

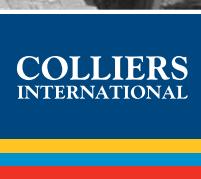
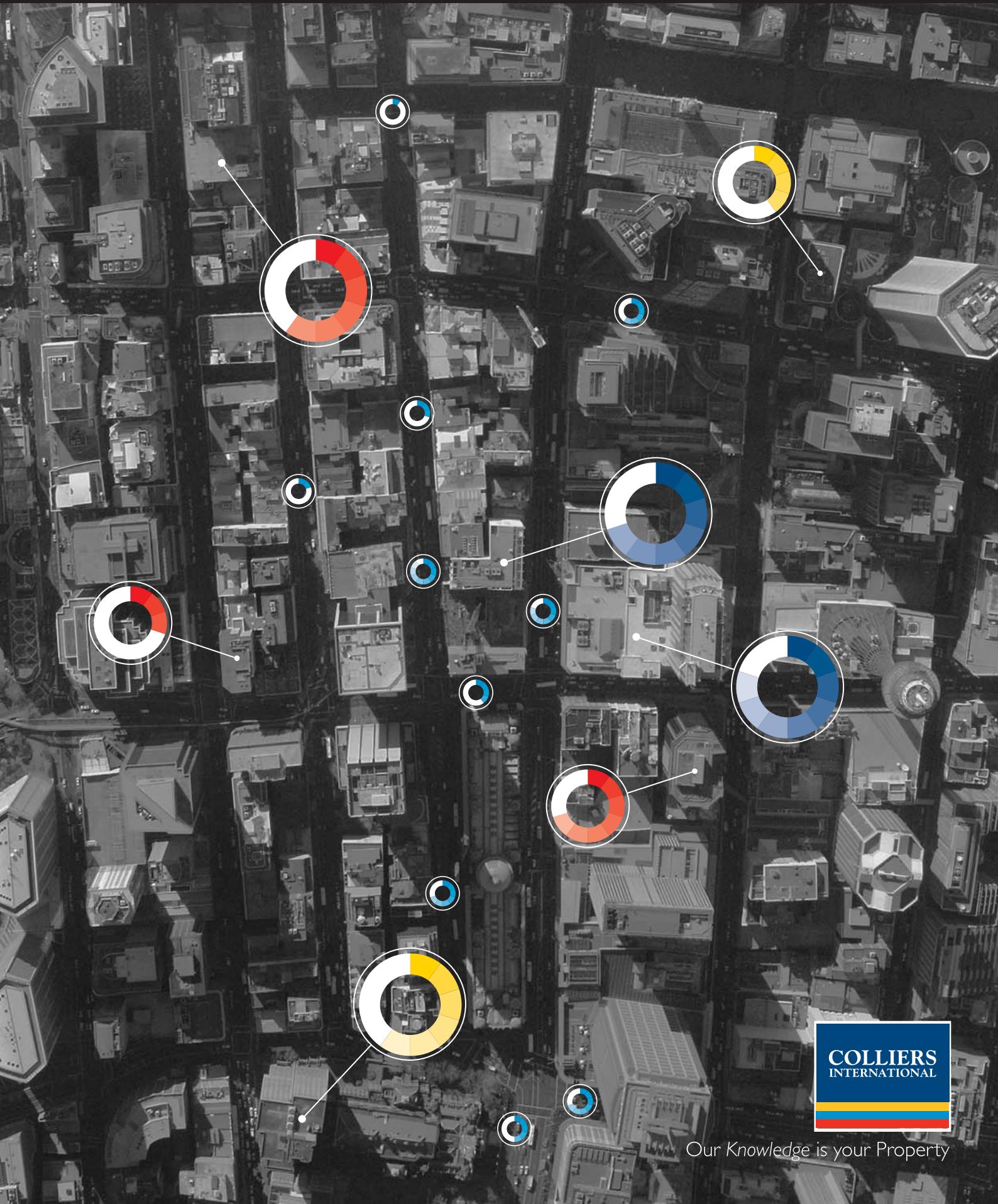
Managing Green
Improving existing
building performance
through management

Developing Green
Creating new green buildings
and refurbishing existing

Occupying Green
Leasing a green building,
producing a green fit-out
and operating a green office

Living Green
Improving your own
individual footprint

r.e. Design
the green
real estate guide
Australia



Our Knowledge is your Property

Foreword



Australia now has a green real estate market. In the office sector, developers and investors are supplying increasingly more advanced green stock, tenants are demanding it and this dynamic will soon start to show real variances in value between green and non-green assets. Other building sectors are also now beginning their own transformations. This market change is a world leading achievement by the Australian real estate industry, but is only the beginning of a much deeper transformation as we move to cut the environmental footprint of Australia's built environment.

Colliers International is committed to supporting the acceleration of green real estate practices in Australia and doing so in a way that generates and sustains social and economic prosperity for all stakeholders involved. We trust that you will find this Guide helpful in developing strategies that leverage the greatest long term real estate value for you.

We look forward to sharing further knowledge and success stories with you as we all play our roles in responding to the great and exciting challenges of climate change and sustainability.

A handwritten signature in black ink, appearing to read "John Kenny".

John Kenny
Chief Executive – Australia
Colliers International

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These ‘gauges’ symbolise measurement of the environmental footprints of buildings, occupancies and people.



We need to re.Design our buildings, and also re.Design the way in which we transact, develop, value and manage real estate.

Introduction – A Design Challenge

We have now reached an exciting and critical phase in real estate development. We are beginning to redesign our built environment to be environmentally sustainable and, in order to achieve that, we are redesigning how we conduct our real estate practices.

'Green Real Estate' is real estate that embodies the value proposition that green buildings and development brings to its various stakeholders, including around both the risks and the opportunities associated with the global movement towards environmental sustainability.

Our global society has reached a juncture in its progress. We are looking for increasing economic growth and improvements in our lifestyles while the ecological systems of our planet have exceeded their capacity to support us. This is fundamentally a design challenge. How do we create expanded built environments and strong real estate value, and at the same time address an unfolding environmental crisis?



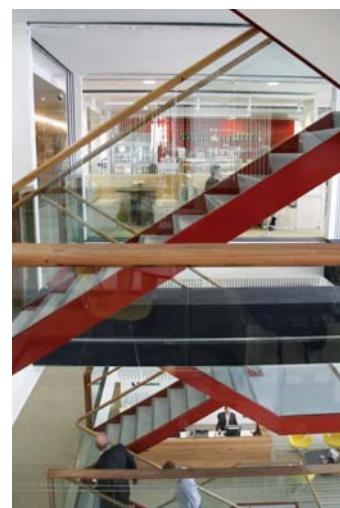
**30 The Bond
Sydney, 2004**

By demonstrating new standards in indoor environmental quality in office buildings, 'The Bond' was instrumental in making green buildings a commercial reality in Australia.



**City Central Tower I
Adelaide, 2007**

With an Australian leading 5 star Green Star – Office Design rating, City Central helped redefine the Adelaide market with a 'flight to quality' to green buildings.



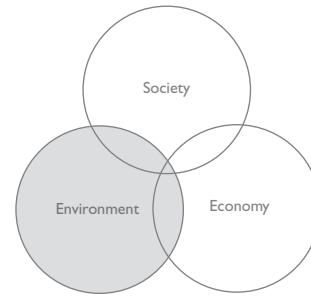
**Stockland
Sydney, 2007**

Stockland's new headquarters was pioneering in the adaptation of existing buildings into exceptional work environments with high levels of environmental performance.

Glossary

The topic of sustainability has many acronyms and other new terminology. Please see the Glossary at the back of this guide.

Sustainability



'Sustainability' in this document refers to environmental sustainability, including its associated social and economic implications such as the well-being benefits of good indoor environmental quality or cost savings with energy efficiency.

There is no standard solution to green buildings, as many of us would like. Every building is different in its ownership, occupancy, management, geometry, technology and in its cultural and climatic contexts. We have some excellent tools at our disposal to help us make a strong start. However, our ability to make deep cuts in a building's footprint and in a way that returns the greatest value to stakeholders, depends on our ability to uncover what is appropriate to each specific building and to think creatively. This challenge for real estate is indeed a design challenge.

r.e.Design is intended to assist you to design strategies that manage the risks and leverage the opportunities associated with this change in real estate. It is intended to help you understand why and how the change in buildings and real estate is occurring, where the value in green buildings lies, current best practice, mistakes that can be avoided, what the jargon means and, most importantly, what you can do.

Some sections of this guide focus primarily on office buildings and office premises. This is due to the inability to cover all building types in a document of this size. The office sector also has a strong value proposition for each of its stakeholders, making it a good case study of Green Real Estate principles. These principles can then be translated to other building types.

Much of the content of **r.e.Design** stems from over ten years experience working with green buildings by the Australian real estate industry, which is arguably one of the most advanced in the world in terms of making green the standard.

Colliers International wishes to share our knowledge and services to help accelerate your success during this most important phase of evolution in buildings, real estate and our global society.

The Sixth Technological Wave

It can be said that we are on the cusp of our sixth wave of technological revolution. The first five were:

1. Mechanisation
2. Steam
3. Electricity
4. Mass Production
5. Information and Communications

The sixth wave will be in our use of resources: shifting from harvesting resources that are plentiful and cheap to managing resources that are scarce and valuable. Given the large proportion of resources that our built environment consumes, the effects of the sixth wave in real estate will be considerable, with a rapid move to zero – or even positive – footprint buildings.

r.e.Design has four core practical guides that act as starting points for strategy design:

Guide 1. Managing Green

Improving existing building performance through management



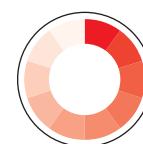
Guide 2. Developing Green

Creating new green buildings and refurbishing existing



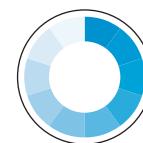
Guide 3. Occupying Green

Leasing a green building, creating a green fitout and operating a green office



Guide 4. Living Green

Improving your own individual footprint



The Impact of Buildings

- In the US, buildings account for:
- 65% of electricity consumption
 - 36% of energy use
 - 30% of greenhouse gas emissions
 - 30% of raw materials use
 - 30% of waste output
 - 12% of potable water consumption

Source: US Green Building Council

Green Buildings

Green buildings can be defined as those that, throughout their entire lifecycle (construction, operation and demolition), support the health and well-being of the local, regional and global environment, and of the people in and around them.

Green buildings embody technologies and design approaches to:

I. Minimise greenhouse gas emissions (GHGs), particularly through minimising energy use;

2. Minimise energy, water and other resource use;
3. Minimise waste production;
4. Provide excellent indoor environmental quality (IEQ) for the health and well-being of occupants;
5. Avoid pollution of air, land, water and sky;
6. Enhance biodiversity; and
7. Support the well-being of the communities in which they are located.

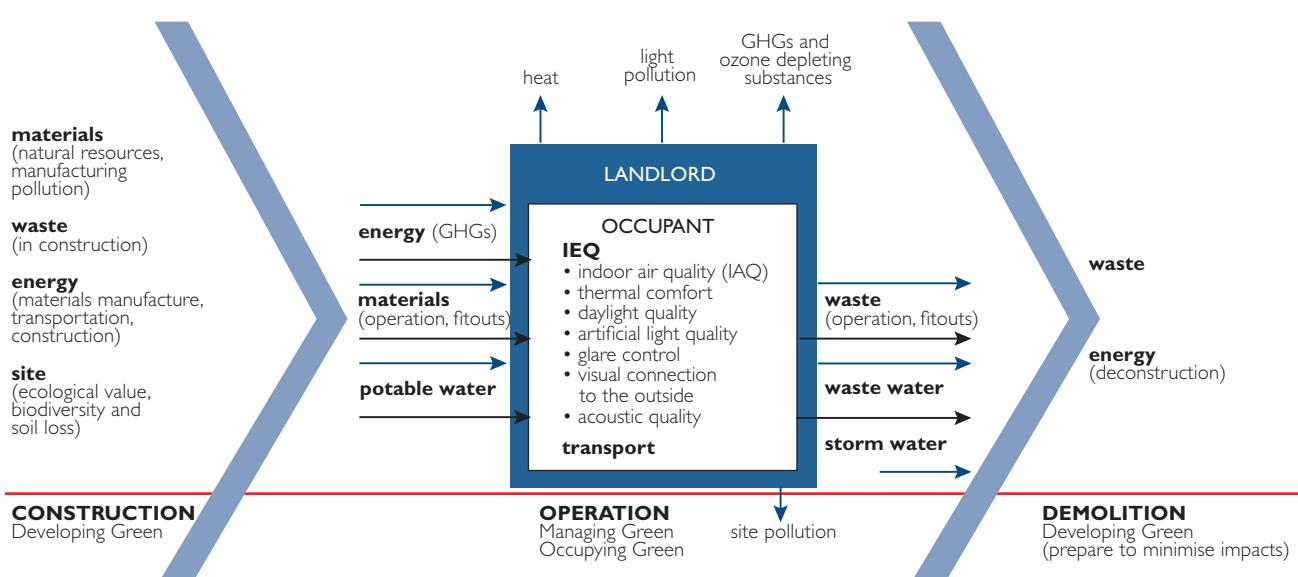
Green Buildings Take Many Forms

What is appropriate in terms of green building technologies and design approaches for one building might not be appropriate for another. Despite having green building rating tools (see page 15 – Measuring Green) that provide a good basic framework to compare the ‘greenness’ of different buildings, there is no standard prescription for what a green building is.

Each building will vary according to its specific climatic, geographical, market, social, economical, and usage contexts.

Asking for a ‘green’ building is similar to asking for a ‘modern’ building; that building can take on many different forms and attributes.

Diagram 1
The Lifecycle Impacts of Buildings

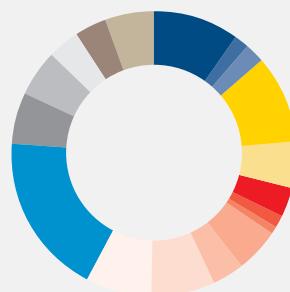


Indoor Environmental Quality (IEQ) Comprises:

- Indoor air quality (IAQ)
- Thermal comfort
- Daylight quality
- Artificial light quality
- Glare control
- Visual connection to the outside
- Acoustic quality

Diagram 2

World Greenhouse Gas (GHG) Emissions By End Use/Activity



Source: World Resources Institute, CAIT (2000 data)

The energy use by buildings plus the GHGs associated with their construction, operation and demolition makes up a large proportion of the world total.

Five Key Points About Green Real Estate

1. Be Prepared for Rapid Transformation

Markets can transform in a short amount of time, as shown by the office sector in mid 2007 when green tipped from being an optional extra in investment grade new developments to being a standard requirement.

In office we can now expect to see the minimum expectations of the market continue to rise, rating schemes such as Green Star recalibrated to reflect rising standards and secondary markets such as metropolitan and regional ones tip. Other building sectors will also be pushed with the emergence of rating systems, increased tenant demand and regulation.

This market dynamic means it is highly important that developers are careful in determining levels of green performance for developments and ensuring that performance is delivered. Under-specifying performance outcomes may result in diminished asset value, especially as tenants and investors are now becoming more experienced in their ability to distinguish the real green performers from the pretenders.

2. Green Performers to Retain Value

For years developers and investors have looked for the 'Green Premium' – 'How much extra rent will my green building get?' While there are certainly instances of this, along with quicker lease-up periods and green buildings being selected by tenants over otherwise comparable non-green ones, the primary valuation issue is the prospect of non-green buildings being devalued.

As markets transform and green becomes a standard requirement, to not deliver it is likely to damage a building's attractiveness in the market. An analogy can be drawn to air-conditioning in cars – at first a luxury extra and now you can't buy a new car without it. Leading investors in Australia are now purchasing high rating buildings for their portfolios to future proof against this.

3. Focus on Value, Not Just Cost

Over-focusing on the cost of green developments can be greatly misleading. When markets transform, it is the cost of not having a green building in terms of ability to lease

or sell that is of the greater importance.

Developers must manage development costs, but they should do so in balance with careful examination of their market to understand potential future increases or decreases in value due to changing market expectations.

4. Knowledge is Money

Organisations working with green buildings go through a learning process. Those that invest in learning quickly and comprehensively find that dealing with green buildings becomes easier and that they can drive down the costs of doing so and increase their returns. Those that delay going through the process often have greater inefficiencies and difficulties in achieving the desired green results.

As markets evolve with regard to Green Real Estate, information and tools become more readily available, but depth of knowledge and experience becomes scarce.

For developers, the expertise and depth of experience of their design and development team will be instrumental in managing costs.

5. Collaborate for Best Results

Because the behaviour of one party can affect the environmental performance of the other, the owners and occupiers of real estate need to collaborate in order to share both the risks and the opportunities associated with the move to Green Real Estate.

In the design and development phase, traditional linear project processes will be insufficient. Processes where all key stakeholders, including sustainability experts, collaborate at the inception of a project have proven around the world to be the most effective. Leveraging knowledge and skills in this way can greatly increase the chances of achieving the most cost-effective designs that add the most long-term value to an asset. It can also mitigate the serious risk of poorly integrated green technologies and approaches resulting in reduced overall building performance.

The Intergovernmental Panel on Climate Change (IPCC)

The IPCC is the global scientific authority on climate change. It is an intergovernmental body established by the United Nations Environment Programme (UNEP) and the World Meteorological Organisation (WMO). It has representatives from 130 nations and forms consensus views on the occurrence and effects of

climate change based on the input of 2,500 leading scientists from around the globe. The IPCC releases a major report every four or five years, with the last one, the Fourth Assessment Report, launched in 2007. It was the joint winner of the 2007 Nobel Peace Prize with Al Gore.

Our Great Global Challenge

The Urgency of Climate Change

At global, national and local levels, we are experiencing a range of significant environmental challenges. Most notably, the world has now moved to a crisis situation with regard to the issue of climate change.

The debate about whether climate change is occurring and whether it is caused by humans has been completed.

In 2007, the Fourth Assessment Report from the Intergovernmental Panel on Climate Change (IPCC) stated: “Warming of the climate system is unequivocal, as is now evident from observations of increases in global average air and ocean temperatures, widespread melting of snow and ice and rising global average sea level”, and “Global atmospheric concentrations of CO₂, CH₄ and N₂O have increased markedly as a result of human activities since 1750”, and “There is a very high confidence [>90%] that the global average net effect of human activities since 1750 has been one of warming”

In measurable history (the last 650,000 years as measured from ice core records) the carbon dioxide (CO₂) concentration in the atmosphere has not risen above 300 parts per million (ppm). It is now around 390ppm and rising at an accelerating rate.

The world is struggling to contain levels below 450ppm, the threshold scientists believe will keep the average temperature increase around the globe at just 2°C above pre-industrial levels. Even at 2°C, the effects on the climate, ecosystems, our lifestyles and, in many locations, the basic ability to live, will be considerable. (See Diagram 3.)

Australia stands to suffer more than other nations under climate change. Professor Ross Garnaut of the Garnaut Climate Change Review noted in the Review's 2008 Draft Report “Australia has a larger interest in a strong mitigation outcome than any other developed countries. Our location makes us already a hot and dry country; small variations in climate are more damaging to us than to other developed countries.”

He also notes: “While an effective response to the challenge would play out over many decades, it must take shape and be put in place over the next few years. Without such action, if the mainstream science is broadly right, the Review's assessment of likely growth in global greenhouse gas emissions in the absence of effective mitigation tells us that the risks of dangerous climate change, already significant, will soon have risen to dangerously high levels.”

Garnaut Climate Change Review

The Garnaut Climate Change review was commissioned by Australia's Commonwealth, state and territory governments to examine the impacts, challenges and opportunities of climate change for Australia. It is being lead by economist Professor Ross Garnaut.

www.garnautreview.org.au

Climate Change, Global Warming and the Greenhouse Effect

'Global warming' is a term given to the effect that occurs as certain gases (greenhouse gases) in our atmosphere trap more solar heat on the planet. Over the past 100 years, the average temperature of the planet has risen 0.74 degrees. (IPCC, 2007)

'Climate change' is an outcome of global warming. Its effects are not

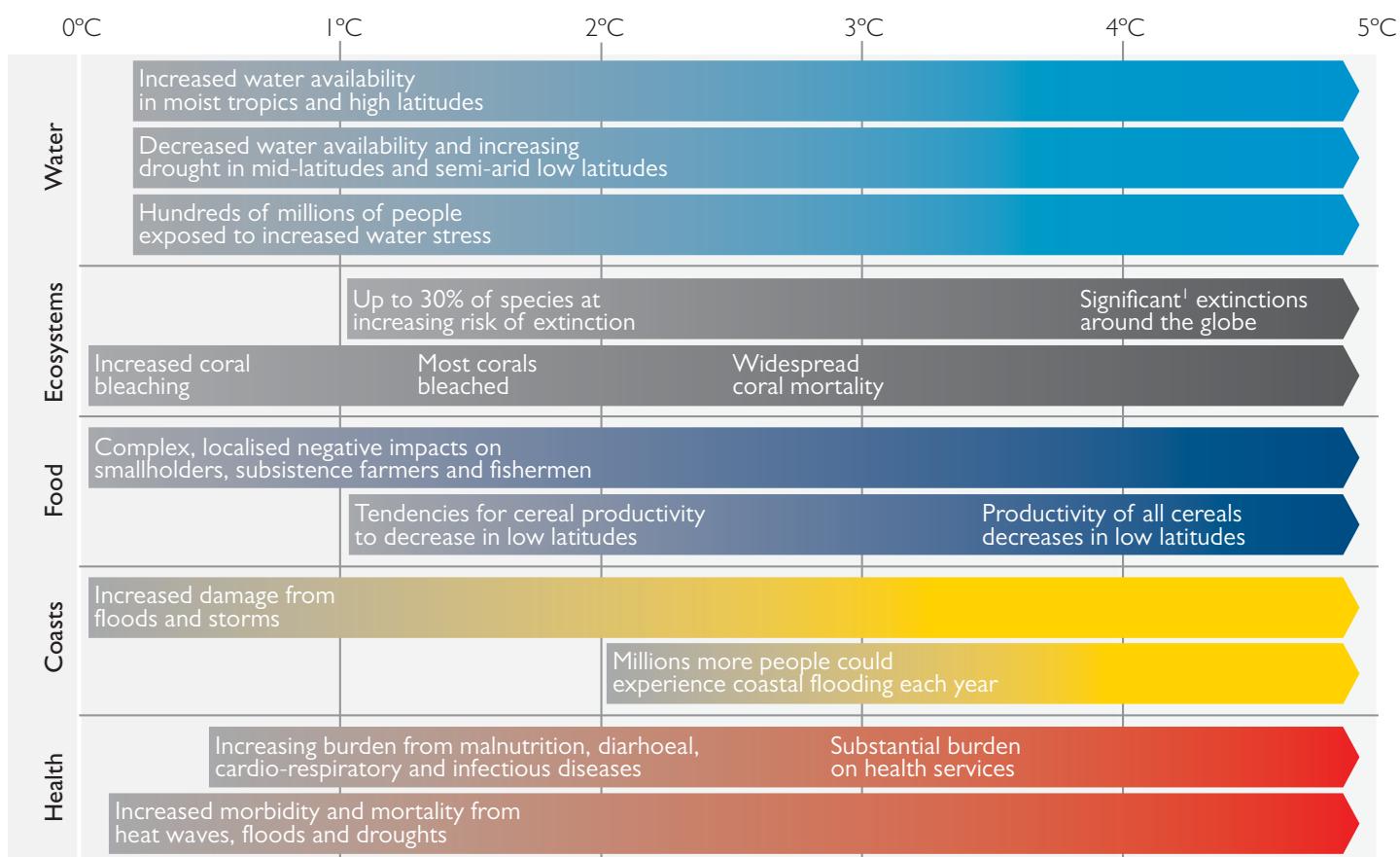
evenly distributed around the world; temperatures and the climate will change much more dramatically in some places than in others. For example, some may be hotter or have more cyclones, while others will be cooler or drier.

The term 'greenhouse effect' refers to the trapping of the extra heat on the planet.

Diagram 3

Examples of Predicted Impacts at Increasing Global Average Temperature Levels

(relative to average temperature 1980-1999)



¹Significant is defined here as more than 40%

Source: Adapted from Intergovernmental Panel of Climate Change, 2007

The winners in the emerging 'carbon economy' will typically be those who prepare early.

Governments and economies will turn to buildings to achieve deep emission cuts quickly.

Our Great Global Challenge cont.

Restructuring Our Economy – there will be winners and losers

In recent times, there has been an enormous shift in politics around the globe towards sustainability. A key policy mechanism being used to reduce carbon emissions are Emission Trading Schemes (ETSS), which places a financial value on carbon. In Australia, this is called the Carbon Pollution Reduction Scheme (CPRS) and is a cap and trade scheme, meaning an emissions limit will be put on emitters and they then purchase carbon credits to offset the amount they are above their cap. It is currently being developed for implementation in 2010 and

the primary effect in property will be an additional increase in energy prices.

Buildings offer very cost-effective emission cuts compared to other economic sectors and so will play a leading role. The Greenhouse Gas Abatement Cost Curve by McKinsey and Company (Diagram 4) shows the relative costs of different greenhouse gas abatement options and how those associated with buildings are among those with the highest negative cost (profit).

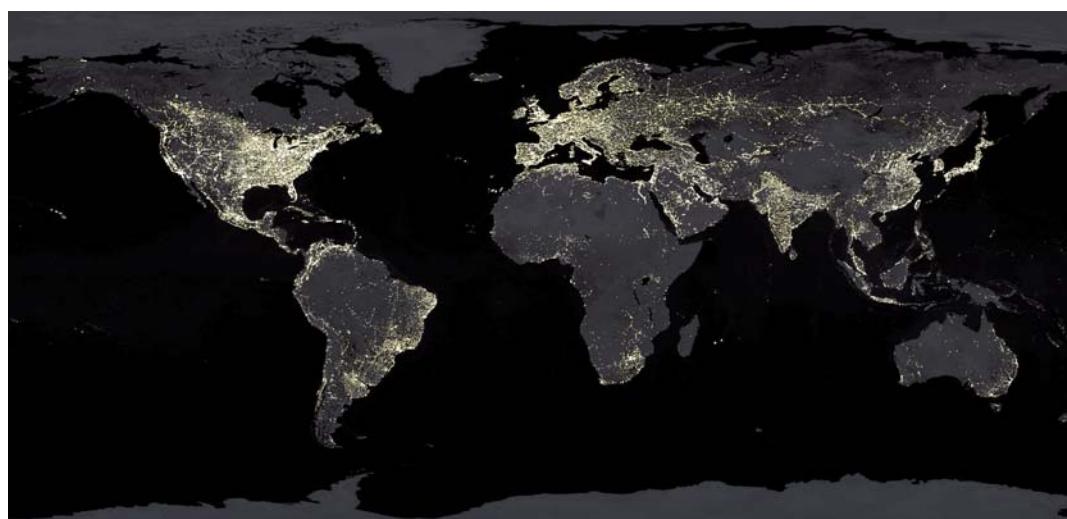
It should be noted that, while McKinsey's cost curve indicates possible reductions, it does not consider all the challenges involved in realising them.

'Be good, instead of less bad'

Michael Braungart, chemist

The move towards sustainability has only just begun. We have so far focused on improving our current processes. However, this approach is insufficient to overcome the challenge that we are facing. The focus will increasingly be on transforming whole systems, e.g. How can we 'close the loop' on the production of building materials so that the process requires no new resources, produces no waste and simply recycles or reuses existing materials? This is a 'cradle to cradle' versus the current 'cradle to grave' approach.

We are moving from an incremental approach to environmental sustainability to an absolute one. Science is setting targets for the improvements we collectively need to make in order to exist sustainably, and policy and economics are now allocating responsibility for achieving those targets to nations, industries, organisations and individuals.



The Earth at Night

If, when we started industrialisation, we said we would illuminate the globe, no one would have believed it possible. We have achieved it, but now have the new challenge of climate change and achieving sustainability.

Source: NASA Visible Earth

The Greenhouse Gases and CO₂ Equivalent (CO₂e)

There are several key greenhouse gases (GHGs) and each occurs in different amounts, has a different duration in the atmosphere and has different levels of impact. For example, methane (CH₄) is shorter lived in the atmosphere than CO₂ and is emitted in much smaller amounts, but is estimated to be 20-25 times more powerful in trapping heat than CO₂.

The GHGs typically included in reporting are:

- Carbon dioxide (CO₂)
- Methane (CH₄)
- Nitrous Oxide (N₂O)
- Sulfur Hexafluoride (SF₆)
- Hydrofluorocarbons (HFCs)
- Perfluorocarbons (PFCs)

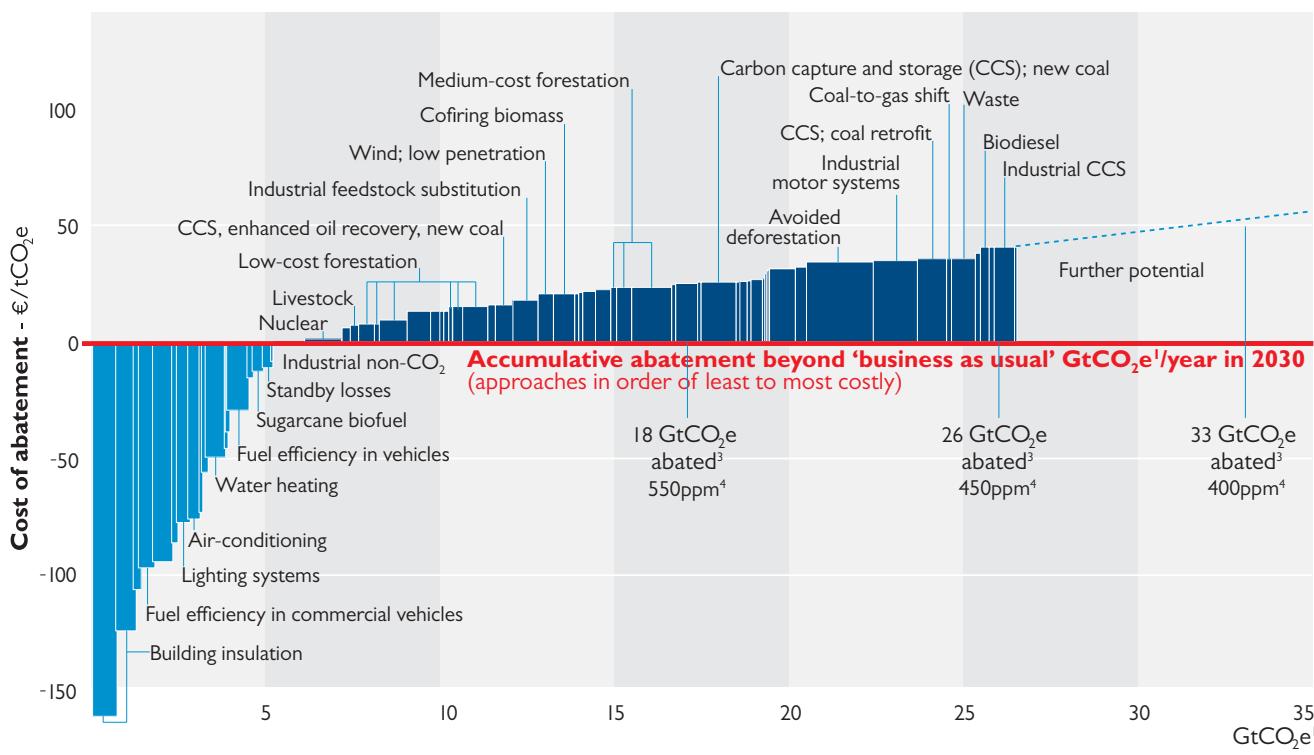
For simplicity in reporting, we convert the GHGs to equivalent amounts (for the same amount of impact) of CO₂ (CO₂e).

Positive Footprint Buildings

- Put energy into the grid.
- Expel cleaner water and air than went into the building.
- Recycle or reuse materials that would otherwise go to waste.

Diagram 4

McKinsey Greenhouse Gas Abatement Cost Curve



¹GtCO₂e = gigaton of carbon dioxide equivalent.

²tCO₂e = ton of carbon dioxide equivalent.

³Approximate abatement required beyond "business as usual", 2030.

⁴Atmospheric concentration of all greenhouse gases recalculated into CO₂ equivalent; ppm = parts per million.

Source: Enquist, Per-Andes et al, 2007

Leading examples of Australian property industry sustainability and corporate responsibility reporting can be found at:

Investa Property Group:
www.investa.com.au/sustainability/

Stockland:
www.stockland.com.au/about-responsibility

The Transformation of Markets

It is now clear that real estate markets can transform such that green goes from being an optional extra to being a minimum requirement to maintain value in the market.

In mid 2007 we saw the office sector tip such that all new investment grade developments were suddenly being Green Star rated. Developers also started pushing the boundaries to achieve higher rated developments and 6 star Green Star ratings became the common expectation for Premium Grade buildings.

Owners of existing assets subsequently began to consider how they could go beyond a 'tune-up' phase of improving performance through management practices and we saw Green Star-based refurbishments commencing in capital cities.

Factors for Market Transformation

In Australia, Green Real Estate slowly unfolded for most of a decade before adoption accelerated quickly in recent years to the point of having become the standard in some markets. The following key events contributed to transforming the office sector and progressing Green Real Estate generally.

1. Sydney 2000 Olympics

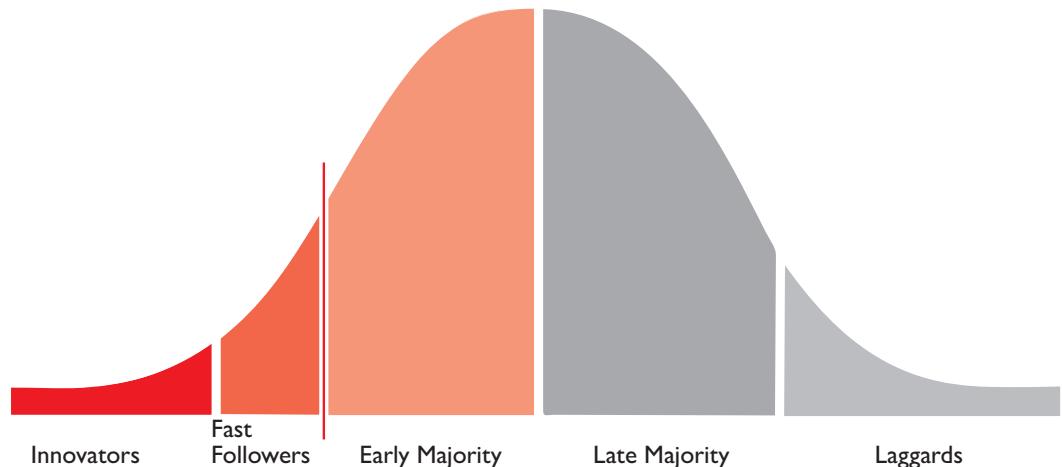
The 'Green' Olympics helped catalyse the green building movement in Australia by demonstrating new technologies, defining new standards and developing new capabilities in leading development, construction and design firms.

2. Organisations Support Market Transformation

Various organisations such as state government departments and agencies, the Green Building Council of Australia and the Property Council of Australia, started providing education, setting standards and developing new tools to help establish a green building movement.

Diagram 3
Adopters' Curve

Where do you sit on the curve in terms of your preparedness for Green Real Estate?
Where do your customers sit?
Where will your customers sit in one years time?



3. Green Building Rating Tools

Provision of rating tools, at first by government and then by the Green Building Council of Australia, provided a basis for buildings to compete on environmental merits in the market.

4. Competition for Brand Differentiation

Designers, builders, developers, landlords, professional service providers and other stakeholders recognised that being advanced in sustainability showed that their brand was a leader, innovative and quality-driven, and started to compete to leverage this opportunity.

5. Investor Reporting

Landlords committing to sustainability reporting practices, such as for the Dow Jones Sustainability Index or Carbon Disclosure Project, stepped into much more comprehensive performance measurement and reporting programmes for their portfolios.

6. Incorporation in Building Quality Grading

The Property Council of Australia (PCA) revised its Office Quality Grading Matrix (which determines if a building is Premium, A, B, C or D grade) to include minimum green building ratings. This meant that green was now implicit in tenant briefs to market.

7. Government Leadership With Its Own Accommodation

State and Commonwealth governments designated a set of minimum environmental performance requirements for buildings they sought to occupy. Given that they represent a large proportion of most capital city markets, this provided a strong mandate for landlords and developers to invest in green buildings.

8. Non-Government Tenant Demand Growth

Green buildings and tenancies became recognised by tenants as a highly valuable tool to attract and retain talented employees in a tight employment market.

9. Knowledge and Built Examples

Stakeholders increasingly learned about the benefits of green buildings and how to create them. The achievement of well-performing and high-profile green buildings in most capital cities demonstrated that they worked, were attractive to employees and were good for corporate reputations. This enabled the movement to progress beyond theory to enable people to physically experience green buildings for themselves and for the media to actively promote their benefits.

10. Regulation

In the residential sector, regulation, such as BASIX in NSW, caused rapid progress. In other sectors, it became clear that some form of regulation would come in time, resulting in industry stakeholders wanting to be prepared.

As markets become more knowledgeable on Green Real Estate, assets that are not capable of being future-proofed against the market requirements of tomorrow, are likely to be devalued today.

Green Real Estate Value

The Benefits

Green buildings offer a range of benefits to their stakeholders. The value of each may differ by building type and by market and may also change over time as Green Real Estate markets evolve.

Key Benefits for Landlords

1. Future-proofed Assets

Green buildings can be 'future-proofed' against changing government regulations and transforming tenant demands as tenants increasingly understand the benefits of green buildings to them. Given that it can be difficult to change the design of a new building once development is advanced, or that the improvement of an existing building can take time, it is important to be prepared for a rapidly changing market.

2. Differentiated Product for Tenants

In markets that have not yet transformed, tenants who understand the benefits of green buildings may prefer them over competing conventional stock. Good green building performance can also be seen as an indicator of building quality and a commitment to good management practices and performance improvement. Buildings that are more attractive to tenants can enjoy stronger tenant retention and shorter lease-up and vacancy periods.

3. Differentiated Landlord's Brand

Landlords can use their credentials with green buildings to differentiate themselves as a market leader and enjoy associated public and industry recognition.

4. Eligibility for Investment

Some investors with strong Corporate Social Responsibility (CSR) agendas or long investment horizons, such as super funds, will invest in green buildings to help ensure the sustainability of their investment.

5. Reduced Costs

Efficiency in energy and water consumption can reduce outgoings, which can either be retained or used to incentivise tenants. Improving these attributes in an existing building can be a catalyst for improving performance in other aspects of the building and growing a culture of continuous improvement among management staff.

6. Simplified Reporting

Green buildings can provide the data required for voluntary or mandatory environmental reporting.

Tenant Demands – The Importance of Building Attributes in Attracting and Retaining Staff

	Mean*
Location close to public transport	8.4
Excellent indoor air quality and thermal comfort	8.3
A high level of natural light	7.9
High level of security	7.8
Cutting edge ICT	7.8
Location near service-related amenities	7.5
Quick and efficient lifts	7.5
Building's environmental performance	7.3
On-site secure car parking	7.1
CBD location	6.9
Open work environment	6.9
On-site changing rooms/shower	6.9
On-site informal common spaces	6.8
Access to outdoors or green space	6.2
On-site gym	5.0
On-site childcare facilities	5.0

* 8-10 is important, 1-4 is average, I-4 is not important

Source: Colliers International Office Tenant Survey 2008
(independently administered survey of 270 tenants in Adelaide, Brisbane, Canberra, Melbourne, Perth and Sydney).

Key Benefits for Occupiers

1. Attraction and Retention of Talent

Where there is a shortage of talented staff in an employment market, employers often find it increasingly important to be able to offer a high-quality work environment in order to compete for available talent. In particular, younger employees are exhibiting an aspiration to work for companies known to be socially and environmentally responsible, and that will look after their well-being. As tenant markets learn more about green buildings, especially as more examples are completed, excellent levels of indoor environmental quality (IEQ) become an expectation.

While many green building attributes may continue to be on a tenant's 'Wants' list, good IEQ is one that appears to be making it into their 'Needs' list, making it a minimum requirement. See Tenant Demands above.

2. Enhanced/Protected Reputation

With the rapid growth of CSR, green buildings are recognised as excellent tangible signifiers of a corporation's commitment to the well-being of its people, the environment and their surrounding communities. In markets new to CSR, this can be a point of difference and enhance reputation. In markets that are advanced in CSR, this becomes an expected requirement and the intention is then to try to protect reputation by avoiding the perception of being a laggard.

3. Enhanced Productivity

Building user response survey research has shown a clear lineal relationship between occupants perceiving that they have high levels of comfort in a building and perceiving that they are more productive. Good IEQ in green buildings assists in increasing comfort and also, by providing a healthier environment, can reduce sick leave (see page 14).

4. Assisted Learning

For organisations looking to develop strong levels of knowledge about sustainability within their organisation, including generating new commercial opportunities, occupying a green building or tenancy can provide a powerful learning environment.

5. Reduced Liability

Where directors and managers of companies have a personal liability associated with the well-being of their employees, excellent IEQ and, especially indoor air quality (IAQ) can help reduce that risk.

6. Reduced Costs

Green buildings and tenancies typically consume much less energy than conventional options and this benefit increases in value as energy prices rise.

7. Better Management

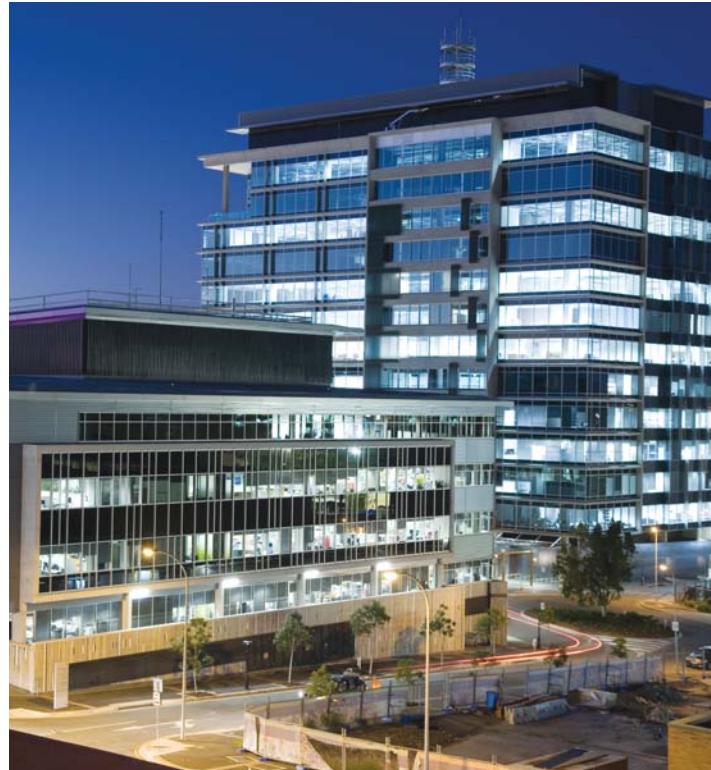
In order to maintain good levels of environmental performance, green buildings are often better managed than conventional buildings and this flows on to other areas of building amenity.

8. Simplified Reporting

Green building can provide the property related data required for voluntary or mandatory environmental reporting.

Green Square North Tower Brisbane, 2008

Green Square North Tower was developed by Leighton Properties, is owned by ISPT and is managed by Colliers International. It was the first building in Queensland to achieve a 6 star Green Star - Office Design rating, representing 'World Leadership in Environmental Sustainability'. Amongst its green attributes, a co-generation system is designed to reduce the building's greenhouse gas emissions by 43% in addition to other reduction measures and the building is targeting annual water savings of 1.7million litres.



Green Real Estate Value cont.

What Does it Cost?

The potential cost premium of producing a green building compared to a conventional one is naturally an important issue. However, an over-focus on cost and lack of comprehensive examination of the benefits, particularly future-proofing against changing tenant demands, can result in a loss of value.

Even though green buildings can have the same green building rating, they are still most likely distinctly different and thus their cost will vary. Studies by Green Building Councils and leading quantity surveying companies such as Davis Langdon, have calculated average costs for buildings of different green building rating levels, but have also shown that the variation within those averages is great. A typical example of one of these studies by Davis Langdon shows some of the most expensive buildings to be LEED Certified rated (the lowest level of rating on the US rating system), the most expensive to be a conventional building and some of the very cheapest to be LEED Silver rated.

Rather than looking at average costs for green buildings, developers should have each development or refurbishment assessed on its own merits.

That said, it is now generally accepted that a 4 star Green Star - Office Design rating on a new development can be achieved with zero net additional construction cost.

The Great Productivity Promise

Over the years, one of the key benefits used to promote green office buildings has been that they are more productive for their occupants. Figures of up to a 15 or 20% increase in productivity have been promoted, including in the marketing of buildings. While qualitatively there is wide acceptance that they are typically more productive, the means to quantify the potential productivity gain for a specific building does not yet exist. This is due to:

1. The gain that an occupant might experience being relative to the accommodation they came from and so likely to vary substantially tenant by tenant.
2. Because humans are impacted by the built environment as much psychologically as physiologically, perception is a critical factor in determining how people will respond. For example, while they may physiologically actually be more comfortable and healthy, psychologically they may dislike their new storage arrangements or the quality of the view and, overall, might rate the accommodation down.

3. While laboratory studies have shown that people respond well to specific components of IEQ (e.g. better daylight, IAQ or thermal comfort), once in the real world of an office, it is difficult to predict which of the many factors that make up IEQ will cause the desired improvement.

While we are waiting for the science to develop and provide better quantitative data and in order to avoid charges of misrepresentation in the market, we should be highly cautious of promoting a promise of increased productivity.

Leading developers and their leasing agents will often promote the benefits qualitatively and, in order to provide an example of the potential value of a productivity gain, will use a conservative figure of a 1% increase in productivity over the cost of salaries to a business. For example, if a business pays \$20 million per annum in salaries, a 1% increase in productivity due to better IEQ in a green building is worth \$200,000 per annum.



WORLD GREEN BUILDING COUNCIL

Colliers International is a
Global Partner of the WorldGBC.

Measuring Green

Commentary on Current Practices

Green Building Ratings

Green building ratings are tools used to benchmark the environmental capability or performance of different buildings. They typically use a credit system to rate a wide range of green attributes a building might have, but will only assess attributes where the science behind the assessment is robust enough and the assessment is achievable at a realistic cost. They balance usability and accuracy, providing an extensive, but not comprehensive, assessment of a building.

The assessment of building materials is a good example of where rating tools do not yet have the capacity to make a full impact assessment and address only a selection of achievable impact areas. In time, the science and standards for Life Cycle Assessment (LCA) will be advanced enough so that databases will provide robust data on the impacts of different materials over their full life cycle and designers will be able to model the total impact of a building's materials.

Green Building Councils

Green Building Councils (GBCs) are not-for-profit bodies charged with driving the transformation of markets with regard to green buildings. They are set up under the auspices of the World Green Building Council (WorldGBC), which works to set quality standards and to share knowledge around the globe.

Green Building Councils around the World

Members of the World GBC (September 08)

Argentina
Australia
Brazil
Canada
Germany
India
Japan
Mexico
New Zealand
South Africa
Taiwan
United Arab Emirates
United Kingdom
United States

Performance – Eyes on the Prize!

The darlings of the Australian green building movement have historically been the new buildings. However, the vast majority of buildings are, and always will be, existing ones. We are now faced with two exciting challenges:

1. How do we make big improvements in the performance of our existing stock, including to ensure their ongoing place in the evolving Green Real Estate market against new buildings?
2. How do we ensure the new generations of Green Star rated developments do actually deliver the performance in areas such as energy, water, waste and indoor environmental quality that they promised to the market?

There already exist a number of new buildings that promoted high NABERS Energy (formerly ABGR) ratings while under development and then were unable to achieve those ratings after a year of operation.

There are many factors that can cause this to happen such as ineffective modelling in the design phase, poor construction, insufficient commissioning, lack of ongoing tune up, poor building management and changes in occupant activities and behaviours.

Developers and investors when targeting specific ratings need to think beyond just the Green Star design or as-built ratings to the NABERS ratings that will ultimately confirm performance. They need to ensure that there is an adequate plan in place to effectively manage the factors above. In such a rapidly moving Green Real Estate market, failure to do so can mean an asset will fall short of market expectations and require time and financial expense to correct.

Occupiers should likewise be careful when procuring green accommodation. They should specify Green Star as built ratings, rather than just design, and also define a mechanism to assure performance such as a NABERS Commitment Agreement.

Workplace 6 Pyrmont, Sydney, 2008

Developed by The GPT Group and Citta Property Group, Workplace 6 was the first building in Sydney to achieve a 6 star Green Star - Office Design rating.

The building was leased in short time to Accenture and Google by Colliers International and DTZ.

Its green attributes include co-generation, rainwater collection, blackwater treatment, sewer mining, harbour water heat rejection, chilled beams and atria.



Measuring Green cont.

Ecological Footprinting

Ecological footprinting is the calculation of the total amount of land an entity, such as a person, an organisation or a building, requires to sustain it through the provision of resources and the disposal of waste. It provides a fairly comprehensive assessment of the impact of that entity. It is, however, complex to calculate, requiring much more data than green building ratings. It will be used increasingly as technology improves and humankind looks to share scarce resources more equitably.

Carbon Footprinting

Carbon, or greenhouse gas emission, footprinting is the calculation of the total amount of CO₂ emissions caused by the activities of an entity and involves a boundary of inclusion. For example, you might include just the direct emissions that occur where you are (known as Scope 1 in carbon reporting), or also include those that occur as a direct result of your activities but at another location, such as when using electricity (Scope 2), or also include those that occur indirectly as a result of your activities, such as from producing a product you purchased (Scope 3).

Carbon Neutrality and Offsets

There is currently a lot of discussion about 'carbon neutrality' where people and organisations claim they are carbon neutral because they produce no net emissions. This is achieved through the use of 'offsets'; units of greenhouse gas abatement projects such as planting trees, creating renewable energy systems or creating energy-efficiency projects.

Controversy with offsets arises from three key issues:

1. The quality of some offset products has proven to be questionable or misrepresented, with some not actually producing the carbon reduction promised. e.g. trees are not planted.
2. Some organisations or individuals are using offsetting and claims of 'neutrality' for green marketing when they are doing little else to improve their footprint.

3. Accounting of carbon footprints can vary between companies. One may be including less of its downstream or upstream footprint than another, making comparisons unclear.

In time, regulation will control the quality of the offset market and how companies market 'neutrality'. Consumers will also have greater knowledge to differentiate the 'greenwashers' from the serious performers.

In the meantime, the purchase of good-quality offsets can be a good carbon footprint reduction strategy as long as efficiency has been, or is being, achieved across the footprint and carbon accounting is transparent.

City Switch Green Office is a national programme to support the adoption of energy efficiency in office tenancies. It was formerly known as the 3CBD Greenhouse Initiative in Sydney and its signatories include many of Australia's leading corporate brands. Colliers International was an inaugural signatory in Sydney, committing to achieve 5 star NABERS Energy ratings in its participating offices.

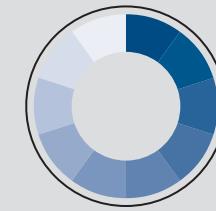
www.cityswitch.net.au

Rating Tools for Office Buildings

Type	Predictive (building capability)	Performance (building in operation)
Suite	 Green Star	 NABERS National Australian Built Environment Rating Scheme
National Administrator	Green Building Council of Australia	NSW Department of Environment and Climate Change (DECC)
Rating Scale	6 stars with no half stars	5 stars with half stars
Tools in Office Suite	1. Green Star - Office Design 2. Green Star - Office As Built 3. Green Star - Office Interiors	1. NABERS Energy (Formerly ABGR) 2. NABERS Water 3. NABERS Waste 4. NABERS Indoor Environment (IE)
Other Information	Assessment categories: 1. Energy * 2. Water 3 Management 4. Indoor environmental quality 5. Transport 6. Materials 7. Land use and ecology 8. Emissions 9. Innovation <small>* Green Star energy can utilise a predictive NABERS Energy rating. This is not an official NABERS Energy rating but developers can sign and work to a NABERS Energy Commitment Agreement to permit marketing prior to achieving an accredited rating.</small>	What can be rated: 1. Base Buildings (Energy, IE, Waste) 2. Tenancy (Energy, IE, Waste) 3. Whole Buildings (Energy, Water, IE, Waste)
Marketing Requirements	Certified Rating: Full referral to rating and use of logo. Registered for certification process: Can refer to 'Registered for a Green Star – [Office Design, Office As Built etc] rating. Cannot state rating level (eg. 4, 5, 6 stars) or use logo. Self Assessment: No referral to a rating or use of logo.	Accredited Rating: Full referral to rating and use of logo. Commitment Agreement: Can use language such as 'designed for' or 'targeted', but cannot state or suggest that it has a rating. Self Assessment: No referral to a rating or use of logo.
Website	www.gbca.org.au	www.nabers.com.au

r.e.Design Guide I

Managing Green



Improving existing building performance through management

This guide focuses on achieving improved performance through management practices and limited new capital expenditure or interruption to occupants.

Using This Guide

Following is a checklist of technologies and approaches that can be employed in a building to improve environmental performance. The list is not exhaustive and many of the items will not be appropriate in all circumstances.

This guide should be used in conjunction with Guide 2 – Developing Green, which provides additional technologies and approaches suited to the refurbishment of buildings. It will also be worth reviewing Guide 3 – Occupying Green, to consider potential tenant activities.

Use the checklist to identify opportunities and create a building improvement plan for your building.

Checklist – Opportunities for Building Management

	Status
I. Management	(done, to do, not applicable)
a. Benchmark – Conduct NABERS ratings to benchmark overall energy, water, waste and indoor environmental performance against the broader market.	
b. Audits – Audit energy, water, waste and indoor environmental quality systems to understand the current performance levels of each system and identify feasible improvement projects.	
g. Heat Loss/Gain – Insulate and use high-performance glazing and shading to avoid loss or gain during heating or cooling phases, respectively.	(done, to do, not applicable)
h. Infiltration – Draught-proof to stop cool or warm air entering during heating or cooling phases, respectively.	
i. Duct Insulation – Ensure sufficient insulation.	
j. Smart Elevator Controls – To optimise efficiency e.g. destination controls.	
3. Energy – Lighting	
a. Lighting Refurbishment – See Energy – Lighting section in Guide 2 – Developing Green.	
b. ‘De-lamp’ – Where light levels are high, remove a proportion of fluorescent tubes. The author of r.e.Design removed every second tube in an architectural studio. This halved lighting energy use and the studio occupants said that light levels were better.	
c. Lighting Levels – Reduce to minimum safety levels in places such as fire stairs and car parks.	
4. Energy – Other	
a. Tenancy Meters – Install for separate tenancies to help tenants manage consumption.	
b. Power Factor Correction – Install to improve efficiency of electrical devices.	
c. ‘Green Power’ – Purchase government accredited Green Power produced by renewable means (e.g. wind or solar). Green Power should complement, not be a substitute for, good energy efficiency.	
5. Water	
a. Leak Reporting Procedure – Establish for building occupiers, cleaners and security.	
b. High Efficiency Fittings and Fixtures – Replace taps and shower heads or install flow restrictors.	
c. Toilets – Upgrade to efficient dual flush models, e.g. 4.5/3L flushes.	
d. Waterless Urinals – Install those that use a chemical or oil trap and do not have a water supply pipe. Otherwise, convert existing units by using ‘waterless urinal’ microbial tablets, preparing waste pipes accordingly and disconnecting the water supply.	

- c. **Targets** – Set targets for performance improvement based on forecast tenant expectations, current and future regulation and portfolio environmental strategies.
- d. **Management Guidelines** – Develop to support efficient management of sustainability practices in the building.
- e. **Building Users' Guide** – Produce to enable occupants to understand how to best operate the building from their perspective.
- f. **Building Management Control System** – Upgrade the computer BMCS to operate building systems more efficiently and provide performance data.
- g. **'Smart Metering'** – Install energy and water meters to provide real-time data of the energy and water usage of specific systems, such as the lifts, air-conditioning, etc. This can be supplied live to the BMCS for monitoring. Water meters can enable leak detection.
- h. **Re-Commissioning** – Ensure building systems are currently working to the level of performance intended.
- i. **Building Users' Survey** – Survey occupants to understand how the building is performing for them, particularly with regard to indoor environmental quality (IEQ).

2. Energy – Heating, Ventilation and Air-Conditioning (HVAC)

- a. **HVAC Upgrades** – Identify high-performance options for installation at time of upgrade.
- b. **Variable Speed Drives** – Added to pumps and fans, these adjust speeds to accommodate required flow rather than continually operating at a high rate.
- c. **Economy Cycle** – When outside air is a suitable temperature and humidity, it can be circulated through the building without chilling or heating. This greater amount of fresh outdoor air has a well-being benefit for occupants.
- d. **Waste Air-Conditioning** – Avoid air-conditioning during unoccupied hours and in spaces that don't require it, such as ancillary spaces. Consider a slightly higher temperature set point.
- e. **Air-Conditioning Zones** – Reduce zone sizes so that less space is air-conditioned when occupancy is less than full.
- f. **Carbon Dioxide Sensors** – Install to detect current levels of air quality (CO_2 is a key indicator) and determine how much extra fresh air is required.

- e. **Fire Sprinklers** – Collect test water in holding tanks and reuse.
- f. **Rainwater, Grey Water, Stormwater and Landscaping** – See Water section in Guide 2 – Developing Green.

6. Waste

- a. **Operational Recycling** – Install facilities to collect and store recyclable materials, such as metal, glass, plastic, paper, cardboard and organic waste. These might be separated or the dry materials might be 'co-mingled' depending on the requirements of available removal services.
- b. **Fluorescent Tubes** – Recycle as they contain mercury, which is toxic to humans.
- c. **Fitout Waste Management Guide** – Provide to tenants when they are doing fitouts.

7. Transport

- a. **Bicycles** – Provide storage and changing facilities.

8. Materials

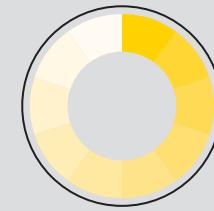
- a. See Materials section in Guide 2 – Green Development.
- b. **Cleaning Products** – Use biodegradable, non-toxic products with no phenolic compounds or petroleum solvents.

9. Pollution

- a. **Refrigerants** – Use non-ozone-depleting substances. Replace chillers that use substances such as chlorofluorocarbons (CFCs).
- b. **Smokers** – Provide places for people to smoke away from building air intakes, entrances and circulation areas.

r.e.esign Guide 2

Developing Green



Creating new green buildings and refurbishing existing

The design and development phase of a new building or a refurbishment is the optimum time to enable it to achieve good environmental performance and deliver the benefits of being a green building. It is also a time of high risk in terms of ensuring that the building does in fact perform as intended. Good green building design and delivery experience, and diligence in selecting technologies and approaches, will be critical.

Using This Guide

Following is a list of technologies and design approaches that can be employed in a building to assist good environmental performance. The list is not exhaustive and many of the items will not be appropriate in all circumstances. Good designers are required to determine what specifically should be employed in each development.

This guide should be used in conjunction with Guide 1 – Managing Green, which provides additional technologies and approaches suited to the operation of buildings. It will also be worth reviewing Guide 3 – Occupying Green to understand how to best work with the objectives of tenants.

Use the checklist to identify opportunities and begin to create a sustainability plan for your development or refurbishment. For a more detailed framework use the Green Star suite of tools for offices and put in place measures to ensure NABERS ratings are achieved in the future. See page 17.

Checklist – Opportunities for New Developments and Refurbishments

	Status	
I. Management	(done, to do, not applicable)	
a. Building Management – Ensure building managers understand how to manage and maintain all building systems, and have the capability and capacity to do so. Even green buildings, if managed poorly, can become terrible buildings to occupy.		d. Chilled Beams or Ceilings – Cool by pumping chilled water through small pipes in the ceiling, rather than blowing air through large ducts. These cool occupants more comfortably than conventional conditioned air systems, save energy, support high fresh outdoor air rates, are robust and reduce ceiling void heights. In Australia, they have been configured to cope with humidity.
		e. Individual Controls – Studies have proven that a sense of control over an indoor environment has a big effect on an occupant's satisfaction with it. Providing openable windows in breakout spaces can be effective in doing this.
		f. External Solar Shading – Control solar heat gains into the building and possibly assist with glare control. Needs to be carefully designed according to sun paths.
		g. Green Roofs – Soil and vegetation on the roof provides thermal insulation, absorbs water and supports biodiversity.
		h. Insulation – In hot or cold climates, ensure good building envelope insulation to keep heat out or in, depending on climatic requirements.
		i. Double or Triple Glazing – To optimise building envelope insulation in very cold or even hot climates.
4. Indoor Environmental Quality – Visual and Acoustic Quality		
NB: Many of the items in this section are also good for reducing energy.		
		a. Daylight – Optimise with careful design of window opening orientation, size, glazing type, and solar and glare control systems. NB: Lots of glazing (as is often advertised in real estate) does not necessarily mean good natural light in a building, e.g. lots of glazing facing west will often result in blinds being down and poor daylighting.
		b. Lightwells and Atria – To bring daylight into the building. Carefully manage sunlight intrusion, which can cause unwanted heat gain and glare.
		c. Light Shelves – Install on windows to reflect daylight deeper inside.
		d. Low-E (Emissivity) Glazing – Permits good daylight inside while omitting a proportion of solar heat.
		e. Reflective Surfaces – Paint in white or light colours to reflect daylight and reduce electrical lighting. Good for car parks.

Provide a Building Management Manual that covers all environmental initiatives and systems in the building.

- b. **Tenant Knowledge** – Ensure tenants understand any non-conventional systems in the building and have a means to ensure that all new occupants in the building receive that knowledge. Provide a Building Users Guide.
- c. **Pre and Post Occupancy Evaluation (POE)** – Survey occupants prior to them relocating to their new premises and after one year of occupation to establish how the building is performing for them in comparison.

2. Site

- a. **High Ecological Value Areas** – Avoid sites with high biodiversity or agricultural value. Preference reusing 'brownfield' (previously used) sites and urban infill.
- b. **Microclimate** – Select and design sites to provide good breezes, and suitable levels of thermal mass and shading for passive heating/cooling and ventilation strategies in the building.
- c. **Soil** – Minimise cut-and-fill and soil removal from site.
- d. **Orientation** – Orientate buildings and relevant spaces within buildings to the North. This can help with solar heat gain and avoidance in winter and summer respectively, and simplify the design of facades for solar control and glare reduction.
- e. **Shading** – Use adjacent buildings or trees for shading. Deciduous trees will provide shade in summer and shed their leaves in colder months to provide greater access to natural light and heat.

3. Indoor Environmental Quality – Air Quality and Thermal Comfort

NB: Many of the items in this section are also great for reducing energy.

- a. **Natural Ventilation** – Consider a ventilation system without air-conditioning, such as by using operable windows.
- b. **Mixed Mode Ventilation** – Natural (or passive) ventilation system with air-conditioning system as back-up for when external conditions are not suitable for comfort. Saves energy and gives occupants a sense of control over their environment, which is important to their sense of satisfaction.
- c. **Displacement Ventilation** – Involves the supply of air at low velocity and temperature at floor level, letting it warm, rise and transfer pollutants to a level above the occupants. Can provide better air quality, save energy and be coupled with raised data flooring.

f. **Glare** – Specify glazing, blinds or fixed glare screens to minimise glare from windows to occupants.

- g. **Connection to Outside** – Enable good views to outside or at least a daylight source, such as an atrium. Narrow floorplates are helpful with this and are legislated in parts of Europe. Aim for occupants to be within 8m of a glazing line.
- h. **Noise Levels** – Avoid both high background noises (from outside or inside) and high intermittent noises that stand out above background noise levels, e.g. in a quiet office, noises such as a mobile phone ring or footsteps seem much louder and some gentle background ('white noise') might be needed to mask them.

5. Energy – Lighting

- a. **Office Lighting** – Use T5 triphosphor fluorescent lamps with high-frequency ballasts (less flicker) in high-efficiency fittings. Avoid incandescent bulbs and low voltage downlights (unless new high-efficiency models) and explore LEDs as the costs of this new technology reduces.
- b. **Controls** – Install timers to turn lights off, occupancy sensors to turn lights on without the use of light switches and daylight sensors to enable dimming of perimeter lighting when natural light levels are good.
- c. **Zoning** – Use small zones (e.g. 100m²) to minimise the number of lights turned on when one person enters a dark office.
- d. **Task Lighting** – Use lower ambient light levels combined with task lighting at work stations.

6. Energy – Heating, Ventilation and Air-Conditioning (HVAC)

- a. **Air-Conditioning** – Avoid systems that heat and cool at the same time. Use smaller air-conditioning control zones.
- b. **Night Cooling** – Flush the building with cooler air during the night to reduce the amount of cooling the air-conditioning system needs to do the next morning.
- c. **Thermal Mass** – Use stone and concrete to naturally cool at night and then absorb heat during the day, or absorb heat during the day and reradiate it at night to warm the space.
- d. **Ground Source Heat Pumps (Geothermal)** – Pump water through a long loop of pipe buried in the ground to use the stable cool temperature below the ground to pre-cool water for an

Developing Green cont.

Checklist – Opportunities for New Developments and Refurbishments

Status	Status
air-conditioning system. A large body of water such as a harbour can also be used for this.	(done, to do, not applicable)
e. Absorption Chillers – Uses heat to drive a chilling system for air-conditioning. Can be fitted to co-generation systems to use the heat produced. This is called 'tri-generation'.	e. Recycled Content and Recyclability – Choose materials with a high recycled content and/or that can easily be recycled after use. This helps 'Close the Loop' on materials. Otherwise, choose those that are biodegradable and so return to the ecosystem. Design for disassembly; meaning that materials can easily be separated for reuse or recycling at the end of their current use. This often means using mechanical rather than chemical fixings. Reuse existing buildings.
7. Energy – Other	
a. Gas Cogeneration – Gas turbines produce electricity with low greenhouse gas emissions, and the heat from the turbine is collected and used, e.g. for building heating or heating a swimming pool.	f. Flexibility – Design for flexibility to enable the building to adapt to different uses over time with minimal refurbishment.
b. Solar Hot Water – Provides cost-effective hot water.	g. Maintenance – Use materials that require minimal maintenance over their life cycle.
c. Renewable Systems – Systems such as photovoltaic cells, solar thermals, micro-hydro and micro-wind turbines are increasingly becoming more cost-effective and may suit particular projects.	h. Construction waste – Design and document to minimise wastage in construction, e.g. use standard product sizes.
d. Internal Stairs – Provide for reduction of lift use and also social interaction value.	
8. Water	
a. Fittings, Fixtures and Appliances – Ensure efficiency; e.g. use tap flows of 2.5L/minute compared to conventional rates of 10-12L/min.	12. Pollution
b. Toilets – Upgrade to efficient dual flush models, e.g. 4.5/3L flushes.	a. Construction – Ensure appropriate construction practices to avoid any air, water, land and noise pollution.
c. Waterless Urinals – Install those that use a chemical or oil trap and do not have a water supply pipe.	b. Site Pollution – Remediate any existing pollution.
d. Rainwater – Collect on roofs for use in toilets and irrigation.	
e. Greywater (waste water without faeces) – Collect, process appropriately and re-use for toilet flushing or irrigation.	
f. Blackwater (waste water with faeces) – Collect, process appropriately and re-use for toilet flushing or irrigation.	
g. Stormwater – Minimise discharge from site by using retention tanks and maximising permeable landscaping surfaces and ability of the site to absorb.	
h. Plants – Use species that require little water, drip irrigate below the ground surface and use soil moisture sensors.	
Important Knowledge	
I. Experience	
Ensure that you employ design professionals with substantial experience in sustainable design. Using professionals with limited experience (even if they are keen to learn on the job) can lead to higher construction costs and sub-optimal building performance in operation.	
2. Integrated Team	
Ensure that your sustainable design experts are engaged in the design team at the beginning of the design process. Endeavouring to add sustainability concepts later in the design process usually results in increased costs. For example, ensure that passive building systems integrate with mechanical systems.	

9. Waste

- a. **Shell and Core** – Provide office space with no finishes that a tenant might have to replace on occupation.
- b. **Operational Recycling** – Provide central and floor-by-floor spaces for recyclables collection and storage.
- c. **Construction** – Minimise waste on site through recycling off-cuts and reusing as much material (such as demolition rubble) as possible.

10. Transport

- a. **Public Transport** – Locate close to hubs that provide frequent services to a wide range of locations.
- b. **Bicycles** – Provide storage and changing facilities.
- c. **Small Car Parking Spaces** – Provide to encourage small car use.

II. Materials

- a. **Fitouts** – see Fitouts checklist in Guide 3 – Occupying Green. This includes finishes.
- b. **Volatile Organic Compounds (VOC)** – Avoid materials that produce these air-polluting emissions, such as composite timber products (e.g. MDF and particle board), carpet and underlay, adhesives, paints and furniture upholstery.
- c. **Timber** – Use Forest Stewardship Council (FSC)-certified timber. This is a global and highly regarded standard for sustainable timber and timber products. Otherwise, use plantation or recycled timbers. Do not use rainforest timbers or timbers that may be supplied through the black market.
- d. **PVC** – Avoid due to toxicity in production and other lifecycle impacts. Substitute pipes, cables, etc. with other more benign plastics, such as HDPE.

3. Forward Thinking

When setting targets for the building, such as a green building rating, carefully consider the rate of change in the market and ensure that you are aiming high enough to meet future expectations.

Leading green buildings today are achieving reductions in energy consumption of 60-80% compared to conventional equivalents, with similar reductions in water use. The market leaders will very soon be zero- or positive-footprint buildings.

4. Target Your Market

Be occupier- and not property- or building-focused. Promote how the building will help them based on an understanding of their specific business challenges around sustainability. For example, are particular tenants looking for new ways to differentiate themselves in a tough employment market, position their brand as part of their Corporate Social Responsibility programme, or manage the legal duty of care risks associated with the well-being of their people on their premises?

5. Ensure Performance, Not Just Features

While exciting features are good for marketing the building, landlords will ultimately, either mandatorily or voluntarily, have to demonstrate measured performance to the market and poor performers will be devalued. Manage performance risks associated with new technologies very carefully. Some early green commercial buildings in Australia did not do this well, experiencing lengthy, and often costly, processes to correct the subsequent performance problems.

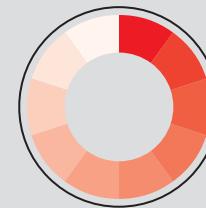
6. Commissioning – Skip at Your Peril

The failure to commission a green building properly is a common cause of reduced performance in operation. Ensure that it is operating as designed and achieving the intended cost savings by having systems thoroughly commissioned by specialist commissioning agents who are independent of the system suppliers.

Also ensure the building's managers are involved in the hand over process well in advance of practical completion to ensure effective transfer of knowledge.

r.e.esign Guide 3

Occupying Green



Leasing a green building, creating a green fitout and operating a green office

While landlords can improve the environmental performance of a base building, the occupants play the important roles of providing demand for such buildings and ensuring that their tenancies are green.

Using This Guide

This guide addresses three topics:

1. How to lease a suitable green building.
2. How to create a green fitout.
3. How to manage the environmental performance of your office.

It will also be beneficial to review Guide 1 – Managing Green, and Guide 2 – Developing Green, to understand green building capability and performance from a developer's or landlord's point of view.

Use the checklists to identify opportunities and create plans for selecting an appropriate green building, producing your green fitout and operating your office in a green way. The checklists are not exhaustive and many of the items will not be appropriate in all circumstances.

For a more detailed framework for fitouts refer to the Green Star-Office Interiors rating tool. See page 17.

Checklist – Selecting a Green Building

Some Key Questions

1. What NABERS or Green Star ratings does the building have and what is its history of ratings like? Are the building's performance ratings improving over time?
2. What NABERS ratings is the building capable of achieving?
3. How does the building perform in the specific environmental areas that are important to you?
4. If it is a new building, is there a significant risk that the building may actually not perform as well in operation as promised?
5. Will the landlord and building managers maintain the performance levels well into the future?
6. What maintenance procedures does the landlord have? What rate of response to performance issues do they provide?
7. What publicly disclosed performance reporting does the landlord do? e.g. do they produce an annual sustainability report and participate in leading indices? This can be an indication of a high level of commitment to improving performance.
8. What performance reporting (e.g. base building and/or tenancy energy usage, base building water usage and waste management) does the landlord provide?
9. Does the landlord/manager employ contractors that satisfy the same environmental standards? e.g. cleaners that satisfy waste management and energy efficiency policies.
10. Do you get a share of any energy cost savings?
11. Will the building and landlord support you well in achieving good environmental performance in your tenancy? Is there the potential to collaborate with the landlord and create a great greening success story for the whole building?
12. Will other tenants in the building be supportive of green initiatives?

Leasing a Green Building

What are your objectives?

The clarity of your objectives is important for getting the most value out of investing in green premises. For example, do you want to:

- Enjoy marketing benefits?
- 'Future-proof' your business against a changing business, consumer or employee market?
- Catalyse cultural change in your organisation?
- Respond to new expectations from your employees?

See also Key Benefits for Occupiers on page 13 to explore other key questions your organisation might ask.

Answering these and other questions about your objectives will determine the extent of your organisation's footprint that needs to be addressed and the potential investment required. For example, a business can currently generate some strong marketing benefits from greening its tenancy, without needing to occupy a green building. In the future, it is possible that the market will consider a tenant's footprint to also include a pro-rated proportion of the footprint of the building it has chosen to occupy.

Do you have to occupy a green building in order to demonstrate strong environmental credentials or is it possible to create a green fitout in a non-green existing building? Given that in Australia, improving the existing stock is a more important challenge than creating new green buildings, tenants of existing buildings who collaborate with their landlord to help improve that building are actually demonstrating a very high level of environmental responsibility.

Clarity of objectives is also important for understanding what benefits each 'green' building offers you specifically beyond an umbrella Green Star rating. Two buildings with the same rating may offer you very different sets of features, which may or may not serve your objectives. For example, some organisations might be motivated by providing healthy and comfortable work environments for staff and thus seek high levels of IEQ; while others might focus on energy performance in order to help fulfil their carbon footprint reduction targets.

Note to Landlords – Partner with your Tenants

Many tenants currently do not fully understand what they really want with regard to sustainability when they create their requirement briefs. Some even have conflicting requirements between their environmental aspirations, such as energy efficiency, and other specifications, such as for power supply. The advice tenants receive on environmental sustainability is also often inadequate.

Some office landlords originally looked to control tenants' activities in the building with aggressive lease clauses. A more effective approach has shown to be a collaborative one where the landlord presents information and opportunities to a tenant, and assists them to both green their own tenancies and also support the base building improvement programme.

This is recognised as a powerful tenant attraction and retention strategy. A good example of this is Investa Property Group's *Green Lease Guide* and *Greenhouse Guarantee* products for their tenants. See www.investa.com.au/sustainability/

Green Leases

Green Lease is a term used to describe a lease with terms that act to share the risks, costs and benefits of green buildings between landlord and tenant. While Green Leases tend to be tailored to the specific requirements and aspirations of the parties, some large landlords and tenants, such as the Commonwealth Government of Australia, have created standardised Green Leases.

Occupying Green cont.

Checklist – Opportunities for Fitouts

	Status (done, to do, not applicable)
1. Energy – Lighting	
a. See Energy – Lighting section in Guide 2 – Developing Green. If the landlord owns the lighting, can you incentivise them to invest in a new system, maybe by offering them a proportion of your energy savings for a period of time?	
2. Energy – Other	
a. Appliances – Use efficient hot and chilled drinking water units, fridges, dishwashers, etc. eg. a four stars or higher rating on appliances.	
b. Supplementary Air-Conditioning – Avoid or use energy-efficient equipment (e.g. a coefficient of performance [COP] of at least 3 and preferably 5). Install controls to ensure air-conditioning is off when the room is unoccupied.	
c. Sub-metering – Install separate metering for uses such as lighting, IT rooms and general power to enable performance monitoring.	
3. Water	
a. Fittings, Fixtures and Appliances – Use efficient taps, shower heads and dishwashers. eg. a AAA or higher rating on showerheads.	
4. Indoor Air Quality	
a. Large Copiers and Printers – Locate away from people and with a dedicated air extract to avoid volatile organic compound (VOC) emissions.	
5. Operational Waste	
a. Recycling – Provide bins, possibly with housing cabinetry, to collect recyclable materials.	
6. Materials	
a. Use Less – While we might not yet have Life Cycle Assessment technology to quantify the impact of materials in a development or fitout, we can apply the over-riding principle of using less. For example, halving the amount of a particular material halves the amount of its life cycle impacts attributable to the project. Can	

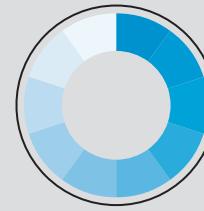
Checklist – Opportunities for Operational Performance

Status (done, to do, not applicable)
1. Management
a. Measure and Assess – Audit energy, water, transport, waste and use of office consumables, and benchmark energy and waste with NABERS ratings.
b. Policy and Plan – Develop a corporate level ('top down') policy that commits the organisation to achieving set targets (e.g. greenhouse gas, waste and paper use reduction) by a set time. The plan for how this will be achieved should include a strategy for how employees will be engaged and encouraged to play their part.
c. Report – Report progress to staff to highlight the benefits of the initiatives and encourage participation.
2. Energy
a. Procurement – Ensure efficiency of computers, copiers, printers, etc.
b. Computers – Enable Energy Star mode to automatically switch to 'sleep' mode or minimise power in 'stand by' mode. Choose laptops over desktops, avoid old cathode ray tube (box) monitors and, when procuring desktops, select smaller monitors.
c. Settings – Ensure that energy-efficiency settings are activated on all equipment with such features (especially hot water boilers) and turn off at the wall when not in use for significant periods of time. Standby modes still use energy.
d. Temperature – Have slightly higher set points to enable the landlord to reduce air-conditioning energy use, maybe as part of Green Lease negotiations.
3. Paper
a. Procurement – Choose 80-100% recycled content paper with non-chlorine bleaching. Recycled content should be post-consumer rather than post-industrial as the former has a much greater impact in terms of 'Closing the Loop'. Non-recycled content should be certified (e.g. FSC) plantation pulp.
b. Double-Sided Printing – Set printers and copiers to double-sided as default. While some people may complain that they are wasting more

	Status		Status
<p>partition walls, joinery and furniture be minimised?</p> <p>b. Reuse Existing – Reuse as much as possible from an existing fitout, e.g. ceilings, floor finishes, furniture and partitions.</p> <p>c. Recycled Materials – Use products with high amounts of recycled content. This helps to 'Close the Loop'.</p> <p>d. Reusability/Recyclability – Use products for elements such as partition walls, joinery, furniture and floor coverings that can be reused at the end of the current use or otherwise be recycled. Leading furniture manufacturers are designing products that can easily be disassembled and the component materials separated for recycling.</p> <p>e. Carpet – Choose modular carpet tiles over broadloom. Carpet is a major source of waste. Tiles can have a much longer life than broadloom and some are recyclable.</p> <p>f. Timber – Use Forest Stewardship Council (FSC) certified timber. This is a global and highly regarded standard for sustainable timber and timber products. Otherwise, use plantation or recycled timbers. Do not use rainforest timbers or timbers that may be supplied through the black market.</p> <p>g. Formaldehyde – Avoid composite wood products, such as medium-density fibreboard (MDF) and particle board that is bonded using urea formaldehyde, which is a toxin that leaches out over time and affects indoor air quality (IAQ).</p> <p>h. PVC – Avoid, e.g. use linoleum (made from natural products) instead of vinyl flooring.</p> <p>i. Paints, Sealants and Adhesives – Use low- or non-VOC emitting products.</p> <p>j. Indoor Plants – Provide psychological benefits to occupants and some select species also remove VOCs from the air, improving IAQ.</p> <p>k. Demolition and Construction Waste – Have contractors separate materials to be disposed of, send to recycling facilities and provide certification of this having been done.</p>	(done, to do, not applicable)	paper while they are getting used to the new set-up, they will soon become acclimatised. This practice is commonplace among leading organisations, and can save a lot of paper and money.	(done, to do, not applicable)

r.e.esign Guide 4

Living Green



Improving your own individual footprint

Our lifestyles and activities impact on the environment in many ways, some very direct and some indirect. We all have an ecological footprint, being the amount of resources required to sustain our lifestyle and dispose of the waste produced.

For a typical industrialised lifestyle, our major environmental impact areas (or components of our ecological footprint) are the:

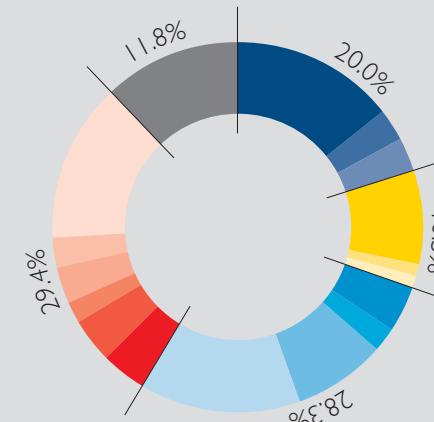
1. Food we eat.
2. Products we consume: furniture, clothes, etc.
3. Energy and water consumed in our home.
4. Car trips and flights we take.
5. Waste we produce.

Improving your own footprint might seem insignificant considering the number of people in our cities, country and the world. However, it does make a difference as your leadership in doing so helps set new standards with your families, social circles, companies and communities.

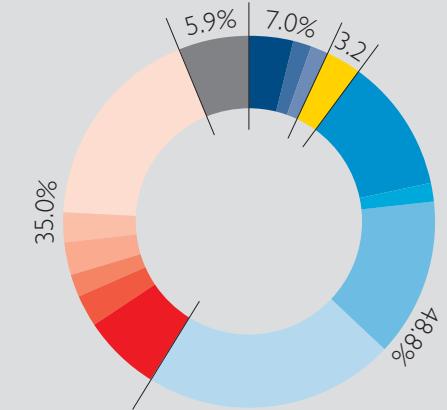
Which of the following can you do to improve your footprint? This checklist is just a start.

There are many other creative opportunities that you can find and which might also be profitable in terms of your money, time, health and well-being.

Average Australian household greenhouse gas emission footprint



Average Australian household ecological footprint



Household Use	Transport	Food	Goods and Services
Electricity	Petrol	Beef	Clothing
Gas, coal, oil, firewood	Public transport	Dairy	Furniture and appliances
Other household	Air travel	Restaurants	Books and magazines
		Other food	Tobacco and alcohol
			Personal care
			Other goods and services

Source: Australian Conservation Foundation, 2007

Checklist – Opportunities to Improve Your Own Footprint

Item	Status
I. Management	(done, to do, not applicable)
a. Calculate – Use an online ecological or carbon footprint calculator to measure your current footprint, set targets and select initiatives to improve them.	
b. Offsetting – Purchase offsets to offset the greenhouse gas emissions that you are not able to avoid. See page 16.	

Item	Status
4. Energy-Efficient Home	(done, to do, not applicable)
a. Showers – Put in a highly efficient shower head. It's also great for saving water.	
b. Appliances – Buy four star and higher rated appliances, ensure that energy efficiency features are turned on and switch them off at the wall when not in use to minimise standby power use.	

- c. **Apartment Buildings** – Support your building management's initiatives to go green. Perhaps you can reduce the running costs of the building.

2. Your Diet

- a. **Amount** – Can you eat less? Avoid waste.
- b. **Cows** – Eat less red meat, especially beef, and less dairy products. Cows produce enormous amounts of methane and have large land and water impacts.
- c. **Local** – Eat a greater proportion of locally produced food (say from within 100km). Don't drink bottled water from France, Fiji or other distant locations as there are transport impacts in getting it to you. Eat fruit and vegetables that are in season locally, rather than flown in from overseas.
- d. **Organic** – Make a greater proportion of the food you eat organic.
- e. **Endangered Species** – Don't eat endangered species such as Southern Blue Fin Tuna and shark.

3. Your Consumption and Waste

- a. **Consume Less** – Avoid acquiring anything that you don't really need and especially that might become waste. Avoid packaging where possible.
- b. **Investments** – Invest in companies and products with strong Corporate Social Responsibility practices and environmental performance records.
- c. **Low Impact** – Buy low-impact products, such as sustainable timber or paper products, products made from recycled or biodegradable materials, or recyclable products.
- d. **Recycle and Reuse** – All that you can.
- e. **Compost** – For organic waste.

- c. **Light Bulbs** – Change your incandescent light bulbs to compact fluorescents. (These are about four times more efficient and last much longer). Avoid low-voltage downlights.

- d. **Hot Water** – Install a solar (best), heat pump (best) or gas (good) hot water heater. Insulate your existing heater and avoid buying new electric storage systems.
- e. **Heat Loss/Gain** – Insulate and draught-proof your home, including window coverings.
- f. **Clothes** – Wash your clothes in cold water and dry them naturally rather than in a dryer.
- g. **Size** – Move into a more compact home with good natural heating/cooling and ventilation features.
- h. **Air-Conditioning** – Cool to a slightly warmer temperature or heat to a slightly cooler temperature.
- i. **'Greenpower'** – Purchase power produced from renewable sources. See www.greenpower.gov.au

NB: Many of these things have great financial paybacks!

5. Water-Efficient Home

- a. **Usage** – Take shorter showers, turn the tap off when brushing your teeth and even reduce the number of times you flush the toilet.
- b. **Fittings, Fixtures and Appliances** – Install water-efficient tapware, toilets (dual flush), dishwashers and washing machines. The old trick of placing a brick in the toilet cistern can save a lot of water!
- c. **Taps** – Install flow restrictors or aerators in existing taps.
- d. **Washing** – Only use washing machines and dishwashers when you have a full load.
- e. **Plants** – Have those that require little or no watering.
- f. **Leaks** – Fix promptly as they can use large amounts of water very quickly.

6. Your Transportation

- a. **Flights** – Reduce the number of flights you take.
- b. **Car Use** – Drive less and drive a fuel-efficient car (perhaps a smaller one). Walk, cycle or use public transport.

Case Studies



Developing Green

City Central, Adelaide

City Central represented the biggest development in the city of Adelaide in two decades and was faced with the challenge of setting new rent levels in a slow market.

Colliers International office leasing agents conducted workshops with the developer, Caversham Property, and other stakeholders to explore how the development could transform tenant expectations. The concept for Tower I, stage one of the development, was changed from a tall tower model, to a lower level, higher technology, green building. City Central Tower I received a 5 star Green Star – Office Design rating, the biggest development of its time to receive such a rating.

Bigger floor plates with chilled ceiling thermal comfort technology and excellent natural light quality, among other features, proved very attractive to tenants looking to entice new employees in a tight employment market. Other tenants chose the building due to the excellent brand and reputational value available from being seen to occupy the high-profile green building.

One tenant, Deloitte South Australia, advised that the work environment offered by City Central Tower I was highly valuable to them when trying to attract the most talented university graduates into their business. Deloitte noted that the things that these graduates were most interested in when being interviewed were (in no particular order):

- Opportunities overseas
- Policies on CSR
- Work environment
- Work-life balance

On moving into City Central, staff at Deloitte rated the following building attributes highly:

- Openness
- Fresh air
- Very light
- In sync with sustainability issues

City Central Tower I was relatively quickly fully let and most major developments in Adelaide since have targeted the same green rating or higher.



Occupying Green

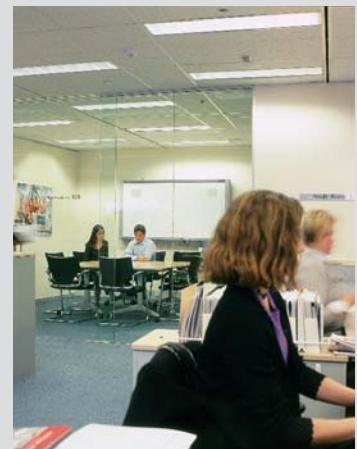
Stockland, Sydney

Stockland is one of Australia's largest property developers and investors and is a leader in environmental sustainability. In 2007 they created a new work environment for their Sydney CBD head office and produced one of the greenest and most innovative fitouts in Australia.

Rather than building a new building, Stockland adapted an existing building they owned. In order to bring daylight deep into the space and support a sense of community, 50m² openings were cut through seven consecutive 1,300m² floors. Staff now primarily circulate through this 'Vertical Highway', rather than use the lift between floors.

Their open and transparent work environment strategy saved large amounts of materials compared to conventional offices. Lighting systems were replaced with high-performance fittings and controls.

Environmentally friendly materials were used extensively, including recycled timber, to give the office a domestic feel. Plants were included for psychological and IAQ reasons.



Occupying Green

Colliers International, Sydney

Colliers International has been improving the environmental performance of its offices across Australia as part of its Green Office Programme.

A 2004 lighting refurbishment of their 2,000m² head office in Sydney, helped to create one of the most energy-efficient tenancies in Australia; rating a maximum 5 stars with the NABERS Energy scheme in 2007. Even though the landlord prohibited changing the light fittings, the use of occupancy sensors and timer controls ensured the lights are not on when spaces are not occupied.

Office waste has also been more than halved. Seven out of eight waste bins were removed from the office as the majority of refuse is paper. Every desk has a paper recycling box that is emptied by the cleaners, who actually have less work to do under this new approach. While there were a few complaints from staff initially, everybody soon got used to the system and many started promoting it to clients.

Glossary

Biodiversity

The variability of life within a given ecosystem, including the Earth, and a measure of the health of biological systems.

Blackwater

Waste water including faeces.

Brownfield Site

A site that has previously been developed.

Carbon Credit

A financial credit that is tradable in emissions trading schemes and produced when an entity abates an amount of carbon.

Carbon Disclosure Project (CDP)

Global initiative where a group of large institutional investors requests the voluntary disclosure of carbon emissions by the world's largest companies. www.cdproject.net

Carbon Neutral

When an entity, such as a person or company, is causing no net carbon to be put into the atmosphere.

Carbon Offsets

Units of investment in a carbon abatement project that can be used to offset emissions produced by an entity.

Carbon Pollution Reduction Scheme (CPRS)

Australia's cap and trade emissions trading scheme being developed for launch in 2010.

Chilled Ceilings and Beams

Energy efficient thermal comfort systems that pumps chilled water through panels or beams in the ceiling to provide radiant cooling to occupants.

Climate Change

The changing of climates around the world caused by global warming.

'Close the Loop'

Recycling a product into a new product such that no new resources are required or waste produced.

Co-generation

A high efficiency power generation process that utilises the waste heat from a generator as an energy output.

Corporate Social Responsibility (CSR)

The integration of environmental, social, economic and governance considerations into a company's business model in consideration of the interests of society and its other stakeholders, and beyond that required by regulation.

'Cradle to Cradle'

The lifecycle of an item where it is fully reused or recycled at the end of its use. ie. no waste is produced.

'Cradle to Grave'

The lifecycle of an item where it is disposed of as waste at the end of its use.

Dematerialise

The process of reducing the amount of material in circulation in a system such as an economy or market.

Ecological Footprint

The amount of land required by an entity, such as a person, company or building, to produce all of the resources that it requires and dispose of all of the waste that it produces.

Emission Trading Scheme (ETS)

A market-based trading scheme for emissions credits such as carbon credits. Parties with excess credits above a mandated cap can sell to those who are short of their requirement.

Energy Efficiency Opportunities (EEO)

Commonwealth Government programme for large energy using companies to identify suitable energy saving projects and report publicly on them. www.energyefficiencyopportunities.gov.au

Global Warming

The warming of the Earth caused by increasing greenhouse gases.

Green Star

Suite of predictive (or capability-based) rating tools for buildings. www.gbca.org.au

Greenfield Site

A site that has not been previously developed.

Greenhouse Gas (GHG)

Gases such as carbon dioxide and methane that trap the sun's energy in our atmosphere, causing warming of the Earth.

'Greenwashing'

A person or company overstating their green performance in order to generate marketing benefits.

Greywater

Waste water excluding faeces.

Indoor Air Quality (IAQ)

The quality of the air in an enclosed space as it impacts the well-being of occupants.

Indoor Environmental Quality (IEQ)

The quality of the indoor environment as it impacts the well-being of occupants. Includes thermal comfort, IAQ, daylighting, artificial light quality, glare, view to outside and acoustic comfort.

Life Cycle Assessment (LCA)

Assessment of the total impact of an entity such as a building, accounting for all areas of impact over its entire lifecycle (construction, operation, demolition).

National Australian Built Environment Rating Scheme (NABERS)

Suite of performance-based rating tools for office buildings and homes www.nabers.com.au

National Greenhouse and Energy Reporting Act 2007 (NGER)

Mandatory reporting system for corporate greenhouse gas emissions and energy production and consumption. www.climatechange.gov.au/reporting

Post Occupancy Evaluation (POE)

Evaluation of the performance of a building; usually after one year of occupancy and involving surveying of occupants.

Tri-generation

A co-generation system utilising an absorption chiller to turn the waste heat into cooling.

Volatile Organic Compounds (VOCs)

A group of air pollutants that have adverse health impacts on humans, from drowsiness and nausea to causing cancer.

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<http://cait.wri.org>; accessed 21 April 08

Resource Websites

Green Buildings

City Switch Green Office
www.cityswitch.net.au

Green Building Council Australia
www.gbcas.org.au

NABERS
www.nabers.com.au

US Green Building Council (US)
www.usgbc.org

Usable Buildings (UK)
www.usablebuildings.co.uk

World Green Building Council (Global)
www.worldgbc.org

Your Building
www.yourbuilding.org

General Sustainability

Rocky Mountain Institute (US)
www.rmi.org

Worldwatch Institute (Global)
www.worldwatch.org

Climate Change

Australian Government
Department of Climate Change
www.climatechange.gov.au

Garnaut Climate Change Review
www.garnautreview.org.au

Intergovernmental Panel on Climate Change (Global)
www.ipcc.ch

Pew Centre on Global Climate Change (US)
www.pewclimate.org

About Colliers International

Colliers International is a leading provider of real estate services and knowledge based property solutions. We represent property investors, developers and occupiers in local and global markets, working as partners to manage our clients' real estate needs through integrated quality solutions and a focus on specialisation. We offer a full range of services within every sector of real estate, with an unparalleled geographical reach across Australasia. We are committed to accelerating your success by making our knowledge your property.

Colliers International operates a Corporate Social Responsibility programme and in 2008 was the first property company to voluntarily list on the Corporate Responsibility Index. We address our own corporate footprint through our national Green Office Programme.

Sustainability Services

Colliers International offers a range of sustainability services for new and existing buildings and work environments. This includes services to:

- Improve the performance of:
 - Buildings
 - Workplaces
 - Data centres
 - Portfolios
- Deliver accredited NABERS ratings
- Design and project manage green fitouts

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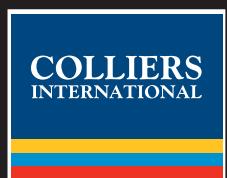
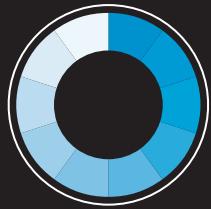
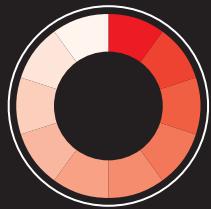
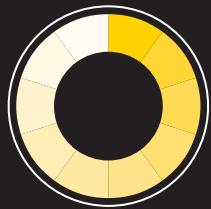
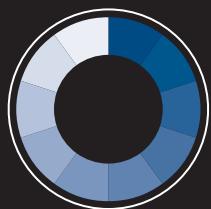
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