

60 Leicester Street, Carlton, Victoria (60L)

Building Profile

Building	60 Leicester Street, Carlton, Victoria
Construction date	1877
Refurbishment date	2001
Owner	Australian Conservation Foundation
Building Size	3,500m ² (NLA) / 4 Storey
Refurbishment Team	Spowers Architects John Mullen & Partners Advanced Environmental Concepts Lincoln Scott Donald Cant Watts Corke
Building Management	On-site: Andrew Gemmell (ACF)
Awards	<ul style="list-style-type: none"> • Planning Institute Australia - Victorian Division - 2003 Awards for Planning Excellence – Winner Ecologically Sustainable Development (Built) Award • Banksia Awards 2003 – winner of Leadership in Sustainable Buildings category • Australian Property Institute 2003 Excellence in Property Awards - Winner Colonial First State Environmental Development Award

Overview

The 60L Building in Carlton is a leading example of an energy efficient refurbishment that has employed innovative leasing agreements to facilitate energy reduction initiatives. The retrofit of 60L focused on energy efficient design, resource efficiency and involvement of people in the running of the building.¹ It includes a wide array of passive design features and user-controllable design elements such as natural ventilation, operable windows, light wells and a central atrium. Whole systems design principles were employed to ensure building systems were integrated and aligned towards high performance outcomes, rather than operating as a series of separate systems.² The building only uses about 30 per cent of the energy of similar buildings.³



¹ Baird, G. (2010) *Sustainable Buildings in Practice*, Routledge, NY, USA, pp 213-221.

² Magee, R. (2004) *Sustainable Offices: Do they work? Performance Analysis of the 60L Green Building and Other Developments*, Ideaction 2004, Facilities Management Association of Australia, online: www.wintercomms.com.au/files/ESD%20&%20the%20Environment/r_mcgee.pdf, accessed 08/08/2012.

³ ACF (2011) *60L Building Tour Brochure*, Australian Conservation Foundation, online: www.acfonline.org.au/resources/60l-building-tour-brochure, accessed 08/08/2012.

Tenants in the building are under a 'green lease', which specifies legally binding behaviour and ensures occupants adhere to energy efficient practices.⁴ This increases tenants' awareness of energy efficiency and recognises the key role of occupants in contributing to improved building performance. The lease also requires adherence to a fit-out manual and schedule, which ensure tenant fit-outs do not compromise the building's indoor environment quality or energy efficient operation.

Several occupant surveys have been conducted in the building and indicate very high occupant satisfaction. This highlights the benefits of energy efficient design, coupled with good building management, post-occupancy evaluation surveys, innovative leasing agreements and good education to aid energy reduction initiatives.

Design Elements

*Monitoring and Control Technology*⁵

A Building Automation System (BAS) interfaces with a variety of building systems and components to optimise building performance and allow monitoring of energy consumption. The BAS system controls ventilation system components, including motorized louvres and the mechanical ventilation system. The BAS interfaces with a rooftop weather station and is connected to sensors that measure light, temperature and humidity, and provides information to tenants to allow them to monitor and manage their energy consumption.⁶ Energy metering is installed to meter lights, power and HVAC energy consumption.⁷

Lighting^{8,9}

The refurbishment is designed to maximise the use of natural light throughout the building, thus reducing artificial lighting and avoiding additional heat load from lighting fixtures.¹⁰ For example, the central atrium with light reflecting surfaces increases daylight transmission and brings daylight into the building core.¹¹ Light-wells along the north and south perimeters have glazed openable windows to increase daylighting and control glare, while reflective lightshelves help angle additional light into tenancy areas. The building is modelled to

⁴ Gemmell, A. (2012) *Personal Communication*, Building Manager, 60L Green Building, 21/09/2012.

⁵ ACF (n.d.) *Detailed report – 60L Green Building*, Australian Conservation Foundation, online: www.acfonline.org.au/sites/default/files/resources/Detailed_report_on_60L.pdf, accessed 22/08/2012.

⁶ ACF (n.d.) *Overview of the 60L Green Building*, Australian Conservation Foundation, online: http://www.acfonline.org.au/sites/default/files/resources/Detailed_report_on_60L.pdf, accessed 13/09/2012.

⁷ Pears, A. (2012) *Learning from the 60L Green Building: good intentions, tough action and their outcomes*, Presentation to Melbourne Forum 2012, March 28 2012, Melbourne, online: www.airah.org.au/imis15_prod/Content_Files/MelbForum/MF_280312_AP.pdf, accessed 22/08/2012.

⁸ Magee, R. (2001) *The 60L Green Building – A Summary*, Spowers Architects, Facility Management Australia, www.wintercomms.com.au/files/Green%20Retrofitting%20&%20Corporate%20Fitout/RosMagee_EB2001.pdf, accessed 08/8/2012.

⁹ ACF (n.d.) *Detailed report – 60L Green Building*, Australian Conservation Foundation, online: www.acfonline.org.au/sites/default/files/resources/Detailed_report_on_60L.pdf, accessed 22/08/2012.

¹⁰ ACF (n.d.) *Detailed report – 60L Green Building*, Australian Conservation Foundation, online: www.acfonline.org.au/sites/default/files/resources/Detailed_report_on_60L.pdf, accessed 22/08/2012.

¹¹ ACF (n.d.) *Detailed report – 60L Green Building*, Australian Conservation Foundation, online: www.acfonline.org.au/sites/default/files/resources/Detailed_report_on_60L.pdf, accessed 22/08/2012.

provide daylighting equivalent to 320 lx at desk level to 60 per cent of the building for 85 per cent of the year.¹²

Other energy efficient lighting features include:¹³

- T5 fluorescent lamps
- High efficiency ballasts
- Local switching
- Photosensors to monitor and control light levels along the atrium
- Tinted glass to reduce solar heat transmission by 51 per cent while retaining 78 per cent visible light transmission.

Overlighting has been avoided through good zoning and careful placement of light fittings in relation to workstations, resulting in a 15 per cent reduction in light fittings compared with a standard grid layout.¹⁴ Lighting controls reduce energy consumption through local switching, photosensors that automatically switch lighting off when luminance levels at workstations reach 320 lx, and a time clock that switches lighting off after office hours.¹⁵ Overlighting is further reduced, while still complying with Australian Standards, by providing lighting of only 160 lx in general areas, hallways and public areas.¹⁶ The average power density of installed artificial lighting throughout the building is 5.5 W/m².¹⁷ The refurbished building lighting system is estimated to consume 80 per cent less energy for lighting than in a similar building.¹⁸

*Heating, Ventilation and Air Conditioning*¹⁹

A mixed-mode ventilation strategy facilitates natural ventilation when outside conditions permit, and is estimated to reduce energy consumption for heating and cooling by 41 per cent.²⁰ A central atrium, four thermal chimneys, louvres, operable windows, and perimeter

¹² Magee, R. (2001) *The 60L Green Building – A Summary*, Spowers Architects, Facility Management Australia, www.wintercomms.com.au/files/Green%20Retrofitting%20&%20Corporate%20Fitout/RosMagee_EB2001.pdf, accessed 08/8/2012.

¹³ Magee, R. (2001) *The 60L Green Building – A Summary*, Spowers Architects, Facility Management Australia, www.wintercomms.com.au/files/Green%20Retrofitting%20&%20Corporate%20Fitout/RosMagee_EB2001.pdf, accessed 08/8/2012.

¹⁴ Magee, R. (2004) *Sustainable Offices: Do they work? Performance Analysis of the 60L Green Building and Other Developments*, Ideaction 2004, Facilities Management Association of Australia, online: www.wintercomms.com.au/files/ESD%20&%20the%20Environment/r_mcgee.pdf, accessed 08/08/2012.

¹⁵ Magee, R. (2004) *Sustainable Offices: Do they work? Performance Analysis of the 60L Green Building and Other Developments*, Ideaction 2004, Facilities Management Association of Australia, online: www.wintercomms.com.au/files/ESD%20&%20the%20Environment/r_mcgee.pdf, accessed 08/08/2012.

¹⁶ ACF (n.d.) *Detailed report – 60L Green Building*, Australian Conservation Foundation, online: www.acfonline.org.au/sites/default/files/resources/Detailed_report_on_60L.pdf, accessed 22/08/2012

¹⁷ Pears, A. (2012) *Learning from the 60L Green Building: good intentions, tough action and their outcomes*, Presentation to Melbourne Forum 2012, March 28 2012, Melbourne, online: www.airah.org.au/imis15_prod/Content_Files/MelbForum/MF_280312_AP.pdf, accessed 22/08/2012.

¹⁸ ACF (n.d.) *Detailed report – 60L Green Building*, Australian Conservation Foundation, online: www.acfonline.org.au/sites/default/files/resources/Detailed_report_on_60L.pdf, accessed 22/08/2012

¹⁹ ACF (n.d.) *Detailed report – 60L Green Building*, Australian Conservation Foundation, online: www.acfonline.org.au/sites/default/files/resources/Detailed_report_on_60L.pdf, accessed 22/08/2012

²⁰ Magee, R. (2004) *Sustainable Offices: Do they work? Performance Analysis of the 60L Green Building and Other Developments*, Ideaction 2004, Facilities Management Association of Australia, online: www.wintercomms.com.au/files/ESD%20&%20the%20Environment/r_mcgee.pdf, accessed 08/08/2012.

light-wells draw air through the building and provide comfortable conditions for occupants while drastically reducing the need for mechanical heating and cooling.

Air is drawn through light-wells on the north and south façades towards the central atrium. Four thermal chimneys that extend past the atrium roof line draw air upwards through the building.²¹ Computer-controlled motorised louvre windows in each of the tenancies and in the thermal chimneys interface with the Building Management System and a roof-mounted weather station to detect wind speed, wind direction and external temperatures in order to adjust the various elements of the ventilation system.²² Louvres are automatically controlled and modulated from fully open to fully closed depending upon conditions,²³ while electronically-controlled blinds in the atrium are operated to control heat gain. Additionally, the Building Automation System controls a night purge mode, which operates the thermal chimney louvers to expel heat and pre-cool the building automatically using cooler nighttime air when ambient conditions permit.²⁴

The natural ventilation system is designed to maintain internal temperatures within a range of 19-26°C for much of the year. When internal temperatures are outside this range, small domestic reverse-cycle air conditioners provided in each tenancy operate in combination with a central ducted mechanical ventilation system to maintain acceptable temperatures and ventilation rates.²⁵ Air-conditioning set-points are 19°C for heating and 26°C for cooling to reduce energy consumption and align with the thermal comfort band determined for the natural ventilation strategy.

²¹ Baird, G. (2010) *Sustainable Buildings in Practice*, Routledge, NY, USA, pp 213-221.

²² ACF (2011) 60L Building Tour Brochure, Australian Conservation Foundation, online: www.acfonline.org.au/resources/60l-building-tour-brochure, accessed 08/08/2012.

²³ Baird, G. (2010) *Sustainable Buildings in Practice*, Routledge, NY, USA, pp 213-221.

²⁴ ACF (n.d.) *Detailed report – 60L Green Building*, Australian Conservation Foundation, online: www.acfonline.org.au/sites/default/files/resources/Detailed_report_on_60L.pdf, accessed 22/08/2012.

²⁵ Magee, R. (2004) *Sustainable Offices: Do they work? Performance Analysis of the 60L Green Building and Other Developments*, Ideaction 2004, Facilities Management Association of Australia, online: www.wintercomms.com.au/files/ESD%20&%20the%20Environment/r_mcgee.pdf, accessed 08/08/2012.



Figure 1: Thermal Chimneys²⁶

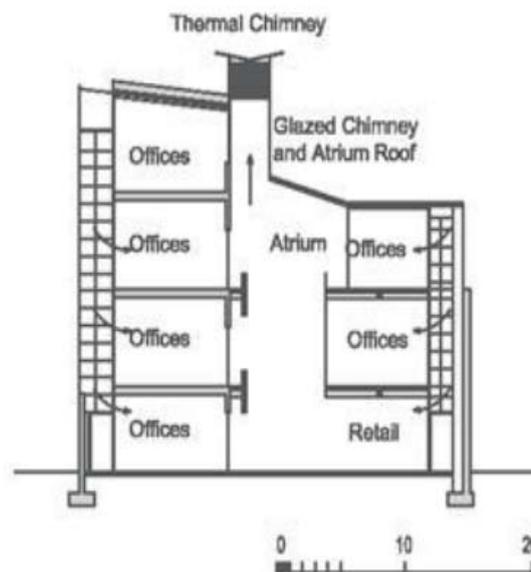


Figure 2: Ventilation strategy, showing thermal chimney²⁷

²⁶ Australian Government (2007), *ESD Design Guide: Office and Public Buildings*, Australian Government Department of the Environment and Water Resources, online: www.environment.gov.au/sustainability/government/publications/esd-design/pubs/esd-design-guide-appendices.pdf, accessed 08/08/2012.

²⁷ Baird, G. (2010) *Sustainable Buildings in Practice*, Routledge, NY, USA, pp 213-221.

*Building Fabric*²⁸

The building is orientated with predominately north facing openings to take advantage of solar passive design opportunities, while the eastern façade has large windows to let in morning light. Low emissivity glass on the atrium roof allows light in but reflects a high percentage of shortwave solar radiation, and retractable blinds control solar gain.²⁹ The atrium is positioned to capture the sun for most of the day in order to supply light and warmth. The building fabric is well-insulated with R3.5 roof insulation, astro-foil, and insulated gutters, and the building structure's significant thermal mass helps stabilize internal temperatures.

Other Plant and Equipment^{30,31}

The roof space houses solar chimneys for natural ventilation, and atrium glazing for improved daylighting. A roof garden also provides some insulation to the floor below, reducing heat gain and helping to stabilise internal temperatures. Additionally, sixty four photovoltaic cells on the roof of the building generate 10-30 per cent of the electricity required for base building services. To reduce the use of elevators and minimize energy consumption, stairs are positioned in a prominent location to increase the likelihood of occupants using them.³² Energy efficient pumps, low pressure drop filters and sensor-controlled circulation pumps reduce the energy consumed by pumping and water systems.³³

*Tenancy Design and Fit-out*³⁴

The office design is open plan throughout most of the tenanted space and facilitates the natural ventilation and daylighting strategies. Tenancy fit-outs are controlled to ensure they do not reduce air flow or the penetration of daylight. Care has been taken to minimise the use of furnishings and materials that could impact indoor environment quality, such as through emissions of chemical contaminants. Energy efficient office equipment is estimated to draw approximately 5 W/m², which is significantly less than the 15 W/m² estimated for a standard office.³⁵

²⁸ ACF (nd), *Detailed report – 60L Green Building*, Australian Conservation Foundation, www.acfonline.org.au/sites/default/files/resources/Detailed_report_on_60L.pdf, accessed 22/8/2012.

²⁹ Baird, G. (2010) *Sustainable Buildings in Practice*, Routledge, NY, USA, pp 213-221.

³⁰ The Fifth Estate (2011) *Has ACF's 60L green building measured up to its goals?*, www.thefifthestate.com.au/archives/25665, accessed 24/8/2012.

³¹ ACF (nd), *Detailed report – 60L Green Building*, Australian Conservation Foundation. Accessed online 22nd August 2012, www.acfonline.org.au/sites/default/files/resources/Detailed_report_on_60L.pdf, accessed 08/08/2012.

³² Pears, A. (2012) *Learning from the 60L Green Building: good intentions, tough action and their outcomes*, Presentation to Melbourne Forum 2012, March 28 2012, Melbourne, online: www.airah.org.au/imis15_prod/Content_Files/MelbForum/MF_280312_AP.pdf, accessed 22/08/2012.

³³ Pears, A. (2012) *Learning from the 60L Green Building: good intentions, tough action and their outcomes*, Presentation to Melbourne Forum 2012, March 28 2012, Melbourne, online: www.airah.org.au/imis15_prod/Content_Files/MelbForum/MF_280312_AP.pdf, accessed 22/08/2012.

³⁴ Magee, R. (2004) *Sustainable Offices: Do they work? Performance Analysis of the 60L Green Building and Other Developments*, Ideaction 2004, Facilities Management Association of Australia, online: http://www.wintercomms.com.au/files/ESD%20&%20the%20Environment/r_mcgee.pdf, accessed 08/08/2012.

³⁵ Magee, R. (2004) *Sustainable Offices: Do they work? Performance Analysis of the 60L Green Building and Other Developments*, Ideaction 2004, Facilities Management Association of Australia, online: http://www.wintercomms.com.au/files/ESD%20&%20the%20Environment/r_mcgee.pdf, accessed 08/08/2012.

Building Management

Management Personnel, Communication and Education

An on-site building manager has been involved with the building over a long time and is actively involved in energy efficiency and occupant satisfaction initiatives. Results of occupant surveys have been used by the building manager to inform management practices, contributing to improved occupant satisfaction.³⁶

Reporting and Evaluation

Active building management practices, including the monitoring of energy consumption to identify if tenants are incorrectly operating air conditioning systems, contribute to the energy efficient operation of the building. Tenancy air temperatures are monitored along with electricity use, which helps to identify if tenants are operating mechanical cooling systems when they are not supposed to,³⁷ and thus helps to ensure the natural ventilation strategy is upheld and tenants operate the building correctly. Further education is provided in the case of incorrect operation to ensure occupants understand the design and function of the building.

Building management is able to monitor indoor conditions through a series of sensors that interface with the Building Automation System. This provides the building manager with the necessary information to ensure the natural ventilation strategy can be optimised to provide a comfortable environment for occupants while ensuring the most energy efficient building operation.

Agreements and Culture

Tenant Agreements

Tenant Agreements require compliance with the buildings' Environmental Management Plan, the tenancy fit-out manual and fit-out schedule, and the Green Building Principles and Rules.³⁸ The lease does not set out specific energy targets, but instead specifies legally binding behaviour.³⁹ This increases tenants' awareness of environmental outcomes and recognises the key role of occupants in contributing to high building performance.

For example, the building's natural ventilation strategy is designed to operate within the temperate range 19-26°C and the lease supports this design intent by stipulating that tenants must not operate air conditioning units unless internal temperatures are outside these limits. Tenants have access to the Building Automation System which provides information from the rooftop weather station to ensure occupants are aware of when it is appropriate to operate air conditioners. Energy use is monitored by building management,

³⁶ Gemmell, A. (2012) *Personal Communication*, Building Manager, 60L Green Building, 21/09/2012.

³⁷ Gemmell, A. (2012) *Personal Communication*, Building Manager, 60L Green Building, 21/09/2012.

³⁸ ACF (nd) *Detailed report – 60L Green Building, Australian Conservation Foundation*, online: www.acfonline.org.au/sites/default/files/resources/Detailed_report_on_60L.pdf, accessed 22/8/2012.

³⁹ Gemmell, A. (2012) *Personal Communication*, Building Manager, 60L Green Building, 21/09/2012.

which helps to identify if air conditioning is being misused.⁴⁰ When necessary, further education is provided to ensure occupants understand how the building works.

The lease also requires adherence to the fit-out manual and fit-out schedule, which ensure tenant fit-outs do not compromise energy efficiency or indoor environment quality. These requirements are enforced and have on many occasions prevented alterations that would have compromised the natural ventilation strategy.⁴¹ The lease precludes the use of materials and substances that may be detrimental to indoor air quality or occupant health, and this has helped prevent the inadvertent installation of restricted materials.⁴² Tenants must seek approval from the landlord for renovations and fit-outs. The planned fit-out is assessed for airflow and access to natural light, and it is specified that materials must not compromise indoor environment quality, such as through emissions of volatile organic compounds.⁴³

Communication and education

Tenants are provided with access to the Building Automation System to allow them to monitor their energy and water consumption and other environmental information.⁴⁴ The provision of this information in an accessible way can assist with behaviour change.⁴⁵

Occupants are encouraged to take a tour of the building to improve their understanding of its features and functioning.⁴⁶ Additionally, a Building Users' Guide developed for tenants defines the environmental and energy strategy and building features. As well, orientation kits are provided for tenants and their employees.

Tenants are encouraged to reduce energy use by switching off appliances, choosing efficient lighting, and choosing resource efficient appliances, such as printers that print double-sided.⁴⁷

Organisational Culture

The organisational culture generated by the building owner has been integral in driving energy efficiency and human comfort outcomes. A list of Green Building Principles provides support for these goals, and these include:⁴⁸

- Creating, maintaining and operating a quality and commercially viable building.
- Minimising energy consumption and greenhouse gas emissions.

⁴⁰ Gemmell, A. (2012) *Personal Communication*, Building Manager, 60L Green Building, 21/09/2012.

⁴¹ Gemmell, A. (2012) *Personal Communication*, Building Manager, 60L Green Building, 21/09/2012.

⁴² Gemmell, A. (2012) *Personal Communication*, Building Manager, 60L Green Building, 21/09/2012.

⁴³ The Fifth Estate (2011) *Has ACF's 60L green building measured up to its goals?*, online: www.thefifthestate.com.au/archives/25665, accessed 24/08/2012.

⁴⁴ ACF (n.d.) *Detailed report – 60L Green Building*, Australian Conservation Foundation. www.acfonline.org.au/sites/default/files/resources/Detailed_report_on_60L.pdf, accessed 22/8/2012,

⁴⁵ ACF (n.d.) *Why 60L has a unique green lease*. www.acfonline.org.au/about-us/our-home-60l/why-60l-has-unique-green-lease, accessed 24/8/2012.

⁴⁶ Baird, G. (2010) *Sustainable Buildings in Practice*, Routledge, NY, USA, pp 213-221.

⁴⁷ ACF (n.d.) *Why 60L has a unique green lease*. www.acfonline.org.au/about-us/our-home-60l/why-60l-has-unique-green-lease, accessed 24/8/2012.

⁴⁸ ACF (2004) *60L Green Building Project, Green Building Principles*, 60L Green Building Partnership, Australia.

- Adopting environmentally sound and healthy work practices, both during construction and in occupancy.

Occupant Experience

Several occupant surveys have been conducted in the building and indicate very high occupant satisfaction. An independent organization carried out a survey of the 60L building and found that 60 per cent of building occupants perceived that they were 10 per cent more productive than in their previous workplace. A separate in-house survey by ACF found that occupants' perceived productivity was 15 per cent greater than in ACF's previous premises in Fitzroy.⁴⁹ A Building Use Studies (BUS) survey indicates that satisfaction with 'overall comfort', 'productivity', and 'health' are significantly better than benchmark scores in the BUS database.⁵⁰

BUS results indicate that the natural ventilation strategy contributes positively to occupant satisfaction. Levels of satisfaction with aspects related to thermal comfort and air in both summer and winter were similar to or better than benchmarks in the BUS database, with the exception that air was considered slightly too still in winter and a little too dry and stable in summer.⁵¹ Responses for control over heating, cooling, and lighting, were all above benchmarks, while control over ventilation and noise were similar to benchmarks.

Additionally, occupants feel that the natural ventilation and daylighting strategies contribute to higher productivity and health in the building, as indicated by a high number of positive or balanced comments in the survey.⁵² This highlights the benefits of energy efficient design coupled with good building management, occupant surveys, and good education to aid energy reduction initiatives.

Indoor Environment Quality

No formal Indoor Environment Quality assessments have been conducted, but a number of sensors are installed in tenancy areas and continually monitor indoor environmental conditions. Sensors measure temperature, light, humidity and other important comfort-related parameters.⁵³ These sensors interface with the Building Automation System and information is accessible to occupants in real-time to help inform their behaviour. For example, the natural ventilation strategy permits occupants to operate air conditioning if internal temperatures are outside the comfort range of 19-26°C. Occupants can therefore check the BAS to determine if it is appropriate to operate the HVAC systems.

⁴⁹ Australian Publishing Resource Service (2011), *60L Green Building*, www.aprs.com.au/australian-environment-news/60l-green-building, accessed 24/8/2012.

⁵⁰ Baird, G. (2010) *Sustainable Buildings in Practice*, Routledge, NY, USA, pp 213-221.

⁵¹ Baird, G. (2010) *Sustainable Buildings in Practice*, Routledge, NY, USA, pp 213-221.

⁵² Baird, G. (2010) *Sustainable Buildings in Practice*, Routledge, NY, USA, pp 213-221.

⁵³ Magee, R. (2004) *Sustainable Offices: Do they work? Performance Analysis of the 60L Green Building and Other Developments*, Ideation 2004, Facilities Management Association of Australia, online: http://www.wintercomms.com.au/files/ESD%20&%20the%20Environment/r_mcgee.pdf, accessed 08/08/2012.

Performance Nexus Summary

Key lessons to inform the Performance Nexus concept

- Tenant lease agreements can be used to support energy efficiency and indoor environment quality in the following ways:
 - Tenants have agreed to comply with the building rules, building principles, the Environmental Management Plan, and the tenancy fit-out guide. These specify legally binding behaviour that ensures tenant actions contribute to the environmental goals of the building.
 - Tenant leases require compliance with fit-out guidelines to ensure that fit-out changes do not compromise the design intent of the building. Fit-outs require prior approval so that natural ventilation pathways are not unintentionally compromised by new elements such as walls and partitions. This is achieved through requirements such as specifying walls with openings at the top and bottom to facilitate air movement. This has been actively enforced to prevent fit-out changes that would have otherwise compromised the natural ventilation strategy in the building. Where privacy/sound proofing has been required, rooms have been located in areas that will not obstruct critical airflow paths.⁵⁴
 - Fit-out guidelines have also been used to prevent the use of materials known to emit chemical pollutants,⁵⁵ and to ensure that fit-out changes do not compromise other indoor environment quality parameters such as lighting and daylighting strategies.
 - Tenant lease agreements legally bind tenants to operate HVAC systems in accordance with the natural ventilation strategy. For example, tenants are not permitted to use air conditioners when internal temperatures are within the range of 19-26 degrees Celsius.⁵⁶
- Good whole system design, focused first on passive design principles and on building systems interactions that can work together to improve energy efficiency and indoor environment quality, has helped deliver a comfortable low-energy building. Natural ventilation systems and daylighting strategies work together to deliver multiple performance outcomes. Additionally, energy efficient lighting and office equipment and a lower occupant density has helped reduce the internal thermal load by 53% compared to typical office space in Melbourne.⁵⁷

⁵⁴ Gemmell, A. (2012) *Personal Communication*, Building Manager, 60L Green Building, 21/09/2012.

⁵⁵ Gemmell, A. (2012) *Personal Communication*, Building Manager, 60L Green Building, 21/09/2012.

⁵⁶ Gemmell, A. (2012) *Personal Communication*, Building Manager, 60L Green Building, 21/09/2012.

⁵⁷ ACF (n.d.) *Detailed report – 60L Green Building*, Australian Conservation Foundation, online: www.acfonline.org.au/sites/default/files/resources/Detailed_report_on_60L.pdf, accessed 22/08/2012.

- Good education aids efficient building operation. Occupants are educated on correct operation of the building and design elements, and all tenants are encouraged to go on a tour of the building to learn how it works.⁵⁸
- Active use of post-occupancy evaluation results can contribute to improved building performance. Several occupant satisfaction surveys have been completed with building tenants, and the results of these have been used to inform building management practices or adjust design elements to improve building performance.
- Good building management practices and regular monitoring of energy consumption contributes to improved building performance. Energy consumption and internal temperatures are continually monitored to see if tenants are incorrectly operating the building HVAC systems. This provides the building manager with the necessary information to ensure the natural ventilation strategy can be optimised to provide a comfortable environment for occupants and ensure energy efficient building operation, and further occupant education is provided where necessary to ensure compliance.⁵⁹

Acknowledgements:

Andrew Gemmell, Building Manager, 60L Green Building
Australian Conservation Foundation

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⁵⁹ Gemmell, A. (2012) *Personal Communication*, Building Manager, 60L Green Building, 21/09/2012.