CH2 Setting a new world standard in green building design

Design snap shot 01: Introduction

A revolutionary healthy building that harvests sunlight, cool night air, water, wind and rain – creating a lasting landmark for one of the world's most liveable cities.

This is the task the City of Melbourne set for itself with the design of CH2, it's new administration building on Little Collins St in the central business district of Melbourne. Officially known as CH2 (short for Council House 2, which differentiates it from the current administration building, Council House), the building has set a new international standard in ecologically sustainable design. It offers a financially responsible way of meeting the Council's long-term accommodation needs, and makes the most of a previously under-utilised site (a surface car park owned by City of Melbourne). CH2 also builds on the emerging qualities of Little Collins Street as a leading retail experience, with increased retail frontage and pedestrian links to Swanston and Bourke streets.

Why CH2 is significant:

Emissions will be 64 per cent less than a five-star building. When compared with the existing Council House, CH2 expected to:

- reduce electricity consumption by 85 per cent;
- reduce gas consumption by 87 per cent;
- produce only 13 per cent of the emissions; and
- reduce water mains supply by 72 per cent.

New LCD computer monitors should consume 77 per cent less energy and new T5 light fittings should consume 65 per cent less energy.

48m^2 of solar panels will provide about 60 per cent of the hot water supply.

26m^2 of photovoltaic cells will generate about 3.5kW of solar power.

A gas-fired co-generation plant will provide 60kW of electricity, meeting about 40 per cent of the building's electricity with much lower carbon dioxide emissions.

Recycled waste heat from the cogeneration plant will provide 40 per cent of the building's supplementary air heating/cooling system.

Construction of CH2 started early in 2004, and staff moved during August in 2006. The Green Building Council of Australia has given the design stage of the building a six-star rating – world leader status – under the new method of comparing the environmental performance of commercial properties (Green Star – Office Design v1).

This series of Design Stage Snap Shots outline the main processes, lessons and outcomes of the design phase for the City of Melbourne CH2. They were written with funding from the Australian Greenhouse Office in 2004-5. They are a result of interviews, participation in design meetings and document reviews with extensive input from the design team.

CH2 will add enormous vibrancy to this significant section of Little Collins St, with new shops, cafes and pedestrian connections and, as it does so, it will strive to set a new standard in how buildings can deliver financial, social and environmental rewards…
Lord Mayor John So (2004)

Figure 1. Lord Mayor John So, explaining the vision behind the CH2 project (2004)

Snap shot compiled by Dominique Hes, dhes@unimelb.edu.au from input by the entire design and construction team.

02 Introduction

Background on the City of Melbourne

The City of Melbourne is a municipal government organisation located in the heart of Melbourne, the capital city of the State of Victoria, Australia. The municipality of Melbourne covers the Central Business District (CBD), and some surrounding suburbs (for more information see www.melbourne.vic.gov.au).

'City Plan 2010 – towards a thriving and sustainable city' is the City of Melbourne's primary planning strategy, with 4 strategic directions: Connected and Accessible City, Innovative and Vital Business City, Inclusive and Engaging City, and Environmentally Responsible City.

Our vision

Melbourne, the capital of Victoria, will be internationally recognised for the opportunities it offers all Victorians to live, learn, work and prosper in a quality and sustainable environment. We want Melbourne to be viewed with pride by all Victorians.

Our mission

To create a thriving and sustainable city, the City of Melbourne is committed to:

- Promoting Melbourne's advantages;
- Encouraging and facilitating sustainable social, economic and environmental development and prosperity;
- Ensuring transparent and accountable governance;
- Delivering best value customer service;
- Maintaining and enhancing the liveability of the City through the provision of quality assets and associated services;
- Planning for and identifying opportunities to build on the City's strategic advantages; and
- Ensuring that the operations of the City of Melbourne are environmentally, socially and economically sustainable.

Our Core Values

- **Integrity** (for example "I will do and others will see it")
- **Respect** (for example "I will consider and understand the perspective and circumstances of others")
- **Excellence** (for example "I will commit to achieving outstanding outcomes for Melbourne")
- **Courage** (for example "I will dare to create")

These Core Values guide the way Council does business and deliver all of its activities and services for community benefit.

Facts and figures

Municipality

Area 36.5 sq km

Estimated residential population* 52 117
(metropolitan Melbourne: 3 417 218)

Daytime population* 567 000

Total length of roads 315 km

Total area of parkland 565 ha

Total number of businesses 14 915

Total number of dwellings 24 391

Central Business District

Area 3.54 sq km

Total number of dwellings 4 407

Total number of businesses 9 352

Source: Australian Bureau of Statistics Census, June 2001
*Includes daytime business, working and visitor population

Objectives and drivers for the development of CH2

In 2002 Council undertook a strategic investigation of all accommodation options for staff. The initial investigation included some green initiatives, but was mainly based around meeting regulations and other non-environmental requirements:

1 Meet statutory requirements and occupational health and safety regulations.

2 Accommodate most staff except a small core of staff to manage councillor needs.

3 Modern interactive flexible work environment which is responsive to organisational needs and change.

4 Latest environmentally sustainable design features.

5 Long term operational efficiency at least cost.

6 Comply with planning schemes.

02 Introduction

The CH2 proposal had to meet these criteria, as well as those set up in response to specific Council environmental and social strategies listed below:

Greenhouse Gas Emissions

Zero Net Emissions by 2020 sets a roadmap for ending Council and the municipality's contribution to global warming by 2020. This will be achieved through leading edge building design, greening energy supplies, and offsetting emissions through the establishment of carbon sinks. City of Melbourne also has operational targets to reduce energy consumed in Council buildings by 20% by 2005 (based on 1996 levels) and a 5% increase in the use of renewable energy by 2005 and a 10% increase by 2010 (expressed in the Corporate Energy Management Strategy and Energy Policy).

This has further been translated into a requirement to meet at least an ABGR[1] 5 star energy rating for CH2.

Water

Total Watermark strategy aims to achieve municipal and organisational sustainable water management by 2020, in the areas stormwater management, water consumption, water quality and water recycling. In particular City of Melbourne has set a target to reduce residential 40% reduction per resident; Commercial 40% reduction per employee; Industry 40% reduction per employee and Council 40% reduction absolute, using 1999 as the base year.

Social and economic

The social and economic strategy which informed the aims for CH2 is the Retail Strategy 2000. This applies to the retail core of the building and highlights the importance of improving safety, amenity and accessibility for the city customer. The retail core strategy seeks to enhance the retail offer and tenant mix, enhance the quality of design in new retail developments in streets, and enhance the quality of pedestrian movement by improving access, amenity and safety.

For CH2, this means integration with the Tivoli shopping mall, linking Bourke and Little Collins streets, and a continuation of the Little Collins street shopping precinct.

However City of Melbourne has extended its aspirations beyond those directly resulting from the strategies and policies mentioned above. The CH2 design also provides innovative solutions to the following issues:

- Waste minimisation and sustainable material selection
- Indoor environment quality
- Staff health and wellbeing
- Low toxic chemicals
- Sustainable transport

As a result, the Green Building Council of Australia has given the design stage of the building a six-star rating – world leader status – under the new method of comparing the environmental performance of commercial properties (Green Star – Office Design v1).

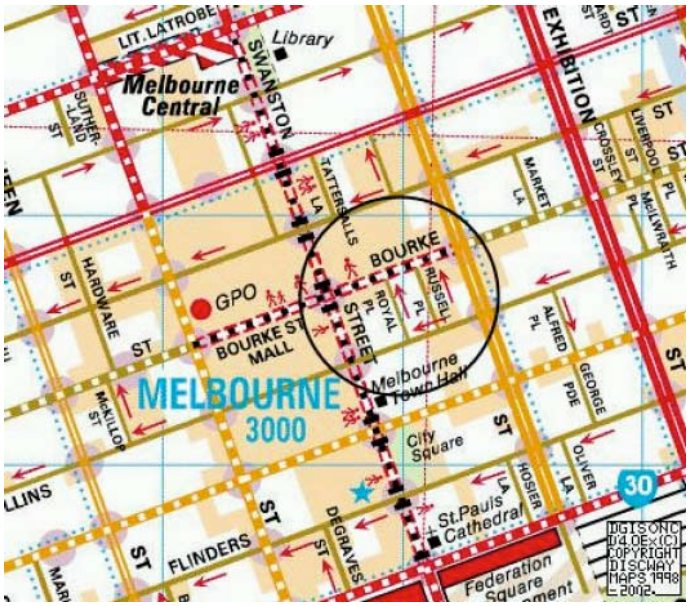

Figure 2. Location of CH2 in Melbourne CBD

1 ABGR – Australian Green Building Rating scheme – An Australia wide rating scheme which models the energy use of buildings initially based on design and once the building is built through actual energy bills. For more information see www.abgr.com.au

02 Introduction

CH2 fact file

Project	CH2
Owner	City of Melbourne
Project manager	City of Melbourne
Architect	City of Melbourne in association with DesignInc (Melbourne)
Engineer	Lincolne Scott
Services	Advanced Environmental Concepts (AEC) ESD consultant
Engineer Structural/civil	Bonnaci Group structural engineers
Builder	Hansen Yuncken
Cost Consultant	Donald Cant Watts Corke
Completion Date	2006
Cost	$51M excluding fit out
Size	12,536 m^2 GFA
Typical floor	1,046 m^2 GFA
Construction Type	Precast concrete 10 storey office
User Group	CoM staff
Annual Energy Use	Expected to be 50-60kwh/m^2/yr
Site Area	1316 m^2
Country	Australia
Occupancy	540 Staff
Latitude	37.81 (S)
Longitude	144.91 (E)
Elevation above sea level	18m

Design stage snap shots

The snap shots have been written to describe how CH2 was designed. This information is meant to not only to highlight the building's features and pass on what eventually ended up in the building, but also to tell the stories which were behind these outcomes. A summary sheet is provided at the beginning of each snap shot to present the main outcomes, followed by more general information of that particular initiative.

Snap shots include information on the following areas:

- Business case
- Charrette
- Design features
- Biomimicry
- Transport
- Lessons
- Modelling
- Green Star

There are also a set of snap shots that focus on how the building works. These response specific snap shots focus on:

- Energy systems
- Shower tower
- People
- Water initiatives
- Western façade
- Street Interface
- Indoor Environment Quality
- Phase change materials
- Chilled ceiling panels and beams
- Turbines
- Vaulted ceilings
- Lighting