THE RANDS & SENSE OF GREEN BUILDING

Building the Business Case for Green Commercial Buildings in South Africa

GREEN BUILDING COUNCIL
OF SOUTH AFRICA

Front cover image:

AURECON CENTURY CITY CAMPUS, CAPE TOWN:

5 Star Green Star SA - Office v1 Design
(Shading devices on the facade reduce glare whilst still allowing natural daylight to filter through to the office floors)

If you want to change the world,
deliver people a truly better bargain.
Not something cheaper, but something
better - a better economic return.

Anthony Malkin, President, Malkin Holdings -
owner of Empire State Building

GREEN BUILDING COUNCIL SA

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A green building is one that incorporates design, construction and operational practices that significantly reduce or eliminate the negative impact of development on the environment and occupants with strategies for addressing:

1. energy efficiency;
2. greenhouse gas emission abatement;
3. water conservation;
4. waste avoidance, reuse and recycling;
5. pollution prevention - noise, water, air, soil & light;
6. enhanced biodiversity;
7. reduced natural resource consumption;
8. productive and healthy environments; and
9. flexible and adaptable spaces.

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The environmental benefits of green building are beyond dispute.

With the construction and on-going operation of buildings consuming 40% of total energy usage worldwide and generating a third of all carbon emissions, green building is a major part of the solution to addressing climate change and resource scarcity.

But in order for green building to be taken up by the mainstream property and construction industry, the financial and business case must be clear too.

Green building is gaining remarkable traction across the globe. Certain markets like the US, Australia and UK are relatively advanced as a result of a combination of voluntary market drivers like rating tools as well as regulatory forces.

A number of these more mature international green building markets have undertaken large-scale, evidence-based studies into the costs and benefits of green building. **Results clearly show that there is no significant difference between the cost of green buildings compared to conventional buildings and that green buildings achieve better investment returns and higher valuations.** However, the South African market does not yet have enough certified green buildings to undertake such a broad comparative study.

In the meantime, the Green Building Council of South Africa (GBCSA) has compiled this report to build on these international studies with local case studies, examples and anecdotal evidence to begin to build the business case for green commercial buildings in South Africa.

GREEN BUILDING IN SOUTH AFRICA

In many respects 'green building' simply refers to good and efficient design. In this sense there have been examples of green building in South Africa for many decades. However, green and efficient building has been an area of growing focus in the commercial property and construction

"When the Green Building Council of Australia published our first 'Dollars and Sense of Green Building' in 2006, there was certainly a cost premium for green, we had less than 10 buildings Green Star certified and 44 registered. However, a number of leading developers had started to seize on the opportunities we had identified, and by the time of our second report in 2008, we had more than 68 certified and 400 registered, and the issue of a green premium had diminished. We were able to demonstrate that a 4 star Green Star building costs no more to build than a non-green building. Expect 'Rands and Sense' to have the same impact on the South African market. [1] *"*

Romilly Madew
Chief Executive, Green Building Council of Australia

industry, following the severe electricity shortages and large increases in electricity prices over the last few years, combined with the launch of the Green Star SA rating system for buildings.

The GBCSA was formed in 2007 to lead the transformation to an environmentally-sustainable built environment in South Africa. Besides its work in general promotion and advocacy, education and resource provision, the non-profit organisation's major offering is the **Green Star SA rating system for buildings. This rating tool essentially sets standards and benchmarks for what constitutes a 'best practice' green building in South Africa and has given the industry a framework to work with which has marked the beginning of the mainstream take-up of green building in the country.**

GOVERNMENT LEADERSHIP

Government has an important leadership role to play in increasing the uptake of green building by formulating policy, extending building regulations and greening its own large portfolios, whether owned or leased. International trends in government leadership include green building certification for government buildings, mandatory disclosure of energy efficiency, carbon taxes, expanding regulations, incentives and subsidies.

NEDBANK PHASE II, SANDTON:
4 Star Green Star SA - Office v1 Design & As Built
First Green Star SA certified project in the country

One of the GBCSA's key focus areas is raising awareness around the benefits of green building

BENEFITS OF GREEN BUILDING

Green buildings deliver a suite of financial and environmental benefits which conventional buildings do not, including:

- **Lower Operating Costs –** particularly savings in energy and water usage. The Green Star SA buildings profiled in this report cite energy savings of between 25% and 50% compared to a building designed to SANS 204 standards. The payback periods of energy and water saving initiatives are becoming markedly shorter as a result of increasing utility costs and the wider availability of more affordable green building technology.
- **Higher Returns on Assets –** Extensive studies in the US and Australia have shown rental rates in green buildings to be approximately 6% and 5% higher respectively.
- **Increased Property Values –** based on decreased operating costs, lease premiums and more competitive, less risky, future-proofed buildings. This has been empirically proven in the US and Australia with 11% and 12% valuation premiums respectively, but not yet in South Africa.
- **Enhanced Marketability –** Green building creates a differentiated product in the market, which is viewed as technologically advanced and environmentally and socially responsible. These attributes can be positively linked to the company brand and image of the owner and/or the tenant.
- **Reduced Liability and Risk –** Green buildings are future proofed against increases in utility costs, potential energy and water supply problems, tightening legislation, carbon taxes and the impact of mandatory energy efficiency disclosure, as well as costly retrofits or even obsolescence to ensure they are not at a competitive disadvantage in future.
- **Ability to Attract and Retain Government and Other Major Tenants –** The Department of Public Works' planned 'Green Building Framework' is likely to include certain green building requirements for government accommodation. This will increasingly apply to large multi-national tenants too.
- **Responsible Investing –** Investment in green building forms an integral part of the worldwide trend to more responsible, sustainable and ethical investing.
- **Increased Productivity –** Improved internal environment quality (IEQ) from increased ventilation, temperature and lighting control, as well as daylighting and the absence of toxic materials result in increased health, comfort and wellbeing of building occupants. This has been shown to lead to increased productivity – an important area of focus due to the significant potential impact on the profitability of a business. Studies show improvements in productivity of up to 20% · easily covering the premium which may be paid for the higher quality green space.
- **Competitive Edge in Attracting and Retaining Talent –** especially younger graduates who are increasingly aware of environmental and health issues.
- **Minimising the Costs and Impacts of Churn –** as a result of increased comfort and occupant satisfaction and more flexible spaces. With lease terms in South Africa typically ranging between 3 and 5 years, churn can lead to significant costs.

More local examples of green commercial buildings are required to quantify these benefits for the South African property industry.

BARRIERS TO GREEN BUILDING

Despite the above benefits of green building and the strengthening business case, there are also a number of challenges and barriers preventing the wider uptake of green building.

The major barrier is the perceived increased cost. Cost premiums are often perceived to be far higher than they really are and in a number of markets green buildings can be built for minimal or no increase in cost. Studies show perceived cost premiums still to be 12.5% in Australia and 17% in the US, with the relevant actual cost premiums in fact being negative in some cases and an average of just 1.5%.

In relatively young green building markets like South Africa, sustainable buildings generally incur a small green premium above the costs of standard construction. However, once these markets mature and green building practices become more prevalent, these 'new market premiums' decrease and green building can be done at costs similar to traditional buildings. An Integrated Design Process (IDP) is very important to ensure any additional costs are minimised.

The Green Star SA case studies set out in this report show that the South African property industry should expect the cost premium of building a new commercial green building to be between approximately 1% and 10%:

BUILDING NAME	RATING	CAPITAL PREMIUM	SUBMISSION COSTS
Aurecon Century City	5 Star Design	5%-8%	1.7%
Nedbank Phase II	4 Star Design 4 Star As Built	3.3%	<0.5%
Mayfair-on-the-Lake	4 Star Design	5%	1%
24 Richefond Circle	4 Star Design	10%	R750,000
Falcon Building Menlyn Maine	4 Star Design	9.2%	0.55%
Aurecon Lynnwood Bridge	4 Star Design	2.6%	0.26%
Forty on Oak	4 Star Design	<1%	Not available
ABSA Towers West	5 Star As Built	<2%	Not available

ABSA TOWERS WEST, JOHANNESBURG:

5 Star Green Star SA - Office v1 As Built
Enhancing the indoor environmental quality (IEQ) was a great priority for the design team

Other challenges to building green include:

- **Split Incentives –** where the party paying for the green improvement, typically the developer or owner, doesn't benefit from the resulting efficiencies or savings, which usually accrue to the tenant.
- **Cost of Retrofitting and Conversion of Existing Building Stock –** although this is becoming more financially feasible as utility prices increase and the relevant technologies and products are more affordable and more easily available.
- **Poor Industry Knowledge and Skills Shortage –** inadequate coverage of sustainable building at tertiary institutions and a lack of relevant professional education and training.

- **Lack of Evidence to Inform Valuations –** which results in the benefits of green buildings not yet being fully recognised in valuations.
- **Inconsistent Standards and Insufficient Regulations –** In order to shift the entire market, more extensive, coordinated green building regulations are needed.
- **Availability, Cost and Difficulty in Identifying Green Products, Materials and Technology –** Reliable, thorough and robust systems of assessment are needed to identify and differentiate green materials and products.
- **Lack of Research –** especially local data on costs and benefits.

Education is a key priority for the GBCSA and includes its annual Convention and Exhibition at the CTICC

THE WAY FORWARD

The following range of initiatives is recommended to facilitate the continued greening of the property and construction industry in South Africa:

STANDARDS, BENCHMARKS AND LEGISLATION

- An increase in **rating tools** available to cover all types of buildings and an increase in the uptake and usage of the tools, especially for existing buildings.
- Consistent **minimum standards for green building** elements should be incorporated into the National Building Regulations.
- A **national product eco-labelling system** to identify green products, materials and services.

EDUCATION

- A **public and professional green building education programme.**
- Improved **information on the value of green building elements** is needed to enable valuers to take account of the full life cycle benefits of green building.

GOVERNMENT LEADERSHIP AND PARTNERSHIP

- **National targets** for the built environment to reduce CO_2 emissions.
- Government leadership by example by **greening its own portfolio.**
- **Pricing of carbon emissions** so that society begins to pay the 'true' cost of energy.
- **Cost sharing support** to developers who plan to decrease the impact on or the cost of infrastructure required as a result of a development.

INCENTIVES

- **Special tax deductions** for certain expenditure on green building.
- **Tax credits** for buildings that meet certain green standards.
- **Council concessions on municipal rates** for qualifying expenditure or **planning concessions** such as density bonuses, green offset schemes for achievement of a green standard and green door policies for expediting green building planning approvals.

RESEARCH

- **Cost and financial benefits** of green building.
- **Productivity impacts** and gains, including post occupancy surveys.
- The **business case** of green building.

The South African property and construction industry needs to keep pace with global developments to ensure we enjoy the range of benefits from building green.

There are already signs that South Africa is moving in the right direction, with an expanding stock of green commercial buildings and growing government commitments to sustainable development, reflecting leadership by industry and government alike.

But more needs to be done.

This report is the first attempt to consolidate international findings and reinforce these with local examples and experience to start to build the business case for green buildings in South Africa.

1

INTRODUCTION

Numerous international studies have identified the fact that the take up of green building principles and practices by the commercial property sector is being hampered by a lack of documented project-specific evidence that clearly demonstrates the benefits that green buildings can deliver.

In particular, the commercial property sector is seeking evidence of a compelling business case.

A number of ground-breaking studies into the costs and benefits of green buildings have been documented in the United States of America and Australia. However, due to the relative immaturity of the South African green building industry, no comparable research has been undertaken in South Africa and placed in the public domain for debate – until now.

The Green Building Council of South Africa (GBCSA) is committed to driving the shift to a sustainable property industry in South Africa. While the GBCSA has already succeeded in creating momentum to build green in South Africa, this Report aims to further make the case for a sustainable built environment in South Africa.

Building on international reports, case studies and examples of the business case for green commercial buildings, this Report seeks to detail the financial and social benefits of green commercial buildings to the owner, manager, developer, investor, financier and tenant in a South African context by incorporating available South African research and case studies of green developments. It also examines a number of challenges and barriers to green commercial buildings in South Africa.

It must be noted upfront that the relatively small number of rated green buildings in South Africa does not yet allow for a broad evidence-based study on the costs and benefits of green buildings, as have been undertaken in some other global markets. However, this Report uses the currently available information and case studies to start to identify the trends.

Finally, this Report identifies a range of actions that could provide a way forward for industry and government to drive the transition to green commercial buildings in South Africa.

> *"Green building is not a fad. It is a response to the new global realities of energy and resource depletion. South Africa may be a couple of years behind the leaders, but green building in the country is growing rapidly in spread and sophistication and South Africa will soon be up there with the best.* [8] *"*
>
> **Bruce Kerswill**
> Founding Executive Chair, Green Building Council of South Africa

CASE STUDY 1

AURECON, CENTURY CITY CAMPUS, CAPE TOWN

Green Star SA case studies

DESCRIPTION OF PROJECT

The Aurecon Century City building is an office development based in the Century City precinct that accommodates 466 Aurecon employees and serves as the multi-disciplinary engineering group's Cape Town head office.

The building is comprised of semi-basement level parking, a ground floor with external parking deck, three levels of office space and a roof with entertainment area and a garden on the upper level.

Total Gross Floor Area (GFA)	: 7 402 m²
Car Parking Area	: 6 138 m²

The building was the first building in South Africa to be awarded a 5 Star Green Star SA – Office Design v1 rating by the GBCSA and the first Green Star SA-rated building in Cape Town.

PROJECT COST

According to the developer and part owner, Rabie Property Group, **the additional capital cost to achieve the 5 Star Green Star SA rating was between 5-8%.** The portion of the capital cost which related to the actual Green Star SA submission was 1.7% of the total.

AURECON CENTURY CITY CAMPUS:
5 Star Green Star SA - Office v1 Design
The roof garden provides a space for staff recreation and team social events, as well as enhancing the biodiversity of the site

BUSINESS CASE

A company which promotes and offers sustainable development services, Aurecon specifically wanted their new Cape Town head office to reflect this ethos and capability. According to Colin Anderson, Director at Rabie Property Group, **the company was happy to pay a slight premium on the rental as they will benefit directly from the savings in operating costs and their staff will enjoy the benefits of a healthier and more productive environment.**

Rabie Property Group decided to build a green building as they wanted to differentiate the building from the general market and believe that providing energy efficient buildings is a critical factor in future proofing them. Although they have not yet had the building valued, **they believe that it is worth at least 6 – 10% more as a result of its Green Star rating.**

As the first Green Star SA building in Cape Town and the first building in South Africa to achieve 5 Star Green Star SA status, it received "incredible marketing and publicity". Rabie estimates the value of the exposure to be close to R1million.

> *"We learnt that green buildings are not quite as complex and mystical as often believed and that they can be developed within reasonable commercial budgets. Once the entire project team has gone through the process a few times it will become the natural way for buildings to be designed."*
>
> **Colin Anderson**
> Director, Rabie Property Group

GREEN DESIGN INITIATIVES

WATER

The use of potable water is reduced by:

- Using treated effluent for irrigation as well as heat rejection for the HVAC system,
- Harvesting rainwater and using it to flush the toilets and urinals, and
- Using low-flow fittings.

ENERGY - HVAC

Energy use by HVAC system is reduced by:

- The selection of a chiller with a high seasonal rating, and
- Incorporating an economy cycle into the HVAC system.

ENERGY - LIGHTING

Energy used for lighting is reduced by utilizing a well-designed lighting system by:

- Efficient light fittings,
- The selection of 25W T5 fluorescent tubes, and
- The installation of a DALI lighting control system for daylight harvesting.

BUILDING MANAGEMENT SYSTEM (BMS)

A BMS was incorporated to:

- Monitor the energy use in the building,
- Monitor the water use in the building, and
- Monitor the CO_2 content of the air in the building.

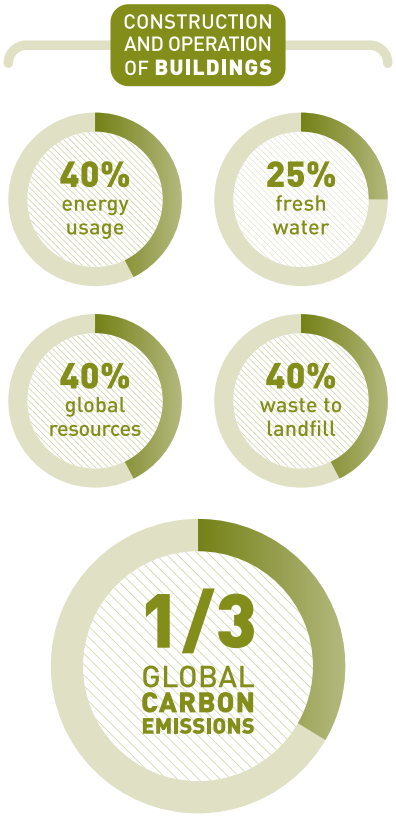
GREEN INNOVATION

- A 'green lease' has been adopted, requiring both the landlord and tenant to operate the building as was intended by its sustainable design.
- Monthly, guided tours of the building will be offered to encourage the adoption of green building principles.

SOURCE: Anderson, Colin, Rabie Property Group. Email Interview.

2

BACKGROUND



The construction and on-going operation of buildings consumes 40% of total energy usage worldwide, 25% of fresh water, 40% of global resources[3] and generates 40% of waste going to landfill.[4]

A third of all global carbon emissions is generated from the built environment.[5] In South Africa, 28% of total emissions is from commercial and residential buildings, including the embodied energy in building materials.[6]

So it is clear that in order to address the global priorities of climate change and scarce resources, the environmental impact of buildings requires urgent focus and improvement.

South Africa is at a key tipping point with green buildings. Following the launch of the Green Star SA rating system in 2008, green building is gathering momentum in the mainstream commercial property industry. There is pressure from industry stakeholders, tenants and government to build green, but there are still some pockets of scepticism in the commercial property industry, specifically around the perceived cost of initiating, building, procuring and operating green.

So how do industry, government and tenants move towards adopting sustainable measures in their buildings?

The international experience has been that a major part of the answer lies in providing examples of the benefits of building green – both financial and non-financial – and ultimately by making a compelling business case for building green. While there seems to be consensus on the environmental and social benefits of green buildings, there is a lack of accurate and thorough financial and economic supporting information.

In the last few years numerous international projects have documented the cost, financial return on investment and benefits of green initiatives. However, by their very nature development projects are unique and the ability to translate one project's costs and benefits to another in a different location is often very difficult. As the Davis Langdon report 'Costing Green: A Comprehensive Cost Database and

"The level of energy use and the resulting CO_2 emissions associated with buildings are almost as high as that from transportation and industry combined. Thus, the built environment provides a powerful and necessary lever for fundamentally changing our patterns of resource and energy use and responding to the grave reality of climate change. [2] *"*

Greg Kats
'Greening Our Built World – Costs, Benefits and Strategies'

Budgeting Methodology' notes:

"There is no one size fits all answer. Each building project is unique... Benchmarking with other comparable projects can be valuable and informative, but not predictive." [7]

But there are some common trends.

International and local green building projects note that, in relatively young green building markets like South Africa, sustainable buildings generally incur a small green premium above the costs of standard construction. Once these markets mature and green building practices become more prevalent, these 'new market premiums' decrease and green building can be done at similar costs to traditional buildings. But whether the upfront premium exists or not, green buildings deliver a suite of financial and environmental benefits which conventional buildings do not.

Benefits of building green include elements that are easy to quantify such as savings in energy and water usage. Others are less easily quantified, such as improved indoor environmental quality which relates to increased occupant satisfaction, wellbeing and productivity, and are important elements of focus due to their significant potential impact on the ultimate profitability of a business. South African green building projects also point to immediate market differentiation and marketing benefits from building green.

What is also known however, is that barriers exist to building green.

Within the property industry there are still challenges and inherent barriers that result in green building measures not being adopted, despite the fact that a business case can be made for their implementation.

The major barrier is the perception of increased cost. Other challenges to building green include a shortage of industry skills, the cost and availability of green products and materials, the cheap pricing of energy and water, the lack of incentives for demonstrating best green practice, inadequate or conflicting government regulation (e.g. water reuse approvals), and the difficulty with valuing green elements. The potential also exists for uncoordinated and conflicting rating tools, standards and regulations which could cause confusion in the industry.

It is of critical importance that new buildings are designed, built and operated as green buildings, but perhaps the greater challenge is the modification of existing building stock to reduce their environmental impact.

EMPIRE STATE BUILDING, NEW YORK CITY:
A major retrofit of the Empire State Building resulted in significant energy savings for the building tenants

The Empire State Building design is a registered trademark and used with the permission of ESBC.

CASE STUDY 2

24 RICHEFOND CIRCLE, UMHLANGA, DURBAN

Green Star SA case studies

DESCRIPTION OF PROJECT

The Shepstone and Wylie office development is located in Ridgeside Office Park in Umhlanga. The building provides office accommodation for 200 occupants and comprises two levels of parking, and four levels of office space:

Total Gross Floor Area (GFA) : 4 840 m^2
Car Parking Area : 4 545 m^2

The project achieved a 4 Star Green Star SA Design certification in December 2010.

PROJECT COST

The developer cites **the capital premium for greening the building to be in the region of 10%, which includes the ice storage system.** Obtaining the Green Star SA certification cost approximately R750 000, which includes all the specialist professional and design fees for the green building consultant, energy modelling, acoustic engineer, amongst others.

24 RICHEFOND CIRCLE, UMHLAMGA:
4 Star Green Star SA - Office v1 Design & As Built
Cycle lanes and bicycle racks promote cycling to work and reduce emissions

BUSINESS CASE

After a great deal of research on the subject of green building, co-developers Maponya Developments and Beare Holdings decided that developing a green building would be the right thing to do, despite the fact that there was no external pressure to do so.

The building's tenant, Shepstone and Wylie, did not initially specify a green building. However, once they realised the benefits – in particular the cost savings related to the air-conditioning system using ice storage technology – they were delighted with the building and prepared to enter into one of the first 'green leases' in South Africa (see 'Green Design Initiatives').

Electricity bills are around 50% of what they would be in a conventional building, mainly due to the ice storage air conditioning. Water consumption is also extremely low with bills of around R2 000 per month, with savings due to air-cooled air conditioning, xeriscape landscaping and waterless urinals.

Although the building has not yet been externally valued, Donald Borthwick of Maponya Developments says they "expect a significant premium." He also explains that should they need to replace the tenant, they would "expect to find a replacement much more quickly because of the low operating costs."

The project has received **significant marketing and publicity coverage,** which has reflected positively on both the developer and tenant.

"The (Green Star) process provides a comprehensive review and also aims you in the right directions to achieve genuine green."

Donald Borthwick
Maponya Developments

GREEN DESIGN INITIATIVES

The main challenge encountered by the professional team was to create an energy-efficient building to meet the design criteria specified by the client on a "tight" budget.

Design initiatives related to the building envelope included:

- Corobrick **clay bricks** used due to lifecycle environmental sustainability principles incorporated in the manufacture of the bricks and their relatively low embodied energy.
- 15mm polystyrene inserted into the skin between the outer and inner wall along with a 30mm air gap, exceeding minimum requirements laid out by SANS204.
- **Double glazing** was used on all the windows to maximise East-facing views and natural light, while reducing glare and energy usage as a result of heat gain.
- The **roof was insulated** for airtightness and thermal insulation.

Energy and occupant comfort-related systems include:

- An **assisted Ice Storage system** – a standard chiller produces solid ice at night during off-peak periods when the building's electrical loads are at a minimum and tariffs are lower. The ice is then used to provide cooling the following day allowing chillers to be downsized or turned off.
- **Increased ventilation rates linked to Energy Wheels.** Ample amounts of outside air are provided in the building to counteract the build-up of indoor pollutants. The fresh air supply to the building is via three dedicated energy wheels which assist in ensuring the increase in outside air supply to the building by 100%.
- **CO_2 detection & control.**
- Full **Building Management System (BMS)** functionality connected to water meters, electrical meters and CO_2 monitoring – assists with seasonal system changes and alerts facility management to any changes in consumption trends which could indicate a problem.
- **High frequency ballasts.** The fluorescent lamps included electronic/high frequency ballasts to ensure that the building occupants do not suffer from headaches and eyestrain associated with low frequency flicker.

OTHER GREEN DESIGN INITIATIVES FEATURED IN THE BUILDING INCLUDE:

- **Waterless urinals and automatic aerating tap heads** reduce the potable water consumption.
- 99% of **interior paint finishes meet the TVOC content limits** as prescribed by the GBCSA. VOC's (Volatile Organic Compounds) in paints 'off-gas' into the atmosphere and are dangerous to human health.
- **Cyclist facilities** have been provided to facilitate the use of bicycles by the building occupants as well as the visitors to reduce the emissions associated with transport. Secure bicycle storage, accessible showers, changing facilities and lockers has been provided.
- A dedicated **recycling waste storage area** facilitates the recycling of resources used within the building to reduce waste going to landfill.
- During construction of the building, **76% of the construction and demolition waste was recycled.**
- **Xeriscaping the landscaped area and roof gardens** – Xeriscaping is a term used to describe landscaping that is both indigenous and does not need watering. This saves clean water resources, and enhances the ecological value of the environment by introducing indigenous vegetation.
- Concrete Usage - The slabs for each floor of the building are post tensioned slabs, which reduces the amount of concrete needed for the building. In addition, flyash, a waste product, was added to the concrete to reduce the amount of Portland cement and greenhouse gas emissions associated with concrete production.

The tenant was willing to fund specific green building elements with a quantifiable payback period by way of a 'green lease':

- Ice Storage
- Energy Wheels
- After hours switching
- T5 light fittings

"By adopting and choosing to achieve a Green Star rating, the professional team focused more on alternative solutions and resources, good engineering practices, communicated freely in all associated disciplines and more importantly, proactively got involved in the complete development."

Richard Humphrey
Aurecon

24 RICHEFOND CIRCLE, UMHLAMGA:
4 Star Green Star SA - Office v1 Design & As Built
The ice storage system reduces peak electricity demand

SOURCE: GBCSA website
Borthwick, Donald, Maponya Developments. Email Interview

3

THE GREEN BUILDING INDUSTRY

A wide range of players are becoming interested in and involved with green building practices, including building owners and managers, as well as their tenants, designers and architects, builders, retailers and manufacturers and - one of the potential key drivers - governments (national, provincial and local). Interest in green buildings also comes from planners and property valuers.

Reflecting the growing momentum to build green, in just four years the membership of the Green Building Council of South Africa (GBCSA) has grown to almost 1 000 member organisations and includes nearly all the significant corporate property players and a range of firms from contractors to professionals. The GBCSA's annual Convention and Exhibition attracts close to 1 000 delegates and has cemented itself as one of the key events in the property industry's calendar. Major property publications like 'SA property Review' and 'The Property Magazine' have regular green building features and a dedicated green building magazine, 'Earthworks', has recently been launched – all demonstrating the increased awareness and interest in green building.

According to Eric Noir, Director at WSP Green By Design, there is no turning back. He predicts: "Very soon no new premium commercial office building will be announced to the market unless it aims for a Green Star SA rating." [9]

This section covers the importance of the built environment, specifically the commercial property sector, it provides an outline of what constitutes a green building, and a snapshot of the current state of the green building industry in South Africa and in international markets, and examines the role of government in driving greener buildings.

The commercial property industry is defined as all those who produce, develop, plan, design, build, alter, own or maintain the commercial built environment, and includes building materials manufacturers and suppliers as well as end use occupiers.

SANRAL CORPORATE HEAD OFFICE, PRETORIA:
4 Star Green Star SA - Office v1 Design
First parastatal Green Star SA certified building

3.1
IMPORTANCE OF THE BUILT ENVIRONMENT

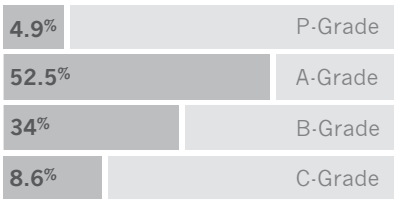
NEDBANK, RIDGEVIEW, UMHLANGA:
4 Star Green Star SA - Office v1 Design
Position of staircase encourages walking over using the lift

A report by Merrill Lynch highlights just how important the property sector is, stating in part: "Property is the largest asset class in the world by a significant margin. The development of property and the uses of the property have massive impacts on the environment." [11]

The South African Property Owners Association (SAPOA) places the value of the commercial property market in South Africa at approximately R333billion (investment market, excluding owner-occupied buildings – Stats SA) [10]. The commercial office market is classified by SAPOA as follows – Premium and Grades A, B and C buildings. A number of quality parameters define a building's grade, including location, views, age, finishes, access, building services, security, amenities, parking and general condition.

Premium Grade properties are top quality, modern space which are generally pace-setters in establishing rentals and which include the latest or a recent generation of building services, ample parking, a prestige lobby finish and good views, or a good environment. On the other end of the spectrum are C-Grade buildings, which have older style finishes, services and building systems and may or may not be air-conditioned or have on-site parking.

The total commercial office market in South Africa is estimated to be worth approximately R88billion (investment market, excluding owner-occupied buildings – Stats SA) and covers over 15 million m^2 [10]:



There is a clear difference between new and recently refurbished buildings (Premium and A-Grade) which will increasingly include green features, existing 'good quality' buildings (B-Grade) which could improve their environmental impact through incorporating green solutions, and those buildings (C-Grade) which may be in need of major refurbishment or redevelopment.

International trends show that some form of green building rating is starting to be required for the higher level building gradings – for example, the Property Council of Australia's quality matrix requires new buildings seeking to achieve a Premium grade status to achieve a minimum of a 5 Star Green Star rating and new buildings seeking to achieve A and B-grade status to achieve a minimum of a 4 Star Green Star rating. [12]

The GBCSA believes that South Africa will follow this international trend, which would leave buildings that do not include green initiatives (as evidenced by a green building certification) at a competitive disadvantage with a significant impact on the relevant rental returns and building valuations.

VODAFONE SITE SOLUTION INNOVATION CENTRE, MIDRAND:
6 Star Green Star SA - Office v1 Design

"The tide has turned in South Africa... green building principles have infiltrated the mainstream commercial property industry and energy efficiency and green building is part of the strategy of every major property owner in the country. SAPOA is proud to be a founding member of the GBCSA and our association with the GBCSA is essential to the industry."[10]

Neil Gopal
CEO, SAPOA

CASE STUDY 3

V&A WATERFRONT, CAPE TOWN

Existing building case studies

BACKGROUND

The V&A Waterfront precinct is a mixed-use development comprising about 400 000m² of buildings and attracting around 23 million visitors per year. **The shareholders of the property have embarked on a programme to green the development for the dual purpose of making the entire operation more environmentally sustainable as well as improving efficiencies and saving costs.** Approximately R22million has been invested in energy saving projects alone over the last 3 years.

GREEN/EFFICIENCY INITIATIVES

ENERGY – ELECTRICAL & AIR CONDITIONING

INITIATIVE	COST	MONTHLY SAVING	ANNUAL SAVING
Installation of Power Factor Correction to reduce maximum demand	R180 000(2008) R80 000(2009)	R10 000	R120 000
Review and restructure of Electrical Tariffs	No Cost	R150 000	R1 800 000
Installation of energy efficient lighting & lighting control system (Phase 1)	R3.2million	R76 000	R915 000
Installation of more energy efficient lighting and upgrade of lighting levels (Phase 2)	R2 426 264	R32 260	R387 120
Re-use of excess fittings in other buildings	No Cost		R200 000
Improvement of air conditioning controls – customise and change operating times in accordance with the seasons and outside weather conditions	No Cost in management actions, but a cost of R50 000 to upgrade the BMS	±R50 000	R720 000
Replace 4 screw chillers with 2 centrifugal chillers which are 25% more energy efficient (part of normal end of life replacement) Move from a constant volume to a variable volume system – variable speed drives on air handling units, variable volume diffusers	R15million	R70 000	R840 000
Moving from traditional cooling tower system to seawater cooling	Not available	R68 000	R816 000

Currently the V&A Waterfront is moving from three independent chiller plant rooms to a district cooling philosophy, which will lead to significant additional energy savings.

Consumption savings of R5.67million in 2011/12 compared to 2008/09 (17%)

WATER - LANDSCAPING

INITIATIVE	MONTHLY SAVING	ANNUAL SAVING
Converted part of irrigation system from spray to drip irrigation for less water usage, reduced weed growth and pest problems (25 litres/10m² for spray irrigation vs 10 litres/10m² for drip irrigation)	R20 000	R240 000
Reduced watering times, especially during the rainy Cape Town winter and watering times adjusted according to weather and location e.g. shade vs sun	No cost	R320 000(2008) R330 618(2009) R295 770(2010)

WASTE MANAGEMENT

INITIATIVE	MONTHLY SAVING	ANNUAL SAVING
Appointed Wasteman and waste recycling programme implemented in 2009. Guaranteed payback of R55 000 per month on recycled material. Approx 40% of the precinct's waste is recycled (110-130 tons per month)	R73 000	R876 000

Total Savings to date for energy, water and waste management initiatives above = Approximately R15.512million (over approximately 3 years)

OTHER INITIATIVES

- Most of chemicals and cleaning products used on site are ISO14001 compliant – no cost implication
- Use of low or zero VOC (Volatile Organic Compounds) paints with no premium in costs
- Plan to restructure waste tariffs with incentives for tenants to recycle at source
- Installation of 4 new escalators which are approximately 20% more energy efficient which will result in a saving of around R25 000 per year

CRITICAL SUCCESS FACTORS

- Get executive/senior management buy-in
- Educate staff and make utility management part of staff's KPAs
- Don't try to do everything at once, but have a plan
- Base all actions on a sound business case
- First pick the low hanging fruit and develop a track record
- Report on savings internally and externally
- Meter and measure everything first, then analyse and act
- Benchmark (KL/m², VA/m², kWh/m²) and prioritise

SMALL CHANGES, BIG REWARDS

23 million visitors per year

Assume:

- Each visitor utilises a WC once during their visit
- Each flush saves 1litre of water

Equals:

- 23 million litres of water saved each year, or
- 460 swimming pools at 50 000 litres each or R207 000

SOURCE: Devenish, Colin. V&A Waterfront. Email Interview.

> *"The term 'green building' can be misleading... in the commercial property industry of today 'green building' refers to 'high performance' or 'efficient' building.* [13] *"*

Brian Wilkinson
CEO, GBCSA

3.2
GREEN BUILDING DEFINITION

It is important to clearly understand what a green building is prior to presenting a business case.

The environmental impact of commercial buildings is well documented. Buildings produce carbon dioxide and other emissions that harm air quality and contribute to climate change. Buildings also generate an immense amount of waste during construction, operation and demolition, and they frequently have poor indoor environment quality which can adversely affect occupants' health. By contrast, a green building minimises its environmental impact and is healthy and comfortable for occupants.

But there is still uncertainty as to exactly what constitutes a green building.

The GBCSA defines a green building as one that incorporates design, construction and operational practices that significantly reduce or eliminate the negative impact of development on the environment and occupants with strategies for addressing:

- **energy efficiency;**
- **greenhouse gas emission abatement;**
- **water conservation;**
- **waste avoidance, reuse and recycling;**
- **pollution prevention - noise, water, air, soil & light;**
- **enhanced biodiversity and a positive impact on the ecology of the site;**
- **reduced natural non-renewable resource consumption;**
- **productive and healthier environments; and**
- **flexible and adaptable spaces.**

Green buildings are designed, constructed and operated in ways that strive to enhance their impact on the environment and on the building occupants.

In order to develop a more precise definition or criteria of whether a building is in fact green, rating tools set specific standards and benchmarks to provide an independent assessment of a building's green credentials.

24 RICHEFOND CIRCLE, UMHLAMGA:
4 Star Green Star SA - Office v1 Design & As Built
Double glazing was used on all the windows to maximise East-facing views and natural light while reducing glare and energy usage as a result of heat gain

BAHRAIN WORLD TRADE CENTRE:
The first skyscraper to intigrate large scale building-integrated wind turbines.
The project was presented at the 2009 GBCSA Convention and Exhibition.

CASE STUDY 4

COUNCIL HOUSE 2 (CH2), MELBOURNE, AUSTRALIA

International case studies

DESCRIPTION OF PROJECT

CH2 is the office accommodation of the City of Melbourne. **The building achieved Australia's first 6 Star Green Star Design rating.** Completed in 2006, CH2 is a 10 storey office building:

Gross Floor Area (GFA): 12 536m^2

PROJECT COST

Total building cost = $51.045million, including:

- $29.9million for the base building ($2 334/m^2 or 58.5% of cost)
- $11.3million for sustainability features ($884/m^2 or 22.1% of cost)
- $2.8million on education and demonstration process ($218/m^2 or 5.5% of cost)
- $7.1million on requirements specific to Council ($553/m^2 or 13.9% of cost)

COUNCIL HOUSE 2, MELBOURNE:
6 Star Green Star - Office v1 Design and As Built
Rooftop garden and wind turbines

BUSINESS CASE

The City specifically wanted to influence the market by acting as a leader in sustainable development so CH2 was in many ways a 'demonstration project'.

The building was designed to enhance the health, wellbeing and ultimately the productivity of the staff, whilst reducing the building's impact on the environment. The building's improved air conditioning and internal environment was conservatively expected to deliver a 4.9% increase in staff effectiveness through decreased sick leave and healthier, happier staff, representing a cost saving of $1.12m/year. Incorporating the energy and water savings too, the original payback expectation for the environmental features was 10 years. **An independent evaluation in fact showed a 10.9% increase in productivity after the first full year of occupancy, representing an actual cost saving of over $2m/year and reduced the payback period to 7 years.**

The City of Melbourne believe the estimated savings from the improved effectiveness and well-being of staff represent the largest potential gain from the project.

Compared to the previous Council accommodation, CH2 was expected to:

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

Other savings were achieved from:

- new LCD computer monitors that consume 77% less energy;
- new T5 light fittings that consume 65% less energy;
- solar panels that should provide about 60% of the hot water supply;
- photovoltaic cells that generate about 3.5kW of solar power;
- a gas-fired co-generation plant that provides 60kW of electricity, meeting about 40% of the building's electricity needs with much lower carbon dioxide emissions; and
- recycle waste heat from the cogeneration plant that provides 40% of the building's supplementary air heating/cooling system.

GREEN DESIGN FEATURES

Designed as a landmark demonstration project, with a sizeable portion of the budget allocated to green features, sustainable technologies are incorporated into every conceivable part of the development, including:

- a black water-mining plant in the basement;
- phase-change materials for cooling;
- automatic night-purge windows;
- undulating high thermal mass concrete ceilings for passive radiant cooling;
- a façade of louvres (powered by photovoltaic cells) that track the sun;
- solar shading;
- shower towers for low energy cooling;
- rooftop solar collection for water heating;
- green roofscape; and
- glare control.

"Many studies talk about the increase in productivity. This gives the perception that the outcome is for people to do more with less. This is not the intention of CH2 or the City of Melbourne. Through a great work environment, fresh air, natural light, low emitting materials and greenery, the City of Melbourne hopes to create a healthy place to work. A place where, at the end of the day, you feel that you have achieved what you wanted – that you have been effective. With the added bonus that you have fewer sick days, less headaches, and feel good while you are at work."

City of Melbourne Technical Research Paper 10 - The Business Case for Sustainable Design

SOURCE: City Of Melbourne website

BP HEAD OFFICE, CAPE TOWN:
Skylights and photovoltaic panels on one of the first large scale commercial office green buildings in South Africa.

3.3
STATE OF THE GREEN BUILDING INDUSTRY IN SOUTH AFRICA

Many aspects of green building are simply elements of good and efficient design principles – in this sense there have been examples of sustainable building design in Southern Africa for many decades already.

For example, Standard Bank's Head Office at No 5 and No 6 Simmonds Street, Johannesburg, dating back to 1990 and 1982 respectively, achieved a high degree of thermal efficiency of the building envelope via the use of double glazing and insulation. Energy efficiency was achieved using the concept of structural cooling through the elimination of ceilings and using cool night air to remove the heat build-up that occurred during the day and then topping it up with mechanical cooling. Ventilation efficiency was high as the fresh air was introduced through a raised floor and stale air was relieved at high level.[14] Another example is the Eastgate Shopping Centre in Harare, Zimbabwe, which opened in 1996 and whose design mimics the workings of a termite mound for a system of passive ventilation.

However, the modern green building movement in South Africa started gaining momentum with the focus on energy efficiency brought about by the rolling blackouts in 2008.

One of the first well publicised green office buildings in South Africa was the BP Head Office building in the Waterfront in Cape Town in 2003, followed in 2007 by the Woolworths Distribution Centre in Midrand and the Anglogold Ashanti Headquarters at Turbine Square in Newtown, Johannesburg – these projects were seen as the first examples from which the property industry could learn that minimising a building's impact on the environment could be commercially viable. These buildings pre-dated the Green Star SA Rating System, but the BP Building includes numerous green features like light shelves which reflect natural light deeper into the office floor plates, roof-mounted photovoltaic panels which generate 6.5% of the building's energy consumption, and a grey water system featuring a 1 350m^3 grey water tank located in the basement which results in the usage of potable municipal water being only 25% of that of a conventional building. The Woolworths Distribution Centre includes daylight harvesting techniques, rainwater harvesting and a grey water system and 2 000m^2 of green roofs, amongst other green initiatives.[15]

The Green Buildings for Africa (GBFA) programme in 1998 and the subsequent Sustainable Buildings Assessment Tool (SBAT) were both developed by the Council for Scientific and Industrial Research (CSIR) to drive the adoption of green and sustainable building practices in South Africa. Although the SBAT system has been used by numerous projects to guide the decision-making process of development, it is not a certification scheme in the same sense as Green Star SA.

Individual progressive designers and developers have pioneered various green (commercial) buildings in South Africa, but **it was not until the 2007 launch of the GBCSA and the Green Star SA system a year later that green building started gaining serious mainstream traction.**

TABLE 1:

TIME LINE OF GREEN BUILDING DEVELOPMENTS

1990	**BREEAM** – Building Research Establishment Environmental Assessment Methodology launched in the UK	OCT 2009	**First Green Star SA building certification awarded:** Nedbank Phase II, Green Star SA 4-star Office Design v1
1993	**US Green Building Council (USGBC)** established	APR 2010	**Second Green Star SA rating tool launched:** Retail Centres v1
1999	**LEED** – Leadership in Energy and Environmental Design rating system launched by the USGBC	MAR 2011	GBCSA **Energy & Water Benchmarking Tool** Project commences. (Expected completion in 2012)
1999	**World Green Building Council (World GBC)** founded	2011	South African **National Climate Change Response White Paper** published
2002	**Green Building Council of Australia (GBCA)** established	JUL 2011	Aurecon Century City Campus achieves South Africa's **first 5-star Green Star SA** Office Design v1 certification
2002	All buildings in Europe mandated to display **Energy Performance Certificates**	JUL 2011	National Building Regulations- Part XA and **SANS 10400-XA** – Energy Efficiency in Buildings effected
2005	South Africa's **National Energy Efficiency Strategy** launched by the Department of Minerals and Energy (DME)	SEP 2011	Vodafone Site Solution Innovation Centre achieves South Africa's **first 6-star Green Star SA** Office Design v1 certification
2007	**Green Building Council of South Africa (GBCSA)** established	OCT 2011	**Third Green Star SA rating tool launched:** Multi Unit Residential Tool v1
2008	First version of **SANS 204** launched – energy efficiency standard for buildings	OCT 2011	**Fourth Green Star SA rating tool launched:** Public & Education Building PILOT
NOV 2008	**First Green Star SA rating tool launched:** Office v1	2011	Department of Public Works announces the development of its **Green Building Framework**
NOV 2008	City of Cape Town draft **Green Building Guidelines** launched	MAY 2012	Launch of GBCSA / SAPOA **Green Lease Toolkit**
2008	City of Joburg **Design Guidelines for Energy Efficient Buildings in Johannesburg** launched	JULY 2012	GBCSA launches **Rands & Sense of Green Building**

CASE STUDY 5

THE GAUGE, MELBOURNE, AUSTRALIA

International case studies

DESCRIPTION OF PROJECT

Opened in 2009, the Gauge is the Melbourne headquarters of property group Lend Lease. The building consists of six office floors with approximately 9 000m^2 of nett lettable commercial office space and approximately 1 300m^2 of ground level retail space and **achieved the first 6 Star Green Star – Office As Built v2 certification, representing 'World Leadership' in sustainable design and construction.**

PROJECT COST

According to Lend Lease, ''The objectives for The Gauge were to demonstrate real and measurable environmental gains over 30 The Bond, at a lower price, in a building that the industry sees as readily accessible in an overall push to make the highest level of sustainability mainstream.'' The company describes the development cost of the building to be ''competitive'' compared to other mainstream buildings of its class.

BUSINESS CASE

The Gauge responds to the two significant environmental challenges facing Australia, greenhouse gas emissions and water supply.

It is anticipated that water saving initiatives in The Gauge's design will reduce potable water consumption by a further 30% when compared with typical existing 5 Star Green Star rated buildings, while **the focus on energy efficiency coupled with the on-site cogeneration system will reduce greenhouse gas emissions by over 30% when compared with typical 5 Star Green Star buildings.**

The building model employed by Lend Lease allowed the company to successfully refine the engineering processes, systems and materials, integrating and streamlining the techniques from beginning to end. The result has been the delivery of a 6 Star Green Star rated A Grade office building at a competitive development cost.

The Gauge represents a milestone for the Australian property development industry. **It achieves environmental leadership through reducing consumption, on site generation and recycling and a 6 Star Green Star rating at a price point accessible to the majority of the market.**

THE GAUGE, MELBOURNE
6 Star Green Star - Office v2 Design and As Built
Natural light is maximised in the Lend Lease offices via low tint, full floor to ceiling glazing

Lend Lease Project Director, Chris Carolan, contemplates how The Gauge is anticipated to change the landscape of sustainable development. "This is not a peripheral building," he says. "It is not just a building with clever ideas. It is not an experiment and it is not a one-off. The Gauge will influence the mainstream in Australia because it demonstrates that the highest level of environmental performance can be achieved in a building that the industry considers normal. When sustainability becomes normal rather than an ambition, we are on course to make real progress."

Lend Lease Chief Operating Officer, Ross Taylor, said "The Gauge is one of the very first new buildings to be acknowledged with a 6 Star Green Star rating for its design, and **clearly demonstrates that leading sustainable technology and commercial viability can go hand in hand.**

"The Gauge makes the business case for green buildings; and it sets a new global benchmark for Lend Lease's green building project portfolio," he said.

GREEN DESIGN INITIATIVES

THE WATER WORKS

The Gauge tackles Victoria's water-scarce future through intelligent design and water efficient technologies like cooling tower control systems that limit water wastage, high efficiency fixtures and fittings in urinal and toilet facilities, as well as a fire system tank that enables collection and reuse of fire system water.

An on-site blackwater sewage treatment system recycles 92% of water used on-site each year, re-using it to flush toilets in the building. **The reduction in potable water consumption not only represents a substantial environmental outcome, but also a profitable one as a reduction in water utility costs is established and sustained for the life of the building.**

WAY TO ZERO

A natural gas-fired cogeneration unit on the roof of the building generates more than 25% of the base building's overall energy demand, using waste heat for pre-heating domestic hot water and air supply in the colder months. The building also features a passive chilled beam cooling system that utilises natural convection to transform warm air into cool air before floating back down to occupants, providing improved air quality and reduced mechanical noise, as well as energy cost savings.

The flow-on benefits from these technologies mean **cost savings for the building owner and tenancies, as well as reduced reliance on the energy grid and improved indoor environment quality.**

DRIVING CHANGE

In Australia in 2002, cars contributed to approximately 8% of total CO_2 emissions. This figure, paired with the CO_2 emitted by trucks and light commercial vehicles, raises the environmental impact of the transport sector to 13% of Australia's emissions.

With a convenient CBD location, tenants in The Gauge can leave their cars at home and cycle or catch public transport to work each day. The building provides well-equipped bicycle facilities including secure racks, lockers and showers for 72 office employees. There are also a limited number of car parking spaces, with 30% reserved for small cars or motorcycles. **By encouraging the uptake of green transport to work, The Gauge will contribute to the overall reduction of transport-based CO_2 emissions.**

SOURCE: (http://203.145.50.198/idl/media/MAY-08/gauge_hero.jpg) Green Building Council of Australia website (http://www.worldbuildingsdirectory.com/project.cfm?id=1298)("http://www.indesignlive.com/articles/6-stars-in-the-gauge" \l "ixzz1uprwkJjy")

OTHER GREEN DESIGN INITIATIVES:

WASTE

- Diversion of 94% of construction waste from landfill
- Recycled waste storage located throughout the building

INDOOR ENVIRONMENT QUALITY

- Electric, internal solar blinds on north and west facades with occupant override
- Individual task lighting controlled by the occupant in the Lend Lease fit-out
- Maximisation of natural light through low tint full floor to ceiling glazing, two full height atriums and a segmented core with windows

MATERIALS

- Fit-out integrated with base building construction to minimise waste
- 20% replacement of cement with fly-ash, an industrial waste product
- High level of post-consumer recycled content in majority of steel used
- Sustainable timber used throughout, either Forestry Stewardship Council rated or post-consumer recycled

LAND USE & ECOLOGY

- Reuse and remediation of a heavily contaminated industrial site

EMISSIONS

- A stormwater management system treats all stormwater leaving the site. Stormwater is collected for irrigation of the adjacent Victoria Green
- Zero ODP refrigerants and insulants.

GREEN BUILDING COUNCIL SA

"At present, the bulk of South Africa's commercial buildings are relatively energy inefficient, and the sector has been identified as one of the main sources of greenhouse gas emissions in South Africa. [16] *"*

Barry Bredenkamp
Senior Manager: Energy Efficiency, South African National Energy Development Institute (SANEDI)

3.3.1
FORMATION OF THE GREEN BUILDING COUNCIL OF SOUTH AFRICA (GBCSA)

In an attempt to build more efficient buildings, do their bit to combat climate change and keep pace with international trends, a number of South African property owners and developers were seeking assistance with green building in 2006 and 2007.

One of these developers was Bruce Kerswill of the Spire Property Group, who realised that not only isolated developments, but the entire South African property industry needed to transform to environmental sustainability.

With initial financial and operational assistance from the South African Property Owners Association (SAPOA), Bruce launched the GBCSA in September 2007 and became the organisation's inaugural Executive Chair.

The Council's aim was to assist the South African industry to adopt green building principles and practices by providing an integrative framework and national environmental rating system for buildings, together with supporting programmes like education, training and research.

The GBCSA is an independent, non-profit, member-based organisation, made up of corporate members from all sectors of the commercial property industry. Its vision and mission is as follows:

VISION

The Green Building Council of South Africa will lead the transformation of the South African property industry to ensure that all buildings are designed, built and operated in an environmentally sustainable way that will allow South Africans to work and live in healthy, efficient and productive environments.

Changing the way the world is built.

MISSION:

To promote, encourage and facilitate green building in the South African property and construction industry through market-based solutions, by:

- **Promoting** the practice of green building in the commercial property industry,
- **Supporting government** to lead by example, to legislate and facilitate the adoption of green building practices,
- Facilitating the implementation of green building practice by acting as a **resource centre,**
- Enabling the objective measurement of green building practices by developing and operating a **green building rating system,**
- **Recognising and rewarding** industry leaders who achieve green building excellence, and
- Improving the knowledge and skills base of green building in the industry by enabling and offering **training and education**

GREEN STAR SA

Central to the work of the GBCSA is the development and operation of the Green Star SA Environmental Rating System for Buildings, the only national comprehensive environmental certification scheme for buildings in South Africa. Green Star SA is based on the Green Building Council of Australia's Green Star system, which in turn is based on other international rating systems, but has been totally customised for the South African context and conditions. Development and customisation of Green Star SA rating tools involves a Technical Working Group of industry experts and includes a public comment process as well as a lengthy PILOT period to work with the industry to test the appropriateness and applicability of the tools to the local market.

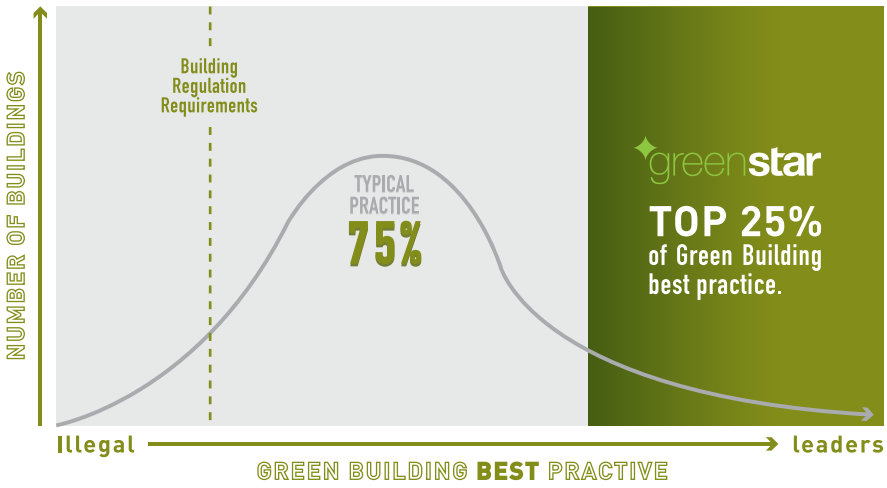
The GBCSA created 'Green Star SA' to establish a common language and standard of measurement for green buildings; to promote integrated, whole-building design; and to identify building life-cycle impacts.

Green Star SA separately evaluates the environmental initiatives of projects based on eight environmental impact categories:

- Management
- Energy efficiency
- Water efficiency
- Indoor Environment Quality
- Transport
- Material selection
- Land Use and Ecology
- Emissions
- + **Innovation**

Importantly, Green Star rating tools are voluntary and aim to drive best practice, not to duplicate regulations.

The Role of Green Star rating tools vs Regulations:



In just four years the Green Building Council has established itself as the nation's leading authority on green building and demand for its Green Star education and associated support services has been overwhelming. As of April 2012, the GBCSA has almost 1 000 member organisations, has trained more than 3 000 industry representatives and more than 40 projects around South Africa have registered for Green Star certification, whilst 18 have already achieved formal certification. All this against the backdrop of the global financial crisis.

It is now becoming common on turning the sod for a new major commercial building to state that the building will seek to achieve a Green Star Certified Rating.

"Green Star is so simple and easy to understand that every project can do it... it should be intrinsic to your design process. [19] *"*

Ché Wall
Joint Managing Director, Lincolne Scott
Co-founder & Past Director of the GBCA; Past Chair of the World Green Building Council

CURRENTLY, THE FOLLOWING GREEN STAR SA TOOLS ARE AVAILABLE:

OFFICE V1

RETAIL CENTRE V1

MULTI-UNIT RESIDENTIAL V1

PUBLIC & EDUCATION BUILDING PILOT

All of these tools are available for the design phase of the new or refurbished buildings ('DESIGN' Tool), or for the construction and procurement phase ('AS BUILT' Tool).

Future planned tools will include tools for Commercial Interiors, Industrial Buildings and crucially, for the Operation and Performance of Existing Buildings. The GBCSA has begun the development of the tool for Existing Buildings, by commencing development of an Energy and Water Benchmarking system, which will form a key part of the broader Existing Buildings tool.

"Green Star certification is the only way in which one can confidently measure how green a building is, based on an independently recognised certification process. [17] *"*

Colin Anderson
Director, Rabie Property Group

TABLE 2:

GREEN STAR SA CERTIFIED PROJECTS

As of April 2012 more than 40 projects had registered for certification under the various Green Star SA rating tools. Table 2 details those projects that have received a Green Star Certified Rating as at end April 2012:

BUILDING	GREEN STAR CERTIFICATION	LOCATION	DATE
Nedbank Phase II	4 star Green Star SA Office v1 Design	**JHB**	Oct 2009
Nedbank Phase II	4 star Green Star SA Office v1 As Built	**JHB**	Sep 2010
Villa Mall	4 star Green Star SA Retail Centre v1 Design	**PTA**	Oct 2010
Nedbank Ridgeview	4 star Green Star SA Office v1 Design	**DBN**	Sep 2010
24 Richefond Circle	4 star Green Star SA Office v1 Design	**DBN**	Dec 2010
24 Richefond Circle	4 star Green Star SA Office v1 As Built	**DBN**	Sep 2011
Aurecon Centre Tshwane	4 star Green Star SA Office v1 Design	**PTA**	Sep 2011
Aurecon Century City	5 star Green Star SA Office v1 Design	**CPT**	Sep 2011
Nedbank Menlyn Maine Falcon Building	4 star Green Star SA Office v1 Design	**PTA**	Sep 2011
Vodafone Site Solution Innovation Centre	6 star Green Star SA Office v1 Design	**JHB**	Sep 2011
Forty on Oak	4 star Green Star SA Multi Unit Residential PILOT Design	**JHB**	Oct 2011
Mayfair on the Lake	4 star Green Star SA Office v1 Design	**DBN**	Oct 2011
Lincoln on the Lake	4 star Green Star SA Office v1 Design	**DBN**	Dec 2011
Upper Grayston Office Park, Building E	4 star Green Star SA Office v1 Design	**JHB**	Jan 2012
SANRAL Corporate Head Office	4 star Green Star SA Office v1 Design	**PTA**	Jan 2012
Millennia Park	5 star Green Star SA Office v1 Design	**CPT**	Feb 2012
ABSA Towers West	5 star Green Star SA Office v1 As Built	**JHB**	Feb 2012
New Sisonke District Offices	5 star Green Star SA Office v1 Design	**IXOPO**	Apr 2012

CASE STUDY 6

NEDBANK PHASE II, JOHANNESBURG

Green Star SA case studies

DESCRIPTION OF PROJECT

Nedbank Phase II forms part of Nedbank's Johannesburg headquarters and is located in central Sandton on the corner of Rivonia Road and Maude Street, opposite the Village Walk. Accommodating 3 000 employees, the development includes three levels of basement parking, ground floor retail and seven levels of office space.

Total Gross Floor Area (GFA): 45 401m²
Car Parking Area: 59 253m²

Completed in April 2010, **Nedbank Phase II was the first project in South Africa to achieve a 4 Star Green Star SA – Office Design v1 rating and also the first to achieve a 4 Star Green Star SA – Office As Built v1 rating.**

PROJECT COST

As a corporate Head Office building, Nedbank Phase II had a higher budget than Nedbank's standard office buildings.

3.3% of the capital cost related to the green/sustainable features of the building and less than 0.5% related to the Green Star SA certification process.

NEDBANK PHASE II, SANDTON:
4 Star Green Star SA - Office v1 Design and As Built
Change room facilities encourage cycling & jogging to work

BUSINESS CASE

Nedbank is known as the 'Green Bank' and as such need to be seen as leaders in the green space. The bank "received a lot of coverage" as a result of their achievement of the first Green Star SA certification in the country, which was "good for the company's image," Says Ken Reynolds, Regional Executive of Nedbank Corporate Property Finance's Gauteng division.

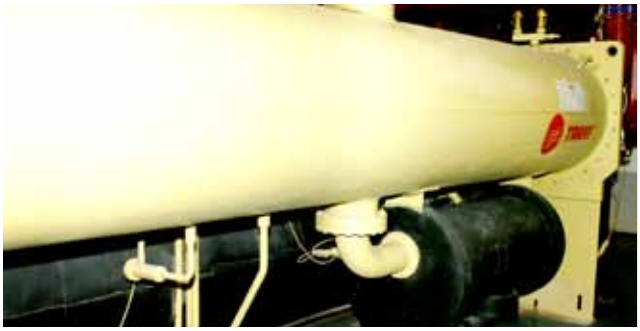
As owner occupiers, the anticipated 30% electricity and water savings were expected to contribute to paying back the 3.3% green 'premium' in 3.5 years. With utility cost increases, the estimated payback was ''closer to 2.5 years,'' explained Reynolds.

GREEN DESIGN INITIATIVES

Amongst many other green design initiatives, the following are key green features of the building:

- 79% of all construction waste was recycled or reused.
- A digital addressable lighting installation (DALI) has been provided for the office areas with fully addressable fittings controlled by motion and light sensors.
- Heat rejection of the chillers takes place via energy efficient open circuit evaporative cooling towers.
- Air handling units (AHUs) are fitted with variable speed drives to provide variable air volume to offices.
- A full economy cycle has been incorporated into the HVAC system to provide 100% fresh air when external conditions permit.
- A black water treatment system was designed and planned to be installed to provide recycled water for all non-potable water uses including irrigation, toilet flushing and the cooling towers. However, this system was ultimately not installed due to approval not having been granted by the local municipality.
- The outflows to the sewerage system have been reduced by 50% through the implementation of highly efficient fixtures and fittings. (Outflows could have been reduced by 90% had the black water treatment system been installed).
- The project was instrumental in getting one of the large paint manufacturers to supply paint with volatile organic compound (VOC) levels within the maximum limits as set by Green Star SA months earlier than the paint company had planned to make it available to the South African market. This is a powerful example of the capacity of Green Star SA to transform the market as this paint is now available to all projects in the country.

NEDBANK PHASE II, SANDTON:
4 Star Green Star SA - Office v1 Design and As Built
Rainwater storage tanks are used for toilet flushing



NEDBANK PHASE II, SANDTON:
4 Star Green Star SA - Office v1 Design and As Built
Energy efficient centrifugal chillers are used for air conditioning systems

"You need to incorporate the green design philosophy from the inception of the project and always maintain it as part of the project. A project which is correctly designed with the appropriate specifications can be delivered at a similar cost to a standard building. Operating costs need to be considered when doing the feasibility for the project."

Ken Reynolds
Nedbank Corporate Property Finance

SOURCE: GBCSA website
Reynolds, Ken, Nedbank Corporate Property Finance. Email Interview

3.3.2
GOVERNMENT LEADERSHIP

All levels of government (national, provincial and local) have a major influence on the sustainability agenda through the vast amount of space they occupy and own, as well as through regulation, policy, incentive programs and leadership.

Internationally, governments have played vital leadership roles in driving the take-up of green building practices both by transforming the space they own or occupy as well as by gradually greening their respective building codes. A few key developments are highlighted here:

GREEN BUILDING CERTIFICATION FOR GOVERNMENT OWNED OR LEASED BUILDINGS

In many areas of the United States and Australia, governments are leading the green building movement by example by specifying a green building certification (eg LEED, Energy Star, Green Star or NABERS) for government-owned or leased accommodation. The General Services Administration, which manages all federal government accommodation in the US, is aiming to have 15% of its entire portfolio certified under the LEED rating tool by 2014 and since 2003, every new building or major refurbishment has been LEED certified.[20]

The Construction Industry Development Board (CIDB), an agency of DPW, has already gazetted Green Star SA as a best practice, and has released a framework for discussion in which it is proposed that all new government buildings would need to achieve the minimum level of Green Star SA certification.

Two government buildings have already achieved Green Star SA certification – the new SANRAL Corporate Head Office in Pretoria and the New Sisonke District Offices in Ixopo, Kwazulu Natal (See Table 2) and a further five government buildings have registered for certification, including new buildings for the National Department of Public Works and the Department of Environmental Affairs.

The South African national Department of Public Works (DPW) has also stated that it is currently developing a 'Green Building Framework', in which it has committed itself to greening its own buildings via the development of a "uniquely South African green building rating system" and an Eco-labelling scheme, to be developed in conjunction with Indalo Yethu (See Section 5.3.3).[21]

The DPW Strategic Plan 2012–2016 states, "This (green building) framework demonstrates DPW's commitment towards addressing greenhouse gas emissions and energy efficiency and promoting the concept of a 'green economy' as one of the key elements in government's new growth path and Industrial Policy Action Plan (IPAP)." [22]

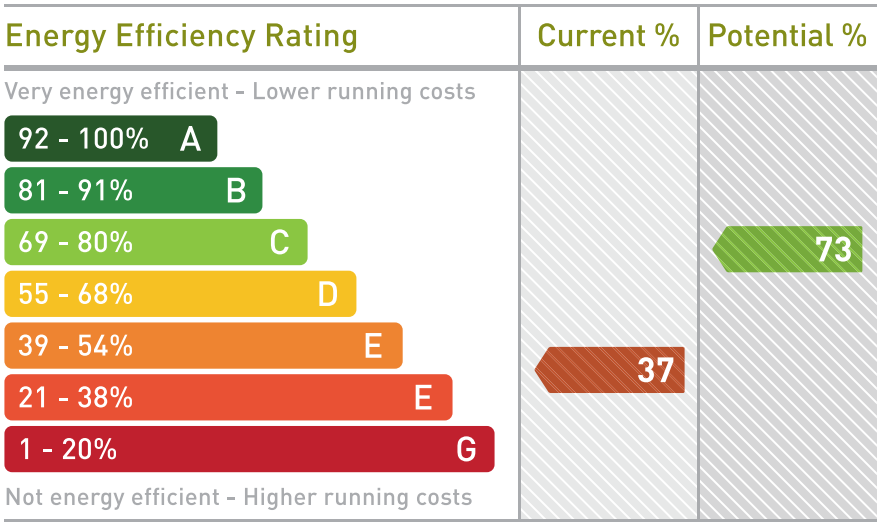
"Government needs to lead by example by setting best practice standards for new government buildings and (within resource constraints) by enhancing the government programme for retrofitting existing buildings. In addition, government needs to promote those best in class buildings as demonstration projects. [6] *"*

Dr Rodney Milford
Construction Industry Development Board
'Greenhouse Gas Emission Baselines and Reduction Potentials from Buildings in South Africa'

MANDATORY DISCLOSURE OF ENERGY EFFICIENCY – ENERGY PERFORMANCE CERTIFICATES

Under the EU Directive 2002/91/EC all buildings in Europe are mandated to display 'Energy Performance Certificates'(EPCs), which show the relative energy efficiency of the building compared to predefined benchmarks and bands, on sale or lease of the building. Australia has now followed this lead and requires mandatory disclosure of a building's 'NABERS' energy efficiency rating on lease or sale since 2010.

EXAMPLE OF AN ENERGY PERFORMANCE CERTIFICATE:[23]



South Africa is considering following this approach, and will elaborate on these plans in the 2nd review of the National Energy Efficiency Strategy, which is due to be released for public comment in 2012. The **intention of Government is to introduce EPCs initially in the Public Building sector for existing buildings not older than 10 years and in excess of 1 000m².** According to the Department of Energy (DOE), a committee has been formed with working groups and a relevant standard is being developed for submission to SABS. The intention is for the CIDB to administer the labelling system on behalf of the National Department of Public Works.

Additionally, the government also intends introducing regulations before 2015 requiring residential buildings for sale to be in possession of a certifiable fully functioning energy efficient means of heating water, such as solar water heaters or heat pumps. This will need to provide at least 50% of a dwelling's water requirements.[24]

CARBON TAX

Carbon taxes aim to reduce carbon emissions by putting a price on carbon, thereby creating an incentive to reduce the use of non-renewable energy sources while penalising those with non-efficient energy usage.

Already a reality in Europe, **Australia has recently introduced a carbon tax which has increased the occupancy costs of commercial office space by approximately $2-$4 per square meter per annum.**[25]

FORTY ON OAK, MELROSE ARCH, JHB - First Green Star SA certified multi unit residential building

AURECON CENTURY CITY CAMPUS, CAPE TOWN:
5 Star Green Star SA - Office v1 Design
Shading devices on the facade reduce glare from direct sunlight, while still allowing natural daylight to filter through to the office floors

The South African Department of National Treasury is working towards the introduction of a carbon tax and released a discussion paper for public comment on this proposal in December 2010. The discussion document concludes that "A carbon tax appears to be the most appropriate mechanism to reduce GHG emissions in South Africa, creating incentives for emissions reduction at least cost to the economy." It also notes that "A tax of R75 per ton of CO_2 and with an increase to around R200 per ton CO_2 (at 2005 prices) would be both feasible and appropriate to achieve the desired behavioural changes and emission reduction targets."[26]

So the imposition of a carbon tax appears to be imminent. While there is some reluctance to introduce such a tax locally, it is recognised that other jurisdictions are likely to impose surcharges on goods produced in areas without appropriate carbon controls.

GREEN BUILDING REGULATIONS/CODES

Usually focused initially on energy efficiency, building regulations and codes worldwide are increasingly including green building standards as part of their minimum levels. In fact the International Code Council has released a draft "International Green Construction Code" (IgCC)[27], which is a model code which may be adopted or referred to by any government anywhere in the world. This code focuses on new or existing commercial buildings and addresses green building design and performance.

It is important to note that although differing opinions exist as to the efficacy of voluntary certification schemes compared with a regulatory approach, both approaches are critical as they address different segments of the market and complement each other to shift the entire market towards greener practices.

In one of the first major moves to include 'green building' elements in the South African National Building Regulations, the Regulator has issued NBR-XA and the SABS has developed SANS 10400-XA – the first set of minimum standards for energy efficiency and environmental sustainability for buildings – which applies to new and refurbished buildings submitting for municipal approval from November 2011. These new regulations address the design and construction process by providing for minimum requirements for design elements such as glazing, insulation, shading, orientation and building services, including air conditioning, hot water and lighting.

The new SANS 10400-XA refers in part to the aspirational and voluntary SANS 204 standard, the first version of which has been available since 2008. (Note: SANS 204 is used by the GBCSA as a minimum energy requirement for projects seeking Green Star SA certification. Green Star SA rewards projects which exceed the requirements of SANS 204.)

Both SANS documents may be bought online from the SABS website.

The process has also begun to draft minimum standards for water efficiency in buildings, including the setting of maximum flow rates, flush rates etc.

According to the Minister of Public Works, DPW will "undertake an international study early in 2012 to research and compare best practices where green building regulations or processes have been put in place", in partnership with the Council for Scientific and Industrial Research (CSIR).[21]

SZENCORP BUILDING, MELBOURNE:
6 Star Green Star - Office v1 Design
Rooftop mounted photovoltaic panels supply 20% of the building's energy needs from renewable sources

> *"The Department of Public Works intends to lead the South African construction and property industries towards a regulated green building dispensation, beyond the 'nice to do' concept currently in place. This is a long term project and requires partnerships amongst others with the South African Bureau of Standards (SABS) and the Department of Trade and Industry.* [21] *"*
>
> **Thulas Nxesi**
> Minister of Public Works

INCENTIVES/SUBSIDIES/REBATES

ESKOM'S INTEGRATED DEMAND MANAGEMENT (IDM) PROGRAMME[28]

In light of the energy-constrained future facing South Africa, Eskom's Integrated Demand Management (IDM) business unit has established a range of programs to incentivise energy efficiency. IDM is dedicated to ensuring the short-term security of electricity supply.

There are three funding mechanisms by which commercial property owners may claim rebates for their energy efficiency improvements:

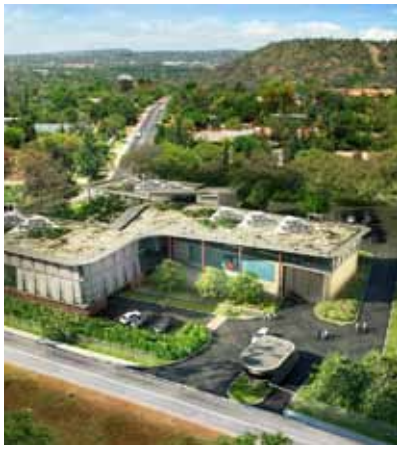
1. **STANDARD PRODUCT**
2. **STANDARD OFFER**
3. **ESCO PROCESS**

1. STANDARD PRODUCT

This rebate for small to medium projects is available for deemed savings of 1kW-250kWs per metered site and is available for the installation of specific pre-approved technologies, covering lighting, hot water (heat pumps) and showerheads. The projected savings are verified by Eskom and the rebate dependent on these projected savings, to a maximum of R1.9million. The list of approved technologies will continue to grow as 'new' technologies are identified and approved for inclusion. Specifically, Eskom plans to add recognised solutions for air conditioning improvements and solar water heating technology to this offering in future. The approval process under this programme typically takes up to two weeks.

"The government will lead by example through raising energy efficiency awareness and by implementing specific measures within its own estate."

National Energy Efficiency Strategy, DME, 2008 [29]



SANRAL HEADQUARTERS, PRETORIA:
4 Star Green Star SA - Office v1 Design
First Green Star SA certified parastatal building
A rooftop garden provides improved thermal insulation, stormwater retention and biodiversity.

2. STANDARD OFFER

This is a performance-based system whereby Eskom pays for verified electricity savings of between 50kW and 5MW at 42-70c per kWhour for a period of 3 years. In terms of this system, measurement and verification professionals establish a baseline of electricity consumption as well as the actual consumption after the energy efficiency upgrade. 70% of the total estimated savings are paid upon initial verification and the remaining 30% in equal annual instalments. Technologies incentivised via this programme include lighting upgrades including LED lighting, Building Management Systems (BMS), improvements to electrical hot water systems like heat pumps, efficient shower heads and insulation, process optimisation and solar water heating systems. The approval process under this programme typically takes under two months.

3. ESCO PROCESS

This rebate is aimed at larger projects of at least 1MW – Eskom will fund between R3.5m-R6.3m per megawatt of energy generated/saved, dependent on the specific technology employed.

This process is driven by an Energy Service Company (ESCo), accredited by Eskom. The ESCo submits a proposed project to save significant energy on behalf of a client, which is then reviewed and approved by Eskom, based on its technical and financial merits, as well as its energy savings potential. This program is more complex than the previous two, and can take between 6-18 months to approve.

In order to ensure that ESCo projects deliver the promised savings, there are penalty clauses in place.

PROPOSED SECTION 12L OF THE INCOME TAX ACT – REGULATIONS ON THE ALLOWANCE FOR ENERGY EFFICIENCY SAVINGS

A draft amendment has been made to the National Energy Act 2008 whereby a tax rebate may be claimed for energy efficiency savings in a building under Section 12L of the Income Tax Act.

Under this system, an authorised Measurement and Verification professional will need to compile a report which determines the baseline energy usage of a building (based on the previous year's energy usage) as well as the current year's energy savings compared to the baseline.

"Government buildings and procurement give government the opportunity to lead by example and create sustainable built environments that result in beneficial social, economic and environmental impacts." [34]

Jeremy Gibberd
Gauge (Inclusion & Sustainability Consulting)

"Accelerated and focused attention needs to be given to translating existing policy into regulation and translating intent into action. [6] *"*

Dr. Rodney Milford
Construction Industry Development Board
'Greenhouse Gas Emission Baselines and Reduction Potentials from Buildings in South Africa'

TABLE 3:

NATIONAL GOVERNMENT: SAMPLE OF GREEN POLICIES AND PROJECTS

Below is a sample of a few key recent green-related policies and documents released by the SA National Government:

2007	**Long Term Mitigation Scenarios (LTMS) (ERC for DEAT)**	Modelling study which outlines different scenarios of mitigation action by SA to inform national policy and provide a basis for South Africa's position in international climate change negotiations.
2008	**National Energy Efficiency Strategy (DME) 1st Review**	Outlines the development and implementation of energy efficiency practices for all sectors of the economy in SA. National target for energy efficiency improvement of 12% compared to business-as-usual by 2015.
2010	**Green Economy Summit**	The Department of Environmental Affairs as a coordinating department called this summit to start the process of development of a national green economy strategy.
2010	**Reducing Greenhouse Gas Emissions – The Carbon Tax Option (Discussion Paper by NT)**	Explores the economic policy instrument option of carbon tax for putting a price on carbon and curbing greenhouse gas emissions.
2011	**National Climate Change Response White Paper**	Presents the South African Government's vision for an effective climate change response and the transition to a climate resilient and lower carbon economy and society.
2011	**National Building Regulations NBR-XA and SANS 10400-XA**	The first set of minimum standards for energy efficiency and environmental sustainability for buildings in the National Building Regulations applicable to new and refurbished buildings.
2011	**SANS204**	Aspirational/voluntary standard on energy efficiency in buildings
2011	**Integrated Resource Plan for Electricity 2010-2030 (DoE)**	This 'National Electricity Plan' directs the expansion of the electricity supply over the given period, by identifying the investments in the electricity sector that will allow the country to meet the forecasted demand.
2011	**Green Economy Accord**	SA government pact to create 300 000 new green jobs and double the country's energy generation capacity over the next 20 years, including the commitment to install one million solar water-heating systems in South Africa by the 2014, promotion of retrofitting in commercial buildings to reduce energy use, and the provision of R25 billion by the Industrial Development Corporation (IDC) for investments in green economy activities over the next five years.

EXAMPLES OF GOVERNMENT LEADERSHIP

GAUTENG PROVINCE

The Gauteng Department of Local Government and Housing launched the "Gauteng Integrated Energy Strategy" in March 2010 addressing energy efficiency and alternative energy. By 2055, the Gauteng province aims to reduce its overall energy consumption by 18% from business-as-usual projections and its carbon emissions by 49% in relation to 2007 levels.[30]

At the launch Gauteng Premier Nomvula Mokonyane explained that Gauteng had to place emphasis on the low-hanging fruits of energy-efficiency and renewable energy, as this offered significant scope to enhance the profitability of business and to contribute to the economic development of the province.[31]

CITY OF CAPE TOWN

The City of Cape Town (CoCT) has demonstrated its view of the importance of green building by recently releasing its Green Building Handbook. This document will not only assist users in complying with the new XA section of the building regulations, but also aims to give guidance on complying with the planned Resource Efficient Development Policy, which encompasses the rollout of the XA building regulations, but which will in fact have broader application too.

Another notable initiative of the CoCT is its plan to facilitate the rollout of 300 000 solar water heaters in middle and high income homes by 2014. The CoCT was also instrumental in getting an allowance for ceilings included in the low income housing subsidies in areas with winter rainfall – a critically important factor in insulating these dwellings.

Finally, the CoCT is also walking the talk by registering both its new CoCT Electricity Head Office building and the Manenberg Housing Office building for Green Star SA certification.

The City of Cape Town has underlined the importance of these issues by establishing the 'Energy and Climate Change' Unit as part of the Environmental Resource Management Department. The Energy and Climate Change Committee is also a political committee which reports directly to the Mayoral Committee.[32]

CITY OF JOBURG

The City of Joburg launched its 'Design Guidelines for Energy Efficient Buildings in Johannesburg' in 2008. This document aims to provide practical guidance on ways of designing buildings that minimize the requirement for energy and is part of a strategy to reduce energy consumption and address global warming within the municipality. It lists as reasons why all new buildings should be designed to be energy efficient: global warming, reducing operating costs, compliance with tightening legislation and standards, limiting the requirements for additional power, market and client demands.[33]

CITY OF TSHWANE

The City of Tshwane is currently developing a Green Building Development By-law.
The by-law will incentivise the inclusion of energy efficiency interventions through a discount on plan approval costs if energy efficiency measures have been implemented.

NELSON MANDELA BAY METROPOLITAN MUNICIPALITY

This municipality is working in partnership with provincial government to ensure that solar water heaters (SWHs) are included in all new low-income developments. SWHs are to be financed by the national housing subsidy.

OTHER EXAMPLES

The above are a few examples of energy efficiency and green building action by local and provincial governments, but this list is by no means exhaustive.

> *"The deliberations of the Conference of the Parties (COP 17) in December 2011 added emphasis to the Department's green buildings framework and responsiveness to South Africa's newly unveiled White Paper on Climate Change. Efforts to step up the greening of state buildings are underway as part of South Africa's mitigation strategies on the effects of global warming."* [22]
>
> **Department Of Public Works Strategic Plan 2012-2016**

CASE STUDY 7

MAYFAIR ON THE LAKE, DURBAN, KWAZULU-NATAL

Green Star SA case studies

DESCRIPTION OF PROJECT

Still under construction at the time of going to print, Mayfair on the Lake is an L-shaped 5 storey office building in Umhlanga Ridge in Durban which **has achieved a Four Star Green Star SA Office v1 – Design Rating:**

Total Gross Floor Area (GFA) : 6 415 m² Car Parking Area : 5 559 m²

With a design governed by environmentally sustainable principles and incorporating energy efficiency strategies, the speculative development aims to deliver cost-effective office space to future tenants.

PROJECT COST

The developers paid a capital cost premium of approximately 5% to green the design of the building to a 4 Star Green Star SA standard, including a figure of approximately 1% for the Green Star SA certification process.

BUSINESS CASE

Building owner Growthpoint Properties is a Platinum Founding Member of the GBCSA and committed to environmental sustainability. According to Greg de Klerk, Regional Head KZN at Growthpoint, GBCSA standards are used as a baseline for the company's environmental behaviour in respect of new developments and "Green Star certification provides confirmation of our commitment to responsible environmental behaviour."

Mayfair on the Lake is a speculative development, and although the general take-up in the rental market in Durban is currently slow, **there is "greater interest shown by prospective tenants" compared to other non-Green Star buildings,** says Richard Hertz of Key Developments, Growthpoint's JV partner in the development. He explains that although "the energy savings are attractive to potential tenants", cost and a low base rental is still the major issue in tenants' minds. However he believes "this will change in the near future, especially as energy cost increases bite." **Energy savings in the building are expected to be in the region of 24% compared to a similar conventional building designed to SANS204 standards.**

The development also received additional publicity and coverage as a result of the Green Star certification, although the developers say "it is difficult to put a value to it."

GREEN DESIGN INITIATIVES

- Energy usage has been reduced by a combination of insulation, sun-screening, double glazing and airtightness of the building.
- The level of carbon dioxide is monitored and ventilation rates are automatically increased when necessary to reduce the carbon dioxide levels to improve the IEQ and make the indoor environment more comfortable and healthy.
- Water is saved by harvesting rainwater and air conditioning condensate as well as the use of waterless urinals.
- All mechanical systems are properly commissioned and the building thoroughly tuned to ensure that all are operating in accordance with design specifications.
- The building is situated in close proximity to an established transport node, which minimises the environmental impact of transport to and from the building.

LESSONS LEARNT

- Design the building using green principles from inception

SOURCE: Hertz, Richard, Key Developments. Email Interview
De Klerk, Greg, Growthpoint Properties. Email Interview

3.4 THE INTERNATIONAL SITUATION

The **global transition to building green** is well underway and it is **gaining momentum.**

GREEN BUILDING IN GLOBAL MARKETS

Different global markets have slightly different drivers - the shift to greener building practices in the UK and Europe has largely been driven by regulatory forces and progressive policies, whilst in the US and Australia, the use of voluntary rating tools like LEED and Green Star has marked the mainstream take-up of green building. But regardless of these differences, it is clear that the world is embracing greener, more efficient and healthy buildings.

As mentioned in the previous section on Government Leadership, a 2002 EU Directive mandated that all buildings display 'Energy Performance Certificates'(EPCs) on sale or lease of the building. This has resulted in a far greater awareness of energy efficiency in buildings and this policy is being introduced in numerous other world markets. In the UK, the government has set a target of all new homes being zero carbon by 2016, amongst other ambitious policies to tackle climate change.

In the US as in Australia to a degree, a great deal of the early success of the green building movement was the result of institutions and governments mandating LEED and Green Star-certified buildings. The government sector in the US led the way in adopting green design for its projects, with government projects accounting for 31% of all USGBC LEED registered projects at the end of 2011.[35]

The rating systems are now widely used by the private sector too and in the US over 25 000 buildings have been LEED certified while a further 93 000 have been registered – this accounts for 7.6% of the total US commercial office space. Over 175 000 property professionals have qualified as LEED Accredited Professionals.[35]

Developing markets are also beginning the journey to transform their property and construction sectors. The Indian Green Building Council (IGBC) was founded in 2001 and had an impressive 1 426 registered projects covering over a billion square feet at the end of 2011.[35] In China, the biggest global emitter of carbon, the government has launched its own 'Three Star Rating System' for buildings and is planning to mandate that all new government buildings meet this system while offering various incentives to private developers to achieve certification, including tax breaks and increased floor-to-area ratio incentives. The USGBC's LEED system is also fairly widely used amongst the private sector in China, with 786 buildings either registered or certified at the end of 2011.[35]

WORLD GREEN BUILDING COUNCIL (WORLD GBC)

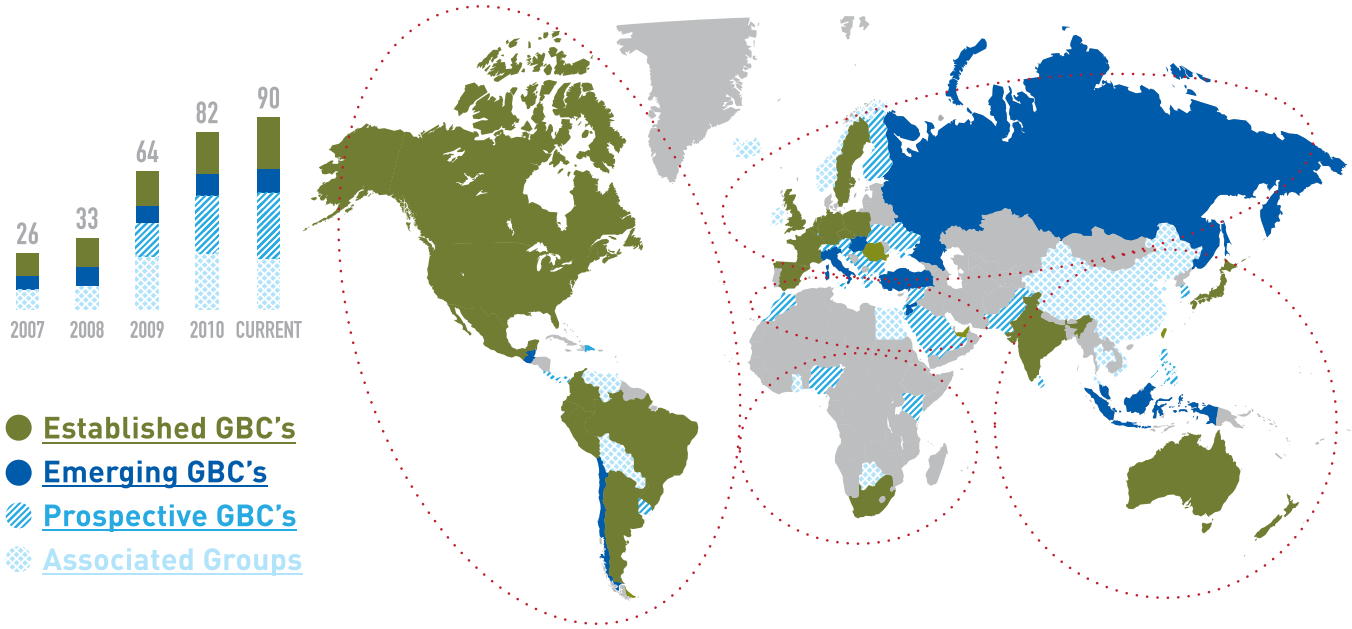
Founded in 1999, the World GBC is a coalition of national Green Building Councils, making it the largest international organization influencing the green building marketplace. Its mission is to facilitate the global transformation of the building industry towards sustainability through market driven mechanisms, like national green building rating tools.

By driving collaboration between international bodies and increasing the profile of the green building market, the World GBC works to ensure that green buildings are a part of any comprehensive strategy to deliver carbon emission reductions.

The World GBC currently has 90 member countries representing 20 000 companies worldwide, with national GBCs in various stages of formation. These include 24 established national GBCs, with a further 66 countries in the process of setting up a GBC and applying for full membership of the World GBC. South Africa was the first country in Africa to establish a GBC and was the 13th official World GBC country member.[38]

> *"In communities around the world, green building continues to blossom, and is offering real, measurable results in our efforts to reduce our global carbon footprint and promote environmental, economic and social prosperity.* [37] *"*
>
> **Rick Fedrizzi**
> Chair, World GBC
> President and CEO, USGBC

INTERNATIONAL GREEN BUILDING COUNCILS:



> *"Our goal is to continually promote the highest common denominator in green building practices and empower business to make smart business decisions that deliver value to their shareholders, the community and the planet we live on."* [39]
>
> **Jane Henley**
> CEO, World GBC

OTHER INTERNATIONAL ORGANISATIONS

There are a number of other global organisations, groups and initiatives dedicated to a sustainable built environment, a few of which are mentioned here:

The United Nations Environmental Programme's Sustainable Buildings and Climate Initiative (UNEP SBCI) is a partnership of major public and private sector stakeholders in the building sector, working to promote sustainable building policies and practices worldwide. The UNEP SBCI provides an interface between international governments and between governments and industry on green building issues.[3]

The World Business Council for Sustainable Development (WBCSD), which is made up of many of the world's largest companies, advocates for cooperation between business and government to balance economic and environmental interests and has an Energy Efficiency in Buildings programme.[40]

The International Initiative for a Sustainable Built Environment (iiSBE) is an international non-profit organization whose overall aim is to actively facilitate and promote the adoption of policies, methods and tools to accelerate the movement towards a global sustainable built environment. In partnership with the International Council for Research and Innovation in Building and Construction (CIB) and UNEP, iiSBE coordinates the SB series of regional conferences every few years, the last of which was held in London in 2011.[41]

GLOBAL POLICY

Launched at the Earth Summit in Rio in 1992, the United Nations Framework Convention on Climate Change (UNFCCC) consists of 195 national governments attempting to come to a consensus on an international agreement to limit average global temperature increases and the resulting climate change. The annual Conference of the Parties (COP) process convenes meetings at which representatives from all these international governments attempt to negotiate and conclude such an agreement.

The most significant achievement of the UNFCCC to date was the adoption of the Kyoto Protocol in 1997, which legally binds developed countries to emission reduction targets. The Protocol's first commitment period started in 2008 and ends in 2012.

At the most recent COP conference in 2011, COP17 in Durban, South Africa, the outcomes included a decision by the Parties to adopt a universal legal agreement on climate change as soon as possible, and no later than 2015. With much disagreement between developed countries like the US and developing countries like China over the respective responsibilities to reduce emissions, it appears that coming to a global agreement on international action on climate change will be an enormous challenge.

While national governments struggle with on-going negotiations, far more progress is being made on the local government level, with over 100 city mayors at COP17 signing an agreement ('The Durban Adaptation Charter') committing themselves to "urgent, decisive, measurable, reportable and verifiable climate commitments."[42]

Many cities are pioneering efforts to reduce emissions from buildings, deliver low-carbon transport, reduce waste, encourage product reuse and recycling, promote integrated planning and land use, use renewable energy, encourage efficient water and energy use and adapt for climate variability. With estimates that by 2050 almost 70% of the global population will live in cities, this progress is very encouraging.

The Cato Manor green street retrofit is a living showcase of how greening interventions in low-cost housing can improve quality of life

In the 2011 **'World GBC Government Leadership Awards for Excellence in City Policy for Green Building'** winners included:

San Francisco's 'Green Building Ordinances' for the 'Best Green Building Policy' – These requirements together represent the strictest, most ambitious and comprehensive policy approach to the built environment submitted.

Mexico City's 'Climate Action Plan' for the 'Local Climate Action Leadership Award' – an integrated policy expected to impact housing, commercial buildings, governmental offices, subway stations, public parks and transportation with a goal of reducing the city's greenhouse gas emissions by 12% by 2012.

Birmingham's 'Energy Savers Program' for the 'Urban Retrofit Award – A comprehensive and ambitious initiative to do green retrofits of 200 000 buildings over the next 15 years.

Singapore's 'Green Building Masterplan' for the 'Regional Leadership Award' – is comprised of policy instruments designed to impose minimum environmental standards for building codes, spur private sectors towards building green, promote research and development in environmental sustainability as well as build Singapore's capacity for green buildings. With a goal of achieving Green Mark certification for 80% of Singapore's buildings by 2030, the projected annual savings in S$1billion as well as energy efficiency gains of at least 25-35% against 2005 building codes.

New York City's 'Greener, Greater Buildings Plan (GGBP)' for the 'Industry Transformation Award' – one of the most comprehensive energy efficiency policies in the US, targeting the city's largest existing buildings, which constitute half its building square footage and 45% of citywide carbon emissions. It establishes an energy code for all building upgrades, requires annual disclosure of energy benchmarking data, an energy audit and tuning of equipment and systems every 10 years in large buildings, and mandates lighting upgrades and sub-metering. GGBP is estimated to cost $5.2billion while saving $12.2billion, for a net saving of $7billion.

Tokyo's 'Cap-and-Trade Program' for the 'Most Groundbreaking Policy Award' – the world's first carbon trading scheme aimed at reducing CO_2 emissions from large commercial and industrial buildings.

24 RICHEFOND CIRCLE, UMHLAMGA:
4 Star Green Star SA - Office v1 Design & As Built

"A number of the cities highlighted the complementary relationship between minimum building code standards and voluntary best practice benchmarks, as having paved the way for sustainability becoming much more widely accepted within the built environment community.[39] *"*

Jane Henley
CEO World GBC

CASE STUDY 8

FIRST RAND GROUP, JOHANNESBURG

Existing building case studies

BACKGROUND

The FirstRand group of companies includes First National Bank (FNB), Rand Merchant Bank (RMB) and Wesbank. Approximately six years ago, **the group began the implementation of an Energy Management Strategy to save electricity throughout its buildings and businesses** for the following reasons:

- To reduce the load on the struggling Eskom grid
- To extend their backup power supply
- To participate in the Energy Conservation Scheme (ECS)
- To manage reputational risk and enhance marketing
- To lessen the group's impact on the environment
- To save money

ENERGY MANAGEMENT STRATEGY

The key elements of FirstRand's Energy Management Strategy were:

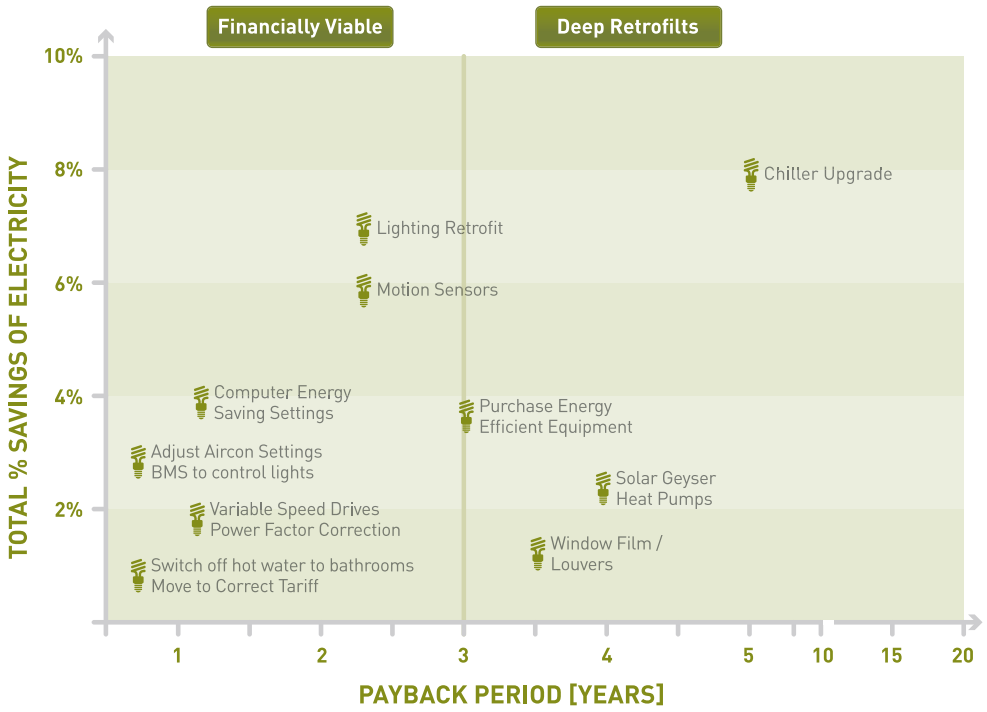
1. Develop a baseline of electricity spend – at FirstRand this period was Oct'06 – Sep'07
2. Set a target for reduction in energy use per building – a target of an 11% reduction by 2011 was set
3. Install 'Energy Dashboards' in all large buildings and business units to enable the accurate and real-time measurement and monitoring of energy usage compared to the baseline and target usage. Implemented initiatives are also tracked including information on costs, savings and payback periods.
4. Implement selected best practice energy saving initiatives
5. Identify and advise on new technology and initiatives
6. Get buy-in from senior management

Air conditioning systems utilise the majority of electricity in the average FirstRand building (45%), followed by lighting (28%), office equipment (20%) and water heating (5%).

WESBANK OFFICES, FAIRLANDS BUILDING, JOHANNESBURG

GREEN/EFFICIENCY INITIATIVES

Energy saving initiatives with payback periods of 3 years or less were considered 'financially viable' to undertake immediately while those with paybacks in excess of 3 years will be undertaken as part of more major building retrofits:



A selection of implemented energy saving initiatives are detailed below together with their associated costs and annual savings:

BUILDING IMPLEMENTED	ACTIONS	Date Implemented	Implementation Cost	kWh SAVED JUL 10 – JUN 11	SAVINGS ACHIEVED JUL 10 – JUN 11
Bank City	After hours emergency lighting minimised	Jul-11	No cost	6,687,341	R4,381,450
	After hours air-con reduced	Jul-11	No cost		
	New centrifugal chillers implemented	Aug-11	R9,700,00		
	Energy saving settings defaulted on computers	Jan-11	No cost		
	Reduce transformer voltage from up to 238volts to not less than 221volts (R1m saving)	Sep-09	No cost		
	Replaced 436 dichroic downlighters and 39 uplighters with LED's (R173K Saving)	Dec-10	R90,000		
	Switch off hot water to bathrooms (R220K saving)	Oct-10	No cost		
	60 Motion sensors installed	Sep-08			
Towers Offices	72 Motion sensors installed	Sep-08	R100,800	282,355	R88,754
Towers Parking	24 Motion sensors installed	Sep-08	R43,200	184,291	R57,928

BUILDING IMPLEMENTED	ACTIONS	Date Implemented	Implementation Cost	kWh SAVED JUL 10 – JUN 11	SAVINGS ACHIEVED JUL 10 – JUN 11
Call Centre Randburg	17 Motion sensors installed	Aug-08	R37,405	71,020	R22,055
	120 Basement lights retrofitted	Aug-08	R162,000	252,288	R31,831
	90 fittings changed from 150w to 30w	Aug-08			R45,234
	85 fittings changed from 150w to 23w	Aug-08			
	Power Factor Correction	Mar-10	R328,000	198,483	R129,014
Selby	Power Factor Correction	Mar-10	R330,000	187,692	R122,000
	2 X Heat Pump Water Heater	Mar-10	R105,000	98,462	R64,000
	Variable speed drive on cooling towers	Mar-10	R206,000	187,692	R122,000
Branch Banking	Lighting retrofit motion sensors on Bill of Quantity for "One and Done" branches. 130 (08/09) + 137 (09/10) + 49 (10/11) + 14 (Jul to Dec 2011) branches implemented. Avg Saving R450 per branch per month) = 330 branches	Started Oct-08	Ongoing maintenance cost	2,625,231	R1,706,400
	Automated Shut Down of Linux computers after hours. 15 000 computers (10pm-6am)	Mar-09	No cost	2,902,349	R2,031,644
Randburg Computer Centre	Four Chillers replaced. Maintenance saving of R1m per annum	May - Aug-08	R4,700,000	0	R0
	Chillers replaced in Yellow plant and put into standby		R9,783,946		
	Excess UPS on standby	Aug-08	No Cost		
	Power Factor Correction	Aug-09	R400,000	944,680	R444,000
Branch Banking TSD	Lighting retrofit and Sensor installation	Nov-08	R1,154,110	1,309,032	R385,146
9 Fredman	Low watt lighting & Sensors	Oct-10		2,582,300	R689,318
	Programme cycle for lighting				
	Variable speed drives on aircon				
All Merchant Place buildings	Lighting retrofit 22,009 lamps & 3,122 ECG fitted	May – Sep-08	R2,964,962	3,348,596	R1,463,896
	Sensors installed 1,654	May – Sep-08			
	Replaced air-con fan motors	Oct-08			
	Install variable speed drives in fans	Oct-08			
Fairlands Building (Wesbank & FNB)	Reduce transformer voltage closer to 220v	Nov-09	R1,050	15,285,127	R7,469,511
	Lighting to BMS & LED retrofit (600)	Apr-10	R652,760		
	Sequence starting of air conditioners	Apr-10	No cost		
	Escalator shut down after 10pm	Apr-10	No cost		
	Power Factor Correction	Apr-10	Property Developers paid		
	Heat Pump	Nov-09	R48,000		
Total			**R30,807,233**	**37,146,939**	**R19,254,181**

More examples include:

HEAT PUMP WATER HEATERS

Anticipated 67% water heating saving with a payback period of 4 years.

VARIABLE SPEED DRIVES (VSDS') ON AIR CONDITIONERS

One building (1 Merchant Place) installed VSD's for 25 ventilation fans, 8 chiller plant pumps, 8 cooling tower systems motors and all air handling units, achieving a reduction of about 200MW, with a saving of R500 000 per annum, with a payback of just under one year.

INCREASE TEMPERATURE OF THE AIR CONDITIONING

Another building (4 Merchant Place) increased the temperature by 2 degrees for one week with the following results: Air conditioning power requirement dropped by an average of 50KW, which is equivalent to 438 000kWh or R226 000 per annum, with the same number of complaints about the air conditioning system being recorded as before the temperature increase.

ENERGY SAVING SETTINGS AND REMOTE SHUTDOWN OF COMPUTERS

R100 to R250 electricity savings per computer per annum were achieved by installing energy saving settings and implementing automatic remote shutdown of computers after hours. The cost of this initiative is expected to be paid back in one year.

WESBANK OFFICES, FAIRLANDS BUILDING, JOHANNESBURG

CRITICAL SUCCESS FACTOR/TIPS

According to William Cass, Group Energy and Climate Change Manager at FirstRand, the following elements are key to achieving energy efficiency in commercial buildings:

- Measuring the electricity consumption is key to **determine a baseline,** savings achieved and consumption trends.
- **Start with quick wins,** for example sequence start chillers, ensure after hour lighting and air-conditioning is kept to a minimum and use your BMS effectively. These initiatives cost nothing to implement.
- Then move to the **initiatives with a shorter payback period** like VSD's, power factor correction and defaulted energy saving settings on computers. These have payback periods of less than one year.
- **Use Eskom IDM incentives to** further reduce payback periods. For example, a lighting retrofit payback, will move from two years to less than one year.
- With these reductions, the finance team should realise that **electricity is not a fixed cost** and be more willing to finance larger projects.
- Using Eskom's IDM incentives and using increasing costs of maintenance on older chillers in **your business case,** purchasing a new efficient HVAC system can have payback periods of less than four years. This will make the biggest impact in reducing your electricity costs.
- **Measure and communicate savings** within your organisation

SOURCE: Cass, William, FirstRand Group

4

THE BENEFITS OF GREEN BUILDINGS

Industry players are increasingly implementing green building practices as a result of demand from market consumers, investors, shareholders, employees, the community and government. The benefits that can accrue to them include reduced infrastructure and plant and equipment costs, enhanced reputation or brand and reduced operational costs.

While it is still too early in South Africa for local studies to be conducted into this area on any significant scale, several major studies have been undertaken into the costs and benefits of green buildings in North America, Australia and the UK, and include:

- 'Greening our Built World – Costs, Benefits and Strategies' by Greg Kats, 2010; [2]
- 'Sustainability and the Dynamics of Green Building – New Evidence on the Financial Performance of Green Office Buildings in the USA' research report by the Royal Institution of Chartered Surveyors (RICS), October 2010; [43]
- 'Building Better Returns – A Study of the Financial Performance of Green Office Buildings in Australia' research report by the University of Western Sydney Australia and the University of Maastricht Netherlands in conjunction with Jones Lang LaSalle and CBRE, September 2011; [44]

The following sections build on the compelling cases presented in these international publications, noting the benefits for each segment of the property market: building owners and managers; developers; investors; and tenants. Where possible the international information is substantiated by South African examples and case studies.

It should be noted that the international studies are based on numerous buildings (several hundred) that have been designed, constructed and operated with green initiatives. By comparison the number of green projects in South Africa is still relatively small – so these types of large-scale evidence-based studies are not yet possible locally. The GBCSA is however putting in place the structures to ensure that such studies are carried out as soon as the number of green-rated buildings in South Africa allows for meaningful comparison.

PIXEL BUILDING, MELBOURNE, AUSTRALIA:
The first building to achieve a perfect Green Star score

DOCKSIDE GREEN, VICTORIA, CANADA:
Platinum LEED Certification - LEED for Neighbourhood Development

"The cost of building green is minimal – and makes for a very good investment. From energy savings alone, the average payback time for a green building is six years. Additional benefits include reduced water and infrastructure costs, and health and productivity gains; these benefits more than double the financial gains for green building owners and occupants. Over 20 years, the financial payback commonly exceeds the additional cost of greening by a factor of between four and six. [2] *"*

Greg Kats
'Greening Our Built World – Costs, Benefits and Strategies'

CASE STUDY 9

CITY OF GOSNELLS CIVIC CENTRE REDEVELOPEMENT PROJECT, PERTH, W AUSTRALIA

International case studies

DESCRIPTION OF PROJECT

Dating back to 1972, the original City of Gosnells Civic Centre building was due for an upgrade to both modernise the office design as well as improve the capability and efficiency of the building services. A new three storey west wing was added and the existing administration and civic buildings completely refurbished.

The result is 4 500m^2 of office space with a further 500m2 of civic space including council chamber, function rooms, meeting rooms and dining area.

The project achieved a 5 Star Green Star – Office Design v2 certification, which represents 'Australian Excellence' in sustainable design.

PROJECT COST

The total capital cost of the project was $26million, including a **sustainability 'premium' of $750 000, or 3%.**

BUSINESS CASE

The City of Gosnells wanted to demonstrate its commitment to sustainability and show that even buildings built during the 1970's can be given an environmental and economic overhaul.

Paul McAllister, Project Manager, City of Gosnells, explains, "Initially we thought the age of the building would make a sustainable retrofit unviable, however for an additional cost of 3%, a sustainable make over was the only responsible option."

With water use down by 35% and energy use down by 315 000kWh per annum amongst other things, the Council expects **a five year payback on the extra outlay of $750 000, demonstrating that building green is a smart financial decision.** As McAllister points out, "We have a commitment to fiscal responsibility for our rate payers. That's why we decided to build green."

The sustainable transformation means the Civic Centre is now future-proofed to withstand tighter environmental legislation, the rising cost of utilities and the introduction of a price on carbon. Its energy and water saving features will reduce bills, while **the improved indoor environmental quality is helping the City improve productivity as well as attract and retain staff who want to work in a healthy and sustainable workplace.**

GREEN STAR INITIATIVES

The following green initiatives contributed towards the Green Star rating:

MANAGEMENT

During the retrofit of the Civic Centre, a comprehensive building users' guide was created to help the occupants understand how to interact with the building, and to help the building managers quickly identify and fix problems. This will ensure that the City of Gosnells' building maintains the highest possible level of performance.

Other initiatives include comprehensive building commissioning, tuning and a thorough, yet simple Building Users' Guide. 80% of construction waste was to be re-used or recycled.

INDOOR ENVIRONMENT QUALITY

The City of Gosnells was determined to provide a healthier, happier and more productive working environment for employees – and that meant reducing internal noise levels, maintaining a comfortable temperature for employees and good access to daylight without glare and outdoor views.

The Civic Centre also minimises staff exposure to volatile organic compounds (VOCs), which are linked to 'Sick Building Syndrome', by specifying low-VOC paints and carpets. This will provide a healthier workplace and support the City's goal of becoming the local government employer of choice in Western Australia.

ENERGY

The Council has installed a thermal energy storage tank in the building which will store 'cool' energy in the form of ice. It is charged overnight to avoid peak energy tariffs, with the cool energy then released during the day, reducing the City's reliance on traditional air conditioning. This will save the City money by reducing energy demand at peak periods. Overall the building is expected to reduce energy usage by 315 878kWh each year – equivalent to taking 43 cars off the road for a year.

The Civic Centre also uses solar energy to heat water for domestic use within the building, a measure alone which has reduced gas usage by 55%.

TRANSPORT

Initiatives include 50% less parking than allowance, specific parking for small cars and motorbikes, cyclist facilities and access to public transport networks.

WATER

Water-efficient fixtures and fittings, as well as a rainwater tank for toilet flushing and irrigation, have been installed to reduce water use. These measures will cut the City's water use by 35% each year, saving 840KL of water, equivalent to the water in nearly 17 average size backyard swimming pools, from being flushed down the drain each year.

MATERIALS

Initiatives include space allocated for recycling waste storage, re-use of the building façade and elements of the existing structure. Most of the timber was either sustainably grown or reused/recycled.

EMISSIONS

Stormwater is collected and filtered on site before it enters the Canning River. This will improve the health of the river by reducing runoff contamination and will help reduce the need for extra in-ground stormwater infrastructure in the future. No light beam designs are directed into the night sky or beyond site boundaries.

CITY OF GOSNELLS CIVIC CENTRE REDEVELOPMENT PROJECT, PERTH:
5 Star Green Star – Office v2 Design
The internal envirnonmental quality was specifically designed to provide a healthier, happier and more productive working environment.

"The City of Gosnells' Civic Centre demonstrates that smart, sustainable design is not the preserve of large, expensive developments. The council's 5 star Green Star rating is positive proof that low-technology design principles and a modest budget can produce a leading-edge green building."

SOURCE: Green Building Council of Australia website

WOOLWORTHS DISTRIBUTION CENTRE, MIDRAND: The Building Management System is programmed to switch lights down to 50% when sufficient natural lighting is available.

4.1 OWNERS AND MANAGERS

Commercial buildings can be managed by their owners or by property managers. In some cases the drivers for both are similar, such as minimising operating costs, ability to attract tenants, achieving higher returns on assets and increased property values, enhanced marketability and reduced liability and risk.

A Jones Lang La Salle report, 'Commercial Property Going Green', states that property owners who overhaul older buildings will be rewarded with cost reductions such as lower energy costs, lower waste disposal and water costs, lower environmental and emission costs, and lower operations and maintenance costs.[45]

South African companies Old Mutual Property, the V&A Waterfront, Woolworths and The FirstRand Group have all achieved significant cost reductions as well as industry recognition for their reductions in energy and water usage (Refer to Case Studies 3, 8, 13 and 20).

Rabie Property Group was the first organisation to be awarded a 5 Star Green Star SA – Office Design Certified Rating for the Aurecon Campus at Century City. The project has achieved a high degree of tenant satisfaction, stakeholder awareness and media coverage as well as reductions in energy and water costs (Refer to Case Study 1).

4.1.1 LOWER OPERATING COSTS

Direct operating costs include all expenditures incurred to operate and maintain a building over its full life. Obvious costs are energy and water consumption, security, cleaning, minor repairs and routine maintenance activities. However, this cost category also includes less obvious costs such as property taxes, insurance, and the costs of reconfiguring and upgrading space and services to accommodate occupant moves. Excluded are the costs of major renovations that are considered to be direct capital investments.

"The Green Star SA buildings profiled in this report cite energy savings of between 25% and 50% compared to a building designed to SANS 204 standards."

The RICS report states that **"energy represents 30% of operating expenses in a typical office building and is the single largest and most manageable expense in the provision of office space".**[43] So energy efficiency can have a dramatic impact on decreasing the monthly operating costs in a building.

While green buildings can achieve far greater energy savings, the 2010 McGraw Hill study on US buildings states that **"green buildings average 25-30% more energy efficiency and 39% average water efficiency".**[46] **The Green Star SA buildings profiled in this report cite energy savings of between 25% and 50% compared to a building designed to SANS 204 standards.** Although the price of potable water is still relatively inexpensive, as this resource becomes increasingly scarce, prices are sure to increase as has been the case with energy prices.

Energy efficiency in a typical office building may be achieved by a number of strategies, including energy efficient lighting, lighting controls, energy efficient heating, ventilation and air conditioning (HVAC) systems, lifts and energy efficient appliances, amongst other things.

> *"On reflection, it should not be surprising that cutting waste and improving design should be profitable."* [2]
>
> **Greg Kats**
> 'Greening Our Built World – Costs, Benefits and Strategies'

It should be noted that simply through formal commissioning and on-going 'tuning' or ensuring that mechanical systems, like HVAC systems, are operating properly and as designed, can lead to major gains in energy efficiency and operational cost savings. This easily-achievable outcome is surprisingly frequently overlooked.

Electricity in South Africa has traditionally been relatively inexpensive as a result of the country's cheap and plentiful supplies of coal, which has meant there was previously "little incentive to save energy".[29] However, the last few years have seen dramatic tariff increases with more significant increases to come, as the state power utility Eskom seeks funding for the construction of new power stations to support the country's economic growth.

ESKOM'S AVERAGE TARIFF ADJUSTMENT FOR THE LAST 10 YEARS: [47]

YEAR	AVERAGE PRICE ADJUSTMENT	CPI
1 January 2001	5.2%	5.7%
1 January 2002	6.2%	9.2%
1 January 2003	8.43%	5.8%
1 January 2004	2.5%	1.4%
1 January 2005	4.1%	3.42%
1 January 2006/7	5.1%	4.7%
1 January 2007/8	5.9%	7.1%
1 January 2008/9*	**27.5%**	**10.3%**
1 January 2009/10	**31.3%**	**6.16%**
1 January 2010/11	**24.8%**	**5.4%**
1 January 2011/12	**25.8%**	**4.5%**

*Comprises two increases in 2008/9; average of 14.2% on 1 April 2008 and 34.2% on 1 July 2008.

As prices continue to rise, so the payback periods of energy efficiency initiatives get steadily shorter and the feasibility of such initiatives more compelling. For example Colin Devenish, Executive Manager of Operations at the V&A Waterfront says that "Payback periods on lighting upgrades have almost halved following the magnitude of recent electricity tariff increases combined with the availability of better, more affordable technology due to increased demand – so projects which were previously not viable are certainly worth having another look at now." [48]

According to a US guide to marketing green buildings, green buildings will save on operating costs such as energy for years to come. It states:

"With (the price of oil rising dramatically) and the prospect of peak period electricity prices zooming up again, it just makes good sense to design the most energy-efficient building possible. Even with "triple net" leases in which the tenant pays all the operating costs, it makes sense to offer tenants buildings with the lowest possible operating cost." [49]

AURECON CENTURY CITY CAMPUS, CAPE TOWN:
5 Star Green Star SA - Office v1 Design
Interior

Local property owners note that tenants consider the total cost of occupation when renting space, and that higher monthly electricity and operating costs put downward pressure on net rentals.

It is important to note that the South African government has recently introduced Energy Efficiency standards for new and retrofitted buildings (SANS 10400-XA) into the National Building Regulations, which aim to ensure that buildings are designed specifically to be energy efficient. (See Section 3.3.2)

Another interesting benefit of green buildings to owners and investors is explained by Jim Young, VP of Asset Management, AEW Capital Management LP in the US. He says, "...green building (it) not only lowers the operating cost but increases building value. It also sends a message to potential investors and tenants that the building has been intensively managed. Increasingly, Energy Star, LEED and sustainable policies will be synonymous with class A buildings. A green strategy sends a message that ownership is focused on keeping the facility competitive, modern and as efficient as possible." [46]

4.1.2
HIGHER RETURNS ON ASSETS AND INCREASED PROPERTY VALUES

A number of ground-breaking international studies have been undertaken in the last few years on the link between building green and returns on assets and property values.

Such broad evidence-based studies are only possible in more mature green building markets than South Africa where there are significant numbers of rated green buildings to make for a meaningful sample size. The independent certification of a building as green is critical to these studies in order to determine the sample of green vs traditional/non-green buildings.

"... the effective rental rates as well as the transaction prices (market value) of commercial property are markedly higher in green buildings.[43] *"*

Perhaps the most definitive of these studies, which links increased investment returns and property value to building green, is the Royal Institution of Chartered Surveyors'(RICS) report, 'Sustainability and the Dynamics of Green Building – New Evidence on the Financial Performance of Green Office Buildings in the USA', which concludes that **the effective rental rates as well as the transaction prices (market value) of commercial property are markedly higher in green buildings.**[43]

This intensive study, which examined a sample size of 21 000 rental buildings and 6 000 sales, and used the US Green building Council's LEED Rating (similar to Green Star SA) as well as the US EPA's Energy Star rating as the indication of a 'green building' found the following results:

PREMIUMS COMPARED TO SIMILAR, NON-CERTIFIED PROPERTIES: [43]

	ENERGY STAR CERTIFIED BUILDINGS (ENERGY EFFICIENCY GRADING)	LEED CERTIFIED BUILDINGS (GREEN BUILDING GRADING)
Rental Premium	2.1%	5.8%
Effective Rental Premium*	6.6%	5.9%
Transaction Price Premium (Market Value)	13%	11.1%

*Effective Rent = rents multiplied by the occupancy rate

These results are rigorously controlled for differences in building type, size, quality, location, age, amenities, etc.

Interestingly, this report also concludes that the "large increases in the supply of green buildings between 2007 and 2009, and the recent downturns in the property markets, have not significantly affected the returns of green buildings relative to those of comparable high quality property investments."[43]

The results of the RICS report have recently been mirrored in a September 2011 Australian research report entitled 'Building Better Returns – A Study of the Financial Performance of Green Office Buildings in Australia' which was commissioned by the Australian Property Institute together with the Property Funds Association. The key findings in this report, which assessed 40% of office buildings in Sydney and Canberra, **showed clear evidence of green rental and value premiums** as follows: [44]

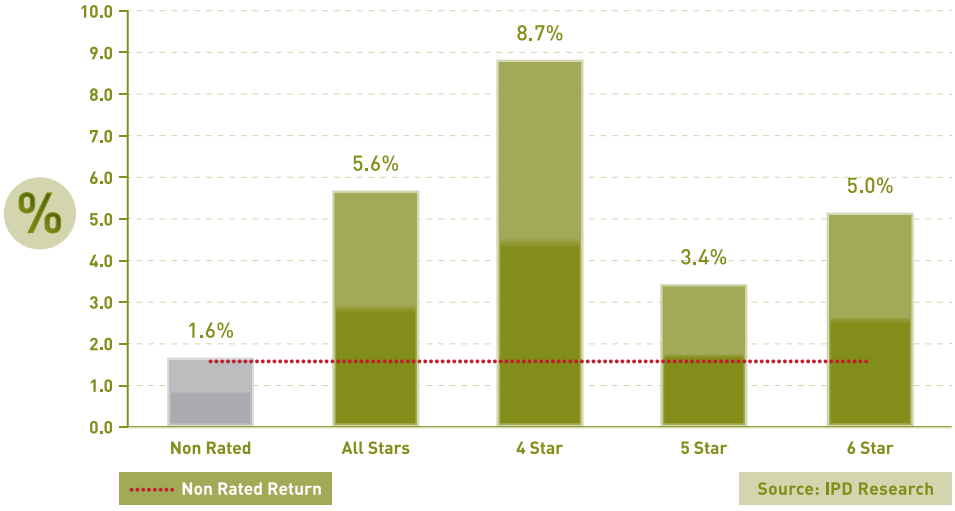
	GREEN STAR CERTIFIED BUILDINGS
Rental Rates 'Green Premium'	5%
Market Value 'Green Premium'	12%

In addition the Report concludes that "green premiums are also seen for reduced vacancy, reduced yields and reduced outgoings."

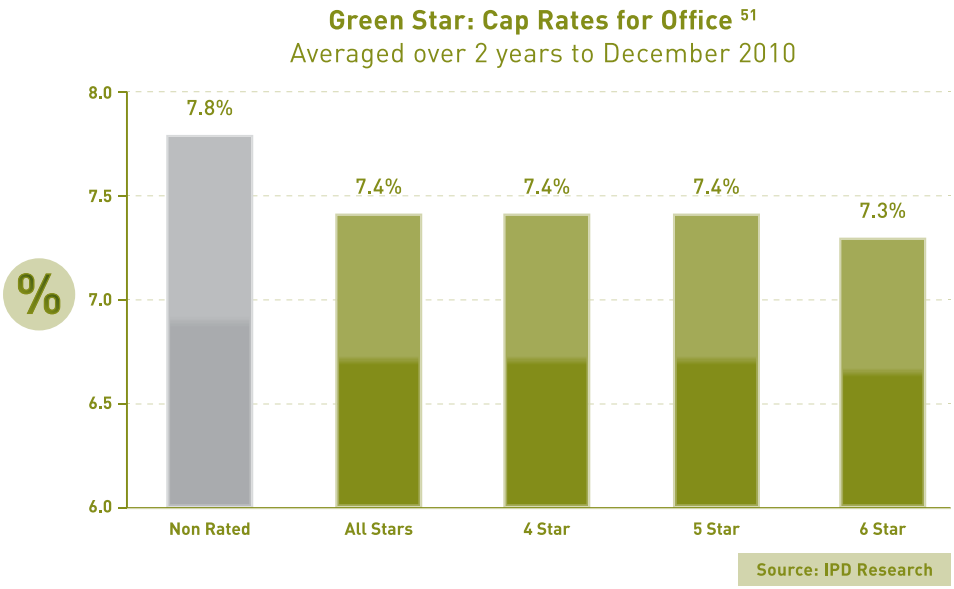
In 2011, the Investment Property Databank (IPD) in conjunction with the Property Council of Australia (PCA) launched the PCA/IPD Green Investment Index to quantify the investment performance of buildings with environmental ratings compared to conventional, non-rated buildings. **Buildings with all levels of Green Star ratings were found to outperform the annualised 2 year returns of non-rated buildings by 4% as measured at December 2010. 4 Star Green Star rated buildings outperformed the non-rated buildings by 7.1%.** [51]

"Buildings with all levels of Green Star ratings were found to outperform the annualised 2 year returns of non-rated buildings by 4%..."[51]

Green Star: Returns for Office Market [51]
Annualised 2 year returns to December 2010



This index also reflects **capitalisation rates of 7.4% for Green Star rated buildings compared to 7.8% for non-rated buildings.**



An earlier version of the above-mentioned RICS report, entitled 'Green Value: Growing Buildings, Growing Assets'[52] considered the financial value of green buildings and how they contribute to a sustainable community, balancing economies with the environment. Or, to put it another way, assess whether sustainable practices make money or not.

This report, which took more than two years to complete, found that green buildings can in time be expected to enhance an asset's value, as they can:

- secure tenants more quickly;
- command higher rents or prices;
- enjoy lower tenant turnover;
- cost less to operate and maintain in most cases;
- attract grants, subsidies and other incentives to do with stewardship of the environment, increasing energy efficiency and lessening greenhouse gas emissions; and
- improve business productivity for occupants, affecting churn, renewals, inducements and fitting out costs amongst others.

The report continues that a major area in which green buildings can add value is the benefit to business (in terms of staff productivity) and if this can be realised it can even exceed the value of all real estate-related expenditure combined.

This earlier RICS report[52] found examples of where such operating efficiencies do indeed draw demand and add value, not just to the business and the economy, but to investment and development (see table on following page):

MORGAN STANLEY FIT-OUT AT 30 THE BOND:
5 Star Green Star Office Interiors
The firm's objective was to create a stimulating and innovative workplace that would attract and retain top financial services talent

TABLE 4:

RICS REPORT: THEORETICAL LINKS TO VALUE [52]

GREEN OBJECTIVE	GREEN INITIATIVES	GREEN IMPACT	THEORETICAL VALUE
Sustainable Site Development	• Reduce site disturbance & soil erosion during construction. • Use of natural drainage systems(e.g. swales). • Preserve or restore natural site features. • Landscape and orient building to capitalize on passive heating and cooling.	• Improved site aesthetics. • Greater public support for the development and accelerated local approval process, hence lower carrying costs. • Lower energy costs.	• Reduced development costs, improved marketability, reduced ongoing maintenance costs, improved natural appearance, higher sales/ rents, absorption and re-tenanting, NOI*/ROI** benefits. • For gross leases, higher NOI. May have impact for net leases*** if benefit can be demonstrated to tenants.
Water Efficiency	• Use captured rainwater for land-scaping, toilet flushing, etc. • Treat and re-use greywater, excess groundwater and steam condensate. • Use low-flow fixtures and fittings (pressure assisted or composting toilets, waterless urinals, etc.) and ozonation for laundry. • Use closed-loop systems and other water reduction technologies for processes.	• Lower water consumption/ costs.	• Lower tenant CAM**** charges. Direct NOI benefit for gross leases, potential for net leases requires communicating benefit to tenants.
Energy Efficiency	• Use passive solar heating/ cooling and natural ventilation. • Enhance penetration of daylight to interior spaces to reduce need for artificial lighting. • Use thermally efficient envelope to reduce perimeter heating and size of HVAC. • Use energy management systems, monitoring and controls to continuously calibrate, adjust and maintain energy-related systems. • Use third-party commissioning agent to ensure that the installed systems work as designed. • Develop Operation and Maintenance manuals and train staff.	• Lower capital costs. • Occupant benefits. • Lower energy costs. • Operational savings (can offset higher capital costs. • Reduced capital cost of mechanical systems because control systems reduce the need for oversizing. • Lower operating costs. • Lower maintenance costs.	• Reduced operating costs, longer life cycle, lower development costs. • Improved occupant pro-ductivity, lower churn, turn-over, tenant inducements, etc. • Higher net income for gross leased buildings, improved yield.Lower operating costs. On gross leases, higher ROI/ NOI. On net leases, potential improved ROI/NOI. • Marginally higher initial soft costs should be offset by long term operating cost benefits, higher ROI.

* NOI: net operating income ** ROI: return on investment *** Net lease: a lease that requires a lessee to pay all their operating costs resulting from their occupation of the premises **** CAM: common area maintenance

TABLE 4: (CONTINUED)

GREEN OBJECTIVE	GREEN INITIATIVES	GREEN IMPACT	THEORETICAL VALUE
Indoor Environmental Quality	• Control pollutant sources. • Use low-emission materials. • Ventilate before occupancy. • Enhance penetration of daylight and reduce glare. • Provide outdoor views. • Provide individual occupant controls when possible.	• Superior indoor air quality, quality lighting and thermal quality. • Fewer occupant complaints. • Higher occupant productivity.	• Risk reduction. • Greater marketability. • Faster sales and lets. • Improved churn/turnover. • Higher ROI/NOI.
Reduced Consumption of Building Materials	• Select products for durability. • Eliminate unnecessary finishes and other products. • Reuse building shell from existing buildings and fixtures from demolished buildings. • Use salvaged/refurbished materials. • Design for adaptability.	• Longer building lifecycle. • Lower maintenance costs.	• Lower depreciation typically after higher investment costs. • Lower construction costs, probable lower operating/ maintenance costs, higher ROI/NOI.

Another very important publication covering this area is 'Greening our Built World: Costs, Benefits and Strategies'[2] by Greg Kats. The 2010 publication developed a **20 year Net Present Value analysis of a sample of 180 green buildings:**

Net Present Value (NPV) Element	Typical Green Building (Range)	Green Office (Median)
Green Cost Premium	$32-$97/m² *	$43/m² *
20 year present value of energy savings	$43-$172/m² *	$108/m² *
20 year present value of water savings	$5-$22/m² *	$5/m² *
Net Present Value	**$16-$97/m² ***	**$70/m² ***

*Measurements and amounts have been converted from the original square feet

Assumptions:

- Above figures in US Dollars
- Discount rate of 7%
- Annual increases in energy and water costs of 5%
- NPV based on energy and water savings alone (ie excluding other potential benefits like health & productivity improvements & impact on property values)

BP HEAD OFFICE, CAPE TOWN:
One of the first well-publicised commercial office green buildings in South Africa

"Our experience in respect of our As-Built Green Star certified buildings is that we attract corporate prospective tenants, willing to pay market and above market related rentals.[78]"

Rudolph Pienaar
Growthpoint

DOCKSIDE GREEN, VICTORIA, CANADA:
The interior of an apartment in the LEED Platinum - certified neighbourhood development

LOCAL EXPERIENCE

It is too early in the evolution of the green building market in South Africa to clearly ascertain the effect of green buildings on asset returns and values. It is logical to assume that the lower operating costs and increased net income will result in higher valuations, but "it is the longer term retention of happy and satisfied tenants that will ultimately drive up the demand for, and the value of, green property," says Trevor King, Property Valuation Manager at the Old Mutual Investment Group.[53]

Colin Anderson of the Rabie Property Group says that they "believe that green buildings will attract a higher calibre of corporate tenant who are happy to pay a slightly higher rental in order to let a better quality building." Aurecon, the tenant at their new 5 star Green Star building in Century City, are paying "a slight premium on the rental as they benefitted directly from the savings in operating costs and their staff enjoy the benefits of a far healthier and more productive environment." [54] (See case study 1)

However, the valuation industry relies heavily on past evidence of sales prices to determine the appropriate capitalisation rates to use when valuing a property. So, until there are a greater number of rated green buildings in South Africa which have changed hands, the full benefits of green buildings may not be reflected in their valuations.

King points out that "as 'green' becomes a necessity and not a luxury, demand for green building will rocket." He envisages that "cap rates may reduce by as much 50 basis points to 200 basis points for a green building in the not too distant future." [53]

"The upward value shift of a green building will be attributable to both an increase in net income and a decrease in the remunerative capitalisation rate," says King. He concludes that "property values in the office sector are lagging behind other sectors. A value gain through a green strategy is exactly the kick start that the office sector needs." [53]

FORTY ON OAK, MELROSE ARCH:
4 Star Green Star SA
Multi Unit Residential PILOT Design
According to the developer, the Green Star rating "certainly assisted in the marketing of the new apartments."

"Building green is a clear expression of commitment to the environment. Increasingly, people around the world perceive green buildings as modern, ethical and proactive – and companies associated with green buildings benefit from these perceptions through increased brand equity and staff satisfaction." [58]

GBCA
115 Batman Street Case Study - 5 Star Green Star Office Design, As Built & Interiors

4.1.3 ENHANCED MARKETABILITY

All the Green Star SA-rated buildings profiled in this publication noted increased media coverage and industry awareness as a result of their green initiatives and Green Star certification. Although this increased publicity and recognition is often difficult to quantify in Rand terms, it is nevertheless valuable and an important payback for going green.

Regardless of the business case, the public generally perceives green buildings as modern, advanced, dynamic, and altruistic and organisations associated with green buildings will benefit from these perceptions through employee pride, satisfaction and well-being as well as through the improved public perceptions.

Frank Berkeley, Managing Executive at Nedbank Corporate Property Finance, confirms this: "Obviously it is very difficult to quantify the value of the publicity we received as a result of the extension to our Head Office complex in Johannesburg receiving the first Green Star certification in South Africa, but judging from the publicity at the time, as well as the on-going interest and the continuing enquiries we receive, it was very substantial." [56]

Multi-disciplinary engineering firm Aurecon's new Cape Town offices achieved the first 5-Star Green Star SA rating in South Africa, as well as the status of being the first Green Star SA building in Cape Town. According to Aurecon SA GM Albert Geldenhuys these accomplishments offered "significant reputational gain for the group. We were able to tangibly demonstrate our commitment to sustainability, which provided good return on investment. The media coverage we have received in terms of this building, to date, has served to market Aurecon's Environmentally Sustainable Design capabilities." [57]

In the case of 8 Brindabella Circuit at Canberra International Airport, the first Green Star certified project in Australia, the Executive Director Tom Snow said it was a case of prospective tenants coming to them, causing them to completely rethink their marketing strategy. In fact the interest in the project forced the owners to create a waiting list for tenants.

> *"The volatility of energy prices and the long-term trend of rising demand for finite and depleting fossil fuels, make greening and energy efficiency cost effective risk reduction strategies.* [2] *"*

Greg Kats
'Greening Our Built World – Costs, Benefits and Strategies'

4.1.4 REDUCED LIABILITY AND RISK

Environmental issues are becoming significant risk factors in all industries, including the property and construction sector. This is clearly evidenced by the fact that the global insurance industry is grappling with how it responds to the threats imposed by resource scarcity and climate change. Specifically, how does the industry include suitable metrics and measurements in its predictive modelling.

FUTURE PROOFING

'Future proofing' an asset such as a building is about profitability and what benefits and opportunities are ahead for organisations that anticipate and adapt rather than react. **By incorporating sustainable features now, building owners are future proofing for changes in the business and regulatory environment, therefore ensuring they will not be at a competitive disadvantage in the future.** With governments and large corporates increasingly incorporating green principles into their property requirements, tenants beginning to demand green and investors using sustainability indices to ascertain investments, future proofing investments by greening buildings makes good business sense.

By greening their buildings, owners and managers are future proofing their assets against increasing attention from policy-makers in the form of wider green building regulations, mandatory energy efficiency disclosure and planned carbon taxes.

By decreasing a building's reliance on water and energy through the incorporation of conservation and efficiency measures, a building is being future proofed against future utility price increases.

Green buildings that incorporate natural lighting and ventilation and internal energy and water generation are less reliant on external grids, are less vulnerable to grid related problems or failures such as load-shedding and black-outs or possible water shortages. This was a major factor identified by representatives of numerous African cities at the UN Habitat 'Conference on Green Building Rating Systems in Africa' in Nairobi in 2010, in which the GBCSA was a key participant.

Building green now or incorporating green elements into routine upgrades avert the need for costly retrofits in future. Inefficient or non-green buildings could even face the risk of obsolescence in time as they become comparatively less competitive and ill-equipped to deal with a resource-constrained world with high energy and water prices and an emphasis on good internal environment quality for building occupiers.

500 COLLINS STREET, MELBOURNE, AUSTRALIA:
5 Star Green Star - Office Design v1
The project involved a staged upgrade of an existing and occupied multi-tenanted 28 level office building demonstrating that existing stock can be upgraded and future proofed to high sustainability standards.

'A Business Case for Green Buildings in Canada' [59] claims that risks can be reduced through building green. The Fireman's Fund, one of the bigger insurers in the US, is in fact already offering 'green insurance' products for buildings and linking lower premiums to certified energy efficient and green buildings.

"In our space it's very clear if we don't do it (become energy efficient) we won't 'future proof' our buildings and we will become uncompetitive. Very soon people wouldn't be able to afford to be tenants in our buildings quite frankly. [60] *"*

Chris Davey
National Technical Manager,
Old Mutual Property

POSSIBLE LEGAL ACTION AS A RESULT OF POOR INDOOR ENVIRONMENTAL QUALITY

According to an OECD report 'Environmentally Sustainable Buildings'[61] health problems from indoor air pollution have become one of the most acute problems related to building activities. The report found that pollutants from building materials, ranging from paints to backing materials, lead to occupational health issues.

Considering that 25% of office workers' lives, or 40% of their waking hours are spent inside commercial buildings, there is now a realisation that conventional building practices expose people to raised levels of toxins.[62]

'Sick Building Syndrome' lawsuits, whilst not prevalent in South Africa, are more common in the United States and a Canadian report on the Business Case for Green Buildings[59] states that owners and managers are increasingly facing legal action from tenants blaming the building for their health problems.

As more data is compiled on the risks of poor ventilation and air supply, and cross contamination of illnesses, tighter controls on the Indoor Environment Quality (IEQ) of commercial buildings internationally and in South Africa could result.

Since property owners are responsible for IEQ, it is prudent for owners to reduce their potential liability. Tom Cantwell, Partner in Australian law firm Phillips Fox, believes it is "only a matter of time before property investors have to consider sustainability in the due diligence process to mitigate their risk."[63]

AURECON TSHWANE, PRETORIA:
4 Star Green Star SA - Office v1 Design & As Built
Interior

4.1.5
ABILITY TO ATTRACT AND RETAIN TENANTS

GOVERNMENT TENANTS

National, provincial and local governments combined have substantial accommodation requirements.

By considering the property portfolio of the National Department of Public Works alone, which owns 72 868 buildings[64], a picture of the enormity of government office accommodation requirements develops.

As well as the spatial requirements for office accommodation, most government departments also have accommodation guidelines which are beginning to identify sustainability as a key component of their property requirements.

Internationally, many governments now specify a green building rating or green building criteria for their own accommodation, whether owned or leased. Indications are that South Africa will follow this trend, and the Department of Public Works (DPW) has recently announced the launch of the development of its 'National Green Building Framework'. In this National Framework, the DPW has committed itself to greening its buildings. The Construction Industry Development Board (CIDB), an agency of DPW, has also already gazetted Green Star SA as a best practice, and has released a framework for discussion in which it is proposed that all new government buildings would need to achieve the minimum level of Green Star SA certification.

In short, where a building owner or manager wishes to have a government tenant, the building will increasingly have to conform to a number of green building requirements.

WORKPLACE 6, SYDNEY, AUSTRALIA:

6 Star Green Star - Office v2 Design
Google selected the building as its Australian Headquarters due to the superior internal envirnomental quality

LARGE CORPORATE TENANTS

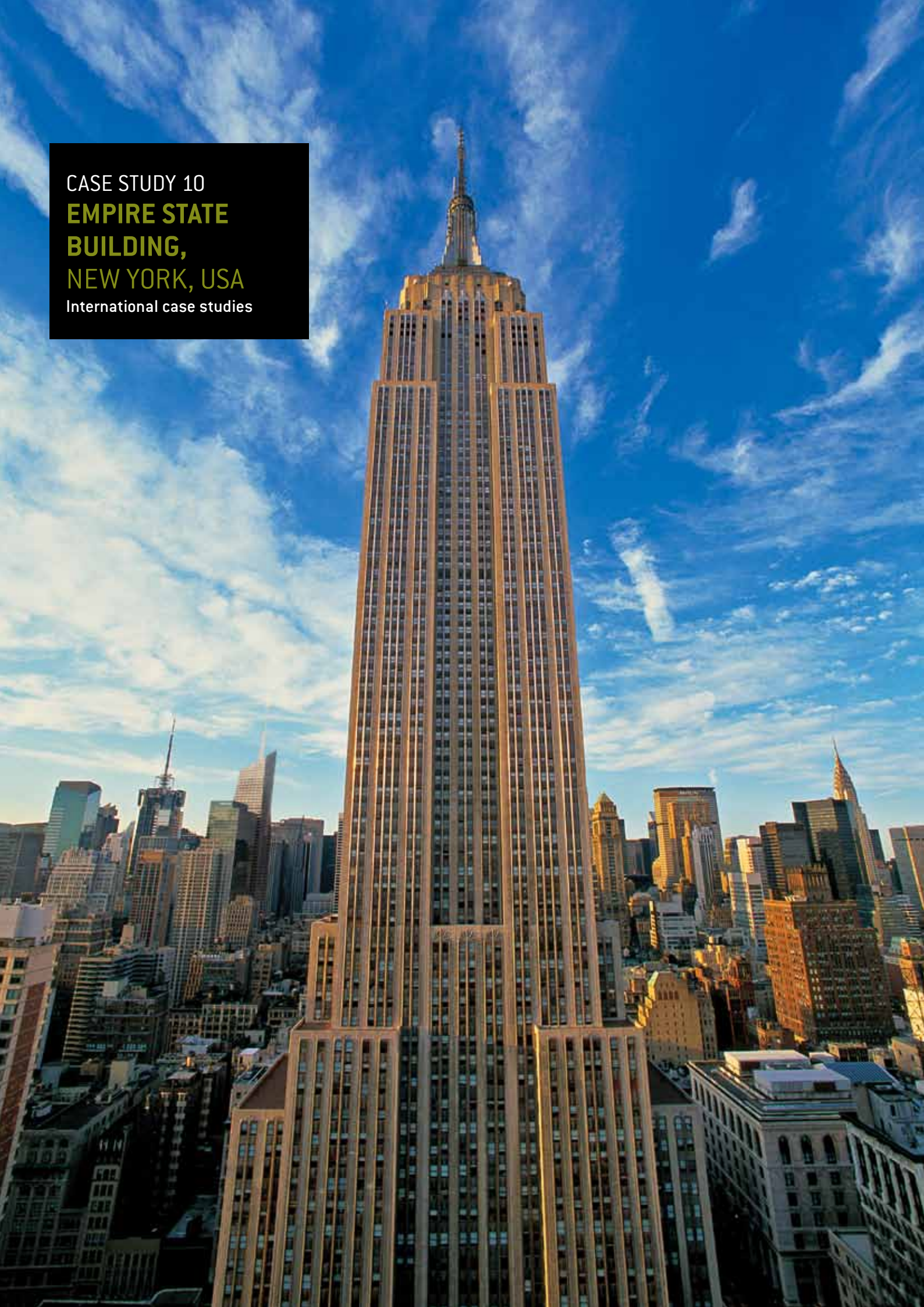
Increasingly, this is becoming the case for large multi-national company tenants too. Green building strategies are a key part of the sustainability plans of these types of organisations, both as a means to decrease their carbon footprint and demonstrate their commitment to the environment, as well as to benefit from the improved internal environments for the health, well-being and productivity of their staff.

> *"In respect of the first multi tenanted As-Built certified building, we achieved an exceptionally high tenant retention ratio and the building is currently fully-let."*[78]
>
> **Rudolph Pienaar**
> Growthpoint

RETAINING TENANTS AND DECREASING TENANT CHURN

With South Africa's predominantly short-term lease structures of 3-5 year terms, there is great financial benefit to be derived from retaining tenants at the end of their lease term. This avoids the significant costs associated with finding and securing new tenants, including lost rental and any applicable incentives and fit out costs.

Studies have shown that green buildings have lower tenant turnover[52] and are more likely to retain their tenants – a major benefit for property owners and managers.



CASE STUDY 10

EMPIRE STATE BUILDING, NEW YORK, USA

International case studies

DESCRIPTION OF PROJECT

The Empire State Building (ESB) is a 102 storey landmark skyscraper in New York City with 85 stories of commercial and office space and a total floor area of 257 211m^2. The iconic building is over 75 years old and began a major sustainability and energy efficiency retrofit in 2009, which will be completed by 2013.

The building owner, Anthony Malkin of Malkin Holdings, put together a consulting, design, and construction team including Clinton Climate Initiative, Johnson Controls Inc., Jones Lang LaSalle, New York State Energy State Research & Development Authority (NYSERDA), and the Rocky Mountain Institute. The team completed an eight-month iterative process using their experience, energy and financial modelling, ratings, metrics, and robust debate to develop the optimal retrofit solution.

The goal of the team was to develop a replicable model for optimising the performance of an existing building, while reducing greenhouse gas emissions and delivering measurable economic returns.

PROJECT COST

The ESB was due to undergo a planned $500m capital improvement programme, with $93m earmarked for energy related projects, with no expected resultant energy savings initially. When the capital expenditure programmes were re-evaluated with the goals of energy efficiency and sustainability, an additional $13m would be spent on energy related projects, with 38% anticipated energy savings.

BUSINESS CASE

The retrofit of ESB was motivated by the owner's desire to:

1. Dramatically reduce energy usage and be able to demonstrate the savings in a transparent and verifiable way,
2. Prove or disprove the economic viability of whole-building energy efficiency retrofits,
3. Create a replicable model for cost effective whole-building retrofits,
4. Improve tenant comfort and reduce tenant energy use via improved design and energy awareness,
5. Improve the competitiveness and marketability of the building, and
6. Reduce greenhouse gas emissions · Buildings are responsible for 38% of carbon emissions in the US. With approximately 75% of US buildings over 20 years old and ready for a retrofit, energy efficiency improvements to existing buildings must be a large part of the solution.

At current energy costs, ESB can cost-effectively reduce energy use by 38% with a payback of 3 years and save a minimum of 105 000 metric tons of CO_2 over the next 15 years.

Energy Service Company (ESCo) Johnson Controls Inc. were responsible for many of the upgrade projects and were employed via a performance contract mechanism, which guarantees the related energy savings over a period of 15 years and ensures commitment to the success of the project.

"The goal with the Empire State Building is to define intelligent choices to either save money, spend the same money more efficiently, or spend additional sums for which there is a reasonable payback through savings. Addressing these investments correctly will create a competitive advantage for ownership through lower costs and better work environment for tenants. Succeeding in these efforts will create a replicable model for others to follow."

Anthony E Malkin
President of Malkin Holdings, owner of ESB

GREEN DESIGN INITIATIVES

Over sixty possible energy efficiency initiatives were identified and evaluated based on their net present value, greenhouse gas savings and the dollar to metric ton of carbon reduced.

Eight projects were ultimately selected with the optimal balance of financial and environmental return:

ENERGY EFFICIENCY INITIATIVE	% ENERGY SAVING	DETAIL
DIRECT DIGITAL CONTROLS (DDCS)	9%	Upgrading the existing control systems at ESB.
TENANT DAYLIGHTING/ LIGHTING/PLUGS	6%	Reducing lighting power density in tenant spaces, installing dimmable ballasts and photosensors for perimeter spaces, and providing occupants with a plug load occupancy sensor for their personal workstation.
VAV AHU'S	5%	Replace existing constant volume units with variable air volume units using a new air handling layout (two floor-mounted units per floor instead of four ceiling-hung units.)
RETROFIT CHILLER PLANT	5%	Includes the retrofit of four industrial electric chillers in addition to upgrades to controls, variable speed drives and primary loop bypasses.
BUILDING WINDOWS	5%	Re-manufacture existing insulated glass units (IGUs) within ESB's approximately 6 500 double-hung windows to include suspended coated film and gas film.
TENANT ENERGY MANAGEMENT	3%	Providing tenants with access to online energy and benchmarking information as well as sustainability tips and updates.
RADIATIVE BARRIER	3%	Install more than 6 000 insulated reflective barriers behind radiator units located on the perimeter of the building.
TENANT DEMAND CONTROL VENTILATION (DCV)	2%	The installation of CO_2 sensors for control of outside air introduction to chiller water and DX (direct expansion) Air Handling Units.
TOTAL	**38% Energy Saving**	

The incremental capital cost of the eight initiatives and their related annual cost savings are as follows:

PROJECT DESCRIPTION	PROJECTED CAPITAL COST	2008 CAPITAL BUDGET	INCREMENTAL COST	ESTIMATED ANNUAL ENERGY SAVINGS
DDC Controls	$7.6m	$2m	$5.6m	$741K
Tenant Daylighting/ Lighting/Plugs	$24.5m	$16.1m	$8.4m	$941K
VAV AHUs	$47.2m	$44.8m	$2.4m	$702K
Chiller Plant Retrofit	$5.1m	$22.4m	-$17.3m	$675K
Windows	$4.5m	$455K	$4m	$410K
Tenant Energy Mgmt.	$365K	$0	$365K	$396K
Radiative Barrier	$2.7m	$0	$2.7m	$190K
Demand Control Vent	Inc in DDC	$0	Inc in DDC	$117K
Power Generation (optional)	$15m	$7.8m	$7m	$320K
TOTAL (ex. Power Gen)	**$106.9m**	**$93.7m**	**$13.2m**	**$4.4m**

An incremental cost of $13.2m with additional savings of $4.4m per year represents a 3 year payback for the above energy efficiency initiatives.

"If you want to change the world, deliver people a truly better bargain. Not something cheaper, but something better – a better economic return."

Anthony E Malkin
President of Malkin Holdings, owner of ESB

LESSONS LEARNT

Take the right steps in the right order - Ensure loads are minimised prior to investigating expensive new equipment or controls:

1. Reduce loads
2. Use efficient technologies
3. Provide controls

SOURCE: Empire State Building website

"With rapidly rising energy costs, increasing regulation and growing tenant awareness of the benefits of green, the business case for building green is getting stronger. Developers need to respond to these drivers with more efficient, greener buildings to stay competitive. [65] *"*

Brent Wiltshire
Development Executive, Old Mutual Property

4.2 DEVELOPERS

One of the major obstacles to developers building green has been the inherent nature of the development process which results in the tendency to hold a short term view. Generally it is perceived that the benefits of a green building accrue to the tenants or longer term owners and that few benefits accrue to the developer.

However, developers have much to gain from going green. By creating more desirable working and living conditions, green buildings can offer a handsome return on investment. High performance buildings offer the developer a wide range of profitable opportunities including:[66]

1. CAPITAL COST SAVINGS

Optimising building environmental systems to interact synergistically can lead to substantial savings in capital costs. For example, downsizing HVAC systems through energy efficient design not only produces savings in ductwork, but by reducing the requirement for bulky mechanical equipment more floor space can be made available for leasing.

It is critical to adopt a holistic view involving the entire professional team. Initially, solutions tend to seek to simply add on technology, creating greater expense. With greater experience by the professionals however, whole systems are redesigned on a more efficient, more economical basis.

2. ENHANCED ABILITY TO RENT OR SELL SPACE

An American BOMA study[67] showed that green buildings have an enhanced ability to rent or sell space – they are more attractive to tenants based on perceptions of their superior indoor environment. Furthermore, businesses are becoming increasingly aware of the importance of healthy work places in the attraction and retention of their employees and improvements in productivity. It should be noted that this has not yet been proven in South Africa due to the relatively small number of rated green buildings and the fact that most green buildings have not been tenanted for more than a year.

3. COMPRESSED SCHEDULE

One of the key ingredients of a successful green building project is the integrated manner in which the entire consulting team works throughout the design and construction process. Such an integrated team approach to design (as required when using Green Star) results in fewer design conflicts and subsequent change orders. North American experience is that green projects are routinely coming in on time and ahead of schedule.

4. IMPROVED MARKETABILITY

Building green creates a distinct product in the marketplace, which can be integrated with corporate image and used to market the property to attract and retain potential buyers, tenants and employees. Certification schemes such as Green Star are useful marketing tools since they help verify and substantiate green claims.

5. IMPROVED PUBLIC PROFILE AND COMMUNITY RELATIONS

Building green demonstrates environmental responsibility – a valuable differentiator for developers, who are sometimes accused of having a purely profit motive at the expense of environmental considerations. This improved image can accelerate the approval process when dealing with planning approvals, zoning requests and environmental assessments.

6. FREE PUBLICITY

Green buildings frequently generate extensive media interest and publicity. The increased marketing potential of a superior building can recoup the additional capital cost which may be associated with green building through faster leasing and reduced costs for promotional advertising.

7. OPERATIONAL COST SAVINGS (AND RENTAL PREMIUMS)

Reduced lighting loads, high efficiency appliances, increased insulation, passive solar heating, passive ventilation, water conservation measures and commissioning that uncovers and corrects inefficiencies all lead to savings in operational costs. These cost savings can be used to market the project to prospective buyers, clients and tenants – especially in this climate of rapidly increasing energy costs.

These cost benefits can also be quantified and added as a rental premium to offset possible increased capital costs.

8. REDUCED LIABILITY RISK

In North America especially, the insurance industry is becoming increasingly aware of lawsuits associated with building-related sickness and other indoor air quality issues, resulting in rising insurance costs and mould exclusion clauses. There are already cases of insurance companies in the US linking lower premiums to green buildings.

9. FUTURE PROOFING

Green buildings use less water and energy than conventional buildings, thereby providing a buffer against future increases in utility costs and protecting against services shortages – another benefit that can be marketed to customers. Green buildings are also future proofed against costly retrofits or even obsolescence as well as the potential impact of planned carbon taxes, mandatory energy efficiency disclosure and a tightening regulatory environment for buildings.

10. HIGHER BUILDING VALUATIONS

Reducing operating costs, capturing lease premiums and building more competitive, less risky and future proofed projects, provide a basis for higher building valuations. This is now being proven in extensive evidence-based studies in the US and Australia.

30 THE BOND, SYDNEY, AUSTRALIA:
5 Star Green Star - Office v1 As Built
The landmark Sydney building was the first in Australia to achieve this rating

"Sustainability is no longer a nice to have; it's an imperative in order to keep the heart of the central city beating as a commercial, residential and retail hub. As with other successful global CBDs, the importance we place on making this (Cape Town) a green city is fundamental for our plans to retain and attract business.[68] *"*

Rob Kane
Director, Vunani Properties and Chairperson of The Cape Town Central City Improvement District (CCID)

CASE STUDY 11

NEDBANK MENLYN MAINE FALCON BUILDING, PRETORIA

Green Star SA case studies

DESCRIPTION OF PROJECT

The Menlyn Maine Falcon Building will be the new home of the Nedbank Regional head office. It is the first building developed in the Menlyn Maine precinct, east of Pretoria central.

The Menlyn Maine precinct has been designed as a mixed use development. The precinct will include retail and residential buildings as well as other office developments.

It is intended that the Menlyn Maine precinct stand out as a green node in South Africa. All buildings will target a Green Star SA rating and will follow strict environmental guidelines in all aspects of the design and construction.

Total Gross Floor Area (GFA) : 15 943 m²

The project achieved a 4 star Green Star SA Office v1 Design certification in September 2011.

PROJECT COST

At viability stage, the **premium on the capital cost to build a green building was 9.2%.** 0.55% of the development cost related to certification costs, including GBCSA registration fees and consultant fees.

MENLYN MAINE FALCON BUILDING, PRETORIA
4 Star Green Star SA - Office v1 Design
Interior

BUSINESS CASE

Following international trends in large-scale urban development and as a key differentiator, Menlyn Maine is being developed as a 'sustainable city' and is marketing itself as the '1st Green City in Africa'. Green buildings are an integral part of this strategy and the "Green Star certification goes a long way to proving that this is not just marketing, but is actually possible," says Justin Bowen, Development Director of Menlyn Maine Investment Holdings.

In line with their corporate strategy as the 'Green Bank', Nedbank specified a minimum of a 4 Star Green Star certification for the building. Justin Bowen explains that their understanding of what was required to deliver a Green Star certified building, was the reason that Nedbank moved to the precinct. He continues that "without the guarantee to obtain the certification, we would not have attracted them to the precinct."

Bowen says that "the building will be one of the most energy efficient in the country, as well as having a great 'feeling and atmosphere' due to the daylight views and natural light." The building is designed to use 30% less energy than a SANS204 compliant building, and use approximately 35-45% less water for sanitation and irrigation.

Although the building's rentals are currently in line with other non-certified "energy efficient" buildings in the area, the developer expects the rising costs of rates, lights and water, and the resultant operational costs savings due to the building efficiencies to give them a competitive advantage in the medium term.

GREEN DESIGN INITIATIVES

This building has been fortunate in that it has been designed as a green building from the outset, rather than needing to match existing foot plates or previous phases. Specific attention was paid to:

1. **Energy Efficiency –** the building is designed to be one of the top 5% energy performers in South Africa. Chilled water with thermal storage reduces peak demand, and occupancy sensors on lighting and air conditioning switches systems depending on occupancies.
2. **Water Efficiency –** the building harvests rain and groundwater for non-potable use, which is stored in an 80 000 litre storage tank built into the building structure.
3. **Staff Comfort & External Views –** the building is a doughnut shape, with a very large atrium. Baring the toilet cores, almost every point in the building has either an external view, or natural light from the atrium.
4. **Materials –** Nedbank have carefully selected all interior finishes based on their environmental impact. Only natural timbers (bamboo) and locally sourced products have been selected – with the intention of obtaining an Interiors Certification when such a tool becomes available.

LESSONS LEARNT

- Use good design principles to achieve as much 'low-hanging fruit' as possible, and then
- Concentrate on energy efficiency as much as possible.

"The construction of green buildings has finally moved out of the realm of the esoteric and into the mainstream. The days of squandering natural resources in how we build and run buildings have passed and green buildings just make financial business sense."

Justin Bowen
Development Director, Menlyn Maine

SOURCE: Bowen, Justin, Menlyn Maine. Email Interview

"Failure to address climate change could damage reputations and profitability as more significance is given to climate change by investors and other key stakeholders." [69]

Corli le Roux
Head of SRI Index at the JSE

4.3
CORPORATE INVESTORS

There is growing investor demand worldwide for listed companies and investment funds to demonstrate a commitment to sustainability principles. As sustainability actions and progress can be difficult to measure, a number of guidelines, frameworks, assessments and indices have been created.

SUSTAINABILITY REPORTING

The Global Reporting Initiative's (GRI) voluntary Sustainability Reporting Guidelines are arguably the most widely used worldwide and enable all organizations to assess their sustainability performance and disclose the results in a similar way to standardized financial and sustainability reporting.

The GRI in fact launched a new sustainability reporting sector guideline for the construction and real estate sectors in September 2011 aimed at providing more consistency in this sector's reporting. Specific issues covered include building and materials certification, CO_2 emissions, management and remediation of contaminated land and labour, health and safety issues.[71]

'Integrated Annual Reporting' integrates the sustainability report of a company with its annual financial report. This may also be called 'Triple Bottom Line' reporting, where organizations publicly communicate their economic, environmental, and social performance in one integrated report. Such reporting is recommended by the King Code of Governance Principles (King III) and in fact since March 2010 listed companies on the JSE have been obliged to integrate their sustainability report with their annual report.[72]

SZENCORP BUILDING, MELBOURNE:
6 Star Green Star - Office v1 Design

It is also becoming common practice to report on a company or organisation's greenhouse gas (GHG) emissions. Various guidelines have been developed for this purpose, with the 'GHG Protocol' being regarded as *the* standard for measuring and reporting on carbon emissions. In addition the 'Carbon Disclosure Project' (CDP) challenges the world's largest companies to measure and report their GHG emissions, water use and climate change strategies – 83 of the 100 largest corporations on the JSE voluntarily participated in this initiative which is run locally by the National Business Initiative (NBI) in South Africa. The top 10% of the JSE 100 companies with the highest scores are included in the Carbon Disclosure Leadership Index (CDLI). Companies included in this Index for 2011 are Nedbank, Barloworld, Woolworths, FirstRand, the Bidvest Group and Group 5.[73]

SUSTAINABILITY INDICES/ASSESSMENTS

There are also an increasing number of sustainability assessments and indices being applied to listed companies worldwide - the Dow Jones Sustainability World Index tracks the financial performance of the leading sustainability-driven companies globally and provides asset managers with reliable and objective benchmarks to manage sustainability portfolios; and the FTSE4Good Index admits companies based on their ability to meet social responsibility criteria. In South Africa, the JSE's Socially Responsible Investment Index tracks the sustainability performance of listed companies on the JSE All Share Index.

In response to the need for a sustainability benchmark specifically for companies in the property and construction sector, the 'Global Real Estate Sustainability Benchmark' (GRESB) was launched in 2011.[74] Described as an initiative to assess the environmental and social performance of public and private real estate investments, the benchmark measures sustainability at the portfolio level by assessing responses to an annual survey of 55 key questions. Participating real estate companies and funds receive a tailored scorecard representing their environmental performance, as compared to peers and the leaders in the region. The scorecard can be used as a tool to identify opportunities for improvements, and serves as a guide for real estate managers that are implementing sustainability aspects into their portfolio as well as to investors wanting to factor sustainability into their investment decisions.

There are a plethora of sustainability awards for companies both internationally and locally, which are now too numerous to list.

> *"(There is...) a growing recognition that there is a huge range of carbon reducing activities that companies can undertake that have a very clear business case."* [70]
>
> **Paul Simpson**
> CEO Carbon Disclosure Project

BP HEAD OFFICE, CAPE TOWN:
Atrium skylight

NEDBANK PHASE II, SANDTON:
4 Star Green Star SA - Office v1 Design and As Built Interior

SOCIALLY-RESPONSIBLE INVESTING

Worldwide, investors are increasingly interested in more socially and environmentally-responsible businesses. This is evidenced by initiatives such as the United Nations-backed 'Principles for Responsible Investment' (PRI) Initiative, which is a network of international investors working together to put six "Principles for Responsible Investment" into practice.

The Principles were devised by the investment community. They reflect the view that Environmental, Social and Governance (ESG) issues can affect the performance of investment portfolios and therefore must be given appropriate consideration by investors if they are to fulfil their fiduciary (or equivalent) duty. The Principles provide a voluntary framework by which all investors can incorporate ESG issues into their decision-making and ownership practices and so better align their objectives with those of society at large.

As of April 2012 over 1 000 investment institutions have become signatories, with assets under management approximately US$30trillion. A full list of current signatories can be found at www.unpri.org/signatories.[75]

Locally, the final 'Code for Responsible Investing by Institutional Investors' in South Africa was released July 2011. The Code seeks to encourage institutional investors and their service providers (asset, fund managers and consultants) to put in place measures aimed at ensuring responsible investing. The Code is voluntary on an "apply or explain" basis. The Code consists of five principles and related recommendations. This makes South Africa the second country after the UK to have such a code for institutional investors.[76]

One of the largest institutional investors in South Africa, the state-owned Public Investment Corporation (PIC), has set out its policy concerning investment decisions, in which it recommends actions and structures to embed the best economic and social practice in organisational structure and implementation.[77]

In March 2010, South Africa's largest pension fund, the Government Employees Pension Fund (GEPF), released a Responsible Investment Policy Statement. The Statement contains GEPF's policy to integrate environmental, social and governance issues in investment decision-making and ownership practices.[77]

GREEN BUILDING AS A SUSTAINABLE AND RESPONSIBLE INVESTMENT

Green building is a 'concrete' and visible way of demonstrating an organisation's commitment to sustainability principles – whether it be the greening of the company's own premises or the greening of the portfolio of a listed property company. Green building provides extensive opportunities to cut carbon emissions, while improving the health and productivity of building users, and as such certainly fall into the category of 'responsible investments' and should be eligible for the growing funds seeking to be invested in this manner.

The 2004 Jones Lang La Salle report 'Commercial Property Going Green'[45] states that several large Australian investors such as public authority superannuation funds are selectively investing in firms, including property trusts, that can demonstrate their corporate responsibility.

NEDBANK RIDGEVIEW, UMHLANGA
4 Star Green Star SA – Office v1 Design
Interior

Growthpoint Properties, the largest listed property fund in South Africa, has been investing in green building initiatives since 2008. The entire office portfolio of R14.3billion is being audited and reviewed for energy efficiency and the plan is to extend this focus to broader sustainability initiatives in time. The objective is to have all Growthpoint's A-grade office buildings rated under the GBCSA's coming Energy and Water Benchmarking Tool, which will assist with the sustainability measurement and management of the portfolio. Rudolf Pienaar, Growthpoint's Divisional Director: Offices, views environmental programs as not only "essential for future proofing", but also a way in which they "can reduce costs and keep the fund competitive". [78]

Another reason to factor corporate sustainability into investment and management decisions is that it has been shown to boost the value of an investment by improving a company's intangible assets such as brand image, supplier relations, and appeal to customers and employees.

PROPERTY VALUATION AND DEVELOPMENT PROFITS

A 2005 hypothetical study 'Property Valuation and Analysis Applied to the Environmentally Sustainable Development'[79] concluded that the current market incorrectly values green buildings as though they are conventional buildings, when in fact green buildings can generate higher values resulting from higher rental returns, lower operating costs and lower risks and hence lower capitalisation rates.

The table on the following pages is from the study. 10% profit to the developer is allocated for the conventional building while the green building delivered 15% profit. The land value for the conventional building is $2.2million and that for the green building is $8.8million. This hypothetical study claims that the worth of the green building ($58million) is substantially higher than the estimated price of $40million for the conventional building.

"With the business case for green commercial buildings now deeply rooted in a growing body of evidence, it should be crystal clear to property investors that there are significant performance gains to be made from competitively pricing green assets, and by the same token, a unique opportunity to be in the driving seat of the current shift to a low-carbon and resource-efficient economy." [44]

Paul Clemens-Hunt
Head of United Nations Environment Programme Finance Initiative

TABLE 5:

THEORETICAL COMPARISON OF CONVENTIONAL AND ESD BUILDING RESIDUAL VALUES [79]

CONVENTIONAL BUILDING	FLOOR AREA	RENT/SQM	NET RENTAL	TOTALS
DEVELOPMENT RETURNS				
Gross rental value		$400		
Staff saving		$0		
		$400		
Outgoings		$80		
Net rental value	10,000	$320	$3,200,000	
Net income				$3,200,000
Capitalisation rate				8.00%
				$40,000,000
Less sales commissions & costs		1.50%		$600,000
				$39,400,000
Less vacancies				
Prelet		100.00%		
Letting up period		0		
Rent lost				$0
				$39,400,000
Less letting commissions & costs		15.00%		$480,00
Net Returns				**$39,920,000**
DEVELOPMENT COSTS				
Developer's allowance for profit & risk			10.00%	$3,538,182 $35,381,818
Building costs			$30,000,000	
Consultants' fees		0.00%	$0	
			$30,000,000	
Construction finance				
Interest		8.00%		
Construction period		24		
			$2,400,000	
Total construction costs				$32,400,000
GROSS RESIDUAL LAND VALUE				**$2,981,818**
Less rates & taxes				$100,000
				$2,881,818
Less holdings costs				
Interest		8.00%		
Preconstruction period		6		
				$480,303
				$2,401,515
Less land purchase		6.00%		$135,935
NET RESIDUAL LAND VALUE				**$2,265,580**

ESD BUILDING	FLOOR AREA	RENT/SQM	NET RENTAL	TOTALS
DEVELOPMENT RETURNS				
Gross rental value		$420		
Staff saving		$100		
		$520		
Outgoings		$70		
Net rental value	10,000	$450	$4,500,000	
Net income				$4,500,000
Capitalisation rate				7.75%
				$58,064,516
Less sales commissions & costs		1.50%		$870,968
				$57,193,548
Less vacancies				
Prelet		100.00%		
Letting up period		0		
Rent lost				$0
				$57,193,548
Less letting commissions & costs		15.00%		$675,00
Net Returns				**$56,518,548**
DEVELOPMENT COSTS				
Developer's allowance for profit & risk			15.00%	$7,371,985 $49,146,564
Building costs			$35,000,000	
Consultants' fees		0.00%	$0	
			$35,000,000	
Construction finance				
Interest		8.00%		
Construction period		24		
			$2,800,000	
Total construction costs				$37,800,000
GROSS RESIDUAL LAND VALUE				**$11,346,564**
Less rates & taxes				$100,000
				$11,246,564
Less holdings costs				
Interest		8.00%		
Preconstruction period		6		
				$1,874,427
				$9,372,137
Less land purchase		6.00%		$530,498
NET RESIDUAL LAND VALUE				**$8,841,638**

CASE STUDY 12

AURECON LYNNWOOD BRIDGE, TSHWANE

Green Star SA case studies

DESCRIPTION OF PROJECT

This is the new Tshwane head office of engineering, management and specialist technical services group, Aurecon. Situated just off the N1 highway, the 20 000m² office building accommodates approximately 1 000 staff, over 6 floors and 4 basement parking levels. As the developer and co-owner of the building, Atterbury Property was responsible for the project management on the entire project, which forms part of their new 73 000m² Lynnwood Bridge precinct.

The building achieved a 4 Star Green Star SA Design certification in September 2011.

PROJECT COST

The capital premium for greening the building was approximately 4% on the construction value, but only 2.6% on the overall development cost. The Green Star SA certification costs were about 10% of the above costs, or between 0.26% and 0.4%.

BUSINESS CASE

By building their new Tshwane head office as a green building and obtaining a Green Star SA certification, Aurecon wanted to demonstrate its commitment to the implementation of greening initiatives and sustainability. According to Martin Smith, Technical Director in the Building Engineering division, the company is "committed to excellence and they wanted to demonstrate that they practice what they preach."

The company believes that important benefits of green building include increased staff wellbeing and productivity as well as a reduction in energy and water consumption, ultimately resulting in significant savings. The total energy savings (base building + tenant equipment) were modelled to be approximately 45% and after approximately 300 days of operation the actual consumption has closely matched the simulated figures.

Smith confirms that the company "received additional marketing and publicity from the Green Star certification." He explains that "a significant number of people have expressed interest in wanting to have a tour of the building in order to observe the green/sustainable features" and that "people have also contacted Aurecon to host events and presentations in order to give people a first-hand experience of what a green building looks and feels like on the inside." Although he admits that it is difficult to put a value on the rating, the company believes that "the certification will assist Aurecon in securing similar design appointments."

> *"It's important to realise that a green building is a long-term commitment. What we set out to achieve is the creation of an office which doesn't harm the natural landscape which surrounds it, and benefits the people who use it. I believe we've succeeded in achieving this vision."*
>
> **Gustav Rohde**
> Chief Operations Officer, Aurecon

GREEN DESIGN INITIATIVES

A number of innovative green building initiatives were applied, aimed mainly at reducing electricity and water consumption, improving the indoor environment quality for staff, reducing the impact of materials on the environment, improving building design and management and encouraging alternative forms of transport.

Some of the key green design initiatives include:

- **A predominantly north-south orientation** with an internal atrium, coupled with a high performance façade of high performance glass and extensive external shading. This allows for maximised daylight (and minimised artificial lighting), extensive external views, minimal blinds, as well as optimised energy performance.
- **High performance zoned VAV (variable air volume) air conditioning** with maximised individual control. (This initiative did not however achieve Green Star SA points due to the large open plan areas.)
- **Increased ventilation rates** as a result of a full economy cycle, which ensures free cooling with fresh air is possible when outside conditions are favourable, and CO_2 monitoring to ensure enough fresh air is supplied into the building.
- **Efficient lighting** with motion and occupancy sensors. These ensure that lights are only turned on when a particular zone is occupied, and are predicted to save the company thousands of Rands in their overall electricity bill.
- **A Rainwater harvesting system** and tank will collect, store, treat and use non-potable water for toilet flushing and storm water attenuation. Excess water is slowly released into an innovative vertical wetland/filtration system (constructed on the northern basement façade) into the adjacent wetland.
- **The potable water consumption** for landscape irrigation has been reduced by more than 90% by making use of plants which require no water (xeriscaping), and indigenous plants which need a minimal amount of irrigation. The small portion of landscaping consisting of grass and flowerbeds will only be irrigated at night and will make use of soil moisture sensors so that only the necessary amount of water is used.
- **Sub-metering** has been installed for all major energy uses. This will enable the building owner and/or facilities manager to verify that equipment and systems are operating as per their design specifications, and to identify areas where potential energy savings can be achieved.

LESSONS LEARNT/TIPS

- A Green Star SA rating involves many elements of sustainability. In order to ensure a successful submission, it is crucial to have a Green Star SA Accredited Professional on the project team - a dedicated consultant who functions as the submission collator/project manager for the duration of the entire process.
- Closer coordination between professionals was required. Weekly meetings were held in order to ensure that all parties involved were clear as to what documentation needed to be provided for a successful submission and all e-mail correspondence went through the submission collator/project manager.
- The most important lesson learned for future Green Star projects is to “plan ahead”. When putting together a submission for the first time it is always tricky to coordinate and readily obtain correct information from all parties involved. On subsequent submissions the documentation proved to be less onerous.

“Aurecon is a silver founding member of the Green Building Council of South Africa (GBCSA)... our sponsorship of the Council’s efforts confirms our support of transformation in the industry and affirms our commitment to playing a leading role in promoting environmentally sustainable development. In line with this, it is important that our own buildings and facilities are designed and built in a sustainable manner.”

Gustav Rohde
Chief Operations Officer, Aurecon*

SOURCE: Smith, Martin, Aurecon. Email Interview
Rohde, Gustav, Aurecon. Engineering News Online ‘New Premises Incorporates Green Design and Construction’ 2011

4.4
TENANTS

Attracting tenants is of critical importance to owners. **There is mounting evidence internationally that pressure is coming from large corporate and government tenants demanding green space.**

One indicator is the strong industry uptake of the Green Building Council of Australia's Green Star – Office Interiors rating tool as well as the US Green Building Council's LEED rating tool for Commercial Interiors, both of which are designed to assess the environmental impact of an interior fit-out once construction is complete. The GBCSA is in the early stages of development of a similar tool for the local market.

"Architects have traditionally pushed green thinking, while clients have been concerned with the cost," says Joseph Quraishi of Amdec Property Development, developer of the Melrose Arch mixed-use precinct in Johannesburg. But he points out that "tenants are the real drivers of change." Since obtaining the first Green Star SA Multi-Unit Residential PILOT Design rating for their Forty on Oak building, Amdec has received a number of enquiries from new and existing tenants on how they could either pursue a Green Star SA rating, or implement greener building principles within their office, residential or retail space.[80]

Markets in North America and Australia are starting to empirically show a premium for green buildings[2,43,44] and corporate and government tenants, in particular, are showing a willingness to invest more in a building that supports their sustainability policies as environmentally responsible corporate citizens.

Another driver for many owners and managers is the retention of tenants. As an Executive General Manager at Australian developer Australand put it, "if it's cheaper for the tenants, then returns to us are only better because there are more yields and we're going to hold our tenants for longer." [81]

Green building elements are also becoming more important to tenants in the retail sector. The Canadian report on the business case for green buildings[59] says there is some evidence that green buildings or at least good quality natural lighting, can have a dramatic effect on retail sales. Examples included a study of 108 retail stores by the Heschong Mahone Group, where the daylit stores had 40% higher sales than those without daylighting. International retail giant Walmart has done similar studies and found that in addition to the energy savings from daylighting, retail sales in the daylit portion of the store were twice that of the artificially lit areas.

NEW SISONKE DISTRICT OFFICE, IXOPO:
5 Star Green Star SA - Office v1 Design

In most instances in South Africa, leases are structured so that tenants pay for their own operating costs like electricity and water expenses. So a critical benefit to tenants of green buildings is the ability to keep these costs down.

Tenants of green buildings will also benefit from the improved public perception, free publicity and enhanced reputation usually associated with environmentally-responsible buildings, as discussed in the previous sections.

> *"Green building in South Africa will take hold in the mainstream when the tenants of buildings push for a more sustainable built environment – and the way to ensure this market demand is through education. Long-term energy and water savings, which translate into cost savings, are steadily pushing business- and home-owners to seek out green buildings, rather than leaving it up to built environment professionals."* [80]
>
> **SA Commercial Prop News**

> *"The greening changes have also been beneficial to the tenants' pockets. The renovations have translated to saving the tenants R10–R15/m², a 10–15% saving on a rental of R100/m². Bearing in mind how sensitive tenants are to their accommodation costs, this is a material saving.* [68] *"*

Rob Kane
Director, Vunani Properties and Chairperson of The Cape Town Central City Improvement District (CCID)

4.4.1
LOWER OPERATING COSTS

As the benefits of decreased operating costs like lower energy and water expenses usually accrue to the tenant, this major benefit associated with more efficient or green buildings is of importance to tenants. Energy efficiency especially is becoming increasingly important to tenants as the electricity tariff increases in the country continue to exceed inflation. (See Section 4.1.1 on the detailed benefits of lower operating costs in green buildings.)

4.4.2
INCREASED PRODUCTIVITY

One of the most powerful potential advantages of occupying a green building is the impact that improved Indoor Environmental Quality (IEQ) can have on the health, comfort and well-being of building occupants. Increasingly, elements of green design such as increased natural lighting, fresh air flow and the absence of toxic materials in interior finishings are being shown to improve the productivity of workers in green office buildings.

Although the impacts of improved IEQ can be difficult to measure, multiple peer-reviewed studies have linked improved indoor environments to greater productivity, including increases in the amount of work accomplished, better student performance, improved worker retention, reduced absenteeism from work or school, and reduced hospitalization times.[82]

One US study of office worker productivity[83] reached the following conclusions:

- An increase in daylight illumination levels up to seven metres resulted in a 13% improvement in productivity.
- An ample and pleasant view was consistently found to be associated with better office worker performance. Office workers were found to perform 10-25% better on tests of mental function and memory recall when they had the best possible view versus those with no view.
- Glare from windows decreased performance by 15-21%.
- Increased ventilation was associated with performance improvements of 4-17%.
- Physical comfort conditions were found to affect worker performance by up to 20%.
- Better quality ventilation reduces sickness by 9–50%.

NEDBANK PHASE II, SANDTON:
4 Star Green Star SA - Office v1 Design and As Built
Besides productivity, improvements from increased daylight, fresh air and the absence of toxins, supporting technology like video conferencing lessens the need for employee travel

Another US report[84] noted that there is no standard for estimating the exact productivity impact of a green building. Each green building has a different set of technologies and design attributes, and each building's tenants have different health attributes and comfort needs.

The report goes on to say that **four of the key attributes associated with green building design – increased ventilation control, temperature control, lighting control and daylighting – have positively and significantly correlated with increased productivity.**

It is generally accepted that toxic substances in the workplace can increase sick days and sap energy levels.[85] – hence the commonly-used term "sick-building syndrome". Statistical evidence suggests that reduced sick-building syndrome would yield $10-$30billion in potential productivity benefits nationally in the US.[86]

Adrian Leaman and Bill Bordass are considered international experts in post occupancy and building use studies. Their 2005 paper 'Productivity in Building: the Killer Variables',[87] based on extensive surveys carried out in the UK, claims that **productivity gains of up to 20% can be achieved through improvements in heating, cooling, lighting, ventilation and noise, noting that occupant control over these elements is a key contributing factor.**

IMPACT ON PROFITABILITY

In most commercial office buildings, payroll costs greatly overshadow all other costs, including those involved in the design, construction and operation of a building. 'A Business Case for Green Buildings in Canada' [59] outlined annual commercial expenses as:

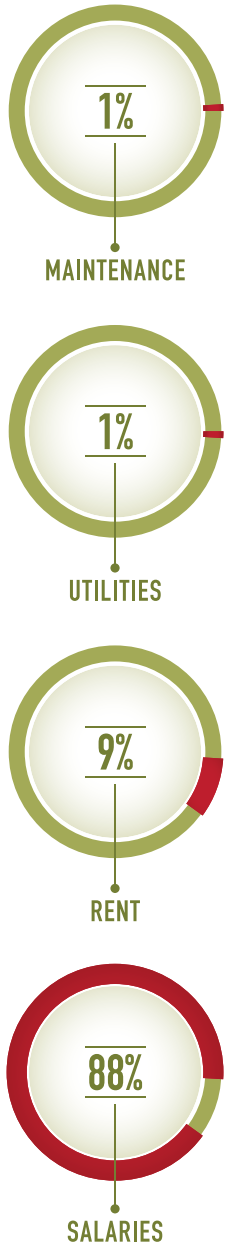
- maintenance 1%;
- utilities 1%;
- taxes 1%;
- rent 9%; and
- salaries a staggering 88%.

The principles and ratios are similar in the South African market, with salary costs anecdotally being greater than occupation costs (rental) by a factor of ten.

So it can be seen that **productivity increases associated with green buildings have a major impact on the profitability of a business (especially those with a relatively high salary bill) and can quickly show payback for green building upgrades or initiatives.** Therefore anticipated productivity gains should be included to some extent at least in the life cycle cost analysis of a green building, especially for an owner-occupied building.

Aurecon SA GM Albert Geldenhuys says they "believe that the extra cost required for the design and construction of their new Green Star SA-rated buildings in Century City and Lynnwood Bridge have been excellent investments which will be repaid in the short to medium term through savings in consumption and maintenance and through increased productivity and health of our motivated and vibrant staff".[57]

TYPICAL ANNUAL COMMERCIAL EXPENSES



> *"The direct economic benefits of green building include reductions in energy and water costs and higher retruns on investment. When combined with indirect benefits such as increased productivity and reputational equity, staff acquisition and retention and decreased absenteeism, green building clearly delivers a 'triple bottom line benefit'.* [44] *"*

Romilly Madew
CEO, GBCA

4.4.3 A COMPETITIVE EDGE IN ATTRACTING AND RETAINING TALENT

In competitive recruitment markets such as professional and financial services, tenants are realising the benefits of using an office building's superior environment to gain a competitive edge in attracting talent.

In a presentation about 'Managing Generations in the Workplace', Roslyn Sawyers stated that Generation Y graduates (1978-1994) have an increased awareness of environment, drought, climate change and environmental sustainability.[88] Failure to understand this will result in failure to attract or retain the very people who hold the key to an organisation's survival.

William McCormack Place in north Queensland was a good 2002 case study on how building green provided a competitive edge in attracting and retaining talent. This building was the first building in Australia to be awarded the highest energy rating under the Australian Building Greenhouse Rating (ABGR). A tenant of the building stated that this has helped enhance the reputation of their organisation and is attracting employees to the organisation.[62]

4.4.4 CHURN

Churn is the frequency with which a building's occupants are moved, either internally or externally, including those who move but stay within an organisation, and those who leave a company and are replaced. Churn is caused by business restructuring, staff increases, staff reductions or bad space planning.

The Australian Facilities Management Association undertook a survey in 2001 which concluded that the potential cost of churn in Australia was $3.6billion per annum. The research found that the 'relocation of staff' cost of churn was $2 482 per person or $41 per m^2 net lettable area.[89] It is reasonable to assume that the situation in South Africa is similar.

In most organisations it is the Board or senior executive team that makes the decision to create churn. Most senior managers saw churn as part of doing business, but many also believe that it is a problem that should be minimised.

The costs associated with churn include:

- management and other employee direct hours in planning & execution;
- consultants and legal fees;
- building contractors and other fit out costs;
- packing and removal costs;
- local authority approval fees; and
- specific employee time.

Indirect costs may include additional management time, staff downtime and productivity losses, disruption to other parts of the facility, additional energy consumption at weekends or evenings, damage or loss during moving and so on.

As a general guide, indirect costs are approximated as 25% of the direct costs, based on the survey data.

Green buildings can minimise the impact of churn in two ways:

- Green buildings can result in an actual decline in churn because of increased occupant comfort and satisfaction.
- Green buildings often incorporate systems, such as raised floors and moveable partitions designed to be disassembled and reused that reduce the costs of accommodating churn. For example, raised floor systems utilise the spaces beneath the floor for cabling, electrical wiring, and ventilation, and are easier and less costly to relocate specific elements (such as electrical outlets or data ports) in buildings with raised floor systems.

"It is hoped the provision of a healthy working environment will promote the city as a responsible employer, and an employer of choice. This in turn is expected to reduce staff churn and provide additional financial benefits." [55]

City of Melbourne Technical Research Paper 10 - The Business Case for Sustainable Design

CASE STUDY 13

OLD MUTUAL PROPERTY

Existing buildings case studies: HVAC controls as a tool in energy management

BACKGROUND

HVAC – Heating, Ventilation and Air Conditioning - is responsible for up to 60% of the energy consumption in a building, according to Chris Davey, National Technical Manager at Old Mutual Property (OMP). **So improvements in the efficiency of a building's HVAC system can have a major impact on energy efficiency and translate into significant financial savings with relatively short payback periods.**

Old Mutual Property manages a number of large shopping centres around the country and since 2008 the company has undertaken a project to improve the efficiency of the HVAC systems in some of their major centres. **Focus was placed on creating efficiencies within the existing HVAC equipment mainly by means of upgrading and improving the control systems and methodologies.**

1. CAVENDISH SQUARE SHOPPING CENTRE

Cavendish Square shopping centre is located in Claremont, Cape Town. With a GLA of 43 654m², it consists of three levels of retail and four levels of parking.

GREEN/EFFICIENCY INITIATIVES

- Improve HVAC performance by allowing the chilled water temperature to drift reducing chiller load by 400KW in summer and 620KW in winter
- Install variable speed drives to secondary chilled water pumps
- Install variable speed drives on cooling tower fans
- Automate fresh air dampers with external air temperature as reference
- Introduce precooling – shifting demand to off-peak periods by bringing the building temperature down during off-peak periods, which then enables building management to lessen the use of chillers during peak periods

PROJECT COST & PAYBACK

Average Monthly Savings(KW)	616 200kWh
Annual Savings(KW)	7 394 400kWh
Annual Savings (R)	R2 246 418 @ 2009 rates
Theoretical Payback	Approx. 2 months (funded by Eskom DSM)

"Efficiency is the optimal use of resources to achieve a desired result. Efficiency will not be achieved by applying a rigid set of criteria but by intelligently applying the input from multiple variables to achieve the desired goal."

Chris Davey
National Technical Manager,
Old Mutual Property (OMP)

2. MENLYN PARK SHOPPING CENTRE

Situated in Menlyn, Pretoria, this shopping centre has a GLA of 118 000m² and consists of three levels of retail and four levels of parking.

GREEN/EFFICIENCY INITIATIVES

- Allow chilled water temperature to drift to reduce the chiller load by 340KW in summer and 540KW in winter
- Convert constant volume supply air fans to variable volume
- Install variable speed drives to control cooling towers
- Install variable speed drives to control air handling units
- Install variable speed drives to control return air fans
- Introduce pre-cooling

PROJECT COST AND PAYBACK

Average Monthly Savings(KW)	875 992kWh
Annual Savings(KW)	10 511 904kWh
Annual Savings (R)	R3 820 726 @ 2009 rates
Payback period	1.47 years

MENLYN PARK SHOPPING CENTRE, PRETORIA

SOURCE: Davey, Chris, Old Mutual Property

5

CHALLENGES AND BARRIERS

The property industry is well placed to deliver significant long term environmental improvements using a broad range of measures and by creating behavioural changes at all stages of its supply chain (planning, design, procurement, construction, management, operation and valuation).

However, within the property industry there are inherent barriers that often result in efficiency measures not being adopted, despite the fact that a strong business case can be made for their implementation.

No matter how significant the environmental and tenant benefits of green buildings, these must be translated into the hard economic realities that are the essence of business decisions – in particular, the issue of who pays versus who gains.

Until 2008, South Africa was without a national framework and metrics to support and quantify sustainability which was broadly used by the commercial property industry. There is still a lack of education and understanding of the fundamental principles of sustainable development. There is a lack of value attached to the long term benefits of green buildings and too great a focus on short-term low-cost construction entrenched by a long industry history of 'build it cheap and demolish it in the future'. Finally, there could be greater government support and leadership, including incentives and more extensive regulations to help break through the short-term and capital cost barriers associated with the split incentives of the development industry.

A significant challenge confronting the greening of the property industry is the predominance of existing building stock, and the cost of retrofitting and converting existing buildings to green assets.

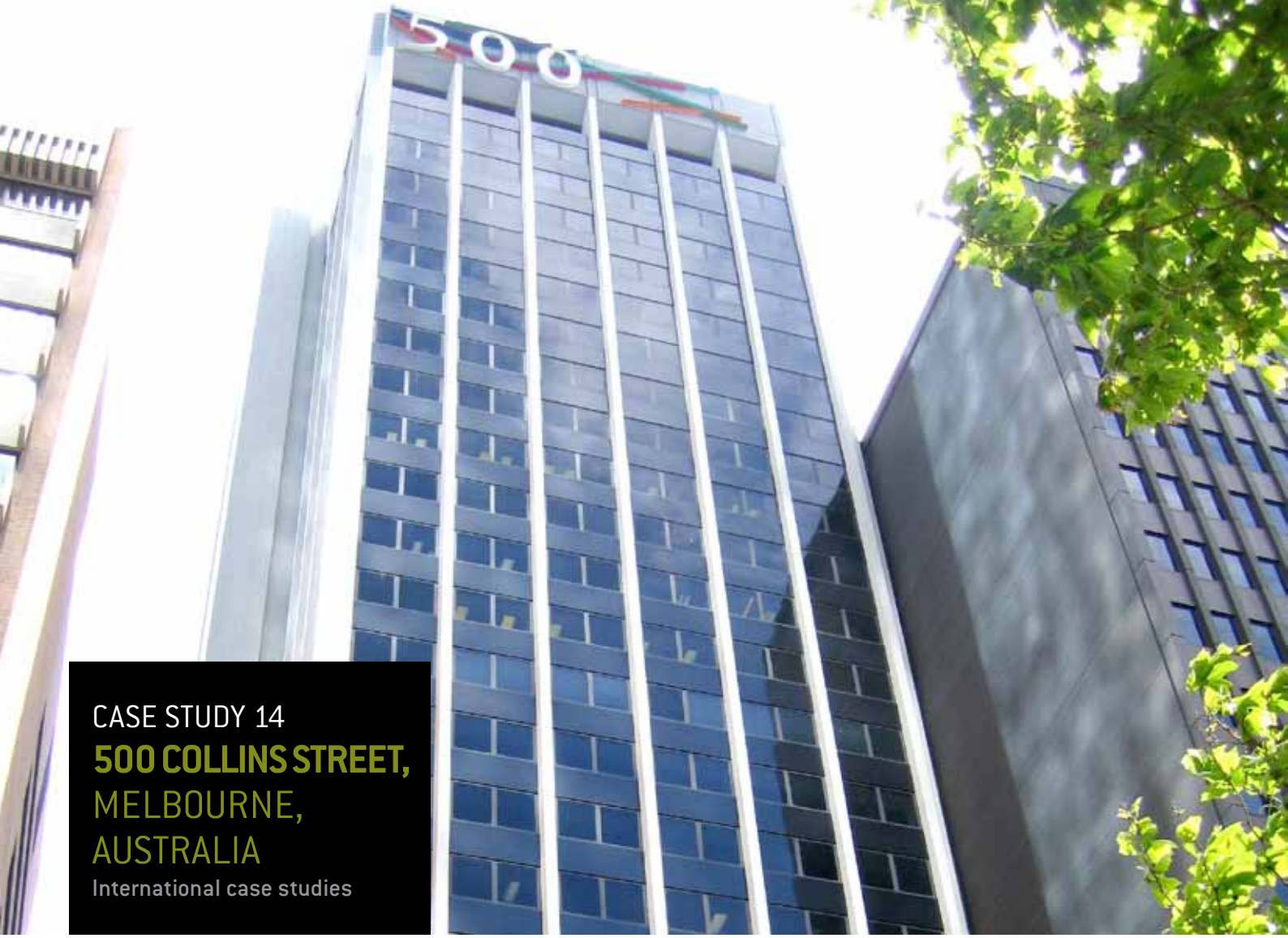
One of the major causes of delays in the greening of new and existing buildings has been the lack of appropriate green products and materials. South African manufacturers have been slow to create and offer green products, although this is changing now, especially following the introduction of Green Star SA in 2008.

Finally, another challenge to the industry is the possibility of different and competing rating tools entering the market and the confusion and lack of focus this can cause – although this is not an issue in South Africa at this stage as Green Star SA has become the recognised national rating system for the commercial property industry.

AURECON CENTURY CITY CAMPUS, CAPE TOWN:
5 Star Green Star SA - Office v1 Design

"There are a lot of roadblocks to green buildings, although they are more about change than anything else. Change is hard for all of us, from industry, government to individual people." [91]

Anthony Bernheim
US indoor air quality expert



CASE STUDY 14

500 COLLINS STREET, MELBOURNE, AUSTRALIA

International case studies

DESCRIPTION OF PROJECT

500 Collins Street was the first and oldest refurbished CBD office building in Australia to achieve a Green Star rating, and demonstrated to the marketplace that existing stock can be upgraded to high ESD (Environmentally Sustainable Development) standards, in this case to a standard of ''Australian Excellence'' as symbolised by the 5 Star Green Star - Office Design v1 Certified rating.

The project involved a staged upgrade of an existing and occupied multi-tenanted 28-level office building with 25 500m^2 NLA. The project comprised replacement of the major plant and equipment, reconfiguration of the car park, repair and upgrade of the façade, upgrade of the ground floor entrance including lobby, lifts and retail areas, and the progressive upgrade of the office floors.

PROJECT COST

Built in the early 1970s, 500 Collins Street was due for a major refurbishment in order to remain competitive and the new owners, the Kador Group, made sustainability the cornerstone of the comprehensive building upgrade. But "commercial principles weren't ignored either."

Rather than emptying the multi-tenanted building, the refurbishment was carried out floor by floor, and a tenant occupancy rate of approximately 80% maintained through the majority of the project. Lease income was therefore maintained and tenants retained.

In addition to reducing energy, water and waste, improved indoor environmental quality was also a goal of the project, in order to make the building ''a good place for business to do business.'' Pre- and post-occupancy studies carried out on two of the tenants found that overall staff productivity increased by 12% on the refurbished floors.

The retrofitted building is designed to use around 50% less energy and 40-50% less water than a standard office building, significantly decreasing monthly operating costs of the building.

Kador Group director Paul Martin explains that they plan to hold the building long term, and believes that "industry should look at life-cycle cost, not just capital cost."

He concludes, "A project like this only happens once every 30 or 40 years in a building's life-cycle. Get it wrong, and you're stuck. We've positioned ourselves for the future."

GREEN FEATURES

AIR CONDITIONING

One of the major initiatives of the refurbishment is the installation of a chilled beam air conditioning system.

The simple principle behind chilled beam technology is that cooling is distributed by way of chilled water pipes to chilled beams located in the ceiling space. Hot air in the occupied space rises through a perforated ceiling. It then makes contact with the chilled water, and the cold air drops down into the occupied space.

The benefits of the chilled beam system are that it uses less energy than a traditional system, and also that it creates less drafts and a better indoor environment than other traditional systems.

Both active and passive chilled beams were used at 500 Collins. Active chilled beams have some air supplied to them through ducts at ceiling level, and are able to handle greater cooling loads than passive beams. The active beams are used in the perimeter zones of the building near the façade where the heat loads are typically highest, whereas the passive beams are used in the internal zone.

Outside air is supplied to each floor through ducts at a rate of 50% above what is required by Australian Standards, to improve indoor environment quality.

WATER

Solar collectors supply 25% of the building's domestic hot water. The system has been installed despite limited space being available on the roof for the panels. The commercial payback period of the system is around 14 years which would generally be considered to be non-commercial; however the cost was minimal in relation to the total project, and solar hot water systems significantly minimise the environmental impact of heating water in a building.

Waterless urinals are another feature of the building that was uncommon at the time of design. Water efficient toilets and flow restrictors further reduce water consumption. Rainwater collection tanks have been included and are used for irrigation and cleaning purposes.

Water consumption in the building's cooling towers has been reduced through the application of a modified water treatment program.

WASTE MANAGEMENT

During the refurbishment process, the project recycled 80% of construction waste, including existing fit-out and other materials.

Operational waste has also been addressed. 500 Collins was the first multi-tenant building in Australia to achieve Waste Wise certification. The floor plans are designed to include provision for separated waste systems, with waste collection services contracted to support this.

Finally, a worm farm in its basement processes food waste.

500 COLLINS STREET, MELBOURNE, AUSTRALIA:
5 Star Green Star - Office Design v1
Interior

OTHER INITIATIVES

Other features of the building that reduce energy consumption and improve indoor environment quality include the use of energy efficient T5 lighting, the selection of low volatile organic compound (VOC) carpets, paints and other materials, and a reduction in the amount of PVC used in the fit-out.

Mark Ross, Kador's Manager of Investment Projects, points out that the building's design didn't only rely on 'big ticket items' to achieve its sustainable outcomes. Sustainability has instead been achieved through the integration of many smaller items.

FACILITY MANAGEMENT

Harry Hullin, the building's facility manager, is cited as one of the major reasons for the success in retaining the majority of the existing tenants. In addition to contributing his knowledge of the building, he kept tenants informed throughout the refurbishment and also helped with the commissioning process. His intimate knowledge of the new technologies used in the fit-out has also been vital to the ongoing performance of the building.

SOURCE: Resource Smart website / Green Building Council of Australia website

5.1
COST BARRIERS

"We have already seen a significant reduction in the cost premiums associated with green buildings, partially due to a better understanding in the industry of what is required, but also due to an increasing availability of products and services. The trend will continue as industry experience grows and project teams are able to rationalize their designs, and construction teams optimize their delivery. [92] *"*

Paul Carew
PJ Carew Consulting

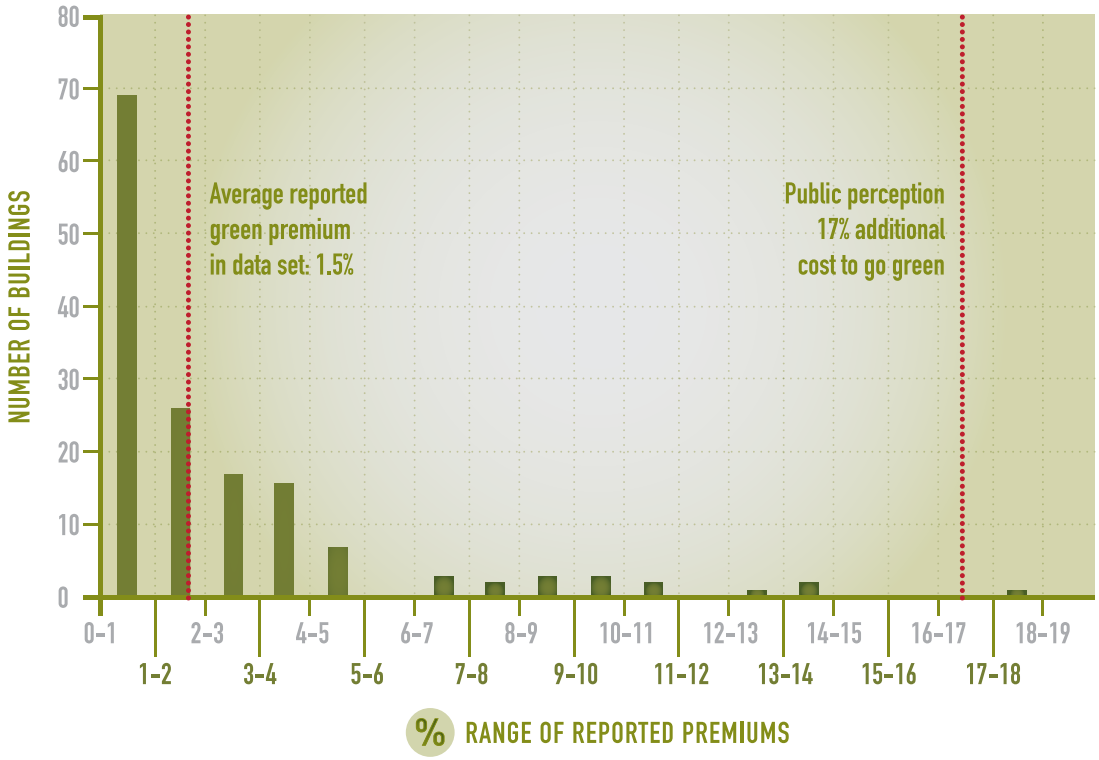
5.1.1
DIRECT CAPITAL COSTS

Capital costs include the money required to design and construct buildings, including interest accrued during construction.

A major barrier to the greening of the industry is the perception that the capital costs of green buildings are significantly higher than those of conventional buildings. "The most common reason cited in studies for not incorporating green elements into building designs is first cost."[93]

Increasingly, international studies are showing that the costs of green building are in fact not significantly higher than conventional buildings. Peter Morris of Davis Langdon concludes in his article that "it is clear from the substantial weight of evidence in the marketplace that reasonable levels of sustainable design can be incorporated into most building types at little or no additional cost."[93]

In his book 'Greening our Built World: Costs, Benefits and Strategies',[2] Greg Kats studies the green capital premiums of 180 green buildings. **Although public perception is that there is an additional 17% capital cost to build green, the average capital premium for these buildings is in fact just 1.5%, with the majority of reported premiums being between 0% and 4%, as illustrated in the graph below:**



Similarly in Australia, perceptions persist that green buildings have higher upfront costs, with the BCI Green Building Market Survey showing the perceived premium to be 12.5% [94], when in fact empirical data shows that green buildings are even cheaper to construct than conventional buildings in some cases. The 2011 Davis Langdon study 'The Road to Green Property'[95] sets out the following capital cost impacts of green buildings:

LEVEL OF GREEN BUILDING CERTIFICATION	CAPITAL COST IMPACT (%)
4 Star Green Star – Best Practice	-5% to -2%
5 Star Green Star – Australian Excellence	0%
6 Star Green Star – World Leadership	6% and more

The South African market mirrors these perceptions of increased costs, with the 2010 Frost & Sullivan report on "The SA Market for Green Building"[96] citing the following challenges: professionals in the built environment overestimating the costs of green building by more than 17% and the fact that upfront costs are often the only consideration rather than full life-cycle costs, amongst other challenges listed.

Due to the relative immaturity of the South African green building market, there have not yet been any broad empirical studies on the capital cost impacts of green building locally. The GBCSA has begun such a study on the cost impacts of the Green Star SA buildings certified thus far, in conjunction with the Association of South African Quantity Surveyors (ASAQS) and hopes to publish this information later in the year.

The Green Star SA case studies set out in this report show that the South African property industry should expect the cost premium of building a new commercial green building to be between approximately 1% and 10%.

AURECON CENTURY CITY CAMPUS, CAPE TOWN:
5 Star Green Star SA - Office v1 Design

TABLE 6

Summary of Cost Premiums of Green Star SA Case Studies:

BUILDING NAME	RATING	CAPITAL PREMIUM	SUBMISSION COSTS
Aurecon Century City	5 Star Design	5%-8%	1.7%
Nedbank Phase II	4 Star Design 4 Star As Built	3.3%	<0.5%
Mayfair-on-the-Lake	4 Star Design	5%	1%
24 Richefond Circle	4 Star Design	10%	R750,000
Falcon Building Menlyn Maine	4 Star Design	9.2%	0.55%
Aurecon Lynnwood Bridge	4 Star Design	2.6%	0.26%
Forty on Oak	4 Star Design	<1%	Not available
ABSA Towers West	5 Star As Built	<2%	Not available

The Green Star SA system promotes integrated design, which can lead to cost savings

The GBCSA acknowledges that 'new market premiums' do exist in markets like South Africa where green building is still gaining traction. However these will diminish as sustainable design elements become more widely accepted and used, building owners and tenants begin to demand and value these features and professional teams get more experience with these techniques.

When the Australian green building industry was at an earlier stage it too experienced similar cost premiums to the above. In its 2007 report "The Cost and Benefit of Achieving Green Buildings" [97], Davis Langdon Australia found the following initial impact on construction cost of Green Star buildings compared to comparable non-Green Star projects:

GREEN STAR RATING	PERCENTAGE CONSTRUCTION PREMIUM
4 star Green Star rated building	0%
5 star Green Star rated building	3%-5%
6 star Green Star rated building	9%-11+%

The Canadian report on the business case for green building[59] summarised discussion on capital costs as follows:

"Green buildings can be achieved using a number of different methods and to different levels of green. In general, the greener a building, the higher the capital costs. However, different building types and sites offer different opportunities to achieve green principles, so the costs associated with utilizing green principles are different from building to building. Accordingly, costs associated with green buildings can vary."

So although "there can be no single, across-the-board answer to the question 'What does green cost?'" [93], the more pertinent question for each developer and owner is what green will cost on their specific project? And how do they manage those costs so that the appropriate sustainable features are delivered in a cost-effective and efficient manner.

INTEGRATED DESIGN PROCESS

Perhaps the key element critical to achieving a green design in a cost-effective manner is to use an 'Integrated Design Process' (IDP). This is in contrast to taking a traditional linear design process and adding green technology – which will almost guarantee greater cost. IDP ensures that the entire consulting team works together from the start of a project to design the whole building as an integrated system. "Where synergies can be found systems can be eliminated or downsized."[98]

"The Green Star process was valuable as it made each member of the professional team consider the impact that their designs had on that of the other disciplines. This prevents them from working in their own silos." [54]

Colin Anderson
Director, Rabie Property Group

The following 2 hypothetical scenarios illustrate the benefits of IDP clearly: [99]

EXAMPLE: HOW IDP CAN DECREASE FIRST COST

Scenario 1
An architect suggests to an unconvinced client that they should upgrade the quality of the windows and frames in their project from conventional aluminium frames and insulated glazing units (IGUs) or double glazing to thermally improved aluminium frames with high performance IGUs to reduce energy costs. With energy being so cheap the client is unsure and asks the builder who does a quick calculation and says 'that's going to cost an extra $20 000 at least- and it won't pay back for over 20 years'. So the client shrugs saying 'that's too expensive' and the architect doesn't pursue it any further, effectively committing the client to high energy costs and greenhouse emissions for the life of the building.

Scenario 2
An architect suggests to a client very committed to sustainability that they should upgrade the quality of the windows and frames in their project to thermally improved aluminium frames with high performance IGUs externally shaded and upgrade the insulation to the whole building to reduce energy costs. Because the client is committed to wanting a truly green building he asks the architect, the other consultants and the builder to do a thorough calculation of all of the costs and related possible savings and report back on the total building costs that result from the changes.

The architect and the MEP Consultant/Energy modeller work with the builder and realize that with the upgraded window, shading and insulation specifications, they can massively reduce the air conditioning plant, reduce the size and overall length of ducting (as not as much conditioned air is needed) as well as reducing the size of the electrical conductors, wiring and backup generator. The properly designed external shading (the design relates to the solar aspect of the elevation and is different north/south and east/west) also means that there is no glare control needed. All in all, the up-front savings outweigh the extra costs to the extent that they will pay for interactive daylighting controls and lighting system.

Along the way the client asks the architect to pursue a green building rating. In the first scenario, the building barely rates a 'Certification' level, yet without even worrying about credits or points, when the architect tallies up the achievements of the second scenario, he is confident the project will easily achieve 'Gold' (just in this example ignoring all the other issues involved in green building).

The client is delighted and instructs the team to pursue the green approach, effectively committing the building to massive long term energy and greenhouse emission savings for the life of the building. In the meanwhile the client/developer has the considerable benefits of a low energy, low cost building to market and corporately and personally gain great credence and respect for moving into the green building arena. **In the end, it doesn't matter if the client is committed to green because it can all be justified on a cost basis and provides additional non-tangible and financial benefits as well.**

Similar scenarios have been playing out in real world examples for many years already, like the 40 000m^2 10 storey Mutual 94 office building built by Old Mutual as part of their Mutualpark campus. By installing double glazing they were able to omit a chiller and install only five chillers as opposed to the designed six.

5.1.2 SPLIT INCENTIVES

Within the property industry there are inherent barriers that result in efficiency measures not being adopted, despite the fact that a strong business case can be made for their implementation. Most significantly, these barriers relate to the developer/owner and owner/tenant divisions, or **split incentives, that often result in the benefits of efficiency or improved performance measures not accruing to the party that initiated or paid for them.**

Often the entity responsible for design, construction and initial capital financing of a building or refurbishment is different from those operating the building, meeting its operational expenses and paying employee salaries – so the financial benefit of improved efficiencies is not always directly experienced as improved return on investment (ROI) by the developer/owner.

Thus, if there is a premium for green features, the cost would usually be borne by the developer or owner, while the long-term benefits would be enjoyed by the owner or tenant.

However, as energy and other costs continue to rise, and the demand for more efficient green buildings increases, so the relative competitiveness of green buildings increases in turn, which will begin to have a positive impact on relative ROI compared to conventional buildings. This trend counters the split incentive issue to some degree.

Reinforcing the split incentives nature of the industry, the commonly-used initial capital cost approach to investment decision-making takes into account only the cost of design and physical construction. It does not take into account the costs associated with a building's useful life. By contrast, Life-Cycle Costing evaluates the cost of a building over its entire life span, from planning, design, construction and operation, as well as its ultimate re-use or demolition. Life-Cycle Costing evaluates the economic performance of additional investments that may be required in green buildings. It is based on discounting all future costs and benefits to amounts in today's terms that are referred to as 'Present Value'. This makes for more meaningful quantification of costs and benefits and the comparison of alternatives based on similar economic measures.

A green lease can help to address the unequal split between benefits to the developer / owner and tenant

When energy savings over time, increased durability, enhanced worker productivity or the benefits of all are factored in, green building initiatives become much easier to justify. Currently the industry still does not consider life-cycle as a matter of course in building design. Most practitioners in the building profession are forced to deal almost solely with first-cost in justifying project design and procurement costs.

As the green building industry matures, it is becoming clear that integration is the key to achieving energy and environmental goals, especially if cost is a major driver. Integration is more than using the savings from one change to pay for another. A smaller chiller, for example, makes money available to upgrade the building envelope. While integration can keep construction costs down, it can also require more time to be spent in up-front design.

It has been demonstrated that decisions made at the first phase of building design and construction can significantly affect the costs and efficiencies of later phases, and in fact the building's entire life-cycle. In his book 'Lean and Clean Management: How to Boost Profits and Productivity by Reducing Pollution' [100], Joseph Romm states that **"up-front building and design costs may represent only a fraction of the building's life-cycle costs. When just 1% of a project's up-front costs are spent, up to 70% of its life-cycle costs may already be committed; when 7% of project costs are spent, up to 85% of life-cycle costs have been committed."**

Yet the property industry frequently records a project's costs and ROI on the up-front capital design and construction costs only. Recently it is becoming more common for tenders to include the requirement to provide life-cycle costing information to enable owners/tenants to make informed decisions regarding the real whole of life cost of the building under their operation or occupancy.

> *"There is no incentive to act, when the investor is often not the ultimate user who is responsible for energy bills."* [55]
>
> **City of Melbourne Tech Research Paper 10 -** The Business Case for Sustainable Design

"Two of our recent developments achieved Green Star certification and a number of others are seeking certification. However, this is a small percentage of the 1,1million m² of gross lettable area of the office portfolio. Therefore, there is a lot of scope for improving the efficiency of the balance of our existing commercial portfolio. The strategy to increase the sustainability of our assets is critical in order to keep costs down and retain the competitiveness of the portfolio as well as to make our contribution to reducing GHG emissions. [78] *"*

Rudolph Pienaar
Growthpoint

5.1.3
EXISTING BUILDING STOCK – COST OF RETROFITTING AND CONVERSION

Existing buildings far outnumber new buildings and are the greatest contributors to overall levels of emissions, inefficient use of energy and water and poor indoor air quality. The capacity to upgrade these assets is often constrained by outdated technology locked into the structure of buildings.

In some cases, without incentives the owners of these existing assets struggle to demonstrate a return to their shareholders from the investment needed to significantly improve their environmental performance.

For a while many owners of older buildings saw few economic benefits in making their existing assets green. However, the tide is turning. As energy and other operational costs continue to rise and green building materials and technologies become more accessible and affordable, green retrofits are becoming more financially feasible.

According to Colin Devenish of the V&A Waterfront, "Existing buildings can be steadily greened by moving to more efficient options as part of a normal maintenance programme or end-of-life replacement. It can be easier to justify an investment when it's included in an annual maintenance or capital expenditure budget, rather than attempting a large scale retrofit or upgrade. Green building is often about doing things differently, rather than necessarily spending more." [48]

Certainly it makes sense to include green initiatives and options where possible as part of routine upgrades and refurbishments, which are a normal part of a building's life-cycle. This approach is more manageable than attempting to green an entire portfolio in one go.

A number of South African property owners have upgraded their existing buildings with compelling financial returns – see case studies 3, 8, 13 and 20.

MILLENNIA PARK, STELLENBOSCH:
5 Star Green Star SA - Office v1 Design
First refurbished Green Star SA certified building

CASE STUDY 15

AUSTRALIAN INSTITUTE OF MANAGEMENT (AIM), KATITJIN CENTRE, PERTH, W AUSTRALIA

International case studies

DESCRIPTION OF PROJECT

The Australian Institute of Management's (AIM) new building, the Katitjin Centre in Perth, Western Australia, is a high-performance, environmentally-friendly educational facility representing AIM's investment in a sustainable future. The building covers 1 400m² in a 3 level training facility and is the third building on the site. The new building will provide nine new training rooms, associated syndicate rooms and individual work spaces and administrative accommodation. The building includes its own entry, reception and foyer spaces along its northern elevation and forms the first stage of a more formal network of pedestrian links between the existing Institute buildings on the campus.

The building achieved a 6 Star Green Star - Education Design v1 certification, representing 'World Leadership' in sustainable design.

PROJECT COST

The project cost $12million, with a **10-15% sustainability premium.**

AIM KATITJIN CENTRE, PERTH:
6 Star Green Star - Education v1 Design
Interior

BUSINESS CASE

The Centre is emissions-neutral, meaning it produces as much energy in operation as it consumes. It also features a number of water-efficient features, such as a 42KL rainwater tank for toilet flushing and a 'xeriscape' garden - a method of landscape design that minimises water usage. **Coupled with an emphasis on excellent indoor environment quality, the Katitjin Centre is not only better for the environment, but will improve student health and learning outcomes.**

The design team recognised that thinking green from the outset would allow significant sustainability initiatives to be realised for minimal cost. The appropriate-ness of this approach was confirmed early on, as Executive Director Patrick Cullen explains. "During the tender stage, we put out options for both a 5 Star and a 6 Star rating. There was relatively little financial difference between the two, reinforcing our desire to target the higher 6 Star Green Star rating."

According to Fred Chaney, Project Director at Cox Howlett and Bailey Woodland, "the Katitjin Centre was always going to be a sustainable building. What we needed was a credible benchmark to substantiate the outcomes and ensure a higher level of rigour in the design and delivery process. In Australia, Green Star is that benchmark."

So, was the effort to achieve the Green Star rating worth it?

"Definitely," is the enthusiastic answer from NDY's Director, Darrel Williams. "The process of achieving the 6 Star Green Star rating, while challenging, has been a positive experience. The Green Star process has added quantifiable value to the project by providing the project team with a means to formally audit and benchmark the building's sustainable credentials."

To achieve a Green Star 'Design' rating requires a commitment to innovation and a holistic approach to green building design. AIM is now seeking a 6 Star 'As-Built' rating for the project, which will confirm that the sustainable design intentions were implemented during the construction process.

"As a premier learning institution, AIM prides itself on achieving measurable outcomes," says Patrick Cullen, AIM's Executive Director. "Our decision to seek a 6 Star As-Built rating, in addition to the 6 Star Design rating, demonstrates that ethos, as we'll have a building which is not only designed to world leadership sustainability benchmarks, but also constructed to that level."

ENERGY BUSINESS CASE

The Katitjin Centre is designed to have exceptional energy performance, producing as much energy as it uses, with passive design the critical factor in achieving emissions neutrality.

Smart site orientation allows the Katitjin Centre to benefit from high levels of daylight penetration while also reducing the building's thermal loads. This means the air-conditioning and ventilation system doesn't need to work as hard, and the lighting system is only used sparingly, which reduces demand in two traditional areas of high energy use. This orientation, coupled with highly efficient systems, allows the Centre's remaining energy requirements to be met by the installed solar array. "The energy performance is above and beyond what we expected," NDY's Darrel Williams explains. "It demonstrates how far good design can push building performance."

Better yet, it effectively eliminates the Centre's power bills. As Patrick Cullen elaborates, "AIM will derive a major financial benefit from this investment. Our running costs will be reduced and we'll have protection against future increases in energy prices. Plus, by achieving zero net emissions, we are doing our bit to help combat climate change."

INDOOR ENVIRONMENT QUALITY BUSINESS CASE

The direct link between Indoor Environment Quality (IEQ) and better educational outcomes made this a key driver for the project. Features include a ventilation system which delivers high levels of fresh air, improving both air flow and quality; paints and carpets with low or no volatile organic compounds, providing healthier classrooms; and an environmental design which improves natural light levels and enhances learning outcomes.

Aside from the improved health and learning outcomes, AIM wanted its green building to capture the hearts and minds of state and national decision makers who pass through its doors. The Katitjin Centre will allow them to see, touch, feel and operate in a world-leading 6 Star Green Star building. As Patrick Cullen notes, the facility will "provide a tangible experience that will equip our clients with the knowledge, enthusiasm and confidence that green buildings are possible, practical and can deliver real benefits to users."

GREEN DESIGN INITIATIVES

GENERAL

The building is oriented to the north, with a large fully glazed southern façade taking advantage of views to the native bushland. The building materials were selected for their high quality, durability, high environmental standards and low maintenance requirements. The roof contains a high density of PV panels, which are used to power the building and any excess energy is fed onto the grid. The building contains small car parks and car-pooling bays to encourage fuel efficient transport.

The building is served by air-cooled chillers which feed 6 air handling units (3 in the basement plant room and 3 in the roof-top plant room). The ventilations have been designed to provide a 150% increase on the outside air required by regulation. All enclosed spaces have motion detectors and carbon dioxide sensors. The motion detectors control the lighting and decrease the air-conditioning temperature band, where the carbon dioxide sensors increase the amount of outside air into the building as required. Each floor has a VOC sensor located in the return air grille. There are no lifts, but the staircase has been designed to maximize occupant use.

MANAGEMENT

The Katitjin Centre achieved all the Management category credits in Green Star, despite unique challenges due to the project's location. The Waste Management credit was a particular hurdle. According to Darrel Williams, "there was a real lack of local infrastructure and experience in this area. AIM was supportive, though, so we worked closely to develop a joint strategy with the contractor. By practical completion, the contractor reported more than 80% of demolition and construction waste was reused or recycled - an exceptional result in WA."

WATER

Perth's infrequent summer rains, sandy soil that prevents landscaped grounds from retaining water, and lack of water-saving culture means it currently has the highest water consumption in Australia. A 2011 report by the National Water Commission found Perth households use an average of 276KL of water a year - double that of Melbourne and Brisbane.

AIM KATITJIN CENTRE, PERTH:
6 Star Green Star - Education v1 Design

The Katitjin Centre is making a solid contribution to WA's water-wise future. Efficient fixtures and fittings have reduced the Centre's water consumption and the water harvesting system is designed to meet 100% of average monthly demand for the toilets and urinals.

The last word goes to AIM's Executive Director, Patrick Cullen, who praises the Green Star process for providing "an additional level of rigour in the design and delivery of the Katitjin Centre. Most importantly it has provided a common metric and language for the project team to apply during the design and construction, as well as external validation and auditing of the building's sustainability credentials."

SOURCE: Green Building Council of Australia website

5.2
LACK OF EDUCATION

5.2.1
POOR INDUSTRY KNOWLEDGE AND SKILLS SHORTAGE

At many levels of the property industry there is still a lack of understanding of sustainability principles and those specific to green building, even among key decision makers. Industry education is a key activity of the GBCSA and the number of participants in the GBCSA's various courses, including the Green Star SA Accredited Professional training course, in approximately the last three years (over 3 000 as at December 2011) makes it clear that the industry is thirsty for green building knowledge.

Beyond the obvious demands on the organisation's time and resources, the challenges for the GBCSA as property industry educators include how to:

- present South African research and case study examples when there is a shortage of relevant local green building research data and a limited number of green-rated buildings;
- reach the wide range of stakeholders in the industry with the appropriate, specifically tailored offerings from basic, introductory courses to more advanced, detailed and technical sessions; and
- keep the information up to date when the body of knowledge about sustainability and green buildings is changing fast and constantly being added to.

The lack of knowledge and skills related to sustainability amongst built environment professionals can be traced back to the training offered at tertiary-level institutions. "The integration of sustainability and green issues into the tertiary-level curriculum of applied disciplines in the built environment in South Africa has lagged almost two decades behind the trend in both the developed economies, as well as those of the newly emerging economies such as China and India," says Daniel Irurah, Senior Lecturer, Sustainability and the Built Environment at the School of Architecture & Planning at WITS.

"We are now starting to experience a lag between the growing market demand for such skills and competencies versus the limited availability of the skills within the current cohort of professionals in practice," he continues. "Bridging this gap will take the efforts of multiple stakeholders (in academia, industry and public sector). This is one area where the contribution of GBCSA will be critical in the next 10 years or so as we await the necessary curriculum changes and the graduation of professionals with the appropriate balance in skills with regard to sustainability in the built environment." [101]

VODAFONE SITE SOLUTION INNOVATION CENTRE, MIDRAND:

6 Star Green Star SA - Office v1 Design
The GBCSA hosts regular case study presentations on Green Star certified buildings - this cutting edge project was presented at the 2011 GBCSA Convention and Exhibition

"The emphasis industry puts on initial costs versus life-cycle costs mitigates against ESD (Environmentally Sustainable Design) outcomes.[55] *"*

City of Melbourne Tech Research Paper 10 -
The Business Case for Sustainable Design

BEACH ROAD, SINGAPORE:
This development by Foster + Partners continues the Singaporean ideal of the 'city in a garden' with its lush planting and sky gardens

5.2.2
LACK OF EVIDENCE TO INFORM VALUATIONS

The global financial/valuation sector has until recently not seemed to fully recognise the benefits of green buildings, and therefore neither have prospective buyers. This means that the benefits are not always being properly reflected in selling prices or asset valuations, so the potential benefit to developers and owners cannot be fully realised.

Until the financial/valuation sector recognises and is able to quantify the benefits of being green to the net value of an asset, financing calculations and valuations will not be able to incorporate green into their decisions. Therefore a lack of understanding of what constitutes value in a green building and/or the difficulty in quantifying some of these aspects, is still a significant barrier to greater adoption by the investment community.

This is changing as a greater body of evidence becomes available on the financial benefits and the impact on risk in green buildings.

At first, easily-measurable factors like lower operating costs will push up the values of green buildings. But Trevor King, Property Valuation Manager at the Old Mutual Investment Group explains that ultimately, **''the valuation of green buildings will be evidence-based''** [53] **and be influenced by the sales prices of these buildings. So until there is a greater pool of rated green buildings in the country which have been valued or sold from one owner to another, the true value of green buildings may not be recognised.**

Roger Hunting, Director of Broll Valuation and Advisory Services, part of the CB Richard Ellis Affiliate Network, agrees that "the importance of a robust evidence-based approach is clear." [102] To this end, CBRE has launched its own sustainability checklist to establish an evidentiary base whereby property valuers will be able to directly correlate the impact of sustainable building attributes and innovations to the value of an asset.

King cautions that "valuers will need to be on their toes and keep abreast of market sentiment towards green buildings." He expects **capitalisation rates to reduce markedly for green buildings in the not too distant future.**[53]

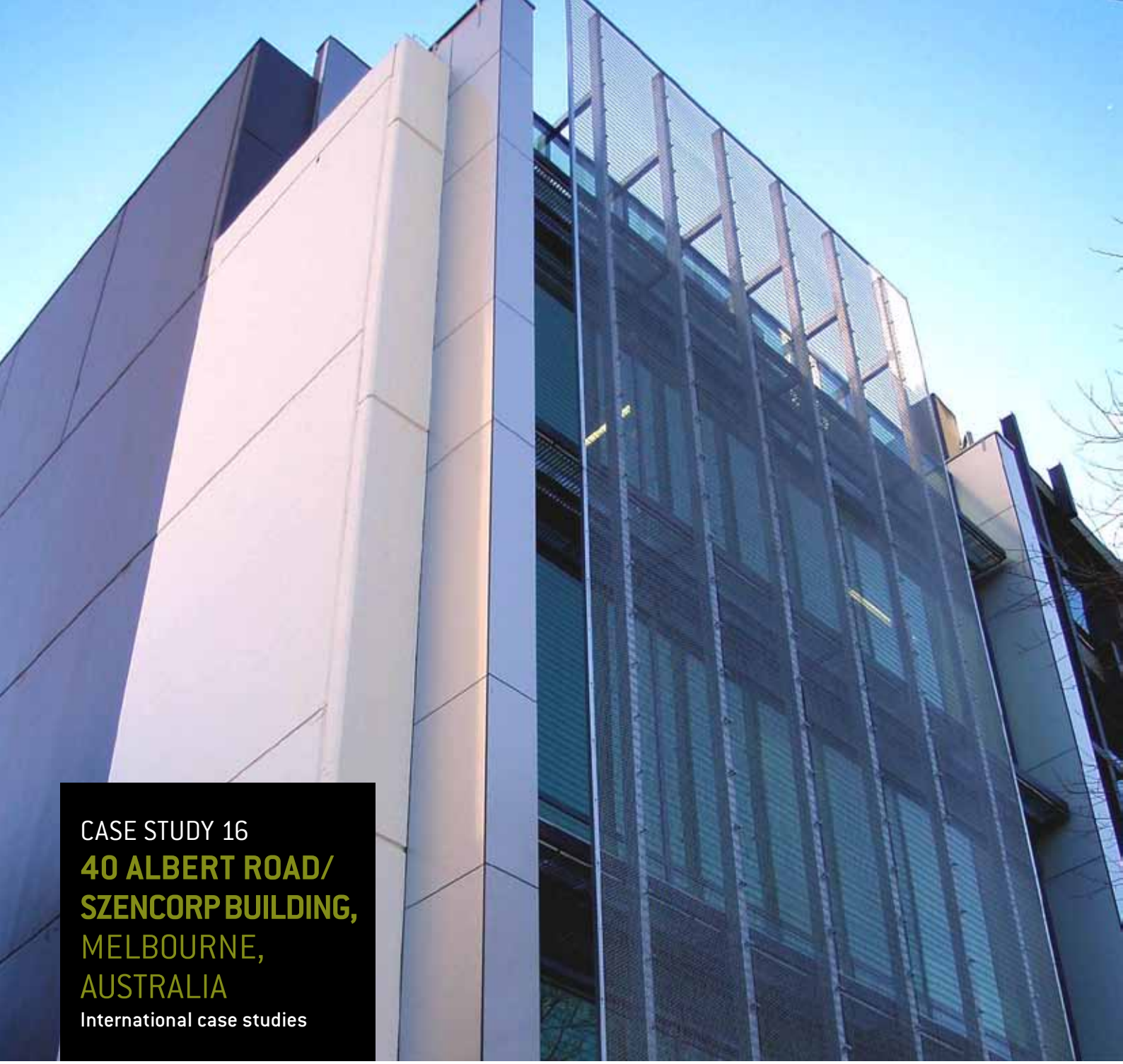
Internationally this phenomenon has already begun, with extensive studies in both the US and Australia reflecting premium valuations/sales prices for green-rated buildings in the order of 11-13% and 12% respectively and capitalisation rates of 400 basis points lower for Green Star rated buildings (See Section 4.1.2 Higher Returns on Assets and Increased Property Valuations).

With the number of green-rated buildings in South Africa growing quickly, it is likely that the local valuation market will follow this trend.

AURECON CENTURY CITY CAMPUS:
5 Star Green Star SA - Office v1 Design
Roof garden

"The challenge is to recognise the full economic and environmental potential of the sector by overcoming some of the market failures, skills deficits and institutional barriers that impede action." [90] *"*

Tony Arnel
Previous World GBC Chair



CASE STUDY 16

40 ALBERT ROAD/ SZENCORP BUILDING, MELBOURNE, AUSTRALIA

International case studies

DESCRIPTION OF PROJECT

This 1 215m^2 office building was transformed from an outdated, typical inner-Melbourne office of the 1980's, to a state-of-the-art green building - **Australia's first retrofitted building to achieve a 6 Star Green Star Office Design v1 rating, which represents "World Leadership" in green building.**

With 5 levels of offices over a basement car park, the building is the headquarters of sustainable development group, Szencorp, and as such is a showcase of sustainable building performance and innovative technology.

PROJECT COST

$4.5million was spent on modifications to the base building and $1.62million on the integrated fit-out.

SZENCORP BUILDING, MELBOURNE:
6 Star Green Star - Office v1 Design
Rooftop

BUSINESS CASE

Sustainable development is Szencorp's key business and it is important that their own premises reflect their capability in this regard.

As owner occupiers, the Szencorp group looked at life-cycle costing when undertaking this retrofit as they benefit directly from the building's improved efficiency and performance. This strategy is paying off with energy savings of over 70% and water savings of 94% less than the industry average in the second year of occupation after project completion. The company is also benefitting from a perceived overall productivity increase of 13% as a result of improved internal environment quality.

As a demonstration and partly experimental project, Szencorp believes "the money and effort expended would be difficult to justify for a single building." However, they also believe "the investment has more than paid for itself in terms of the learnings, the profile the project has received and the ability of the owner to develop a new level of business services in the rapidly growing market of leading-edge, green buildings."

"...Improving the environmental performance of buildings is not only beneficial for our planet, but also provides a great long-term strategy that increases building asset value and makes good financial sense."

Peter Szental
Managing Director, Szencorp

GREEN DESIGN FEATURES

ENERGY EFFICIENCY

- Twenty-one occupancy zones with sensors to ensure lights and air-conditioning are only activated when needed.
- Natural ventilation supplements mechanical air conditioning when weather conditions permit.
- Three solar PV arrays generate around 13.8MWh per annum, which is around 20% of the building's electricity requirements.
- Solar hot water system.
- Insulation in walls and roof, and double glazed facade.
- Increased ceiling height to take advantage of the building's thermal mass.
- 59 individual meters to monitor energy use.

WATER CONSERVATION

- Grey water from hand basins and showers is treated then used to flush toilets.
- Two rainwater tanks, mixed with water to also flush toilets.
- Waterless urinals.
- Low flow taps and shower heads.
- Automatic hand basin taps.
- Dual, low flush volume toilets.

WASTE MANAGEMENT

- Co-mingle, food organics and general waste bins on each floor.
- White office paper bins at each desk.
- Signage on recycling bins and in kitchen areas.
- Regular internal newsletter featuring recycling tips.
- Shredded paper used for packaging and boxes reused.

INDOOR ENVIRONMENT QUALITY

- Building Management System that controls heating, cooling and ventilation.
- Automatic windows that open for natural ventilation when weather conditions are appropriate.
- Occupancy based lighting system with a high level of flexibility.

SOURCE: The Szencorp Building website (http://www.ourgreenoffice.com/index.html)
Thomas, L & Vandenberg, M. 'BEDP Environment Design Guide – 40 Albert Road, South Melbourne: Designing for Sustainable Outcomes'
Green Building Council of Australia website

5.3 LACK OF COORDINATION AND INCONSISTENCY

5.3.1 RATING TOOLS

Environmental rating tools for buildings are a clear way of setting coordinated and consistent standards and benchmarks for green building. However, numerous different rating tools for buildings exist worldwide. LEED (Leadership in Energy and Environmental Design) in the US and certain other markets, BREEAM (BRE Environmental Assessment Method) in the UK and Green Star in Australia, New Zealand and South Africa are some of the more widely used systems, but are only a handful of the many systems currently available.

Although it is widely accepted that different countries and geographic, legislative, climatic and commercial contexts require unique and specifically-tailored systems, at the same time it is preferable for national rating tools to have a degree of international relevance and comparability. It can be difficult to balance these two priorities. **It can also be confusing and counter-productive to individual markets to have a number of alternative and competing rating tools and approaches.**

This is not currently an issue in South Africa with Green Star SA being the main recognised national voluntary rating system, but this could become a problem should other systems be introduced or used.

Another challenge for the market is that rating tools continually evolve and set higher benchmarks. New buildings which might be rated as the benchmark today under an existing rating tool, might not represent best practice in the future and might face considerable expense to reach new standards. The industry will need to keep up in order to remain competitive.

Common to most of the international rating tools has been frustration with the extensive documentation requirements and costs of obtaining certification, as well as the fact that building energy and associated services modelling can be expensive and complicated. These concerns have resulted in continual review and streamlining of certification processes. The GBCSA is collaborating with the GBC of Australia and the USGBC to improve this aspect and facilitate greater access to and successful application of the rating tools.

5.3.2 INCONSISTENT STANDARDS AND INSUFFICIENT REGULATIONS

As discussed in Section 3.3.2, government has an important role to play in driving the shift to sustainable development by providing leadership.

However, while promoting green, governments can at times effectively stifle industry progress through uncoordinated and at times contradictory regulations and requirements. An often cited problem is the difficulty in obtaining municipal approval for water conservation technologies, water harvesting solutions and greywater/blackwater recycling.

The 2010 Frost & Sullivan report "The South African Market for Green Building" cites the lack of policy, legislation and incentives as challenges to the uptake of green building practices in South Africa.[96] This is illustrated by the fact that despite the energy supply shortages of the last few years, energy efficiency regulations for buildings have only very recently been introduced (See Section 3.3.2 Government Leadership).

At this stage the majority of government green building commitments relate only to energy efficiency, although the process has begun to include water efficiency provisions in the National Building Regulations too. As mentioned in Section 3.3.2, the Department of Public Works (DPW) also "intends to lead the South African construction and property industries towards a regulated Green Building dispensation, beyond the 'nice to do' concept currently in place."[21] To this end, DPW is researching international examples of green building regulations and processes.

Voluntary green building rating tools like Green Star SA play a key role in setting standards and benchmarks for best practice and rewarding the market leaders for their efforts. However, regulations covering green building elements are crucial to move the entire market forward and ensure all buildings begin to adopt basic efficiency and environmentally responsible measures.

It should be noted that a number of the larger municipalities are developing green building-related by-laws. Whilst these are positive developments, they should as far as possible be aligned with the National Building Regulations and have streamlined documentation requirements to ensure that the administrative burden of the various sustainability demands does not become unwieldy.

"We have made a commitment to accelerate the advent of green building in South Africa. [21] *"*

Thulas Nxesi
Minister Of Public Works

5.3.3 PRODUCTS, MATERIALS AND TECHNOLOGY

Currently, committed designers and specifiers in South Africa spend many additional and often unrecoverable hours investigating the green claims of manufacturers and trying to establish which materials options are environmentally preferable.

Designing green requires a green products and material supply chain and this is one of the challenges facing green designers and specifiers in South Africa. Internationally, there are a plethora of tools, assessment schemes and ecolabels that aim to help industry assess and identify green materials and manufacturers, including systems such as Greenguard and Green Seal in the US, and Good Environmental Choice in Australia.

Such systems are crucial to the greening of the property industry and are starting to be set up in South Africa, though most are still at a formative stage. Local systems include:

ECOSPECIFIER

Ecospecifier is chiefly a product and materials assessment service and online eco-product database. Its aim is to help architects, designers, builders and specifiers shortcut the materials sourcing process. Its broader aim is to help create a more sustainable physical environment by increasing the use of environmentally preferable and healthy products, materials and design processes.

Ecospecifier began in Australia in 2003 and now has a presence in the Middle East, South East Asia and China. Ecospecifier South Africa was launched in 2009 and currently has a database of more than 1 300 independently vetted eco and health preferable products in nearly 80 common industry categories and 550 subcategories. Where relevant, products are assessed against specific credits in the Green Star SA rating system.

Ecospecifier is also planning to launch its 'GreenTag' system in South Africa. 'GreenTag' is a Life Cycle Assessment (LCA) based rating system for products and is a Type 1 ISO 14024 compliant ecolabel. LCA is a fully audited process of evaluating the impacts that a product has over its entire life-cycle.

www.ecospecifier.co.za

ECOSTANDARD

Eco Standard South Africa is a Resource and Standards Council for the sustainable building product and material sector. Their material and product assessment tool is designed specifically for South Africa and serves as an accurate measurement to be used as a reference to identify materials and products for responsible environmental practice.

Although still at an early stage of development, Eco Standard's mission is to establish a valuable portfolio of certified and rated products, manufacturers and/or services which have been awarded an Eco Standard label for their transparency and outstanding environmental practice.

Life Cycle Analysis (LCA) principles are employed to undertake the assessment, although a full LCA will not be conducted. The scope has been defined in terms of ISO 14024 although Eco Standard have changed the terms used to describe these areas of focus to be in line with current cradle-to-cradle approach in product manufacture.

www.ecostandard.co.za

SOUTH AFRICAN NATIONAL ECO-LABELLING SCHEME (SANES)

During the 17th Conference of the Parties in Durban in 2011, the Minister of Public Works, Thulas Nxesi, launched the concept of the South African National Eco-labelling Scheme (SANES) for the built environment. In conjunction with Indalo Yethu (an agency of the Department of Environmental Affairs aimed at mobilising the country around environmental and sustainability issues), DPW will develop this ecolabelling scheme as part of the department's 'Green Building Programme'.[21]

The scheme will involve the scientific eco-endorsement of construction materials and property development processes. More specifically, the system will track the extraction of natural resources to be manufactured into products for use in the built industry and monitor them through the construction and disposal phases in the life-cycle of a building.

According to the Minister of DPW, ecolabelling of construction materials and property development processes will be "an integral part of the development of a specifically South African Green Building Framework"[21].

CASE STUDY 17

DOCKSIDE GREEN, VICTORIA, CANADA

International case studies

DESCRIPTION OF PROJECT

Dockside Green is a 4.7 hectare site located in the heart of the City of Victoria in British Columbia which is being developed by VanCity, a triple bottom line credit union. **The precinct-scale project is a 120 000m² mixed-use sustainable community development on a newly remediated, former brownfield site.** The project is made up of residential, office, commercial and light industrial uses and is a global showcase of an approach to development emphasizing environmental principles. The new-generation, master-planned waterfront community aims to set the benchmark as the future of sustainable harbour-front communities for years to come.

As a LEED ND (Neighbourhood Development) Platinum project, it is created around the principles of smart growth, green building and sustainable community design in harmony with nature. **Dockside Green is committed to achieving LEED Platinum certification for all buildings where possible – an ambitious goal, but by applying an integrated approach to design they are able to realize economies of scale, allowing the development of higher performing green buildings.**

TRIPLE BOTTOM LINE

The development plan recognises that each triple bottom line component (economic, environmental and social sustainability) should not be treated as separate or individual targets independent of each other. The approach integrates and intertwines economic, environment and social objectives to enhance the attributes of each other, making it difficult to distinguish what component a particular approach is addressing.

DOCKSIDE GREEN, VICTORIA, CANADA:
LEED Platinum Neighbourhood Development

"Rising utility costs and environmental pressures will change the way buildings are built. Our goal is to develop buildings at Dockside that appreciate in value (because of our environmental and energy efficient design), and also provide energy security. We call this 'future proofing' your investment."

VanCity
Developer of Dockside Green

INTEGRATED DESIGN FOR COMMUNITY AND QUALITY OF LIFE

The team is using an integrated design process (IDP) tailored specifically for the Dockside lands and the Victoria community, recognising the necessity of applying integrated design principles to the whole site, as opposed to individual components and design characteristics.

A holistic approach is the only way to enhance synergies between building systems, building scales and façades, landscapes, surrounding communities, activities and amenities, community health and well-being, transportation, economy and relationship-building.

Whole site integrated design is critical for this project given the challenges associated with remediation of the site, meeting the community's needs and achieving the necessary density to make the project financially viable.

WHOLE SYSTEM COSTING

The sustainable community objectives strive to move the concept of whole system costing beyond building design to site and community infrastructure costs. For example, ecological stormwater management (a sound green building strategy) can also create habitat, reduce heat island effects, decrease emission of greenhouse gases, reduce infrastructure costs and improve human health. The developers believe that whole system costing has the potential to create mutually beneficial and supportive results for all ecological, social and financial aspects of the Dockside site.

WASTE IS FOOD

The development creates opportunities for specific functions and systems to feed off each other, thus embracing the principle of "waste is food". Waste resulting from one use will provide the nutrients for other uses. Such holistic, closed-loop thinking and design has the effect of improving and potentially compounding the economic, environmental and liveability benefits and attributes of all uses by all occupants in the development.

ECOLOGICAL FEATURES & INITIATIVES

Some of the key ecological features designed into Dockside Green include:

HEALTHY BUILDINGS, HEALTHY PEOPLE

- 100% fresh air in buildings through either a central or individual heat recovery ventilators.
- Low or no volatile organic compounds (VOC's) paints, sealants and adhesives and the use of ureaformaldehyde composite wood products is avoided.

ENERGY PERFORMANCE

- Buildings designed to use 45-55% less energy than Code. Strategies to save energy include: 4 pipe fan coil system, low-e double glazing and exterior blinds on the west and south faces of the building to keep interior spaces cool.
- Energy Star efficient appliances results in an average 47% energy saving over the Code.
- Compact fluorescent lighting, LED lighting in corridors, occupancy sensors and some solar lighting in landscape.
- Designs maximise the daylight in buildings.
- Meters are provided in each apartment to measure:
  - Domestic hot and cold water use,
  - Heating bills and
  - Electricity usage

Temperature settings may be pre-programmed to be lower while residents are away from home. Settings may be monitored and adjusted on the meter or on your computer while at home or remotely via a secure website. Individual meters have been shown to result in up to 20% energy savings by providing real time information to residents.

LIGHT POLLUTION

- Rather than wasting energy to light the sky, fixtures are used that provide downward lighting to enhance safety and save energy while retaining the natural beauty of the night sky.
- Photovoltaic lighting is used on site for landscaping areas, harvesting electricity from the sun.

BUILDING COMMISSIONING

An independent commissioning agent verifies that mechanical systems are designed and working properly upon construction completion. The commissioning agent will revisit the building within a year of occupancy to retest the mechanical systems to ensure they are working properly. Numerous studies show non-commissioned buildings are generally 5 to 15% less energy efficient because systems were not fine-tuned and/or parts were incorrectly installed or not working properly.

SEWAGE TREATMENT... AND REUSE OF TREATED WATER

The development will treat 100% of its sewage on site and use the treated water for flushing toilets, landscape irrigation and water features. It is estimated that over 38 million gallons of potable water will be saved by treating and re-using the water on site.

WATER CONSERVATION - POTABLE WATER

Potable water consumption is estimated to be 65% less than traditional developments. This is accomplished by using high performance water fixtures and appliances such as water efficient dishwashers, washing machines, dual flush toilets, faucets and shower that save water without sacrificing personal comfort. The amount of water saved for the entire development is equivalent to the annual water use of 580 homes.

STORMWATER AND URBAN ECOLOGY

Stormwater will be treated through green roofs and flow via a series of connected naturalized creeks and waterways to achieve LEED requirements and create a “delightful, lush and ‘living’ urban environment”.

ALTERNATIVE TRANSPORTATION

Alternative transportation strategies will reduce reliance on the automobile - the car share program, upgraded bike trails and bike racks in each building, harbour ferry dock, transit and a mini-transit shuttle bus. The project is designed with many trails and walkways throughout the development which also enhances liveability.

MATERIALS AND RESOURCES

Materials are selected for their durability and environment-friendliness:

1. Carpets are selected based on low emissions and environmental qualities.
2. More expensive carpet tiles are used for corridors in the residential buildings as this will reduce long term maintenance and waste for condo owners.
3. Bamboo flooring and cabinets will be used in the development with upgrade options for other environmentally-friendly products like cork flooring.
4. Salvaged wood products will also be used to promote sustainable harvesting practices.
5. The goal is to recycle or reuse 90% of the construction waste on site.

OTHER CLIMATE CHANGE INITIATIVES

- Fly ash will be used in concrete. One tonne of cement production generates about one tonne of CO_2 and is a significant generator of GHG. By utilizing the ash waste product from cement production in our concrete mix we are reducing the amount of CO_2’s and making the concrete stronger.
- A program of supporting local businesses and suppliers which supports our local economy and reduces CO_2 emissions by minimizing transportation needs.
- Extensive tree planting and green roofs to absorb carbon.
- Dockside Green is striving to be the first greenhouse gas neutral development from a building energy perspective.

BIOMASS SYSTEM

The onsite centralized heat plant uses waste wood biomass to produce a clean gas that converts to heat for heating and domestic hot water needs on site. The entire system is backed up by central boilers in the event the primary plant is down, so there will be no need for individual boilers in buildings.

> *“We embrace what we consider to be our responsibility as developers to balance profits with environmental and social dividends. We believe that our long-term economic prosperity depends on our ability to preserve and improve the quality of life and health of the environment within our communities.”*

VanCity
Developer of Dockside Green

SOURCE: Dockside Green website (http://www.docksidegreen.com/)

5.4
LACK OF RESEARCH

Due to the relative immaturity of the South African green building market, there is at this stage still a lack of compiled local data which would provide the valuable evidence of costs and financial benefits for green building in the South African context.

There is also limited sharing of knowledge and experience about green building practices. Many in the industry are either cautious about sharing their knowledge or don't have the time and resources to collate the lessons learnt and benefits found on projects. Many development projects are completed when the individuals that could contribute valuable information on the costs and benefits, have already moved onto a new project. As such the opportunity to capture knowledge and share it is a challenge for the property sector.

The need for relevant research on green buildings in South Africa has been identified as a priority by the GBCSA and research projects have been started, both on the capital cost impacts of Green Star SA-rated buildings, as well as the income and valuation impacts of these buildings.

NEDBANK RIDGEVIEW, DURBAN, KWAZULU-NATAL:
4 star Green Star SA Office v1 Design

CASE STUDY 18

ABSA TOWERS WEST, JOHANNESBURG

Green Star SA case studies

DESCRIPTION OF PROJECT

Absa Towers West is a multi-building development that forms part of the Absa City Campus in the Central Business District of Johannesburg. The project comprises of Block A and Block B, which are separate office buildings linked together with an eight-level atrium bridge structure over Marshall Street, and Block C which is a 2 100 car parkade and houses the gas powered 'Energy Centre' on its ground and mezzanine levels. The development, which covers three city blocks and can accommodate 3 800 employees, includes support facilities of a gym and restaurant:

Total Gross Floor Area (GFA):	60 037m^2
Car Parking Area:	71 777m^2
Building Footprint:	9 961m^2

The new buildings form part of the Absa Urban Campus Regeneration Proposal which plans to narrow the precinct's streets and introduce various types of trees to define the urban edge, reintroduce outdoor artwork and to improve pedestrian links around the Campus to facilitate movement between buildings, retail shops and public transportation nodes.

Completed in May 2011, **the building is the first in South Africa to achieve a 5 Star Green Star SA As-Built certification.**

PROJECT COST

Despite the fact that the building design was already underway when the Green Star SA system was launched, **the capital cost premium to green the building was less than 2%, including the costs related to the Green Star SA certification.**

ABSA TOWERS WEST, JOHANNESBURG:
5 Star Green Star SA - Office v1 As Built Interior

Images from Creamer Media at www.engineeringnews.co.za

BUSINESS CASE

As part of Barclays and Absa's continuing investment in its corporate social and sustainability agenda, the Towers West building gave "a great opportunity not only to invest in regenerating part of the City, but to include a number of green elements to give the building a sustainable future and reduce the bank's impact on the environment," explains Colin Taylor, Head of Capital Projects at Absa. He says that the project effectively gave the bank an opportunity to "demonstrate and be recognised as an investor in the future of reducing our impact on the environment."

The on-site Energy Centre will reduce monthly electricity costs by up to 50%, which not only saves money, but also reduces reliance and demands on the national energy grid and lowers the risk of power outages.

Absa confirms that additional marketing and publicity has been derived as a result of the building's green features and the Green Star SA certification, but they are not able to quantify the value of this coverage.

> *"The on-site energy centre will reduce monthly electricity costs by up to 50%, which not only saves money, but also reduces reliance and demands on the national energy grid and lowers the risk of power outages..."*
>
> **Colin Taylor**
> ABSA

GREEN DESIGN INITIATIVES

ENERGY - ENERGY CENTRE

In 2006, Absa began to look for options to generate its own energy supply to the entire Campus, comprising of eight buildings with a total usable area of 130 000m^2.

Gas powered generation was selected, as it provides cost effective power with up to 40% less emissions than the utility power it replaces.

Four gas engines, producing up to 11.2MW, generate power for all eight Campus buildings. The entire Campus load is around 12MW and the gas generation is supplemented by 6MW of emergency backup diesel generation, so that the Campus can be self-sufficient under maximum demand conditions. The Energy Centre is designed for potential future expansion to 19MW of generation.

Replacing this portion of Absa's electricity with gas generation reduces the associated emissions from 97 000 tons to 78 000 tons per annum. This is approximately equivalent to planting 1 900ha of rain forest.

The emissions are further reduced when generator waste heat is used for heating and cooling of the Campus. At present, waste heat is utilised to heat the new Absa Towers West buildings with greater use for both heating and cooling in future as further opportunities arise.

ENERGY - AIR CONDITIONING

The selection and operation of the air conditioning system ensured energy expenditure was optimised by:

- Utilising reject heat from the power generating plant to preheat the building in winter.
- Using cool outside air at night to precool the building in summer and intermediate seasons.
- Using outside air during the day to cool the offices when the ambient temperature is below 22°C and raising the comfort temperature to 23°C in summer, which minimises the demand for cooling.

ENERGY - ELECTRICAL

- Only energy efficient lighting sources are used within the building, from T5 fluorescent lamps for the basement and office areas, to compact fluorescent and LED down-lighters for bathroom and meeting room areas.
- All luminaries used within the office areas are controlled by a Digitally Addressable Lighting (DALI) system. Settings are in place to harvest daylight for dimming during the day when there is sufficient natural light.
- The majority of lighting is motion sensor controlled; where there are no motion sensors, these lights are controlled via the BMS system to turn them on and off during preset hours, so as to not have all lights on all of the time.
- Energy uses, greater that 100kva, have all been separately metered.

WATER

- Efficient fittings such as dual flush toilets, low flow shower heads and tap aerators have been installed.
- The largest grey water recycling plant in any commercial building in South Africa has been installed, with the capacity to recycle 45m³ of grey water. The grey water will be collected from all the gym showers and used in the flushing of toilets and urinals as well as for irrigation.
- There are no evaporative cooling systems installed in the buildings, the project elected to install an air cooled chiller system therefore a further water saving is achieved.

INDOOR ENVIRONMENTAL QUALITY

Enhancing the indoor environmental quality (IEQ) was a great priority for the design team:

- Fresh air ventilation rates have been improved by 50% over the standard.
- Natural daylight is maximised, whilst minimising glare.
- High frequency ballasts to minimise flicker and protect against eye strain.
- 60% of the office useable area has external views.
- A high degree of thermal comfort.
- Acceptable noise levels.
- All carpets used in the building have low levels of VOC's.

SITE SELECTION

The location of the buildings on a brownfield site in the Johannesburg CBD enabled the building to score points in the Transport, Land Use and Ecology and Materials categories without any additional cost to the client, demonstrating the importance of site selection in sustainable building.

ABSA TOWERS WEST, JOHANNESBURG:
5 Star Green Star SA - Office v1 As Built
Grey water system

LESSONS LEARNT

- Focus from day one on the importance of achieving the best possible rating and obtain the support of a green building consultant.
- The Green Star SA process was extremely valuable - in particular, the CIBSE commissioning process that improved both quality of design and installation.
- Engage the consultants and contracting teams early and recognise the importance of a clear and concise detail briefing of the entire consulting and contracting team.

SOURCE: Taylor, Colin, ABSA. Email Interview Absa Towers West Case Study, WSP Group

CALIFORNIA ACADEMY OF SCIENCES, SAN FRANCISCO:
Designed by Renzo Piano

"In addition to direct utility savings and job creation, green buildings have been shown to improve the health and wellbeing of occupants, enhance productivity, reduce staff turnover, reduce patient hospitalization time, and even enhance student achievement in green schools. Both the direct and indirect cost savings of integrated green building strategies are real and significant. The long-term impacts of green buildings form the pillars of a green economy that will catalyse environmental, economic and social sustainability.[39] *"*

Jane Henley
CEO, World GBC

6

THE WAY FORWARD

NO. 1 SILO, V&A WATERFRONT CLOCK TOWER, CAPE TOWN:
Still under construction, this building has registered for Green Star SA certification

There are already strong signs that South Africa is moving in the right direction, but more needs to be done.

Having identified a number of challenges and barriers to the mainstream uptake of green building principles and practices, this section identifies a range of focus areas which could provide a way forward in facilitating the greening of commercial buildings in South Africa.

In particular, there are significant opportunities for:

- increasing the number and uptake of rating tools, especially related to the existing building stock;
- improving and increasing government policy and regulation with regard to green building to ensure consistent minimum standards are applied across planning schemes and building codes;
- improving understanding of, and skills in, green building practices and technologies through a range of education programs;
- government leadership and partnership with industry;
- creating a range of incentives to increase the uptake of green building practices, particularly in relation to existing building stock; and
- further research into the costs and benefits of green commercial buildings in South Africa.

The Green Building Council of South Africa is proud of its leadership role in driving the shift to a sustainable commercial property industry in South Africa and it will continue to play a key role in the way forward.

6.1
STANDARDS, BENCHMARKS AND LEGISLATION

Like all green building markets internationally, South Africa requires a coordinated and consistent national framework of green building policies, regulations, standards and rating tools.

6.1.1
RATING TOOLS

The international experience has demonstrated that successful progress in greening a commercial property industry has usually been facilitated by the mainstream acceptance and usage of green building rating tools.

The most successful and effective environmental rating tools are those which are comprehensive in scope and technically robust, yet also simple to apply. Given that the transition to green buildings is a global phenomenon, it is also important that rating tools should allow international comparison.

Green Star SA has been successfully launched in South Africa and has gained growing acceptance as the single national environmental rating system for buildings, that has international recognition and a degree of comparability. It has been totally customised for South African conditions with a Technical Working Group of industry experts as well as a public comment and PILOT testing period.

In order to build on this progress, Green Star SA rating tools need to be developed to address all major building types and the different phases of a building's life cycle, particularly the crucial operational phase for the large stock of existing buildings.

The uptake and impact of the Green Star SA tools also need to be expanded beyond the market leaders who have embraced the system thus far, so that the standards and practices it rewards, become far more widespread and ultimately the mainstream norm for commercial building projects.

6.1.2
NATIONAL STANDARDS & REGULATIONS

At the moment, the only specific 'green building' provisions included in the National Building Regulations are the recently introduced sections related to energy efficiency (See Section 3.3.2 Government Leadership).

Policy, standards and regulations addressing green building issues need to be developed and implemented, to ensure that coordinated and consistent minimum standards are applied to issues such as efficient energy and water usage, waste minimisation, the use of environmentally responsible materials and other important health and well-being sustainability issues such as Indoor Environment Quality.

Ideally, the National Building Regulations should be expanded to set minimum environmental standards that are directly related to the best practice metrics within the national voluntary tool, Green Star SA.

6.1.3
NATIONAL PRODUCT LABELLING

The general consensus is that environmental labelling schemes for building products and materials could improve building performance indirectly through changing the behaviour of buyers.

A four year OECD research project suggested that environmental labelling schemes directly encourage manufacturers to produce materials that are better for health. The study noted that a 'simple seal of approval is easy for consumers to understand', and that 'labelling schemes may help those who have incentives to choose environmentally-friendly products to make the right choice, although they cannot create the incentives themselves.' [61]

A number of initiatives have begun in the country to establish environmental labelling schemes for building products and materials (see Section 5.3.3). However, none of these is at a sufficiently advanced stage to have the required impact on the industry yet.

Support should be given to an internationally recognised South African environmental labelling scheme for products and materials.

CASE STUDY 19

FORTY ON OAK, MELROSE ARCH, JOHANNESBURG

Green Star SA case studies

"A holistic, sustainability approach will be the only way to ensure the greatest longevity for this kind of investment."

Josef Quraishi
Amdec Property Development

DESCRIPTION OF PROJECT

Forty on Oak is a new upmarket apartment building situated close to the heart of the Melrose Arch precinct in northern Johannesburg and the first multi unit residential building to achieve certification under the Green Star SA rating system. Over 9 500m² and 5 storeys high, the building features 59 double-aspect apartments. Designed according to 'New Urbanist' principles, the mixed-use precinct includes high end retail, banks, restaurants, supermarkets, a Virgin Active Gym, GP's and many JSE Top 100 companies. Two M1 off ramps and a dedicated Gautrain bus service (every 15mins during peak hours) to the precinct add to convenience and accessibility of Melrose Arch.

The project achieved the first 4 star Green Star SA Multi Unit Residential PILOT Design certification in October 2011 and will reach practical completion at the end of 2012.

PROJECT COST

The construction value was affected by less than 1% to achieve the Green Star SA certification, the majority of which focused on reducing the energy consumption of the building and that of the occupants.

BUSINESS CASE

Even though Melrose Arch was designed and built in the late 1990's, many features tackle todays issues of sustainability and this assisted the Forty on Oak building in its goal of achieving Green Star SA certification. The precinct has a central District Cooling System which provides both cooling and pre-heated water from a central source extremely efficiently and a gas main provides an alternative to typical coal fired energy sources. The precinct is also easily accessible by public transportation and provides many local amenities within a 5 minute walking distance. All these inherent advantages of the building's location made the decision to pursue a Green Star SA rating more compelling.

According to Josef Quraishi of developer Amdec Property Development, "Design features of the building like natural cross ventilation, double glazing, gas powered heating and water saving devices address the needs of the target market, namely providing a desirable apartment in a superb location whilst making the building energy and water efficient and thereby reducing the occupants' expenditure on utilities and rates."

They believe that the relatively small additional capital expenditure (less than 1%) will provide "long term benefits to both the resident and the building owner."

Quraishi adds that the pursuit of a Green Star SA rating "certainly assisted in the marketing of the new apartments" and the achievement of the desired rating has resulted in additional publicity and coverage of the project, to the value of approximately R360 000. In fact, Quraishi explains that the rating has generated a knock-on effect in the precinct, with "both existing and new business tenants approaching us to see how they can utilise the knowledge and experience gained in the pursuit of this prestigious accolade and how they could implement sustainable measures to their premises or indeed pursue a Green Star SA rating!"

"The GBCSA now has a robust tool to assist developers to measure how sustainable their residential buildings will be and the South African construction market can offer developers the tools they need to achieve such goals more easily than ever before."

Josef Quraishi
Amdec Property Development

GREEN INITIATIVES

- **Waste Management Plan -** ensuring from the outset that waste construction materials were recycled and dealt with sustainably wherever possible.
- **Natural Cross Ventilation -** providing an extremely energy efficient building pays dividends for the end-user and building owner and this was addressed through natural ventilation and taking advantage of the double aspect views.
- **Gas Fired Heating -** Melrose Arch Precinct is fortunate enough to have a gas ring main on site for which the project could tap into and which could provide heat to its water, using a significantly cleaner fuel source than coal.
- **Double Glazing -** Another measure to address thermal comfort and energy efficiency by ensuring that heat loss was reduced through glazing.
- **High Recycled Content -** using recycling materials wherever possible.
- **PVC/Formaldehyde and Volatile Organic Compound minimisation -** addressing IEQ and reducing and removing toxins to provide a healthier environment for the occupants.
- **Close proximity to Public Transportation and Amenities -** reducing the need for use of private vehicles and providing greater flexibility and lifestyle benefits for residents.
- **Thermal Modelling -** to ensure that the design, orientation and specifications of the building worked effectively. A thermal model assisted in measuring that the occupants would be thermally comfortable throughout the year.
- **BMS/Technology -** Building Management System providing occupants with 'fingertip' access to data on their energy and water usage.

LESSONS LEARNT/GREEN STAR TIPS

- Ensuring the appointment of a competent and experienced Sustainability Consultant was one of the most significant benefits to the project and provided invaluable assistance and guidance to the team.
- The contribution of the Contractor, especially their proactive response to the decision to go for a rating, was also of huge importance.

SOURCE: Quraishi, Joseph, Amdec Property Development. Email Interview

6.2 EDUCATION

A lack of public and professional education about green buildings and their benefits is hampering the greening of commercial buildings in South Africa.

The OECD report[61] noted that demand for green buildings increased, where there was evidence of an educational program which identified the benefits.

> *"One of the key roles of the GBCSA is to improve the knowledge and skills base of green building by enabling and offering training and education... via our numerous courses, seminars, workshops and annual convention.* [13] *"*
>
> **Brian Wilkinson**
> CEO GBCSA

6.2.1 PUBLIC EDUCATION

A green building education program for all South Africans would increase the general awareness, knowledge of and ultimately the demand for green buildings.

A national public education program on the benefits of green building should be undertaken.

6.2.2 PROFESSIONAL EDUCATION

Professional education is clearly required to address the limited industry knowledge and lack of skills in green building practices and technology.

Industry education is a key activity of the GBCSA and the number of participants in the GBCSA's various training courses in the last three years (over 3 000 as at December 2011) makes it clear that the industry is seeking improvement in green building knowledge. However as a non-profit organisation, the GBCSA has limited resources.

Relevant government agencies and departments should provide support to extend existing educational programs that educate industry professionals about the national voluntary rating tool and other green building technologies and practices.

6.2.3 IMPROVED INFORMATION FOR VALUATIONS

Investment decisions are sometimes made based purely on upfront costs, which can result in sustainability elements being discarded. Such approaches account for the at times higher capital investment of green buildings, but in effect ignore the resulting benefits to occupiers and on market value. This can slant decision-makers against green buildings, deter green investment, and prove unhelpful to companies for whom sustainability is central to their corporate ethic.

Benefits such as energy and water savings should be looked at through a whole of life or life-cycle cost methodology, not just evaluated in terms of upfront or initial capital costs.

From a life-cycle savings standpoint, savings from investment in green design, material procurement and construction often dramatically exceed any additional upfront costs.

While valuation is not an exact science, and the effect of new technology in buildings can be difficult to ascertain, consideration of the following factors will assist in a more accurate assessment of value for green buildings:

- Life-cycle costing and its effect on value;
- The effect of lower building risk to capitalisation rates, discount rates and terminal yields;
- Impact on rental rates, lease structures, and growth in rents;
- Lower operating costs and the net effect to the asset value;
- The impact upon vacancy rates, tenant retention and lease incentives;
- The financial impact of 'soft' gains such as increased productivity, improved morale and lower absenteeism;
- The financial impact of intangible income such as improved corporate image and marketing benefits.

The South African valuation industry should ensure that green initiatives are considered as far as possible in valuations, and undertake appropriate education programmes to update valuers on the value of green buildings.

CASE STUDY 20

WOOLWORTHS

Existing buildings case studies: Energy savings in retail supermarkets

BACKGROUND

As part of its "Good Business Journey," Woolworths has been striving to make their entire business more sustainable. Green building and energy efficiency initiatives in the company's 400 odd stores are an important part of this drive, which have the added incentive of significant cost savings and have resulted in more pleasant environments for shoppers and staff alike.

GREEN/EFFICIENCY INITIATIVES

REFRIGERATION

60% of the total power usage in the average Woolworths supermarket is used for refrigeration, as maintenance of the 'cold chain' is vital to ensure the quality of the food. Woolworths has undertaken a programme to upgrade the old refrigeration systems in their stores with more sophisticated controls. Variable Speed Drives (VSD's) amongst other improvements have been installed to make the systems more efficient and responsive to changes in external variables. **These upgrades have resulted in 30% savings in energy costs with payback periods of approximately 3.5 years.**

AUTOMATED LOAD CONTROL

This system of head office-centralised control and switching for the lighting and air conditioning of the majority of their stores cost approximately R3million and resulted in a payback period of approximately 4 years. **The average store saves 5.5% on its electricity bill as a direct result of head office controlling the switching on and off of the lighting and air conditioning systems.**

ONLINE METERING

Alex Kuzma, Head of Engineering Services at Woolworths, stresses that thorough and preferably real-time metering, must be the first step in such an energy efficiency programme. **With relatively short payback periods of under a year, online metering for all the stores allows the company to quickly identify trends and outliers, alerting them to obvious problems and inefficiencies.** Another benefit of direct metering of the stores is that they are now able to verify Council electricity bills and pick up discrepancies.

Woolworths has recently begun a similar programme of metering for the water usage in each of its stores too, enabling them to quickly pick up possible leaks and other problems.

LIGHTING UPGRADES

Lighting upgrades have been performed in all stores nationally, including changes from magnetic to high efficiency electronic ballasts and LED's. **These upgrades were mainly funded by Eskom's Demand Side Management programme so paybacks were less than a year.**

GREEN STORE DESIGN

Woolworths are adopting a more holistic approach to green design in their new stores, with an emphasis on more natural lighting, CO_2 refrigeration and visible electricity metering, amongst other things. **Feedback from both customers and staff has been very positive, particularly around the enhanced shopping experience created by more natural lighting.**

LESSONS LEARNT

Don't forget the human element – focus on improving awareness and training and automate where appropriate.

SOURCE: Kuzma, Alex, Woolworths

6.3
LEADERSHIP AND PARTNERSHIP

Government leadership and partnership with industry would support the industry's uptake of green building practices.

6.3.1
NATIONAL TARGETS

The South African government has made ambitious commitments to reduce the country's greenhouse gas emissions by 34% by 2020 and by 42% by 2025 compared to the 'business-as-usual' scenario. This commitment is dependent on the provision of financial resources, the transfer of technology, and capacity-building support from developed countries.

However, unlike many other countries, South Africa has not yet set out how it plans to achieve the above targets in a set of 'Nationally Appropriate Mitigation Actions' (NAMAs). In order for there to be any chance of achieving the targets, "there needs to be a national discussion about how much each sector contributes," [103] says Harold Winkler of the Energy Research Centre at the University of Cape Town, whose team compiled the initial scenarios on which the 34% target is based.

So national policy and targets for the reduction of greenhouse gas emissions for individual sectors is the next step. The importance of defining these targets has been recognised in the 'National Climate Change Response White Paper' [104], which sets out as a key element of its overall approach to mitigation, "Defining desired emission reduction outcomes for each significant sector and sub-sector of the economy based on an in-depth assessment of the mitigation potential, best available mitigation options, science, evidence and a full assessment of the costs and benefits," amongst other things. The White Paper elaborates that, "Under the leadership of the relevant national sector government department, each significantly emitting economic sector or sub-sector will be required to formulate mitigation and lower-carbon development strategies."

For the property and construction industry, the setting of key national objectives and targets for the broader sustainability of the built environment, would provide important leadership. It would focus all the different stakeholders in the industry, by providing an overarching goal and framework for the improvement of the sustainability of South Africa's built environment, including the crucial reduction in carbon emissions.

Xeriscape gardens reduce water consumption

6.3.2
LEADERSHIP BY EXAMPLE

As well as setting co-ordinated and consistent standards (See Section 6.1.2), all levels of government (National, Provincial and Local) could have a major influence on the demand for green buildings through the vast amount of space they occupy and own.

In particular, governments can provide valuable leadership to the industry and the wider community by committing to best practice green building standards across a comprehensive range of environmental criteria for their own buildings,

procurement and interior fit outs. This process has begun with two government buildings already achieving Green Star SA certification (See section 3.3.2) and the DPW plans to implement a "Green Building Framework".

Government can also show leadership by including whole of life-cycle cost accounting in all government tender contracts, and by using this costing approach to make key contract decisions.

Importantly, government departments need to expand their focus from being mainly on energy targets for their buildings and/or tenancies and include water, materials, indoor environment quality and transport, as well as other holistic green building strategies that reduce the environmental impact of development.

NEW SISONKE DISTRICT OFFICE, IXOPO:
5 Star Green Star SA - Office v1 Design
Green roof

6.3.3 CARBON TRADING

The South African national government has "agreed on the need to price carbon emissions and on the phasing in of a tax instrument for this purpose," says Pravin Gordhan, South Africa's Minister of Finance, referring to the plans to implement a carbon tax in 2013/14[105].

However, National Treasury Deputy Director-General, Ismail Momoniat, explains that Treasury has not ruled out the introduction of a 'cap and trade' system in future, in which emissions are capped, either by sector or by emitter, or both, and those that produce less emissions than their cap are able to trade the surplus[106].

Under such a scheme, property developers and owners who undertake energy efficiency and demand side abatement measures, could be able to accrue and trade carbon credits from these initiatives.

6.3.4 COST SHARING

In Canada, government is working in partnership with industry, by cost sharing with developers' strategies at the building level that reduce infrastructure costs, that government and taxpayers ultimately have to pay for.[107]

Traditionally, utility providers which will ultimately benefit from green building initiatives often require developers to pay for all infrastructure levies, thereby penalising and not rewarding green buildings.

Utility providers will ultimately benefit greatly from on-site energy generation, energy efficiency, water and waste recycling as these initiatives reduce the burden on the utility's plant and avoid the need for costly upgrades and expansions. But developers who seek to install on-site green facilities usually still need to pay the full cost of public infrastructure levies, even though their initiatives are not placing an additional burden on public infrastructure.

Utility providers need to recognise the benefit of on-site facilities and other green features and not only waive the levies but provide fiscal incentives for the installations. **Cost-sharing support should be provided to developers who undertake strategies that reduce the impact upon or cost of surrounding infrastructure.**

CASE STUDY 21

THE SPOT, MELBOURNE UNIVERSITY, MELBOURNE, AUSTRALIA

International case studies

DESCRIPTION OF PROJECT

The Spot is home to the University of Melbourne's new Economics and Commerce Faculty, and is the latest addition to the much lauded University Square precinct. With 25 851m^2 of GFA, the 12 storey combined teaching and academic facility is a mix of lecture theatres, flexible seminar spaces, computer laboratories and offices for staff and administration. With views towards Melbourne's CBD skyline and surrounding areas, it represents an integrated approach to building in a campus setting that maximises its usage of the prior infrastructure.

It was awarded a 5 Star Green Star rating under the GBC of Australia's Education PILOT tool.

PROJECT COST

To achieve the Green Star rating, the project team put aside a margin equivalent to 5% of the project's capital cost. This consisted of 4% for known works, along with a 1% contingency to cover the unknown implications of the yet-to-be-released Education tool. This 'green building fund' proved enough to deliver The Spot a 5 Star Green Star rating, recognising 'Australian Excellence' in environmentally sustainable design.

BUSINESS CASE

In 2007, the University made a commitment to reduce its carbon footprint by 50% by 2010 and achieve carbon neutrality by 2030. To help reach this target, the University decided to benchmark The Spot against the Green Star Education tool.

The University committed to achieving the Green Star rating to provide independently-verified evidence of the building's environmental credentials and to help the project team to adopt a holistic approach to the building's design.

According to the Vice-Chancellor Professor Glyn Davis AC, "The success of The Spot has spurred the University to commit to a minimum rating target of 5 Star Green Star for all new major building developments, and 4 Star Green Star for all major building upgrades."

"Green Star enables us to demonstrate our true commitment to sustainability. This is important to reduce our carbon emissions significantly as prospective students increasingly consider the environmental impacts of their university choice. Rating our buildings helps build trust in our commitment. Furthermore, it helps us to reach our performance targets and makes economic sense, as our green buildings outperform existing buildings by large margins."

The Spot used 46% less energy in its first year than comparable buildings across the rest of the University. This translates to savings of over $180 000 per annum compared to the average of equivalent buildings on campus, a saving which will more than discount the sustainability premium of 5%, before productivity benefits are even calculated.

GREEN DESIGN INITIATIVES

The following notable green initiatives were included:

UNIQUE FAÇADE

To improve indoor environmental quality, the project team worked closely with glass manufacturers to develop a unique high performance façade for the building. In an innovative approach, frit - a vitreous substance used in making porcelain, glazes or enamels - was applied to 50% of the external surface. The result is a façade that both maximises daylight penetration and minimises solar heat gain.

By minimising heat gain, The Spot has reduced its overall annual chiller load by 20 645 kWh/annum, a saving of 15% compared to having installed the same glazing unit without frit. This reduction has also allowed for the installation of a chilled beam air conditioning system - a first for an Education building in Australia.

IMPROVED AIR QUALITY

Studies in the US have shown consistently that improved indoor air quality leads to better health outcomes, with reductions in illness symptoms ranging between 13.5 to 87%.

The Spot delivers 100% fresh air with a 200-250% increase on Australian Standards rates, provides individual thermal control of workspaces and has reduced volatile organic compound exposure through the use of low VOC paints, carpets, and sealants. **Each of these improvements will help enhance student wellbeing and focus, and deliver improved educational outcomes.**

According to Chris White, the University's Executive Director of Property & Campus Services, "the central environmental focus of the project was IEQ due to its capacity to improve learning outcomes. The great outcomes we achieved in this area were the direct result of having wall-to-wall Green Star Accredited Professionals on the project from day one".

FLEXIBLE PARTITION DESIGN

Modular and soft-wired demountable partitions were installed throughout the academic accommodation areas of the building. Representing 56% of all partitions installed, these demountables can be easily relocated without specialised tools or even specialised contractors such as electricians. This gives a greater flexibility to the space without the need to perform remedial works, thereby reducing both waste and operational impacts. The Spot was awarded one innovation point in recognition of the environmentally-beneficial outcomes of this partition design.

GREEN STAR INITIATIVES

The following are a selection of green design initiatives which contributed towards the Green Star rating:

ENERGY

- 46% less energy/m^2 GFA than the average of comparable university buildings.

MANAGEMENT

- Engagement of Green Star Accredited Professionals across all disciplines

TRANSPORT

- Located near numerous public transport hubs.
- Bike racks and shower facilities installed.

WATER

- 83% reduction in water use.

EMISSIONS

- Reduced flow to sewer, via use of a blackwater treatment plant.
- Blackwater recycling system capable of treating 30 000 litres of sewerage per day.

LAND USE AND ECOLOGY

- Re-use of an existing site.

SOURCE: Green Building Council of Australia website

6.4 INCENTIVES

A detailed study is required of possible incentives (planning & fiscal) that could be implemented by government to promote a higher level of sustainable practices in the South African property sector.

One of these possible measures is the use of taxation to either:

- reward taxpayers who undertake green building practices e.g. through the provision of tax concessions and incentives; or to
- penalise taxpayers who fail to undertake green building practices e.g. through the imposition of penalty taxes.

There are many examples of fiscal and planning incentives offered worldwide for green building initiatives, the effectiveness of which should be studied in determining the most appropriate options for South Africa.

Incentives for commercial green buildings include deductions for new or renovated buildings that save 50% or more of projected annual energy costs for heating, cooling and lighting compared to modelled national standards, and partial deductions for efficiency improvements to individual lighting, HVAC and water heating or envelope systems.

Similar incentives are needed to ensure South Africa has the capacity to meet the demands of development in a sustainable manner, to address the poor environmental performance of existing buildings and to inject much needed funds into the commercialisation and application of green technologies and products.

Green Star SA rating tools provide government with a third party certification of environmental improvements and thus create a transparent framework under which incentives potentially could be applied.

The tax and planning reform options on the following page are framed around international examples of incentives for building green.

BP HEAD OFFICE, CAPE TOWN:
Incentives may be offered to developers who lessen the impact of their development on surrounding municipal infrastructure

6.4.1
SPECIAL TAX DEDUCTIONS

Special tax deductions can be made available to promote and facilitate the growth of certain industries and activities in the economy. For example:

- Immediate Deductions may be allowed for certain specific expenditure, where the expenditure would normally be deductible over a longer period or would be non-deductible as it is of a capital nature,
- Accelerated Depreciation on certain qualifying expenditure, and
- Tax concessions like the deferral of tax payments.

Special tax deductions and concessions for developers and owners that adopt green building practices would provide a strong incentive to do so. A special tax incentive applied for improving the environmental attributes of existing buildings could be the catalyst for wide-scale refurbishment activity that would reduce the impact of South African city developments.

Canada is one of the international markets which has introduced immediate tax deductions for the purchase of equipment that qualifies as electrical energy efficient equipment.

NEDBANK RIDGEVIEW, UMHLANGA:
4 Star Green Star SA - Office v1 Design
Specific areas are allocated for waste recycling

6.4.2
TAX CREDITS

The majority of tax concessions mentioned above relate to the provision of tax deductions (write-offs) that can be offset against a taxpayer's taxable income.

Tax credits or tax rebates are another form of tax concession that enable a taxpayer to offset the credits from tax payable on taxable income. If the amount of tax credits exceeds the amount of tax payable, a taxpayer can, in certain circumstances, receive a refund for the difference between the two amounts.

Tax concessions in the form of tax credits would provide more incentive to the building industry to adopt green building practices.

New York State offered one of the first examples of a Green Building Tax Credit program as incentive for developers and builders of environmentally-friendly buildings. The legislation provided for tax credits to owners and tenants of eligible buildings and tenant spaces which met certain "green" standards (increased energy efficiency, improved indoor air quality, and reduced environmental impact of large commercial and residential buildings). Launched in 2000, this innovative program opened a market for new technologies and has become a model for other states and communities.

6.4.3
COUNCIL CONCESSIONS

Concessions to municipal rates and taxes could be made to encourage building owners to build/renovate or purchase property that meet certain green building requirements.

For example, a rebate on municipal rates could be provided for qualifying expenditure based on a percentage of expenditure incurred.

Planning concessions are also powerful tools for encouraging achievement of a standard. Planning concessions such as density bonuses and green offset schemes could be introduced using pre-defined standards such as Green Star SA to assess and benchmark performance (e.g. water and energy efficiency). Green door policies which expedite green building planning approvals can also be used to encourage developers to build green.

There is substantial evidence of the implementation and success of planning concessions internationally. In Arlington, Virginia, in the US, the Green Building Incentive program allows developers to request a slightly larger building than would normally be allowed by County Code if the project receives official LEED certification from the USGBC at one of the four LEED award levels.

CASE STUDY 22

TRINITI BUSINESS CAMPUS, SYDNEY, AUSTRALIA

International case studies

DESCRIPTION OF PROJECT

Triniti is a 28 000m^2 A-grade office campus located in Macquarie Park, Sydney. The development integrates three, high quality buildings into a shared environment of landscaped outdoor public space. It includes an on-site cafe, a childcare centre as well as a basement car park for 995 cars and bicycle racks with shower and change room facilities.

The entire campus is in the process of achieving Green Star certification, with buildings 1 and 2 having been awarded 5 Star Green Star ratings under the Green Star - Office As Built v2 rating tool in 2009. Building 3 is also targeting a 5 Star Office As Built rating.

PROJECT COST

The Triniti development was in a unique position where the contract had been priced without Green Star initiatives and then was 'enhanced' with Green Star initiatives. In doing so Stockland has provided an accurate breakdown of the Green Star cost premium compared to an equivalent office project.

To raise the Triniti buildings up to Green Star standards, the project team worked with the contractor to identify which extra features would be needed and the additional costs they would incur. **These sustainability features increased costs by 2.2%, with the bulk of the 'green premium' being spent on further commissioning, metering and more efficient electric lighting.**

For a minimal increase in costs, the project team was able to deliver an entire 5 Star Green Star business campus – demonstrating that 5 Star Green Star buildings can be delivered without exceeding traditional commercial premiums.

BUSINESS CASE

The performance benefits of Triniti's sustainability features are clear: Building 1 has achieved a 5 star NABERS Energy and Water rating, which represents a 50% reduction in energy use over a standard 2.5 star NABERS Energy-rated building and a 60% reduction in water use over a standard 2.5 star NABERS Water rated building. **This translates into a saving of more than $10/m² per annum in reduced energy costs and over $1.50/m² each year in reduced water costs. This will translate into savings on energy and water costs for Triniti's tenants.**

While buildings 2 and 3 have not yet been operational for the full year required to achieve ratings, Stockland is anticipating similar results.

Australian research has shown that there are real advantages for businesses operating in Green Star buildings – and these benefits extend well beyond the carbon footprint. **Tenants are increasingly demanding sustainable buildings to 'future proof' their businesses against escalating energy and water prices, to attract and retain top talent, and to demonstrate that corporate social responsibility starts at home.**

Triniti has a range of features which benefit both tenants and the environment. All buildings within the campus feature 'floor flexibility' enabling tenants to split and isolate half floors down to 700m² or whole building up to 11 300m². The floor plate flexibility will assist in managing the ongoing needs of tenants for expansion or contraction of their tenancies, as well as future proofing the asset to accommodate infill space at the end of the current leases.

The campus also features easy public transport access, bicycle and changeroom facility, together with an emphasis on excellent Indoor Environment Quality.

With such sustainability features on offer, Stockland was able to lease Triniti earlier than industry practice – which meant the campus reached 100% occupancy sooner. The fact that other buildings without Green Star ratings around the Triniti campus still lay vacant, speaks volumes about the shift to sustainability.

In a vote of confidence in the building, Baulderstone, the main contractor on the project, has moved in as the major tenant. "We are very pleased to be a major tenant in North Ryde's first 5 Star Green Star office building, as it represents Baulderstone's commitment to creating what matters in a sustainable way," says Baulderstone's NSW General Manager, David Lougher.

CSR is another tenant that chose Triniti due to its sustainability characteristics. The company recently achieved a 5 Star Green Star certification for its own fit-out within Triniti under the Office Interiors v1.1 rating tool.

GREEN STAR INITIATIVES

The 5 Star Green Star certification was achieved by means of the following green initiatives:

MANAGEMENT

Initiatives included comprehensive building commissioning, tuning and a thorough, yet simple Building Users' Guide. 80% of construction waste was reused or recycled.

INDOOR ENVIRONMENT QUALITY

The Indoor Environment Quality is improved for the health and well-being of the tenants, by means of maximised daylight levels, outdoor views, thermal comfort and the installation of high frequency ballasts to reduce occupants' eye strain from low frequency flicker.

Internal noise levels are minimised as well as volatile organic compounds (VOCs) in painted surfaces and all carpets. Composite wood products have low-formaldehyde emissions.

ENERGY

Energy saving initiatives include sub-metering in all substantive base building uses and all tenancies. Individual, clearly-labelled switches are installed for enclosed spaces and zones in accessible locations for building occupants. Energy efficient T5 lighting is used and motion sensors assist with out-of-hours lighting control. High performance full height double glazing allows maximum natural lighting with minimal heat gain.

TRANSPORT

Initiatives include specified priority parking for small cars and motorbikes, cyclist facilities and access to many public transport networks.

WATER

Potable water efficiency is achieved by metering all major water uses, integrated with the Building Management System (BMS) and providing leak detection. The cooling tower water treatment achieves 6 or better cycles of concentration for water-based cooling systems.

Rainwater in collected on-site for landscape irrigation and further controlled through subsoil drip systems and automatic timers with soil moisture and rainwater sensors installed.

MATERIALS

Recycling waste storage is provided in the base building. 20% of all aggregate used has significant recycled content and 90% of all steel contains post-consumer recycled content greater than 50%.

SOURCE: Green Building Council of Australia website

CALIFORNIA ACADEMY OF SCIENCES, SAN FRANCISCO:
Designed by Renzo Piano

6.5 RESEARCH

The construction market is generally seen as risk-averse, with a reluctance to accept new building methods without proof that they work. It follows that, as more quantitative financial data becomes available, there will be a wider acceptance and take-up of green buildings. In addition, the improvement in post-occupancy analysis should assist in proving the business case for green buildings.

6.5.1 COST AND FINANCIAL BENEFIT

Several international studies have focused on the capital costs of green buildings but to date little research has been done in the South African market and there are still limited case studies.

The general consensus in the more mature international green building markets is that entry-level green-certified buildings can be designed and constructed for similar costs to conventional buildings (See Section 5.1.1).

A Davis Langdon report, 'Examining the Cost of Green,' [108] found that while there was a high variation in the construction costs within both green and non-green categories, there was no statistically significant difference between the capital costs of green and conventional buildings. In an analysis of initial budgets, the authors were able to conclude that "the cost per square foot for buildings seeking LEED certification (Green Star equivalent rating tool used in the USA and Canada), falls into the existing range of costs for buildings of similar program type and **many projects can achieve sustainable design within their initial budget, or with a very small supplementary funding''.**

Another early US report[84] which analysed the actual costs and financial benefits of green buildings, concluded that:

"The benefits of building green include cost savings from reduced energy, water, and waste; lower operations and maintenance costs; and enhanced occupant productivity and health. An analysis of these areas indicates that total financial benefits of green buildings are over ten times the average initial investment required to design and construct a green building. Energy savings alone exceed the average increased cost associated with building green. Additionally, the relatively large impact of productivity and health gains, reflects the fact that the direct and indirect cost of employees is far larger than the cost of construction or energy. Consequently, even small changes in productivity and health translate into large financial benefits."[84]

The findings of these and many more recent reports point to a clear conclusion: building green is cost-effective and makes financial sense today.

There is even some evidence to suggest that the integrated thinking and solution driven design process associated with green building means that you actually reduce the amount of risk, construction time, variations and the capital costs are actually less.

The analyses of these various international reports have played an important role in driving the mainstream shift to building green in markets like the United States and it is anticipated that South Africa will soon have enough green buildings to conduct a similar analysis.

Based on a review of the local Green Star SA case studies in this report and wider industry engagement, the GBCSA believes the South African property industry should expect the cost to build a Green Star SA building to be between approximately 1% and 10% more than a conventional building. (Refer to Table 6 Summary of Costs Premiums of Green Star SA Case Studies in Section 5.1.1) The GBCSA also believes that this premium will decrease rapidly as green building becomes more common and the relevant professionals gain experience.

But more research and case studies are required.

Funding should be provided for the development of green building case studies which quantify the economic, social and environmental benefits in a way that the financial sector can understand and report on them.

6.5.2 PRODUCTIVITY GAINS

While international studies have provided impressive statistics on the linkage between productivity, health and well-being and improved indoor environmental quality, further study is required in this area in South Africa.

As a key potential benefit of green buildings, research into productivity gains, including the measurement of employee productivity and the monitoring of building use, would contribute significantly to the business case as well as improve the way buildings are designed and the way they function.

Nedbank has begun such a project to study the post-occupancy impacts in three of its Green Star SA rated buildings, with results indicating improved physical well-being in its Ridgeside building in Umhlanga, Durban[109].

Funding should be provided for post-occupancy research into productivity and other gains from green buildings.

CITY CENTRAL TOWER 1, ADELAIDE, AUSTRALIA:
5 Star Green Star - Office Design
Additional research is needed into the costs and benefits of green building - especially the impact of improved IEQ on staff productivity

6.5.3 BUILDING THE BUSINESS CASE

This Report builds on international findings, but the sample size for green buildings in South Africa is still small and availability of data on them even smaller, making the comparative local costs and benefits of green buildings difficult to ascertain.

As more local and international examples of green commercial buildings are developed and studied, this Report should be updated to strengthen the business case for green commercial buildings and ultimately to drive the transition to green commercial buildings.

CASE STUDY 23

CII-SOHRABJI GODREJ GREEN BUSINESS CENTRE, HYDERABAD, INDIA

International case studies

DESCRIPTION OF PROJECT

The CII-Sohrabji Godrej Green Business Centre (CII-Godrej GBC) is a unique and successful model of public-private partnership between the Government of Andhra Pradesh, Pirojsha Godrej Foundation and the Confederation of Indian Industry (CII), with the technical support of USAID. The 1 858m^2 building consists of an office building, a seminar hall and a Green Technology Centre, displaying the latest and emerging green building materials and technologies in India.

The building was the first LEED Platinum-rated building for New Construction (NC) outside of the US and a large number of visitors tour the building to view its green features annually.

According to the Indian Green Building Council, the CII-Godrej GBC building "marked the beginning of the Green Building movement in India."

PROJECT COST

As the first well-publicised green commercial building in India, the incremental cost was 18% higher than a conventional building. However, the Indian Green Building Council asserts that green buildings are now being delivered at an incremental cost of 6-8% in India and this initial incremental cost usually gets paid back in 3 to 4 years.

> *"India being a developing country and with 80% of infrastructural facilities anticipated to be built in the next two decades, it is a great opportunity to build India in a green way."*
>
> **S Raghupathy**
> Indian Green Building Council

BUSINESS CASE

Benefits achieved so far include:

- 31 000kWh of renewable energy generated per year
- Over 120 000kWh energy savings per year as compared to ASHRAE 90.1 base case
- A reduction in CO_2 emissions of 100 tons per year since 2004
- Potable water savings of 40% compared to a conventional building
- Excellent indoor air quality
- 100% day lighting (Artificial lights are switched on just before dusk)
- Higher productivity of occupants

GREEN INITIATIVES

Energy Efficiency

- Installed a state-of-the-art Building Management System (BMS) for real-time monitoring of energy consumption.
- Use of aerated concrete blocks for facades reduces 15-20% load on air-conditioning.
- Double-glazed units with argon gas filling between the glass panes, have enhanced the thermal properties.
- Water-cooled scroll chiller.
- Installed two 25TR chillers.
- Secondary chilled water pumps installed with Variable Frequency Drives (VFDs).
- Energy efficient lighting design through Compact Fluorescent Lamps (CFLs).
- Roof garden covering 60% of area.

Renewable Energy

- 20% of the building energy requirements are catered by Solar Photovoltaics (PVs).
- The Solar PVs have an installed capacity of 23.5kW.

Water Efficiency

- Zero water discharge building.
- The entire waste water, grey and black water generated in the building is treated biologically through a process called the 'Root Zone Treatment System'. The treated water is reused for landscaping.
- Waterless urinals used in men's restrooms.
- Rain water harvesting system to reuse storm water.
- Water-efficient fixtures include low-flow/flush fixtures.

Indoor Environmental Quality

- Indoor Air Quality is continuously monitored and minimum fresh air is pumped into the conditioned spaces at all times.
- Fresh air is also drawn into the building through wind towers.
- Use of low Volatile Organic Compound (VOC) paints and coatings, adhesives, sealants and carpets.
- Maximum day-lighting.
- Operable windows and lighting controls for better day-lighting and views.
- Fenestration maximized on the north orientation.

Materials and Resources

- 80% of the materials used in the building were sourced within 500 miles from the project site. Most of the construction material contains post-consumer and industrial waste as a raw material during the manufacturing process.
- Fly-ash based bricks, glass, aluminium and ceramic tiles, which have post-consumer and industrial waste were used in constructing the building to encourage usage of recycled content.
- Office furniture is made of bagasse-based composite wood.
- More than 50% of the construction waste was recycled within the building or sent to other sites and diverted from landfill.

Sustainable Site

- The building design was conceived to have minimum disturbance to the surrounding ecological environment. The disturbance to the site was limited within 40 feet from the building footprint during the construction phase.
- The majority of the existing flora & fauna and natural microbiological organisms were retained around the building.
- Extensive erosion and sedimentation control measures to prevent top soil erosion were implemented at the site during construction.
- Large vegetative open spaces.

Other Notable Green Features

- HFC-based refrigerant in chillers.
- Swales for storm water collection.
- Electric vehicle for staff use.
- Car parking shaded with trees.
- Energy Efficiency Index (EEI) - 84kWh/m^2/year.

SOURCE: Indian Green Building Council

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ABOUT THE AUTHOR

Nicola Milne was the Founding CEO of the Green Building Council of South Africa (GBCSA) and served in this role for the first three and a half years of the Council's existence. During her time as CEO, the GBCSA recruited over 800 corporate members, launched three Green Star SA rating tools, trained over 3 000 property professionals and hosted three highly successful annual Conventions and Exhibitions. Nicola has featured as a guest speaker on green buildings at property conferences in South Africa, Australia and the United States. After the birth of her first child in February 2011, Nicola stepped aside as CEO and now consults to the Council on specific contracts and projects.

Trained and qualified as a Chartered Accountant, Nicola worked in finance in New York and London before entering the property industry in South Africa in 2001. During her time with the Old Mutual Property Group, Nicola had wide-ranging exposure to the different elements of property development and management, mainly focusing on new business start-ups such as Old Mutual Property's Joint Venture in India. After a year-long sabbatical spent managing a boutique lodge in Pemba, Zanzibar, Nicola relished the opportunity to re-enter the green side of the property industry and set up the exciting and important initiative which is the GBCSA.

Nicola lives in Cape Town with her husband and 1 year old son.

The ‘Rands and Sense of Green Building’ in South Africa is possibly one of the most definitive pieces of work the Council will ever do. The study builds on the international experiences of green buildings, and adds local case studies and evidence that sets out, in a clear and substantiated manner, the economic business case supporting green building. It debunks the myth that green buildings cost more, and provides the “boardroom” answers to why it makes sense. The GBCSA is of the firm belief that ‘Rands and Sense’ will have a significant impact on the strategy of investors and developers in informing their green building initiatives.

Bruce Kerswill, Executive Chairman GBCSA
and Vice-Chair of World GBC

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