

Sustainability in the built environment; a Government perspective

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Abstract: The current and emerging policy initiatives in Government are aimed at making Victoria a sustainable state. The extended drought, melting icecaps and extreme weather conditions have solidified public awareness. The built environment should be an easy win in the war on climate change but there seems a reluctance to act from the private sector and a public campaign aimed at diffusing Government initiatives from some lobby groups. The government has ensured all new office buildings and houses in Victoria have to meet minimum energy and water standards. Further development of environmental standards for existing buildings are the next step and are necessary, however this must be carried out with high levels of consultation and in a spirit of cooperation.

The paper examines green buildings, links staff productivity and indoor environment quality, building selection, corporate citizenship and strategies for building owners to adopt “defensive mechanisms”. By far the best scenario will be to encourage the private sector to act without the need for regulation.

Rating tools are very important in creating long term sustainability. The Green Building Council of Australia’s “Green Star” rating tool, energy house rating software such as FirstRate5, developed by Sustainability Victoria, leads the field. ABGR and NABERS are both Government designed and supported rating tools – both are viral to drive the existing commercial building market.

Government is a major purchaser of goods and services and a major owner of property. The paper looks at a number of governments owned or leased buildings and their sustainable features. The guidelines Government set for their own operations are examined.

Conference theme: Keynote address Government Policy
Keywords: Government, Sustainability, Built Environment.

INTRODUCTION

Australians are the world’s largest emitters of greenhouse gas per capita. Victoria burns brown coal for electricity generation and therefore produces the highest amount of greenhouse gas of any Australian state. Energy, in most of the forms we use within our buildings, is not an unlimited resource and remains one of the key environmental initiatives in building operation.

Electricity demand as well as consumption needs to be considered. The provision of additional infrastructure (the poles and wires) is a cost borne by all Victorians. There is a requirement to reduce maximum demand across all electricity consumers. One estimate puts the cost of providing 1 megaWatt of electricity to a new building or sub division at \$4 million.

The built environment has been defined as commercial and residential buildings. The building sector’s greenhouse gas emissions are the fastest growing in Australia. This sector consumed 21% of the total Australian emissions, or 81 million tonnes (Mt) of CO_{2-e}¹.

Victoria’s greenhouse gas emissions in 2004 totalled 123 million tonnes. The “built environment” in Victoria was responsible for generating 35.5%, which represents 43.7 Mt of greenhouse gas emissions.²

Victoria’s emissions are projected to increase by an average of 1.9% per annum by 2020 to 160Mt. The energy use for the Australian residential sector is expected to increase 40% over the 20 year period of 1990 to 2010, while greenhouse gas emissions are expected to increase by 17%.

¹ Million tonnes of carbon dioxide-equivalent.

² Data from secondary research by Sustainability Victoria 2007 – “Buildings energy use - A working document to support planning for market transformation”.

The problem is not just limited to energy, Waste is a major environmental issue in the built environment with more than 40% of landfill resulting from building related waste. The imperatives of sustainable design are to reduce, reuse and recycle.

There is great potential to reduce operational waste during the life-cycle of the building. During “churn” (refitting of office space) there is a large volume of waste produced on site during demolition and construction. The “day to day” operation of the office generates large volumes of landfill. There is potential for these materials to be composted, reused or recycled rather than directed at landfill.

Australia is the second driest continent on the planet, while Australians are the world’s largest consumers of water per capita. While water used in office buildings is a small proportion of our national usage, guaranteeing the supply and quality of mains water to our cities has large ramifications in terms of cost and availability of catchment resources. Available technologies and water pricing regimes do not currently provide many financially viable returns on investment for water conservation initiatives.

Within existing buildings the priority is to remove harmful materials. Materials identified as dangerous to humans include asbestos, synthetic mineral fibre (SMF) materials including fibreglass, rockwool and ceramic fibre-based products, polychlorinated biphenyl (PCB) and other hazardous materials. During office churn and the fitout of new buildings, materials must be selected to minimise the impact on the environment.

The sourcing and disposal of materials such as floor coverings, fabrics, aluminium, steel, plastics, plays a major role in defining the environmental sustainability of a building.

1. CURRENT AND EMERGING POLICY INITIATIVES

Former Vice President Gore and Sir Nicholas Stern have led a public call for action in addressing climate change. The results of climate change have been demonstrated with melting of polar icecaps, extremes in weather conditions, rising sea levels across the world. Closer to home the extended drought across Victoria and Australia has solidified public response and for the first time, we believe, the general public attitude is leading Government action.

Victoria’s Response

In Victoria environmental statements like “Our Environment Our Future” and “Our Water Our Future” have placed the “marker in the sand”. The Victorian Government is committed to making Victorian a sustainable State. New buildings are a key focus of this commitment. Government leadership is a term often used and misused however in the area of sustainability, Victoria is showing true leadership. The built environment is key area Government is focussing on to reduce environmental impact. Homes and offices are seen as easy wins and because their contribution to the problem is high they are also seen as achievable wins. Homes and office buildings constructed now will be around for 50 or 60 years. This is why Government have taken a strong stance in this area:

- > The new office building market has embraced sustainability. This has been driven by new regulatory requirements such as Section J of the Building Code, State level planning requirements for minimum energy and water efficiency and the City of Melbourne’s planning requirements (minimum 4.5 Star ABGR and 4 Star Green Star).
- > The new housing market is also delivering sustainable solutions with a requirement to deliver 5 Star environmental standard that comprises energy rating for the building fabric as well as a rain water tank or a solar hot water system. Showerheads and taps must have flow rates no greater than 9 litres per minute.

These standards are working. The report by George Wilkenfeld and Associates commissioned for the Department of Sustainability and Environment has shown that since 2005 when the 5 Star housing standard was introduced over 136,000 tonnes of greenhouse gas is saved each year. This report also demonstrated that without this standard this sector would have increased in the order of 33%.³

Future directions?

The Government believes that the further development of environmental standards for the built environment is necessary. A strengthening of regulation around existing buildings is needed – perhaps at point of sale or as mandatory disclosure at lease. This is particularly important for the disadvantaged sections of society. Recent policy position papers from industry associations have called for the “burden to be shared” and for a relaxing of standards in order to provide a more affordable housing. What this position fails to recognise is the “affordability” of the new home owners’ on going electricity, gas and water bills! The average house today is larger, much larger, than in the past and they use a great deal of energy, water and resources. However because high energy consuming items like low voltage halogen lighting and plasma televisions are not included in the 5 Star housing standards often these items are overlooked, with a consequence of increased energy use and greenhouse gas. By far the best scenario will be to encourage the private sector to act without the need for regulation. Education and rating tools can assist commercial and domestic building owners and tenants.

³ Wilkenfeld 2007, Options to reduce greenhouse emissions from new homes in Victoria through the building approval process. Department of Sustainability and Environment.

2. WHY GREEN BUILDINGS?

Why are governments and private companies moving into, or asking for Green Buildings?

There is a strong link between human productivity and green buildings. A key study from the Building Commission⁴ has showed a positive link between green buildings and improved Indoor Environment Quality (IEQ). Improved IEQ means improved productivity through reduced absenteeism and employee turnover, better concentration and ability to complete tasks quicker with greater accuracy. Tenants of green buildings are less likely to move and will pay higher rents once they have found a building that employees actually like. Improved comfort conditions leading to improved occupant productivity by increased levels of natural lights and ventilation, greater thermal control and reduction in unwanted noise. For example the use of chilled beam technology for cooling allows high levels of fresh air while maintaining good comfort conditions with low background noise.

There is evidence of the importance of building selection in the ability of organisations to attract and retain staff.⁵ The influence of environmental sustainability is certainly on the agenda for many organisations.

“Good Corporate Citizenship” is another driver. A number of large corporate organisations are moving into either new or refurbished green space to show their green credentials. The market has moved. An increasing number of companies are becoming – or wanting to become – carbon neutral. The first step in the process is to identify and act on you buildings’ (or tenancy’s) environmental performance. Sustainability Victoria has been approached by a number of organisations with B to D grade office space enquiring about mechanisms to upgrade. Most are owners’ representatives or real estate professionals see the need to refurbish as a defensive mechanism. The alternative to a green refurbishment is to own or manage a building with diminishing returns, short term tenancies and limited future potential. The simple advice is for building owners to ensure that the building is performing well – with a high ABGR and GreenStar rating.

3. RATING TOOLS

Rating tools are a popular method of setting minimum standards – they also can be used to provide leadership and assistance to the industry. They can use either a(n):

- > **design based approach**, which seeks to predict the performance of a building based on an analysis of the design features or
- > **outcome-based approach**, which measures the actual consumption of resources and environmental impacts of the building in operation.

Green Star

The Government was an early and financially significant supporter of rating tools. The Green Building Council of Australia was formed with assistance from State and Federal Governments. Victoria contributed to this process financially and with our own people sitting on technical committees and steering groups. As a good example the current Chair of the GBCA is Mr Tony Arnel, he is also the Victorian Building Commissioner. This is a demonstrated commitment of governments’ desire to drive sustainability in the built environment.

The Green Star Environmental Rating System is designed to recognise and reward environmental leadership in buildings. The Green Star Environmental Rating System for buildings is applied to management, indoor air quality, energy, transport, water, materials, land use, site selection and ecology, and emissions. It also provides credit for Innovation. Green Star has rating tools for various phases of a building’s life cycle.

FirstRate5

In the residential arena, as well, Victoria, through Sustainability Victoria (then the Sustainable Energy Authority), developed FirstRate – the house energy rating software. This enabled accurate assessment of the thermal performance of houses. The latest version of this house energy rating software is now available - FirstRate5 provides a step change in this area. The software will enable house plans to be directly uploaded from many formats and for changes to be accurately assessed and rated. We believe many hours of work can be saved with the software. FirstRate5 also treats timber floor constructed houses more accurately.

ABGR & NABERS

The Federal and State Governments have developed and fully support the Australian Building Greenhouse Rating (ABGR) Scheme and the environmental rating tool NABERS (the National Australian Built Environment Rating System). ABGR is a ‘world first initiative’ to help building owners and tenants across Australia benchmark building greenhouse performance while NABERS is a performance-based rating system for existing buildings. NABERS rates a building on the basis of its measured operational impacts on the environment. Both of these tools will be vital in the drive to upgrade the existing stock of commercial buildings.

4 Victorian Building Commission 2006. Indoor Environment Quality – Leadership now or damage control in the future? Report by Business Outlook and Evaluation.

⁵ Colliers International 2006 “Office Tenant Survey”

4. GOVERNMENT REQUIREMENTS FOR ITS OWNED PORTFOLIO AND BUILDINGS

EMS

The Victorian Government Departments have a number of major policies and management directions that are providing this critical leadership across its portfolio. The Victorian Government introduced an environmental management system (EMS) in 2002-03. An EMS is designed to act upon and change staff behaviour. The EMS is a program that can be used to identify, manage and reduce an organisation's impact on the environment and generate reports on environmental performance progress. It provides a systematic and methodical approach to planning, implementing and reviewing an organisation's response to those impacts. Each Department and agency sets their own targets and priorities under the EMS which are reported annually and independently audited.

Energy Management

In 1999 the Government introduced a long term energy efficiency target for its' own operations. This target was designed to deliver 15% energy reduction by 2005-06 and purchase of 10% Green Power for Government buildings. The development was carried out by the newly created Sustainable Energy Authority (now Sustainability Victoria) and the Greenhouse Policy Unit within the Department of Natural Resources and Environment (now the Department of Sustainability and Environment). The policy was intended to promote a culture of energy efficiency and sustainable energy practices. To date each department has delivered a good result. A public report is currently being prepared.

A quiet sustainability revolution has occurred in Victorian Government owned buildings. Over the past 5 or 6 years there have been substantial levels of Green refurbishment and new construction. A number of major research institutions of the Department of Primary Industries (DPI) have all undergone a green "makeover". Buildings like the Marine and Freshwater Research Institute at Queenscliff is constructed with an earth roof and worlds' best practice in the areas of energy, water and materials. The location is a former land fill disposal site in close proximity to Swan Bay.⁶

55 St Andrews Place

The owned office portfolio is also undergoing a green makeover. 55 St Andrews Place in Melbourne is a project⁷ the author managed while employed as Manager Sustainability for the Department of Treasury and Finance. The scope was to take a standard 1960s building and upgrade this to a 5 GreenStar building. The team integrated the base building works with the tenancy works. The team or Architects, Engineers, Project Mangers and the other professionals shared responsibility and moved away from traditional confrontational roles. Issues such as poor indoor air quality, drafts, poor natural light, lack of comfort conditions and ongoing operational management were all addressed through this process. Attention was concentrated on achieving results. Interestingly instead of increasing the size of the airconditioning system the team opted to focus on the external fabric of the building by installing external venetian blinds. Improved water efficiency was achieved through installing flow restrictors to taps and showers, waterless urinals and a 48,000 litre rainwater tanks (providing water for toilet flushing), smart metering was installed to all electrical loads over about 20kW with a web based reporting system, improving the indoor environment quality by improved material selection, increasing access and facilities for bike riders, the reuse of existing furniture and the installation of indoor plants and external screening plants for top floor.

The building will deliver:

- > 48% reduction in annual energy consumption (6,700 GJ per annum)
- > A reduction of 2,760 tonnes of greenhouse gas emissions
- > Provide ongoing annual savings of over \$115,000.

Sustainability Victoria tenancy

Government tenancies are also an area that is delivering sustainability improvements. A case in point is the fitout of Sustainability Victoria's own tenancy at 50 Lonsdale Street Melbourne. This fitout is aiming for 6 GreenStar – Office As Built, which equals World Best Practice. This office is open plan, everyone from the chief executive sits in workstations. The design allows for quiet rooms, a recycled cardboard think-tank, and more formal meeting rooms adjacent a busy "social" hub. A number of case studies are developing including a MABEL (Mobile Architectural Built Environment Laboratory) study from Deakin University and a comprehensive productivity study.

5. CURRENT STANDARDS FOR GOVERNMENT'S PROCUREMENT

Government is a major purchaser of goods and services – from vehicles to computer software to buildings. Government at all levels have introduced standards for procuring their own buildings as well

⁶ Department of Primary Industries - Environmentally Sustainable Design Case Study 5 - Queenscliff Centre
⁷ Kluske R, Clarke D, 55 St Andrews Place – Turning a sparrow into a peacock, paper presented at the AIRAH pre-loved building conference 28 November 2006.

as leasing private sector buildings. From the SES headquarters in South Melbourne in 2001 to the latest development of the Royal Children's Hospital with many ESD features and new 6 GreenStar Convention Centre, the government has provided world class buildings and created a legacy for the future generations. All government procurement methods today focus on delivering long term "public good" that includes operation cost and minimising environmental damage.

50 Lonsdale Street (Urban Workshop) and 121 Exhibition Street (Southern Cross)

The Government, for example, leases around 400,000 square metres of office space in the Melbourne CBD and in regional Victoria. Through the requirement to lease 100,000 square metres of office space in 2001 the Government made possible the construction of 121 Exhibition Street and 50 Lonsdale Street. Both buildings were built to ESD requirements and feature many environmentally friendly systems. It also should be noted that this design occurred before the introduction of the GreenStar rating tool in 2003.

121 Exhibition Street - Southern Cross ESD features.

- > Fully integrated design (office fitout and base building)
- > Dual skin façade – with provides energy efficiency and thermal comfort.
- > Waste Management Plan on construction materials
- > Water efficient fittings
- > Black Water Treatment System in the design will recover all of the sewerage water for reuse on site.
- > Multiplex has confirmed that occupant controlled internal blinds are included in the base building package to exterior windows to reduce glare associated with natural lighting
- > Daylight to workstations.
- > Attention to noise levels within the building
- > All refrigerants used for the Southern Cross Offices HVAC are R134A. This is an HFC with an Ozone Depleting Potential of zero
- > Dedicated waste recycling areas
- > Good Public transport access and cyclists facilities

50 Lonsdale Street- The Urban Workshop ESD features

- > Low energy lighting systems
- > Natural daylight to workstations
- > Window Shading
- > Solar hot water
- > Water efficient fittings
- > Black Water Treatment System
- > Waste Management Plan on construction materials including reuse
- > Healthy materials (low off gassing low VOC (volatile organic compounds))
- > Natural - renewable materials
- > Reduced levels of PVC & chrome
- > Best Practice ESD workstations
- > Good Public transport access and cyclists facilities
- > Seeking a 5 Green Stars rating (as built).

Current Government office accommodation standards

The Department of Treasury and Finance releases the Victorian Government Office Accommodation Guidelines. These guidelines specify the performance of office accommodation. This document provides a flow-on effect to other types of buildings for example public buildings, hospitals and schools. The guideline calls:

for the following Green Star rating to apply to new office accommodation:

- > Green Star - Office Design 5 stars (Australian Excellence)
- > Green Star - Office Interiors 5 stars (Australian Excellence)

for the following ABGR to apply to office accommodation:

- > Base Building - existing offices 4 stars
- > Base Building - new offices 4.5 stars
- > Tenancies - (new or existing offices) 5 stars

6. CONCLUSIONS

The Victorian Government is committed to making Victoria more sustainable. The built environment generates a vast quantity of greenhouse gas emissions, uses water like its' an unlimited supply and

generates up to 40% of landfill. Government Policy is aimed at reversing this trend, but we will develop this policy with reference to all sectors of society and with consultation of the industry groups. However the Government would rather not be forced to act. The Governments' own house must be in order as well – however through programs like the EMS and the 15% energy reduction initiative we believe we have commenced the long process.

Private sector are taking up the challenge but like all market transformation there are innovators, early adopters, early majority, late majority and laggards (in that order).

However we know that 98% of the built environment is already built and the take-up of sustainability has been slow in this sector. Sustainability in existing building stock is generally not sexy, and the innovation is a lot less about design than about better building operation and using good technology. It is not highly visible. There is a general perception in the marketplace therefore that sustainability is 'all about new buildings', which takes focus of existing buildings. The challenge for Government is to convince this market about the benefits of going green.

ABOUT THE AUTHOR

Roger Kluske was appointed as Manager, Built Environment in Sustainability Victoria in February 2007. He leads a team of people dedicated to improving the environmental performance of all buildings across Victoria. His previous position was Manager, Sustainability for the Victorian Government Property Group, Department of Treasury & Finance, a position he held since January 2003. Roger has worked in the field of engineering and building project management for most of his career, always striving for good energy and environmental outcomes.

He holds a Master of Business Administration (MBA) from the Victoria University of Technology and a Graduate Diploma in Building Services Engineering also from Victoria University of Technology. His base degree is in Mechanical Engineering from RMIT.