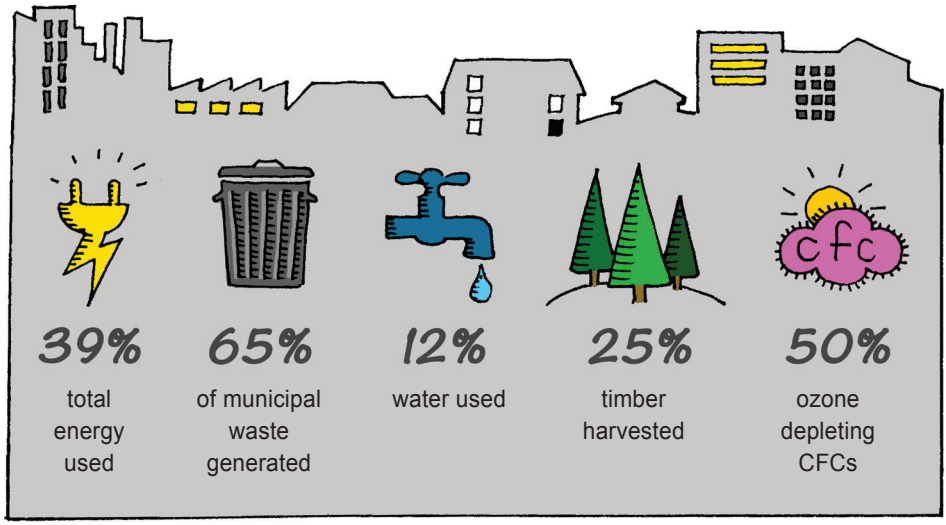
CITY OF CHOICE

PIETERMARITZBURG
MSUNDUZI

First Steps to Greener Buildings

The Msunduzi Municipality has compiled **Green Building Guidelines**, aimed at assisting general residents, property developers, architects, and facility managers in working towards a more sustainable urban form. It provides guidance on the better use of precious resources to create more liveable buildings and neighbourhoods. A copy of the guidelines can be downloaded from http://www.msunduzi.gov.za/ or http://www.iclei.org/africa.

Worldwide buildings account for:



What are green buildings?

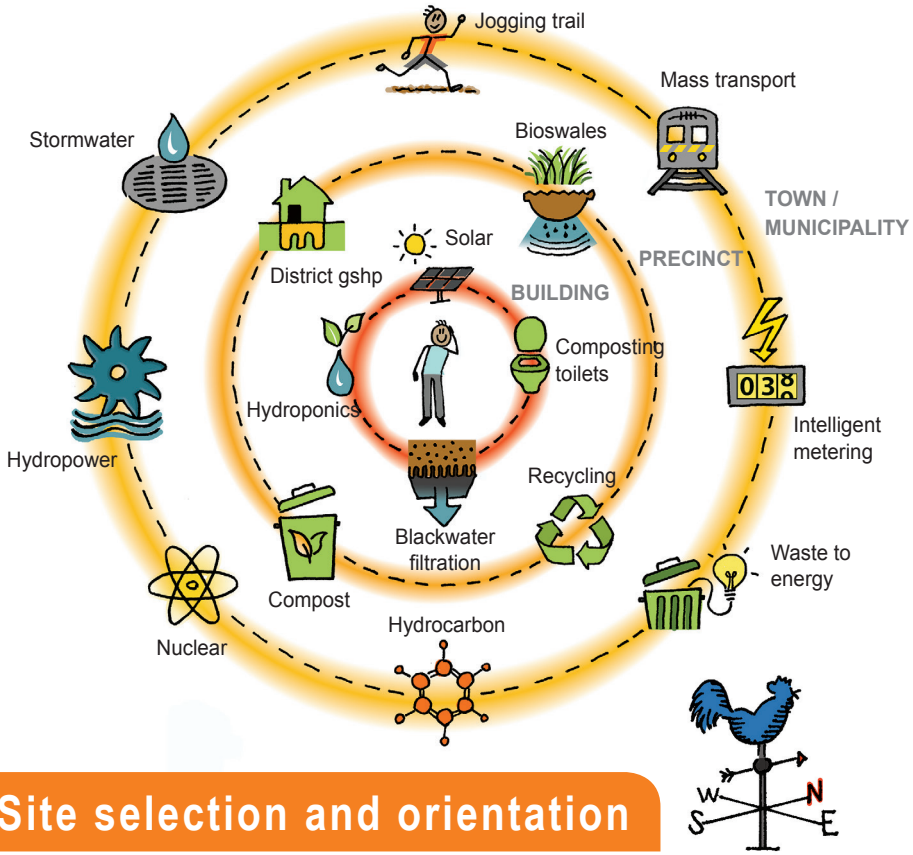
Green buildings are ecologically and resource efficient. They are designed, built, renovated, operated and deconstructed in such a way as to promote long-term benefits to owners, occupants to society as a whole. This involves reducing the environmental impact and improving efficiency and long-term economic performance of the building. In comparison to conventional buildings, green buildings generally result in a reduction of the water and energy requirements with less waste generated. The materials used have less negative impact on the environment and offer a better indoor environment for occupants. The operational and maintenance costs are generally lower, so green buildings are good for your back pocket, and reduce the overall impact of the built form on the environment.

Investing in energy-efficient technologies, alternate technologies, system upgrades or improvements to the building envelope may lead to an increase in the capital and construction costs. However, green buildings don't need to cost more than conventional buildings, and costs can be contained if green building principles are included from the onset into the design and construction of the building.

What can we do?

The early design and construction phase offers a huge opportunity to incorporate sustainable and efficient design and features from the onset. However, most old buildings can be retrofitted to improve their efficiency. This booklet provides a first introduction to green buildings, and outlines some steps that can be taken to green the buildings we live and work in. We hope that it will give you some food for thought and encourage you to explore this topic in more detail.

This booklet is divided into sections that are linked to the entire life of a building, from inception (site selection and design) through construction to the day-to-day operations of the building. To illustrate the principles in a practical way we focus on a residential home, thereafter we will have a brief look at other role players and the impact they can have, namely property developers, architects or other design professionals, and those in charge of running or managing commercial buildings (building or facility managers).



Site selection and orientation

The selection of the correct site and orientation of the building needs to be done from the onset. Site selection needs to consider the **ecological importance** of the land, and only sites outside of high water marks or 50-year floodplains should be considered.

The location and orientation of the building on site should promote the **preservation and enhancement of local biodiversity**, and if possible create links to movement corridors for fauna and flora.

When laying out the rooms, the **living areas should be located on the northern side** of the building, where they benefit from light and warmth especially in winter, and service areas such as bathrooms or the kitchen should be on the cooler southern side of the building.

Design and construction phase

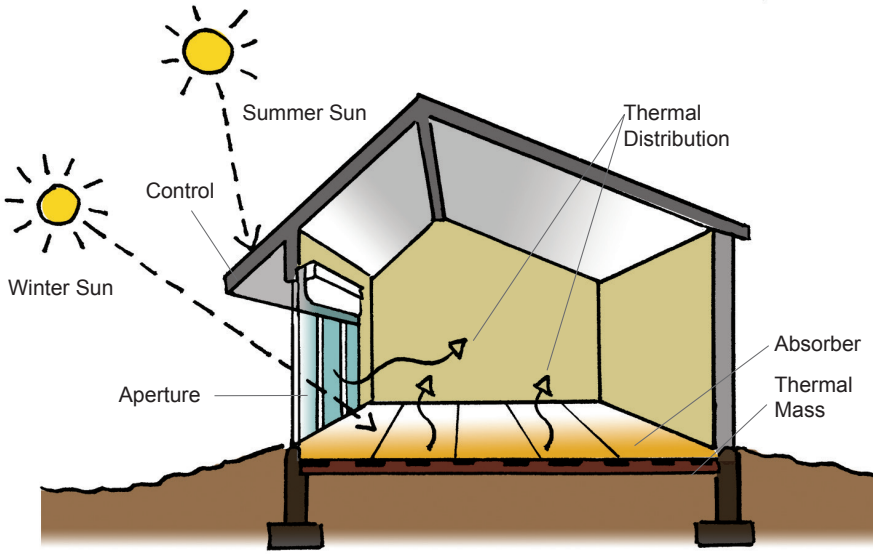
Overall design

All new buildings and major alterations need to comply with the **minimum construction and energy-efficiency requirements** as set out in the national standards (SANS 204 and 10400-XA). These requirements include the use of alternative energy sources for heating water, such as a solar water heater or a heat pump.

The following design principles should be included right from the start:

- Maximise **natural light and ventilation** with appropriate window size and allocation. The use of a skylight or a solar tube can help to bring natural light into dark areas.
- Install **insulation in the ceiling and walls** to reduce the internal temperature fluctuation.
- **Install insulation on the hot water pipes from the geyser** to reduce both energy and water costs.

Passive building designs



Material selection

Most conventional materials contain volatile organic compounds (VOCs) that release harmful gasses over time. When choosing paints, carpets, adhesives and sealants, as well as composite wood products, ensure that they have low or no emissions. Water-based paints with low or no VOCs are generally a good choice. If it smells like a new carpet, it is probably bad for you. Ensure that wood is sourced from a reliable supplier and certified by the Forest Stewardship Council (FSC) that it was sustainably harvested.

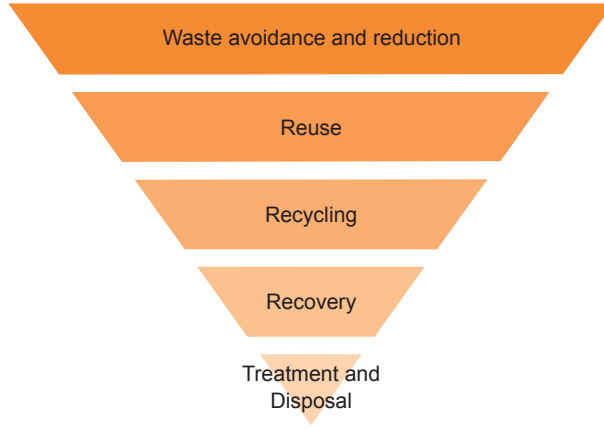
"Local is lekker" – request local materials and labour wherever possible

Waste

While municipalities are exploring ways to provide residents with kerbside recycling, we all have a responsibility to separate our waste. Residents are encouraged to have a three-bin system at their home and it helps if you can design the kitchen cupboard to accommodate this:

- Recycling: Items such as plastic, glass bottles, paper and tin cans that are clean and can be recycled.
- Organic waste: Items such as fruit and vegetables, tea bags, egg shells and other organic products should go into a compost heap or worm farm in the garden.
- Rubbish (waste to landfill): Including items that can't be recycled or are "contaminated" and will go to landfill.

The waste management hierarchy

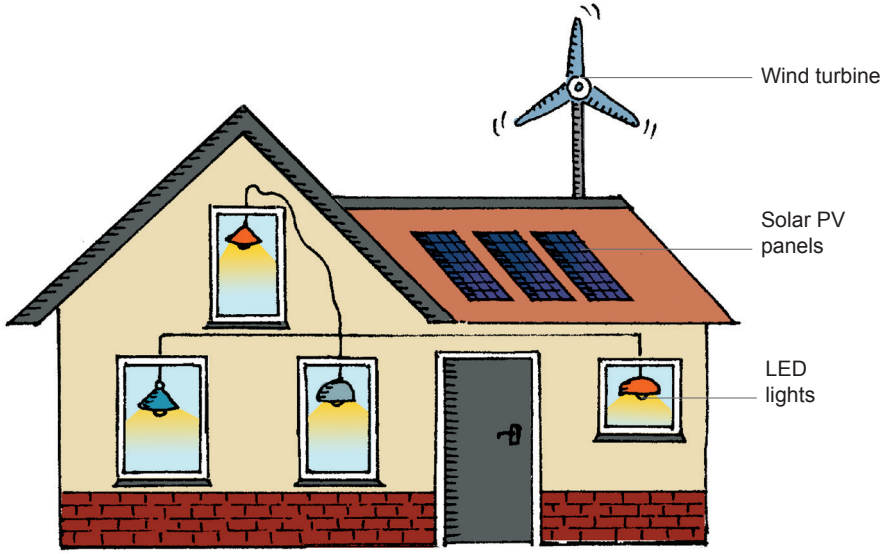


Energy

Electricity prices have doubled over the past 3 years in South Africa, and are likely to double again before 2018. Your monthly electricity bill reflects the energy consumed, and a few simple design features can offer ongoing savings.

- Provide a longer **roof overhang or install shading devices** (such as blinds or film) over the windows to reduce both glare and heat build-up.
- Install suitable **insulation** that will help to keep your home cooler in the summer and warmer in winter.
- Consider the use of **double glazed windows** to assist with temperature control of the internal areas where possible.
- Your geyser is most likely the largest contributor to your energy bill, so consider installing a **solar water heater or heat pump** for your hot water requirements.
- Install **energy efficient lights** such as LEDs, which provide better light quality at a lower consumption rate and last much longer and require less maintenance.
- Ensure appliances, such as fridges and washing machines, are **energy and water-efficient.** They will save water and electricity, which is good for the environment and your back pocket.

Consider installing **solar PV panels or a small wind-turbine** to contribute to your home's electricity needs. While energy supply remains constrained in our country, the cost of renewable energy is reducing and becoming a viable option.



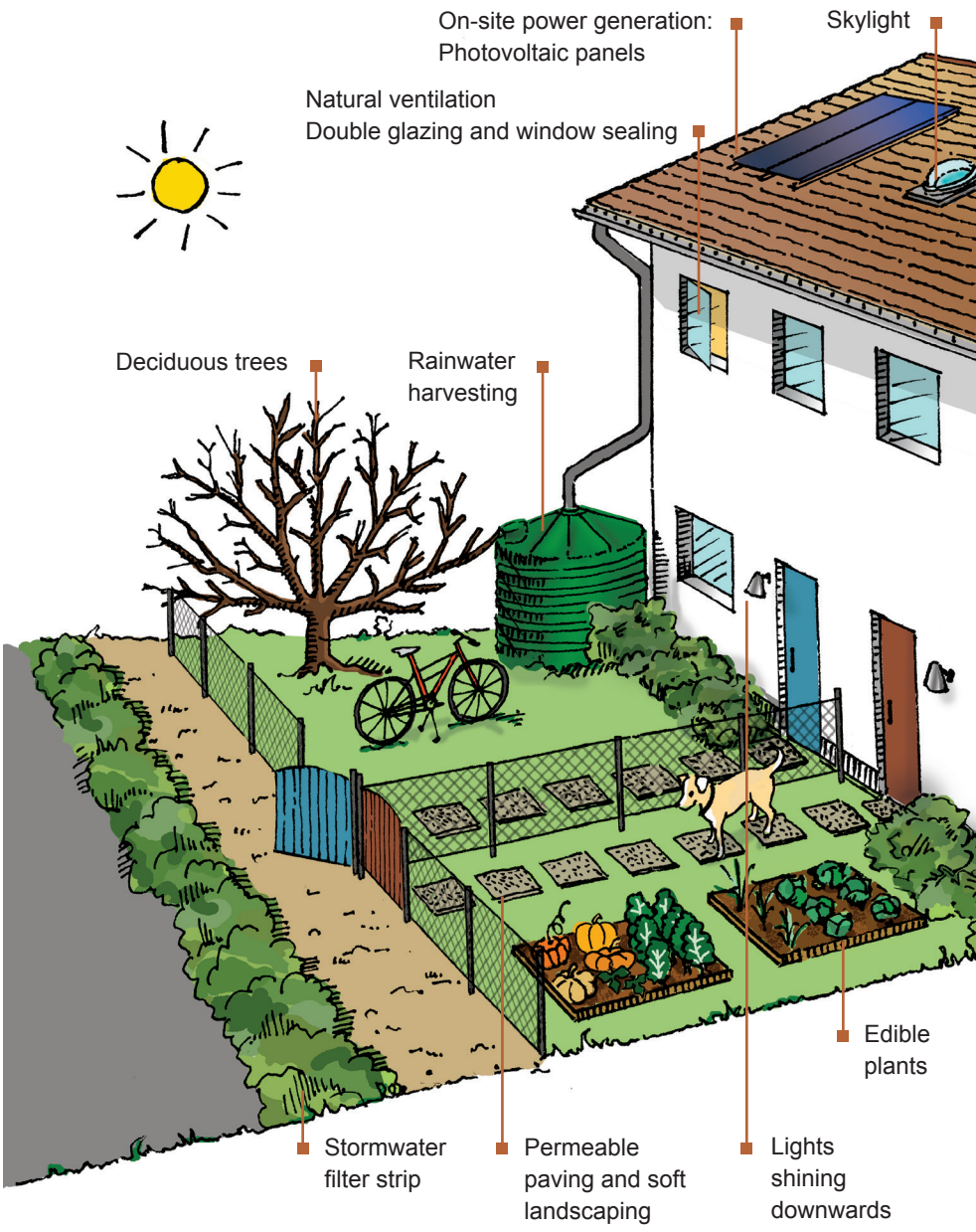
Water

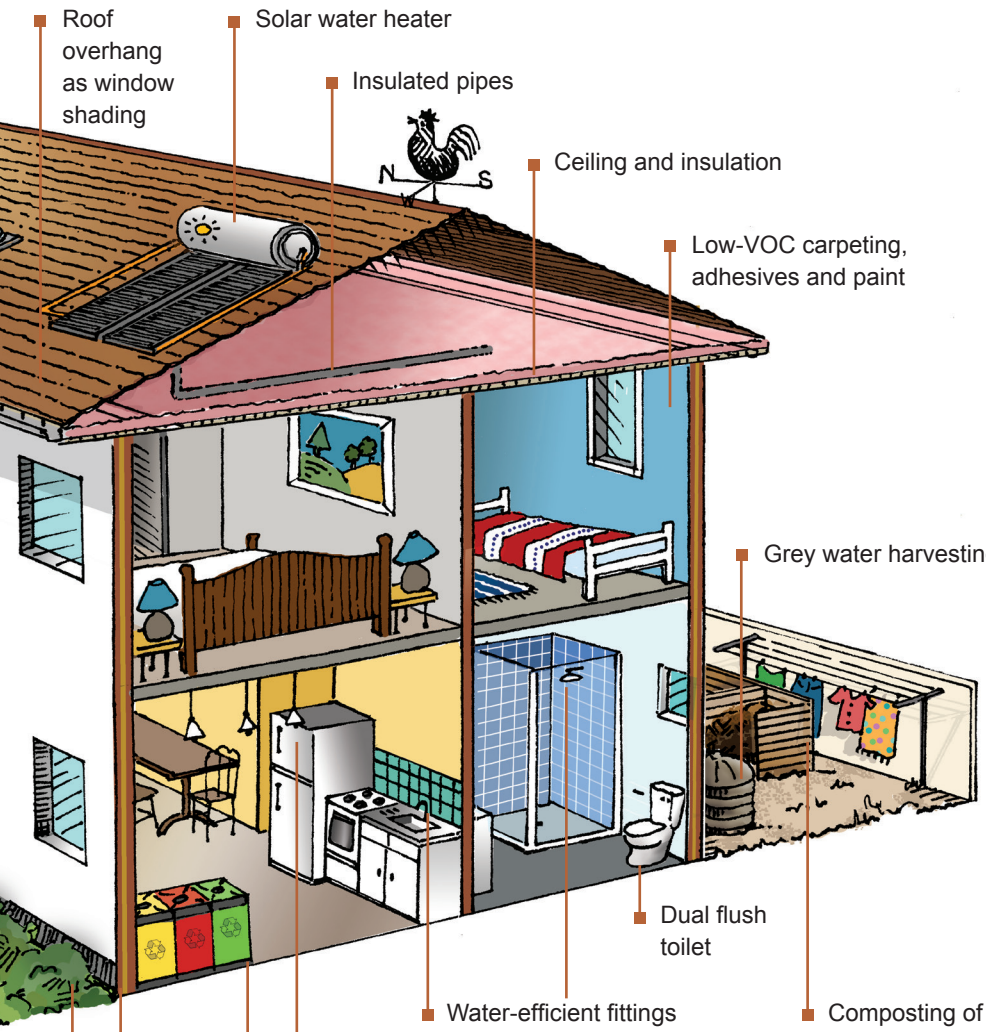
Installation of **water-efficient fittings**, such as a low flow showerhead or aerators on the taps, can greatly reduce your water consumption. A showerhead should use no more than 6 to 10 litres per minute, while taps in the bathroom and kitchen should use approximately 6 litres per minute. An inefficient toilet might require as much as 25 litres per flush, which can be reduced significantly to below 10 litres per flush through the installation of a **low flow or dual flush toilet**.

Connecting a **grey-water system** to your shower, bath and laundry outlets will allow you to reuse this water for irrigating the garden or flushing toilets. Where appropriate, the system can also be linked to a **rainwater harvesting system** using storage tanks.

If you have a swimming pool consider installing a **poolside tank**, where the backwash water is stored in a tank overnight with a flocculent, and then pumped back into the pool.

First steps for greening your home




Roof overhang as window shading
Solar water heater
Insulated pipes
N
S
Ceiling and insulation
Low-VOC carpeting, adhesives and paint
Grey water harvesting
Dual flush toilet
Water-efficient fittings
Composting of organic waste
Cavity walls
Energy efficient lighting and appliances
Three Bin System: - Recycling
- General
- Organic
Indigenous plants

External areas

Plant **indigenous plants** in your garden because they are suitable to local rainfall patterns and resistant to local pests. **Edible plants and food gardens** can provide food for you or your neighbours.

Consider ways to encourage **rainwater to go back into local green spaces** rather than directly to the stormwater system. The use of **permeable paving** and planted areas can assist with this.

Allocate an area of the garden for **composting organic waste from the kitchen or garden** and ensure that this is well maintained. You will need to turn it with a garden fork to aerate it and keep it moist. Compost adds nutrients to the garden soil and can greatly improve its quality over the long term.

External lights should be on a motion sensor and aimed towards the ground instead of the sky. This will help to reduce light pollution, which can disrupt nocturnal species and waste electricity.

Green Living: Practical things to do at home

The first step towards green living is to get organised. If you can't measure it, you can't manage it. Track your energy and water consumption to better understand usage in the home.

Energy

Switch off lights and appliances that are not required. Items that are left on standby or a charger that is left plugged in still uses electricity; vampire energy! Switch to more energy efficient lights like LED lights. Buy energy efficient appliances and dispose of the old ones responsibly at a recycling depot.

Water

Take a shower instead of a bath, and keep your showers less than five minutes. Don't water your garden between 10:00 in the morning or 4:00 in the afternoon and install a self-closing devise on your hosepipe. If you have a water-wise or xeriscape garden you will not require additional watering.

Waste

Reduce, reuse and recycle. These are the starting points for reducing waste to landfill and if you have a system at your home it helps to implement it in a practical manner. Try to implement a three-bin system with recycling, organic and waste to landfill. Remember to safely dispose of electronic waste, anything with a plug or battery. Left over paint, batteries and energy-saving compact fluorescent lights (CFLs) contain mercury vapour and should be disposed of as hazardous waste.

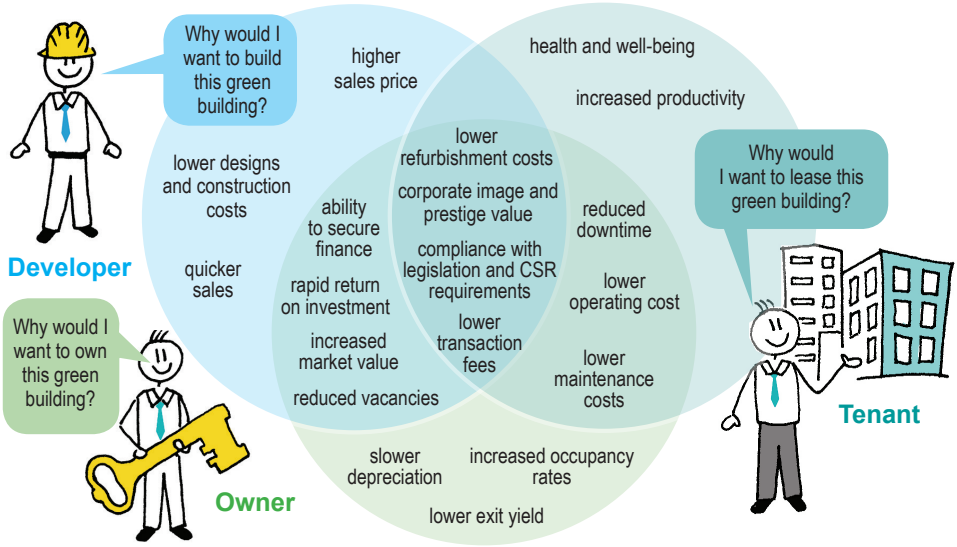
Beyond the basics

Over time you will realise that there is a lot more that you can do, such as planting a food garden, or reducing your reliance on private vehicles by lift sharing, walking, cycling, or using public transport. All of these actions will contribute to reducing your carbon footprint, saving you money and having a positive impact on the environment.

If you want to see what a typical family did to save energy and money at their home, visit the My Green Home website (www.mygreenhome.org.za). There you will find information on what you can do at your home, with short videos focussing on the key actions.

What can developers do?

Reasons for developing, renting or owning a green building rather than conventional building



Understand the business case

The costs involved in green construction have substantially reduced over the years because of the growing experience and cheaper costs of alternate technologies in the market. Internationally, green buildings generally cost no more than a 3 - 5% premium (of the total construction costs). Although, in many cases, they now cost the same as conventional buildings.

Compelling review of costs and benefits

A green building may cost more up front, but offers multiple advantages and savings over the life of the building, reflected through both tangible and intangible benefits. A great proportion of any cost premium may be balanced by the marketing benefits of a certified green building. Such buildings also offer significant operational and energy savings, enhanced indoor environmental quality, better daylighting, and improved health and wellbeing of the occupants. This may translate to increased productivity, staff retention, shorter hospital stays and greater retail sales.

These and other cost savings can only be fully realized when they are incorporated at the project's conceptual design phase with the assistance of an integrated team of professionals. The integrated systems approach ensures that the building is designed as one system rather than a collection of stand-alone systems.

Green premium vs brown discount

Five years ago, asset and portfolio managers were discussing the construction premium attached to building a green development. The rhetoric has now changed around, and it is widely accepted that buildings that are not smart and green, are unlikely to be resilient, and will be less attractive to tenants over time. As such, they are seen to be likely to attract a brown discount over time, with higher vacancies, lower returns and lower values.

For more information about the return on investment, refer to the Green Building Council of South Africa's 'Rands and Sense of Green Buildings', which contains evidence-based studies on the costs and benefits of green buildings, as well as local case studies, examples and anecdotal evidence.

What can architects and designers do?

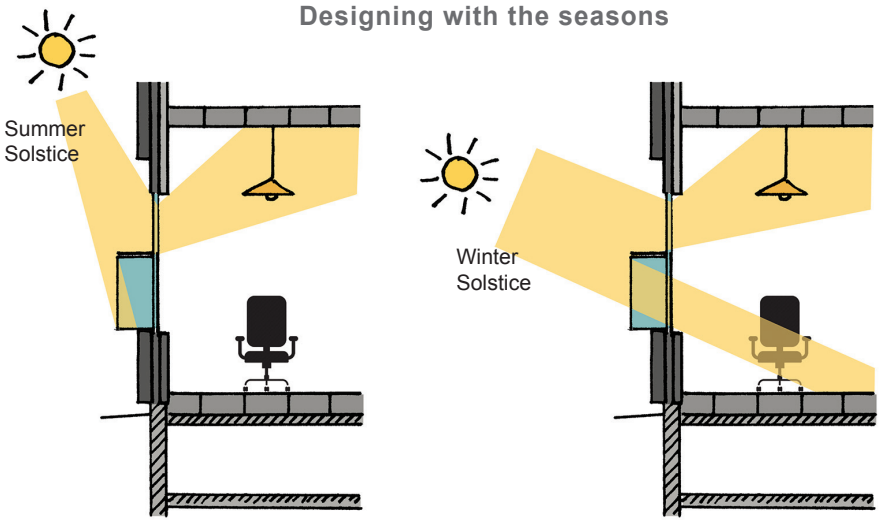
Whole systems approach

In practical terms, green building is a whole-systems-approach to building. Some items which should be considered from the onset include:

- Design for liveable communities and live:work:play environments
- Respond to the natural environment in the design
- Embrace public transport and active transport in design and layouts
- Use sunlight and the site to the building's advantage so as to maximise opportunities for natural heating and cooling, and daylighting
- Build quality, durable structures which are designed for disassembly or reuse over time
- Specify energy-efficient and water-saving appliances, fixtures and technologies
- Include thermal insulation and maximise natural lighting and ventilation
- Design for onsite energy generation (solar/wind/PV), rainwater harvesting and grey water reuse
- Incorporate durable, salvaged, recycled, and sustainably harvested materials
- Ensure internal areas are free of volatile organic chemicals (VOCs)
- Ensure air conditioning equipment uses refrigerants which are free of ozone depleting substances
- Landscape with local, drought-resistant plants and water-efficient practices

The Green Building Council of South Africa (GBCSA) developed the Green Star SA rating tools to provide an objective measurement for green buildings in South Africa and to recognise and reward environmental leadership in the property industry. Each Green Star SA rating tool reflects a different market sector including office, retail, multi-unit residential, public and education buildings, as well as others that are in development such as interiors and existing buildings performance.

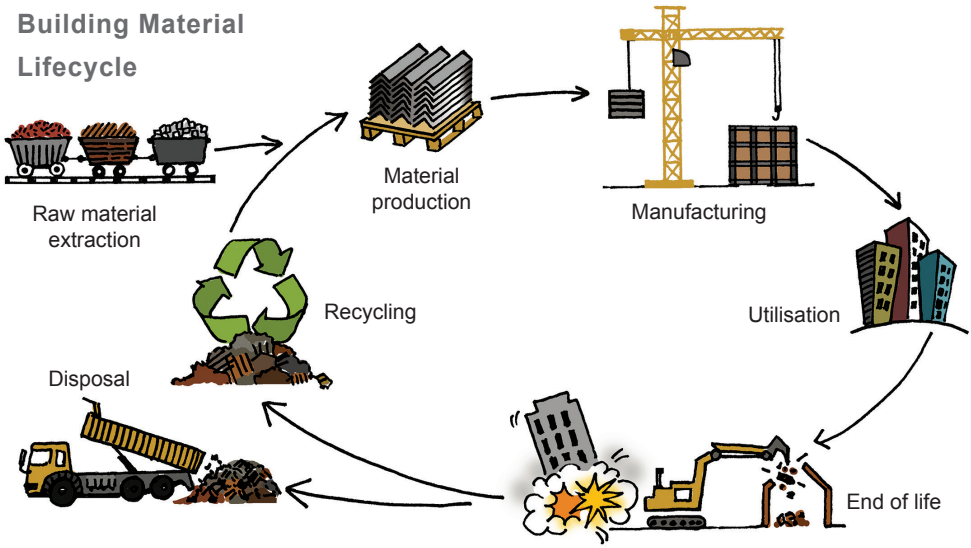
Interested persons can become a Green Star Accredited Professional through participating in a workshop and writing an online exam. For details on this visit the GBCSA website at www.gbcsa.org.za.



What can contractors do?

A large portion of the project's success lies in how well the building is built. Success may be measure by various metrics, such as attaining a certain Green Star SA certification level, implementing innovative strategies for occupants, or keeping the project within budget. The contractor has a significant influence over these outcomes.

Whether it is managing the materials and products used onsite, planning and implementing proper indoor air quality management strategies, or just overall effective project execution, the contractor has the ability to make or break a green building project. This requires the contractor and their trades to be knowledgeable about sustainability and the green building project they are working on.



Strive for ISO 14001 certification

As green buildings and sustainable construction methods gain traction, so too does the demand for local contractors to demonstrate their commitment to sustainability, to be able to add value to the process and to demonstrate a commitment to excellence. Key to this is environmental stewardship (ISO 14001 accreditation) and a good understanding of energy cost savings and life-cycle cost analysis.

Use healthy products and building practices

- A concerted focus needs to be placed on reducing and recycling construction and demolition waste.
- All wood used for scaffolding and formwork should have a high recycled content – preference should be given to reclaimed timber and certified wood.
- Reduce emissions by constructing buildings in an economic way.
- Understand the latest in green technologies, including equipment upgrades and resource-efficient issues.

Develop an understanding of Green Star SA

Contractors should consider sending some of their staff on the GBCSA 'Greenstar for Contractors' course, which equips participants with the necessary knowledge and education to implement best practice throughout the construction process. It is ideal for all those working on the coalface of constructing green buildings.

What can facility managers do?

Facilities managers have an important role to play in ensuring that the building delivers its full potential. They are responsible both for ensuring that buildings are operated the way they were intended to be, and for the upgrade and maintenance of building systems over time. In South Africa, we are seeing increasing numbers of high performing Green Star SA-rated buildings being launched, which tend to attract blue-chip tenants. This tenant-led demand for resource efficiency is placing pressure on existing buildings to improve their performance.

The first step it to develop a snapshot of how your building is operating. This gives you a starting point from which you can identify, prioritise and address building systems for improved resource efficiency. It is considered best practice to apply for a rating under the Green Building Council of South Africa's Energy and Water Benchmarking Tool. This tool allows facility managers to compare their building against similar ones and, so, help to motivate for capital and operating investments to upgrade equipment and systems.

Some easy win items which can be targeted include:

- Improved building insulation
- Focus on energy and water efficiency and water reuse
- Upgrading the HVAC system
- Tuning building systems and regular maintenance
- Waste management and recycling
- Integrated pest control

Further information

ICLEI Africa works with local governments to promote sustainable development and green buildings are an important contributer to low emission development in municipalities. The Green Building Council of South Africa is an independent non-profit company, which focuses on promoting green building practices across the country. They provide useful resources and training opportunities; visit www.gbcsa.org.za.

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URBAN LOW EMISSION DEVELOPMENT STRATEGIES

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UN HABITAT FOR A BETTER URBAN FUTURE

This project is funded by the European Union. The views expressed in this document can in no way be taken to reflect the official opinion of the European Union. This booklet was developed and written by Conscious Property Solutions, MCA Urban and Environmental Planners and Steadfast Greening as part of the Urban-LEDS Project. This booklet was published by Dogstar Design Studio.