buildings
- Develop an energy assurance scheme for buildings greater than 5,000 sq m.

Stakeholder actions

- Commit to best practice for the Commonwealth Games Village
- 5-star energy regulation for residential housing by 2003
- New energy regulations for commercial property by 2004
- Encourage the Property Council of Australia to revise its rating Code to include energy efficiency.

6.2 Issues influencing the leading-edge design strategy

Energy use – excluding transport – in commercial buildings accounts for 60% of the greenhouse gas emissions from the municipality. Improving the energy efficiency of buildings therefore represents the primary means of energy demand management.

This Zero Net Emissions Strategy has looked in detail at the municipality's demographics, the extent and nature of its building stock, and how these are likely to change over the coming decades. The detailed results of this investigation are provided in Appendix 1 and the key findings are presented below.

6.2.1 Demographics of the City of Melbourne

The municipality of the City of Melbourne covers an area of 36.2 square kilometres. It is dominated by the Central Business District (CBD) but includes a fringe of inner city suburbs that support an extremely wide range of activities, including residential; retail; commercial; industrial; transportation and shipping; education and research; hospitals; theatre, arts and other entertainment; parkland and major sporting facilities.

The municipality is undergoing significant changes, including:

- The redevelopment of the areas south of the Yarra River (Southbank) and in the vicinity of the old Victoria Dock (Docklands) as major commercial, residential, entertainment and recreational precincts;
- The construction of new medium and high-rise residential apartment buildings, catering for the significant growth in the number of people wishing to live in the CBD and inner-city suburbs;
- The conversion of light industrial buildings and warehouses into residences and apartments, increasing the population density and totally transforming the nature of some suburbs.

Over the past decade, the City of Melbourne's resident population has almost doubled, with an average growth rate of 6.8% per annum. The most rapid growth has been in the CBD and Southbank, with the population growing from 1,048 in 1992 to 15,711 by 2001. City Plan 2010 estimates that the resident population of the City of Melbourne will exceed 70,000 by 2010.

The number of residents represents only a small component of the City's use, with the residents being swamped by the daily influx of workers, visitors and other users. This transient population is also on the increase, with an annual growth of 8.3%.

6.2.2 Building stock and age

The diversity of businesses, services and activities within the City gives rise to a correspondingly diverse range of building stock. Information on the number and size of buildings is collected in the Census of Land Use and Employment (CLUE), but currently only for the CBD and Southbank.

An analysis of building floorspace in the CBD and Southbank, based on the data in Appendix 1, shows that:

- 50% of the building stock is less than 1000 m^2 in size, and together represents only 5% of the total floorspace;
- 80% of the building stock is less than 5000 m^2 in size, and together represents 20% of the total floorspace; and
- 5% of the building stock is greater than 20,000 m^2 in size and together represents 45% of the total floorspace

Clearly, in targeting the City's building stock for energy efficiency, the larger buildings will be crucial and should be the focus of the City's efforts.

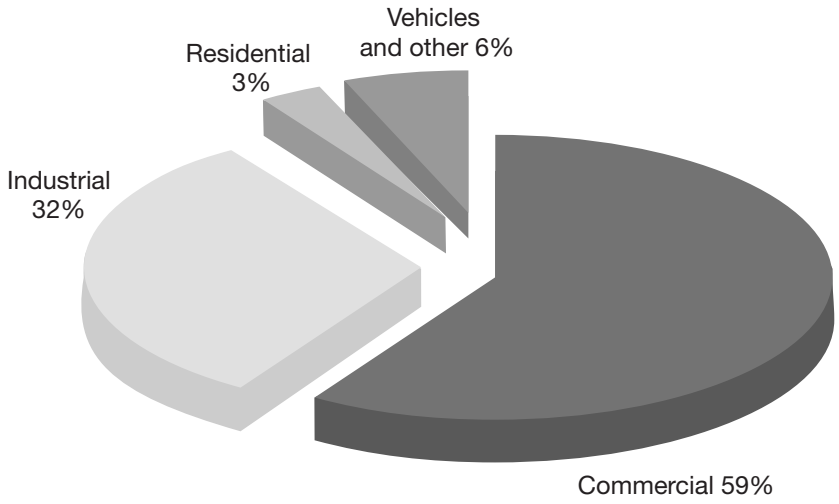
The rate at which building stock is constructed, replaced or refurbished obviously has a direct bearing on the implementation of the Zero Net Emissions Strategy (see Figure 6.1). Construction and refurbishment activity vary according to economic conditions, but the consensus in the literature is that approximately 2-3% of the City's building stock is renewed each year. The CLUE data on building age, however, shows that only slightly over 50% of the building stock in the CBD and Southbank has been constructed or refurbished in the last 30 years, which is a lower rate.

Figure 6.1: Histogram showing the history of construction or refurbishment of buildings within the CBD and Southbank.

6.2.3 Building energy use and greenhouse gas emissions in the City of Melbourne

Estimated greenhouse gas emissions by sector for the City of Melbourne in 2002 are shown in Figure 6.2. As one would expect, emissions from the commercial sector dominate.

Figure 6.2: Greenhouse gas emissions by sector for the City of Melbourne 2002 – total emissions estimated at 3.75 million tones (CO_2 equivalent).



6.3 Implications of the issues for the Strategy's target reductions

The original 2001 Study on zero net emissions assumed that the City would largely rebuild itself every 20-30 years. It was also based on the long-term rate of greenhouse gas emissions from the City of Melbourne of about 1% per annum, which was based on historical data to 1996. This data is collected only every 5 years and more recent data on energy usage in the City as a whole is not available.

Both of these assumptions could be challenged on the basis of the figures on building stock renewal shown in Figure 6.1. Only 50% of the City was rebuilt or re-furbished in the last 20 years. The growth in floorspace and population of the City over the past few years could mean that the long-term trend rate in greenhouse emissions is greater than 1%. Either of these factors could make it difficult to achieve the targeted 50% demand-reduction through improved design.

However, a number of other factors have emerged since the 2001 Study that will help in achieving the target of 50% reduction in building energy use. These include:

- **Improving net present value (NPV) of buildings** – consultations with industry showed a marked shift among building managers to a life-cycle approach to buildings costs, a trend supported by the strong growth in energy services contracting. This trend strongly favours investment in more energy-efficient buildings and in energy efficiency building improvements.
- **Business interest in green buildings** – A survey of major CBD businesses found growing interest among businesses in occupying green buildings to promote a green profile among customers and staff (see Appendix 2).
- **Impact of changing regulations** – the Victorian Government has recently introduced 5-star energy requirements for residential properties. This was based on a Building Commission/SEAV study hich found that the regulatory change would provide an overall positive impact on the economy – an unsurprising result given that it is well established that basic design changes and simple energy efficiency measures required to reach 5 stars offer a good payback. Currently, new Victorian homes manage on average only 2.2 stars and so the change in regulations will cut greenhouse emissions by around 45%. Data is not yet available for the commercial sector, but the Building Commission is scheduled to review regulations for commercial buildings in 2003, and introduce new legislation in 2004. If a similar outcome is achieved in the commercial sector, this Strategy's target of 50% improvement by 2020 will look less ambitious.
- **Improving computer technologies** – the latest flat computer screens use only 12% of the power of tube-based screens, and future screens are likely to achieve even better outcomes. This will have a major impact on commercial buildings' energy demand.
- **Changing character of the City**. The rapidly changing character of the City, evident in its population growth, may also work to the Strategy's advantage: it will accelerate the progress of rebuilding and refurbishment compared to previous decades.

A progressively tighter regulatory environment, combined with the promotion of a green profile for Melbourne commercial and private residents, will boost the pace of refurbishment of buildings in the City. These will also encourage investment in energy demand-reduction techniques.

Overall, there is inadequate data to provide a rigorous calculation of how building energy can be shifted under demand management. Consequently, this Strategy identifies barriers to improving energy demand and develops strategies to overcome them. Progress in the coming years will enable the City of Melbourne to refine the targets to reflect the various factors interactions. For now, we have retained the original target of 50% reduction, but the pace of renewal and the rate of adoption of efficiency measures will be an early indicator of the progress of the Strategy.

6.4 Barriers to the adoption of efficient design

Consultations[10] with key stakeholders identified a number of barriers to the uptake of energy-efficient design and practices. The barriers included:

- cost
- lack of demand
- lack of supporting data
- different objectives among players
- regulatory and market environment
- design process and skills

6.4.1 Cost

'Green buildings cost too much' is a common perception among builders, landlords, tenants and agents. Certainly, the perception is that ESD, and energy efficiency in particular, increases the capital cost of a building. And indeed, some recent attempts to build energy-efficient buildings in Melbourne have floundered as energy-efficient features have been among the first items cut when there is pressure to reduce costs.

But how valid is this perception? Table 6.1 shows results from the C-2000 project of Natural Resources Canada. In this project, designers used an integrated design approach to create buildings with half the average energy use of a building, to meet Canada's Model National Energy Code for Buildings (MNECB). It can be seen that the incremental capital cost of these buildings (as a percentage of the base building cost) ranged between +7.4% and –11.8%.

Care needs to be exercised when talking about the relative construction costs of buildings, so that we are comparing like with like. The construction cost of a particular building can vary over a significant range, depending on the conditions, constraints, compromises, finishes, and fit-out. However, despite the variability, there is now sufficient evidence to show that green buildings need not cost more to construct than conventional buildings (see Case Studies 2,3 & 4 at the end of this Chapter). In fact, they can cost less. There are also many examples where adding green features has added to the construction cost, but rarely does this extra cost exceed 10% of the base building cost. Given that many energy-efficient features also reduce operating costs, additional capital costs for many energy efficiency measures can be paid back over the lifetime of the building.

What determines whether an energy-efficient building costs more or less to construct, and how do designers and their clients respond? Figure 6.3 attempts to capture the current situation diagrammatically. Moving up the pyramid reflects a growing awareness of the issues and increasing sophistication of the response – unfortunately it also reflects a decreasing number of organisations and companies that make this response.

Table 6.1 Results of Canada's C-2000 Projects

Building	Type	Size (m^2)	Energy consumption ($kWh/m^2/year$)	Energy consumption (as % of reference building designed to MNECB code)	Incremental capital cost (as % of base building cost)
Alice Turner Library	Library	1400	194	35	+3
Crestwood 8	Speculative office	7500	92	51	+7
Green on the Grand	Speculative office	2200	82	44	+7.4
Kamloops	Government offices	4200	124	45	- 4
Shoal Point	Office/condominium	25000	150	56	+3–5
Yukon Power HQ	Office	1200	248	58	- 11.8

[10] For a list of the forums where barriers were raised/discussed refer to Appendix 3.

Figure 6.3: The response of clients and design teams to the green building cost challenge.

Response levels explained

Level 7:

At the bottom are the majority of clients and design teams that are either unaware of the whole green agenda or believe, rightly or wrongly, that it's too costly, too hard, or too late to incorporate energy efficiency and other green features. This is especially prevalent among building practitioners and professionals on both the client and provider side who have established business practices and are resistant to change. In Melbourne, where the building industry is the subject of a Royal Commission, the focus of the industry is very much on industrial relations issues, which tends to push energy efficiency off the agenda.

Level 6:

At the next level up, clients receive green features for 'free' or at significantly reduced cost by taking advantage of green benefits resulting from elements that have to be incorporated anyway. For example, highly efficient green appliances (refrigerators, dishwashers, etc.) don't necessarily cost any more. Exterior light shelves and sunshades can be turned into architectural features and funded from the aesthetics budget. Photovoltaic panels can replace spandrel glazing giving the same appearance while generating electricity for substantially less cost than roof-mounted PV.

Level 5:

Compromises are a fact of life in construction. It is common for fit-out and finish levels to be cut back in order to fund an extra elevator or to avoid cutting floor area. At this next level are clients that are prepared to forego features or finish in order to stay within their budget and incorporate energy efficiency.

Level 4:

At the next level of sophistication are clients that are prepared to blur the boundaries between capital and operating costs by incorporating features that deliver short payback periods (usually two to three years or less).

Level 3:

This is the minimum level that we need all clients and design teams to achieve. The concept of payback period is extended to the entire lifetime of the building, its systems and components. Lifecycle analysis (LCA) involves making decisions on the basis of the costs associated with design, construction, operation, dismantling, and disposal/recycling.

Level 2:

The next level of sophistication involves extending lifecycle analysis to include not just hard costs and savings but intangibles such as increased occupant productivity, enhanced corporate culture and image, and competitive advantage (see Case Study 6 at the end of this Chapter).

Level 1:

At the top of the pyramid are those that realise that they can have it all – an energy-efficient, attractive, productive building that costs no more – by adopting an Integrated Building Design (IBD). This is discussed in more detail in a later section, but Figure 6.4 shows one of the key concepts. Adding demand management features one by one can indeed add to the capital cost of a building. But if this is undertaken as part of an integrated process, it is possible to more than offset these costs through reduced heating and cooling plant costs.

6.4.2 Lack of demand

Many developers and real estate agents argue that there is currently no market demand for energy-efficient buildings, and therefore, no incentive to supply them.

Many of the residents, retailers, and smaller commercial tenants in Melbourne are either unaware or ambivalent about their contribution to climate change and what they can do to reduce their impact. However, an increasing number of larger organisations (government and commercial) are espousing a commitment to sustainability and triple bottom line performance. Even some banks are now reporting their greenhouse gas emissions in their annual reports. As these organisations occupy a significant proportion of the floor area within the City, one would expect this to be reflected in a growing demand for green buildings and tenancies.

Our survey of major City businesses confirmed growing interest in green buildings and tenancies (Appendix 2). Discussions with leading developers also confirm a growing recognition that there is an emerging market for green buildings and there is definite interest on the part of at least three major developers in embarking on a green building project.

A number of factors were identified as impeding this growing interest in energy-efficient building from being realised into major projects:

- Hierarchical misalignment - the objectives and reward structure of those lower down in the organisation who are responsible for property/facilities are not aligned with the commitment to sustainability being espoused at the senior executive level;
- Divisional misalignment - the objectives of different divisions within the same organisation are not aligned (for example, the objectives of the property division are different from those of the environment division); and
- Budgetary misalignment - funds for different aspects of a building project (construction, fit-out, furniture, equipment) come from budgets that are under the control of different departments. This is particularly common in government. This makes it difficult to achieve an integrated design.

As the cost profile for commercial tenants shows (see Case Study 1 at the end of this Chapter), electricity represents a relatively small component of the total cost of doing business for commercial organisations (unlike for industry). Therefore it's no surprise that potential energy cost-savings have not led management to demand energy-efficient buildings.

For businesses built around people, where salaries can represent as much as 85% of the cost of doing business, management shows much more interest in ESD buildings when linked to greater employee well-being and productivity, less churn, a strengthened position as an employer-of-choice, and enhanced public image. These benefits are more subjective and more difficult to quantify – consequently, while robust case studies with valid control groups do exist, they are harder to find (see Case Studies 2 and 3 at the end of this Chapter). As a result, management remains unaware or unconvinced of these benefits.

Finally, when clients do make the decision to build a 'green building', often they are not sure what they really want or how to write it into the contract specification. Significant expertise does exist in Melbourne in ESD design and construction, but most developers, architects and engineers are as much in the dark about how to proceed as the client. As a result, there are many examples where good intentions have materialised into nothing more than conventional buildings, or conventional buildings with a few expensive ESD features.

6.4.3 Lack of data and real examples

Because ESD is a relatively new way of design and construction, and because many of the technologies are also new, it is not as easy for clients and designers to:

- access design and information on the performance of energy-efficient technologies and systems,
- walk into and inspect a green building, or
- locate case studies on the performance and cost-effectiveness of green buildings.

Post-occupancy evaluation and long-term monitoring are rare. There are a number of unfortunate consequences, including:

- building owners/tenants have little or no idea about the energy performance of their building and how it compares to what's possible – and therefore, no incentive to improve energy performance,
- the design process is linear (systems are designed the same way every time) rather than cyclic (where the design process is refined through continual design–build–measure–review cycles).

Where performance data has been collected and used in the re-design of systems, the results can be amazing (see Case Study 7 at the end of this Chapter).

6.4.4 Different players – different objectives

Table 6.2 shows some of the cast of players in the commercial property game and the conflicting sets of objectives and outlooks that complicate the process of green development.

Table 6.2: The different objectives of different players in the commercial property game.

Player	Objectives
Architect	Highly visible results; aesthetics; minimise design time
Developer	Attractive property; rapid design and construction; minimise risk and capital cost-maximise return
Mechanical engineer	Large safety margins to cope with worst case scenario; avoid liability; minimise design time
Contractor	Maximise profit by installing least expensive components; do things as they have always been done
Owner	Maximise rental returns and occupancy rates; minimise life cycle costs
Tenant	Quality, safety and productivity of work environment; public image; minimise operating costs and rent
Facilities manager	Minimise downtime and maintenance costs; minimise discomfort complaints from occupants

These different interests and objectives present a number of hurdles to the development of green buildings:

Cash flow	The benefits from energy efficiency accrue over time whereas any extra capital cost must be paid up front.
Cost-benefit anomalies	To make matters worse, the beneficiary of the reduced operating costs is not necessarily the party that has to put up the increased capital cost for a green building.
Visibility	Energy efficiency measures (and many other ESD measures) are largely invisible. Many of the players would rather receive visible features (like a foyer upgrade) for their investment.
Front-end influence	Particularly in the case of a speculative commercial building, the players with the most influence at the front-end of a project (developer, design team, construction company) are the ones with objectives that are least conducive to green development.
Risk	Green development introduces risk and uncertainty into the development process through new technologies, untested suppliers, new and (initially) more time-consuming design procedures, different construction and installation requirements. This increased risk leads in turn to increased cost and even active opposition to green development by some of the players.

These are very real issues and must be addressed by the Zero Net Emissions Strategy.

6.4.5 Regulatory and market environments

Many organisations nominated an unfriendly regulatory or market environment as a barrier to energy efficiency. The first of these, the Building Code, is already undergoing major change with the Building Commission committed to improving energy performance as part of its ESD agenda. This is described below. The other two key areas nominated were building approvals and the market framework of building ratings and financial incentives for designers. These are also described below and offer key leverage points for the City.

(i) Building codes

Until recently, building codes in Victoria have required residential buildings to meet a 3-star energy performance ratings, or alternatively comply with certain standards of materials. Many builders have opted for the materials compliance option as it is easier than the performance option. This has meant that the average outcome of homes in Victoria is only 2.2 stars[11]. The Victorian Government recently introduced a 5-star energy efficiency rating requirement for residential buildings. This new requirement will lead to a 45% reduction in energy use in new dwellings. It will also lead to significant economic gains for the State as resources are shifted from the capital-intensive power sector to the labour-intensive building sector.

New or renovated commercial buildings in Victoria have in the past not been required to meet energy efficiency performance standards. Since it was not required, few builders and developers built in energy efficiency, incorrectly believing it was going to cost them more and erode their margins and competitiveness.

Our consultations with the building industry revealed a surprising level of support for regulating energy performance standards and the incremental lifting of the standards over time. This is because they believe that it will create a more level playing field and signal to the building industry – owners, tenants, architects, engineers and developers alike – that the government, on behalf of the community, regards energy efficiency as an important issue.

The Building Commission of Victoria is scheduled to introduce revised codes covering commercial buildings in 2004. This represents a significant opportunity to raise the bar for energy performance in the City of Melbourne, and is a key point of leverage for this Strategy, albeit outside the City of Melbourne's immediate authority. The Commission has, however, taken a strong interest in this Strategy's development and actions they could undertake to further progress this issue and deliver benefits across all of Victoria.

(ii) Building and planning approvals

Building approvals through the City of Melbourne do not currently have energy efficiency or ESD requirements. In fact, it is possible that green developments are actually disadvantaged in the approval process because they are novel and require more time to consider.

Planning approvals however, are being addressed through the currently exhibited draft Ecologically Sustainable Buildings Policy. The policy is a step in the right direction, providing a basis for encouraging the development of green buildings through the planning system.

The building and planning approval processes represent one of the Council's strongest points of leverage in the development of a Zero Net Emissions Strategy, as described in Section 6.5.

(iii) Market framework

The current market framework greatly disadvantages energy efficiency. For example:

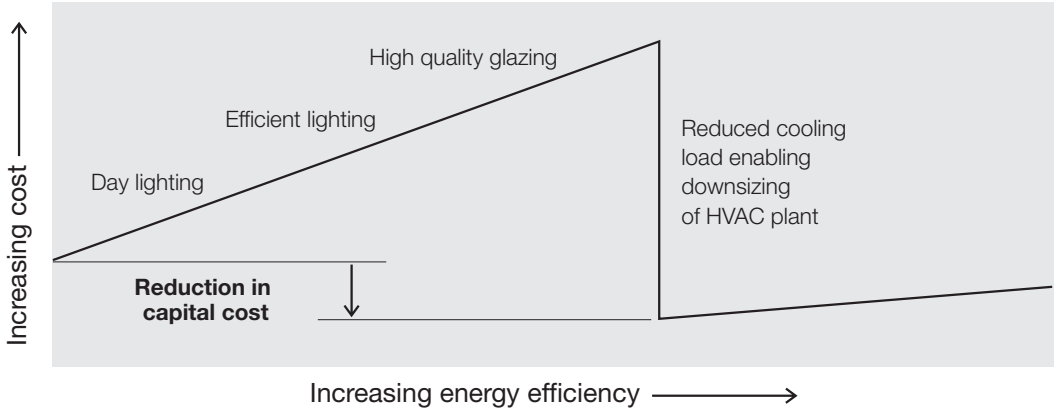
- The Property Council of Australia (despite being a strong proponent of green development) administers a commercial building space rating scheme that ignores ESD and energy efficiency. This adds to the difficulty for clients and developers to agree on green development, as the usual practice is to specify building space using the PCA's code.
- It is common for consultants' design fees to be based (directly or indirectly) on the capital cost of the project (for example, the total building cost for architects, the cost of the HVAC system for mechanical engineers). There is therefore no financial incentive for designers to spend more time designing a greener (and perhaps cheaper) building when they are going to receive the same (or perhaps less) in fees.

6.4.6 Design process and skills

Despite the fact that Melbourne has a number of architects and engineers with the skills and experience to build world-class energy-efficient buildings, the design process is often flawed and results in a rushed 'shopping list' approach to ESD. This drives up capital costs (see Figure 6.4).

[11] Source: Presentation by the Building Commission to the Steering Group, March, 2002.

Figure 6.4: Integrated Building Design delivers energy efficiency at reduced capital cost[3]



Integrated Building Design, on the other hand, optimises the building as a system and can result in reduced capital cost. As Amory Lovins explains[12]:

"A patient, integrative design process, involving users as well as the design team, diverges sharply from rushed normal practice, with architects throwing drawings over the wall to the mechanical engineer with the instruction, "Here, cool this". Sloppy design and fear of liability lead to rounded-up sizing. Capital and operating costs rise; comfort falls."

Melbourne's adversarial building culture, evident in the current Royal Commission, does not encourage such a 'patient, integrative design process', which relies on a high level of trust between participants. A possible model to overcome this is the practice of 'alliancing', used to good effect in some parts of the Australian minerals industry (see case study in Appendix 5).

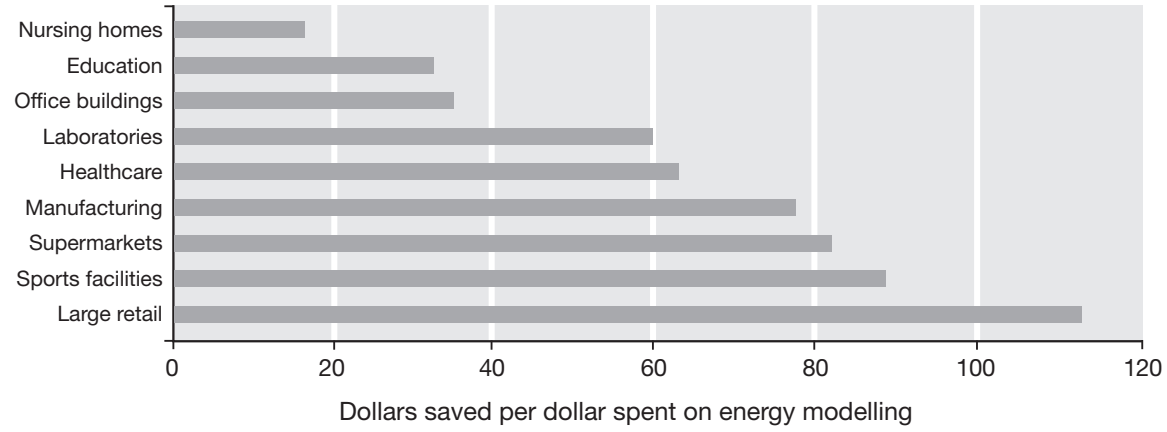
Alliancing would enable all those involved in creating a building to collaborate on an Integrated Building Design, which involves the following steps:

a. Assemble a multidisciplinary team (including users) engaged in the project from inception to completion,
b. Understand the occupancy and sociology of the building,
c. Build an energy model of the building,
d. Optimise the building's envelope,
e. Minimise internal heat gains, and
f. Design a smaller and more efficient HVAC system.

The interactions among building systems and components are complex and not intuitively obvious. For example, adding better insulation will not necessarily increase the energy efficiency of a building. The use of whole-building energy modelling throughout the design process helps the design team to focus on the most important parameters and to be convinced about results that are counterintuitive.

The lack of Integrated Building Design perhaps explains why despite the fact that energy modelling has been shown to offer outstanding returns on investment (see Figure 6.5), energy modelling of entire buildings is not widely used in Melbourne. Increasing its use could lead to significant and early wins for this Strategy.

Figure 6.5: Yield from spending on energy analysis (Source: National Grid).



[12] Source: Amory Lovins and William Browning, "Vaulting the Barriers to Green Architecture", in *Architectural Record*, December 1992.

6.5 Energy-efficient building design: action plan

The City of Melbourne will seek to overcome the barriers – and thus achieve a 50% reduction in energy use in buildings – using the four categories of the balanced scorecard.

6.5.1 Financial – catalysing investment in energy-efficient buildings

Action 1: Create a showcase out of Council's administration building by 2004

The City of Melbourne is planning to refurbish/rebuild new office accommodation. The building is an opportunity to demonstrate best practice in both design process and energy performance. A 5 star energy performance rating has been specified. Working carefully through the design issues outlined in this report will be important to ensure that the commitment does not falter under the pressure to follow conventional approaches to building in Melbourne. Anything less than best practice will reinforce the perception barrier that green buildings cannot be delivered in practice because of cost and lack of genuine demand.

Action 2: Facilitate tenants/developers into consortia to invest in landmark green building developments

During consultations, at least three developers expressed interest in building a best practice green commercial tower in Melbourne. From our survey, we believe that there is also significant interest from a number of organisations in taking a tenancy in such a building (see Appendix 2).

The City of Melbourne will catalyse the formation of a consortium of green tenants who would be prepared to lease space in a landmark green commercial building, and help the consortium choose and come to agreement with one of the developers. While this is a separate project to the City of Melbourne's own building, consideration will be given to leasing space within the green building. Partners in this project (in particular, the Building Commission and the Victorian and Commonwealth Governments) will also be encouraged to become tenants in this development. The creation of such a consortium will have a major impact on the financing costs and security of such a project, yet will not expose the City of Melbourne to financial risk.

The City of Melbourne will assist the consortium by overseeing the call for, and evaluation of Expressions of Interest from developers. Facilitation of the winning developer's project by expediting the building approvals; appointing a dedicated liaison between the consortium and the Council; and funding a design charette involving the tenants, the design team, and ESD experts will also be considered. An approach to the Building Commission for support in piloting an alliancing in building development, to overcome the issues of mistrust and adversarial culture that characterise the Victorian building industry will be considered.

Action 3: Influence best practice for the Commonwealth Games Village

The Commonwealth Games in 2006 will focus international attention on Melbourne. In the wake of the 'green' Sydney Olympics, failure of the Commonwealth Games to lead in environmental issues will run counter to Melbourne's positioning as a world-class sustainable city (and counter to the objectives of this project). With the majority of the sporting arenas and facilities already in place, the opportunity to excel sits with the Commonwealth Games Village. With the Village destined to become city fringe housing after the Games, the development is of obvious importance to this Strategy.

The City of Melbourne will continue to actively press for this Village to meet best practice environmental standards. There is a supportive Victorian Government framework in place covering the Village, but past experience has shown that there are often disconnections between the policy arms of all levels of Governments and their project operational arms.

6.5.2 Business processes – developing market and regulatory mechanisms to drive efficiency

Action 4: 5-star energy rating for residential property by 2003

As noted, the Victorian Building Commission has recently introduced a 5-star energy efficiency requirement for residential housing. The City of Melbourne will actively support implementation of this regulation to achieve 5-star ratings on all new residences in the City by 2003.

Action 5: New energy regulations for commercial property by 2004

With the majority of the municipality's emissions coming from the commercial sector, similar code requirements for commercial buildings and high-rise residential towers are required. The Building Commission will be developing the new building code. The City of Melbourne will support the Commission in introducing stretch target codes for commercial buildings, as part profiling Melbourne as a centre for 'green productivity'.

The Australian Building Codes Board is also examining ESD issues in revising the National Code. As the Victorian Building Commission is the State's representative on the ABCB, its work will automatically incorporate the national standards.

Action 6: Encourage the Property Council of Australia to revise its rating code to include energy efficiency

The Property Council of Australia's rating scheme for commercial property currently takes no account of ESD and can actually disadvantage green buildings. This needs to be addressed. The City of Melbourne will work with the PCA under existing partnership arrangements to progress review of rating scheme.

Action 7: Accelerate approvals for green buildings and ESD features

The cost of building approvals is insignificant compared to the total cost of a building. However, time delays or savings can equate to millions of dollars for a developer. The City of Melbourne will consider a scheme of expediting building approvals for developments that exceed minimum energy and ESD performance requirements.

Action 8: Introduce mandatory energy modelling for buildings greater than 5,000 sq m

The City of Melbourne wields significant power through its building approval system. It can establish minimum performance levels and provide significant incentives to developers for relatively small cost to the Council. All these can drive improvements to business practices that will benefit developers, owners and tenants alike.

As shown in Figure 6.5, the return on investment from energy analysis is enormous. The City of Melbourne will look at introducing mandatory energy modelling for buildings with floor areas greater than 5000 m2. This would apply to approximately 20% of construction projects but would influence approximately 80% of new or refurbished floorspace.

Action 9: Introduce a procurement scheme for green offices

The City of Melbourne will investigate hosting a 'green office procurement scheme' for new and refurbished commercial buildings. Offices are all much the same and their greening requires the same sorts of fittings and equipment (e.g. light fittings and controllers, HVAC equipment and management systems, floor coverings, furniture, wall finishes, appliances, etc.). In order to drive down the cost of fittings and equipment, the procurement scheme would tender on an annual basis on behalf of the municipality. Residents of the municipality could then access the best price from the winning supplier. Administration of the scheme would be low because validation of the buyer's entitlement to the collective price would be at point-of-sale between the supplier and the resident, and will not involve the City of Melbourne.

Other measures

As discussed in the previous section, the current market framework often works against the adoption of ESD and energy efficiency. A number of financial mechanisms were suggested during consultations with stakeholders, and from the literature, to address these market distortions. These included such measures as:

- Council rate relief for high levels of energy efficiency/ESD;
- a 'feebate' scheme (as used successfully by BC Hydro in Canada) where poor energy performance was financially penalised to fund incentives for good performance;
- a scheme for documenting energy cost-savings in commercial buildings as a basis for increased rent;
- a scheme to reward designers for energy-efficient design, funded by energy savings; and
- establishment of a fund to lend money for energy efficiency features, repaid via energy savings.

Each of these mechanisms has merit in certain circumstances, but addresses only certain aspects of the market framework.

Rather than attempt to plan on behalf of the many business and private residents of the City in choosing mechanisms appropriate to their varied circumstances, this Strategy concluded that the most versatile and effective scheme that integrates the various mechanisms is a municipal emissions trading scheme.

The Scheme would be voluntary initially, but could be tightened progressively as Melbourne prepares for the likelihood of a global emissions trading market in the medium term. The market is discussed in Chapter 8 in more detail.

In the case of the built environment, the trading scheme could eventually be rolled out through the building approval process. Initially, builders would be allowed a certain number of credits for a building, and anything above this level would incur a fee. The cost to builders of participating in the scheme could then be offset by the gains they would make by implementing cost-effective measures such as energy modelling.

6.5.3 Stakeholders – engaging stakeholders in implementing the actions

The many stakeholders in this Strategy are each in a position to contribute immediately to its objectives in at least one of three ways:

- By 'getting their own homes in order' with regard to greenhouse gas emissions;
- By taking action within their own spheres of influence that will move the community towards the goal of greenhouse gas reduction; and/or
- By taking action that will inspire and educate the community by demonstrating what's possible.

Community and business attitudes and awareness ultimately translate into commercial demand. As noted, there is growing evidence that energy-efficient buildings deliver significant productivity gains in commercial and industrial environments. The CRC for Construction has a project under way to document this linkage, which will provide crucial information for marketing interest in green buildings to City residents. Assessment of the City of Melbourne's new building, the new ACF building and NAB headquarters will enable Melbourne to further demonstrate this linkage. Greater productivity in buildings will provide one of the key components of the 'green productivity' profile, which is an overarching initiative of this Strategy for Zero Net Emissions (see Chapter 9 for details of the 'green productivity' profile).

As Melbourne's built environment becomes more sustainable, the potential gains in worker productivity could become a powerful attraction to international businesses deciding on their location, particularly leaders of the knowledge-based economy.

As the City of Melbourne's private and business residents embrace the Strategy, they will actively examine the energy performance of buildings that they occupy – whether owned or rented. This will allow the market to start paying premiums for energy-efficient offices and give a further boost to the rebuilding and refurbishment of Melbourne's building stock to take advantage of available, cost-effective energy-efficiency improvements. The SEAV is already developing awareness-raising campaigns with this objective in mind. The City of Melbourne will look to collaborate with the SEAV.

6.5.4 Learning and growth – establishing learning hubs

There are dozens of organisations in Melbourne that spend considerable resources on the issue of green buildings. While there are good contacts between many of these different players, they tend to be ad hoc relationships. From the perspective of the players in the commercial building sector, it is not clear how these efforts are driven or coordinated. There is a need to rationalise these efforts and to establish a single point of contact to access information and services.

Action 10: Establish a green building Learning Hub as part of a Global Centre for Greenhouse Expertise and Technology

A green building Learning Hub would provide the City of Melbourne and it's resident businesses with access to the essential expertise to cut their emissions and progressively rebuild Melbourne as a green City. SEAV is apparently considering a new organisational direction whereby it would fulfil this role, although details were not available when this Strategy was written. In this Zero Net Emissions Strategy, such a green building hub is incorporated into a new Global Centre of Greenhouse Expertise and Technology. This Global Centre would provide expert services to local businesses, export services to the Asia Pacific region, support technological development, and raise awareness across the business and general community on greenhouse issues. The Centre is described in more detail in Chapter 8 and would draw together learning and development across all three strategies of this Strategy.

Some key aspects of the Global Centre relevant to the Built Environment in the City of Melbourne include:

- **International/National linkages**. The US Green Building Council, which has developed significant experience and intellectual property, sought to globalise its activities as the World Green Building Council in 2002. As a result, the Green Building Council of Australia was established and launched in October 2002. The Australian Council is a national industry group dedicated to defining and developing a sustainable property industry for Australia while driving the adoption of "Green" building practices through market-based solutions. Their top priority will be to develop an industry owned and maintained national Green Building Tool which evaluates the environmental and social performance of buildings. Victoria is represented on the inaugural board and the City of Melbourne will seek to be a founding member.
- **Links to and support for Australian research organisations**. The Centre should not duplicate the activities of other bodies as there are already active building research programs under way in CSIRO, the CRC for Construction and some Universities. The Centre could support these organisations through demonstration projects, and by raising funds for research.
- **A conduit for best international practice**. Apart from consulting, the Global Centre could organise industry tours of energy-efficient buildings overseas for developers (at the developer's own cost) and sponsored visits by overseas experts.
- **Linkages with CSIRO**. The demonstration projects, especially the landmark projects, could link with CSIRO's Evergen project (see Appendix 6). CSIRO is looking for an opportunity to work alongside such a landmark project to document and extend best practice in sustainable buildings. CSIRO has expressed strong support for this Strategy, including the development of a major research project based around radically reducing the energy demands of the built environment. CSIRO's interest could be linked to the proposed Global Centre of Greenhouse Expertise and Technology. The learning from catalysing and executing such a landmark project could become a template for progressively improving building energy performance best practice.

Action 11: Fund design charettes for new buildings

Getting the developer, construction firm, tenants, designers, and ESD experts together at the start of the design process has been shown to be a key factor in designing successful green buildings. The City should help to foster a common culture of energy-efficient design among these disparate groups. The Global Centre (perhaps with financial support from the Victorian Government and/or the Australian Greenhouse Office) could run professionally facilitated design charettes for all major building projects within the municipality.

The City of Melbourne could also initiate, through the Global Centre, the codification of best practice in ESD building. Many good intentions are foiled at the outset by a poor understanding of ESD, and by poorly written building specifications. Building owners and tenants need to access specification templates that they can use to communicate their ESD requirements. The City of Melbourne will take the initiative and review what templates are currently available and, if necessary, adapt them to Melbourne. This may be an appropriate way to initiate dialogue with the Green Building Council.

Action 12: Develop an energy assurance scheme for buildings greater than 5,000 sq m

The whole area of energy efficiency and greenhouse gas reduction is handicapped by an acute lack of data and feedback. Tenants and residents are not sure how much energy they use and how this translates into greenhouse gas emissions. Building owners are not sure whether their new building performs well, or even whether it performs as intended. Designers don't receive any feedback on the performance of their designs that will enable them to refine future designs.

The Global Centre can help address this handicap by developing a measurement and feedback system for greenhouse gas emissions.

The Centre could also develop an energy performance assurance scheme, specifically for new buildings having a floor area greater than 5000 m2 and wanting to promote themselves as energy-efficient. The data would be made available to the building's designers and to the green building learning hub.

6.6 Costs

Estimates of the costs of actions to be taken by the City are detailed in the following table.

	Key Action	Yr 1 $k	Yr 2 $k	Yr 3 $k	Yr 4 $k	Yr 5 $k	Budget notes
1	Create a showcase out of Council's administration building by 2004	50					For design consultation, additional to current procedures
2	Facilitate tenants/developers into consortia to invest in landmark green building developments	30					Cost of facilitating meetings etc
3	Commit to best practice for the Commonwealth Games Village	10	10				Political advocacy only – no cash cost
4	5-star energy regulation for residential housing by 2003	9	10	5			In-hand by Building Commission however, internal readjustment required
5	New energy regulations for commercial property by 2004		9	10	5		In-hand by Building Commission however, internal readjustment required
6	Encourage the Property Council of Australia to revise its rating code to include energy efficiency	5					Political advocacy only – no cash cost
7	Accelerate approvals for green buildings and environmentally sustainable development (ESD) features		90				For review of procedures, no ongoing costs
8	Introduce mandatory energy modelling for buildings greater than 5,000 sq m						Cost to introduce regulation, self-funding thereafter. Costs incorporated in action above.
9	Introduce a procurement scheme for green offices		50	10	10	10	Establishment cost plus annual tender administration
10	Establish a green building Learning Hub as part of a Global Centre of Greenhouse Expertise and Technology						Cost included in Global Centre for greenhouse Expertise and technologies
11	Fund design charettes for new buildings		20	20	20	20	Four charettes per year
12	Develop an energy assurance scheme for buildings greater than 5,000 sq m.		10				Establishment cost – a commercial service thereafter
	Total	**104**	**199**	**45**	**35**	**30**	**413**

Case study 1:
Energy cost profile – Commercial building in Melbourne

Energy costs per square metre vary significantly between tenants and buildings, depending on the building's age, use and size, the efficiency of the building and its systems. The table below shows the range of electricity costs ($ per square metre per annum) for commercial office buildings and shopping centres in the CBD in 2001[13]:

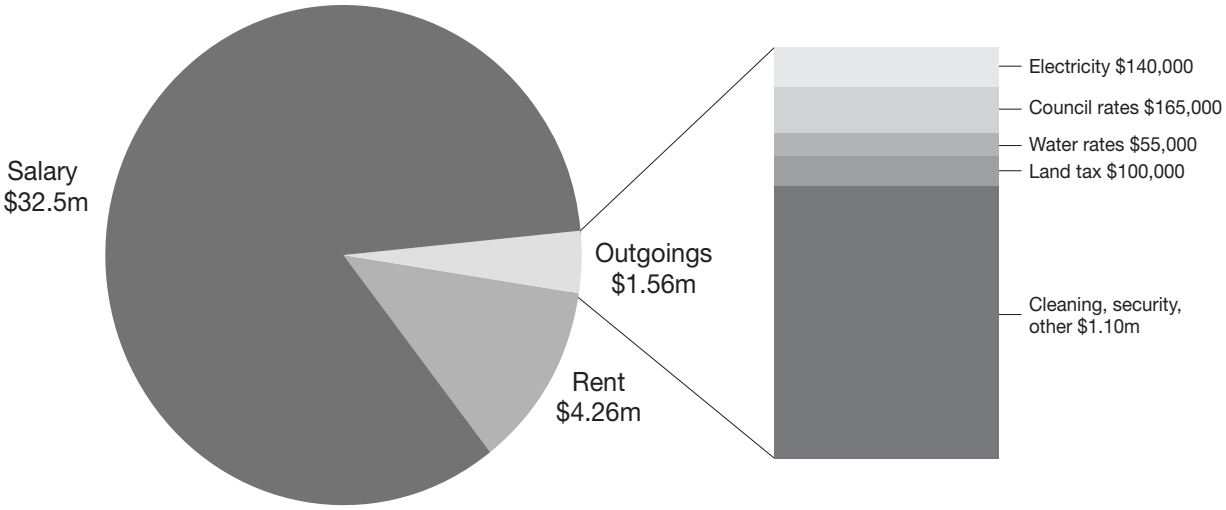
Electricity cost (m^2 pa) for commercial office space and shopping centres in Melbourne CBD.

	<9,000 m^2	9,000-18,000 m^2	18,000-36,000 m^2	>36,000 m^2	Premium and A Grade	B Grade	C Grade	Shopping Centres
Lower	9.06	11.38	6.85	7.56	7.93	7.71	10.16	11.03
Median	12.88	13.73	9.25	8.98	9.8	10.07	14.26	11.18
Upper	16.88	15.68	10.98	11.58	12.1	13.17	17.5	23.64

Other Costs

To understand the importance of electricity costs to a business, we obtained data for a large commercial tenant leasing premium high-rise office space in the Melbourne CBD. This particular tenant leases 8 floors or 14,200 m^2 of space and employs 650 staff on site. An average salary of $50,000 per employee was assumed and median electricity rates for premium office space were used. The cost profile is shown below.

Cost profile for major commercial tenant in Melbourne CBD



This tenant's annual electricity bill is $140,000, for approximately 1.4 million kW hours. If generated using brown coal, this results in approximately 2,000 tonnes of CO_2 (equivalent).

Relative to the total cost of occupying this tenancy, it can be seen that electricity is an extremely small component, representing:

- 9.0% of building outgoings
- 2.4% of the cost of rent plus building outgoings
- 0.4% of the cost of rent plus building outgoings plus salaries

[13] PCA's Benchmarks 2001 - Survey of Operating Costs - Melbourne Office Buildings

Case Study 2:
Green buildings, corporate culture and profile

Building:	**ING Bank Global Headquarters**
Location:	**Amsterdam, The Netherlands**
Completed:	**1987**

The brief called for a building that was 'organic, which integrated art, natural materials, sunlight, plants, energy conservation, low noise, and water' and cost not one gilder more per square meter than the market average.'

The result is nothing like the monolithic towers that one associates with international banks. It is a unique building that has attracted international interest and acclaim, and not only for its energy performance (see Case Study 4). The design is credited with cutting employee absenteeism by 15% and giving the bank a dynamic new public image and corporate culture that has helped to elevate it from fourth to second place among Dutch banks.

Case Study 3:
Green buildings and productivity

Building:	**Lockheed Building 157**
Location:	**Sunnyvale, California, USA**
Completed:	**1983**

This building uses sophisticated daylighting and 'litetriums' (see right) to save 75% of its lighting energy and make the space more attractive and easier to work in. The owners expected to recover the cost of installation in four years. But a 15% drop in absenteeism and a 15% gain in productivity paid for the daylighting in the first year.

Moreover, the lower overhead gave the company the edge in a tough contract competition, and the profits from that unexpected contract earned Lockheed more than it had paid for the entire building.

Source: 'Natural Capitalism' by Hawken, Lovins and Lovins.

Case Study 4:
One quarter of the CO_2 emissions for the same cost

Project:	**Jubilee Campus University of Nottingham**
Location:	**Nottingham, UK**
Completed:	**1999**

The Jubilee Campus is a $150m complex of university student residences, faculty buildings and teaching facilities catering for 1000 students and staff.

The brief called for high levels of energy efficiency and other environmental objectives within a budget that was no different from any of the University's developments.

The super-efficient mechanical ventilation system uses structural elements as both thermal mass and air paths for the ventilation systems to avoid conventional ductwork installations. Wind pressure is used to naturally ventilate the buildings. Large self-powered wind cowls (see above) exhaust air from the seminar spaces via the corridors.

Part of the energy strategy includes the use of natural light and, where necessary, highly efficient occupant-controlled lighting systems. Photovoltaic cells are integrated into the atria glazing and generate enough energy to power the fans in the air-handling units.

The result is that the buildings use only 44% of the energy of the same buildings designed to a good practice base model: 83.6 kWh/m^2/year compared to 191.1 kWh/m^2/year. Carbon dioxide emissions were 28% of the good practice model: 27 kg/m^2/year compared to 96 kg/m^2/year.

Case Studies 5 & 6:
Justifying the extra cost of green buildings

Building:	**ING Bank Global Headquarters**
Location:	**Amsterdam, The Netherlands**
Completed:	**1987**

The ING building uses about one-tenth as much energy as its predecessor building and about 20% of what a conventional new office building in Amsterdam uses (not including plug loads).

The energy-saving features added about $US700,000 to the total construction cost of the 50,000 m^2 building. But by doing so, building energy costs were cut by $US2.9 million per year. In other words, the energy-saving features had a pay-back period of about three months.

Building:	**Four Times Square**
Location:	**New York, USA**
Completed:	**2001**

Four Times Square in New York City is the first large, speculative, green high-rise commercial building in the US. The 48-storey office tower incorporates energy-efficient design, indoor ecology, sustainable materials, and on-site power generation using fuel cells and building-integrated photovoltaics. Energy costs have been reduced by an estimated $US500,000 annually, compared to a conventional office tower, resulting in a payback period of five years or less. The developer (Durst Corporation) believes that ESD has given it a competitive advantage in the cut-throat Manhattan market and is considering a number of similar green developments.

Case Study 7:
In God we trust, everyone else bring data

Building:	**National Library of Australia**
Location:	**Canberra, Australia**
Refurbished:	**1998**

The Library's three original boilers (which supply heating water throughout the building) were installed in 1967 and were at the end of their useful life.

Sizing of the replacement boilers would normally have been carried out using original design briefs. However, the NLA undertook a 12-month program of continuous monitoring of electricity and gas consumption at a sampling frequency of 15 minutes. This monitoring allowed sizing of the boilers to known consumption requirements. The result was that only two new boilers needed to be installed with a total capacity of only 30% of the three original boilers.

The time and cost of the monitoring was more than repaid in savings in capital cost, ongoing savings in operating cost, and the reduced maintenance of servicing only two boilers instead of three.

Source: Commonwealth Energy and Environment Management Case Study

7. Core strategy two: Greening the energy supply

7.1 Overview

This strategy encourages deployment of new and renewable technologies that reduce greenhouse gas emissions. It aims to achieve growth in renewable energy supply to 45% of projected demand (equivalent to about 22% of 'business as usual' demand), and a 50% reduction in emissions from non-renewable sources.

The City of Melbourne has no regulatory or decision-making role in the type of investment that takes place in Victoria's brown coal fields or in renewable energy supply. Consequently, this Strategy focuses on what the City of Melbourne can do to influence the nature of demand for power from within its boundaries.

By stimulating demand for less greenhouse-intensive power, the Strategy encourages increased investment by electricity suppliers in new and renewable energy sources. It also aligns itself with State and Federal Government programs supporting action to reduce greenhouse gas emissions.

Key actions

City of Melbourne actions

- Progressively increase Council's use of renewable energy
- Pass on innovative energy efficient technology proposals to the Sustainable Melbourne Fund[14] independent board of trustees for consideration
- Participate in a fuel cell demonstration project
- Establish a green supply chain by 2004, through the Green Tick and Greenhouse Challenge requirements
- Participate in Community Power – accessing renewable energy at the lowest possible price
- Better coordinate the City's expertise in the management, engineering, technology, administration and regulation of energy.
- Promote Melbourne's expertise and technologies abroad and assist local firms to attract international investment in sustainable energy technologies.

Stakeholder actions

- Support the State Government in encouraging the use of embedded energy, solar hot water and cogeneration
- Support retailers and/or energy service contractors to move to business models that maximise profit through value added services, rather than volume of electricity sales: examine solar hot water financing as a first step.

7.2 Issues influencing the strategy of greening the energy supply

7.2.1 Current supply and forecast demand

The Infrastructure Planning Council (IPC), the special State Government body set up to develop long-term plans for infrastructure in Victoria, forecasts continuing growth in Victoria's energy demand over the long-term. Consequently, attracting private investment in energy to ensure security of electricity supply is a key recommendation of the Council. The Victorian Government has already acted, through its recent call for tenders for the development of new brown coal fields in the La Trobe Valley.

[14] The Sustainable Melbourne Fund is a $5 million dollar investment vehicle Council designed to support the implementation of projects that deliver triple bottom line outcomes.

The IPC's outlook is predicated on the historical correlation between energy demand and economic growth. This Strategy contradicts this correlation: focusing on achieving a major reduction in energy consumption through investments in efficiency with positive paybacks, therefore contributing to, rather than detracting from, economic growth.

From this point of view, it might be argued that if these efficiencies were replicated across Victoria, there may be little need for new generating capacity. If that is indeed the case, the new investments in cleaner and renewable energy may struggle for a niche in an oversupplied market. However, even if this drop in demand for energy eventuates, new investment is still likely for two key reasons:

- The growth of consumer demand for less environmentally damaging energy supply, creates opportunities for new suppliers; and
- Growing international pressure for Australia to reduce greenhouse gas emissions, including the possibility of some form of carbon credits and debits trading system.

The IPC has recognised these drivers, noting that there is a good chance brown coal prices will rise under the pressure of emissions control.

The following are the key factors influencing change in Victoria's generating mix:

- Deployment of cleaner coal burning technologies;
- Reduction of transmission and waste heat losses through greater use of co-generation and embedded power (small, geographically dispersed generators supplying the grid);
- Ambitious targets for supply from renewable resources (IPC mooted a 20% target in the medium-term, compared to the Federal Government's target of 2% by 2010 – the 20% target is similar to the 22% of 'business as usual' power within the City's Plan); and
- New technologies, such as fuel cells and the hydrogen economy.

7.2.2 New, cleaner brown coal technologies

The State Government's call for tenders for the development of new brown coal fields aims to accelerate the uptake of cleaner brown coal technologies. The tender seeks innovative uses of brown coal, with a strong emphasis on reducing environmental impacts and greenhouse emissions.

There are opportunities for brown coal generators to improve the efficiency of their existing plants. A number of technologies are available for remediation of emissions from brown coal generators, the first step of which focuses on drying the coal. The Cooperative Research Centre for Clean Power from Lignite and several private companies in Australia and Germany have made significant progress with these technologies.

However, the energy generation industry appears reluctant to invest in remedial technologies, which add to current production costs. Most generators are carrying significant commercial debt, which is impairing their competitiveness in national electricity markets in which brown coal electricity has a significant cost advantage over other products.

Consequently, the most likely uptake of cleaner brown technologies in both the short and medium-term will be through greenfield[15] developments, such as appear likely to emerge from the current Victorian Government tender. These developments will target emerging markets for low-emission power supplies and will gain significant advantage in more stringent emission control regimes or under carbon trading.

7.2.3 Gas

Gas is an alternative fuel that offers improvements in greenhouse performance over brown coal. Victoria has significant deposits of gas in the Bass Strait and the Otway Basin. However, as noted by the IPC, using these for large-scale power generation would quickly deplete these reserves. The result would be higher prices for gas imported from the Timor Sea or overseas.

A more likely role for gas is as fuel for embedded power using cogeneration, which is a highly efficient means of power generation. For this purpose, the existing gas distribution network within the City would be used. It would involve large electricity users in industry and in commercial/residential clusters producing their own electricity from efficient, combined cycle gas-fired generators, and using the waste heat for heating. Such embedded power reduces transmission losses and allows for the sale of excess capacity back to the grid.

[15] Refers to previously un-subdivided land.

7.2.4 Renewable power sources

Currently, Victoria produces only about 116 MW of renewable power. Under the Federal Government's Mandated Renewable Energy Targets (MRET), Victoria will need to produce about 1,400 MW of renewable power by 2010, unless Victoria purchases its renewable power from another State. The estimated renewable resource capacity in Victoria is 1300 MW, mostly from crop waste (500MW) and wind (500MW), (Redding Energy Management, 1999 – study commissioned by SEAV).

Technologically, there are a number of other energy sources that could boost supply. CSIRO has noted that Australia has massive geothermal reserves and these could become a major source of renewable fuel. Little work has been done on the economics of these alternative supplies. However, if demand continues to grow and the costs of non-renewables, such as brown coal and gas, eventually attract a carbon levy to reflect their environmental costs, then interest in renewable sources will certainly strengthen.

Small-scale embedded renewable power from solar, wind and biomass also have significant potential. Solar hot water, for example, is an economically viable investment as an alternative power source. However, the length of the payback to an individual resident, even with the current Government rebate, makes many residents shy of the commitment. Most people move residences within this period and hence are not able to capture the long-term benefit. This is one reason for the slow take-up of many energy efficiency measures in buildings. Unlocking the potential of these economically rewarding sources of power generation requires attention to some of the structural issues in the electricity retail market, as described in the next section.

Other energy sources, such as photovoltaics, remain too expensive as an alternative power source, except in specialist applications. However, if the trend to lower costs and greater efficiencies continues, photovoltaics will become an economic alternative within the life of this Strategy. This would mean significant offsets of power in commercial and residential buildings using photovoltaics on rooftops and hanging walls.

A key constraint facing embedded energy systems is the difficulty of load management. Those embedded sources that rely on fluctuating power sources such as wind and solar, or which only provide overflow to the grid at certain times, means that it is difficult to match supply and demand. The risk of interruption to power supply is correspondingly greater and carries a cost penalty. However, advances have been made in integrated supply and demand management of such embedded sources using computer modelling tools, and these can greatly reduce this risk, making such systems far more attractive.

7.2.5 The role of retailers in greening the power supply

A survey conducted under this Strategy indicates that some businesses in Melbourne's CBD are willing to pay for green power, capped at a 10% premium (see Appendix 2). This level was also nominated as the premium cap by several energy management consultants, based on their experience with clients. All agree that the willingness to pay a premium for green power has increased over the past decade, and that this trend will continue to grow in the future.

Residential consumers seem more willing to pay a premium for green power. Market research suggests a willingness to pay a premium of up to 30-35% on the part of up to 25% of the population. The current offerings of partial green power allow consumers to make a partial green choice in line with their willingness to pay. Although this means most consumers will still purchase non-renewable power, the net overall effect will be a significant boost to the total demand for green power.

In Victoria, awareness about green power could be further boosted by an SEAV proposal requiring a graph of a customer's greenhouse emissions to be shown on energy bills, along with consumption data currently shown. This additional data would provide consumers a direct understanding of the impacts of their purchasing choice, constantly reinforced in the monthly statement.

The emergence of green power options is an important step toward creating product differentiation in the electricity market, which has traditionally been treated as a uniform commodity. Consultations with retailers during the preparation of this Strategy revealed strong interest in continuing this trend and moving into higher-value services, with tailored products for customers. This, they saw, as a more profitable future than simply maximising the sale of electricity.

Indeed retailers believe that the critical factor in the industry's profitability is load management rather than the quantum of electricity sold. Strong product differentiation could be the key to effective load management, as customers are offered discounts or charged premiums according to the uncertainty created on the load.

The retailers' interest in higher-value services meant that they were also interested in the concept of energy services marketing – whereby instead of selling electricity, they sold a total service. This, for example, could lead to arrangements whereby the retailer took responsibility for managing appliances for maximum efficiency – the customer benefits from reduced power bills, while the supplier benefits from the sale of the higher-value services, paid from the electricity savings. By becoming involved in the overall design of energy use in the home, the retailer can also start to influence load management.

Such an approach could also lead to retailers driving the uptake of economic, embedded energy systems such as solar hot water. Solar hot water is a low-risk, long-term economic investment with high social benefits. However, its uptake is constrained by the fact that owner-occupiers may not remain in a building long enough to capture the economic return. In rented accommodation, hot water systems are a capital expenditure borne by the owner, but from which the tenant gains the benefit – a problem also impeding the uptake of other energy efficiency measures in the built environment.

As noted, the State Government already offers a generous rebate for solar hot water installation, but this still doesn't fully address the issue of payback periods. Consultations with energy retailers and banks identified the possibility of special financing products for initiatives such as solar hot water. Households could finance solar hot water from a special fund, paid back through a levy on power bills or Council rates that would also become the responsibility of any future owner. The measure would still be attractive to future owners because it would be more than offset by the annual power savings. In this way, responsibility for the payback would remain with the property rather than with the transient owner or tenant.

Such financing, with almost guaranteed long-term economic returns could be attractive to retailers, with possible financing from superannuation funds.

Retailers commented that their ability to introduce higher-value service options is constrained by the current price regulations. They describe the current situation as similar to California, where generator sales of power are deregulated but retail prices are held low by the Office of the Regulator General. This, they say, has squeezed margins to such an extent that their focus has been on survival rather than on innovative business design.

The arrival of new green power products shows that there remains some potential for product differentiation (see Appendix 7). The arguments between the retailers and the Office of the Regulator General on what is a reasonable return for retailers is beyond the scope of this Strategy. However, the stronger the focus becomes on issues of security of supply in the short or medium-term, the less priority will be given to ensuring that supply becomes progressively greener and sustainable. A serious supply shortage is likely to cause a shift to short-term solutions with less regard to environmental performance.

7.3 Greening the City's energy supply: action plan

The City of Melbourne has no regulatory or decision-making role in the nature of investment that takes place in Victoria's brown coal fields or in renewable energy supply. The City of Melbourne could invest directly in a power supplier in order to influence the nature and availability of power, but this is not the core business of the City. Nor does the City of Melbourne have the internal expertise to assess and manage such an investment. Such an investment would require commitment to a particular source of supply over the long-term, burdening the City of Melbourne with sunk costs inhibiting flexibility to take advantage of technological change.

Consequently, this Strategy focuses on what the City of Melbourne can do to influence the nature of demand for power from within its boundaries. The Strategy uses the buying power of demand for less greenhouse-intensive power to leverage increased investment by electricity suppliers in new and renewable energy sources.

By communicating the City of Melbourne's commitment to the vision of green productivity and zero net emissions to the investment community and to the relevant State and Federal authorities, the City of Melbourne will create the climate of confidence needed for investments in new and renewable sources of power. The means by which the City of Melbourne can do so have been grouped into the four elements of a balanced scorecard.

7.3.1 Financial – catalysing investment in renewable energy

The City of Melbourne can use its own energy purchasing decisions, as well as its Sustainable Melbourne Fund, to provide financial stimulus to the supply of less greenhouse-intensive energy.

Action 13: Progressively increase Council's use of renewable energy

The City of Melbourne currently purchases about 23% of its corporate power requirements from renewable sources. As the City of Melbourne's total corporate electricity purchases per year are of the order of 26.5 GWh per annum, eligibility for 'Green Tick' status already applies, which only requires a 10% purchase of renewable power at this level of use.

The cost of shifting the City of Melbourne's corporate power to fully renewable sources would be a significant burden on ratepayers, not all of whom would currently support the move. Consequently, the 2001 Study included a gradual move to 100% renewable power by 2020.

This Strategy replaces the target of 100% renewable power purchases by the City of Melbourne by 2020 with a target of 50% renewable energy purchases and 50% sequestration by 2010, achieving zero net emissions in the City of Melbourne's corporate energy purchases.

However, these targets are notional and the City of Melbourne can be flexible in the relativities between renewable energy purchases and sequestration, depending on technological and economic movements over the period. The City of Melbourne may thus opt for varying combinations of renewable power, low greenhouse-intensive power, conventional power and sequestration investment options (Chapter 8 discuses sequestration in detail). At any time, the combination will be influenced by technical developments, and the relative cost, environmental and social benefits of the various options. The essential goal is a progressively lowering the net corporate emissions from the City of Melbourne corporation to zero by 2010.

The City of Melbourne currently spends some $3.4 m on power. It has set a target reduction of 30% of energy use by 2010. Assuming that green power has a cost premium of 30%, an increase from the current 23% renewable purchases to 50% would add an extra $275,000 to corporate electricity bills in current dollars. A steady growth over the coming years to this level has been used in costing this proposal.

However, the projected cost to the City of Melbourne of this strategy will be tempered over time by a number of factors:

- the reducing cost differential between renewables and conventional power, making the cost estimate for renewable energy above probably an over-estimate;
- the reduced demand for power by the corporation as it move to more efficient building accommodation; and
- should carbon trading emerge, the cost of conventional brown power will rise, accelerating the already improving cost attractiveness of all alternatives.

Action 14: Pass on innovative energy efficient technology proposals to the Sustainable Melbourne Fund independent board of trustees for consideration

The City of Melbourne has established a Sustainable Melbourne Fund to invest in innovative ventures that deliver both economic returns and environmental benefits. This is a direct financial investment in the development of Melbourne as a centre of expertise in sustainable development, and can be a key means of stimulating improvements in greenhouse performance in both the supply and demand for energy in Melbourne.

The Fund's independent board of trustees would need to evaluate all proposals on their merit, but could be a useful source of investment in projects that help the greening of supply. The Fund is unlikely to be able to underwrite the full commercialisation of significant technologies by itself, but it can buy the City into potentially high-return greenhouse technologies as a partial investor.

Of key relevance to the Fund is a recent State Government initiative to establish a Centre for Greenhouse Technologies that will fund demonstration projects and commercialisation strategies for greenhouse technologies. This Centre could be co-investor or joint venture partner for the City of Melbourne in greenhouse technologies if a suitable commercial arrangement between the City of Melbourne and the State Government could be reached (see Chapter 9).

A crucial issue in the success of financial investments will be the capability to assess and manage the process of commercialisation, which is as important as the scientific and technological development. Melbourne's, and Australia's, capabilities in these fields have been improving in recent years, but will need to develop further both for the economic success of the investments and to strengthen the marketing of Melbourne as a centre of expertise in greenhouse technologies. Developing this expertise therefore has been included as a critical component of the City of Melbourne's learning and growth strategy (see Action 17).

Action 15: Participate in a fuel cell demonstration project

A specific investment that the City of Melbourne should consider is a new fuel cell developed by the Melbourne-based Ceramic Fuel Cells Ltd, scheduled for 2003. Fuel cells are an efficient and low-polluting way to generate power. They convert energy from chemical reactions directly into electrical energy.

7.3.2 Business processes - developing market mechanisms to drive renewable energy use

Rather than being prescriptive about what should be adopted, this Strategy advocates the establishment of an emissions trading market (see Chapter 9) that allows all players to choose their own mix of greening measures, suitable to their circumstances.

The City of Melbourne is a major purchaser of goods and services within its boundaries, and can use this purchasing power to introduce a green supply chain that meets the same standards as its own internal practices. As the City of Melbourne progressively reduces its own emissions, it can look to impose similar requirements on its supply chain.

Action 16: Establish a green supply chain for the City by 2004, through the Green Tick and Greenhouse Challenge requirements

An easy initial step that could be taken immediately would be to require all of the City of Melbourne's suppliers to meet the requirements of the Green Tick (see Appendix 7). This would boost the demand for green power many times over the City of Melbourne's own purchases. It would also help build a sense of commitment among the corporate, organisational and individual residents of the City to the green productivity profile for Melbourne, and for the ultimate goal of zero net emissions. This requirement could be progressively strengthened over the next twenty years as the supply of cheaper renewable energy come on stream.

Adopting the Green Tick program would also help align the City of Melbourne with Federal Government programs. The City of Melbourne could also require all suppliers to become members of the Greenhouse Challenge, thus leveraging off the resources and advisory services available under this Program. This would encourage not only the purchasing of new and renewable power, but also focus attention on other strategies available to improve energy efficiencies in businesses. Again, the City of Melbourne could progressively tighten the requirements under this program as the performance benchmarks continue to rise.

The move to green supply chains would be a low-cost but highly symbolic move. The Green Tick program is designed to reflect the importance of energy to a business – large users are allowed to purchase a lower percentage of renewable power so that the financial burden is less. For most City residents, electricity is a minor business input, so adopting the Green Tick will have a low financial impact. But the psychological impact would be high.

Implementation of the green supply chain would be straightforward for both the City of Melbourne and its suppliers. Compliance is a simple purchasing decision rather than requiring detailed compliance measures as with, quality standards. Current suppliers could be given 12 months' notice of the implementation of the requirement. The requirement could then be written into all contracts and tenders issued by the City of Melbourne. Individual managers could also have discretion to waive the guidelines in minor purchases, so that compliance doesn't get in the way of 'common sense'.

Action 17: Participate in Community Power – accessing renewable energy at the lowest possible price

The rise of green preferences among consumers creates opportunities for the City of Melbourne to provide leadership beyond its own supply chain. A barrier to consumers expressing their preference for green products, other than price, is confidence that the product or service is genuinely 'green' and will make a real difference. If the City of Melbourne can help its business and residential inhabitants to overcome this lack of confidence, it could significantly accelerate the uptake of greener power.

The City of Darebin, in association with the Moreland Energy Foundation and the City of Port Phillip, investigated assisting consumers to buy green power at the lowest possible price via a green power purchasing, resulting in the establishment of a consortium known as Community Power. A key appeal of the scheme is that the Cities will not become involved in the purchase or administration of consumer purchases. Rather, they will negotiate a price and product from a preferred retailer that City residents can access. The purchasers will then deal directly with the preferred retailer, gaining access to the product by virtue of their status as a City ratepayer – in much the same way as consumer loyalty programs entitle members to discounts and preferred services.

The City of Melbourne is a founding partner in this consortium and will be able to offer access to the scheme business and residents. Such a scheme could make it even easier for suppliers to the City to comply with the green supply chain requirements.

Action 18: Better coordination and focus of the City's expertise

Melbourne has some world class expertise in the management, engineering, technology, administration and regulation of energy. However, this expertise is diffused around the City: the different experts are often constrained within information silos of their organisations. The Institution of Engineers has observed that this inhibits the deployment of this expertise both within the City and on international projects. Melbourne-based companies miss out on opportunities to win overseas work that requires an integrated base of expertise covering technology, business administration, legal, environmental management or design, rather than expertise in just one field.

Better coordination of this expertise, and overcoming the information silos, could create excellent opportunities for Melbourne businesses. The City of Melbourne could broker the creation of a focused, one-stop shop for both local and overseas buyers of services and technologies. Such a one-stop shop would be an excellent asset for the City in its international marketing, would give local businesses a boost, support other businesses moving to green business practices, and provide substance to underpin the City of Melbourne's green productivity profile.

This one-stop shop could be a component of the proposed Global Centre for Greenhouse Expertise and technology described in Chapter 9.

7.3.3 Stakeholders – engaging stakeholders in greening the energy supply

Given that Melbourne's energy suppliers and/or researchers are involved in leading-edge research in new energy supply technologies, greenhouse performance could become a pillar of Melbourne's image as a clean green City.

Melbourne could be profiled as a centre for 'Green Productivity', as described in Chapter 9. A specific goal for 'greening the power supply' could be to encourage international investment in innovations in the energy system. The resulting technologies can then be used as a springboard to other markets.

For example, cleaner brown coal technologies could find wide application in other countries using brown and low-grade coals. China, for example, faces serious health and environmental impacts of burning these coals, including an impact on direct health costs and negative employee productivity. Similarly, the City of Melbourne could help showcase renewable and fuel cell technologies currently under development in Melbourne.

Of equal importance to the sale of technologies is the export of expertise in the form of services. The market for sustainable energy management and technologies is growing rapidly, and is a wave that Melbourne can catch. A green productivity profile would support this commercial drive.

Action 19: Promote Melbourne's expertise and technologies abroad and assist local firms to attract international investment in sustainable energy technologies

The City of Melbourne will also demonstrate its commitment to 'green productivity' and zero net emissions by actively supporting other stakeholders' investment in new and renewable energy sources.

Action 20: Support the State Government in encouraging the use of embedded energy, solar hot water and cogeneration

The Victorian Government has significant programs aimed at the commercial development of renewable energy sources, including embedded renewable power. The City of Melbourne supports the State Government's programs both through its own energy purchases and through its influence on other energy users in the municipality. In particular, many of these features may be included in green building developments. As described in Chapter 6, the City of Melbourne supports such measures by accelerated approvals and co-ordination with the green supply chain. The proposed emissions trading market will also give these state Government programs a strong boost.

Action 21: Support electricity retailers and/or energy service contractors to maximise value-added services: examine solar hot water financing as a first step

Electricity retailers provide the interface between the customer and the large-scale, remote power generators. Most retailers are already offering green power options, with consumers able to select varying percentages of green power, according to their willingness to pay a premium. The retailers' move is partly in response to consumer demand and partly in response to the Federal Government's Mandated Renewable Energy Target (MRET) program.

The City of Melbourne and its constituents can support retailers and or energy service contractors who adopt business models where profit is maximised through value-added services, rather than through increased electricity sales. The emissions trading market, green supply chains and the promotion of green productivity will assist these companies, who may also be interested in collaborating on awareness raising activities linked to the green productivity profile.

A first step could be to undertake a study of the feasibility of a new financing model for solar hot water, as described in section 7.2.5. This could be done as a collaborative study with the State Government, the AGO and relevant industry bodies.

7.3.4 Learning and growth – encouraging continuous learning on 'green productivity'

The development of a 'green productivity' profile for Melbourne, the gradual improvement of business processes and the success of investment attraction and export growth will demand continual improvement of the expertise available to the City of Melbourne. Moreover, during the period of this Strategy, there will be major technological change within the power supply sector requiring constant rejuvenation of the city's skills base.

This Strategy has been designed to manage the uncertainty of technology and business trends by avoiding overly prescriptive measures. An objective has been to encourage demand for green power, while leaving the decision on individual technologies to the marketplace. The efficiency of the marketplace also relies on informed customers and suppliers and so this too demands the development of expertise and of the City's overall literacy in sustainable energy. Key areas of learning and growth include:

- The development of new technologies for brown coal – including the capability to assess emerging technologies and facilitate their introduction;
- Renewable energy expertise, including wind and solar;
- The management of grids sourcing power from multiple, small embedded generators, including cogeneration and small scale renewables,
- Technology commercialisation expertise – Australia has traditionally struggled to commercialise technology, (this situation was discussed at length at the 2000 National Innovation Summit organised by the Federal Government);
- Customer solutions expertise – as electricity products become more highly differentiated, understanding consumer expectations will be critical; and
- Carbon trading expertise – anticipating the eventual introduction of some form of carbon credits trading.

The SEAV runs a range of awareness activities which the City of Melbourne often supports such as conferences and charettes. These should continue and be given a more formal structure through a formal MoU with the SEAV (see Chapter 9). Aligning activities with those of existing industry and community networks such as the Industry Greenhouse Forum, the B*ATE* network, ICLEI and others would also be worthwhile.

7.4 Costs

	Key Action	Yr 1 $k	Yr 2 $k	Yr 3 $k	Yr 4 $k	Yr 5 $k	Budget notes
13	Progressively increase the City's use of renewable energy	35	70	105	140	175	Cumulative expenditure increasing to $275K by 2010, assuming a 30% cost premium for green power
14	Pass on innovative energy-efficient technologies to the Sustainable Melbourne Fund						Capital investments to be made at the discretion of the Fund
15	Participate in a fuel cell demonstration project						In kind resource only
16	Establish a green supply chain by 2004, using the Green Tick & Greenhouse Challenge standards		20	10	10	10	Establishment costs plus annual administration
17	Participation in a green power buying consortium to access green power at the lowest possible price	20	10				Current contribution to establishment, legal and marketing costs of the Moreland City scheme
18	Better coordination of expertise						Action to be undertaken by the proposed Global Centre of Greenhouse Expertise – capital investment by the City of Melbourne, as described in Chapter 8
19	Promote Melbourne's expertise and technologies abroad and assist local firms to attract international investment in sustainable energy technologies						Undertaken as part of the green productivity profile, as described in Chapter 9
20	Support the State Government in encouraging the use of embedded energy, solar hot water and cogeneration						In-kind support only
21	Support energy retailers and contractors to move to value added services: examine solar hot water financing as a first step		10	10			Possible in-kind contribution to the study of solar hot water, as this falls within a State/Commonwealth jurisdiction
	Total	**55**	**110**	**125**	**150**	**185**	**625**

8. Core strategy three: Sequester residual emissions

8.1 Overview

The original 2001 Study required sequestration in 2020 of about 800,000 tonnes of CO2 equivalent. This Strategy does not require the City of Melbourne to assume responsibility for sequestering the emissions of its residents and businesses but assists them to find cost-effective means to 'go green' via an economically self-sustaining strategy.

The best triple bottom line investment identified in the Strategy is blue mallee eucalypts as feedstock for a CSIRO-developed carbon activation process into power generation, with eucalyptus oil as a by-product. This option offers a viable economic investment, with carbon credits, salinity credits and biodiversity credits as potential upsides. Private investors are already interested in the proposed plant and the City of Melbourne's entry into the project as an owner of the mallee trees and a purchaser of the renewable power output could catalyse the venture.

A pilot project to sequester 10% of the City of Melbourne's corporate emissions is proposed. If successful, the Strategy calls for this to rise to 50% of the City of Melbourne's emissions by 2010. Combined with the 50% target in the City of Melbourne's use of renewable energy, sequestration will deliver a net zero corporate emissions. However, as noted in the previous Chapter, the final mix between renewable power and sequestration will be resolved as learning about both forms of emissions management improves. The proposed emissions trading market will provide a focus for this learning.

Once proven, the investment could become a convenient vehicle for other City businesses and residents as part of the proposed emissions trading market. This would enable them to choose a mix of sequestration and renewable power purchases to meet their environmental objectives and create a flexible path toward zero emissions.

Key actions

- Establish a City-rural partnering arrangement to develop a carbon sink investment
- Invest in blue mallee eucalypt plantations as feedstock for renewable power generation, with eucalyptus oil as a by-product
- Establish an investment vehicle for City businesses and residents for commercial sequestration projects
- Link this vehicle and a carbon credit purchasing scheme for tenants as part of the pilot municipal emission trading market.

8.2 Issues influencing the sequestration strategy

Sequestration in a controlled greenhouse gas reduction program is essentially a temporary measure. Most forests and ecosystems in the long-term are in a steady state of absorbing carbon through new growth, and then emitting it in the process of decay. However, if land has been cleared and is reafforested, then a net sequestration occurs over a period of 30-40 years. Similarly, sustainable harvesting of timber as a fuel for power generation also gives an initial boost to sequestration before settling into a carbon neutral cycle as carbon is stored in trees before being released when burnt. Replantings continue the cycle.

Sequestration thus allows carbon emitters the opportunity to offset emissions over a period where expected technological improvements in energy generation will provide the means of eliminating greenhouse gas emissions.

8.2.1 Worldwide preparations for emissions trading

The Kyoto Protocol has not yet been ratified, but there are already numerous bilateral arrangements around the world where carbon emitters are entering into arrangements with other, sometimes several, organisations to purchase the carbon rights from terrestrial carbon sinks. Two recent examples have taken place in Australia – Tepco of Japan in conjunction with the State Forests of NSW, and Cosmo Oil, also of Japan, in conjunction with APT of Western Australia.

There is also considerable activity taking place in the creation of emissions trading markets,which will drive demand (see Chapter 9).

In 2001 the Victorian Government amended the Forestry Rights Act (1996) to encourage investment in the planting of new forests as carbon sinks. Under the legislation, land rights, tree ownership rights and carbon rights are each separate entities and are defined and protected under law. The key features include:

- The private land holder has land rights established and protected under current property law,
- Land holders and tree owners enter into a 'Forest Property Agreement' which is recorded on the land title,
- The tree owner and the carbon rights owner enter into a 'Carbon Rights Agreement'. The Department of Natural Resources and Environment maintains the register of carbon agreements.

Each State in Australia has similar legislation in place, with the exception of the Northern Territory and the ACT. Thus, carbon sequestration despite Kyoto not yet being ratified, is an internationally acceptable strategy as part of an overall greenhouse gas reduction program.

8.2.2 Carbon sink eligibility

The Kyoto Protocol sets international guidelines for a carbon sink to fulfil. While there are still many issues that require negotiation, some basic rules have been set:

- The sink must be on land that was cleared prior to 1 January 1990,
- Forest plantations must be human-induced to indicate a change in land use, and
- Sinks must adhere to a regular and comprehensive self-measuring and monitoring regime.

An important new category currently being negotiated is revegetation, which will include vegetation that does not meet the current definition of a 'forest'. This is potentially a very important development for Australia where revegetation is critical to rebuilding our delicate ecosystems.

The Australian Greenhouse Office (AGO) has developed extensive greenhouse accounting tools that can be used to set up, measure and predict the levels of carbon in forest or plantation ecosystems. These include the National Carbon Accounting System (NCAS) for setting up carbon sinks, and the CAMFor model (Carbon Accounting Model for Forests) to measure and monitor the levels of carbon sequestered in a carbon sink. The AGO and other service providers in the market such as carbon brokers and independent verifiers, can assist in establishing and monitoring arrangements.

8.2.3 Legal and contractual issues

As it is still early days in the development of carbon sink arrangements, legal and contractual issues are still not fully developed. As part of its 'Bush for Greenhouse Program', the AGO has currently several consultants working on legal, contractual, measurements and monitoring standards, insurance issues and risk management. The results of these projects will not be available for another six months, and considerably longer for any recommendations to become binding by law. In the interim, the AGO is in a position to facilitate the development of carbon sink arrangements between parties.

8.2.4 Carbon price indications

Recent predictions of carbon credits in Australia for 2010, as reported by the AGO, range from A$10 to A$50 per tonne of carbon dioxide. The AGO has also stated that current trades for carbon dioxide appear to be at the low end of this range. However, if an emissions trading system is introduced under a ratified Kyoto Protocol, prices could rise significantly.

The key message is that at this point in time, the value of carbon credits alone is insufficient to break even from growing trees solely for carbon, as is evident in Table 8.1 in the next section. Carbon credits are at best an additional, speculative return on the initial investment. Carbon sinks, at this point in time, need to be grown for other reasons, such as the commercial value of tree products and the other environmental benefits that they generate.

However, over the long-term, under a ratified Kyoto Protocol and in a robust international emissions trading market, Australia may have to face the prospect of carbon prices reaching such levels that it would compete directly with other agricultural commodities for land use.

8.3 Sequestration strategy: action plan

The action plan for the sequestration strategy recognises that the City of Melbourne could not meet the obligations of its residents for sequestration. The City of Melbourne and its business and private residents will need to sequester 800,000 tonnes of carbon dioxide (or 217,984 tonnes of elemental carbon) by 2020. If the carbon sink was to be located in north central Victoria, the average sequestration rate that could be achieved will be about 3.5 tonnes of carbon per year. This translates into approximately 62,000 hectares of land with an average tree age of 10 years by 2020.

The establishment cost alone of the required 62,000 hectares would be of the order of $60-80 million, and would be too large a drain on City of Melbourne's resources, even if there was a long-term payback. A lower cost route would be to simply purchase the carbon rights, but even at today's low rate of $10 per tonne this would cost just under A$2.2 million. Either of these would be a heavy impost on the City of Melbourne.

Instead of shouldering the responsibility for the emissions of its businesses and residents, the City of Melbourne could lead the way for its businesses and residents by first sequestering a component of its own emissions and creating a template for others to follow. The Actions below enable the City of Melbourne to do this.

The economics and institutional structures for such a sequestration strategy are in need of further development. Consequently, the first step for the City of Melbourne is to work with regional-based authorities to confirm the economics of different sequestration options and to build the appropriate institutional capabilities to manage them.

Action 22: Establish a City-rural partnering arrangement to develop a carbon sink investment

This recommendation builds on prior discussions between the City of Melbourne, NRE and the Central Victorian Greenhouse Alliance (CVGA) on partnering strategies between the City of Melbourne and regional Victoria. NRE funded this phase of the work.

The partnering strategy recognises that the City of Melbourne's environmental footprint extends into rural Victoria. It also provides a template for other Victorian metropolitan cities to follow.

Selection of an appropriate strategic rural partner, or partners, is of crucial importance in a successful City-rural partnering arrangement. The following criteria can be used to assess the suitability of possible partners:

- The partner must have compatible strategic greenhouse gas abatement goals,
- The capability of the partner must be assessed in terms of its ability to keep to its part of the arrangement as a land manager,
- Location must be in Victoria – it would be inappropriate for the City of Melbourne to partner with an organisation from another State,
- There must be broad general agreement on the parameters of the arrangement in terms of who owns what part of the arrangement, and what are their responsibilities and contributions, and
- There must be agreement on issues of risk, insurance, land management practices, commercial arrangements and general contractual arrangements.

A model of the contractual arrangements under a City-rural partnering arrangement is explored in Box 1 at the end of this Chapter. Because of established relationships, the Strategy has recommended partnering with the CVGA, which is profiled in Box 2.

A number of potential investments in North Central Victoria were investigated for the City-rural entity. None were at a stage where a 'bankable' investment analysis could be undertaken, but work is under way that could lead to this within the year.

The best prospective investment appears to be in blue mallee plantations.

Action 23: Invest in blue mallee eucalypt plantations as feedstock for renewable power generation, with eucalyptus oil as a by-product

Blue mallee gums sequester carbon in their root systems, with the wood harvestable after 5 years, and thereafter on a 2-3 year rotational basis, a far quicker commercial return than sawlogs. The mallee wood can be processed through a novel carbon activation process developed by CSIRO, which makes it a good feedstock for electricity generation, while also supporting the production of eucalyptus oil. The blue mallee tree then regenerates from the remaining stump after harvesting, and continues to sequester carbon in its root system, providing a sustainable sequestration system.

The viability and the expected commercial returns from investment in blue mallee eucalypt plantations are further explored in Box 3 at the end of this Chapter. Box 4 lists the investment criteria for possible investments. Although a full economic evaluation of the blue mallees has not been undertaken, it combines the proven economic potential of eucalyptus oil and biomass production with a relatively short payback period. On the figures in Box 3, it should provide a commercially viable investment.

Western Power is currently commissioning a pilot plant in WA for CSIRO's carbon activation process. The Oil Mallee Company will work with Western Power to extract and market the eucalyptus oil, produced in a complementary process to the carbon activation.

Both companies are interested in establishing a similar plant in Northern Victoria. An investment by the City of Melbourne in a blue mallee eucalypt plantation in the region can help catalyse this interest into action. Eventually, harvested blue mallee could be sold to Western Power and OMC, and the City of Melbourne could also agree to buy renewable energy from Western Power. This would guarantee a significant forward purchase and lowering the plant's risk profile, making it an even more attractive investment for a company such as Western power and its financiers.

As part of the partnering arrangement, the City of Melbourne could become a party to the NRE-led Feasibility Study into the viability of the blue mallee gum industry, which the CVGA is supporting. This would provide the essential due diligence for a possible City of Melbourne investment in a pilot sequestration project in blue mallees.

A viable target for the pilot would be to offset 10% of corporate emissions. The scope of the proposed pilot would be:

- 10% of the City of Melbourne's corporate emissions would be approximately 3,082 tonnes of carbon dioxide equivalents (or 840 tonnes of elemental carbon) per annum.
- To sequester this amount of carbon the City of Melbourne will require about 240 hectares of new forest (using the average sequestration rate in low-rainfall areas of 3.5 tonnes of carbon per hectare per annum). This rate will need to be confirmed for the specific site selected for the project.
- At $10 per tonne, the carbon rights would have a value of $8,400 per annum.
- The establishment of a plantation (for saw logs or biomass production) will cost between $900 – $1400 per hectare, depending on the selected site, plus additional annual maintenance costs. This means that a pilot carbon sink for corporate emissions will cost between $216,000 to $336,000 to establish, plus additional annual maintenance costs. The costs could eventually be lower, depending on whether the carbon sink project is eligible for Bushcare or NAP funding.
- This capital cost would also be offset against the future earnings of the investment through the sale of the blue mallee produce.

The pilot investment adopted by the City of Melbourne and its rural partner is a low-cost learning exercise. Once proven, the City of Melbourne could progressively increase its sequestration to 50% of its projected corporate emissions in 2010 and attract other investors into a new industry for regional Victoria.

Action 24: Establish an investment vehicle for City businesses and residents for commercial sequestration projects

Action 25: Link this vehicle and a carbon credit purchasing scheme for tenants as part of the pilot municipal emission trading market

A successful pilot would also demonstrate the viability of sequestration investment to City businesses and residents and create an ideal vehicle for participants in the proposed carbon emissions trading market (see Chapter 9) to use for a carbon credit purchasing.

As part of the emissions trading market, the City of Melbourne will also need to establish a means by which business and residential constituents can access carbon credits from other approved carbon sink projects.

8.4 Managing the sequestration strategy with the balanced scorecard

8.4.1 Financial management

The key financial feature of the sequestration strategy is that the carbon sink will be established on a commercial basis.

For the pilot carbon sink program, the cost implications are given in Table 8.1. In addition, an initial contribution to the full feasibility study being led by NRE would cost $20,000. As noted, maintenance and harvesting costs are very low, but these and income streams will be investigated in the feasibility study. Based on the RIRDC work shown in Box 3, a 15% project IRR seems a conservative projection.

Depending on the success of the pilot, the City of Melbourne could develop – with a private corporation – an investment scheme based on the blue mallee as a convenient option for business and private residents wanting to gain access to sequestration credits. The cost of developing the scheme could be borne by the private partner, with the City of Melbourne meeting due diligence requirements. The cost of this due diligence has been incorporated into the cost estimate of the emissions trading market.

Also depending on the success of the pilot, the City of Melbourne could increase its investment in sequestration, as part of a strategy to achieve zero net corporate emissions by 2010. As noted, the amount invested in sequestration would depend on the relative attractiveness of green power purchase vs. sequestration. For the purpose of this Strategy, a sequestration target of 50% of the City of Melbourne's corporate emissions has been adopted, with the remaining 50% of power purchase coming from green power and hence not requiring sequestration offsets.

Given that this investment would proceed only if the pilot proved to be commercially viable, it has not been costed separately.

A summary of the scope of investment for the pilot, for the 50% target by 2010 and for the City as a whole is provided in Table 8.1. All figures are in current dollars.

8.4.2 Stakeholder engagement

The partnering arrangement will provide a framework for collaboration between the City of Melbourne and a broad base of community of stakeholders in North Central Victoria. A successful pilot will enable City-based stakeholders to pursue a proven investment option providing a viable economic return with carbon credits attached. This will facilitate their participation in the proposed municipal emissions trading scheme.

By establishing a convenient sequestration investment vehicle for its business and private residents, the City of Melbourne is providing both leadership and a valuable service to help them manage a difficult issue. The fact that this investment genuinely integrates all elements of triple bottom line provides a further dimension to the 'green productivity' profile and a template able to be reproduced elsewhere in Australia and APEC.

8.4.3 Market-driven business process

The documentation for carbon sequestration being developed by the AGO will provide the business process framework for the sequestration agreements. The Feasibility Study can also identify the linkages between landowners and investors.

Creating an investment vehicle open to participants in the proposed emissions trading market will also require a codified prospectus. Developing this is contingent on the success of the pilot and has been scheduled for 2004.

Table 8.1: Cost implications of the sequestration strategy.

	Pilot (10% of Corporate Emissions)	Target of 50% of corporate emissions by 2010*	Municipal in total
Carbon dioxide	3,082	10,780	800,000
Carbon (elemental)	840	2,940	216,802
Sequestration rate	3.5	3.5	3.5
Carbon value @ $10/tonne	$8,400	$29,400	$2.17
Est. area required	240	840	61,943
Establishment costs $900 - $1400 p/ha	$216k - $336k	$756k - $ 1,176k	$55.7m - $86.7m

** assuming 30% reduction in energy use by 2010, as per current energy plan.*

8.4.4 Continuous learning and growth

By recognising that the City of Melbourne's environmental footprint extends into rural Victoria, both city and rural communities learn of the wider impact of their simple day-to-day actions on their household, the environment and the wider community. Once the City of Melbourne establishes and refines the City-rural partnering arrangements with its partners, the template will be made available for other cities, locally and internationally to learn, develop and adopt.

8.5 Costs

(a) Operating

	Key Action	Yr 1 $k	Yr 2 $k	Yr 3 $k	Yr 4 $k	Yr 5 $k	Budget notes
22	Establish a City-rural partnering arrangement to invest in a carbon sink	5					Liaison cost only
23	Invest in blue mallee eucalypt plantations as feedstock for renewable power generation, with eucalyptus oil as a by-product		20				City of Melbourne contribution to NRE-led Feasibility Study – capital investment separate (see Chapter 10)
24	Establish an investment vehicle for City businesses and residents for commercial sequestration projects			20			Cost of selecting and liaising with a commercial partner
25	Link this vehicle and a carbon credit purchasing scheme for tenants as part of the pilot municipal emission trading market						Costs covered under the pilot trading market (see below)
	Total	**5**	**20**	**20**			**45**

(b) Capital

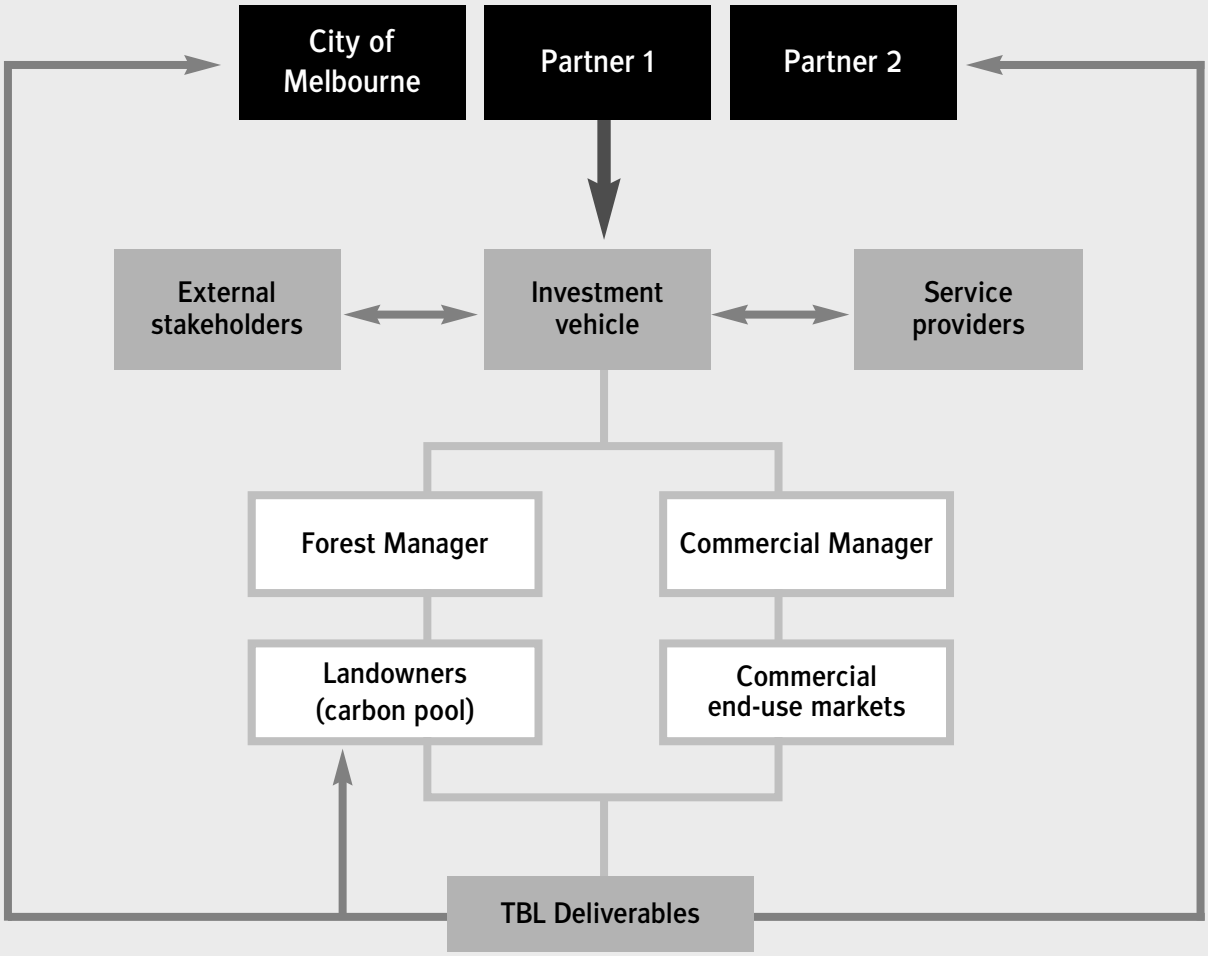
	Action	Yr 1 $k	Yr 2 $k	Yr 3 $k	Yr 4 $k	Yr 5 $k	Budget notes
27	Invest in blue mallee eucalypt plantations as feedstock for renewable power generation, with eucalyptus oil as a by-product		276	100	100	100	Mid-point assessment of establishment cost between $216-336k, followed by $100k per year investment to achieve 50% sequestration target for City of Melbourne corporate by 2010 (also allow one year for review of pilot)
	Total		**276**	**100**	**100**	**100**	**576**

Box 1:

City-rural partnering arrangement: an operating model

An operating model of the contractual arrangements under a City-rural partnering arrangement is shown below. It draws on sequestration agreements developed by the AGO, Australian National University (ANU) and the Rural Industry Research and Development Corporation (RIRDC).

The number of parties in the arrangement, and the number and type of benefits that are produced and distributed are complex. In addition, legal, financial, taxation and contractual obligations also need to be incorporated. The investment vehicle will have to align two separate objectives. One will be to maximise the rate of sequestration from the carbon sink or pool, and the second will be to maximise the commercial return on the investment.



A land management regime

An agreed land management regime and the capability of the land manager are critical to successful execution of a sequestration strategy. Once clear commercial and sequestration objectives are set it will be up to the land manager to determine a long-range program to achieve those targets. A system of control measures is needed to measure, independently verify and report on the sink's performance at regular intervals, currently set at five-year periods.

The land management regime is complicated in a commercial forest, as the harvesting of trees will incur a carbon debit. Replanting is necessary to not only fill the gap created by harvesting and other losses such as tree death and thinnings, but continuous planting must be at a rate that will meet the City's sequestration target by 2020. Beyond 2020, plantings need to keep pace with maintaining the rate of sequestration required to keep the City's net emissions neutral.

Box 2:
North Central Victoria and its Greenhouse Revegetation Action Plan

NRE and the North Central Victoria Catchment Management Authority (NCCMA) are currently jointly preparing a Greenhouse Revegetation Action Plan. The purpose the action plan is to reduce the amount of greenhouse gas in the atmosphere by creating opportunities for new investment in revegetation. There is a strong local community interest and support for various greenhouse activities in the region, such as energy conservation, revegetation, renewable power generation and modified farming practices. These activities are currently being co-ordinated by the Central Victorian Greenhouse Alliance (CVGA), a regional body made up of ten local councils, La Trobe University and other regional organisations. The revegetation component of the CVGA's activities is the responsibility of the NCCMA and NRE. A steering committee has been established to prepare the action plan, with representatives from the community and the CVGA.

The region is currently facing difficult environmental conditions, such as increasing salinity levels, shrinking bio-diversity and declining water quality. Agricultural production is marginal in this predominantly low-rainfall region, with worsening prospects once the reality of global warming takes its toll. The overall goal of the NCCMA is to increase native vegetation cover from 12.7% to 20% by 2020. This is the equivalent of 12,000 ha/year by 2020 (240,000ha in total). It intends to attract private and public investment estimated at $500m in order to stabilise and eventually improve its long-term environmental profile.

The NCCMA appears to be an excellent potential partner for a partnering arrangement with the City of Melbourne. It has been very active with its local community and in building relationships with potential partners in order to achieve its goals. Other regions may also offer opportunities, but the brief for this Strategy was confined to this region, because of the established relationships between it, the City of Melbourne and NRE.

The NCCMA still needs to undertake more work in identifying and commercialising the opportunities that are available in the region, and in building its internal capability to manage these opportunities over the long-term. The City of Melbourne and NRE can build on their existing dialogue with the region to help identify commercial carbon sink opportunities and to create a robust investment option not only for the City of Melbourne, but for resident businesses and households in the City.

Box 3:
The viability and expected returns from blue mallee eucalypts

The combined production of renewable power and eucalyptus oil from blue mallee eucalypts will make it a viable commercial crop. The blue mallee economics is further strengthened because it requires minimal maintenance – unlike pine or sawlog, there is no need for weed control, thinning, fertilisers or irrigation. Moreover, stock can graze among the trees without damaging them. This means that the City of Melbourne could simply purchase the rights to the wood and carbon of trees from farmers who could continue to use the land for stock grazing. And because the mallee is native to Victoria, it will also help improve biodiversity – while controlling salinity and erosion.

Western Power is currently commissioning a pilot plant in WA for the carbon activation process. The Oil Mallee Company will work with Western Power to extract and market the eucalyptus oil, produced in a complementary process to the carbon activation. Both companies are interested in establishing a similar plant in Northern Victoria.

Expected commercial returns from the investment

RIRDC has conducted several studies of commercial returns from agroforestry enterprises in low-rainfall areas in Australia (i.e. 400-600 mm average rainfall per annum). The returns are not high, principally because of the limited market opportunities for traditional timbers produced in low rainfall areas, and the low timber productivity rates in such areas. Furthermore, low-rainfall regions tended to have less established infrastructure and greater distances to markets, which detracted from their commercial attractiveness. North Central Victoria enjoys a higher standard of infrastructure than other low-rainfall regions and so will offer a better return.

Following are the results of the economic assessments undertaken by RIRDC on four key agroforestry enterprises.

Enterprise	NPV	Discount rate of return	Internal rate	Benefit-cost ratio
Sawn timber (project life 47 yrs)	-$16,710	5%	2.7%	0.69 : 1
Firewood (project life 17 yrs)	-$25,620	5%	negative	0.02 : 1
Biomass for electricity (project life 30 yrs)	$855,182	5%	19%	1.2 : 1
Eucalyptus oil (project life 30 yrs)	$5million	5%	6.9%	1.14 : 1

Of the four enterprises, eucalyptus oil is the most economically viable. Biomass for electricity is also viable on the assumptions that were made in the study. These results need to be viewed only as indicative of commercial agroforestry prospects in low-rainfall areas. But the study provides a good basis for further evaluation of possible investments in the target region.

Box 4: Investment criteria for sequestration projects

The following are the investment criteria for possible sequestration projects:

1. What will be the institutional arrangements for the investment?
2. What will be the financial cost to the City of Melbourne and over what time period?
3. What will be the financial return to the City of Melbourne and how robust is this forecast?
4. What triple bottom line benefits will be derived and who will capture these benefits?
5. How does this investment compare with other deals that have recently been made both in Victoria and in other States?
6. What other sources of funding or co-investors are being targeted (e.g. State Government, private investors)?
7. What is the assumed time-frame for the 'upsides' to deliver a tangible return?

The capability of co-investors or project managers should also be evaluated using the following criteria:

1. Do they have the business planning, skills and capability to manage the investments?
2. What additional legal and financial assistance will they bring in?
3. Do they have the infrastructure and resources to establish and run a carbon pool?
4. Within the target region, do they have the land availability and the interest among farmers to participate in the investments over the short to long-term?

Finally, specific issues need to be considered to ensure that the investment meets the Kyoto criteria for a carbon sink:

1. What carbon measuring and monitoring regimes will be followed?
2. How much sequestration will be derived from the target planting areas? What are the planting strategy and options. What sort of buffer will be kept by the pool?
3. What land management standards and practices will be adopted?
4. What payment schedule (annuity to landholders and pool manager) is being suggested?
5. What third party verification and attestation will be included?
6. What risk management strategy will be employed?
7. How will the AGO and its resources be utilised?

At present, there is insufficient information on the investment opportunities identified by this Strategy. Thus, there is little information to help resolve all of these questions. However, work is in progress in the AGO to provide frameworks for carbon sequestration agreements. And in preparing this Strategy, working relationships were established with groups in North Central Victoria that provide the basis to work through these issues and create a detailed model that can deliver benefits to all parties.

The Strategy provides the framework in which those discussions should proceed and integrates sequestration into the proposed carbon emissions trading market.

9. Integrating the strategies

9.1 Overview

The complexity of the Strategy requires mechanisms to help integrate all the efforts of both the City of Melbourne and its stakeholders. Three overarching initiatives provide this, as summarised in the box below. A conceptual framework for aggregating all efforts, and for efficient implementation, is shown in Appendix 7.

It is also critical that a high-level steering body should be formed with overlapping membership of the Boards/CEOs of key stakeholder groups to oversee the implementation of this Strategy.

Key integrating initiatives:

- **'Green productivity' profile for Melbourne**. This should be the underlying focus of each action and strategy under this Strategy. The profile would enable active marketing of Melbourne as a location for knowledge-based industries, with high worker productivity and quality lifestyle. It would be based on developing a local culture committed to the principles of sustainability, and a built environment that delivers convenience, efficiency, health and security.
- **Global Centre of Greenhouse Expertise and Technology.** The new Centre would sustain the 'green productivity' profile. It would 'house' – and make accessible – the technology and expertise required by the City of Melbourne and its residents to achieve net zero emissions. The Centre would complement – rather than duplicate - the City's existing public and private expertise, and may emerge from an existing or planned organisation.
- **Emissions trading scheme**. This would start as a voluntary scheme and be progressively widened. The City of Melbourne could be the first municipality to introduce such a scheme, reinforcing the green productivity profile and preparing the City for global trading in emissions.

9.2 Profiling Melbourne as a centre for green productivity

The City of Melbourne's marketing programs already promote Melbourne as a City of strong 'knowledge age' credentials. To date, this has focused on biotechnology, IT and sustainability. Given that Melbourne's energy suppliers and/or researchers are involved in leading-edge research in new energy supply technologies, greenhouse performance could become a distinct pillar of Melbourne's image as a clean green City.

'Green productivity' is a concept that draws together not only the three core strategies laid out by this Strategy, but also the positioning of Melbourne in the knowledge age overall. The profile would include promoting Melbourne as providing:

- A highly educated workforce, committed to the principles of energy efficiency and sustainability,
- A highly productive built environment, promoting convenience, health and security for employees,
- Low business costs through efficiency,
- Access to leading edge technology and services, and
- A quality lifestyle attractive to the leaders of the knowledge industry with a rich and diverse cultural life in which sustainability is a common theme.

Of course, any successful and sustainable profile must be based on reality. Implementing and embracing this Strategy will provide this reality.

9.2.1 Using international networks and events to promote the profile

The City of Melbourne has developed useful international networks through its participation in APEC and through organisations such as the International Council for Local Environmental Initiatives (ICLEI). These networks are invaluable in maintaining a high profile for the 'green productivity' profile.

This Strategy is already a focus for collaboration with APEC and has the support of ICLEI. The City of Melbourne can now leverage its investment in the development of the Strategy to strengthen its links with other cities in APEC. Indeed, roll out of the Strategy to other APEC cities and members of ICLEI could be one of the services offered by the proposed Global Centre of Greenhouse Expertise and Technology.

This approach could also complement the City of Melbourne's strategy of attracting international events to Melbourne. For example, as part of the development of this Strategy, soundings have been made to hold a meeting of the APEC Energy Working Group in Melbourne in early 2003. This opportunity should be capitalised on by using it as the nucleus of a broader event on zero net emissions, drawing in both local and regional stakeholders. Such an event would be an excellent means of promoting Melbourne's green profile and credentials. It could also be used to launch the Global Centre for Greenhouse Expertise and Technologies, if agreement can be reached on collaboration with the State Government.

Such conferences and events could form an integral part of the promotion of Melbourne as a centre for green productivity.

Action 26: Develop a 'green productivity' profile strategy for Melbourne

The costs of developing a 'green productivity' profile strategy covering external marketing promotion to business and private residents would be $200,000 in the first year of the first cycle. Approximately $50,000 would need to be allocated from the normal marketing budget expenditure in subsequent years.

9.3 A Global Centre of Greenhouse Expertise and Technology

Each component of the strategy for net zero emissions requires businesses and residents of the City to have access to leading-edge expertise and technology. In implementing this Strategy, the City of Melbourne's own knowledge and expertise will accumulate to such an extent that the City could use them as an entry ticket to the export market for greenhouse services and technology.

A Global Centre of Greenhouse Expertise and Technology would be a tool for systematising and codifying all the learning from the actions and strategies implemented under the Strategy.

The role of the Centre would include:

- Providing a one-stop referral point for expertise and information on greenhouse performance,
- Identifying and coordinating local expertise into multi-sectoral teams to tap international opportunities in greenhouse technology,
- Brokering local and overseas investment in research and demonstration projects,
- Disseminating information to business and the community,
- Developing education and training programs in greenhouse management, and
- Driving the progressive rise in performance targets for each of this Strategy's three core strategies.

9.3.1 The Centre adding value to existing organisations

The Centre should be developed in collaboration with relevant stakeholders, with care not to duplicate or compete with existing institutions. Indeed, the mission of the Centre would be to add value to such institutions. To this end, it may be possible for the City of Melbourne to simply support the State Government's proposed Centre for Greenhouse Technologies. SEAV is also developing a new strategic direction, which apparently assumes many of these functions, although few details are yet available.

There is also the opportunity for strong linkage with research organisations such as CSIRO. Indeed, CSIRO is developing a major research and demonstration program on the Sustainable City – one of its BHAG (Big Hairy Audacious Goal) projects – and has expressed interest in merging this with the City of Melbourne's zero net greenhouse emission Strategy. This represents an excellent mechanism for monitoring, updating and upgrading this Strategy over time.

The character and business case for this Centre is similar to that of the Centre for Sustainable Cities for which the City of Melbourne sponsored a Business Plan through Melbourne University Private (see Appendix 7). That Strategy provides a ready business model for the Centre. It included provisions for private investors to ensure that the Centre for Sustainable Cities remained commercially focused, had access to private capital, and reflected the needs of the local business sector. The same imperatives apply to the proposed Centre of Greenhouse Expertise and Technology and indeed, the Centre may branch out into other facets of sustainability over time.

The City of Melbourne could support the proposed Centre through the City of Melbourne's Sustainable Investment Fund, provided the Fund managers are convinced of the business case. If agreement could be reached with the State Government, the Centre would be an appealing investment, based on the business case developed for the Centre for Sustainable Cities, which had an IIR of 80% over a ten-year period.

As a precursor to such a Centre, the City of Melbourne could undertake an audit of available expertise in conjunction with the State Government. The audit could cover greater Melbourne and regional Victoria, as this is the business catchment focused on the City.

Action 27: Establish a Centre for Greenhouse Expertise and Technology

Costs of both a resource and capital nature would be associated with the development of a Centre for Greenhouse Expertise and Technology. Resource costs of $50,000 are anticipated, relating to liaison with State Government and other potential partners to establish the Centre. Capital costs of $1,000,000 are anticipated, pending a business plan.

9.4 Municipal emissions trading market

Despite the Kyoto Protocol not yet being ratified, there are several pilot emissions trading schemes for greenhouse gas abatement operating around the world. Models have been developed in the UK, Denmark and Netherlands, with a scheme currently being negotiated for the EU for 2005. In the UK, sector-based agreements and levies have been established for 15 industry sectors (with over 100 participating organisations). Emissions trading is thus a viable tool for managing emissions.

There are also several internal corporate schemes in operation, most notably for Shell and BP. Closer to home, the NSW Government is currently establishing an emissions trading scheme for the State's energy sector.

According to the AGO, a national emissions trading system will only be implemented by the Government when, and if, it ratifies the Kyoto Protocol and when the Kyoto commitments become legally binding, and when there is an established international emissions trading regime taking place. With the recent Federal Government announcement that it does not intend to ratify the Kyoto Protocol, a national emissions trading scheme is not likely to be on the agenda for the short to medium-term.

However, if the City of Melbourne were to introduce a municipal emissions trading scheme, it would be the first city in the world to do so, provided it moved fast. Already, the City of London is positioning itself as a global hub for greenhouse gas emissions trading.

The essential features of a greenhouse gas emissions trading scheme are the allocation of emission permits under an emission reduction program to all parties to the scheme. The market is created when players can purchase surplus emission allowances from other parties (and vice-versa) and/or invest, or purchase sequestration credits. Emission trading markets are a low-cost, market-based mechanism for driving down greenhouse gas emissions. They require a carefully designed economic instrument and a detailed public consultation process. Emissions trading is an alternative to taxes and legislated emission constraints – or part of a policy mix. Negotiated agreements between industry and Government provide a non-regulatory approach to encourage greenhouse gas abatement.

Action 28: Establish an Emissions Trading Market

There are many models (established and theoretical) that would be relevant to the City of Melbourne. The AGO could facilitate such a project, discussions with the AGO would be a first step.

Participation in the scheme can be voluntary initially, but agreements entered into would be legally binding. An initial group of volunteer organisations could participate in a pilot scheme during 2003. The scheme could then be widened by requiring all suppliers to the City of Melbourne to participate by 2005 as part of the green supply chain. Voluntary participation would be expected to accelerate as global trading picks up and the Scheme could eventually become compliant and interlinked with the global standards.

In the initial scheme, emission permits would be granted to participants, each of which would be allowed a given annual quota of greenhouse gas emissions. This quota would be progressively reduced according to an agreed annual target. Failure to meet the target would require the purchase of additional carbon rights. The reductions could be met by the three prongs of the City of Melbourne's strategy for zero net emissions:

- energy efficiency measures, including shifts to green buildings,
- green power purchases, and
- sequestration investments.

The actions outlined under each of this Strategy's three core strategies are thus drawn together and accounted for under the trading market.

Baseline assumptions will need to be made for City tenants in order to set allowances and provide a basis to set agreed reduction targets. Measurement, verification and reporting parameters will need to be established for all aspects of the trading activities. Furthermore a central registry will be required, whose role it would be to record all holdings, track allowances and transfer ownership to final cancellation or retirement.

The conceptual framework for the scheme is shown in Figure 9.2.

9.4.1 The benefits of an emissions trading scheme

- It provides an effective collective response to achieving emission reduction targets. It need not add a direct cost to participants – they can achieve their targets by the many actions recommended in this report, and avoid the need to purchase new carbon credits.
- With the use of agreements, it is a least-cost method that requires less legal or legislative intrusion.
- It encourages (and creates) a market driven response.
- It prepares participants for international trading, creating opportunities for positioning.

9.4.2 The cost of the scheme

The costs of running the scheme are mainly in administering and verifying the emission trades. There are a number of models that could be adapted to the City's use, including established software for emissions trading, developed by the Cooperative Research Centre for Renewable Energy, with the support of the Commonwealth Bank. This software can run an entire virtual market.

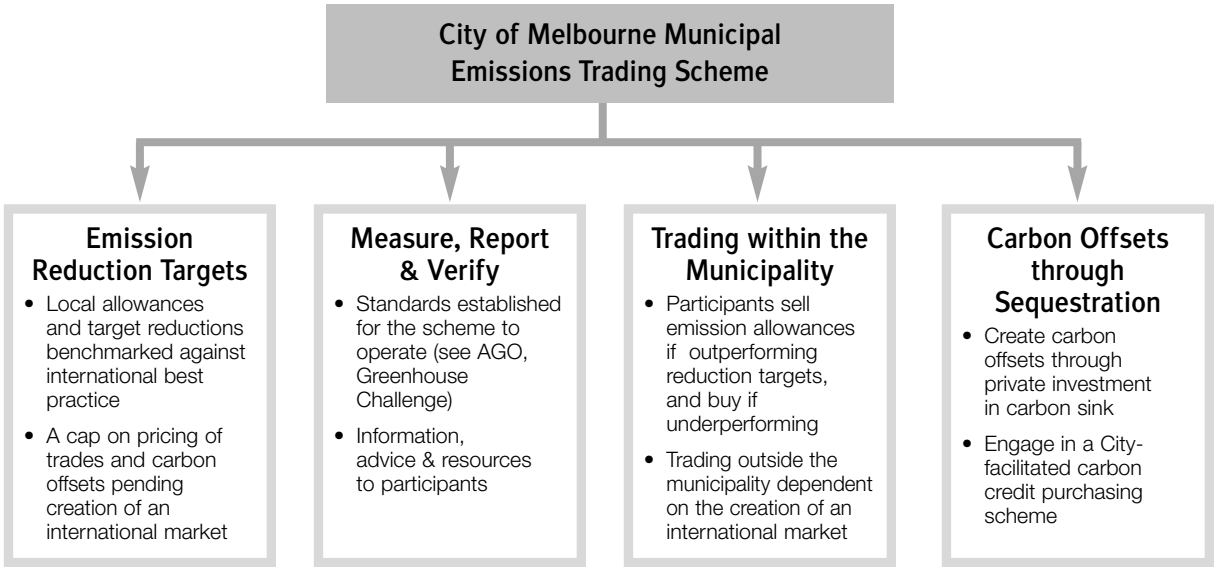
Eventually, the trading market could be self-financing via a modest membership fee from participants. Banks and stock exchanges are positioning themselves to run such schemes, and the City of Melbourne could enter into an agreement with one of them to run the scheme, at no cost.

However, for the purposes of this Strategy, an allowance of $200,000 has been made to develop a detailed Plan, and a potential capital investment of $500,000 has been allowed should the City of Melbourne wish to retain equity in the market. Collaboration with the AGO and the SEAV could extend or offset this amount.

The trading market will prepare the way for an eventual carbon tax, either nationally or internationally. The concept of a tax on greenhouse gas emissions is logical and justifiable. Just as user-pays levies are placed on sullage/sewerage and waste going to landfill, a levy on greenhouse gas emissions, a 'waste' that is the subject of global concern and attention, makes sense.

However, such a tax, to be equitable, needs to be applicable to all who generate this waste. The proposed trading market provides a bridging role to a time when such a tax may become a reality.

Figure 9.2 Pilot trading scheme conceptual framework



9.5 High-level support for the Strategy

Many of the measures contained in this Strategy, especially the green productivity profile, will require support and consensus at the highest levels of the public and private sectors resident in the City. The City of Melbourne has already attracted the interest and participation of a number of key organisations – the Victorian Building Commission, the Property Council of Australia, CSIRO, Sustainable Energy Authority Victoria, the Victorian Department of Natural Resources and Environment, and the Docklands Authority. However, in order to tackle a project of this scope and duration, the leadership of the project needs to be strengthened by formalising and expanding the partnership.

Ideally, support for this Strategy would be formalised through a peak-level steering body. This body would have membership overlaps with the Boards/CEOs of key stakeholder groups, including:

- City of Melbourne
- SEAV
- The proposed Centre for Greenhouse Expertise and Technology
- Departments of Infrastructure, NRE, Premier and Cabinet, and Innovation, Industry and Regional Development
- CSIRO
- The Committee for Melbourne (which is coordinating Melbourne's membership of the United Nations Global Compact and a number of associated sustainability projects)
- Property Council of Australia
- VECCI
- University of Melbourne
- Unions

The City of Melbourne could generate this support through a series of high-level briefings in order to ensure that stakeholders not directly involved in the project partnership are aware of the project, its benefits and its ramifications.

9.6 Costs

(a) Operating

	Action	Yr 1 $k	Yr 2 $k	Yr 3 $k	Yr 4 $k	Yr 5 $k	Budget notes
26	'Green Productivity' profile for Melbourne		200	50	50	50	
27	Global Centre of Greenhouse Expertise and Technology		50				Cost of liaison with State Government and other potential partners to establish the Centre – capital investment separate (see below)
28	Emissions trading market		200				Detailed planning requirement, scheme to be self-funded thereafter through brokerage fees
29	High – level steering group	5	5	5	5	5	Secretariat cost
30	Project Management Role	10	10	8	5	5	Internal project management costs
	Total	**15**	**465**	**63**	**60**	**60**	**= 663**

(b) Capital

	Action	Yr 1 $k	Yr 2 $k	Yr 3 $k	Yr 4 $k	Yr 5 $k	Budget notes
27	Global Centre of Greenhouse Expertise and Technology			1,000			Pending business plan
28	Emissions trading market			500			Pending detailed plan – assume $500k City of Melbourne contribution to establishment, repayable from transaction fees earned by the market.
	Total			**1,500**			**= 1500**

Part C - Strategy Implementation

10. Implementing the Strategy

10.1 Engaging the City of Melbourne's constituents and stakeholders

The first step towards successful implementation of the Zero Net Emissions Strategy is to engage the City of Melbourne's constituents and stakeholders. The City of Melbourne must live its vision: it must demonstrate its commitment to sustainability through its policies, its operations and actions. This way, sustainability and the path to zero net emissions get integrated into the natural flow of work and life in the City.

The process of engaging stakeholders has already begun in formulating this Strategy, which seeks wherever possible to align the City of Melbourne's business processes with relevant Federal and State Government initiatives. However, it is important that the City of Melbourne retain the potential to take independent action on the Greenhouse issue. There needs to be a healthy marketplace of ideas for actions and initiatives within different levels of Government.

A good way forward is to negotiate specific plans of action with Government authorities that maximise alignment, while leaving the City of Melbourne room to promote its own identity and priorities. Thus, to provide stability and maximum leverage from the Government programs, the City of Melbourne should seek to develop Memoranda of Understanding with other relevant Government instrumentalities, which specifically support this Strategy.

10.2 Monitoring performance and deliverables

As discussed in Chapter 5, the Sustainable Business Matrix was used as a guide in developing the strategies and actions recommended in the Strategy. Besides being a planning tool, the Matrix is also a useful management tool, as it provides a quick reference to the outcomes intended for each action.

By reviewing performance against the Matrix, adjustments to strategy implementation can be made, if necessary.

Table 10.1 overleaf is the Matrix developed specifically for this Strategy.

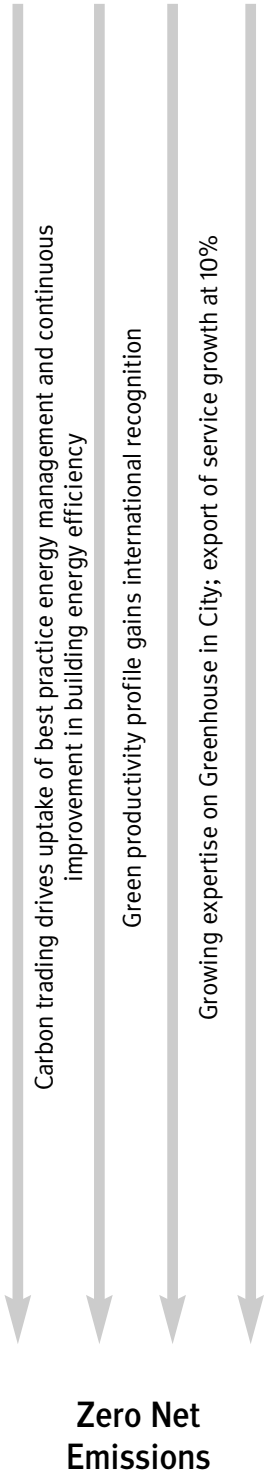
Table 10.1 The Sustainable Business Matrix for the Strategy

Business → / Sustainability ↓	Financial Management	Stakeholder Engagement	Market-Driven Business Processes	Continuous Learning & Growth
Economic Prosperity	Increased investment, exports, more attraction to the City Lower energy costs through efficiencies Higher worker productivity from green buildings	Broad-based support for profiling Melbourne as a profitable, sustainable city Cost & benefits of Strategy implementation shared among stakeholders	An established municipal emissions trading scheme Broad-based business, government & community consortia	Global centre of learning established Operational pilot programs in sequestration & emissions trading for corporate emissions
Social Responsibility	Improved business productivity through sustainable building design Revitalised rural communities through carbon sink investments	Improved worker & residential amenities through sustainable building design Improved the quality of life among residents	Best practice regulatory system in place Consumer preferences for green products & services	Expanded community information and awareness programs Templates of this Strategy created for other Cities
Environmental Quality	Investment in a carbon sink that also meets commercial criteria	Rural-City partnering arrangement with multiple parties for multiple outcomes	Operational collective purchasing schemes for renewable energy and carbon credits	As above

10.3 The timeline

The key milestones for the long term plan for zero net emissions are summarised in Table 10.2 overleaf. The key foundations of this 20 year plan are established in the first five years – 2002- 2007. The impact of these measures then magnifies over the following years.

Table 10.2 Critical path timeline



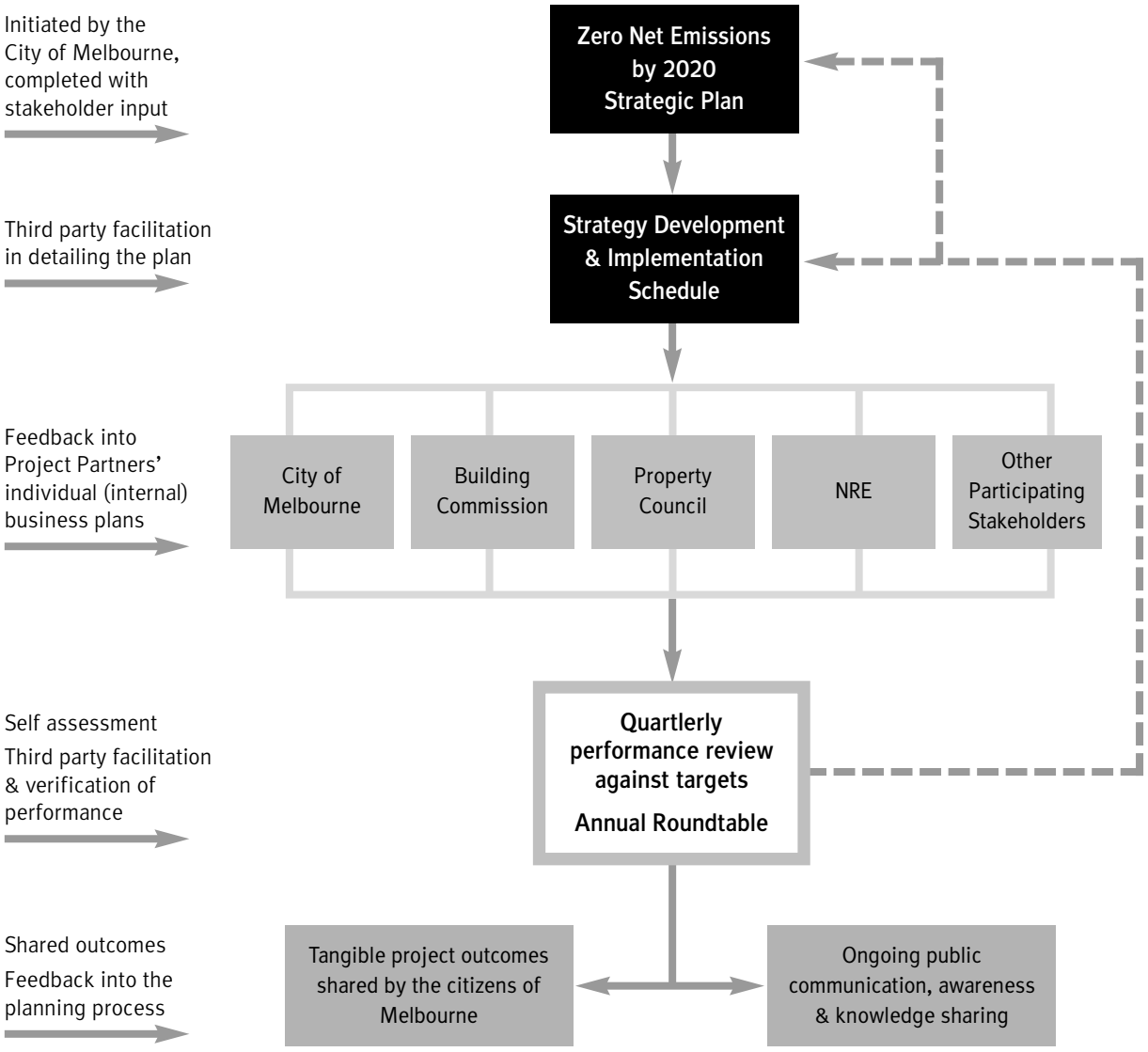
Year	Event
2002-3	• Catalyse tenants/developers consortium for landmark green building with support by CSIRO • Tours of best practice overseas for developers • Introduce green power buying consortia • Establish high level Steering Group • Green productivity profile strategy developed
2003-4	• Accelerated approvals for green buildings and ESD features • Design charettes for new buildings • Manadatory energy modelling for buildings > 5,000 sq m • Green Tick requirement for City supply chain • Establish a pilot carbon sink for 10% of corporate emissions • Develop 'green productivity' profile strategy covering both external marketing and promotion to residents • New residential building codes
2004-5	• Establish a Global Centre for Greenhouse Expertise and Technology • Showcase City of Melbourne corporate building opens • New commercial building codes • Pilot municipal trading scheme • Procurement scheme for green offices • CSIRO BHAG in the City of Melbourne • Energy assurance scheme for buildings > 5,000 sq m
2005-6	• Landmark private buildings opened • Establish carbon credit buying consortia and Municipal sink • City of Melbourne participates in fuel cell trial • First high efficiency brown coal plant initiated
2006-10	• Trading scheme compulsory for City supply chain in 2006 • Kyoto protocol comes into force – international trading in carbon commences • City of Melbourne purchases of renewable energy to 50% by 2010 • Offset 50% of City of Melbourne's own emissions by 2010 • City of Melbourne corporate achieves zero net emissions • Progressive tightening of green supply chain and building regulations • Melbourne's green productivity profile recognised world-wide
2011-20	• Fuel cells enter commercial use • Brown coal generators embark on major plant upgrades to improve efficiency • Refurbishment of City continues • Services export doubled over previous decade • Sequestration through the City-led consortium reaches 800,000 tonnes pa, with major returns for original investors

10.4 Review progress

This Strategy has been prepared with the input of many project partners such as the Building Commission, the Property Council, NRE, SEAV, and the AGO. As it is a long-term plan, it will require the ongoing input and support of all stakeholders. Therefore it is important that all project partners integrate their agreed responsibilities within their own internal corporate planning processes.

It is proposed that progress on strategies will be reviewed on a quarterly basis, perhaps by an independent facilitator, to ensure that all parties stay on track. The process is summarised in Figure 10.1.

Figure 10.1 The integration process



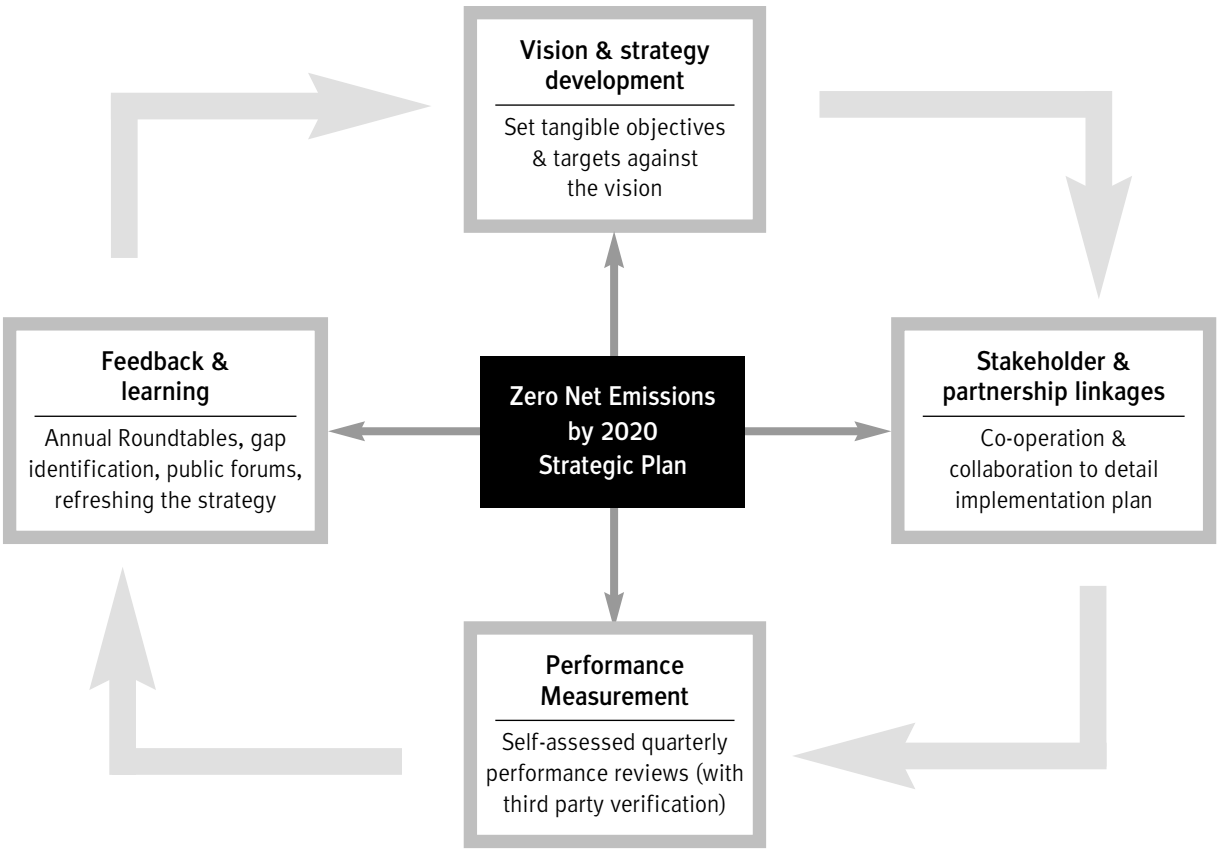
10.5 Managing the strategic development cycle

The strategic development cycle is a continual process towards 2020. It is about creation and re-creation of the Strategy each time developments occur on a technological, political, community or environmental level. The cycle is illustrated in Figure 10.2. Once the vision and strategy are established, stakeholders form partnerships (either informal or formal through a memorandum of understanding) to action the strategies detailed in the Strategy. Performance is measured and reviewed on a regular basis, and there is feedback and learning to be made from each review.

This is a continuous cycle that needs to be maintained on an annual basis, at least for the first five years of this Strategy (2002-2007) when the foundation strategies are being put in place. Key features of this cycle will need to be as follows:

- To become operational, communication and consultation with stakeholders will be crucial. This consultation can evolve into a regular review process, that ideally should be undertaken quarterly.
- By December 2003 the High Level Steering group should review the progress of the Strategy over the 12-month period. This will provide the feedback and learning opportunity to keep the vision and the strategy relevant and vital.
- After relevant adjustments are made to the strategy development, stakeholders will need to collaborate on fine-tuning their individual and joint strategies.

Figure 10.2 The strategic development cycle



Over time, the City of Melbourne and its partners may need to consider expanding the strategy to incorporate other issues of climate neutrality and overall environmental sustainability.

10.6 Integrating the Strategy with other City plans

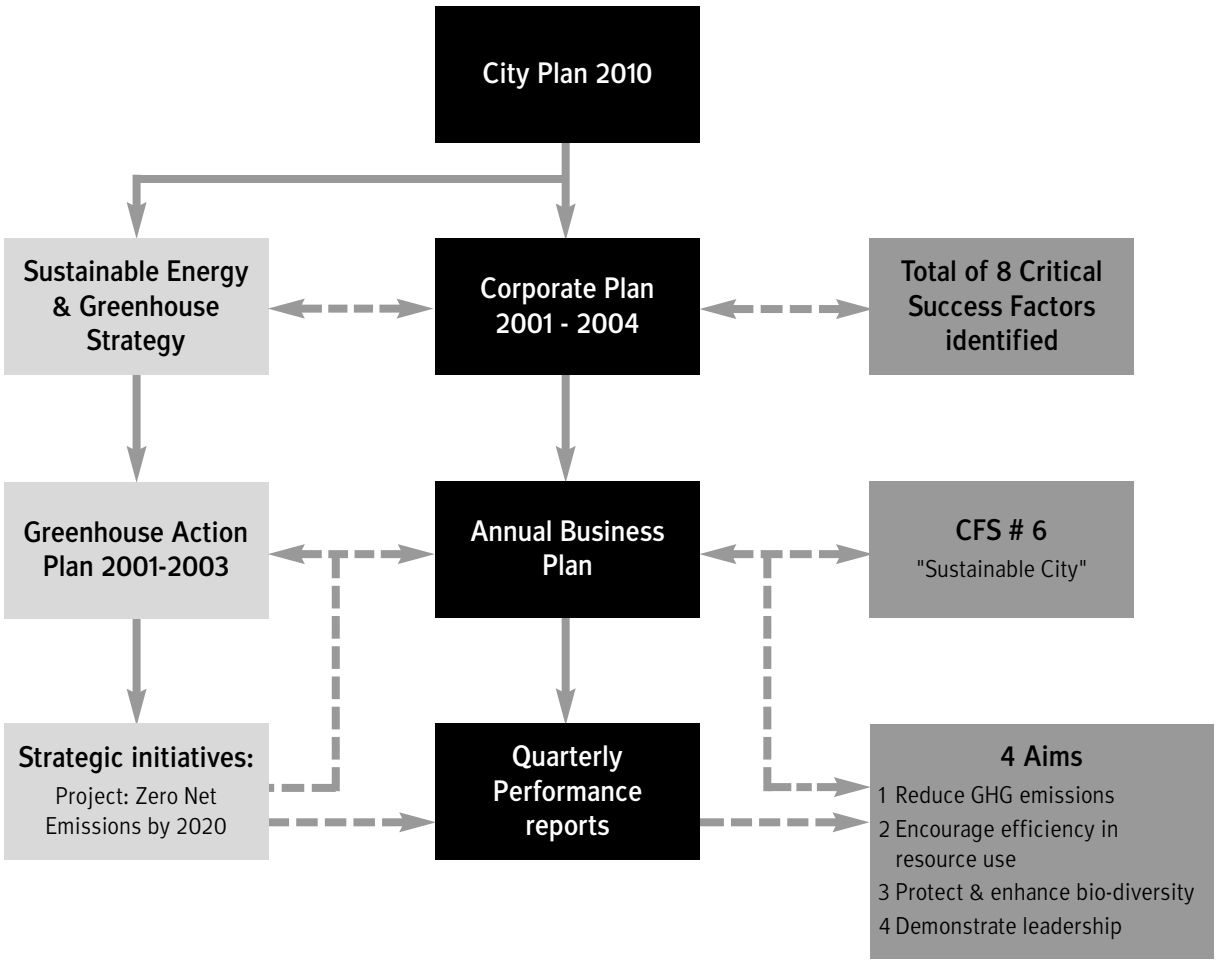
The City of Melbourne already has a comprehensive City Plan and Corporate Planning process in place, which also identifies triple bottom line benefits for each of the City's eight Critical Success Factors. Illustrated in Figure 10.3, the City Plan drives the five-year Corporate Plan, which in turn drives the annual Business Plan and Quarterly Performance Reports. The City's greenhouse and sustainability strategies run parallel to Corporate Planning process, while at the same time feeding off the process.

Within this planning process, the City of Melbourne undertakes a multitude of environmental projects, which span across the organisation. A total of 26 projects were identified after a scan of the City of Melbourne's advertised project activities. These projects also appeared to have different time scales, reporting measures and lines of responsibility within the City of Melbourne.

It is critical that the Zero Net Emissions Strategy fits into the City of Melbourne's current planning framework, and dovetails into the existing sustainability projects already underway (and with those that are being planned).

In developing this Strategy it was evident that a single umbrella framework is needed that gives all sustainability projects a common planning framework and consistent evaluation, reporting and feedback processes. The Sustainable Business Matrix could provide this.

Figure 10.3 Interrelationship between City processes and strategies



10.7 Communicating the strategy

Communicating the strategy and winning support for the 'green productivity' profile among the businesses and residents of Melbourne is fundamental to the success of the Zero Net Emissions Strategy. Some key opportunities for promoting the profile include:

- The formal launch of the Strategy
- The presentation of the Strategy as an APEC template to the APEC working Group on New and Renewable Energy
- A possible display at the Melbourne Museum
- Openings and displays on landmark buildings
- Launch of the City-rural partnering project on sequestration
- Integration into stakeholder communication and awareness programs.

10.8 Financial management and responsibility

Achieving a long-term visionary plan does not come without a cost. All too often, ambitious strategic plans are developed, then left in limbo due to the sudden realisation that 'we do not have the resources to cover this plan'. The difficulty usually comes when existing staff are expected to cope with additional responsibilities without providing sufficient resources that may be needed.

The costs in this Strategy are those that must be borne by the City of Melbourne. A far greater resource is involved in the private investments the Strategy. Included in the City of Melbourne's costs are its internal costs and so some of the resources can come from existing programs. There is also potential for the City of Melbourne to offset some of these costs from grants and collaborations with other stakeholders.

Funding for commercial investments is listed separately. These projects could be financed under the City of Melbourne's Sustainable Investment Fund. This Fund operates as a separate entity and so the projects would have to satisfy the Trustees. This will provide an independent assessment and due diligence on the investments that will give the City of Melbourne comfort in the robustness of the business cases. If, as is possible, the proposed investments do not stand up to scrutiny, then alternatives will need to be sought. This is a natural part of long-term planning – changes will need to be made as further information comes to hand.

The estimated resource cost and financial benefit of each recommendation during the first five-years is outlined overleaf.

Operating cost requirement: 2003-2007

(a) Leading edge design

	Action	Yr 1 $k	Yr 2 $k	Yr 3 $k	Yr 4 $k	Yr 5 $k	Budget notes
1	Create a showcase out of the City of Melbourne's administration building by 2005	50					For design consultation, additional to current procedures
2	Facilitate tenants/developers into consortia to invest in landmark green building developments	30					Cost of facilitating meetings etc
3	Commit to best practice for the Commonwealth Games Village	10	10				Political advocacy only – no cash cost
4	5-star energy regulation for residential housing by 2003	9	10	5			In-hand by Building Commission however, internal readjustment required
5	New energy regulations for commercial property by 2004	9	10	5			In-hand by Building Commission however, internal readjustment required
6	Encourage the Property Council of Australia to revise its rating code to include energy efficiency	5					Political advocacy only – no cash cost
7	Accelerate approvals for green buildings and environmentally sustainable development (ESD) features		90				For review of procedures, no ongoing costs
8	Introduce mandatory energy modelling for buildings greater than 5,000 sq m						Cost to introduce regulation, self-funding thereafter
9	Introduce a procurement scheme for green offices		50	10	10	10	Establishment cost plus annual tender administration
10	Establish a green building Learning Hub as part of a Global Centre of Greenhouse Expertise and Technology						Cost included in Global Centre for greenhouse Expertise and technologies
11	Fund design charettes for new buildings		20	20	20	20	Four charettes per year
12	Develop an energy assurance scheme for buildings greater than 5,000 sq m		10				Establishment cost – a commercial service thereafter
	Sub-total	**104**	**199**	**45**	**35**	**30**	**413**

Operating cost requirement: 2003-2007

(b) Greening the supply

	Key Action	Yr 1 $k	Yr 2 $k	Yr 3 $k	Yr 4 $k	Yr 5 $k	Budget notes
13	Progressively increase the City of Melbourne's use of renewable energy	35	70	105	140	175	Cumulative expenditure increasing to $320K by 2010, assuming a cost 30% premium for green power
14	Pass on innovative energy-efficient technologies to the City of Melbourne's Sustainable Investment Fund Independent Board of Trustees						Capital investments to be made at the discretion of the Fund
15	Participate in a fuel cell demonstration project						In kind resource only
16	Establish a green supply chain by 2004, using the Green Tick & Greenhouse Challenge standards		20	10	10	10	Establishment costs plus annual administration
17	Participation in a green power buying consortium to access green power at the lowest possible price	20	10				Current contribution to establishment, legal and marketing costs of the Moreland City scheme
18	Better coordination of expertise						Action to be undertaken by the proposed Global Centre of Greenhouse Expertise – capital investment by the City of Melbourne
19	Promote Melbourne's expertise and technologies abroad and assist local firms to attract international investment in sustainable energy technologies						Undertaken as part of the green productivity profile, as described in Chapter 9.
20	Support the State Government in encouraging the use of embedded energy, solar hot water and cogeneration						In-kind support only
21	Support energy retailers and contractors to move to value added services: examine solar hot water financing as a first step		10	10			Possible in-kind contribution to the study of solar hot water, as this falls within a State/Commonwealth jurisdiction
	Sub -total	**55**	**110**	**125**	**150**	**185**	**625**

Operating cost requirement: 2003-2007

(c) Sequestration

	Key Action	Yr 1 $k	Yr 2 $k	Yr 3 $k	Yr 4 $k	Yr 5 $k	Budget notes
22	Establish a City-rural partnering arrangement to invest in a carbon sink	5					Liaison cost only
23	Invest in blue mallee eucalypt plantations as feedstock for renewable power generation, with eucalyptus oil as a by-product		20				City of Melbourne contribution to NRE-led Feasibility Study – capital investment separate (see Chapter 10)
24	Establish an investment vehicle for City businesses and residents for commercial sequestration projects			20			Cost of selecting and liaising with a commercial partner
25	Link this vehicle and a carbon credit purchasing scheme for tenants as part of the pilot municipal emission trading market						Costs covered under the pilot trading market (see below)
	Sub-total	**5**	**20**	**20**			**45**

(d) Integration initiatives

	Action	Yr 1 $k	Yr 2 $k	Yr 3 $k	Yr 4 $k	Yr 5 $k	Budget notes
26	'Green productivity' profile for Melbourne		200	50	50	50	
27	Global Centre of Greenhouse Expertise and Technology		50				Cost of liaison with State Government and other potential partners to establish the Centre – capital investment separate
28	Emissions trading market		200				Detailed planning requirement, scheme to be self-funded thereafter through brokerage fees
29	High – level steering group	5	5	5	5	5	Secretariat cost
30	Project Management	10	10	8	5	5	Staff time to project manage implementation of the strategy
	Sub-total	**15**	**465**	**63**	**60**	**60**	**663**
	Total –all action	**174**	**792**	**253**	**245**	**275**	**1,739**

Capital cost requirements: first cycle 2003-2007

	Action	Yr 1 $k	Yr 2 $k	Yr 3 $k	Yr 4 $k	Yr 5 $k	Budget notes
27	Invest in blue mallee eucalypt plantations as feedstock for renewable power generation, with eucalyptus oil as a by-product		276	100	100	100	Mid-point assessment of establishment cost between $216-336k, followed by $100k per year investment to achieve 50% sequestration target for City of Melbourne corporate by 2010 (also allow one year for review of pilot)
27	Global Centre of Greenhouse Expertise and Technology			1,000			Pending business plan
28	Emissions trading market			500			Pending detailed plan – assume $500kCity of Melbourne contribution to establishment, repayable from transaction fees earned by the market.
	Total		**276**	**1,600**	**100**	**100**	**2,076**

NB: All capital investments will be undertaken on a partnership basis and will be operated as commercial enterprises (earning a market return on investment).

10.9 Factors influencing strategy implementation

Key strategic baseline assumptions have been made about the state of play with technology, the environmental, economic, political and social issues that form part of the macro environment that influences this Strategy. Future movements or changes in these variables will have an impact on the City of Melbourne's capability to execute its zero net emissions strategies within the established timeline.

Technology

Few technological gains have been assumed, other than that progress on new energy technologies such as fuel cells and more efficient brown coal technologies will continue and that these technologies will become competitive with conventional power investments. It is also reasonable to assume that renewable power will continue to improve its cost competitive position vis-à-vis conventional power and that continuing improvements in Information Technology will lower building energy usage (eg energy efficient flat computer screens). However, these upsides have not been incorporated into financial calculations.

Environmental

That the rate of growth in greenhouse gas emissions will accelerate unless positive action is undertaken for its reduction. That ongoing, unabated climate change will have a detrimental impact on the Australian economy.

Economics

That world economies will continue to grow at the World Bank's forecast rates and that no major financial shocks will occur. Faster energy price rises will, give rise to greater pressure to reduce costs and adopt energy alternatives.

Political

That there will not be a significant worsening of the current political climate in the Middle East and with the US's 'campaign against terror' to the extent that the overall global economy will slide into recession. That the current Federal Government of Australia will not ratify the Kyoto protocol as long as it is in term. That the Victorian Government will take positive action on greenhouse gas abatement within the State.

Social

That current community concerns over the environment will be translated into more positive action once effective information campaigns illustrate that the financial impact on households on greenhouse gas reduction strategies will be minimal compared to the overall cost to the environment.

That the City of Melbourne will…

Have the confidence, capability and vision to carry out its vision and strategy.

That stakeholders of this strategy will…

Support the City of Melbourne in resourcing and achieving zero net emissions by 2020.

That the citizens of the City of Melbourne will…

Embrace the vision of The Strategy under a suitable promotional campaign.

Appendix

Appendix I

City of Melbourne – Detailed demographics

The municipality of the City of Melbourne covers an area of 36.2 square kilometres. It is dominated by the Central Business District but includes a fringe of inner city suburbs that support an extremely wide range of activities, including residential; retail; commercial; industrial; transportation and shipping; education and research; hospitals; theatre, arts and other entertainment; parkland and major sporting facilities.

The municipality is undergoing significant changes, including:

- The redevelopment of the areas south of the Yarra River (Southbank) and in the vicinity of the old Victoria Dock (Docklands) as major commercial, residential, entertainment and recreational precincts
- The construction of new medium-rise and high-rise residential apartment buildings, catering for the significant growth in the number of people wishing to live in the CBD and inner-city suburbs
- The conversion of light industrial buildings and warehouses into residences and apartments, increasing the population density and totally transforming the nature of some suburbs

Table 1 shows the resident population of the municipality by suburb between 1992 and 2001[1]. Over the past decade, the City's resident population has almost doubled with an average growth rate of 6.8% per annum. The most rapid growth has been in the CBD and Southbank with the population growing from 1048 in 1992 to 15,711 by 2001. City Plan 2010 estimates that the resident population of the City of Melbourne will exceed 70,000 by 2010.

The number of residents represents only a small component of the City's use with the residents being swamped by the daily influx of workers, visitors and other users. Table 2 shows the numbers of daily users of the municipality in 1999[2]. More recent data[3] suggests a significant increase of 8.3% in the worker population to 274,000 in 2000.

Table 1 Resident population of the City of Melbourne 1992–2011[1]

	1992	1996	1999	2000	2001	Growth[5]
CBD	1,008	2,395	5,385	7,734	9,504	28.3
Carlton	6,818	8,798	9,714	10,367	11,240	5.7
East Melbourne	2,372	3,667	3,851	3,816	3,898	5.7
Kensington	3,352	3,735	4,060	5,502	5,648	6.0
North Melbourne	5,683	6,134	6,975	6,797	6,840	2.1
Parkville	5,292	5,422	5,647	5,627	5,733	0.9
Melbourne - Rem	5,438	5,583	6,090	5,564	5,592	0.3
West Melbourne	1,593	1,854	2,434	2,352	2,387	4.6
Southbank	40	2,239	3,197	4,074	6,207	na
Docklands	-	-	200	200	200	na
City of Melbourne	**31,596**	**39,827**	**47,553**	**52,033**	**57,248**	**6.8**

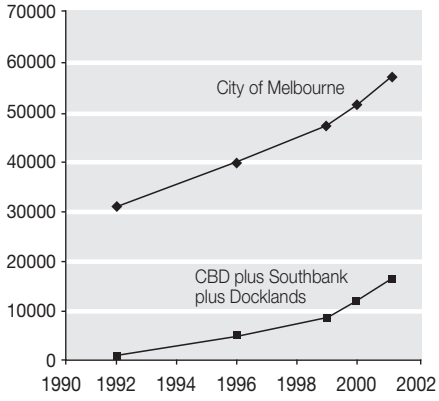


Table 2 Daily population of the City of Melbourne 1999

		1999[2]	2000[3]
Total daily population		567,000	
Including	*Workers*	*253,000*	*274,000*
	Shopping	*53,000*	
	Education	*22,000*	
	Personal business	*18,000*	
	Dining, recreation, meeting	*131,000*	
	Intrastate, interstate and overseas visitors	*42,000*	
	Delivery/pickup	*25,000*	

[1] Australian Bureau of Statistics and City of Melbourne estimates

[2] Council estimates based on CLUE 97, VATS 1996-8, NIER modelling, and ABS Commercial Accommodation Data

[3] Data provided by Strategic Research Branch, Melbourne City Council

The City of Melbourne is home to a wide range of businesses, services and activities. Table 3 shows the number of all occupancies[4] by category in the City of Melbourne and the CBD as at June 2000[5].

Table 3 All occupancies in the CBD and City of Melbourne, June 2000[5]

	CBD only	City of Melbourne
Short Term Residential Accommodation	109	234
Place of Assembly	93	198
Community Use	18	42
Residential Accommodation	4,407	24,391
Education	12	69
Hospital	15	181
Industry	46	763
Casino		1
Leisure/Recreation	16	26
Miscellaneous	24	59
Office	5,678	8,047
Parking	659	748
Retail	2,687	4,046
Transport	15	35
Vacant Land	79	631
Warehouse/Store	149	692
Total	**14,007**	**40,163**

Building Stock in the City of Melbourne

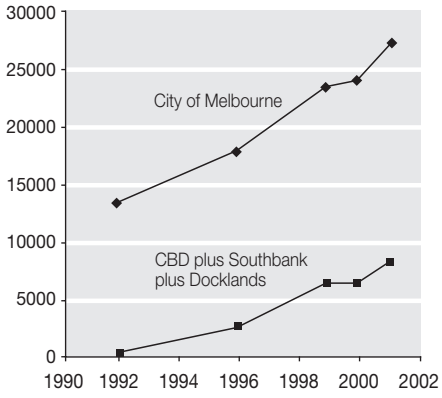
Type, Number and Size

The diversity of businesses, services and activities within the City gives rise to a correspondingly diverse range of building stock.

Table 4 shows the number of residential dwellings (houses, apartments, units) by suburb. It can be seen that the number of dwellings in the City of Melbourne doubled between 1992 and 2001. Furthermore, according to housing development indicators, there are currently a further X dwellings under construction and Y in the planning stage, the vast majority of these in the CBD, Southbank and Docklands precincts.

Table 4 Number of residential dwellings in the City of Melbourne 1992–2001

	1992	1996	1999	2000	2001	*Growth*[5]
CBD	376	1,334	4,064	4,307	5,446	*34.6*
Carlton	2,875	3,792	4,328	4,547	5.037	*6.4*
East Melbourne	1,297	2,050	2,087	2,151	2,235	*6.2*
Kensington	1,425	1,589	2,276	2,361	2,462	*6.3*
North Melbourne	2,751	2,979	3,215	3,337	3,414	*2.4*
Parkville	1,354	1,416	1,533	1,507	1,602	*1.9*
Melbourne - Rem	2,959	3,048	3,068	3,053	3,125	*0.6*
West Melbourne	642	762	1,148	997	1,031	*5.4*
Southbank	12	1,243	2,030	2,031	2,672	*na*
Docklands	-	-	100	100	100	*na*
City of Melbourne	13,693	18,215	23,849	24,391	27,124	*7.9*



[4] An occupancy represents a household, business or other organisational entity.
[5] City of Melbourne Property Base System, June 2000

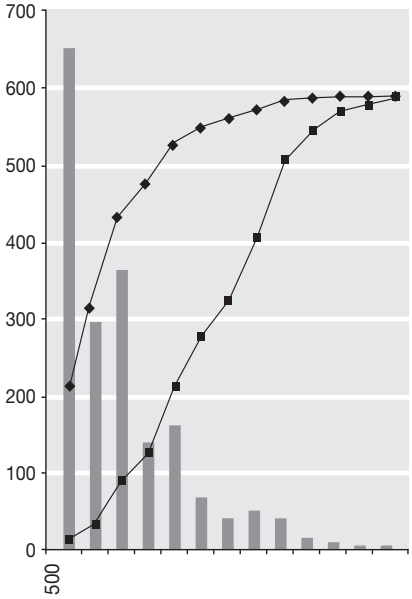
Information on the number and size of buildings is collected in the Census of Land Use and Employment (CLUE), but currently only for the CBD and Southbank. Table 5 shows a histogram analysis of building floorspace in the CBD and Southbank[6]. It can be seen that:

- 50% of the building stock is less than 1000 m^2 in size and together represents only 5% of the total floorspace
- 80% of the building stock is less than 5000 m^2 in size and together represents only 20% of the total floorspace
- 5% of the building stock is greater than 20,000 m^2 in size and together represents 45% of the total floorspace

Assuming a rough correlation between floorspace and energy use, these observations have some interesting implications.

Table 5 Number of buildings by floorspace in the CBD and Southbank 2000

Floorspace (m^2)	Number of Buildings	Cumulative Number of Buildings (as %)	Cumulative Floorspace (as %)
0–500	637	36.3	2.1
501–1,000	292	53.0	5.0
1001–3000	353	73.1	13.7
3,001–5,000	132	80.7	20.8
5,001–10,000	153	89.4	36.0
10,001–15,000	63	93.0	46.7
15,001–20,000	34	94.9	54.8
20,001–30,000	42	97.3	68.5
30,001–50,000	33	99.2	86.1
50,001–70,000	8	99.7	92.4
70,001–90,000	4	99.9	96.7
90,001–120,000	1	99.9	98.1
>120,000	1	100.0	100.0



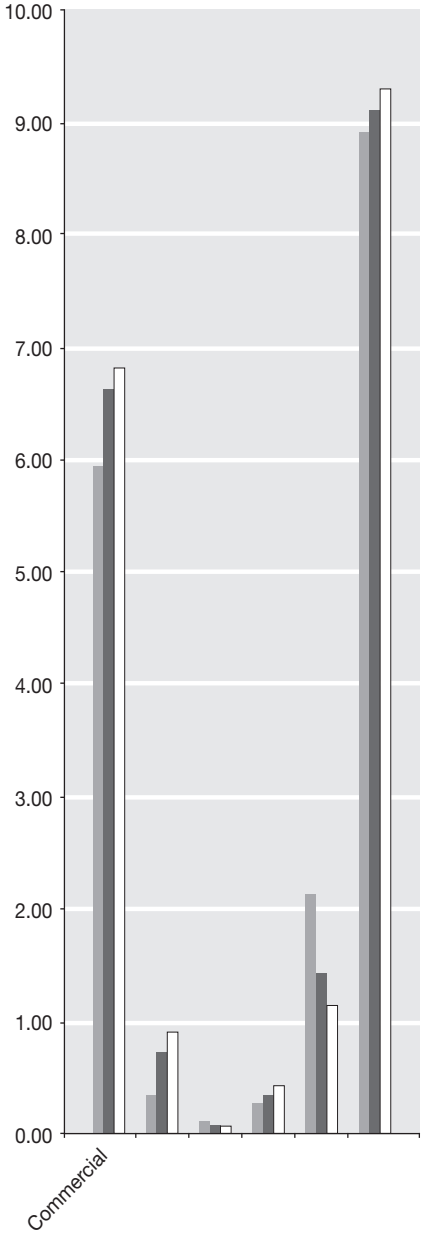
[6] It should be noted that this data corresponds to the primary space use in each building and on average underestimates the total floorspace of each building by approximately 20%.

Table 6 shows floorspace in the CBD by space use for 1992, 1997 and 2000. The accompanying graph shows the same data grouped into five categories – commercial, residential, industrial, public and unoccupied. Because of the large decrease in unoccupied floorspace over the period 1992 to 2000, the total floorspace in the CBD has only increased by 5.5% (equivalent to an annual compounding growth rate of approximately 0.7%) despite the fact that residential floorspace has almost trebled and commercial floorspace has increased by almost 15%. Of more relevance to energy use, the occupied floorspace has increased by 23% between 1992 and 2000 (equivalent to an annual compounding growth rate of approximately 2.6%).

Table 6 Floorspace (m^2) by space use for the CBD 1992–2000

SPACE USE	1992	1997	2000
Office	3,099,679	2,780,511	2,905,927
Retail - Shop	419,528	471,015	454,656
Retail - Stall	22,492	18,554	20,397
Wholesale	0	9,331	9,043
Manufacturing	0	45,427	40,355
Workshop/Studio	112,138	11,919	19,288
Equipment Installation	345,779	225,855	234,108
Transport	59,432	48,620	23,117
Storage	211,901	147,845	164,701
Educational/Research	197,110	231,227	282,721
Hospital/Clinic	39,555	23,689	25,876
Entertainment/Recreation - Indoor	342,945	307,962	345,408
Entertainment/Recreation - Outdoor	2,713	7,645	263
Cultural & Community Use	2,944	89,404	102,083
Conferences / Meetings	105,401	106,950	114,363
House	0	4,401	0
Flat/Apartment/Unit	63,691	239,479	380,717
Hotel/Motel	256,094	339,235	382,853
Hostel/Backpackers Accommodation	2,980	9,680	18,138
Private Hotel/Boarding House	15,805	4,274	470
Institutional Accommodation	4,428	3,715	195
Serviced Apartment	0	46,590	76,138
Student Accommodation	0	20,882	42,732
Corporate Supplied Accommodation	0	3,831	557
Parking - Private Covered	364,802	391,337	428,648
Parking - Private Uncovered	61,037	20,091	16,292
Parking - Commercial Covered	588,769	684,196	714,016
Parking - Commercial Uncovered	93,297	100,661	91,285
Open Space - Indoor	56,010	1,193,148	1,203,776
Open Space - Outdoor	149,976	97,742	105,396
Showroom	45,401	4,280	4,731
Gallery/Museum/Public Display Area	30,026	16,875	19,877
Unoccupied - Under Construction	228,965	66,318	177,322
Unoccupied - Under Renovation	105,100	184,486	212,317
Unoccupied - Demolition/Condemned	3,285	21,426	27,069
Unoccupied - Unused	1,868,910	1,177,369	756,187
Unoccupied - Undeveloped Site	21,576	4,864	4,126
Total	**8,921,770**	**9,160,835**	**9,405,145**

Floor area in millions of square metres



Age

The rate at which building stock is constructed, replaced or refurbished obviously has a direct bearing on implementation of the zero net emissions strategy. Construction and refurbishment activity varies according to economic conditions, but we have been told that approximately 2% of the City's building stock is renewed each year. This is consistent with CLUE data on building age (Figure 2) which show that 50% of the building stock in the CBD and Southbank has been constructed or refurbished in the last 30 years.

It is also interesting to note the relatively large number of buildings constructed more than 100 years ago (many of which presumably carry heritage protection) and in the period after the Second World War.

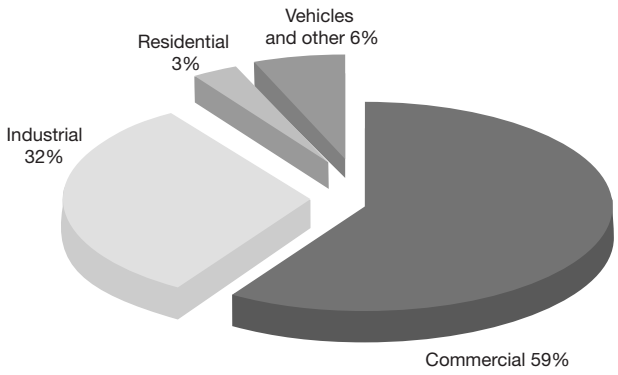
Figure 2 Histogram showing the number of years since construction or refurbishment of buildings within the CBD and Southbank

Energy Use and Greenhouse Gas Emissions in the City of Melbourne

The feasibility study indicated that in the absence of the proposed reduction strategies, greenhouse gas emissions from the City of Melbourne would increase from their 1996 baseline level of 3.5 million tonnes (CO2 equivalent) per annum to 4.5 million tonnes by 2020. However, if occupied floorspace is used as an indicator of energy use, the current rate of increase in occupied floorspace (approximately 2.6% per annum) would lead to emissions much greater than this – approximately 6.5 million tonnes by 2020!

Estimated greenhouse gas emissions by sector for the City of Melbourne in 2002 are shown in Figure 3[7]. It can be seen that, as one would expect, emissions from the commercial sector dominate.

Figure 3 Greenhouse gas emissions by sector for the City of Melbourne 2002 – total emissions estimated at 3.75 million tones (CO_2 equivalent).



[7] Taken from the feasibility study

Cost Profile – Commercial Building Space in the Melbourne CBD

Energy Costs

Energy costs per square meter vary significantly between tenants and buildings, depending on the building's age and size, the efficiency of the building and its systems, the types of energy, and the negotiated tariff. Table 7 shows the range of electricity costs ($ per square meter per annum) for commercial office buildings and shopping centres in the CBD in 2001[8]:

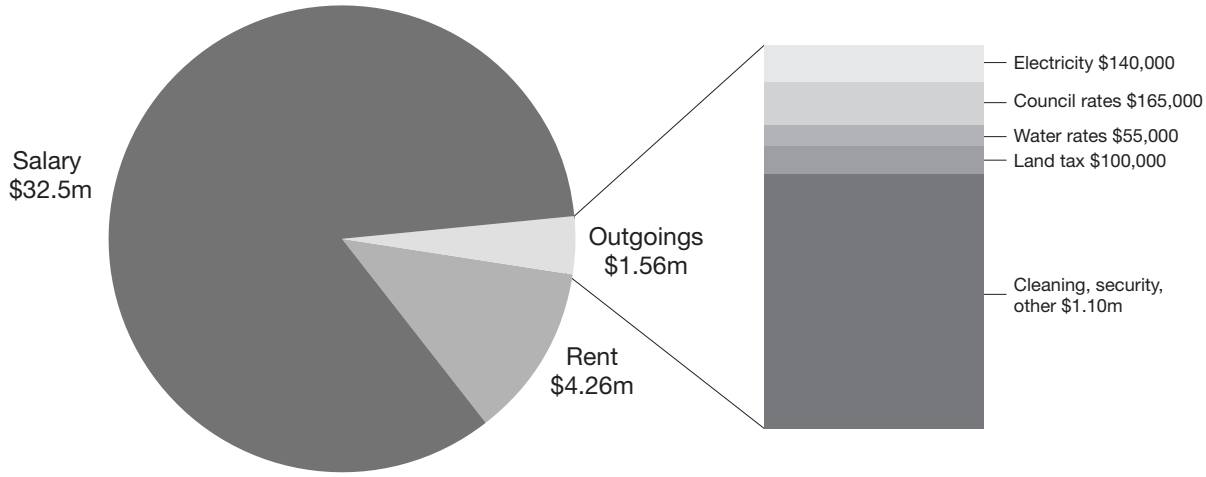
Other Costs

In order to get a handle on the relative costs involved, we obtained data for a large commercial tenant leasing premium high-rise office space in the Melbourne CBD. This particular tenant leases 8 floors or 14,200 m^2 of space and employs 650 staff on site. An average salary of $50,000 per employee was assumed and median electricity rates for premium office space were used. The cost profile is shown in Figure 4.

Table 7 Electricity cost per m^2 per annum for commercial office space and shopping centres in the Melbourne CBD[8]

	<9,000 m^2	9,000-18,000 m^2	18,000-36,000 m^2	>36,000 m^2	Premium and A Grade	B Grade	C Grade	Shopping Centres
Lower	9.06	11.38	6.85	7.56	7.93	7.71	10.16	11.03
Median	12.88	13.73	9.25	8.98	9.8	10.07	14.26	11.18
Upper	16.88	15.68	10.98	11.58	12.1	13.17	17.5	23.64

Figure 4 Cost profile for major commercial tenant in Melbourne CBD



This tenant's annual electricity charge is $140,000. This pays for approximately 1.4 million kilowatt hours of electricity which, if generated using brown coal, results in approximately 1,000 tonnes of CO_2 (equivalent) being released to the atmosphere.

Relative to the total cost of occupying this tenancy, it can be seen that electricity is an extremely small component, representing:

- 9.0% of building outgoings
- 2.4% of the cost of rent plus building outgoings
- 0.4% of the cost of rent plus building outgoings plus salaries

Appendix II

City of Melbourne Collective Green Purchasing Survey

Business Outlook and Evaluation
March 2002

Key findings

- There is significant interest among companies located within the City of Melbourne for a Council-led collective purchasing group for electricity needs.
- Cost saving is the expected primary benefit from collective purchasing.
- The level of green power usage is highly price-sensitive: the majority of respondents said cost would be an important determinant of usage
- Under 60% of respondents link strategies for environmental benefit to sales and productivity increases.
- The majority of respondents link use of green power to their reputation for environmental responsibility.
- The majority of respondents would be interested in considering 'green design components' in their next building; however, at no extra cost.

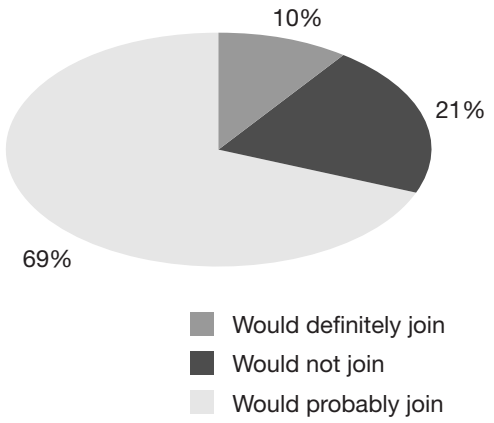
1. Introduction

A survey of selected businesses within the Melbourne Central Business District was undertaken by Business Outlook and Evaluation to provide input to the *Zero Net Emissions by 2020 Strategic Plan*. 31 businesses, including major service providers to the City of Melbourne, were interviewed in March 2002.

2. A City-led collective purchasing group for electricity needs

The survey has indicated a very positive reaction to the notion of Council establishing a collective purchasing group for electricity needs. 69% of respondents reported that they probably would join such a group, and 10% would definitely join (see Figure 1).

Figure 1 Response to a collective purchasing group established by Council



Researchers noted that the preference for the term 'probably', rather than 'definitely', reflected mainly that the respondent didn't feel empowered to make a definite statement, or that they were unsure of existing agreements that would stop them entering a new arrangement.

The main barriers to joining a collective purchasing group were purchasing policies and existing contractual agreements, lack of decision-making authority as decisions are made by parent companies, and the desire to bundle energy needs, including those of facilities outside City boundaries.

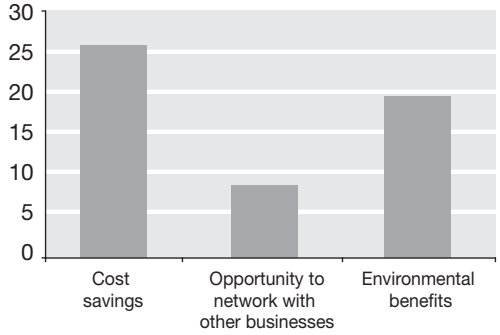
Specific responses included:

- Decision may be affected by existing contract with wholesaler
- Decision may be affected by the policy of a parent company
- Power deals are negotiated nationally
- Buying is undertaken nationally
- Already a member of a corporate buying group
- Energy purchasing of diverse operations is already bundled

3. Benefits of collective purchasing

The main benefit expected to flow from a collective purchasing group was cost savings, nominated by 90% of respondents. 68% believed environmental benefit would flow from such a group. A number of companies expected to receive benefits from the networking activities (see Figure 2). Some companies also expected that collective purchasing could achieve improved service levels from power providers.

Figure 2 Perceived benefits of collective purchasing



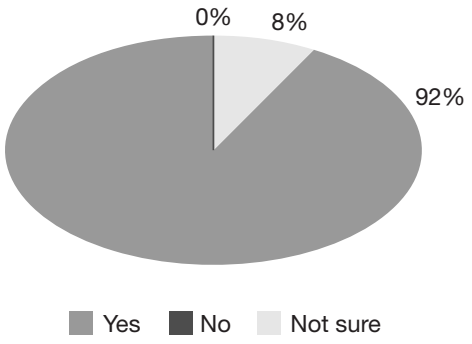
Benefits were most obvious where electricity costs formed a significant operational expense. One company noted that benefits could be contingent on the similarity of usage habits and their relationship to peak-supply periods. Most CBD residents, for instance, may not be in the position to benefit from savings through off-peak power usage.

4. The significance of green power in the mix

Although 93% of respondents believed that the mix available through collective purchasing should include green power, as seen in Figure 3, specific comments underlined high price sensitivity. These included:

- Interest 'only at a reasonable cost'
- Interest 'as long as the cost rise is not dramatic'
- That the decision would depend on cost
- That the decision would depend on cost effectiveness

Figure 3 Should collective purchasing include green power?



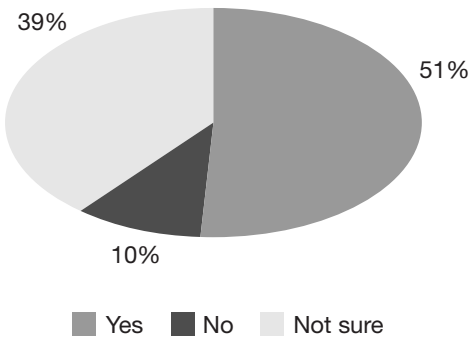
One company noted that it was in the process of formulating a corporate policy on purchasing of green power. Another noted that while its own purchasing power had driven down standard pricing for power, it had not succeeded in gaining price reductions for green power. This made a collective purchasing strategy attractive.

5. Significance of an 'environmentally responsible' reputation

Respondents gave a very mixed response to the contribution of a reputation as environmentally responsible to increased sales, customer and employee loyalty. Only 51% of respondents agreed that this reputation enhanced their sales and customer loyalty (see Figure 4) and only 58% agreed that it enhanced employee loyalty (see Figure 5).

Overall, companies seemed to have a high awareness of their own reputation and how it is perceived by their key stakeholders, including customers and employees. Companies that were not sure generally related this statement back to inconclusive market evidence, rather than lack of knowledge.

Figure 4 Does being regarded as 'environmentally responsible' increase sales and customer loyalty?



The value of environmental perceptions can vary broadly depending upon the industry sector, and company and target market characteristics. As one respondent noted, the value of an environmentally responsible reputation can increase sales and loyalty within some target markets for a specific company, but not necessarily all. However as another respondent said, "green strategies can provide an added bonus for customers, leading to improved customer relations".

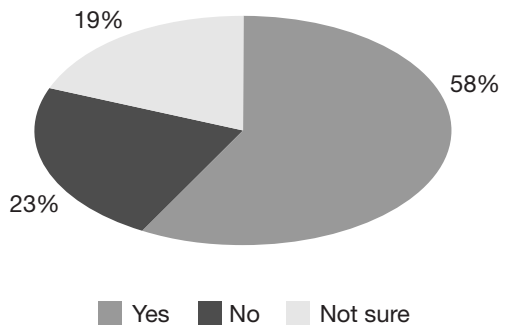
One respondent reported having undertaken a survey that found 75% of its respondents rated sustainability as a key boardroom issue. The survey results also confirmed that 'green' is emerging as a brand issue.

Another respondent to the BOE survey perceived environmental responsibility to be 15 years behind occupational health and safety strategies, "but we are getting there, we've joined the greenhouse challenge and have a good waste management policy in place."

Some companies noted that their strategies to reduce greenhouse gas emissions were more broadly based, including an overall reduction in power usage, and an emphasis on policies that meet the requirements of the Greenhouse Challenge. Waste management strategies, particularly in relation to recycling of a company's own waste, were often cited as significant strategies contributing to a positive environmental reputation. Others cited a strong sustainability policy and public commitment to good environmental practice.

These types of initiatives often have the advantage of involving employees, and thus enhance their loyalty to the company and commitment to its strategies. One respondent ranked staff loyalty as the main corporate driver for greenhouse reduction initiatives.

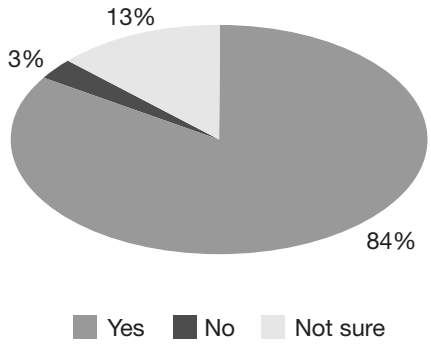
Figure 5 Increased staff loyalty?



6. Contribution of green power to a green reputation

84% of respondents perceived that the use of green power contributed to maintaining a reputation for environmental responsiveness. Negative responses were received primarily from companies who already engage in other areas – such as recycling – to enhance their reputation as an environmentally responsible company. They noted that the purchasing of green power is only one element contributing to environmental reputation.

Figure 6 Does the use of green power add to a green reputation?

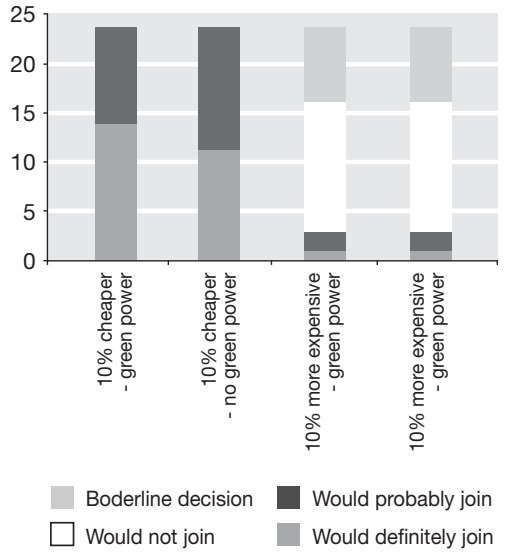


7. Finding the cost threshold for green power purchasing

In an economic climate characterised by counting costs, many respondents demonstrated high price sensitivity when asked to set financial boundaries on purchasing green power. As foreshadowed by one energy management consultant, results showed a considerable decrease in interest if green power raises costs by more than 10%.

Reasons stated by respondents for price sensitivity included responsibility to shareholders, the current actual cost of power and the cost in relation to total operating costs. One respondent noted that reliability is as big an issue as price, and reiterated the potential benefit of increased service levels through a group purchasing agreement.

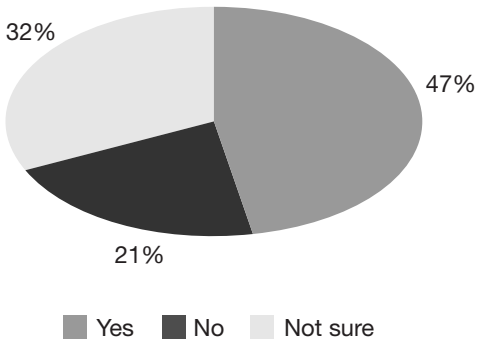
Figure 7 Boundaries for involvement



8. Interest in moving to a green building

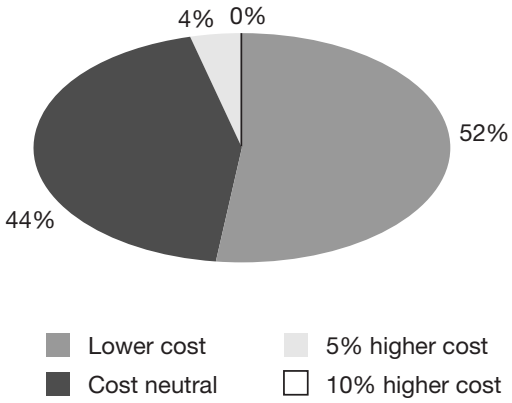
Many respondents would be interested in moving into a building designed to minimise greenhouse gas emissions, however high cost sensitivity was voiced. One respondent noted, however, that an increase in up-front costs of up to 5% would be considered if linked to ongoing efficiency gains. It was also noted that price is not the only factor considered when viewing green design options. As one respondent said, "it is about getting the best environmental benefit for our dollar."

Figure 8 Interested in moving to a green building?



Other respondents ranked 'green' design behind a range of factors including location, size and suitability. A disconnect was noted between environmental policy managers within an organisation and those who make major decisions about accommodation. Environmental policy managers are concerned with green design issues, while property or asset managers look primarily at cost. A strategy for reaching these decision-makers and elevating green design factors as a decision factor would be fundamental in influencing new building and refurbishment design within the City.

Figure 9. Desired cost outcomes for the move



Appendix III

Consultation: Barriers to energy-efficient design

Consultations with key stakeholders identified a number of barriers to the uptake of energy-efficient design and practices. Consultations included:

- Meetings with experts in both 'conventional' and 'green' building design, construction and real estate (including colleagues at the Rocky Mountain Institute in the USA),
- Multiple meetings of the Steering Committee
- Two forums – one convened by the City of Melbourne featuring green architects Robert Vale and Brenda Vale, and one convened by the Property Council of Australia,
- Interviews with major business residents in the City (see Appendix 2), and
- Interviews with Facilities Contract Managers.

Appendix IV

Steering Committee Meeting attendees

Mr Lindsay Bevege, Business Outlook and Evaluation

Mr Adam Briscomb, City of Melbourne

Dr Chris Brookes, CSIRO

Ms Jennifer Cane, Property Council

Mr Simon Cover, Department of Infrastructure

Mr David Craven, SEAV

Mr David Crook, Australian Greenhouse Office

Mr Rob Enker, Building Commission

Mr Ken Guthrie, SEAV

Ms Felicity Hamerston, Department of Natural Resources and Environment

Mr Mark Haycox, Docklands Authority

Dr Erin Jancauskas, Now for Future

Dr Robyn Leeson, City of Melbourne

Dr Mike Murray, CSIRO - Retired

Ms Marigo Raftopoulos, Consultant to Management

Mr James Shevlin, Australian Greenhouse Office

Ms Kimone Stacey-Missen, City of Melbourne

Ms Jan Werner, Business Outlook and Evaluation

Appendix V

Alliancing Case Study

Source: Minenco News, December 1996

Performance Incentives

"win-win" contracts boost productivity at Boyne

Old adversaries have become allies on the Boyne Smelter Expansion Project (BSEP), delivering productivity gains in which everyone has benefited. The new relationship has been helped along by Performance Incentive Contracts and Partnering. The contractors team, from project manager to individual members of the workforce, had clear objectives and incentives to get the job done safely, to the specified quality, the lowest cost and with schedule improvements where desirable.

As a result, BSEP is ahead of schedule, should deliver an improved return to Comalco, and contractors are also in front.

Australian construction sites have traditionally been a battleground of conflicting interests. Owners have fought with contractors, and employers have fought with employees, each trying to gain at the expense of the other. It has given the industry an unenviable record of cost overruns and project delays.

Continued on Page 6

Performance Incentives

Continued from Page 1

RTZ-CRA Business Units have been searching for a better way. At BSEP real progress has been made by giving contractor teams clear incentives to improve their performance by sharing in any financial gains they deliver.

The Boyne Island Aluminium Smelter is operated by [illegible]melters Limited (BSL) which is managed by [illegible]. The A$1 billion expansion is being managed by [illegible]-Minenco Joint Venture (BMJV) on behalf [illegible]melter Development (CSD) which is a [illegible]usiness unit. The expansion will increase [illegible]aluminium production capacity from 260,000 tpa to 477,000 tpa.

The General Manager of CSD, Ian Jacobson, said that when approaching the construction works, CSD was keen to minimise the disruption to production. "We wanted to avoid the protracted delays that have dogged Australian construction sites. Our discussion with the BMJV Project Managers led us to consider Performance Incentive Contracts, although it was certainly new territory for us," he said.

Lloyd Dewhurst is the BMJV Project Director. He and Ian foresaw that one of the key risks was that people would pay lip service to the new approach, while behaving as if they were on standard reimbursable contracts. "Reimbursable contracts have a reputation for going out of control - the contractors' incentive is to maximise use of resources rather than maximise value to the owner! We had to change the whole mind set. We wanted to get contractors to focus on the risks they could manage and not on trying to recover profit in areas over which they had no control," said Lloyd. "We wanted to focus their intellectual input to the project where it could benefit us most," added Ian.

The potential for problems was great. Minenco's Paul Barker, who managed the Infrastructure Area, said that a variety of contractors was needed for the project. "The many different components of the Smelter Upgrade meant that a single contractor would not have all the skills and experience needed to complete the entire job. The facilities to be constructed included a new potline, an integrated paste plant, an anode bake furnace and extending the metal products area. In the end, over a dozen contractors became involved, each bringing its specific experience and value to the project. Companies included John Holland, Thiess, Transfield, ABB, Simon Carves, Goldings, Andreco, Hurll and Crow Industries," he explained.

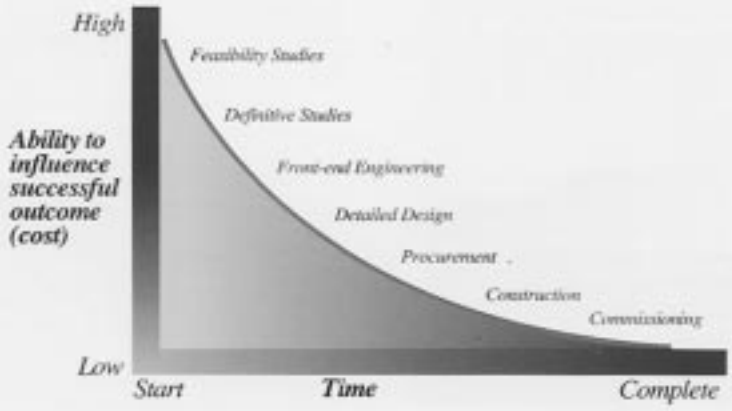
John Burdekin, the Site Manager of the project, has written up the management techniques adopted by the BSE Project team, which he presented to an Engineering Conference recently. He explained that there were five integrated systems. These were:

- *Leadership and leadership training;*
- *Project Development Partnership Agreement (Site Agreement);*
- *Team-based Gainsharing Provisions;*
- *Partnering with contractors; and*
- *Performance Incentive Contracts.*

John stresses that project leadership was focused on good staff selection, regular team and customer communication, coaching and performance review and training.

An innovative Project Development Partnering Agreement (Site Agreement) allowed contractors to share their gains with their workforce. This concept, along with strong team building, brought the unionised construction workforce into the project as partners rather than as adversaries (a "win-win" arrangement.)

Partnering with contractors ensured that the goals of the contractor, the goals of the BMJV as the Project



Manager, and the goals of CSD as the Project Leader were clearly aligned. It was an essential part of the process and involved:

- *a two-day workshop between contractor, BMJV and CSD to agree objectives and working relationships;*
- *drawing up and committing to a Partnering Charter which sets out the agreed objectives;*
- *honest assessment every month on the performance of the BMJV and the contractor, and*
- *agreed action by each party to improve problem areas.*

Aerial photo of Boyne Island project site

A key success factor was bringing the contractors into the project early, when they could have the most impact on the cost outcome. It was important to get the contractors' input on constructability issues during the conceptual design when influence on the project outcomes was greatest: as shown in the influence curve in the figure on Page 6.

The process also set the criteria by which the fee modifier came into effect. These criteria included safety, quality, project controls systems or any other important contract performance indicator. The contractor's performance was assessed every month and the contractor's fee would be varied by as much as plus or minus 30 per cent according to its performance against these criteria.

Performance Incentive Contracts enabled contractors to increase their financial return on the project in three ways:

- *earn an incentive payment bonus by beating the project schedule (where desirable);*
- *share in any total contract cost underruns; and*
- *increase their fee through the Contractor Fee modifier, based on overall performance.*

Targets were set for cost and sometimes time. The contractor executes the work and is reimbursed all of its costs of labour, materials, equipment and overheads. These costs do not include any profit component. If the target cost is underrun then the contractor shares in the savings. This and the fee modifier provided the incentive for the contractor to find better ways of working.

The results can't be argued with. According to the Project Controls Manager, Phil Suffern of the Bechtel-Minenco Joint Venture, to date the hours worked are only 73% of the original budget, for the same output. Some of this gain has been offset by the increased investment required in what Phil calls the 'people systems' that underpin the Performance Incentive Contracts and the Partnering - for example, the leadership training, the performance excellence program and the safety awareness programs. But the project is now on track to come in on, or better than, budget and is months ahead of schedule. The contractors are also very happy with the arrangement. Phil says that many have earned significantly more than their planned fee, usually around 10-20 per cent of the possible 30 per cent increase. None have been made worse off by the fee modifier.

Several of the contractors have also shared in cost underruns, separate from the fee modifier. Phil Suffern says, however, that the contractors were not required to share the cost overruns. "That would have been a sword over their heads and put us back in the old adversarial relationship. The incentive of the cost underruns and the fee modifier were enough."

The project team at Boyne is also making sure that the lessons learned are taken on board. Ian Jacobson says "We were on a steep learning curve and we didn't want our lessons lost to the next project. We've written up our experience and made refinements, in particular to our methods of establishing and maintaining target costs and to our approach to contract supervision and administration. We've also established a new relationship with our contractors that will be a better starting point on future projects."

The team is not, however, getting carried away with success. Ian cautions that while the Performance Incentive Contracts have worked well at Boyne, others shouldn't rush headlong into adopting them. "You have to get people committed to the project objectives and to the new way of doing things from the outset. A good site agreement is also essential. A major investment has to be made in building relationships early on and maintaining that relationship in good faith. The system rests on trust and any short-sighted grab for cost savings will quickly throw the switch back to the adversarial mode," said Ian.

Appendix VI

The Evergen Project

Media Release

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CSIRO Media Releases are available on the Internet: http://www.csiro.au

24 June 2002 **Ref 02/113**

EVERGEN TARGETS RECYCLABLE BUILDINGS

Australian scientists have launched a new project to galvanise Australia's property, building and construction industry to embrace sustainability.

Evergen is an idea with a tangible outcome - commercial buildings, which are built faster, perform better, sell for more, and which ultimately, are recyclable and have a zero net cost to the environment.

Dr Greg Foliente of CSIRO Infrastructure Systems Engineering says, "Evergen promises to make Australian history as the first project of its kind but even more importantly it is the public face of a strategy to place Australian design, manufacturing and construction 'expertise' ahead of the best in the world".

Evergen is founded on achieving this while embracing ecologically sustainable principles.

Dr Foliente says, "Evergen is a collaborative programme founded on the vision that all innovation in the property, building and construction industry should be directed to facilitate and support ecological, social and economic sustainability, in a holistic and integrated fashion".

Evergen's long-term economic goals for Australia promise commercial buildings that:

- Are built 30% faster
- Use 50% less water than the commercial building of today
- Have zero net energy use
- Produce zero waste
- Are worth 20% more in value

Mr John Castles, principal of Melbourne-based architectural firm Castles, Stephenson and Turner says, "Evergen plans to eventually produce a best-of-breed concept building that embodies Evergen's ideals and showcases Australian skills and capabilities".

Mr Bruce Kean, a former managing director of Boral, and Chair of the Evergen Advisory Committee says, "Such a building, which demonstrates many innovative products and processes, has the potential to open global markets for Australian companies".

"Evergen seeks to change the focus of the building industry to recognise that sustainable buildings are the buildings of the future," says Dr Robert Vale, a leading expert on environmentally sensitive design, based at the University of Auckland, and award-winning architect and book author.

Dr Foliente says, "Evergen will be unique because of its 'whole performance' approach to design. This approach aligns the goals and motivation of both clients and the project team, while committing to people-friendly, eco-friendly and commercially viable facilities".

"In other words, all aspects of a facility's design, use and reuse will be optimised as a system."

An Evergen project is one that will provide a fast track to adopting innovative concepts and technologies into tangible facilities for individual clients or whole communities.

Evergen's 'open building' design will make a building that is fit for third-generation use.

This means it will provide a solution to the disruptive and expensive refurbishment of commercial building of the past.

Dr Foliente says, "In other words, Evergen design will be an integrated process in which nearly every conceivable problem facing conventional buildings will be anticipated and provided for at the planning and conceptual design stage".

An Evergen building will be environmentally friendly, and meet or exceed client, health, lifestyle, energy, maintenance, waste, acoustic, lighting, climate, safety and other requirements concurrently.

Office workers can expect to enjoy natural light and fresh air supplied by new-generation hybrid ventilation systems.

Anyone who might have cause to visit or be in the building will have their needs anticipated and met. Evergen means easy access for the elderly, the disabled, the blind, office workers and trades.

Dr Foliente says, "Evergen is a next-generation building, not one for the far distant future, but an example to the world of the way buildings will be constructed within the next decade. It might be one building or several, in different locations in Australia".

"Right now Evergen is an idea looking for the support of stakeholders in the industry," says Dr Foliente.

Evergen is a CSIRO initiative in partnership with the Commonwealth Department of Industry, Tourism and Resources through the Innovation Access Program.

More Information:
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CSIRO Infrastructure Systems Engineering **61 3 9252 6000**
Email: Greg.Foliente@csiro.au

Ken Anderson Manager Communications **0414 457 214**
Email: Ken.Anderson@csiro.au

Appendix VII

Survey of green energy products

Business Outlook and Evaluation
April 2002

Key findings:

- Most electricity retailers now offer a variety of packages that increase the ease, and decrease the cost, for private and corporate purchasers to include green power in their electricity consumption.
- Prices, mix options and power sources vary broadly and can be difficult to compare
- Individuals are more effectively catered for with off-the-shelf packages than are businesses.
- Most retailers link their 'green power' initiatives to the Federal Government's 'Green Tick' incentive scheme for business.

1. Government incentives

The Green Tick of approval for business customers

Depending on the level of green energy a business contributes, the government-approved Green Power customer logo may be used on business stationery, or for promotional purposes to demonstrate commitment to the environment. The table below shows the minimum level of contribution required to qualify.

Annual Electricity use	Minimum Green Power level required to qualify for the Green Power customer logo
>40 GWh / annum	2.5% of electricity purchased in kWh
>4 GWh / annum	10% of electricity purchased in kWh
>750 MWh / annum	25% of electricity purchased in kWh
>160 MWh / annum	50% of electricity purchased in kWh
<160 MWh / annum	75% of electricity purchased in kWh
1 GWh = 1 Gigawatt hour = 1,000,000 kWh 1 MWh = 1 Megawatt hour = 1,000 kWh	

2. Retailer offerings

A. Origin Energy 132 463

RESIDENTIAL

- $52 per year for 20% wind and 80% hydro
- $00.309 x kilowatt usage for 40% wind and 60% hydro
- $00.563 x kilowatt usage for 100% wind

SMALL BUSINESS > 160,000 kw per annum

- "Pay no more for green power" deal means small businesses can forgo a discount they would otherwise receive in return for 20% wind and 80% hydro

LARGE BUSINESS < 160,000 kw per annum
(Priceline 1800 065 425)

Incorporated in energy charges assessed on a case by case basis, not really possible to get an idea of extra percentage – but they might get back to me if they can find a relevant example or way of explaining the system.

B. TXU 133466

RESIDENTIAL

TXU EnviroEnergy is created from renewable energy sources that cost more to generate than standard electricity. Although it comes at a premium, Hydroelectric Power and Landfill Biogas don't contribute to global warming and that's a priceless investment towards your family's future.

Landfill Biogas uses organic matter, such as that buried in rubbish tips, which breaks down to product methane gas. By capturing and burning this methane, electricity is generated.

Hydroelectric Power uses the energy of moving water to make electricity and has minimal impact on the surrounding environment.

- **Option 1** 25% TXU EnviroEnergy Additional EnviroEnergy levy1.32 cents per kWh# Average additional kWh cost Per Week* $1.50
- **Option 2** 50% TXU EnviroEnergy Additional EnviroEnery levy2.64 cents per kWh# Average additional kWh cost Per Week* $2.95
- **Option 3** 75% TXU EnviroEnergy Additional EnviroEnergy levy3.96 cents per kWh# Average additional kWh cost Per Week* $4.50
- **Option 4** 100% TXU EnviroEnergy Additional EnviroEnergy levy5.28 cents per kWh# Average additional kWh cost Per Week* $6.00

BUSINESS
Percentage of renewable energy nominated Additional TXU EnviroEnergy contribution

- **Option 1** 2.5% 0.13 cents per kWh
- **Option 2** 5% 0.26 cents per kWh
- **Option 3** 10% 0.53 cents per kWh
- **Option 4** 25% 1.32 cents per kWh
- **Option 5** 50% 2.64 cents per kWh
- **Option 6** 75% 3.96 cents per kWh
- **Option 7** 100% 5.28 cents per kWh

C. Pulse

Now is the time Pulse's residential and small business customers can make a stand and do something positive for the environment.

For an additional cost of 3 cents per kwh of energy used (about $3 per week for an average Victorian household) you can help support Pulse Clean Green.

Currently, we buy landfill which produces methane, a greenhouse gas which can be used to generate power. Harvesting methane provides a dual benefit for the environment. It reduces reliance on brown coal as well as preventing methane itself from polluting the atmosphere.

D. Ergon

Websites provides details on the following energy program, although no details are provided on purchasing this green power.

The SWERF is an Australian-designed solution to the worldwide problem of waste disposal

Another way we source renewable power for our Ergon Clean Energy program is through the SWERF, or Solid Waste and Energy Recycling Facility – a 'state of the art' waste minimisation and electricity plant in Wollongong, NSW. The SWERF is an Australian-designed solution to the worldwide problem of waste disposal, converting household waste into enough 'green' electricity to power approximately 24,000 households. It mixes and sterilises waste with steam, at temperatures between 130 degrees Celsius and 150 degrees Celsius.

The organic pulp, mainly paper and food waste, is converted to a fuel gas, which is then used to drive a gas engine and power a generator. As part of Ergon Energy's commitment to Green Power, and the new accreditation requirements, a SWERF facility has is planned for construction in Queensland in the future.

E. Citipower

EcoPower is fed into the national electricity grid, and contributes to total electricity supply. CitiPower's EcoPower renewable energy program sources electricity from renewable energy including:

- Solar panels that convert the energy of sunlight directly into electricity.
- Wind driven blades that rotate a turbine to produce electricity.
- Hydro power, where moving water (not involving new dams that flood ecosystems) rotates a turbine to generate electricity.
- Biomass, where organic matter such as agricultural residues (not forestry biomass) are burnt to generate electricity).
- Biogas/landfill, where methane gas produced by decomposing organic matter is burnt to generate electricity.

It is retailed to private and business users for 4.07 cents per kilowatt-hour of consumption.

F. AGL

RESIDENTIAL

Your Green Energy Choice	Green Energy surcharge per KWh	Approximate Green Energy surcharge per quarter**
10%	0.55c	$8.93
25%	1.1c	$17.87
50%	2.2c	$35.75
100%	4.4c	$71.50

AGL is currently sourcing renewable energy from:

- A landfill generator in Broadmeadows Victoria (refer diagram below)
- Various landfill sites in South Australia
- Wilpena Pound solar generator in South Australia (AGL owned & operated)
- Melbourne Water sewage treatment plant biogas generator (AGL owned & operated)

And is also investigating further sources of renewable energy including wind farms.

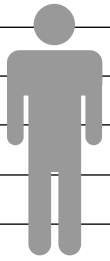
BUSINESS

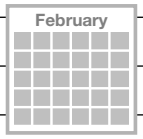
There is also a program for businesses but this is evaluated on a business by business basis.

G. Energex

BUSINESS AND RESIDENTIAL

Contribution amount per bill customer pays	Volume of renewable energy ENERGEX can buy for that amount	% of quarterly electricity use of average customer*	GHG emission savings equivalent to leaving your car in a garage for:
$10	330 kWh	18%	2 months
$20	665 kWh	37%	4.5 months
$30	1,000 kWh	56%	7 months
$40	1,330 kWh	74%	9 months
$50	1,665 kWh	93%	11 months
$60	1,990 kWh	111%	over 12 months





** Based on average customer using 7,200 kWh electricity per annum and participating in earth's choice for one year.*

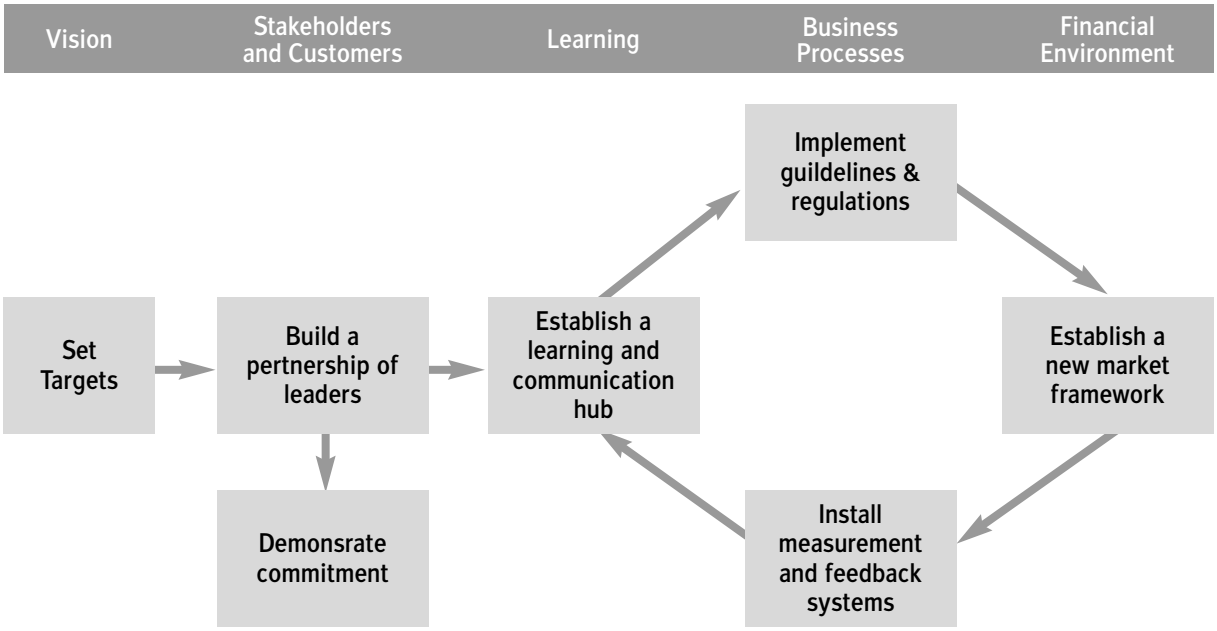
earth's choice green energy is purchased from the following environmentally friendly or 'green' sources.

Micro-hydro - Hydroelectricity is generated by the power of falling water. The force of the falling water rotates a turbine that is connected to a generator creating green electricity.

- **Solar power** - The sun is harnessed via solar photovoltaic panels to generate environmentally friendly power.
- **Wind power** - Windmills are used to produce power by harnessing the earth's wind.
- **Landfill gas and biomass** - Methane gas that is emitted from organic waste substances like sewage, bagasse (crushed sugar cane plants) and organic garbage from tips can be used as a fuel to run a power generating turbine.

Appendix VIII

Conceptual framework for integrating the strategies



Set targets
The first step requires someone to stand up and paint a strategic vision for the city, including the setting of challenging stretch targets.

Build a partnership of leaders
A city council on its own will rarely have the influence and recourses to tackle a project of this magnitude. A partnership of stakeholder organizations and individuals must be built to lead the project.

Demonstrate commitment
Leaders without commitment are a liability to this project. Identifying tangible ways for each partner to contribute immediately to the project achieves a number of things. It gets some runs on the board quickly. It demonstrates their commitment and resolve. And the results act as beacons to guide and inspire the community and other stakeholders.

Establish a learning and communication hub
Learning and communication are the lifeblood of any paradigm shift. Establishing a learning and communication hub, whether this is a new entity or a collaboration of existing agencies, is a critical step. Its mission is to assist the community (both lay and professional) to understand the why and how of GHG reduction.

The focus on learning and communication (rather than research and development) is recognition of the fact that the major hurdles are socio-political and economic, rather than technological.

Implement guildelines and regulations
Guidelines and regulations provide a means of setting the base level of performance, and of incrementally lifting this level over time.

Install measurement and feedback systems
Measurements and feedback systems educate the community on their contribution towards the problem and progress towards the solution. Closing the loop on the design cycle facilitates continual improvement in professional practice.

Establish a new market framework
A system where prices do not reflect the total cost of the commodity, a system that contains perverse subsidies, and that rewards behaviour that is counter to the ultimate objectives is doomed to fail. The establishment of a new market framework that is in-sync with the objectives, is a fundamental step in achieving the systematic change.

Continual iteration through these four steps is required

Appendix IX

Executive Summary – Centre for Sustainable Cities (2000)

The Centre for Sustainable Cities will apply and extend the theory and practice of modern sustainability to help align the economic, social and environmental drivers of the massive urbanisation taking place in Asia. In keeping with this theory and practice, the Centre will itself be a commercial entity. It will deliver business advantages to its shareholders and members, who will be those companies that understand that the secret to survive, thrive and profit in today's corporate landscape is integrating economic, environmental and social factors into their overall business strategy.

Together, the Centre and these companies will target the billions of dollars of mainstream business investment taking place in Asian cities and which are driving an urbanisation that is unprecedented in scale. Improving the business design of this investment is the key to improving economic, social and environmental outcomes – palliative, after-the-event environmental and social programs are simply swamped by this surging tide of change.

Business strategy

The Centre will identify opportunities and then marshal expert teams to seize them. Through a small, expert, entrepreneurial secretariat, it will develop the networks from which these teams will be drawn and become a portal for the delivery of training, consulting services and technologies rather than establish a large new faculty. Companies wanting to participate in these teams will subscribe to the Centre, providing another revenue stream.

Over time, the Centre will also invest in and commercialise Intellectual Property and technologies. However, the growth strategy will be organic, with investment flowing as the Centre becomes profitable. This, plus the use of associate experts rather than extensive faculty staff will minimise the initial capital investment required to establish the Centre.

The market

The target sectors for the Centre are:

- Design and construction
- Urban planning and development
- Energy management
- Water management, and
- Development financing

All these markets are well established and involve billions of dollars of annual expenditure. Significant gains can be made by the application of sustainability principles, so that the Centre can offer a powerful value proposition to potential clients. A product matrix has been developed covering education and training, strategic consulting and research and Intellectual Property generation.

Competitive Strengths

CSC aims to become a leading Centre of sustainability expertise for Asia. There are pockets of relevant expertise in Australia and Asia but no competitor who offers the integrated product proposed for this Centre. Several organisations in the United Sates and Europe that define the leading edge of sustainability theory and practice are not currently active in Asia. They have expressed interest in partnerships and alliances with the Centre and so can be allies rather than competitors.

Apart form its holistic approach, the Centre will also differentiate itself from other consulting services by blending local champions and experts with leading international practitioners to ensure that its solutions and programs address the unique environmental, political and social systems of a locality, within a regional and global context.

Management Team

The Centre will be housed within the Melbourne School of Energy and Environment, of Melbourne University Private. The School has a range of allied initiatives under development that will complement and cross fertilise the Centre. These include the Melbourne Program, whicxh is training business and government leaders from Australia and Asia in the application of the Triple Bottom Line to business; the world's first Triple Bottom Line MBA; and the development of an International Greenhouse University.

The key staff of the Centre will be recruited via international search. They will include an entrepreneurial Chief Executive, who will also provide the holistic intellectual leadership of the Centre. Intellectual leaders will aslo be appointed in urban planning and development, water management and energy management. In later years, intellectual leaders in transport and social dynamics will also be appointed.

Financial Strategy

The financial strategy of the Centre is to raise $1.2 million initial capital from shareholders, drawn from investors who see strong leverage from participation in the Centre. These include construction companies, water companies, energy suppliers and environmental management companies. The City of Melbourne and Melbourne University Private will also invest in the venture.

As noted, the Centre's business strategy minimises capital and operating costs. This allows the Centre to quickly establish revenue streams and a number of projects and alliances have already been identified, reinforcing confidence in the strength of the market demand. The Centre is thus able to turn a positive cash flow in Year 2 and recover all initial outlays in year 3.

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Do you have a question for the Melbourne City Council? Call and speak to us.

9280 0716	አማርኛ
9280 0717	廣東話
9280 0718	Ελληνικά
9280 0719	Bahasa Indonesian
9280 0720	Italiano
9280 0721	國語
9280 0722	Somali
9280 0723	Español
9280 0724	Türkçe
9280 0725	Việt Ngữ
9280 0726	All other languages
9280 0727	English

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