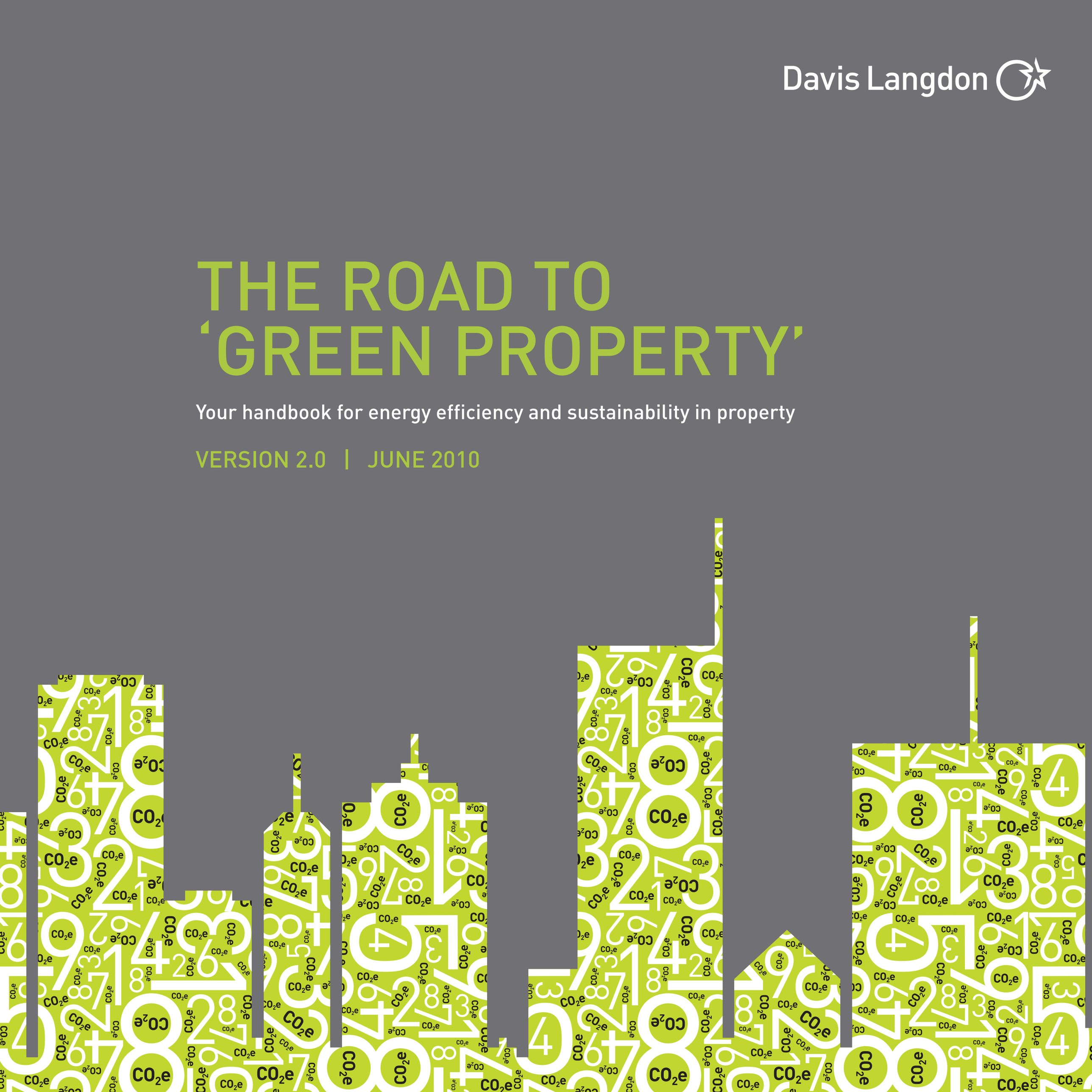
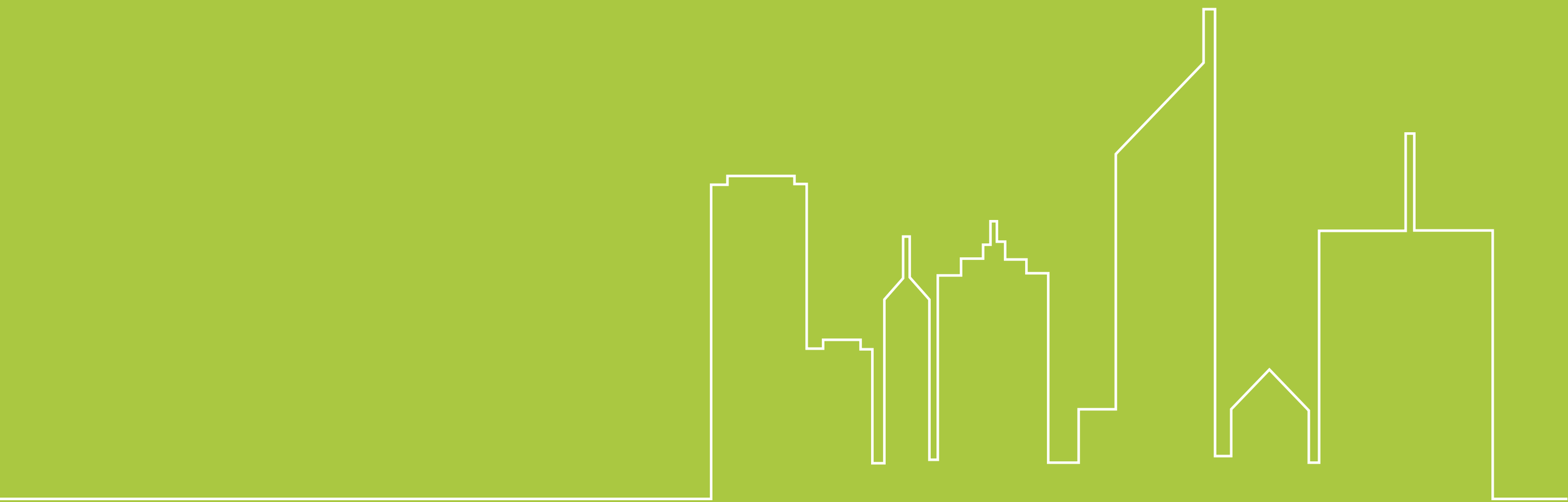
Davis Langdon

THE ROAD TO ‘GREEN PROPERTY’

Your handbook for energy efficiency and sustainability in property

VERSION 2.0 | JUNE 2010





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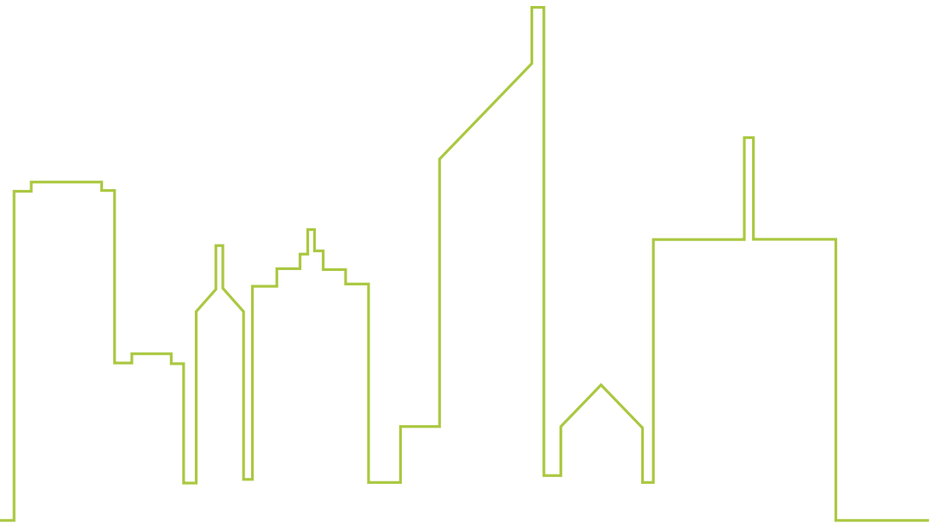


Foreword

Carbon Conservation

The unquestioned need to conserve finite and rapidly diminishing global energy resources, particularly carbon-based energy resources, has engendered significant debate and associated public policy responses, predominately within advanced industrialised nations.

Recent progress in definitive policy outcomes has been impeded by the impact and ongoing consequences of the 2009 Global Financial Crisis. Faced with diminishing financial resources as a result of urgent and unprecedented fiscal stimulus initiatives designed to stabilise fragile economies, the public policy agenda has shifted rapidly to a shorter-term economic focus.

Public sentiment has also shifted as concerns associated with the short-term cost of implementing conservation initiatives to achieve longer-term benefits deepen, and as more immediate issues such as rising unemployment and declining real incomes have come to dominate the political agenda.

However, the certainty of a sustained global economic recovery however and the burgeoning industrial growth of China, India and other emerging economies ensure that the policy imperative of energy conservation will re-emerge as the political agenda moves to readdress fundamental longer–term issues.

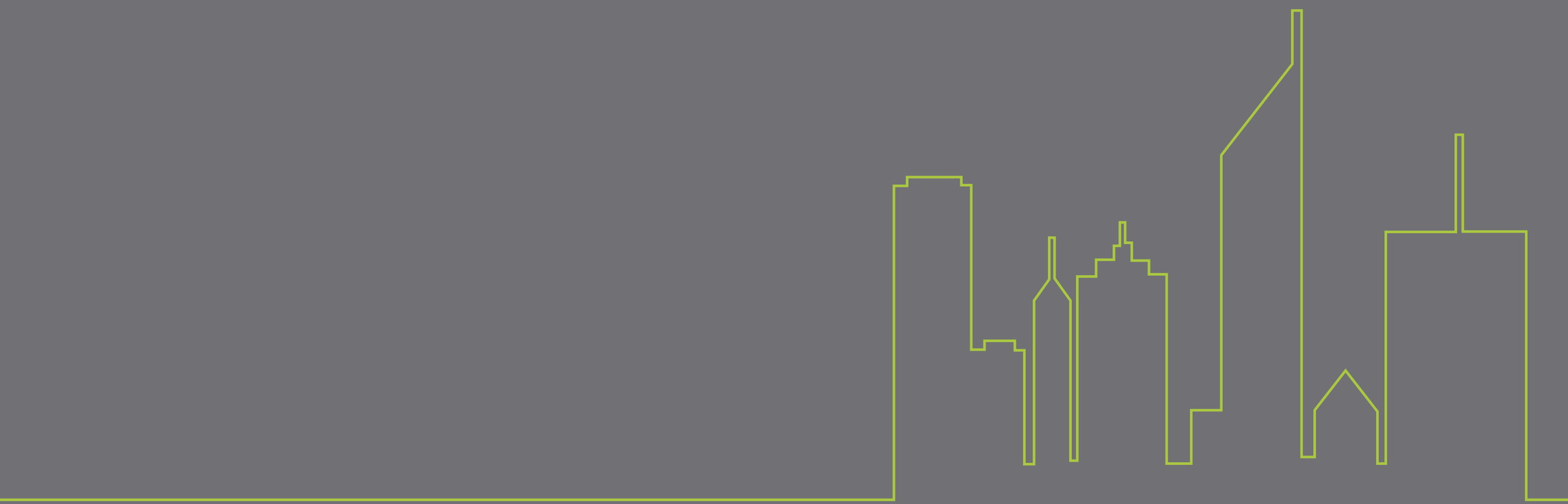
Despite the temporary sidelining of active policy responses to energy conservation, the vision, leadership and commitment required to effectively address this fundamental issue remains prevalent throughout the global community.

Davis Langdon is proud of its leadership and commitment to the imperative of sustainability and carbon conservation within the constructed environment. We are committed to active and significant investment in the development of effective new systems and ways of working.

Davis Langdon's dedication to sustainability reflects a culture of thoughtful innovation, an important driver of our success, and our established role within the property and construction industries as a respected voice in the global conservation debate.

Mark Beattie
Managing Director
Davis Langdon

GREEN STAR RATING TOOLS



Green Star Rating Tools

The growth of green rating tools in Australia has been strong, not only in terms of the number of certified projects (now 249 as of June 2010) and the number of accredited professionals (now 5,454 as of June 2009) but also the number of tools available.

The uptake of green rating tools has increased globally with significant growth especially in the UK and the US where their use has, in many areas, become mandatory.

The Australian Green Star rating tools are:

- Green Star – Multi Unit Residential v1
- Green Star – Healthcare v1
- Green Star – Retail Centre v1
- Green Star – Education v1
- Green Star – Office v3
- Green Star – Office Interiors v1.1
- Green Star – Industrial v1

The following Green Star PILOT and Draft rating tools are also available:

- Green Star – Office Existing Building EXTENDED PILOT
- Green Star – Convention Centre Design PILOT
- Green Star – Communities – Draft framework

A common observation with all these and the overseas rating tools is that they are very strong on environmental issues but largely silent on social and economic issues. The full three being required for sustainable 'triple bottom line' reporting which are commonly understood to comprise of Social, Economic and Environmental attributes, also sometimes defined as People, Planet and Profit.

There are nine environmental impact categories within the tool, which are consistent across all of the GBCA's assessment tools for various building types.

The credits achievable within each category share some commonality, but do vary according to their appropriateness to their building type.

Credit point scores within each category are awarded to projects where they have met the overall objectives of Green Star and the specific aims of the Tool Credits.

All category scores (with the exception of Innovation), are then weighted to ensure the categories are reflected appropriately. These weightings differ between States and Territories to reflect local sensitivities. The weighted scores generate an overall score which provides a Green Star Rating.

The Green Star points credit system contains numerous points available for each of the environmental categories.

The Green Star rating system ranges from 1 Star through to 6 Stars. Only projects that achieve a rating of four stars or above are eligible for certification.

Overall Weighted Score	Rating	Classification
45-59 Points	4 Star	Best Practice
60-74 Points	5 Star	Australian Excellence
75+ Points	6 Star	World Leadership

Office – Design & As Built

Green Star ratings have become a standard consideration in the commercial office market since the initial release of Office Design v1. The achievement of a high Green Star rating in the new office market has been perceived by the office developers as an essential part of marketing to attract long term tenants, preserve the value of the office and provide healthier environments for the building's occupants.

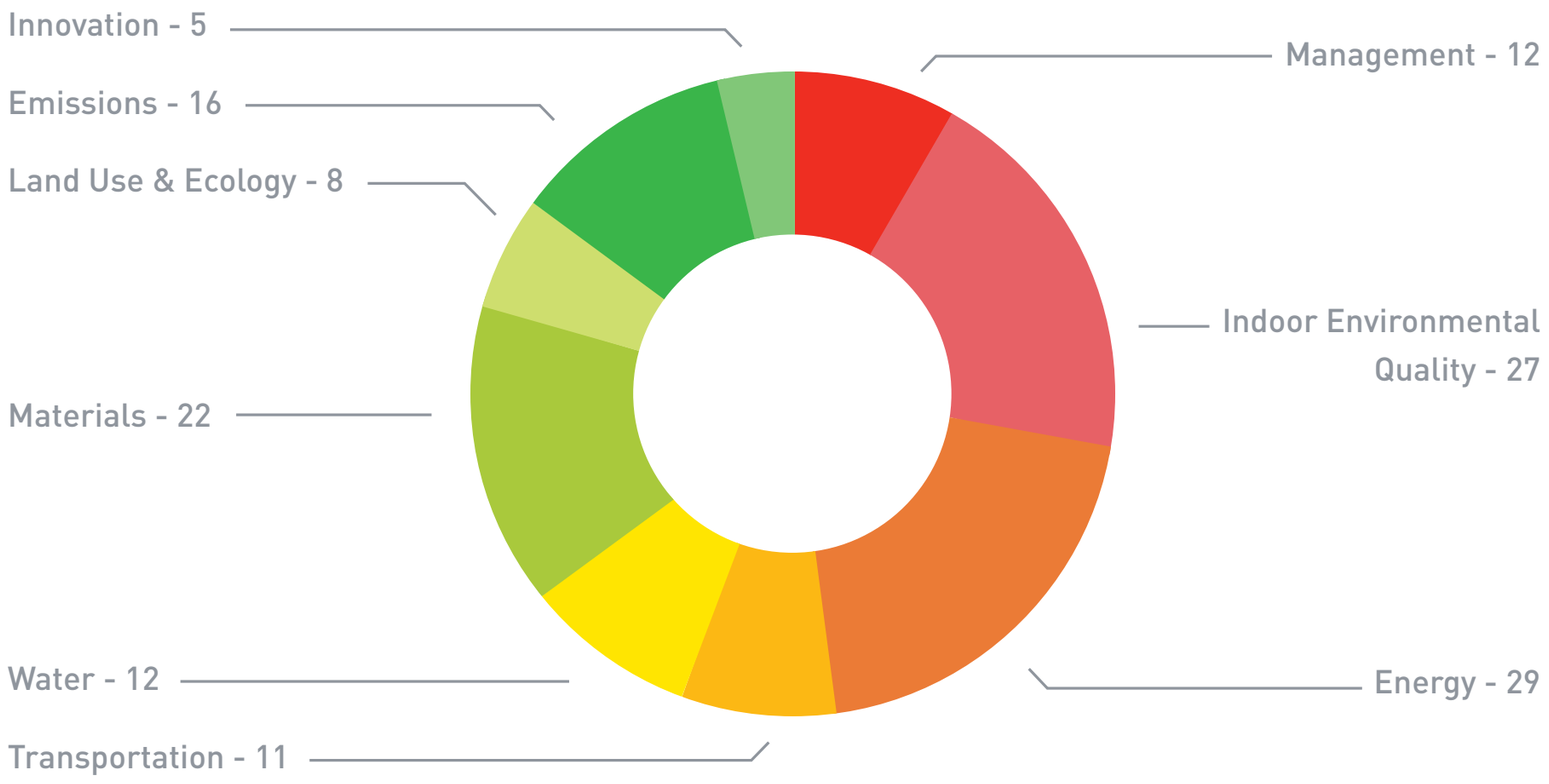
The inclusion of environmental requirements as part of the PCA's Guide to Office Building Quality will impact on building owners across Australia. New Premium Grade and A Grade buildings need to meet a minimum of 4 Star Green Star and 4.5 Star NABERS.

As such, Green design strategies have become 'the norm' for higher quality buildings, and the perception of 'extra' cost has diminished. Most industry commentators are already claiming that the market now regards 5 Star Green Star as the base standard for a marketable building.

The approach for a 4 Star Green Star solution can be achieved fairly simply by adopting readily attained credits available for Management, Indoor Environmental Quality, Energy, Transport, Water, Materials, Land Use & Ecology, and Emissions.

The approach for a 5 Star Green Star solution will tend toward either an Energy reduction or Water reduction approach. At this level, an Energy-centric approach might involve passive chilled beam air conditioning and reduced floor to floor heights. Alternatively a Water-centric approach is likely to include recycled water and grey/blackwater plant.

Office v3 - Credit Points Available



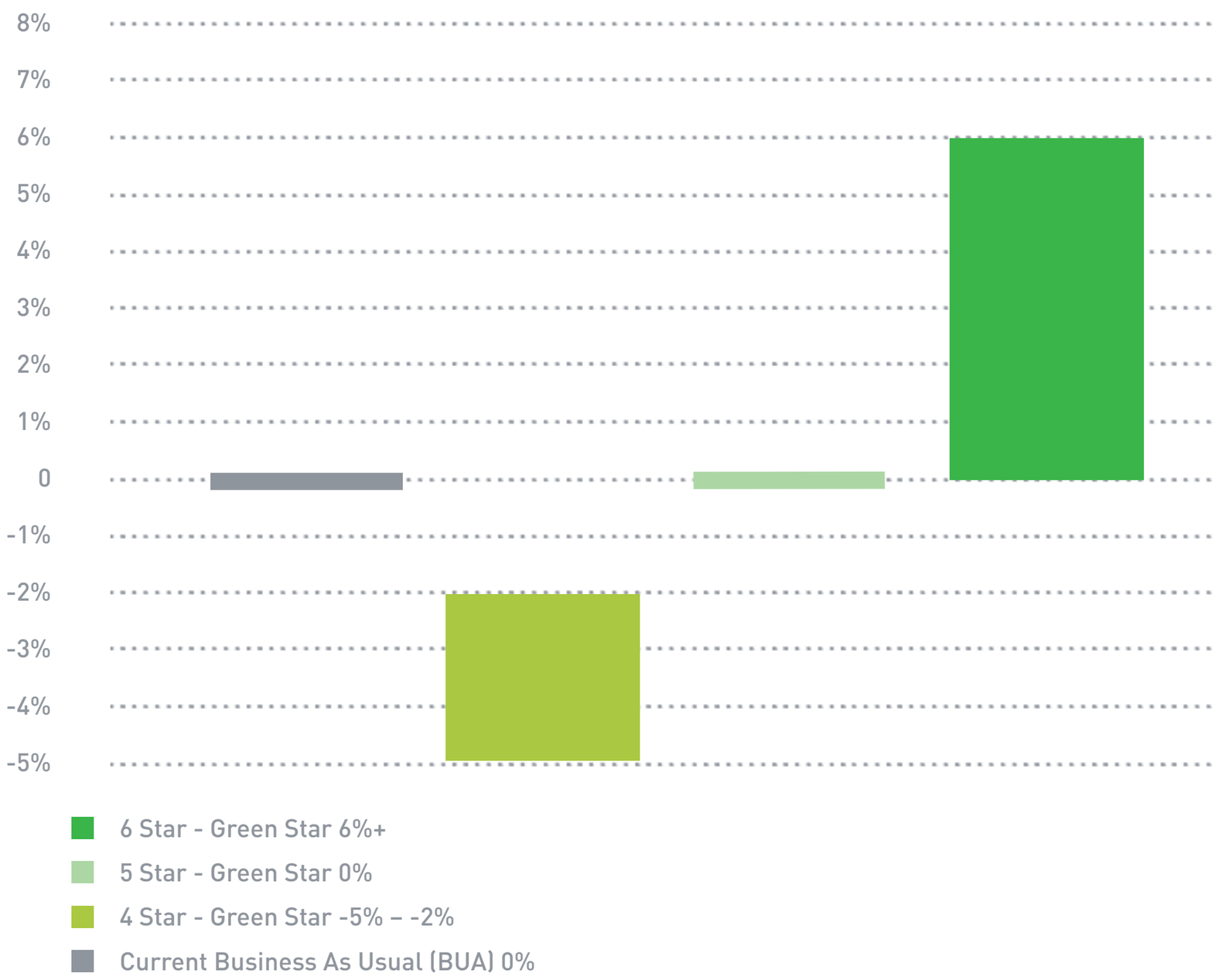
Office – Design & As Built

A 6 Star solution will need to consider a combined Energy and Water reduction approach, which is likely to include all of the above, along with demonstrating innovation, emerging technologies and therefore, a greater focus on life cycle benefits.

Benefits for building owners include:

- potential higher occupancy rates
- higher future capital value
- reduced risk of obsolescence
- less need for refurbishment in the future
- ability to command higher lease rates
- higher demand from institutional investors
- lower operating costs
- lower tenant turnover
- lower costs to maintain and operate

Capital Cost Impacts (%)



Office – Design & As Built

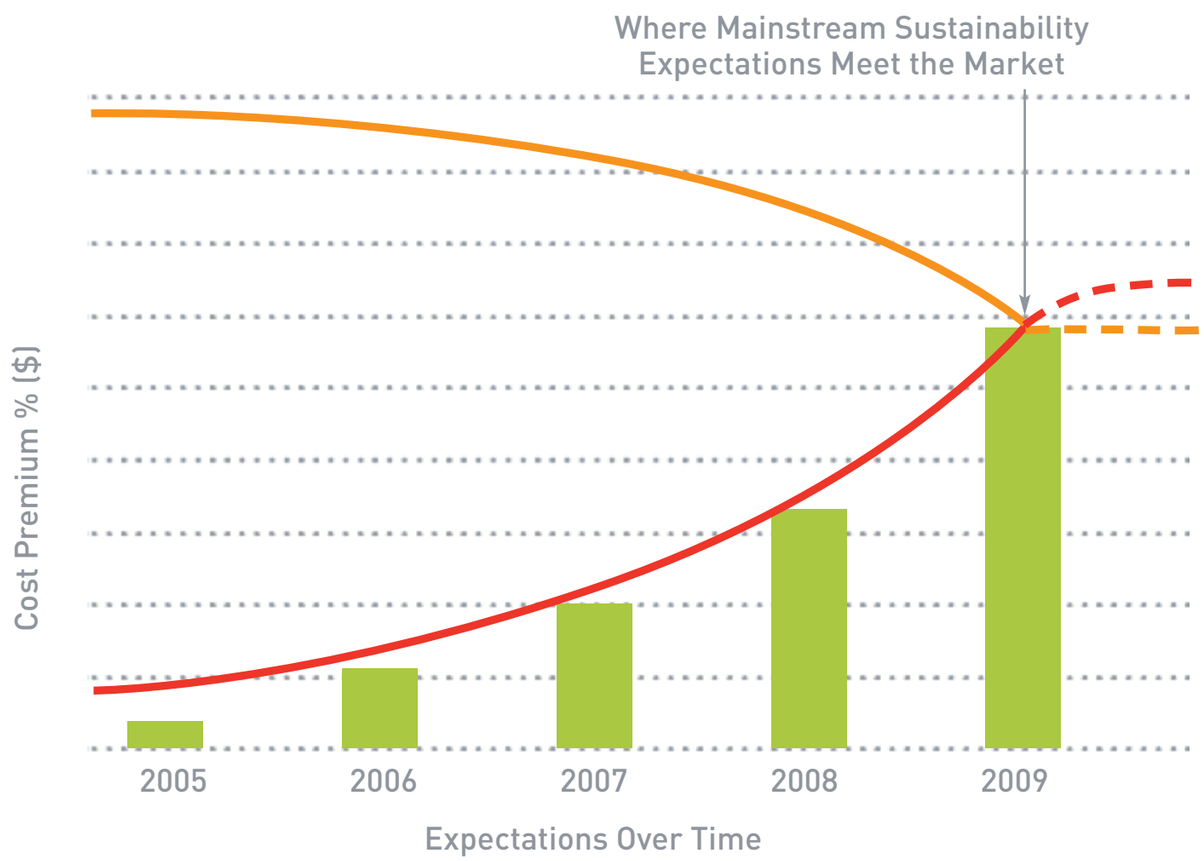
Over the last five years the take up of sustainability has increased dramatically. Design solutions which were once seen as leading edge and innovative have become readily accepted practice as tenant expectations have driven upwards the minimum sustainability standards of office buildings within the nation's CBDs.

Developers and builders have risen to the challenge and are increasingly delivering buildings of high quality which incorporate Green Star ratings as a matter of course. The cost 'penalties' that were previously associated with achieving a specific 5 Star or less rating could now be viewed as being eroded within the major CBDs, with this base expectation now being what is required to attract long term tenants.

The tenant expectations of improved IEQ, energy reduction and improved amenity (cycling facilities, etc) are now almost a given in many cities around Australia. This is leading to an almost two tier cost structure where the quality benchmarks of buildings together with their associated baseline cost has risen to respond to this demand. It could be argued that there is no 'premium' any longer within the CBDs for a Green Star building, as the various elements are required irrespective of whether a building is to be rated or not. This is being dictated by market forces and a clear demand for better quality buildings.

The same cannot yet be said for non-CBD buildings where the demand and associated rental structures are not enabling the same level of take up of the various sustainable features. In these non-CBD areas it can be argued that there is still a premium for green buildings, as these more commercially constrained markets are slower in delivering the same degree of wholesale change as has been visible in areas of high tenant concentrations and demand.

Overlay with Green Building Council of Australia (GBCA) for Green Star Projects



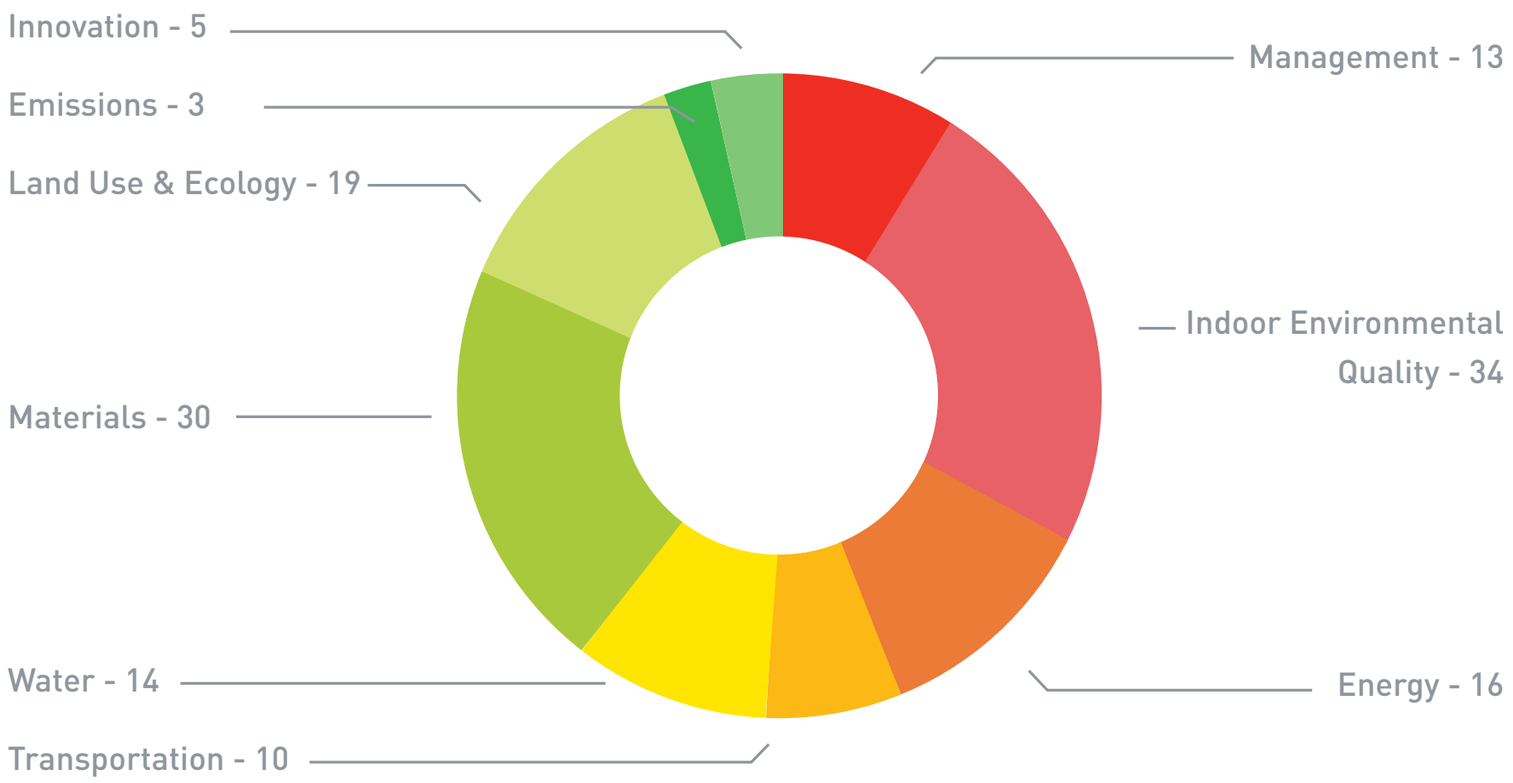
Office – Interiors

The Green Star – Office Interiors v1.1 rating tool is designed for building owners, tenants and interior designers to assess the environmental impact of an interior fitout. A green fitout will include improvements such as access to natural light, waste management, energy conservation and low emission paints and timber from sustainable forests.

Seven Materials Calculators have been developed to assess the environmental impacts of fitout items during their manufacture, use, and post-use phases. The items are assessed for eco-preferred content, durability, the product manufacturer's environmental management system, commitment to product stewardship, and whether the product is modular and/or designed for disassembly. Emissions of volatile organic compounds from paints, carpets, adhesives and sealants and office fitout items are covered within the Indoor Environment Quality category.

The costs of office fitout can vary greatly based on the size, location and level of finishes as the costs are really driven by selection of materials. Similarly, the cost of certification can be proportionately much greater for a smaller fitout compared to a larger fitout, as the certification costs (compilation of documentation and actual submission) do not greatly differ based on the size of the fitout.

Office Interiors v1.1 - Credit Points Available



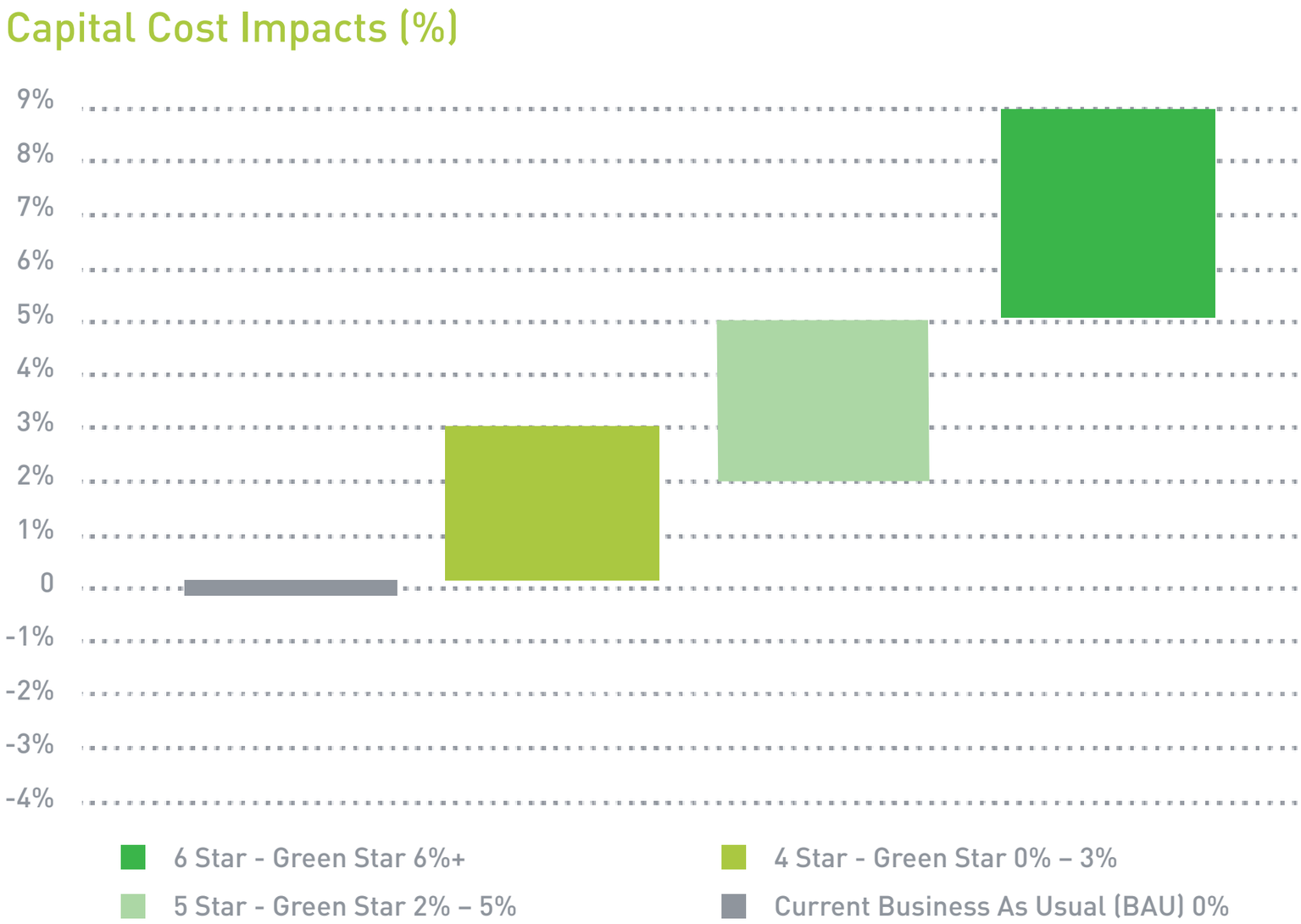
Office – Interiors

Green Star Office Interior Projects

The popularity of green/sustainable office fitouts is evidenced by the number of projects registered for certification under Green Star – Office Interiors. Through an innovative and life cycle approach to design, these projects are demonstrating the sizeable business and environmental benefits that can be achieved – without compromising commercial viability.

Projects are indicating that the additional costs (above a comparable non green project) are in the order of 0–5% for a 5 Star Green Star certified fitout. However, Davis Langdon expects the perception of 'extra' cost to diminish over time as innovative design becomes the norm and companies realise the costs and benefits of going green.

Capital Cost Impacts (%)



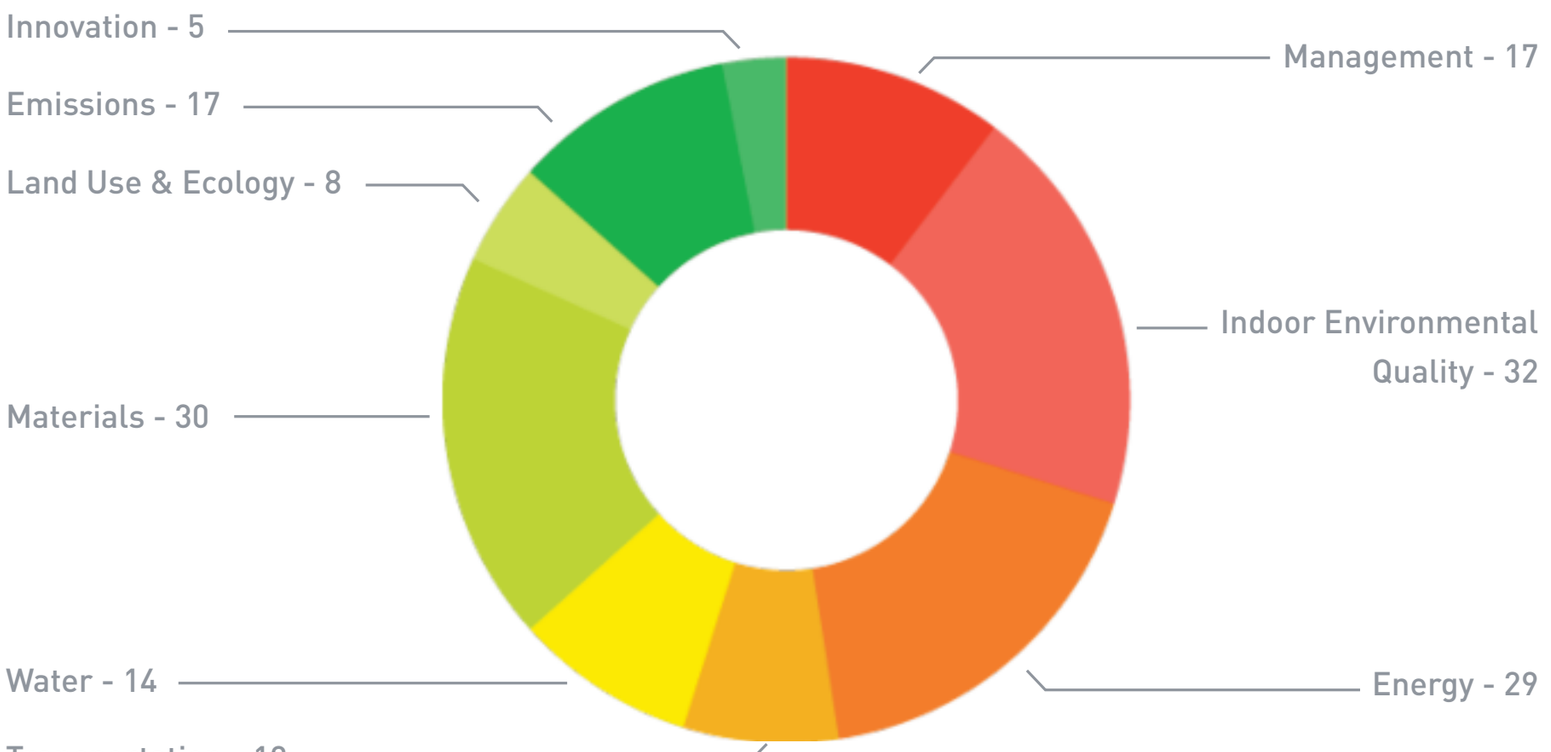
Healthcare

Healthcare facilities are an enormous sustainability challenge, on average a hospital requires at least twice as much energy per m^2 than an office building and approximately six times as much water per m^2. The difficulty in addressing these issues has posed a significant hurdle for the sector and brought about a whole new way of thinking and a long awaited leap in the evolution of the suite of Green Star tools.

The aims of the Green Star - Healthcare v1 tool are to help owners and operators of healthcare facilities around Australia to:

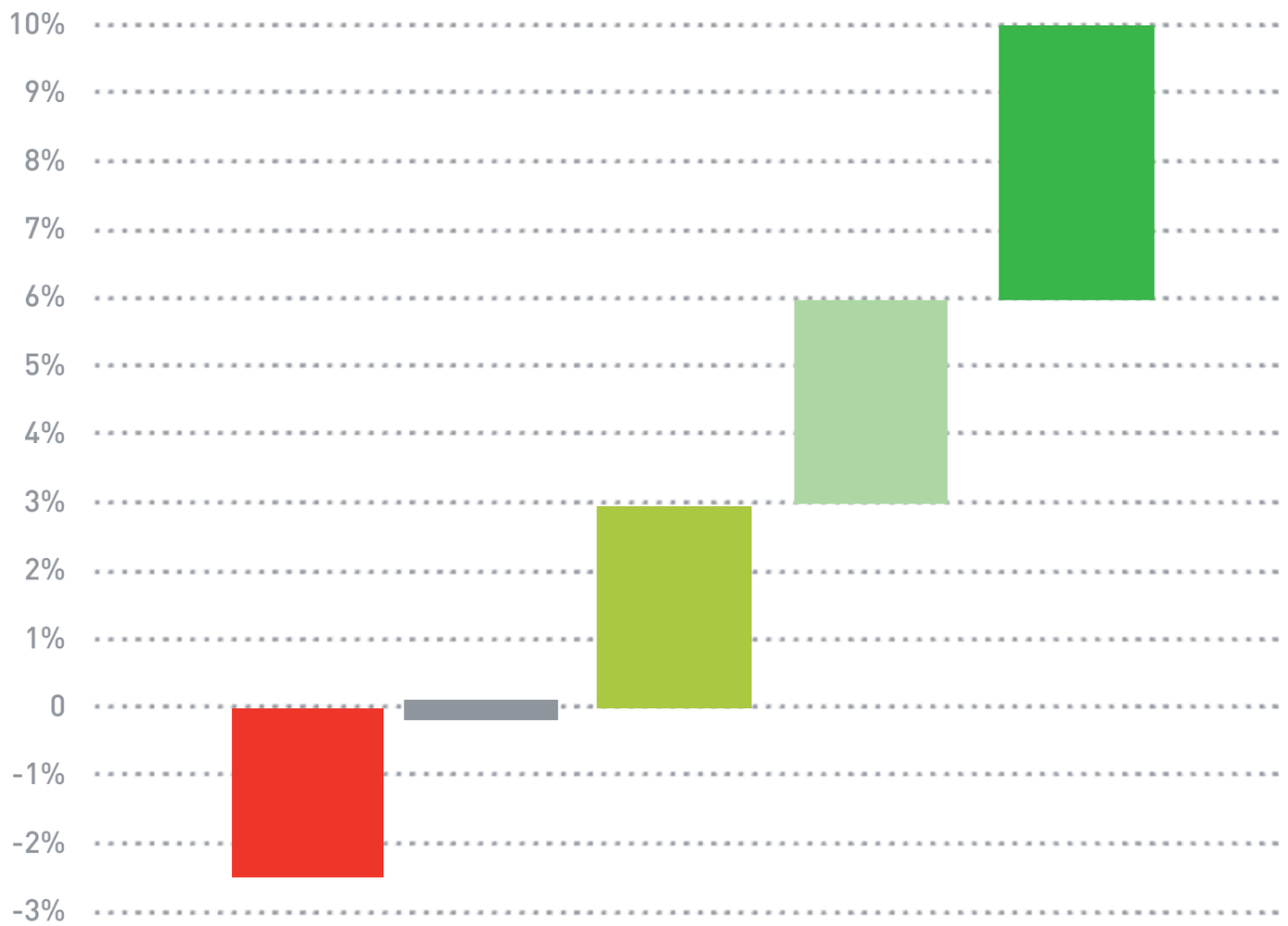
- minimise the environmental impact of their buildings
- improve patient health outcomes and staff productivity
- receive recognition for green leadership
- achieve real cost savings

Healthcare v1 - Credit Points Available



Healthcare

Capital Cost Impacts (%)



- 6 Star - Green Star 10%+
- 5 Star - Green Star 3%–6%
- 4 Star - Green Star 0%–3%
- Current Business As Usual (BAU) 0%
- Previous Industry Benchmark -2%–-2.5%

Healthcare

Primary Drivers

Within the healthcare system, assests are not generally subject to industry driven market factors such as tenant attraction, retention or building resale value. The majority of providers in the healthcare sector operate within the public State-run sustems, wherefore some of the drivers within the commercial office sector do not apply.

There are many and varied benefits to developing a 'green' healthcare facility both quantifiable and qualitative. A number of these benefits are outlined below:

Quantifiable Benefits	Qualitative Benefits
Improved energy efficiency	Improved Environmental Quality with potential for: -increased staff productivity -greater staff attraction, recruitment and retention -improved patient wellbeing and shorter recovery times - improved experience/satisfaction for patients
Reduced emissions	Improved patient wellbeing via increased Vitamin D from sunlight
Improved water efficiency	Risk mitigation from reduced infection control issues, etc.
Reduced operating and recurrent costs	Meeting Government expectations
Contribution to emission reduction obligations	Meeting community expectations

Rather than providing substantial economic savings in the short term, the key benefits within healthcare projects are likely to be more subjective. Benefits include reduction in the embedded environmental impact as well as improved patient and staff well-being such as improved recovery times, increased productivity and reduced staff turnover.

Business As Usual (BAU)

Minimum environmental standards in public hospitals have improved significantly in recent years. The following is a summary of significant items that have become BAU over the past few years:

Energy Reduction Measures	Other Measures
Building management system with energy conservation features	Increased natural daylight provision
External Shading	Rainwater harvesting and reuse
Efficient facades (glazing)	Efficient water fixtures and fittings
High efficiency lighting	Waste management reduction
Variable speed drives (VSDs)	Reduced VOCs (material choices)
Higher efficiency plant and equipment	Minimisation of PVC material usage
Increased insulation	Improved air quality

Healthcare

Davis Langdon estimate that the adoption of greener BAU outcomes over the last five years has resulted in cost increases of around 2% of total construction costs.

Other drivers which have impacted on cost include the current trend towards single in-patient rooms with individual room controls. This increases overall floor areas and costs (including operating costs) but has other perceived benefits such as reduced infection rates and increased flexibility in design.

The criticality of infection control, etc in acute hospital departments also poses challenges to sustainable design, restricting the extent to which some sustainability initiatives can be considered, e.g. temperature and lighting control in theatres, etc.

Travel and engineering (plant) area requirements are also on the increase with major hospitals incorporating travel and engineering area provisions equating to approximately 40% of the hospital's functional areas. This is due to a number of factors including larger plant rooms (mainly as a result of OH&S requirements), provisions for future proofing and the incorporation of sustainable design attributes. This increase in areas makes the natural lighting issue even harder to achieve due to larger floor plates.

An increasing need for future proofing in hospital designs due to rapidly changing technology is also a consideration, where future flexibility needs to be considered to be a true 'sustainable' facility, and avoid obsolescence.

Achieving a High Energy Score

Given the high number of points available within the Energy Category particularly the Greenhouse Gas Emissions credit of the Healthcare tool (20 available points), great emphasis will be put on the energy systems employed within facilities. Trigeneration systems are emerging as the most important system being proposed by designers for assisting with the upgrading of major hospitals from 4 Star designs to 5 Star designs.

Healthcare

Costs of 4 and 5 Star

Davis Langdon's research shows that the cost of achieving 4 Star Green Star in Healthcare V1 is in the range of 0%–3% above baseline costs.

5 Star Green Star is in the order of 3%–6% above baseline costs.

The primary cost differentiator relates to the energy/emission reduction approach, and the incorporation of a Trigeneration plant.

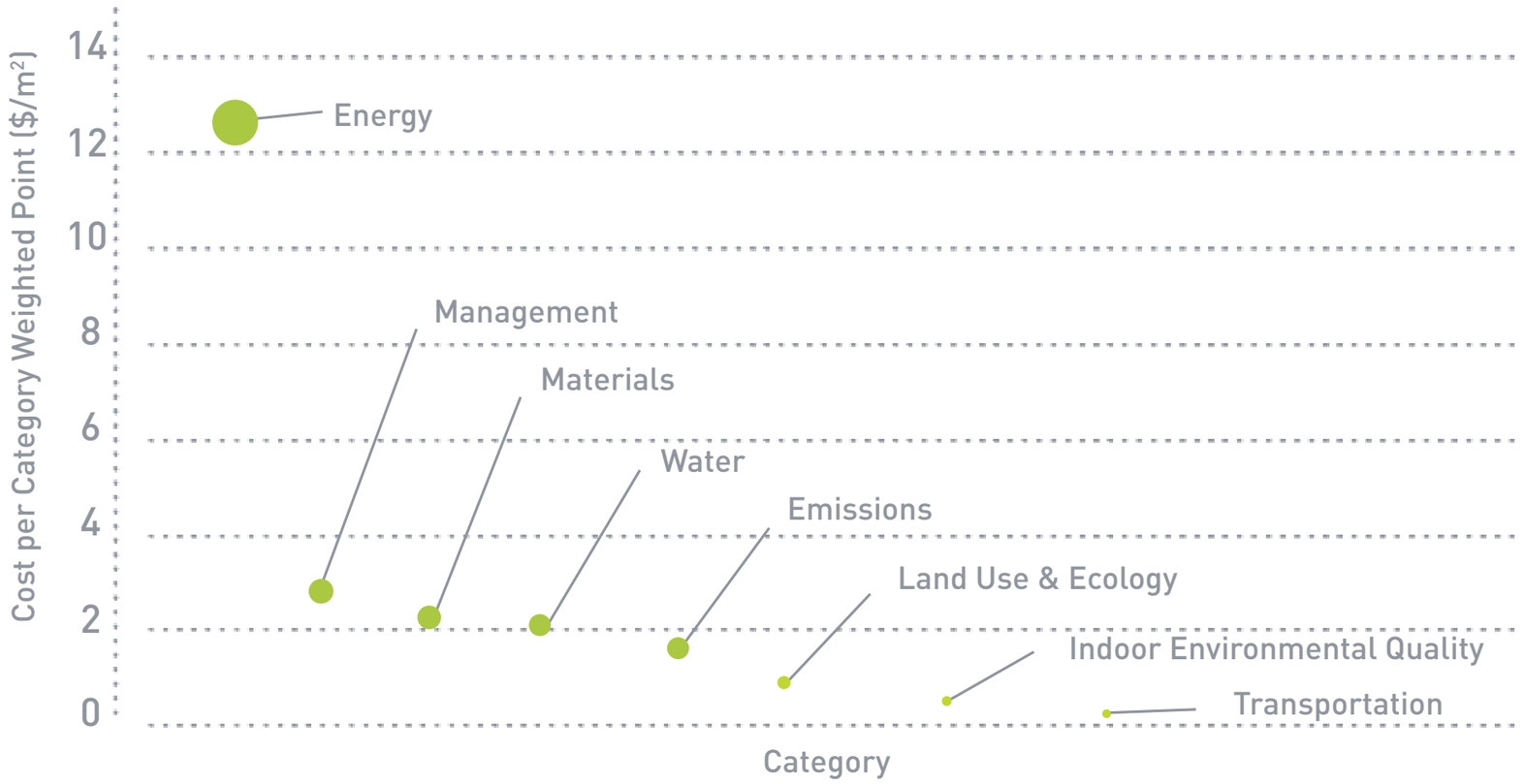
The adjacent graph represents the approximate cost differentials based upon a cost per m^2 of weighted category point for a 5 Star target project.

It should be noted that due to the integrated nature of the design some categories costs are interlinked, and the systems assisting Indoor Environment Quality (IEQ) are heavily related to the Energy category, which is why the IEQ cost appears extremely low. The Management category ranking is due in part to the low weighting it receives as well as the interpretation of the cost of commissioning.

The above is based on a large scale new build hospital development. Costs will vary for smaller facilities, where some aspects of sustainable design will be easier to accommodate. Conversely, facilities with larger, deep floor plates will encounter difficulty in achieving some points economically. The costs associated with refurbishment of existing facilities will also vary widely depending on the existing conditions and site constraints.

The above cost increases relate to capital cost only, and do not factor in any cost benefits that may be derived from the intangible economic benefits a sustainable healthcare facility may generate over its lifetime.

Costs of Achieving 5 Star Healthcare v1



Healthcare

Costs of 6 Star

Davis Langdon is of the opinion that achieving 6 Star ratings on large acute hospitals is yet to be demonstrated to be viable and a 6 Star Green Star target would require substantial additional funding above BAU.

The situation however may be different on smaller facilities where a range of additional ESD features can be more economically incorporated into designs. For example:

- natural ventilation
- improved access to places of respite
- increased natural light penetration
- increased opportunities to improve line of sight to views for a higher percentage of floor areas
- higher percentage of roof area to accommodate ESD features
- more potential for use of green roofs

It is estimated that the additional cost of achieving a 6 Star rating on a smaller healthcare facility may be in the order of 10%+ above BAU.

Recurrent Costs Savings

The quantifiable economic benefits of improved energy efficiency, reduced emission charges and improved water efficiency have the potential to reduce healthcare operational costs. Total Energy and Water costs for a major hospital are typically around 1% of total annual operating costs, so it follows that annual operating costs can be reduced, for example, by some 0.2% if Energy and Water costs are reduced by, say, 20%. Such Energy and Water initiatives have the potential to provide reasonable pay back periods that are typically in the order of 8+ years.

One of the economic challenges associated with justifying the business case for many attributes within high energy usage facilities is the long term establishment of discounted energy tariffs, which many facilities have in place. This impacts on the economic justification of a new plant in terms of payback periods.

It needs to be noted that any established improvement in staff productivity, staff retention and patient wellbeing has very significant potential to reduce healthcare operational costs. For example, staff costs in an acute hospital may be in the order of 70% of all operational costs. So it follows if savings can be made in this cost centre then significant overall cost savings are possible.

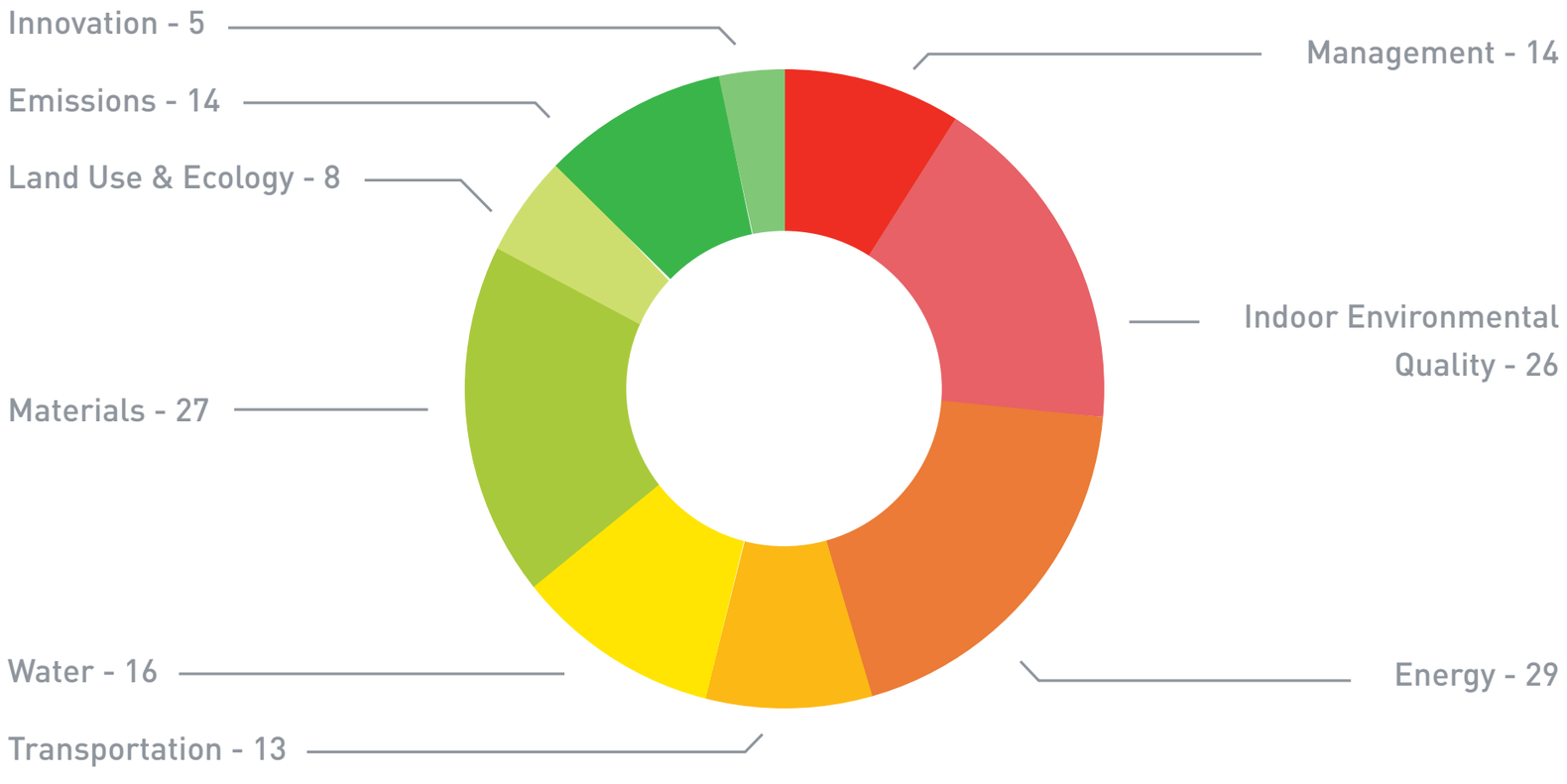
Sustainable healthcare facilities are achievable, but will come at a cost if specific ratings are required. The long term operational benefits, of which it is anticipated there are many, will only be tested should the boundaries of sustainability in buildings continue to be expanded, and invested in.

It will be interesting to see if Government and private providers take up mandatory Green Star ratings which are estimated to add a further layer of costs in the order of 0–3% for a 4 Star rating, 3–6% for 5 Star ratings and some 10%+ for 6 Star ratings.

Education

The Green Star – Education v1 rating tool assesses the environmental attributes of new and refurbished education facilities in Australia. It can be applied from the design phase of a project and up to two years from practical completion. The tool represents a milestone in the assessment of environmental attributes of education facilities, and is expected to guide the industry towards more sustainable design practices.

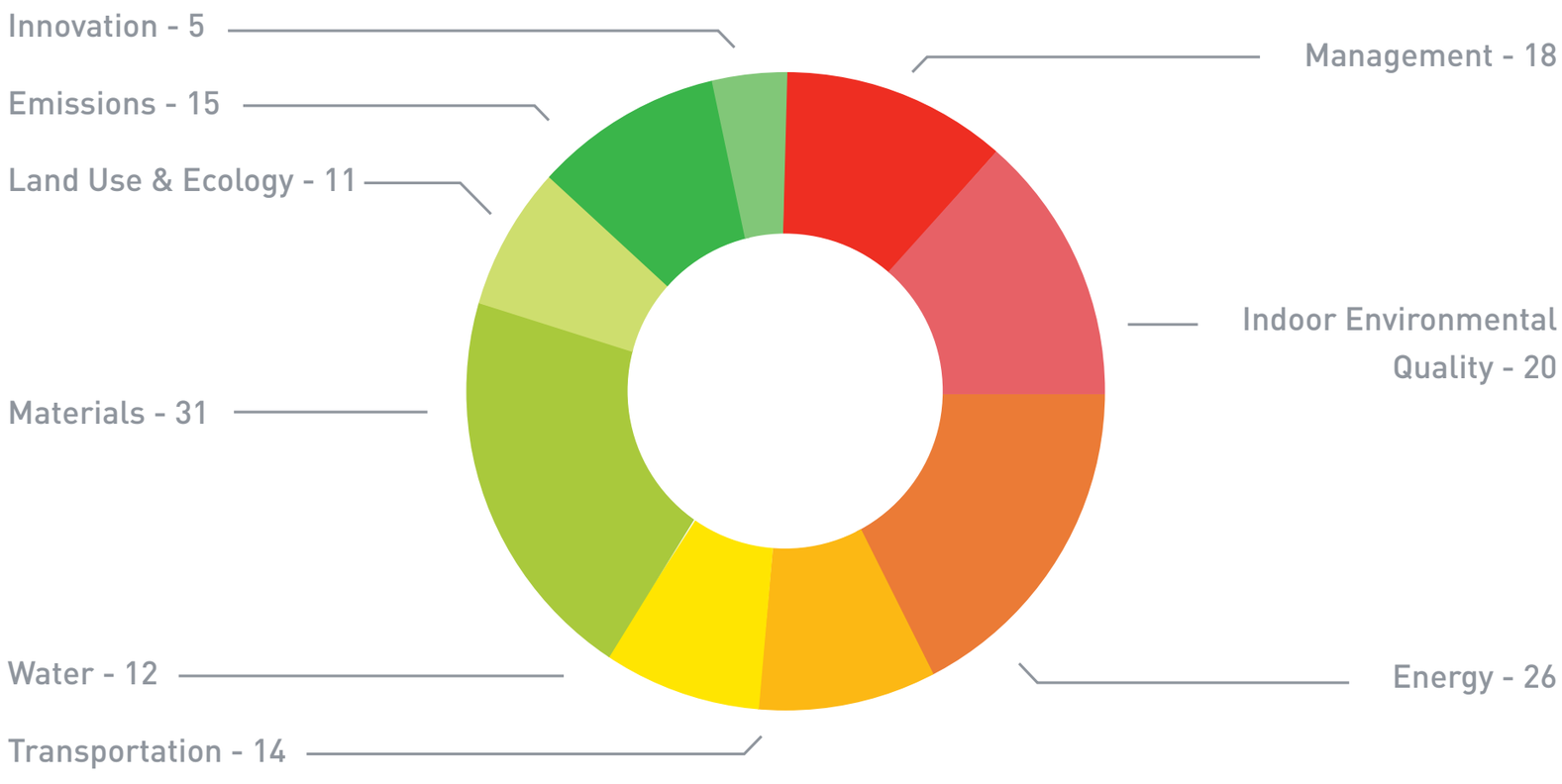
Education v1 - Credit Points Available



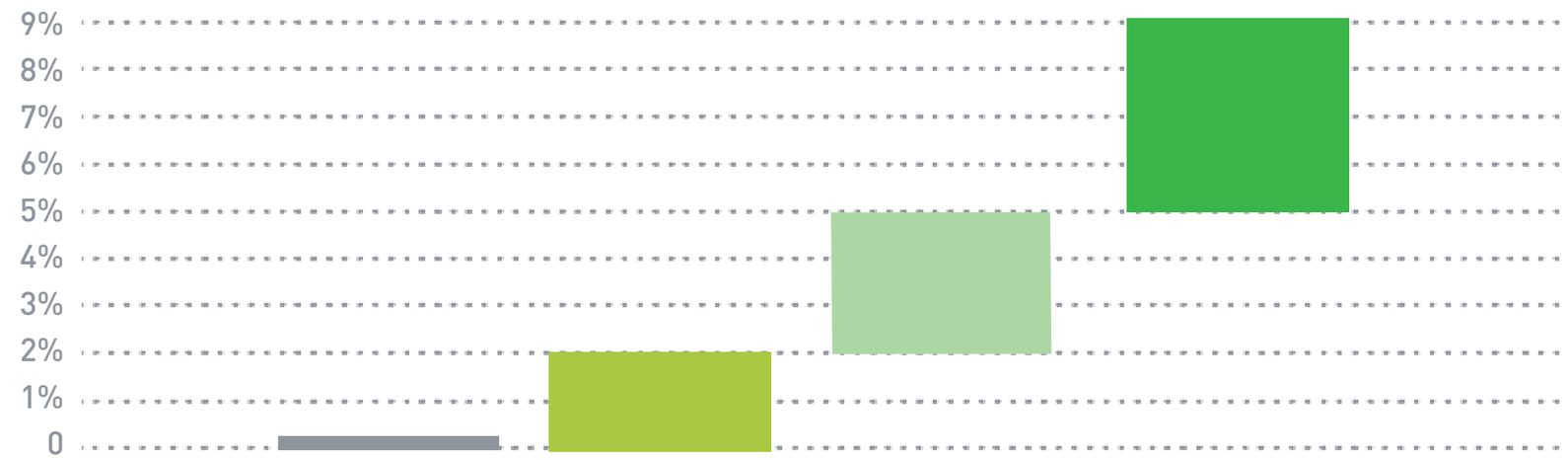
Multi Unit Residential

The Green Star – Multi Unit Residential v1 rating tool was developed to promote the design and construction of high-performance green residential developments. It enables building owners and developers to minimise the environmental impacts of their developments. It is intended to assist in reducing Australia's greenhouse gas emissions and allows building owners and developers to capitalise on the environmental benefits of their initiatives, and receiving recognition for more environmentally sustainable design. It is also expected to deliver health benefits and financial savings for building occupants.

Multi Unit Residential v1 - Credit Points Available



Capital Cost Impacts (%)



Multi Unit Residential

Davis Langdon was involved in the Lilyfield Housing Redevelopment in Sydney — the first social housing scheme in Australia to be awarded a Green Star certification.

Achieving a 5 Star Green Star - Multi Unit Residential PILOT rating, the Lilyfield Housing Redevelopment was also the first project of its kind to achieve a Green Star residential rating on the east coast of Australia.

Some of the initiatives used to achieve 5 Star Green Star in this project included :

Indoor Environment Quality

- all 88 apartments are naturally ventilated and there is no air conditioning in the development

Energy

- roof elements over stair wells have been designed to support and orientate solar hot water and photovoltaic (PV) panels, which provide on-site energy
- all roofs to north facing units are tilted in order to maximise solar access to those units during winter (low sun angle) and to avoid direct excess solar radiation to those units in summer (high solar angle)
- the lighting design has utilised energy efficient bulbs throughout
- a common area interior lighting occupant movement and daylight sensor was installed
- solid floors exposed to the northern sun for thermal mass were included
- low-E glass in all east and west façades was added

Water

- water efficient fixtures throughout apartments and common areas were installed

Innovation

- the building exceeded the benchmarks of TRA-1 by providing significantly less car parking than the minimum – there is no on-site car parking in the development

Quantifiable Benefits	Qualitative Benefits
Improved energy efficiency	Fostering community living
Reduced emissions	Improved resident wellbeing
Improved water efficiency	Increased socialising through design
Reduced operating costs	Meeting Community environmental expectations
Contribution to emission reduction obligations	

Multi Unit Residential

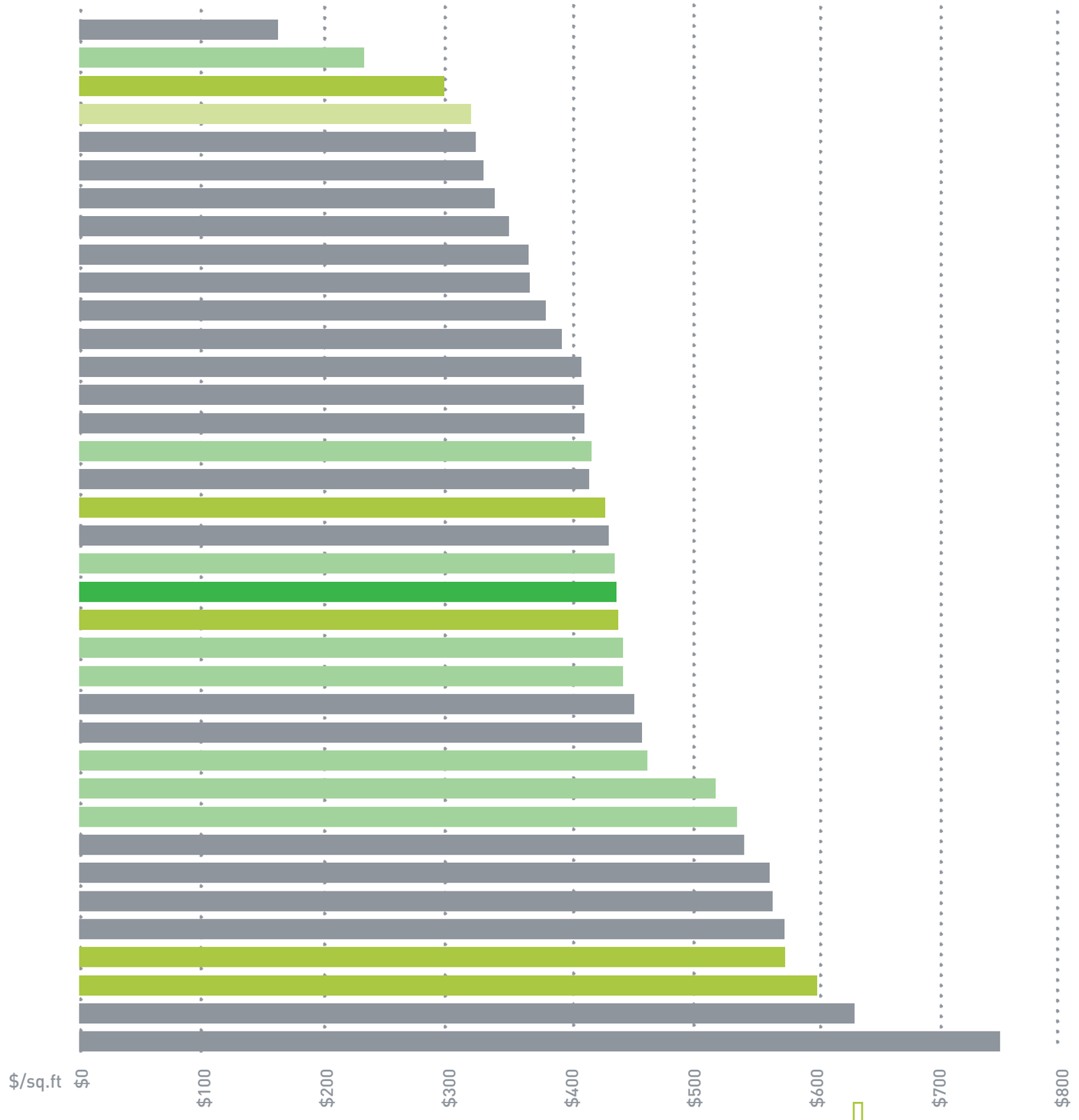
Cost and Benefits

The approach for a 4 Star Green Star solution can be achieved fairly simply by adopting readily attained credits available for Management, Indoor Environmental Quality, Energy, Transport, Water, Materials, Land Use & Ecology, and Emissions. A 4 Star Green Star Multi Unit Residential rating is achievable for a new architecturally designed apartment building with minimal additional cost. It is expected that, through good passive design achieved with the appointment of consultants with a thorough understanding of Green Star, the cost premium would be between 0% and 2%.

The approach for a 5 Star Green Star solution will tend towards either an Energy reduction or Water reduction approach. It is expected that the additional cost of achieving 5 Star Green Star would be in the vicinity of 5%.

A 6 Star solution will need to consider a combined Energy and Water reduction approach, which is likely to include all of the above, along with demonstrating innovation, emerging technologies and therefore, a greater focus on life cycle benefits. This would potentially add an additional cost to the project of over 10% depending on the design of the building as it would be expected to be teamed with an iconic design.

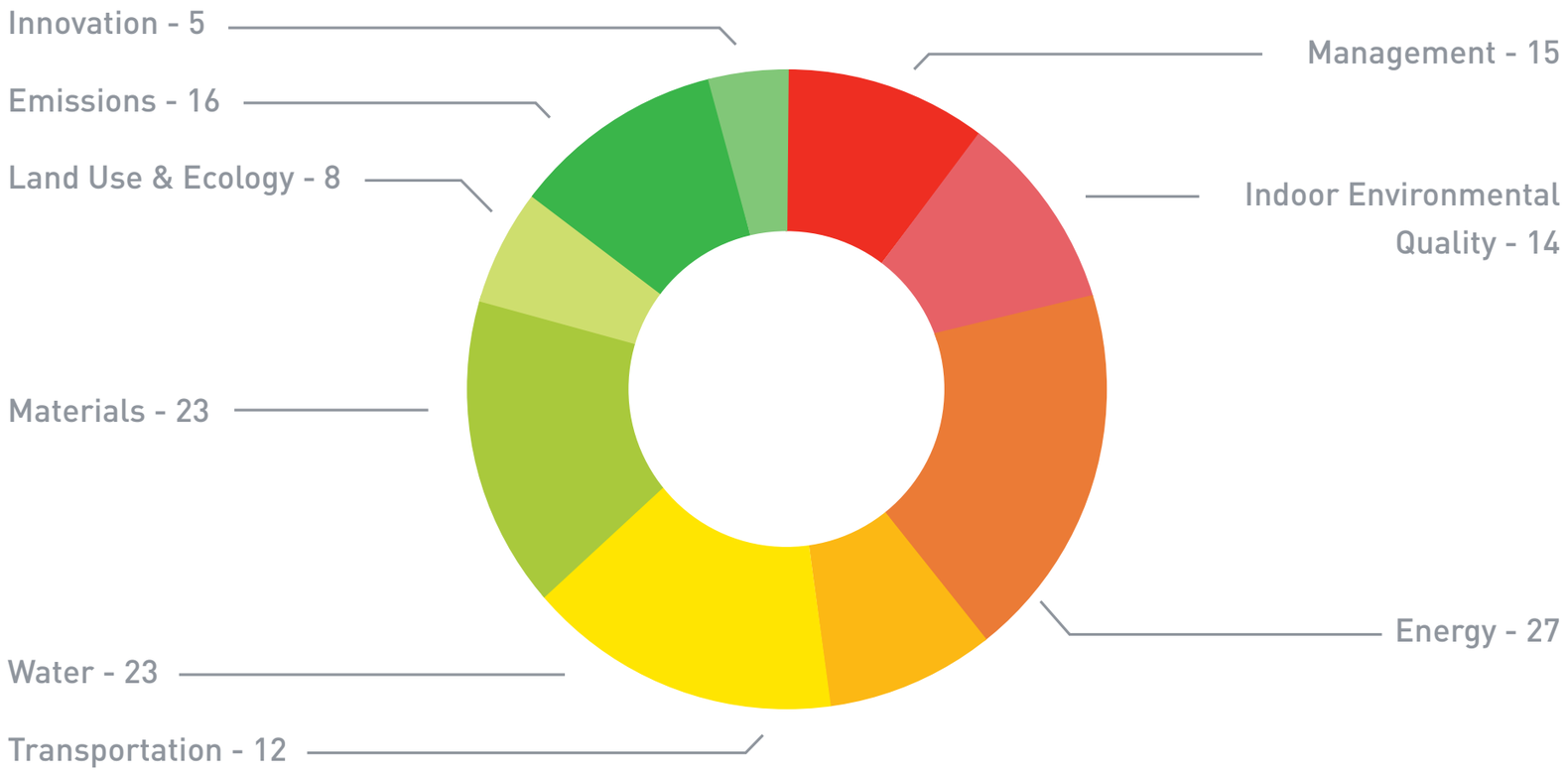
Recent studies carried out by Davis Langdon on residential projects on Manhattan Island in New York City found that Green Star (or LEED certified) projects we able to be delivered cheaper than non-green projects.



Retail

The Green Star – Retail Centre v1 rating tool assesses the environmental attributes of new and refurbished retail centres in Australia. It can be applied from the design phase of a project and up to two years from practical completion. The release of the tool represents a milestone in the assessment of environmental attributes of retail centres, and is expected to guide the industry toward more sustainable design practices.

Retail Centre v1 - Credit Points Available

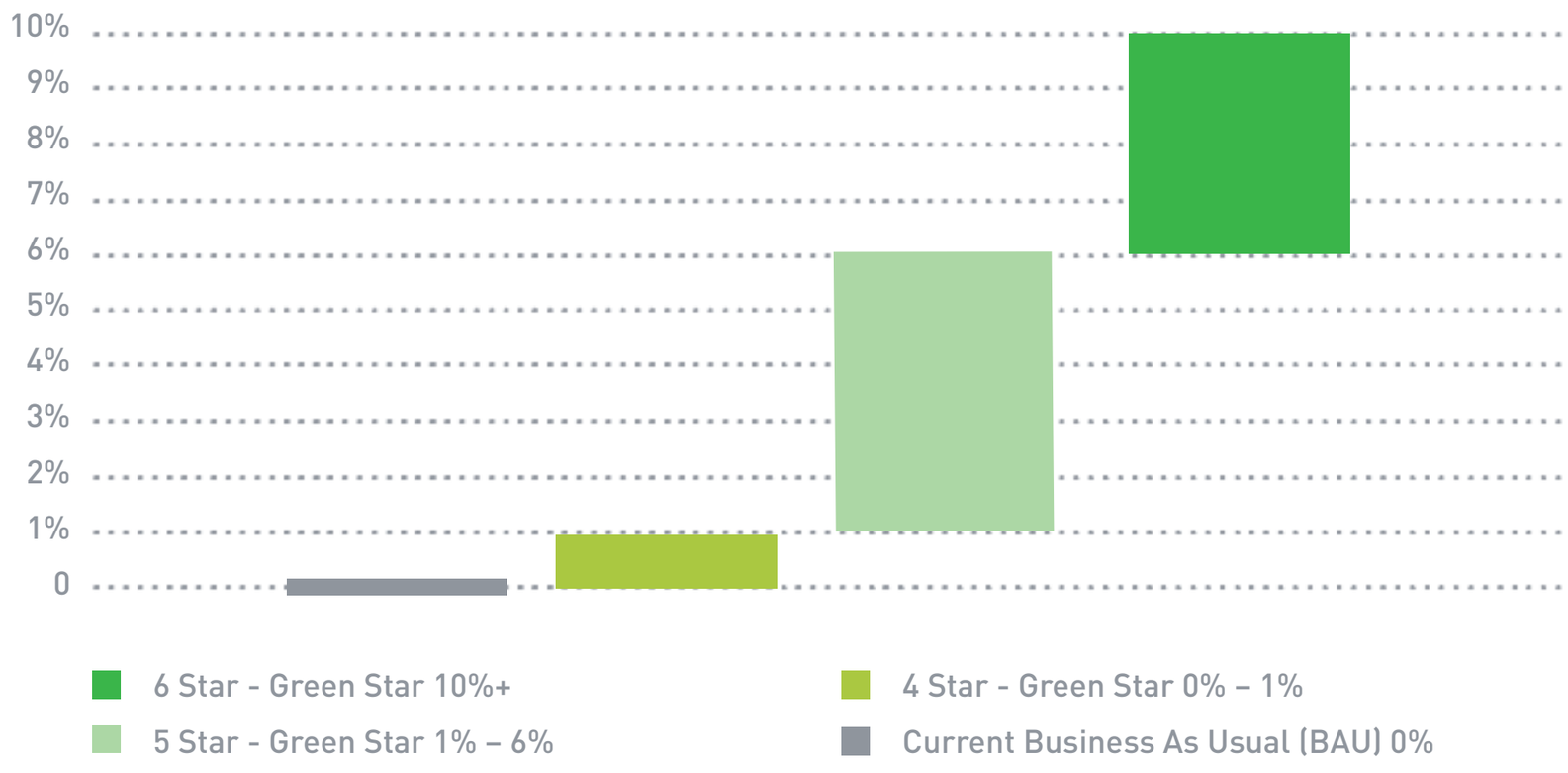


Retail

On projects Davis Langdon has been involved in, only a slight premium (less than 1%) has been recorded to achieve 4 Star Green Star. Cost premiums for 5 Star Green Star are approximately 5% and 6 Star Green Star are 10%+.

Nevertheless, the demand from shoppers is not as great as the demand from companies for sustainable office space, or even homeowners for sustainable housing. Most major chains have not shown any leadership in this area and until they begin to place demands on shopping centre owners there will not be enough groundswell for change.

Capital Cost Impacts (%)



Green Star Communities

The Green Building Council of Australia (GBCA) is in the early stages of developing a new rating tool, Green Star Communities, which will assess new and existing communities in Australia. It has developed an initial framework for nationally defining sustainable communities, in recognition that a long-term vision is required if Australia is to successfully meet the challenges of climate change, productivity, population growth, housing affordability and sustainability.

This national framework establishes five principles for sustainable communities and how they should be applied to projects and include liveability, prosperity, environmental quality, place making and urban governance. Importantly, the framework establishes the foundations for Green Star Communities, which will be the GBCA's newest tool to support Australia's transition to a sustainable, low-carbon future.

What is the GBCA Green Star Communities Project?

In partnership with VicUrban, the GBCA is developing a national framework for industry and Government to deliver best practice communities and precincts, which achieves environmental, cultural, social, governance and economic outcomes. The framework will contain a nationally agreed set of principles for delivering sustainable precincts, and be used by Governments to inform policy and, potentially, reward excellence during the planning approval process.

It is envisioned that the GBCA Communities Project will encompass residential, commercial and mixed use, and will guide and inform design, construction and performance reviews of new and existing communities. It may include a communities-style framework that could provide ratings of a community during its different phases such as:

- planning
- design
- build
- own/invest/occupy
- maintain
- revitalise and retrofit
- deconstruct/end of life

It may also include categories such as:

- climate and energy
- resource management
- transport
- ecology
- business
- community
- place making
- buildings
- governance

EMERGING ISSUES

Cost of Utilities

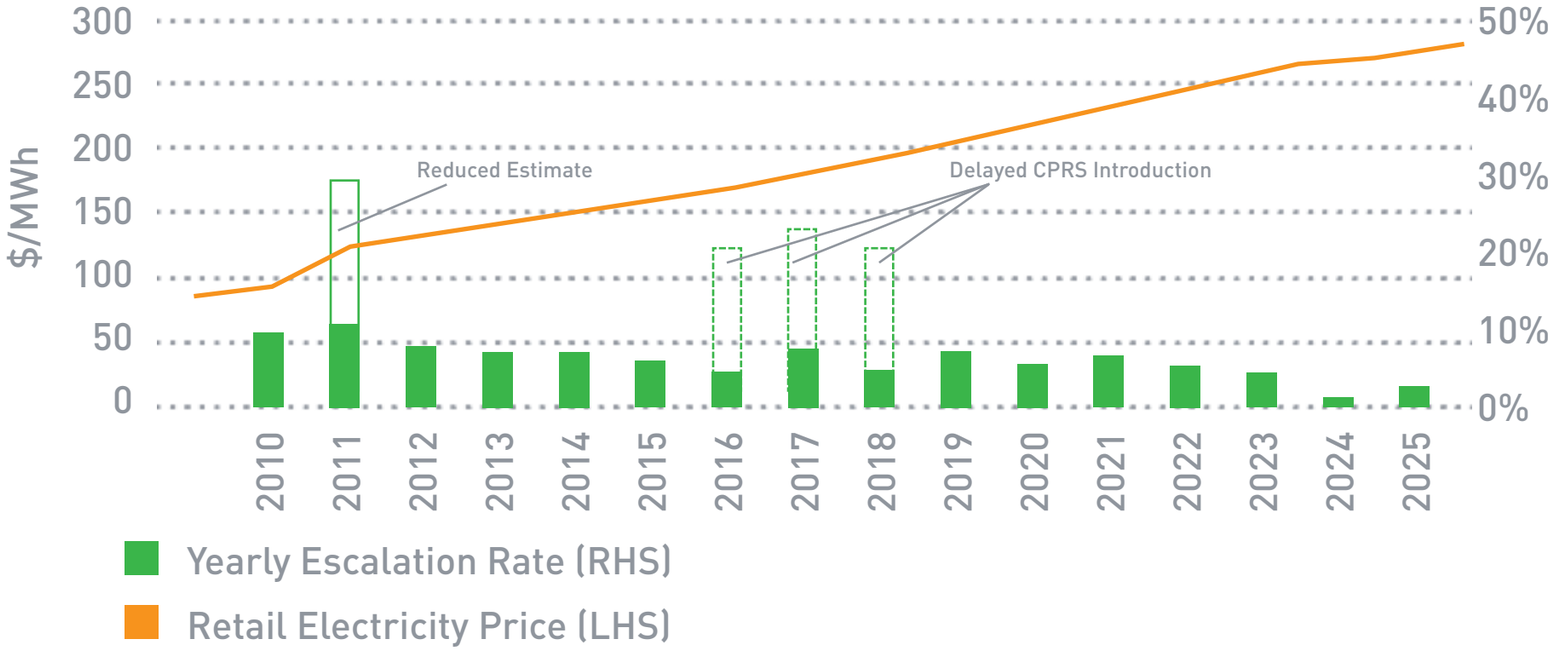
Electricity & Gas

As we move forward, any energy cost increase will start to make a significant impact on alternative energy solutions. The rush is already on to find a sustainable large scale alternative to coal. Globally, alternative power options are being utilised to varying degrees, including wind, hydrogen, solar, clean coal, nuclear and even geothermal power.

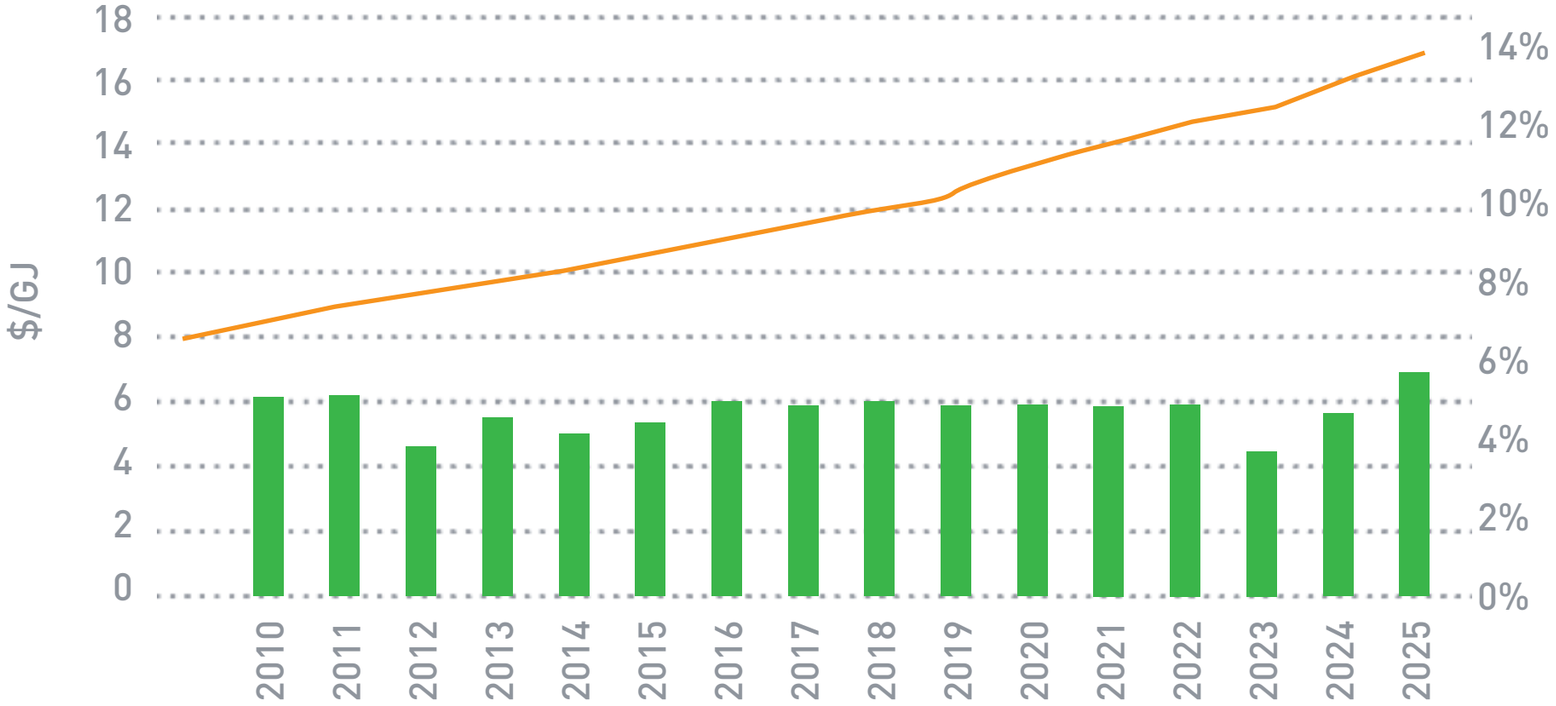
The following graphs detail the cost and escalation rates forecast for the next 15 years. Although these general rates of escalation are based on the introduction of the CPRS in 2011 – as originally planned by the Government – Davis Langdon estimates that the forecasts remain relevant with the exception of the spike in 2011. Electricity generators will continue to future proof their assets by investing in carbon mitigation research and development (at a cost to be passed onto consumers). There is an awareness that, whilst the current Government's leadership change has created uncertainty about whether the CPRS will remain shelved until 2015, some form of emissions trading or tax will occur within this decade.

Prices are adjusted to expected future values.

Retail Electricity Price Forecast – Federal Treasury



Retail Gas Price Forecast



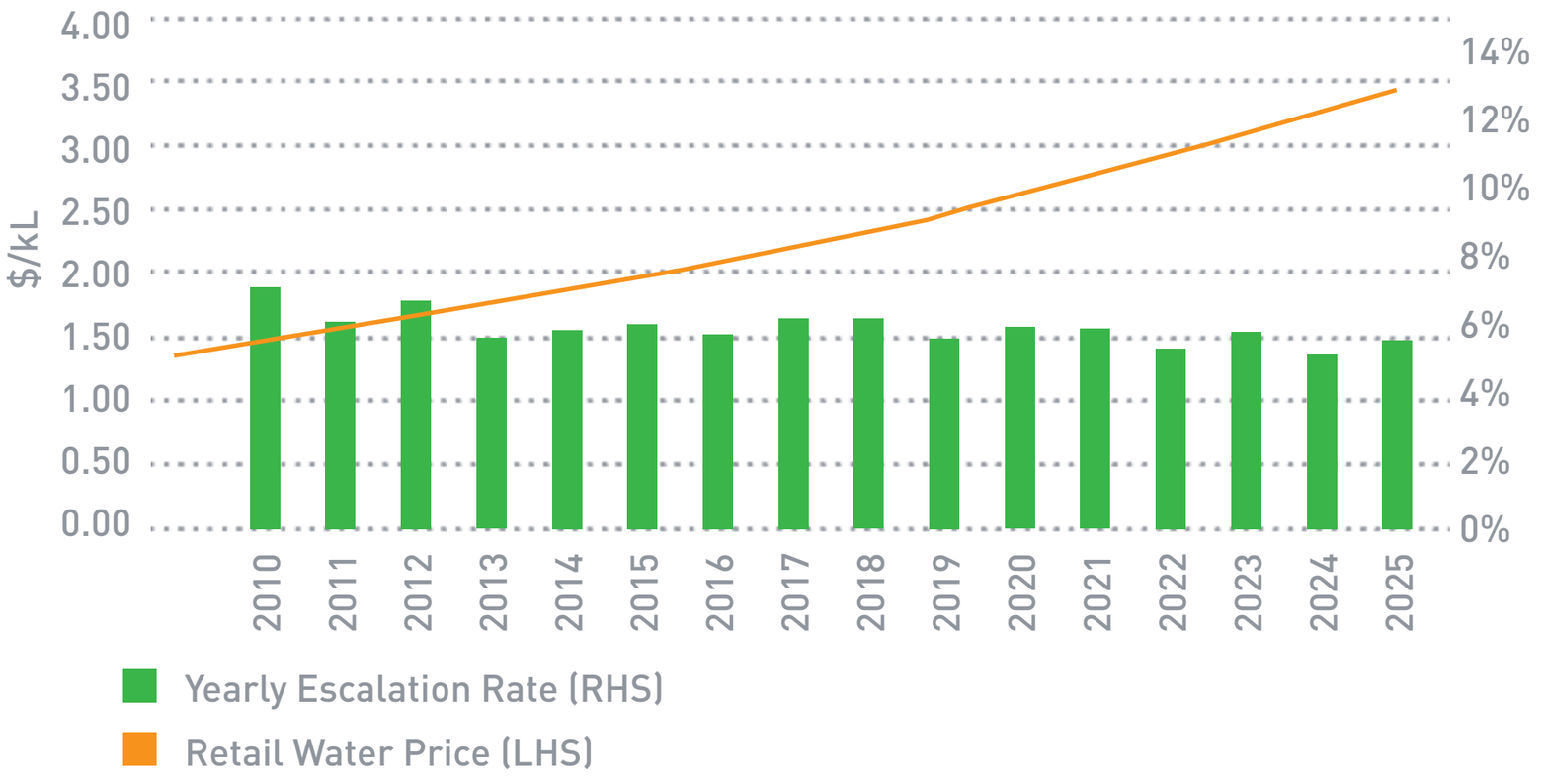
Cost of Utilities

Water

Irrespective of the chosen solution to Australia's growing water crisis, the fact remains that water is likely to get more expensive. A waterless future ultimately means: desalination, recycled water, third pipe systems, grey water, black water, water tanks and associated cost increases.

The following graph details the cost and escalation rates forecast for the next 15 years. Drought conditions around Australia have placed many regions under water restrictions. This drop in demand has reduced profitability for water retailers which has ultimately lead to higher prices. In an effort to combat diminishing water supplies, State Governments are planning new infrastructure to meet demand, resulting in a higher than trend expectation for water price escalation.

Retail Water Price Forecast – CSIRO



The Cost of 'Not' Going Green

Two factors which will profoundly change the way we think about green ratings are Energy and Water.

The public's perception of green has changed in recent years. The drought has crystallised the issue in the minds of the general public – almost everyone being affected by the water restrictions and the impacts on their gardens.

There has been a diametric shift from the 'tree hugging hippy' greenie image to a mainstream awareness of environmental issues which has permeated into almost every home. Awareness is also being raised amongst children who are taught about the need to conserve water and instilling the next generation with an environmental consciousness at a very early age.

This raised awareness also permeates into the workplace. Employees are seeing the advantages of working in improved environments which in many cases equates to working in a green building.

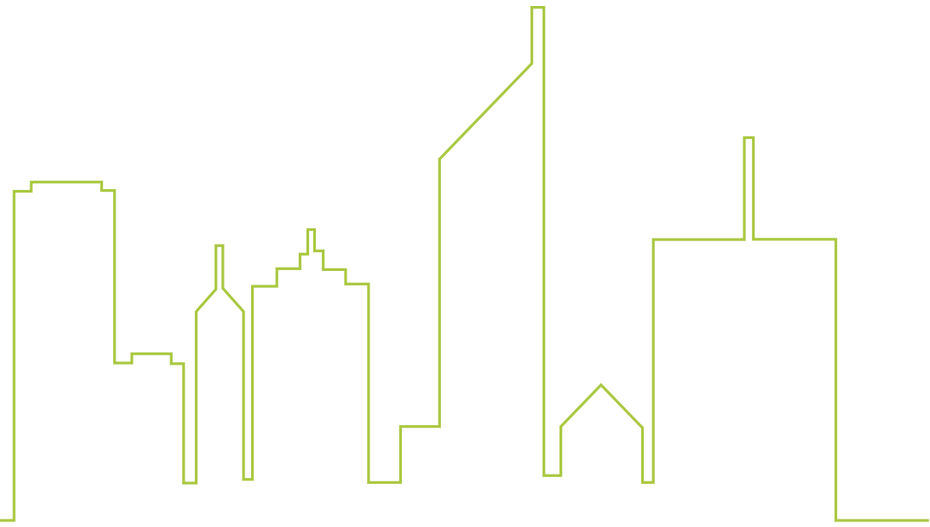
Publicity surrounding the improved working conditions provided by some companies will have a trickle down effect within the workplace. In a time where labour and skills shortages are on the increase the retention and productivity of staff is going to be of increasing importance.

With the developed world increasingly recognising greenhouse gas emissions as a non-traditional but real cost, it is inevitable that a carbon tax will be imposed on energy usage.

The intention: to deliver incentives to switch to more environmentally friendly supply and use of energy.

The logical progression from carbon taxes is a carbon trading system. Under an emissions trading scheme the 'cap' on emissions sets out what level of reduction is necessary under the program. The number of permits issued each year are lowered annually, encouraging the take up of clean or renewable energy alternatives.

In whatever form a new tax is imposed, a more energy efficient building will incur a lesser impact – acting as a safeguard to minimise the effects of future energy price increases.



Green Building Fund Program – Stream A

The Facts

The national Green Building Fund is a Government incentive-based program which aims to reduce the impact of the built environment from commercial office buildings. All six rounds of the program are now closed, however due to the over-subscription by building owners it is evident that incentives of this nature are capable of strongly enticing the private sector to improve energy efficiency in existing buildings.

The scheme was particularly aimed at reducing greenhouse gas emissions by minimising energy usage in the commercial sector through retro-fitting, upgrading and retro-commissioning of existing plants. The program aimed to provide $90 million in grants across five years (although this was achieved much sooner); it commenced in 2009 and was intended to continue until 2012/13.

The Grant

Grants for up to 50% of the project cost were awarded, ranging from $50,000 up to a maximum $500,000, for eligible expenditure items. Building owners therefore had an opportunity to reduce the cost of their capital expenditure by up to 50% where the Government will match building owners' capital cost on a dollar-for-dollar basis. Professional fees incurred during the construction phase of the project are also deemed eligible expenditure items and were subject to the grant.

Current Program Status

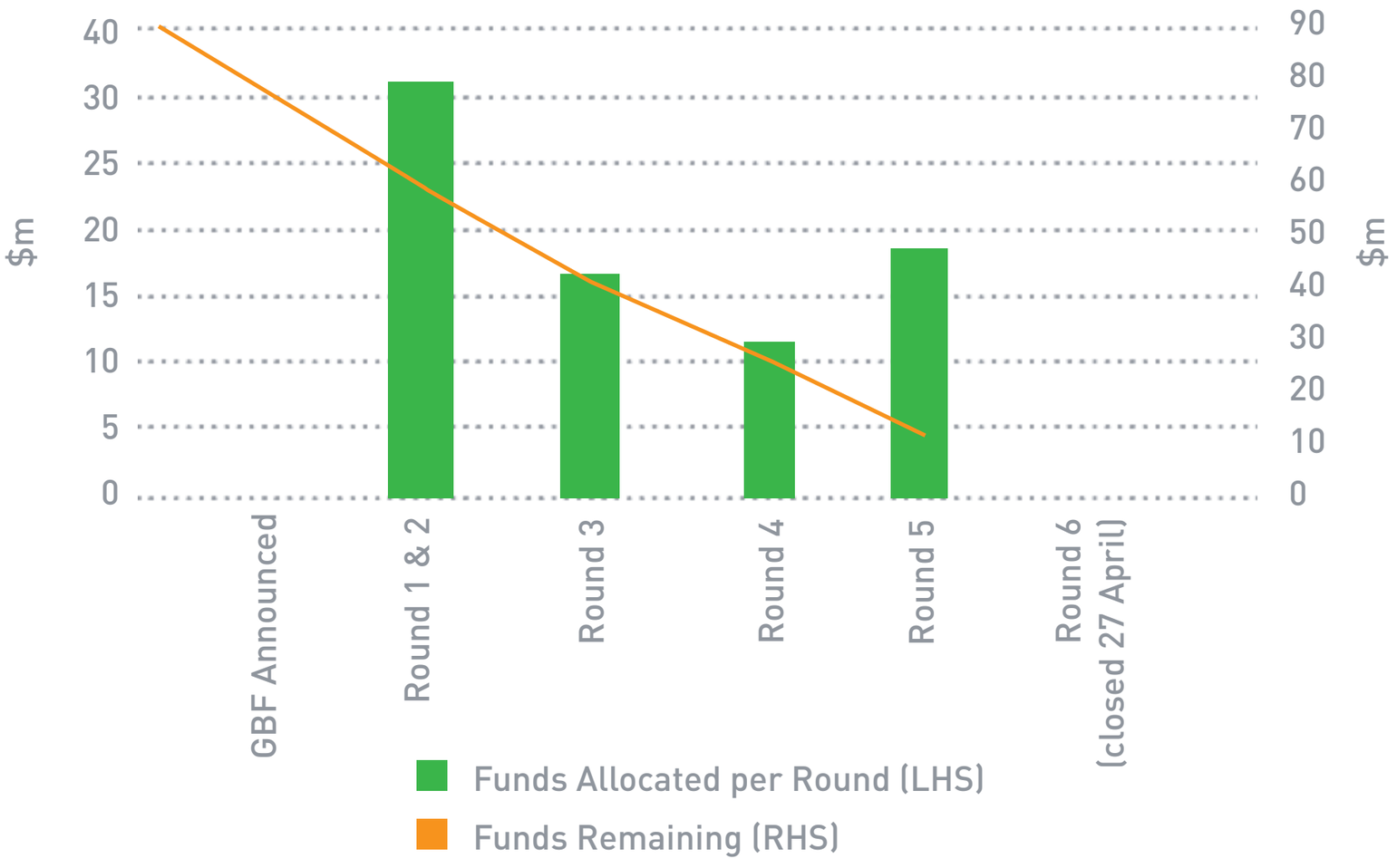
Although Round 6 results have not been released yet it is expected that the remaining $11 million will be allocated in this round.

Eligibility

All projects must be commenced by 31 December 2011 and must be completed within two years in order to be eligible. An applicant must meet specific ownership, tax, and commercial use including Net Lettable Area criteria to be eligible for a grant. The key requirement is being able to successfully demonstrate the level of greenhouse gas emissions prior to commencement of the project and the projected savings in greenhouse gas emissions likely to result from the project. This must be calculated using NABERS.

The works can involve upgrades and/or replacement of heating, ventilation and air conditioning (HVAC) systems, monitoring equipment, building automation systems, and control systems linked to improving energy efficiency. They can also include improvements to common area lighting and building fabric, for example glazing and shading.

Green Building Fund – Grant Allocations



Future Grants

The property industry is calling for additional grants either in the form of subsidised capital expenditure or accelerated 'green' depreciation to assist in the transition to an energy efficient future for our existing building stock. The postponement of the CPRS to no earlier than 2015 has amplified the argument for alternative solutions to be provided by the Government to incentivise the built environment to reduce its emissions intensity.

BCA 2010

The Australian Government has agreed on a comprehensive 10 year strategy to accelerate energy efficiency improvements for householders and businesses across all sectors of the economy. In July 2009 the Council of Australian Governments (COAG) signed the *National Partnership Agreement on Energy Efficiency*, which will deliver a nationally consistent and cooperative approach to energy efficiency, encompassing:

- assistance to households to reduce energy use by providing information and advice, financial assistance and demonstration programs
- assistance to business and industry to obtain the knowledge, skills and capacity to pursue cost-effective energy efficiency opportunities and therefore meet the challenges of a low carbon economy
- higher energy efficiency standards to deliver substantial growth in the number of highly energy efficient homes and buildings, and provide a clear road map to assist Australia's residential and commercial building sector to adapt
- nationally consistent energy efficiency standards for appliances and equipment and a process to enable industry to adjust to increasingly stringent standards over time
- introducing new standards in 2010 for the energy performance of air conditioners and increasing the standard by a further 10% from 1 October 2011
- addressing potential regulatory impediments to the take up of innovative demand side initiatives and smart grid technologies
- Governments working in partnership to improve the energy efficiency of their own buildings and operations
- a detailed assessment of possible vehicle efficiency measures, such as CO_2 emission standards, which international studies have indicated have the capacity to reduce fuel consumption by 30% over the medium term, and significantly contribute to emission reductions

All regulatory measures will be subject to the normal regulatory impact assessment. In addition to an $88 million commitment for joint measures, the strategy builds on the substantial investments and commitments being made by all jurisdictions to driving energy efficiency in their own jurisdictions.

Part of the Australian Government's policy for greenhouse gas emission reduction includes significant improved energy efficiency in buildings. COAG announced that it would request the Australian Building Codes Board (ABCB) to increase the energy efficiency provisions in the 2010 edition of the Building Code of Australia (BCA). For residences it sets the stringency at a 6 Star rating subject to cost effectiveness. For commercial buildings the target is a 2:1 benefit to cost ratio, again subject to cost effectiveness. The target for commercial buildings is a significant reduction from the 4.9:1 benefit to cost ratio for the BCA 2006 measures. Some of the key changes included in the 2010 version of the BCA include:

- an increase in the specification for wall insulation
- more stringent glazing requirements
- pool and spa pump power requirements are now included
- JV3 modelling parameters and method has been amended to reflect user feedback
- changes to lighting requirements
- changes to Class 3 (hotels, motels etc) air conditioning controls and changes to the requirement of door seals for all building types

There Are Alternatives

Arguably, many of the energy usage issues we are facing today have come about as a result of cheap energy. However as we move forward the impact of energy cost increases will start to make a significant positive impact on the feasibility of alternative energy sources.

The rush is already on to find a sustainable large scale alternative to coal. Globally, alternative power options are being utilised to varying degrees, from wind to hydrogen, solar, clean coal and nuclear. Even geothermal power – generating superheated steam from deep beneath the earth's surface – may become an option in the near future. These are but some of a long list of initiatives that may be considered.

A waterless future

A waterless future ultimately means cost increases: desalination, recycled water, third pipes, grey water, black water, water tanks, etc.

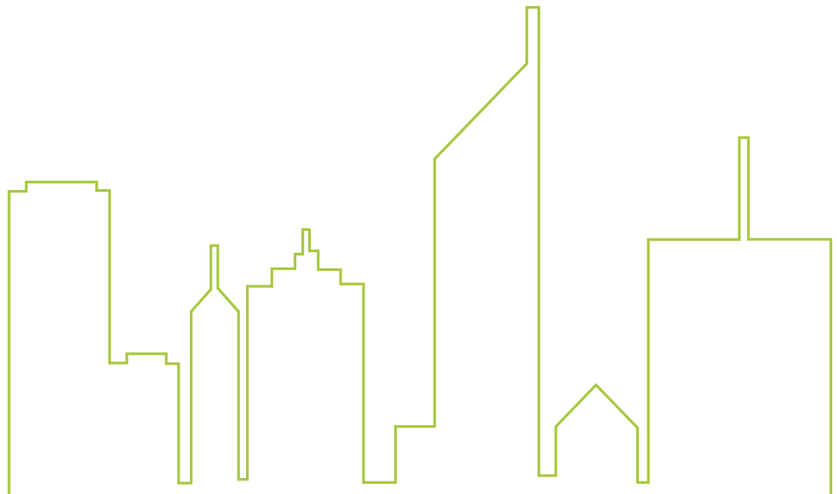
Irrespective of the chosen solution to Australia's growing 'water crisis', the fact remains that water is going to get more expensive. Water falling out of the sky is cheap... considerably cheaper than, for example, water falling from the sky into the sea, harvested and desalinated.

Productivity

Keeping in mind that the greatest cost to business is that of salaries, any improvement in productivity, through occupant comfort, lighting, temperature and increased natural ventilation, etc will have a major impact on the bottom line.

The Building Commission of Victoria indicates that optimal levels of Indoor Environmental Quality would increase Australian workforces' productivity by 30%.

There is still a lack of consensus about productivity benefits derived from green buildings: whilst 'real' in the short term, little long term research has been undertaken regarding the ongoing productivity benefits obtained from green buildings. Davis Langdon has taken the view that the capital cost and 'real' operational/recurrent benefits will need to speak for themselves and the benefits of productivity will be an added bonus, but are unlikely to be the deciding factor when assessing the viability of the green business case. More emphasis needs to be given to Life Cycle Assessment (LCA) in the assessment of ESD attributes.



EMBODIED CARBON METRIC (ECM)

Embodied Carbon Metric (ECM)

The World Resources Institute[1] has estimated the world total greenhouse gas emissions in 2005 at 44,153 $MtCO_2$-e (this is equivalent to the annual emissions of approximately 10 billion passenger vehicles). The operation of buildings equates to 16.5% of these emissions, 10.2% for residential and 6.3% for commercial buildings. Electricity use is the main contributor followed by direct fuel combustion.

Emissions from the manufacturing and construction industries were accountable for 24.4% of the world's total emissions. Prominent contributors to this sector total include:

- cement industry (20%)
- chemicals and petrochemicals industry (17%)
- iron and steel industry (16%)
- aluminium/non-ferrous metals (5%)

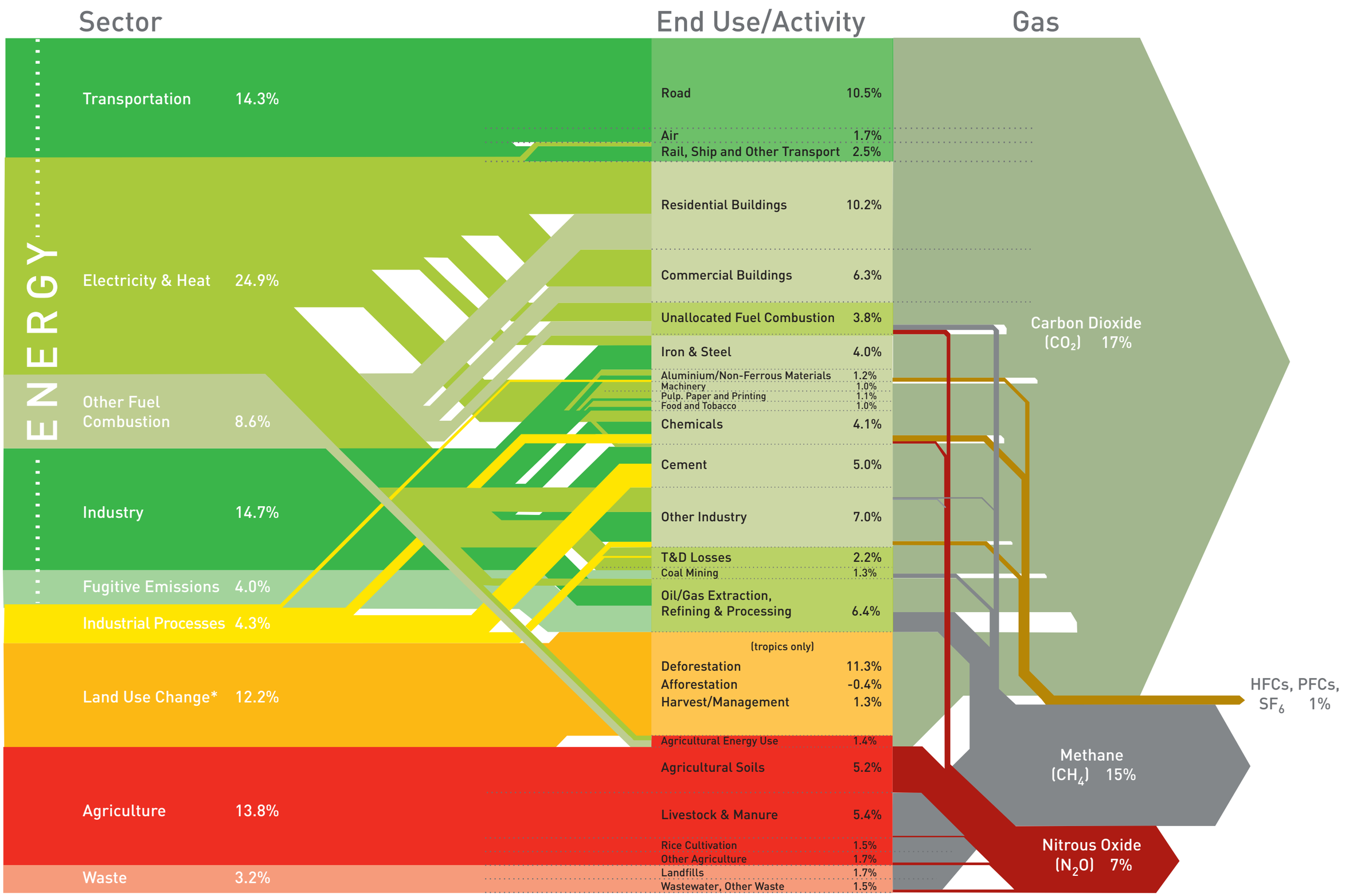
According to the Centre for International Economics[2], 23% of Australia's total greenhouse gas emissions are a result of energy demand in the building sector. Studies further suggest the embodied energy in buildings may be equivalent to 11-23 years worth of operational energy, depending on the complexity of the building.

Government incentives such as the National Greenhouse and Energy Reporting Scheme and the Renewable Energy Target are also likely to affect the industry and push for more sustainable property practices.

1. World Resources Institute. (2005). World Greenhouse Gas Emissions in 2005.
2. Centre for International Economics Canberra & Sydney. (2007). Capitalising on the building sector's potential to lessen the costs of a broad based GHG emissions cut.

Embodied Carbon Metric (ECM)

World Greenhouse Gas Emissions
In 2005. Total 44,153 $MtCO_2$ eq.



Sources & Notes: World Resources Institute (2005). World Greenhouse Gas Emissions in 2005. All data are for 2005. All calculations are based on CO_2 equivalents, using 100-year global warming potentials from the IPCC (1996), based on a total global estimate of 44,153 $MtCO_2$ equivalent. * Land Use Change includes both emissions and absorptions, and is based on analysis that uses revised methodologies compared to previous versions of this chart. These data are subject to significant uncertainties.

Embodied Carbon Metric (ECM)

Davis Langdon believes operational as well as embodied greenhouse gas emissions in new projects will continue to be one of the biggest challenges facing the property and construction industry. For graphic animation of what a Life Cycle Assessment is, please click here.

In order to help clients make informed design decisions, not only around financial costs, operational efficiencies and Green Star compliance, but also around the greenhouse gas legacy of buildings, we have developed the Embodied Carbon Metric (ECM).

The ECM calculates the embodied greenhouse gas emissions of proposed developments, assisting with material selection in the design process as well as the calculation of the overall carbon footprint of the development.

The concept of the ECM is based on the award winning Davis Langdon UK tool, the Carbon Ready Reckoner, which was recognised by the Chartered Institute of Building (CIOB) in the International and Innovative Research Awards 2008-09. Calculations are however based on Australia-specific emission factors derived using a life cycle assessment approach including emissions from the extraction of raw materials, primary energy sources, manufacture, transport and on-site construction.

The ECM will help avoid higher than desired carbon content and additional costs by enabling selection of construction materials in the design process that reduce a development's overall carbon footprint. Direct and indirect benefits include:

- the opportunity for environmental benefits through the enabling of material selection based on embodied carbon intensity
- the opportunity to design a development with lower embodied carbon enabling a clear path to achieve carbon neutrality
- improved brand reputation
- improved tenant and employee interest, engagement & awareness
- long term tenant and employee retention

In the same way that operating and maintenance costs need detailed consideration, it is important that the day-one carbon impact of a project is understood and mitigated. A low-energy building may have a wind turbine, photovoltaics and insulation, but unless there is an accurate assessment of how much carbon has been emitted in construction, it is impossible to effectively calculate the building's overall carbon impact.

The ECM enables this imperative measurement, allowing developers and design consultants to use optimal materials and practices to achieve a low carbon outcome.

Embodied Carbon Metric (ECM)

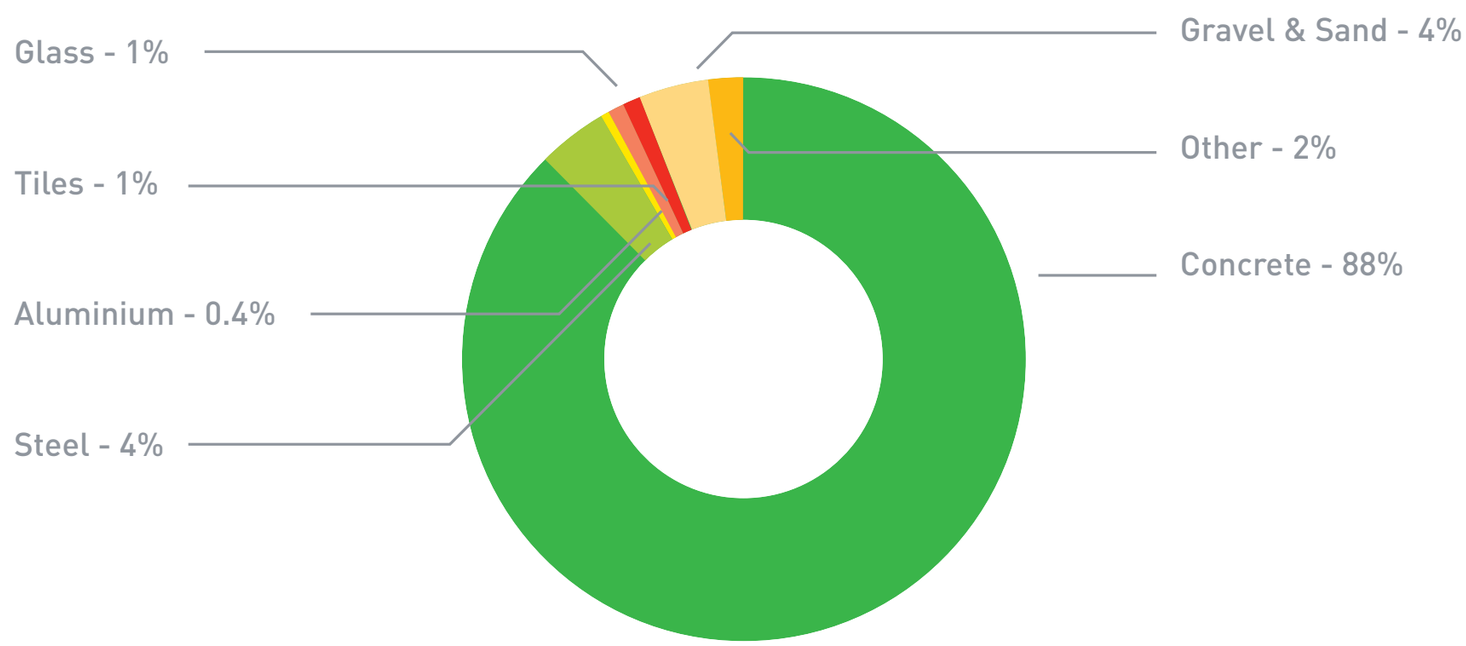
The Embodied Carbon Metric was used in 2009-10 in the design stage for a university building development in NSW. The developer was targeting 6 Stars under the Green Star Education v1 tool and was therefore considering a range of initiatives to improve the overall sustainability performance of the development.

A number of scenarios and design options were modelled including a current industry practice scenario and an improved performance scenario.

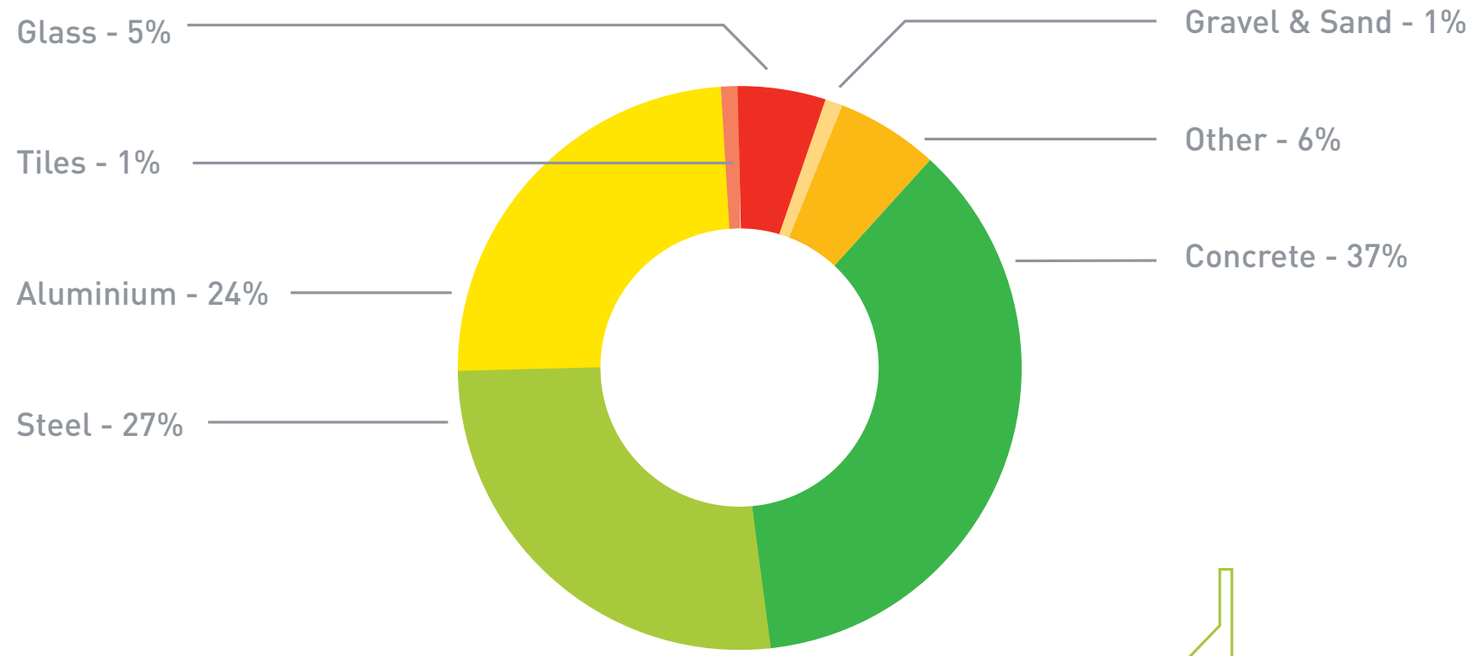
The current industry practice scenario resulted in an overall carbon footprint of 7,655 tonnes of CO_2-e. This is equivalent of driving a passenger car 684 laps around the equator or the equivalent annual electricity use of 1,192 Australian households.

By introducing a number of sustainability initiatives, e.g. cement replacement in concrete using ground granulated blast furnace slag and lowering of concrete strength where applicable, an overall reduction in embodied greenhouse gas emissions of over 16% was proven simple to achieve without significant cost implications.

Material Input by Weight



Contribution to Carbon Footprint



"BY INTRODUCING A NUMBER OF SUSTAINABILITY INITIATIVES, E.G. CEMENT REPLACEMENT IN CONCRETE USING GROUND GRANULATED BLAST FURNACE SLAG AND LOWERING OF CONCRETE STRENGTH WHERE APPLICABLE, AN OVERALL REDUCTION IN EMBODIED GREENHOUSE GAS EMISSIONS OF OVER 16% WAS PROVEN SIMPLE TO ACHIEVE WITHOUT SIGNIFICANT COST IMPLICATIONS."

GOVERNMENT INCENTIVES AND REGULATIONS

National Greenhouse and Energy Reporting System

In 2007, the Australian Government introduced the National Greenhouse and Energy Reporting[3,4](NGER) Act 2007 as a framework for corporations to report on energy use, energy supply and greenhouse gas emissions to the Department of Climate Change. Under the Act, registration and reporting is mandatory for corporations above certain thresholds. The first annual reporting period began on 1 July 2008 with registration required by end of August and reporting by end of October after each reporting year. Emission and energy data is reported using the Online System for Comprehensive Activity Reporting (OSCAR).

The objectives of the NGER Act are to:

- underpin the introduction of an emissions trading scheme
- inform Government policy formulation and the Australian public
- help meet Australia's international reporting obligations
- assist Commonwealth, State and Territory Government programs and activities
- avoid the duplication of similar reporting requirements in the States and Territories

Facility Thresholds

Corporations with operational control of a facility with greenhouse gas emission exceeding 25 kilotonnes of CO_2-e, or an annual energy utilisation or supply of 100 TJ or more, is required to register and report under the Act. These thresholds do not change over time.

Corporate Thresholds

Included in a corporate threshold is the controlling corporation itself as well as subsidiaries, joint ventures and other partnerships. The threshold for corporate groups was for the 2008-09 financial year, 125 kt CO_2-e and the use or supply of 500 TJ or more of energy. These thresholds will decrease during the first three years of reporting, requiring increasingly more corporations to report on their emissions and usage.

	First Reporting Year 2008-09	Second Reporting Year 2009-10	Third Reporting Year 2010-11	Fourth & onwards 2011-12+
Facility Thresholds	25kt 100TJ			
Corporate Group Thresholds	125kt 500TJ	87.5kt 350TJ	50kt 200TJ	
Corporations to apply for registration by	31 August 2009	31 August 2010	31 August 2011	31 August 2012
Corporations to provide data report by	31 October 2009	31 October 2010	31 October 2011	31 October 2012
Government to publish data by	28 February 2009	28 February 2010	28 February 2012	28 February 2012

3. Australian Government. Department of Climate Change. 'National Greenhouse and Energy Reporting'.
4. Australian Government. Department of Climate Change. (2008). National Greenhouse and Energy Reporting Guidelines.

Greenhouse Gas Reporting

Greenhouse gases included for reporting are those covered under the Kyoto Protocol. Greenhouse gas emissions are reported in accordance with the *Greenhouse Gas Protocol: a corporate accounting and reporting standard*[5] and the *Standard for Greenhouse Gases - Part 1: specification with guidance at the organisational level for quantification and reporting of greenhouse gas emissions and removals (ISO 14064-1)*[6]. Reporting of Scope 1 and Scope 2 emissions is mandatory under the system while reporting of Scope 3 emissions is voluntary.

Scope 1: Direct greenhouse gas emissions

Direct greenhouse gas emissions occur from sources that are owned or controlled by the company.

Scope 2: Electricity indirect greenhouse gas emissions

Scope 2 accounts for greenhouse gas emissions from the generation of purchased electricity consumed by the company.

Scope 3: Other indirect greenhouse gas emissions

Scope 3 greenhouse gas emissions allows for the treatment of all other indirect emissions. Scope 3 emissions are a consequence of the activities of the company but occur from sources not owned or controlled by the company.

5. World Resource Institute and the World Business Council for Sustainable Development
6. International Organization for Standardization

Emissions Reporting Schemes

The proposed Carbon Pollution Reduction Scheme (CPRS) was designed as a cap and trade based emissions trading scheme aimed to help Australia reduce our greenhouse gas emissions in the most flexible and cost effective way. The CPRS legislation was first introduced to Parliament in May 2009, but was voted down twice. In February 2010, legislation to implement the scheme was introduced to the Parliament for the third time.

On 27 April 2010, the Government announced a deferral of its attempts to implement the CPRS by July 2011. Instead it will undertake a review of global developments on climate change towards the end of 2012 and then reconsider introducing the CPRS (if it is still in Government).

The Government remains committed to its target of reducing Australia's greenhouse gas emissions by 5% by 2020, which it submitted under the Copenhagen Accord. The delay of the CPRS means that other policies will be required to achieve these emissions reductions, such as the Renewable Energy Future Fund, which was announced as part of the Budget in May 2010. It will be funded from the estimated $652.5 million saved from the delay to the CPRS.

Businesses now face uncertainty around the transition to a low-carbon economy, however, it is still recommended that preparations be made, such as the inclusion of an express contractual provision which specifies the allocation of carbon costs in any new procurement contracts.

Currently, there are also several State-based energy efficiency schemes in operation, which require the electricity sector to help reduce energy consumption. In New South Wales, ACT and Victoria, these are 'white certificate' trading schemes, while in Queensland and South Australia there is no trading component. The Government in Western Australia has referred to implementing similar energy efficiency measures in the past, however, at the time of this publication, there were no indications that this would occur. Currently there are no such programs in place in Tasmania or the Northern Territory[7].

7. ASBEC – The Second Plank

Emissions Reporting Schemes

New South Wales

In NSW and ACT, the NSW Energy Efficiency Trading Scheme (NEET) was introduced in January 2009 as a component of the broader Greenhouse Gas Reduction Scheme (GGAS) which began in 2003. This helps achieve the state's current target of 7.27 tCO_2-e of greenhouse gas emissions per capita by setting individual yearly targets for the participants (mainly electricity retailers)[8].

Key features of NEET:

- targets can be met by generating or buying certificates, called New South Wales Greenhouse Abatement Certificates (NGACs), for approved energy efficiency activities
- liable parties are subject to a penalty if they fail to comply, but are allowed to carry forward a shortfall of up to 10% of their greenhouse benchmark from one year to the next
- trading of certificates aim to encourage innovation and the capacity of the private sector to find cost-effective actions

NGACs can be created through:

- reduced emissions electricity generation
- project-based activities that reduce the consumption of electricity
- carbon sequestration
- industrial activities that cut emissions but are not directly related to electricity consumption

Victoria

The Victorian Energy Efficiency Target (VEET), introduced in January 2009, aims to reduce greenhouse gas emissions in the residential sector by addressing market barriers to energy efficiency in households. It sets a target for energy savings, and allocates this to electricity and gas retailers, requiring them to meet their own targets through energy efficiency activities. For the first three years of the scheme (2009, 2010 and 2011), the scheme target will be set at 2.7 million tonnes of CO_2-e equivalent per annum.

Key features of VEET:

- energy savings will be accredited via tradeable certificates known as Victorian Energy Efficiency Certificates (VEECs), where one VEEC represents the lifetime abatement of one ton of carbon dioxide equivalent
- households will be encouraged to take up energy efficiency activities that are eligible to generate certificates – for example through discounts on energy efficient appliances or the free replacement of incandescent lamps
- energy retailers may have certificates in excess of their targets in which case they may on-sell these to other retailers in the market who may not have reached their individual targets
- by obligating energy retailers, the program aims to encourage energy efficient behaviours in their client base, accelerating energy efficient consumer choices

Key considerations regarding VEECs:

- created through a list of regulated energy efficiency activities
- activities are currently in the household sector, but will be reviewed every six months and may also move into the small commercial sector in the future
- once VEECs are created (through householder activity consent forms), they may be sold to energy retailers

8. Dr David Crossley, States Take the Lead, DSM Spotlight, January 2009

Emissions Reporting Schemes

South Australia

The Residential Energy Efficiency Scheme (REES) was also introduced in January 2009 and sets targets for electricity and gas providers in South Australia, however, there is currently no trading component in the program.

Key features of REES:

- energy providers, and their contractors, will offer incentives to adopt energy saving measures, such as more efficient lighting and appliances
- there is a focus on low income households as providers are required to make sure they meet at least one third of their targets in low income households and must also deliver a set amount of energy audits per year to low income households
- unlimited 'banking' of credits by retailers is permitted and they may choose to carry those credits over to help meet future targets or they can transfer them to another obliged retailer, enabling a limited amount of trading

Queensland

The Queensland Government's Smart Energy Savings Program (SESP) was introduced in July 2009 and aims to drive energy saving improvements in Queensland businesses, but does not have a trading element. The program will require participating businesses to undertake an energy audit, develop an Energy Savings Plan and publish their actions for each relevant site, on a five-yearly cycle.

The initiative aims to increase the adoption of energy efficient technologies and practices by businesses, particularly in the commercial and industrial sectors, and improve business competitiveness by reducing energy costs. It will be introduced progressively over time with the amount of energy a business must consume before they are required to participate lowered over time.

Steps for businesses in the SESP:

- audit energy use and identify energy savings measures
- the audit will need to comply with a Level 2 Energy Audit under Australian Standard AS/NZS 3598:2000, as a minimum requirement
- produce an Energy Savings Plan of measures to implement, publish a public commitment on the actions to be taken and annually update this commitment
- in the third year, review progress and in the fifth year, collect baseline data for the next cycle

Architect: Lyons

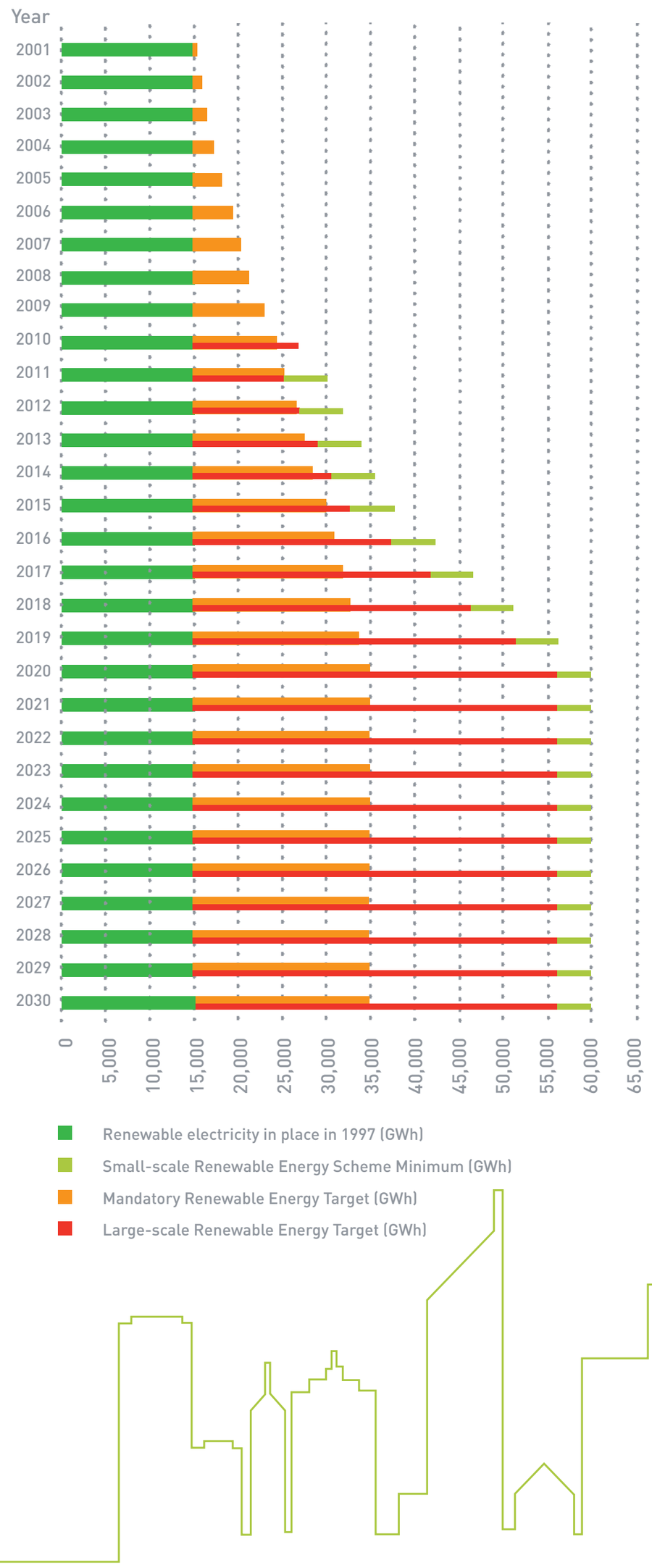
Renewable Energy Target

The Australian Government announced in August 2009 the update and expansion for 2010 until 2030 of the Mandatory Renewable Energy Target (MRET) which began in 2001, now to be called the Renewable Energy Target[9] (RET). The scheme has been designed in cooperation with State and Territory Governments through COAG.

The updated target requires 45,000 GWh of Australia's electricity generation to be supplied from renewable energy sources by 2020. From 2021 to 2030 the target will be fixed at 45,000 GWh, after which the RET will cease operation. The targets refer to renewable electricity in excess of the 15,000 GWh that was already in place in 1997, i.e. a total of 60,000 GWh. With the total electricity generation in 2020 projected to be 300,000 GWh, this corresponds to an overall renewable electricity component of 20%. With the national RET scheme the Government is hoping to provide an incentive to accelerate use of renewable energy sources and to reduce bureaucracy by going from State-based targets to one national scheme.

The scheme will operate through the trade in Renewable Energy Certificates (RECs). One REC is created for each MWh of accredited renewable electricity generated. Wholesale purchasers of electricity must acquire and surrender RECs. Failure to comply with the scheme results in a fine in form of a shortfall charge of $65 per MWh, maintained in nominal terms over the life of the scheme.

Eligible energy sources for the creation of RECs are renewable energy sources as well as current waste coal mine gas-fuelled power stations. The inclusion of the non-renewable waste coal mine gas under the RET was to ensure these facilities remain viable. Waste coal mine gas will no longer be eligible from 2021 and the ability to create RECs is further restricted based on their 2008 output levels. To correct for the inclusion of non-renewable sources in the RET, the annual targets under the scheme for 2011 to 2020 were adjusted. Also a review will be undertaken to consider whether new waste coal mine gas projects should be eligible under the target.



9. Australian Government. Department of Climate Change. 'Renewable Energy Target'.

Renewable Energy Target

Renewable Energy Sources

Energy Source
hydro
wave
tide
ocean
wind
solar
geothermal aquifer
hot dry rock
energy crops
wood waste
agricultural waste
waste from processing of agricultural products
food waste
food processing waste
bagasse
black liquor
biomass based components of municipal solid waste
landfill gas
sewage gas and biomass based components of sewage
any other energy source prescribed by the regulations

From January 1, 2011, the RET will consist of two components:

- a Small-scale Renewable Energy Scheme (SRES) covering small-scale technologies such as solar panels and solar hot water systems
- a Large-scale Renewable Energy Target (LRET) covering projects like wind farms, commercial geothermal and solar

The REC price will be fixed at $40. Entities liable to purchase RECs will be obligated to purchase from both the SRES and the LRET.

Small-scale Renewable Energy Scheme (SRES)

Renewable Energy Certificates (RECs) created by small-scale solar, wind and hydro electricity systems units installed on or after 9 June 2009 will be eligible for Solar Credits. A multiplier will be used, initially allowing the generation of multiple RECs for each MWh of generated energy. The Solar Credits will be available for the first 1.5 kilowatts (kW) of installed capacity. The RET scheme will also allow for banking of RECs for sale or surrender in later years of the scheme without limitations.

Year	Multiplier
2009/10	5
2010/11	5
2011/12	5
2012/13	4
2013/14	3
2014/15	2
2015/16 onwards	No Multiplier

Large-scale Renewable Energy Target (LRET)

The LRET target for 2020 is 41,000 GWh but will be increased if the uptake of small scale technologies is lower than anticipated.

Clean Energy Initiative

The Clean Energy Initiative[10,11] (CEI) was introduced by the Australian Government in May 2009 to complement the CPRS and RET. The initiative, administered by the Department of Resources, Energy and Tourism, supports research, development and use of low-emission energy technologies through the Carbon Capture and Storage (CCS) Flagships Program, the Solar Flagships Program and the establishment of a new body, Renewables Australia (RA), under the Minister for Resources and Energy in 2009-10.

Targets for the initiative are the creation of 1,000 MW of low emission fossil fuel generation through large-scale integrated carbon capture and storage projects in Australia and 1,000 MW of electricity generation through new large-scale solar power stations in Australia. The selection of CCS and Solar Flagship projects is expected to be completed during 2010 with construction commencing in 2012.

10. Australian Government. Department of Climate Change. Clean Energy Initiative.
11. Australian Government. Department of Resources, Energy and Tourism (2009). Clean Energy Initiative.

OFFICE BUILDINGS

Mandatory Disclosure of Energy Efficiency

COAG has agreed that a national scheme for reporting energy efficiency in the commercial office market is required. This could have significant ramifications for property owners. As part of the National Framework for Energy Efficiency, draft legislation for Mandatory Disclosure of Commercial Office Building Efficiency was released for industry comment, a State Committee Report was completed and the Bill was passed in June 2010.

Disclosure obligations will begin in October, however, following consultation with industry stakeholders, the Government decided to minimise the reporting requirements for the first 12 months. The intent of the scheme is to provide potential buyers and tenants with accurate energy performance details that can be used to compare buildings on a like-for-like basis.

Components of the Scheme

Initially, only Class 5 office buildings[12] will be required to disclose the energy efficiency upon sale or lease of the whole building, tenancy or sub-lease space of greater than 2,000m^2.

These are office buildings used for professional and commercial purposes excluding retail, car parks, storerooms, showrooms and storage as per the BCA. The NABERS Office Energy rating tool will be used across all states however it excludes the use of Green Energy. The rating must be disclosed in any advertisement about a sale or lease. The scheme is mandatory for corporations and the Crown, however, non-corporate entities can participate voluntarily.

During the transitional period from October 2010 to October 2011, the only requirement will be the disclosure of a valid NABERS Energy base or whole building rating.

After that time, all prospective tenants or buyers must be provided with a Building Energy Efficiency Certificate (BEEC) which:

- is valid for one year and summarises the performance of the building, including the efficiency of lighting in the building
- includes suggestions on how to improve the energy efficiency of the building
- must be sent by the building owner (or tenant in the case of a sub-lease) to a central registry

The final legislation also reduced the maximum penalties, which were initially expected to reach $110,000 for every day that this information about the building is not disclosed.

The tenancy lighting assessment will benchmark the existing tenancy lighting (that will be passed on to the incoming tenant or building owner) against best practice. Assessors will complete a survey of the lighting and enter data into a calculator. The survey will be undertaken with the NABERS Energy assessment. A prototype calculator has been developed and will be refined over the coming months.

Mandatory Disclosure of Energy Efficiency

The Government estimates that the average cost of preparing a BEEC will be around $6,000, but for more complex buildings the cost could be as high as $15,000. However, this is assumed to include the lighting component, which the Senate Committee Report recommended delaying until a proper process for measuring this component had been decided upon by the Department of Climate Change and Energy Efficiency.

Mandatory disclosure for commercial buildings will be implemented in two phases:

- phase one involves implementing a national mandatory disclosure scheme for commercial office buildings
- phase two involves consideration of expanding mandatory disclosure to other commercial building types, including hotels, retail buildings, schools and hospitals, subject to regulatory impact assessment

Net Lettable Area	Building/ Tenancy Type	Star Rating (excluding Green Power)	Building Energy Efficiency Certificates (every 1 year)
>2,000m²	Whole Building	✓	✓
>2,000m²	Tenancy	✓	✓
>2,000m²	Sub-lease	✓	✓

Where the NLA is less than 2,000m², energy disclosure is voluntary.

Green Leases

Green Leases are likely to become more prevalent as building owners drive further commitment from their tenants in ensuring the environmental performance set by the building's sustainable attributes. The term 'Green Lease' refers to the agreement of a lease between a landlord and tenant which provides both parties with the opportunity to set standards and achieve their environmental goals and aspirations. It governs the management and operation of a building or tenancy to encourage environmentally sustainable operation of the building/tenancy, through control of the usage of energy and water, and management of waste.

From the landlord's point of view, a Green Lease ensures that any tenant occupying their building uses the building the way it has been set up. From the perspective of the tenant, it ensures that the building is run with environmental efficiency and indoor health. By addressing the different drivers which both the landlord and tenant have in owning or occupying a sustainable building, Green Leases encourage both parties to work together to enhance their collective sustainability and therefore reduce their impact.

12. As defined by the Building Council of Australia (BCA)

Existing Buildings

Our research has shown that sustainable refurbishment produces a return of better than 10% on investment. A study[13], titled *Existing Buildings Survival Strategies: Making It Happen*, guides building owners through a step-by-step process for assessing building assets, setting appropriate targets and identifying key upgrade initiatives to make sure they are making sound investment decisions. The results suggest that sustainable refurbishment of commercial property not only provides increased asset value and cash flow, but will soon be essential for maintaining occupancy rates and avoiding obsolescence.

The Study

Three generic building types – a 20,000m^2 CBD tower, a 15,000m^2 city-fringe high-rise and a 2,800m^2 suburban office, all built in the 1980s – were considered not only for environmental performance but also as initiatives to provide rental uplift and reduced vacancies.

Four levels of upgrade were assessed:

Level 1 Re-commissioning, temperature set point adjustments, energy monitoring

Level 2 Replacement of chillers, variable speed drives, high efficiency motors, internal blinds

Level 3 Replacement of all major plant and equipment, chilled beams, high-performance glazing, roof and wall insulation

Level 4 Complete refurbishment

Case A - CBD Tower	Existing Building	Level 1	Level 2	Level 3	Level 4
Capital Cost ($/m^2)	-	35	226	980	2040
NPV of investment (10 Years)	-	-$19,000,000	-$15,000,000	$7,000,000	$4,500,000
IRR of investment (10 Years)	-	4.20%	5.10%	10.00%	9.10%
PCA Grade	C	C	B	B	A
NABERS energy rating	2.0	3.0	3.5	4.5	4.5
Approx. % reduction in CO_2 pa	-	17	26	53	56
NABERS water ratings	2.0	2.5	3.0	4.0	4.0
Approx. % reduction in water use pa	-	16	35	67	69

13. The study was a collaborative effort between Davis Langdon, Arup and Colliers International for the Property Council of Australia.

Existing Buildings

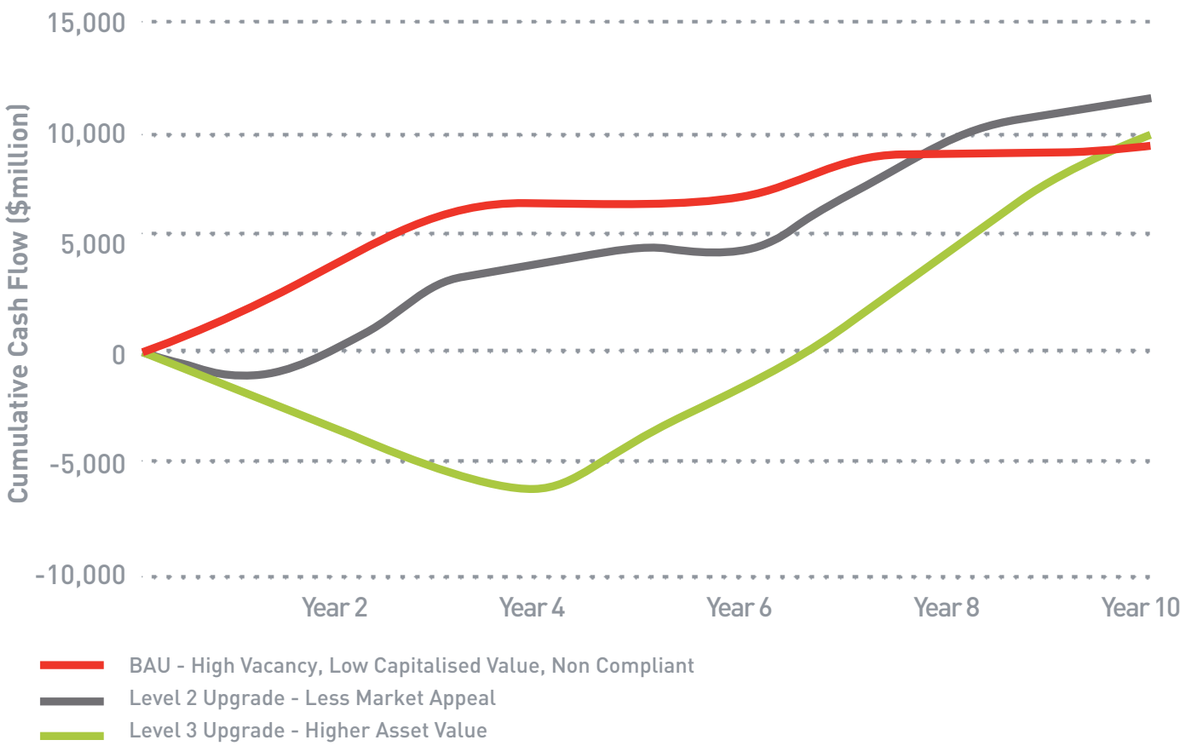
The Drivers

Existing buildings are, now more than ever, faced with an escalated rate of obsolescence. The introduction of Mandatory Disclosure of Energy Efficiency, more stringent BCA energy efficiency requirements and the proposed 'Access to Premises' standard under the Disability Discrimination Act incorporated into the BCA are placing greater pressure on existing building owners to improve their assets to remain compliant and avoid diminished cash flow.

There is an ever-growing demand by building tenants for sustainability and the lack of new supply will make existing buildings even more attractive. To attract and maintain long-term tenants, building owners need to provide office space with excellent environmental credentials.

Colliers International performed a detailed valuation of the CBD Tower case to show how different levels of upgrade would change its market value. The findings indicate an increase in market value in excess of 10% is achievable and that the return on investment for green existing buildings was unquestionable. In addition, the owner is in possession of a regenerated asset that attracts higher rents, lower vacancies and reduced utility outgoings.

CBD Tower - Payback Compared to Business As Usual (BAU)



Building Valuation

	Market Value	Increase from Base Case (%)
Base	$58.4m	—
Level 1	$59.3m	1.5
Level 2	$62.2m	6.5
Level 3	$64.4m	10.3
Level 4	$63.2m	8.2

Retrofitting Office Buildings >10 and >20 Years Old

Commercial office building refurbishment could prevent the creation of more than a million tonnes of greenhouse gas emissions every year, equivalent to removing at least a quarter of a million cars from Australian roads.

Research by Davis Langdon adds significant weight to pressure office building owners to upgrade their buildings to meet 21st century environmental standards. The research highlighted the impact that an intelligent approach to office building refurbishment could achieve a significant reduction in utilities costs and lower emissions. This underscored the importance of office building owners starting to sit up and take notice about impending emission reporting standards.

Most owners of large buildings have already undertaken audits of their buildings' energy efficiency but many owners of medium sized buildings appear to be dragging their heels when it comes to preparedness for the introduction of mandatory energy reporting in May 2010.

From the middle of this year, any owner of a building of more than 2,000 m^2 in lettable space will be required to have NABERS certification, and this will be particularly critical for owners who want to sell or lease space. Owners should already be carrying out at least an initial benchmarking of their building's energy performance so that they can determine what needs to be done in order to meet the certification requirements.

With the Australia-wide increase in vacancies across the office stock, owners also need to be concerned about building's appeal to tenants, which means understanding its social and physical performance.

Owners that do not start planning for the introduction of mandatory energy reporting and meeting tenant demands could face tough pecuniary penalties for a failure to register and report. There is also the potential for building obsolescence in an ever-increasingly competitive marketplace.

To gauge the potential intangible benefits of green refurbishment, Davis Langdon has carried out an assessment of potential greenhouse gas savings in Australia resulting from building upgrades. If all office stock aged over 20 years was refurbished to achieve a 38% improvement in NABERS office base building energy rating, or up to 4.5 Stars, there would be a saving of more than 1.17 million tonnes of greenhouse gas per year. That saving is equivalent to taking 266,333 cars off the road.

Retrofitting Office Buildings >10 and >20 Years Old

Target

To achieve either a 38% improvement in NABERS Office Base Building rating or up to 4.5 Stars, for commercial office stock greater than 20 years old.

	NLA* (20 Years Old)	GHG Savings (tonnes CO_2/yr)	Equivalent Number of Vehicles**
Adelaide	1,063,998	85,603	19,455
Brisbane and South-East QLD	2,012,430	161,909	36,798
Canberra	1,202,593	96,754	21,990
Sydney	6,115,910	492,053	111,830
Melbourne	3,551,563	285,740	64,941
Hobart	269,575	21,689	4,929
Perth	1,324,865	106,591	24,225
Australia (Total)	14,565,553	1,171,866	266,333

*NLA figures for 20 years old are based on national growth rate from Jan 1990 to Jul 1999 (17%) and multiplied across all regions. PCA office market report does not have sufficient data from their first report (1990) to directly extract.

**Emissions per passenger vehicle is based on Davis Langdon's methodology comprising of two industry standard approaches.

THE LARGEST SAVINGS COULD BE MADE IN SYDNEY AND MELBOURNE WHERE MORE THAN 9.6 MILLION M^2 OF OFFICE SPACE COULD POTENTIALLY BE BROUGHT UP TO MODERN ENERGY STANDARDS WITH AN ANNUAL SAVING OF MORE THAN 777,000 TONNES OF GREENHOUSE GAS EMISSIONS. OTHER STATE CAPITALS ACHIEVE LOWER BUT STILL SIGNIFICANT SAVINGS.

GREEN JOBS

Green Jobs

The Construction Forecasting Council (CFC) forecasts that the construction industry will continue to face difficult times over the coming year – irrespective of the Federal Government's spending efforts.

Of Australia's 21 million m^2 of existing office stock, 81% is over 10 years of age, equalling more that 17.5 million m^2.

The lower grades of offices have the highest ratio of old stock, with 89% of all B Grade and C Grade stock over 10 years of age.

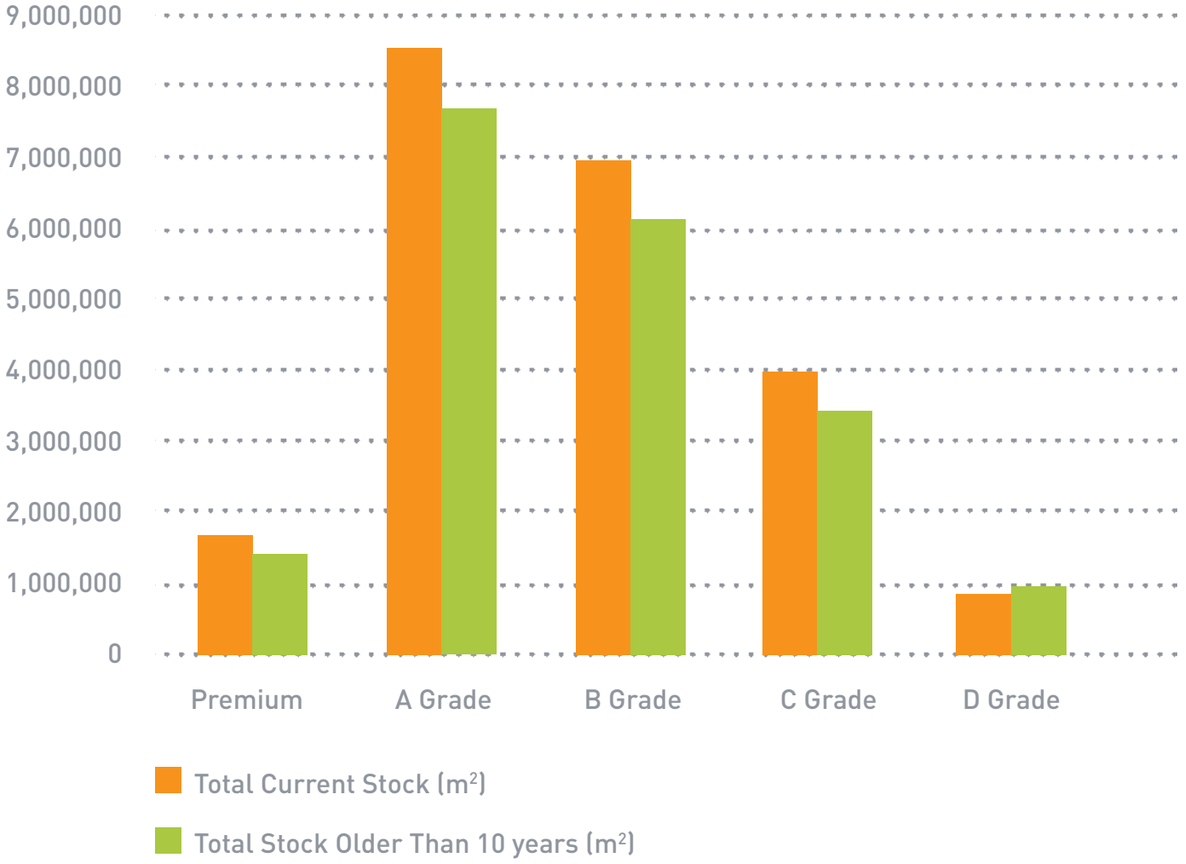
For every dollar spent in the construction industry, the flow on effect to the broader economy multiplies significantly. So the real value of retro-greening our existing office buildings is far more widespread than the immediate impact on the environment, on the economy, or even on direct employment.

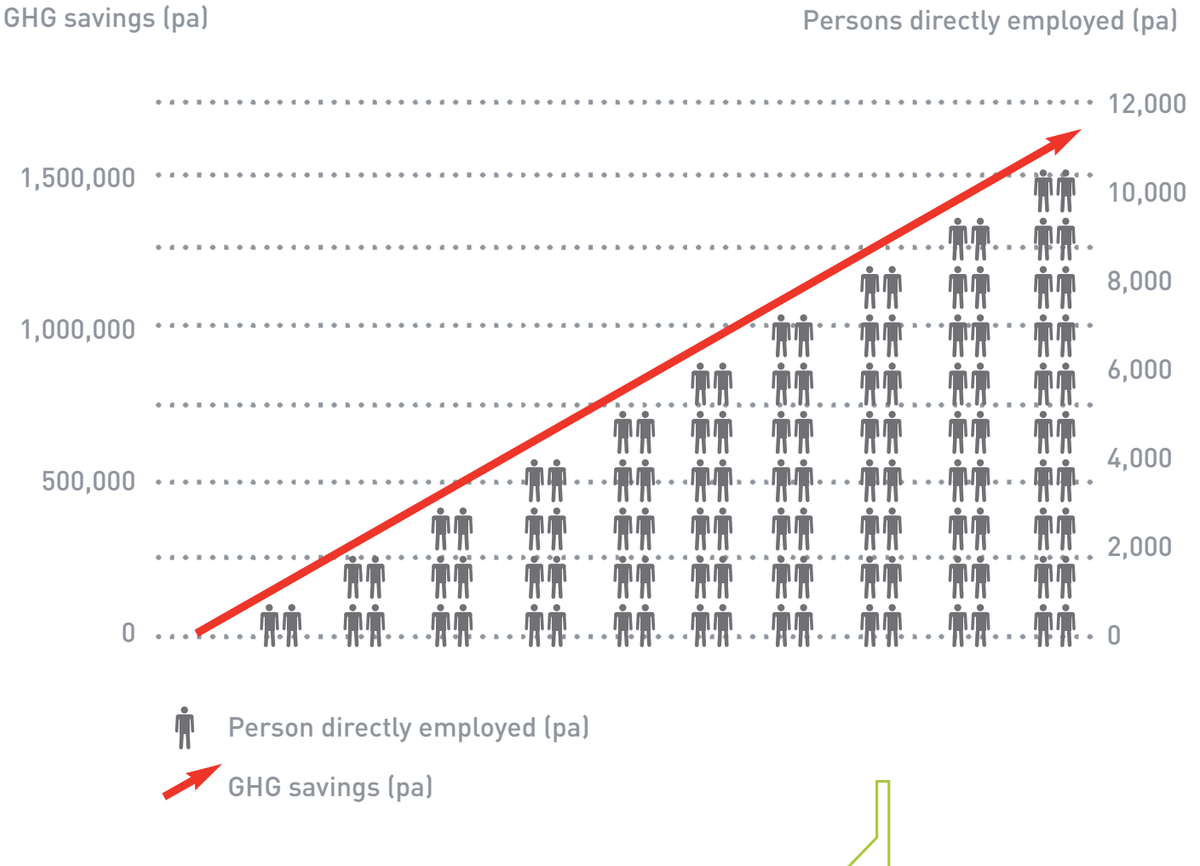
For every job created as a result of retro-fitting existing office stock, there is a potential annual saving of approximately 130 tonnes of greenhouse gas.

If retro-greening was achieved over 10 years then, on an annual basis, there could be a greenhouse gas reduction of 1.4 million tonnes, equivalent to taking 300,000 cars off the road. To achieve this, these buildings would consume 42% less power – reducing the growing demands on already stretched infrastructure.

What is more, this situation creates jobs growth without creating additional office stock – the activity instead serving to future proof existing stock, making buildings perform closer to new standards and new tenant expectations.

Environmentally, there are net greenhouse gas reductions through the upgrade of offices to a medium standard with more than 1.4 million tonnes of CO_2 saved per annum. This is achieved through energy efficiency measures across the base building and tenancy areas.





WATER AND GREEN STAR

Water and Green Star

A Davis Langdon study found that significant savings in water have been achieved through the implementation of Green Star initiatives by projects focusing on claiming points under the Water category in Green Star.

Davis Langdon carried out a study to investigate if projects were complying with the targeted water saving projections claimed in the Green Star Design ratings by carrying out inspections on properties that had achieved Green Star design ratings. It was found that they generally have been constructed in accordance with the points claimed in their Green Star submission and the adoption of products with high WELS ratings has contributed to savings in water.

It can be noted that in the Green Star rating, the Water category is generally the third highest weighted category. The highest weighted category is Energy followed by Indoor Environment Quality. The Water category carries a weighting ranging from 10-15% of the overall score.

In the Green Star Office Tool the WAT-1 item for Occupant Amenity Potable Water consumption provides a possible five points achievable for this item. This equates to approximately 40% of the available points under the Water category. Once the weighting is applied this item alone can contribute up to five points towards a Green Star rating.

The WELS rating is used to easily identify which fixtures and fittings can assist a building owner to achieve maximum points under the WAT-1 item, which is vital in achieving their proposed Green Star rating. The study has shown that the WELS rating system has been relied on by all the buildings when working towards maximising the points achieved in the WAT-1 credit. All the buildings studied have used WELS rated products where possible.

Our study revealed the following results:

- the average predicted water for the base case building was 28.0 litres per person per day
- the average predicted usage for the actual buildings included in the study was 13.2 litres per person per day
- the predicted average water saving was 14.8 litres per person per day
- the total volume of water saved is estimated to be 15,224,937 litres per year for the eight buildings included in our final study (at full occupancy)
- the total annual volume of water saved is estimated to be 262 litres per m² of net lettable area (NLA) at full occupancy

As reported in the Property Council of Australia's Office Market Report (January 2009), Australia currently has approximately 21 million m² of existing office stock in major metropolitan business areas. Of this office area 81% is over 10 years of age, equalling more than 17.5 million m².

ENERGY PERFORMANCE CONTRACTING

Energy Performance Contracting

Energy Performance Contracting (EPC) is a method of savings financing in which a third party contractor designs, installs, finances, and if required, operates and maintains a building/facility/process. The contractor is then paid according to the savings achieved (performance).

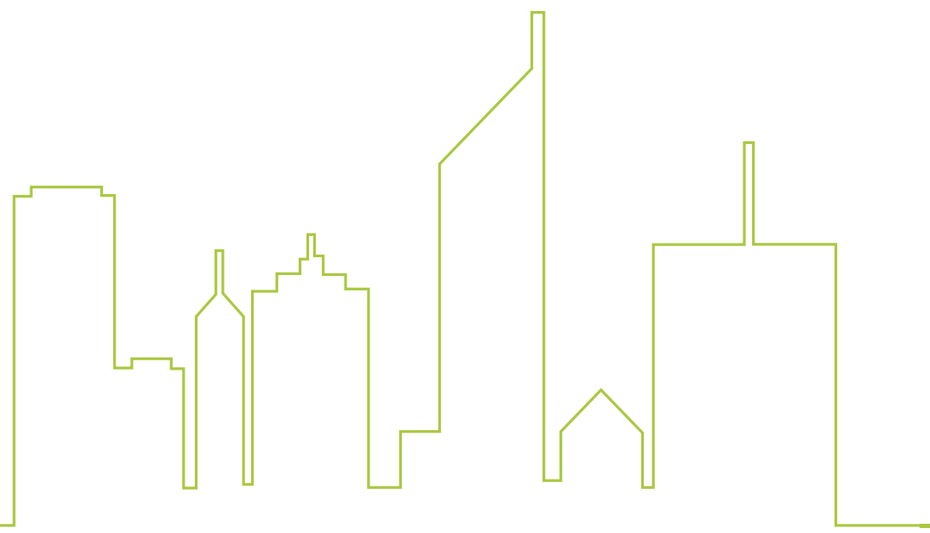
In essence, EPC provides budgetary simplicity and reduces the conflict of interest between organisations Opex and Capex budget holders. It does this by financing and implementing energy efficiency projects, then recoups its costs through receiving a share of the energy savings cost.

The benefits of a performance contract for a business or institution include:

- reduced risk – the performance contractor shares or assumes the risk of not achieving savings
- turnkey services – the performance contractor provides all required services
- the business or institution needs to retain less internal expertise
- project financing can be off-balance sheet and therefore not affect debt load
- the performance contractor ensures up-to-date expertise and products are used
- savings are normally much higher than if the business or institution carries out the work itself on an annual basis
- the ability to pay for other facilities improvements out of the savings, such as CFC replacement, building envelope renovation, improvement environmental practices, etc

It is of note that since 2008 in Australia, the EPC market is quite immature, unlike in Europe, Asia or the US. It also appears that most experience has been with Government-procured EPCs.

EPC in Australia has been characterised by the client financing projects as a key means to reduce the energy usage in Government facilities via a low commercial risk approach. In both New South Wales and Queensland, State and local Governments have financed their own EPC projects, at the State level, from either departmental consolidated revenue or State treasury. This reflects the low cost of money available to Government, but also the low commercial risk nature of EPC. Governments are typically risk averse, and yet they have embraced EPC strongly as a key mechanism to achieve substantial energy and cost reductions.



ESD TECHNOLOGIES

Cogeneration or Trigeneration Systems

Trigeneration is the modern name for a plant that simultaneously produces:

- electricity
- heat
- converts heat energy to chilled water for cooling

The primary energy source in Australia is normally natural gas, however other forms of cheap energy such as waste heat from industrial processes may be used as a primary energy source.

Conventional thermal (e.g. coal fired) power stations only convert around 30% of the fuel energy into electricity for consumers after process and transmission losses. The remainder of this heat is rejected to a body of water, or the atmosphere depending on particular site economics and location. This type of conventional thermal plant therefore has three major downsides:

- primary fuel emissions are higher because of the fuel used (normally coal in Australia)
- there are significant transmission losses between power plants and end users
- only some 30% of the primary energy is converted into a usable form (electricity) for users

The above is in sharp contrast to the outputs from well designed and operated Trigeneration plants that:

- normally use a clean fuel (natural gas)
- convert up to 80% of available primary energy into usable form (around 30% electricity and 50% heat for heating or generation of chilled water)
- eliminate transmission losses

As a result of the above, Trigeneration plants offer substantial reductions in greenhouse gas emissions and contribute to a significant point score in the Energy category of the Green Star tool.

Trigeneration systems also provide additional energy independence and redundancy for hospitals.

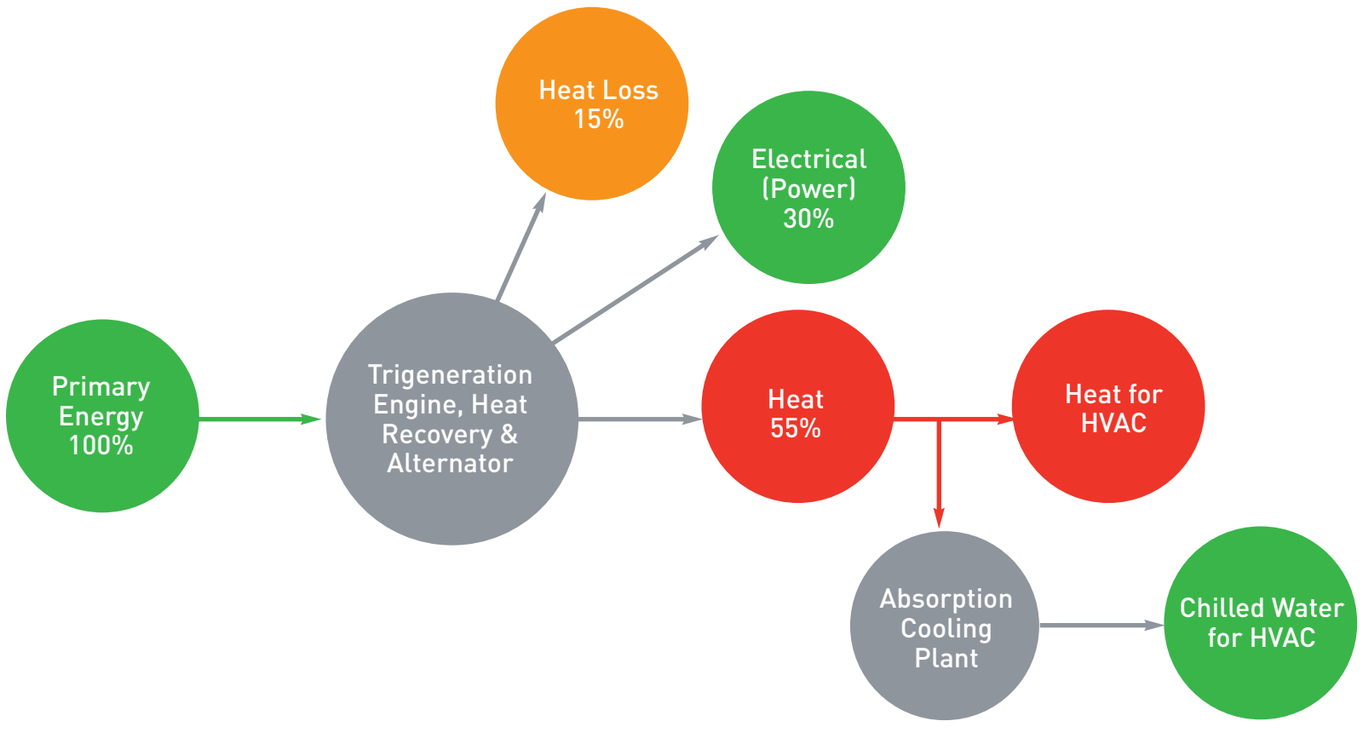
Detailed feasibility studies are required for each Trigeneration proposal as:

- there are many Trigeneration configurations available
- primary energy costs for Trigeneration vary by site
- water costs vary by site
- there is a need to fully test sensitivities to assumptions made in each feasibility study (e.g. energy escalation rates)
- there are significant costs for associated works including plant space/building costs, land cost, supply authority costs, heat rejecting plant costs, etc

It is important that these feasibility studies proceed early in the project design phases so that the overall design can proceed without potential for major changes in the latter part of the design process.

As a guide, typical Trigeneration plants are costing in the order of $3.5-4.5 million per MW including all associated plant, heat exchangers, chillers, building costs, project costs, etc. This represents an extra cost of around $1.5-2.5 million per MW above the use of conventional plant. The associated greenhouse gas reductions are likely to be in the order of 7,000 to 8,000 tonnes per MW per annum.

Life cycle costs vary widely by site, load profile and primary energy cost. Pay back periods of 8+ years plus are being demonstrated on some projects.



Photovoltaic

The energy from the sun can be exploited through solar panels for e.g. hot water and heating purposes or through solar cells, or photovoltaic (PV)[14] cells, for electricity production. The most common types of PV cells used are monocrystalline, polycrystalline and thin films of silicon.

Technology Types

Monocrystalline solar cells made from a large single crystal ingot sliced into wafers of $^1/_3$ to $^1/_2$ of a millimetre. The silicon used is of very high purity with near perfect crystal structure. Monocrystalline PV currently have an efficiency of 20-25%, i.e. the amount of the solar energy being converted into electricity.

Polycrystalline wafers are made by allowing molten silicon to set in a mould before being sliced into wafers. Due to imperfections in the crystal structure, the result is cheaper cells that are, however, significantly less efficient. Polycrystalline systems have an efficiency of 15-20%.

There are a number of thin film technologies available, including amorphous silicon, multicrystalline silicon, copper indium diselenide/cadmium sulphide cells, cadmium telluride/cadmium sulphide cells and gallium arsenide cells. Amorphous silicon is made by depositing silicon as a film to low cost substrates such as glass or plastic. The thin cell technology has several benefits including easier assembly, the ease of mass production and the ability to be deposited on inexpensive materials. Amorphous silicon cells currently have an efficiency of about 10%.

The electricity output is dependent on the type and size of panel used, temperature as well as on orientation, intensity and wavelength of the sunlight. A panel will generally produce about five times its rated power output in watt hours per day, and in winter about two times that amount.

Australian Use and Potential

Various 'green' initiatives from the Government have provided considerable incentives to the growth of the industry. The total installed capacity across the world is estimated to around 8,000 MW. Australia is however still only a small player with just over 80 MW of installed capacity.

Building Integrated Photovoltaics

PV panels are increasingly being used in the property sector where they have the potential to become integrated parts of the structure. These Building Integrated Photovoltaics[15] (BIPV) forms part of the roof or the façade replacing conventional building materials as well as acting as an electric power source. BIPV systems are therefore likely to provide a lower overall cost compared to separately mounted PV systems.

14. Rise, Research Institute for Sustainable Energy. (2008). 'Photovoltaics'.
15. National Institute of Building Science (American). (2009). 'Building Integrated Photovoltaics (BIPV)'.

Examples of buildings in Australia with BIPV are:

- The Solar Pergola[16] on 40 Albert Road in South Melbourne where a BIPV system was used to provide shade and weather protection to a rooftop deck area while generating electricity

- Melbourne's Scienceworks[17], an interactive science and technology museum, is using a BIPV system on one of the demonstration centres. The produced electricity is used for the museum's high voltage theatre. Additional battens were required during the construction compared to a standard lightweight roof system resulting in a small increase in construction cost. However, mounting the solar panels directly on the roofing material however provided a 19% saving compared to a frame mounted PV system on a conventional roof design

- Ballarat University[18] had a 200m^2 vertical north facing BIPV façade installed on a new educational building in 2006. The double glazed façade produces 7.3 MW of electricity annually while also blocking solar radiation by 90%. This has resulted in 40% reduction in air conditioning plant size while still enabling excellent visibility

16. Going Solar. Renewable Energy and Environmentally Sustainable Design Case Studies.
17. Sustainability Victoria. Sun, science and sustainability – Case Study.
18. Going Solar. Renewable Energy and Environmentally Sustainable Design - Case Studies.

Black Water Treatment Plant

Many commercial buildings today have water saving features such as waterless urinals and water efficient toilets. For new developments, on-site black water treatment plants have proven to be a viable option to help reduce the consumption of potable water. Although the final water product is perfectly clean, current reuse applications are generally limited to toilet flushing, irrigation, street cleaning and fountains.

The Urban Workshop in Melbourne

The Urban Workshop[19], a 34-storey commercial building located at 50 Lonsdale Street in Melbourne, was the first large commercial building in Australia to recycle its black water. The 97,500 litres of water being treated within the plant each day is used to flush 297 toilets and 99 urinals.

The plant consists of a stainless steel buffer tank, a rotary drum screen, a balance/anoxic tank, aeration tank, chemical dosing systems, membrane operating system, UV disinfection unit and water quality analysis sensors and analysers/transmitters.

Workplace6 in Sydney

Workplace6[20,21], a five storey and 18,000m^2 building in Pyrmont in Sydney, was completed in 2008. The building was designed to achieve a 90% drinking water use, and 70% greenhouse gas reduction compared to an average existing office building. As part of the design, solar power hot water system, gas Trigeneration, absorption chiller, magnetic bearing chillers, harbour heat rejection, chilled beams, black water treatment plant, 4 Star water fixtures, 6 Star urinals, and extensive water metering are being used.

The black water treatment plant extracts sewerage from an adjacent Sydney Water sewer. Solids are removed using a screen where after the fluid goes to a biological reactor tank. Here microbes are used to clean up organic waste before the fluid goes through a structure of fine membranes with microscopic pores allowing only clean water to permeate through. Remaining particles are removed using an activated carbon filter before further sanitisation of the water by UV treatment and a dose of chlorine.

The plant has a capacity to produce up to 40,000 litres of clean water per day. The building however uses less than 8,000 litres per day for toilet flushing with the remainder being available for irrigation purposes of parks and gardens.

CH2 in Melbourne

The black water treatment plant in the CH2 building in Melbourne[22] is used to treat black water and grey water from the building as well as sewerage from a sewer in Little Collins Street. CH2 is using a non-biological and non-chemical process using a ceramic micro-filtration system. This allows for a more robust approach and removes the risk of being reliable on micro-organisms which are sensitive to, for example, chemical dumps.

The process is undertaken in four stages: micron pre-screening, removal of fine fibre using dissolved air flotation, ceramic ultra filtration and reverse-osmosis. The plant treats up to 100,000 litres of waste water per day with a final water product of Class A quality, the highest standard possible. The system can readily be adjusted to meet the changing building demand and production can be dropped to 20,000 litres without adverse effects. The treated water more than covers the building's need of water for toilet flushing, cooling and irrigation. Surplus water is used off-site for other buildings, fountains, street cleaning and irrigation.

19. Smart Water Fund. 'Industry Superannuation Property Trust'.
20. GBCA, Green Building Council Australia. (2008). 'Another first - NSW celebrates first 6 Star Green Star rating'.
21. The GPT Group. Workplace6.
22. City of Melbourne. 'Water conservation'.

Geothermal

Geothermal energy originates from the original formation of the planet, from radioactive decay of minerals, and from solar energy absorbed at the surface. The energy can be used directly for heating applications or for electricity generation by utilising so-called Hydrothermal systems or Hot Rock systems.[23,24]

Hydrothermal Systems

Hydrothermal systems are generally found in places such as Iceland, New Zealand and the Philippines which are close to active tectonic plate boundaries or above areas of hot basement rocks (which is the case in Australia). These systems have naturally occurring hot water or steam in the ground.

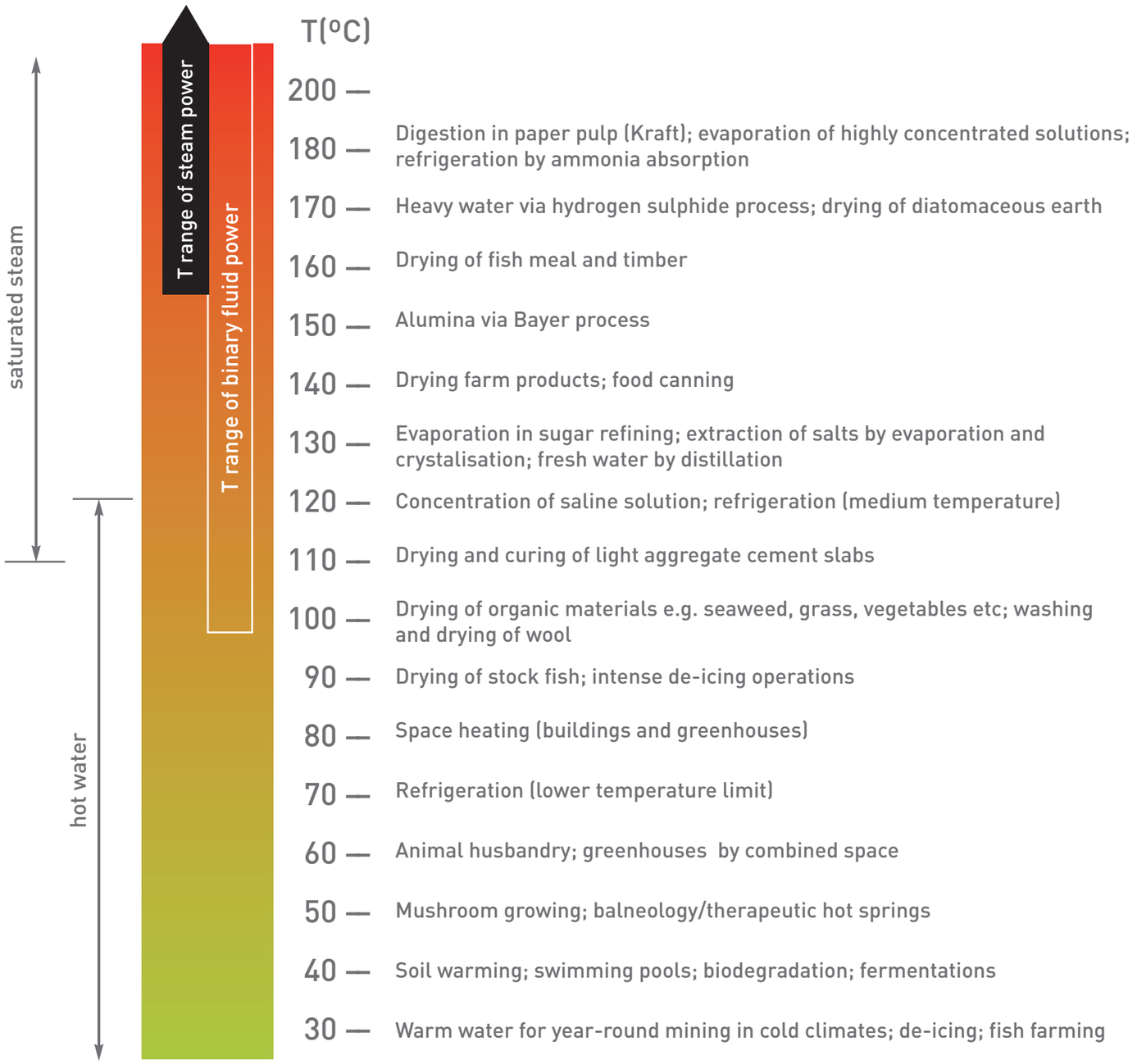
Hot Rock Systems

Hot Rock systems are generally found in areas with granites containing abnormally high concentrations of uranium, thorium and potassium. Over millions of years, heat has been generated with radioactive decay of these elements and trapped by insulating sediments. These Hot Rock systems have no natural presence of fluid, thus artificial systems must be created by circulating water for heat transfer. Granites at these depths generally have very poor permeability and porosity. This is increased by pumping water down a bore under high pressure to reopen existing fractures in the granite. One possible associated risk is induced seismicity, i.e. earthquakes generated by human activities.

Closed-loop systems are used to conserve water and energy and generally require a heat exchanger transferring the energy from the superheated fluid to a secondary fluid. The secondary fluid, for example iso-pentane or ammonia, has a lower boiling point and higher vapour pressure than the steam. As the fluid is passing through the heat exchanger it vaporises and is then expanded through the electricity generating turbine.

23. AGEA, Australian Geothermal Energy Association Inc.
24. Australian Government - Geoscience Australia. 'Geothermal Energy Project'.

Direct-use application for geothermal resources



Geothermal

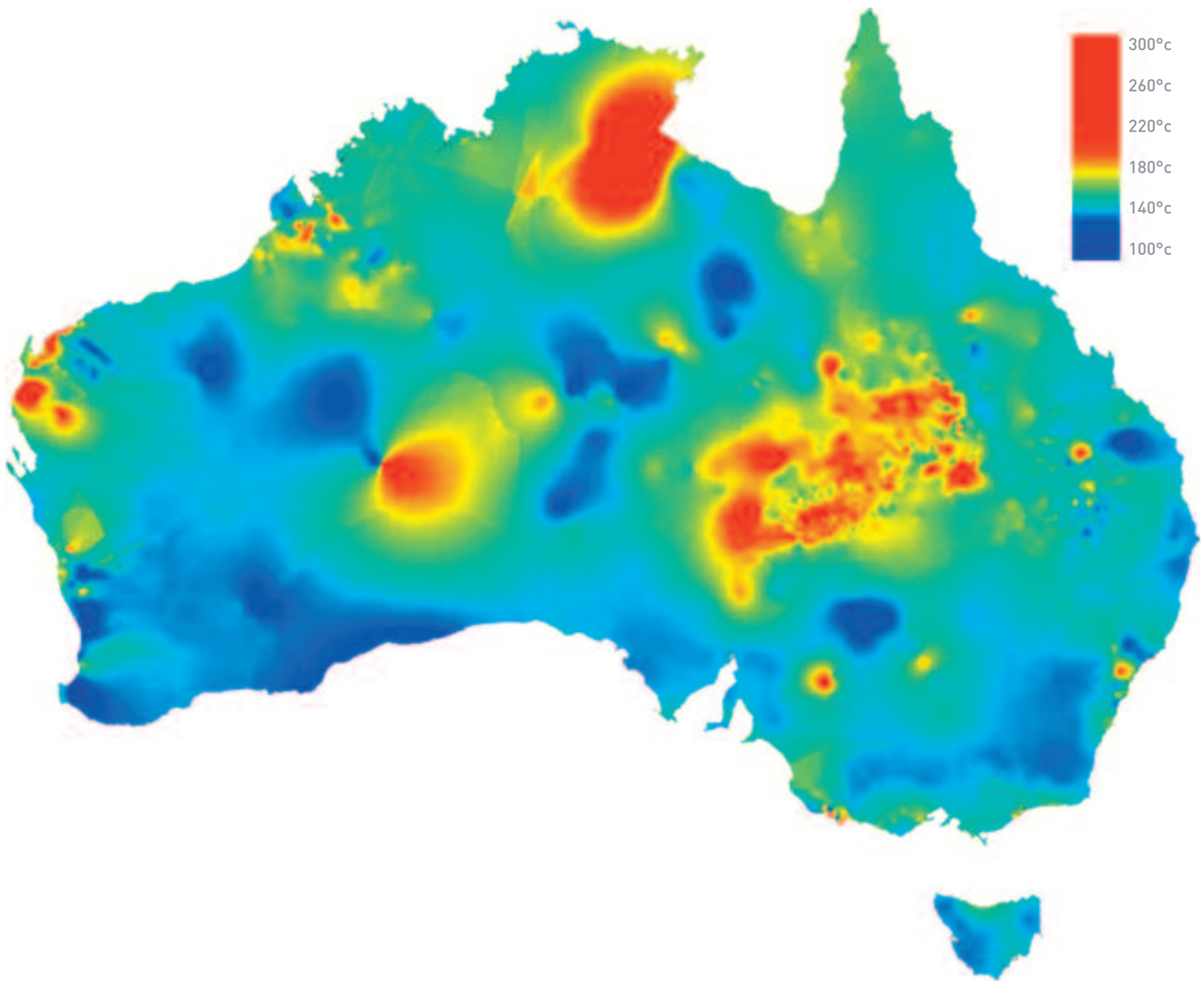
Australian Use and Potential

High-temperature systems are used for electricity generation, while low-temperature systems are generally used for direct-use applications, Geothermal power plants can operate 24 hours a day, are unaffected by climatic factors and have low environmental impacts. Birdsville 80kW Hot Rock geothermal power plant in south western Queensland is drawing 98°C of hot water of the Great Artesian Basin from a depth of 1,230 metres. The plant produces 80 kW of geothermal power, or 30% of Birdsville's energy supplies.

Current direct-use applications of geothermal energy in Australia include building and district heating systems as well as spa, artesian baths and swimming pool heating. Potential further applications are greenhouse heating and crop drying in agriculture as well as industrial processes including concrete curing, milk pasteurisation, desalination, wool processing and pre-heating of water in coal-fired power stations.

The Great Artesian Basin spans 22% of the Australian continent with groundwater temperatures ranging from 30°C to 100°C at well heads. Further, Australia has a wealth of high-heat generating basement rocks buried under sediments. In late 2009, the Federal Government released funding of $153 million through the Renewable Energy Demonstration Program (REDP) to the industry to be shared by development companies Geodynamics and Petratherm. Geothermal power is further eligible for the generation of RECs.

Estimated Crustal Temperature at 5km Depth



Geodynamics' Habanero 3 well flowing steam and water at surface during March 2008 Cooper Basin, SA courtesy of Geodynamics Limited

TRIPLE BOTTOM LINE REPORTING

The Global Reporting Initiative

Since 2006, the Australian Government Institute of Company Directors has encouraged companies to become engaged in Corporate Social Responsibility (CSR) practices relevant to their operations and to communicate with shareholders and stakeholders about their contributions to improved sustainability performance.

Triple bottom line reporting, corporate responsibility reporting and sustainability reporting are terms synonymously used to express the practice of measuring, disclosing and being accountable to internal and external stakeholders for economic, environmental and social impacts.

The Global Reporting Initiative[25] (GRI) is a network-based organisation behind the world's most commonly used sustainability reporting framework. The network draws participants globally from business, civil society, labour and professional institutions. The GRI Reporting Framework includes principles and indicators to measure and report on economic, environmental and social performance. Using the framework ensures the highest degree of technical quality, credibility, and relevance. It further gives the opportunity to benchmark organisational performance, demonstrate commitment to sustainable development and compare performance over time:

- economic performance
- environmental performance indicators
- labour practices and decent work performance
- human rights performance
- society performance
- product responsibility performance

The bases of the framework are the sustainability reporting guidelines. Other components include the sector supplements with industry sector specific indicators and the national annexes with country-specific information.

In accordance with the GRI Framework, users should declare the level to which they have applied the GRI Reporting Framework. Three 'Application Levels', C, B and A are available reflecting the coverage of disclosure. In addition to the mandatory self declaration, report makers can further choose to have a third party provide an opinion on the self declaration and/or request the GRI to check the self-declaration. Plusses (C+, B+ and A+) indicate the use of external assurance for the report.

Corporate Responsibility Reporting Guide

In an effort to encourage further corporate responsibility reporting by Australian property companies, the Property Council of Australia has put together a guide to assist companies.

Many property companies, small and large, are yet to take on the challenge of providing greater transparency in their social, environmental and economic practices. This guide will help property companies report their corporate responsibility performance in a more meaningful and comparable manner. It provides a voluntary template for corporate responsibility reporting that can be customised to the needs of individual corporations.

To download this draft discussion paper, please visit www.propertyoz.com.au

25. Global Reporting Initiative. (2006). GRI Sustainability Reporting Guidelines; GRI Application Levels.

What it Means for Buildings

The market is changing. Many existing buildings now face increased vacancies and compare poorly to newer stock. Whether tenants choose to stay in the building they currently occupy or move to another building, they are increasingly evaluating this choice against a range of performance measures. Called 'contemporary standards', these performance measures raise great expectations for buildings to perform environmentally.

It seems quite a complicated web for owners working their way through the existing performance measurement tools to understand where they fail to meet new standards.

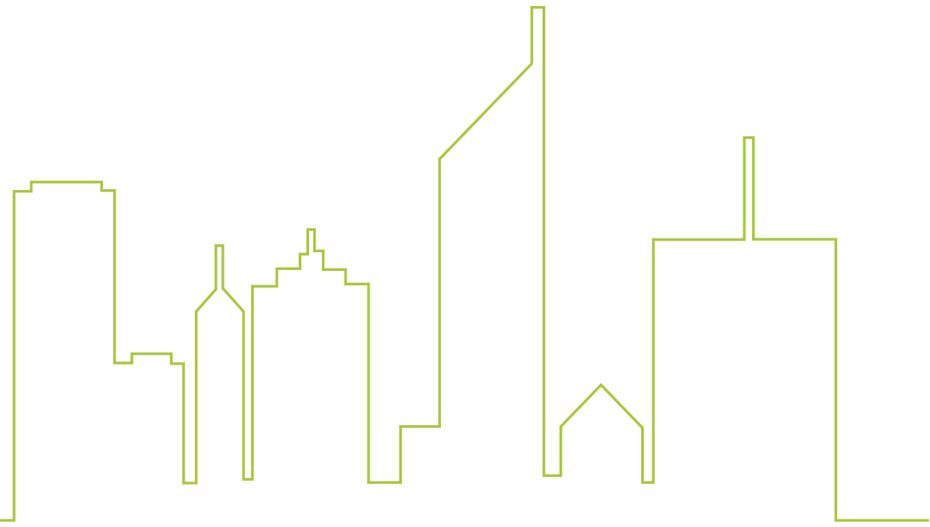
In the first instance what is needed is an assessment process that provides a clear gap analysis and takes the owner towards a balanced improvement strategy. A holistic approach to the assessment process and a high level benchmark is required to show owners where their property or portfolio sits against a range of performance measures. These cover social responsibility categories – the 'triple bottom line': ecological, social and economic. This assists in highlighting potential obsolescence of buildings, especially where there is a much higher expectation from tenants about sustainability issues.

Property Performance

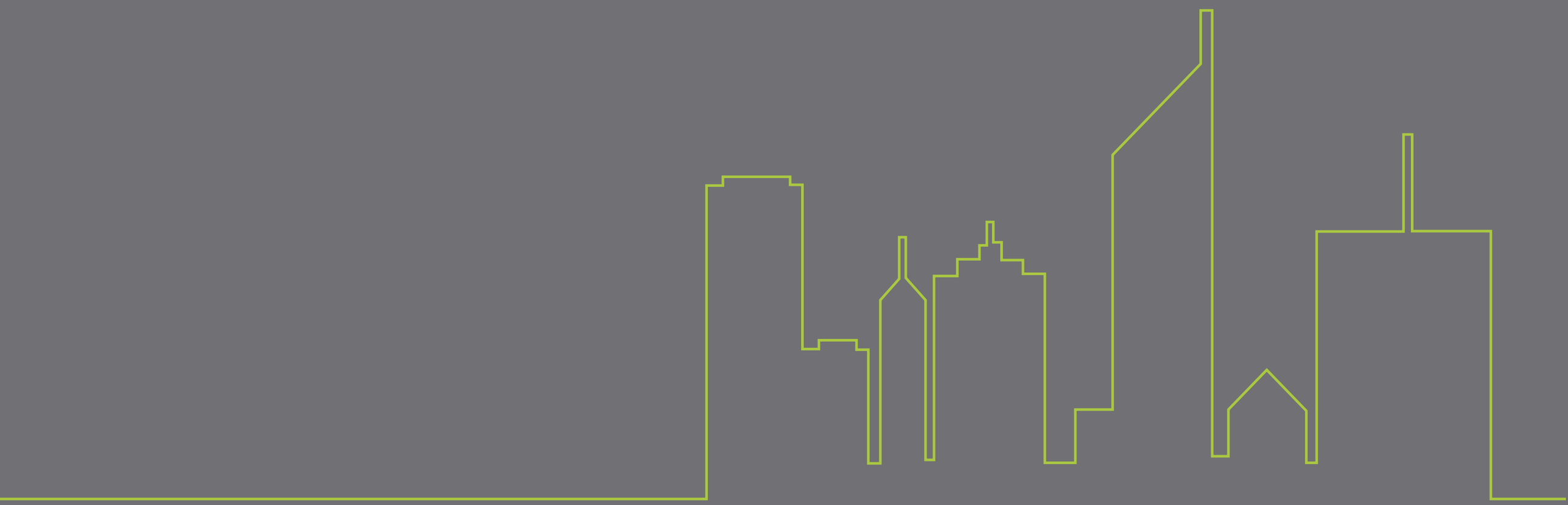
Davis Langdon and EC3 Global have constructed a tool that enables this high level assessment. The Davis Langdon Property Performance Assessment (PPA) can measure and benchmark property performance against contemporary standards. Reports provide strategic measures against international and industry standards, Government reporting targets, property measurement norms and rating tools.

PPA is provided as a consultancy service to clients on both a property portfolio basis and individual building basis. The PPA represents the assessment as an 'indexed rating' incorporating corporate social responsibility ('triple bottom line') categories as follows:

- environmental performance
- social equity indicators
- building condition and compliance
- life cycle costing
- plus an overall property and portfolio performance index



CSR COMMITMENT



CSR Commitment

Davis Langdon recognises its shared responsibility to make every effort to improve the sustainability of the environment and surrounding communities. This responsibility requires the organisation and employees to adjust the way we do business and go about our daily lives.

A Sustainability Strategy has been developed outlining a staged approach to improving the environmental and social sustainability performance of our Australian and New Zealand offices. The strategy further outlines Sustainability Targets and a Communication Strategy to help increase the overall employee awareness and engagement level.

Davis Langdon is a National Gold Corporate Donor of the Property Industry Foundation – the charity of choice for the property and construction industry. Through Davis Langdon's CSR Committee we have established a corporate social responsibility agenda to develop a program providing meaningful environmental and social sustainability actions. We are participating in a variety of charity initiatives and events including the support of a national charity of the year, organising employee volunteering events and promoting environmentally responsible business practices. Davis Langdon further supports needy organisations through pro bono projects.

All Davis Langdon offices are committed to energy efficiency and our Melbourne, Sydney and Brisbane offices are proud to be CitySwitch signatories. CitySwitch Green Office works with tenants to achieve improved office energy efficiency and reducing the greenhouse gas emissions attributed to climate change.

Our Sydney office is further a signatory to the Department of Environment and Climate Change and Water NSW (DECCW) Sustainability Advantage program and has been recognised as a Bronze Partner for its sustainability initiatives. The Sustainability Advantage program is a business support service designed to help organisations better understand and manage sustainability.

CITY SWITCH Green Office Signatory

Sustainability Advantage Bronze

PROPERTY INDUSTRY FOUNDATION YOUR CHARITY

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Property Performance Assessment
Make Good Assessments
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Sustainability Services
Access Consulting

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