The first government building in the country to achieve a 6-Star Green Star SA rating, the Department of Environmental Affairs head office in Pretoria explores the multifunctional idea of concrete as both a structural framing element and a shading device. The building's design, conceptualised by Boogertman & Partners Architects, also includes a broken curtain wall of high-performance double glazing that admits the correct level of natural daylight without allowing heat energy to enter the building

CORPORATES COME CLEAN

AS MORE DEVELOPERS HEED THE CALL FOR SUSTAINABLE BUILDING, SOUTH AFRICA IS POSITIONING ITSELF AS THE FASTEST-GROWING GREEN-BUILDING COUNTRY IN THE WORLD

Text Jocelyn Warrington **Photographs** GLH Associates Architects, V&A Corporate, Raphael Helman and supplied

Fuelled by the knowledge that the world has little time to respond to the growing dangers of global warming and that buildings play a huge role in causing the carbon dioxide emissions that drive climate change, the green-building revolution is sweeping the planet – and nowhere with as great an urgency as in South Africa.

'South Africa has passed the key tipping point with green buildings,' explains Brian Wilkinson, CEO of the Green Building Council of South Africa (GBCSA), an independent non-profit company that was formed in 2007 to lead the greening of South Africa's commercial property sector. 'Following the launch of the Green Star SA rating system in 2008, green building gathered momentum and is now mainstream in the commercial property industry. There is pressure from industry stakeholders, asset managers, tenants and the government to build green.'

Wilkinson's sentiments are echoed by US-based McGraw-Hill Construction in its recent 'World Green Building Trends' survey. 'The future for green building is more concentrated in South Africa compared with other parts of the world,' McGraw-Hill Construction notes. Although the country is playing catch-up to its developed and developing counterparts, the survey pegged South Africa's take-up of green building to grow threefold from a measured 16 per cent in 2012 to 52 per cent by the end of 2015.

South Africa has had relatively high carbon emissions for a developing country. It is estimated that the local building sector accounts for 23 per cent of greenhouse-gas emissions, and emissions from the manufacture of the major materials for the building sector amount to four per cent of total carbon emissions. That architecture is one of the main sources of greenhouse gases in the world makes the green-building trend all the more significant. With the global economy rapidly transforming to low-carbon growth, the green-buildings initiative is an investment by the government in an effort to meet South Africa's carbon-emissions-reduction targets.

Deciding to build with green practices in mind is not just an environmentally friendly choice, but also a logical decision based on limited natural resources and the increasingly high price of electricity and water in this country.

'The green building industry in South Africa is undergoing a transition from an early-adopter stage, where few companies implemented green building practices, to these practices becoming standard,' says Wilkinson. 'No longer is it only companies that are already committed to the green-building industry that are constructing greener buildings; we are now seeing implementation from a far wider base.'

The key driver to going green, according to the McGraw-Hill survey, is that green building is now considered a business imperative around the world. In its 2008 report, McGraw-Hill Construction had found that the top driver for green building was 'doing the right thing'.

However, its recent findings show that business drivers, such as client demand, are now the key factors influencing the market. These findings suggest that the global green-building movement has shifted from a 'push' to a 'pull' paradigm – a universal awareness, in other words, that by increasing the efficiency of the use of energy, water and waste, green buildings can also lower building costs (by up to 50 per cent, according to US and Australian case studies) and can create a building that holds its value for longer than comparable non-green buildings.

While converting a traditional building riddled with greenhouse gas emissions into a green building is no mean feat, the GBCSA puts the standard payback period for cost savings after green retrofits at three to five years.

Inspired by an awakened understanding of how buildings use resources, affect people, and harm the environment, the green-building revolution is in full force, and there's no doubt that the most exciting new buildings in South Africa, and, indeed, the world today, are now almost all environmentally aware, sustainable and conceived to consume far less energy than ever before.

HOW GREEN STAR SA WORKS

The Green Building Council of South Africa (GBCSA) developed Green Star SA, based on the Green Building Council of Australia's Green Star rating system, to provide the commercial property industry with an objective measurement for green buildings. Each Green Star SA rating tool reflects a different market sector or phase in the building life cycle.

Green Star SA covers a number of categories – from management, energy and transport to water, materials and emissions – that assess the environmental impact of a project's site selection, design and construction. The categories are divided into credits, each of which addresses an initiative that improves environmental performance. Points are then awarded in each credit for actions that demonstrate that the project has met the overall objectives of Green Star SA. Once all credits in each category have been assessed, a percentage score is calculated. The following Green Star SA certified ratings are available:

★ ★ ★ ★
4-STAR GREEN STAR CERTIFIED RATING
- **Weighted score:** 45–59
- **Recognises:** Best Practice

★ ★ ★ ★ ★
5-STAR GREEN STAR CERTIFIED RATING
- **Weighted score:** 60–74
- **Recognises:** South African Excellence

★ ★ ★ ★ ★ ★
6-STAR GREEN STAR CERTIFIED RATING
- **Weighted score:** 75–100
- **Recognises:** World Leadership

Source: gbcsa.org.za

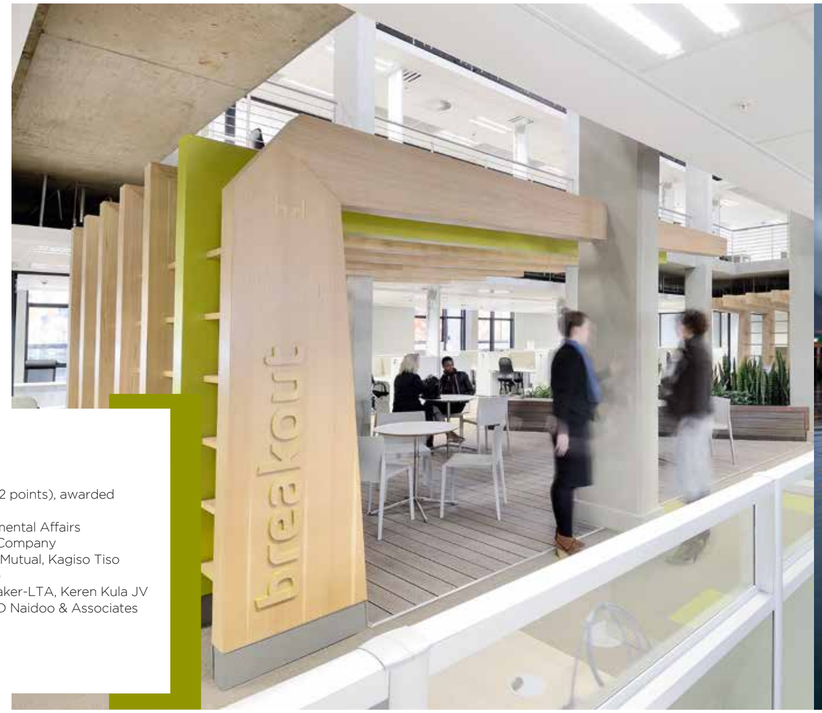
CASE STUDY: DEPARTMENT OF ENVIRONMENTAL AFFAIRS, PRETORIA

This is the first government building in South Africa to achieve a 6-Star Green Star SA rating and the first 6-Star-rated building in the City of Tshwane. The project also achieved the highest score to date for a commercial office space of this magnitude. The new DEA head office is likely to be a catalyst in the South African built environment, spurring the adoption of sustainable building practices. Says Wilkinson, 'Any building's achieving a 6-Star rating is a feat that should be celebrated because of the high standard of green-building design and construction applied. For a government building, this is a precedent-setting move by the leadership of our country and is quite a progressive demonstration of consciousness for the green movement.'

Steps taken to achieve sustainability include:

- optimal building orientation and intense modelling and efficiencies, to meet the ambitious energy consumption goal of not exceeding 115kWh/m² a year
- covering the roof almost entirely with solar photovoltaic panels, to supply almost 20% of the building's energy needs
- the installation, in the parking area, of a concentrated photovoltaic panel (CPV) which tracks the sun and supplies power to the electric-vehicle charging station
- equipping the building with water-efficiency measures to consume 30% less water, including a rainwater-harvesting system, water-wise indigenous plants and efficient irrigation systems
- designing the building to provide 150% more fresh air than is required by law
- using low-VOC (volatile organic compound) carpets, flooring, adhesives and sealants.

An innovative green lease is in place with a performance period for the contracted maintenance party, in which penalties will be paid if the building consumes more energy than predicted.



CLOCKWISE FROM TOP LEFT Smooth terracotta rainscreen cladding on the DEA building's facade keeps out water and provides insulation; the No 1 Silo building's double-skin glass facade maximises views and natural light; neighbouring No 2 Silo is a 4-Star Green Star SA-rated residential development. The Zeitz Museum of Contemporary Art Africa is near completion and will round out this exciting precinct; the size and orientation of the DEA property allows for the even distribution of office space over three storeys, and each floor plate has been kept as open and multifunctional as possible

AT A **GLANCE**

PROJECT SIZE: 30 654m²
GREEN STAR SA CERTIFICATION: 6-Star (82 points), awarded in May 2013
BUILDING OWNER: Department of Environmental Affairs
PROJECT DEVELOPER: Imvelo Concession Company (a private-sector participant comprising Old Mutual, Kagiso Tiso Holdings, Wiphold and Aveng Grinaker-LTA)
DESIGN AND CONSTRUCTION: Aveng Grinaker-LTA, Keren Kula JV
SUSTAINABLE BUILDING CONSULTANT: PD Naidoo & Associates Consulting Engineers
ARCHITECT: Boogertman & Partners

CASE STUDY: NO 1 SILO, V&A WATERFRONT

Described as 'one of Africa's most advanced intelligent buildings', this was the first 6-Star Green Star SA rating of commercial office space of this scale in South Africa and the first building to achieve this rating in the City of Cape Town. 'Sustainable development and green operations are fundamental to the V&A Waterfront's overall development strategy,' says David Green, CEO of the V&A Waterfront, who explains that the project brief was to develop an 18 600m² office building, with approximately 500m² retail space and 455 parking bays extending over two basement levels. No 1 Silo is situated in the Grain Silo heritage site, which includes No 2 Silo, a 4-Star Green Star SA-rated residential development comprising 31 luxurious apartments.

Sustainable building features include:

- the recycling of more than 70% of all the waste generated on site during construction
- the use of 60% less cement than an equivalent building and the use of timber from environmentally sustainable and ethical sources
- the installation of a seawater cooling system that allows for savings in potable water, thus improving the building's overall energy efficiency
- channelling heat generated in the IT server room to the under-floor waterborne heating system to warm the reception area
- using water-efficient fittings and fixtures and a grey-water system that allows wastewater from hand basins and showers to be collected, treated and re-used for flushing the toilets
- the installation of a high-performance facade, including automatically controlled blinds and internal double glazing that regulate the thermal performance and comfort inside the building
- setting up an information and communications technology system that monitors energy and water use
- fitting sensor lights, ensuring that lighting is used only when required and at the correct light levels
- planting a green roof for thermal roof insulation and storm-water retention
- using composting units for recycling organic waste from the kitchen
- creating a secure bike lock-up facility, with lockers and showers for those cycling to work.

AT A **GLANCE**

TOTAL FLOOR AREA: 18 723m²
TOTAL COMMERCIAL OFFICE AREA: 18 565m²
CAR PARKING AREA: 13 850m²
GREEN STAR SA CERTIFICATION: 6-Star (75 points), awarded in February 2013
BUILDING OWNER: V&A Waterfront
PROJECT MANAGER: Mace Management Services
MAIN CONTRACTORS: WBHO Construction Cape
SUSTAINABLE BUILDING CONSULTANT: Arup
ARCHITECTS: Van der Merwe Miszewski, Rick Brown Architects

AT A **GLANCE**

TOTAL FLOOR AREA: 458m²
TOTAL COMMERCIAL OFFICE AREA: 348m²
GREEN STAR SA CERTIFICATION: 6-Star (86 points), awarded in October 2011
PROJECT DEVELOPER: Vodafone
PROJECT MANAGER: Jenmeg PM
SUSTAINABLE BUILDING CONSULTANT: WSP Green by Design
ARCHITECT: GLH & Associates Architects

TOP The principle behind the Vodafone SSIC, according to GLH & Associates Architects, was to integrate the building into the landscape – the building's structural columns are a combination of steel and eucalyptus gum poles, and the roof is an exposed timber beam system **BOTTOM LEFT** Wide pergolas along the eastern and western axes of the building increased the roof area for the installation of nearly 300 solar panels **BOTTOM RIGHT** The fully glazed external facade provides views and light, while the overhangs reduce glare

CASE STUDY: VODAFONE SITE SOLUTION INNOVATION CENTRE (SSIC), MIDRAND

Vodafone identified the Vodacom Campus in Midrand, Gauteng, as the ideal location to host the telecommunication firm's Innovation Centre. The building is at the centre of tower and telecom experimentation, developing technologies appropriate to environments that are poorly served by conventional infrastructure and future-proofing technology for a resource-constrained future. The brief required that the building be a reflection of the activities that take place at the centre and that it embrace renewable energy, water sustainability and locally appropriate materials and technology.

Sustainable building features include:

- a gabion rock store below the building, where fresh air is cooled before it is released into the office space and later extracted into the courtyard for effective air change
- a solar absorption chiller for radiant cooling or warming via water pumped through a thermally activated slab, and providing cooled air to the office space so that no water-based heat-rejection systems are used
- wide pergolas for the installation of 292 photovoltaic panels, delivering 230kWh of solar energy to power the building (double the requirement of the SSIC's needs) with the balance fed back into the Vodacom campus, creating a zero-rated energy building
- LED lights throughout, with motion-detection sensors minimising energy use
- efficient water fixtures and fittings to generate significant savings in water consumption, treating grey water at an on-site wetland and reusing it for irrigation and toilet-flushing, and harvesting rainwater from the roof and using it for irrigation and toilet-flushing
- landscaping with xerophytic (suited to dry areas) indigenous water-wise plants
- re-using materials excavated from the site in the earthwork, foundations and landscaping
- implementing a recycling and waste-management system during construction to reduce the waste transported to dump sites (a similar system is in place for the operation of the building).

The building is at the centre of tower and telecom experimentation, developing technologies appropriate to environments that are poorly served by conventional infrastructure

CASE STUDY: PORTSIDE, CAPE TOWN

Portside, a R1,6-billion joint initiative by Old Mutual and FirstRand Bank, is the tallest building to achieve a 5-Star Green Star SA Design rating. Situated in Cape Town's CBD, it is 32 storeys tall and includes more than 52 000m² of office space. The 142m-high building comprises three floors of basement. On the upper and lower ground floor is retail space (including an FNB branch). There are seven structured parking levels, 19 floors of office space, two floors of dedicated plant room and the Sky Plaza.

Sustainable building features include:

- a facade in which each component has been unitised and marked so that it can be disassembled and re-erected on another site, should Portside be altered in the future
- using LED light fittings used throughout the office space and the parking garage, covering about 99% of the building, making Portside the first commercial property in South Africa to have a majority-LED lighting scheme
- movement sensors that control the air conditioning, and light sensors that adjust the lighting, further minimising energy use
- the recycling of grey water and the harvesting of rainwater, which is stored in a 500 000-litre water reservoir at the base of the building
- a series of electric-car-charging vending points, as well as wiring for additional points, for on-site recharging of electric cars
- 227 bicycle racks for staff as well as a number of community bicycle racks installed on the pavement for visitors, all aimed at encouraging alternative means of transport and supporting Cape Town's nonmotorised transport strategy and Ride Your City initiative.

THIS PAGE TOP TO BOTTOM Portside appears to be light, transparent, harmonious and unobtrusive despite its bulk, say DHK Architects; glass 'curtains' in the lobby area let in natural light and allow visitors to interact with the cityscape **OPPOSITE PAGE TOP TO BOTTOM** It is anticipated that Menlyn Maine's Central Square precinct will be awarded the first Multi-Use Green Star rating in South Africa; visitors to Menlyn Maine's Orion building will be greeted by a lightweight vertical garden screen on the western and eastern facades

AT A GLANCE

TOTAL FLOOR AREA: 68 940m²
TOTAL COMMERCIAL OFFICE AREA: 67 227m²
CAR PARKING AREA: 11 799m²
GREEN STAR SA CERTIFICATION: 5-Star (67 points), awarded in June 2013
BUILDING OWNER: Old Mutual Life Assurance Company, First Rand Bank
DEVELOPMENT MANAGERS: Eris Property Group, Old Mutual Property
MAIN CONTRACTORS: Murray & Roberts
SUSTAINABLE BUILDING CONSULTANT: Agama Energy
ARCHITECTS: DHK Architects, Louis Karol Architects

CASE STUDY: MENLYN MAINE, PRETORIA

Dubbed 'Africa's first green city in the making', the Menlyn Maine development, which is under construction in Menlyn, Pretoria, will offer a green mixed-use lifestyle precinct that focuses not only on energy efficiency but also on the reconciliation of natural, social and economic environments according to sustainability principles.

The development will comprise commercial, retail and upmarket residential and hotel space, all of which will overlook landscaped parklands. The layout will allow residents to walk or cycle easily and safely from one facility to the next.

Nedbank (the first commercial tenant to sign) claims that key to its occupancy in the precinct is the company's commitment to operating as a carbon-neutral business. The 16 300m² five-storey Nedbank building is registered for a Green Star SA Design rating.

Menlyn Maine is one of 16 'green cities' in the world to partner with the Clinton Foundation's Climate Positive Development Programme, an initiative created to support the development of large-scale urban projects that will reduce greenhouse gas emissions below zero in an economically viable manner.

Menlyn Maine aims to obtain a LEED Neighbourhood Design (LEED-ND) certification for its urban design. Developed in partnership with the US Green Building Council, LEED-ND is one of the only rating systems for green neighbourhood design worldwide.

Sustainable building features include:

- constructing all buildings to achieve a minimum 4-Star SA Green Star rating
- employing sustainable practices during the architectural and construction planning phases – including salvaging rubble from the 100 houses demolished on the site for re-use as building materials – and housing all the trees that previously grew on the original land for replanting later, in the new precinct
- building three bus stations that link to the Gautrain, the bus rapid-transit system and Pretoria's city bus service, to encourage the use of public transport.

AT A GLANCE

TOTAL COMMERCIAL OFFICE AREA: 140 000m²
TOTAL RESIDENTIAL AREA: 85 000m²
TOTAL RETAIL AND DINING AREA: 35 000m²
TOTAL HOTEL AREA: 15 000m²
TOTAL PARKLANDS: 5 700m²
GREEN STAR SA CERTIFICATION: Pending
BUILDING OWNER: Menlyn Maine Investment Holdings
DEVELOPMENT MANAGERS: Menlyn Maine Property Owners Association
SUSTAINABLE BUILDING CONSULTANT: Green Consultants
ARCHITECTS: Boogertman & Partners