CITY OF CAPE TOWN
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STAD KAAPSTAD

Smart Living Handbook

Making sustainable living and working a reality.

Making progress possible. Together.

Smart Living Handbook

Making sustainable living and working a reality.

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"We all have a responsibility to learn how to live and develop sustainably in a world of finite resources."

– ARCHBISHOP EMERITUS DESMOND TUTU, 2009

Introduction

Capetonians are at the heart of building a resilient city. We have emerged out of hundreds of years of racial oppression under colonialism and apartheid, and continue to grapple with the legacies of our traumatic past. Much work remains to be done, especially with regard to building city-wide social cohesion. At times, though, we have been able to come together to confront a collective challenge. This we proved again when we drove down water consumption during the 2016–2018 drought crisis – the worst the city region has experienced in recorded history.

We must reflect on and learn from our challenges, take new actions to improve resilience, and apply new knowledge and innovative solutions to future shock events.

Building our resilience supports the City's sustainability goals. Sustainability and the realisations of the United Nations Sustainable Development Goals (SDGs) are dependent on informed and empowered citizens.

This, in turn, requires resources and tools that educate, raise awareness and communicate ways and pathways for citizens to adopt more resource-efficient practices and to make more sustainable choices.

This *Smart Living Handbook* is one of the City's tools to guide Capetonians in becoming more resilient and live a more sustainable life. Every time you switch on a light, drive your car, run a bath or put out your rubbish, you're making a decision that affects the environment. Natural resources – water, coal, oil, land, fresh air – will run out if we consume them faster than they can replenish themselves. There are many indications that this is already happening. Households have a significant impact. To make sure that there are enough resources to go around – enough for both current and future generations – we need to manage our resources well, using what we have, efficiently and fairly.

For more information on the City's Strategies, Policies, By-laws and other key documents and the Integrated Development Plan (IDP), go to **www.capetown.gov.za**.

Many of us know that we should be doing this, but are often unsure about what to do and how to do it. This handbook aims to provide you with information and practical actions to implement – to protect the environment, save money and make your home a safer place to live in. Collectively, we can make a difference and become more resilient.

Background to the Handbook's creation

The City of Cape Town has a partnership with the City of Aachen in Germany that is specifically aimed at promoting sustainable development in a practical way. One of the partnership's projects implemented in Cape Town was the 21 Households Project with families from Khayelitsha, Manenberg and Wynberg. In the course of a year, households met monthly to learn about sustainable living through practical, interactive workshops and outings. Eco-audits were done in their homes at the start and end of the project to determine the main focus areas that had to be addressed, as well as the eventual impact of the training.

The project was a great success in the local communities. It was repeated in different areas, and in all instances, households felt that they had been empowered to make better decisions that would improve their lives and benefit the environment. The participating households believed that it was important to get the message across to the broader community, and suggested that the workshop notes be printed in a handbook format.

Subsequently, the *Smart Living Handbook* was developed by AMATHEMBA Environmental Management Consulting and Sustainable Energy Africa on the City's behalf. It was based on AMATHEMBA's *Home Environmental Management Guide Book* and Sarah Ward's *The Energy Book*, and was first published in 2007.

Minor updates and reprints were done in 2008 and 2009. In 2010, Steadfast Greening and Icologic undertook an extensive update and review of the handbook and compiled the complementary *Smart Events Handbook and Smart Office Handbook*.

In 2018, 2020 and 2023, the City again initiated an update by Steadfast Greening, with another two chapters, transport and heritage added. Additional complementary resources were also compiled, namely the Smart Living Audit Guide for Your Home, Smart Cooking and Home Safety Guide, Smart Living Audit Guide for Early Childhood Development Centres, and the Smart Driving Training Manual. The Smart office handbook and toolkit were developed in 2021 and updated in 2024.

The 2025 update was done internally by all relevant City of Cape Town departments, Water and Sanitation, Urban Waste Management, Sustainable Energy Markets and Environmental Management.

All of these resources, including the *Smart Living Handbook*, are available for download from **www.capetown.gov.za.** Search for Smart living.

How to use this handbook

We would all like to make good choices when it comes to managing our homes – good choices for our health, safety and pocket, but also for the environment. This handbook contains some useful information and handy tips to help you make the best choices to reduce your energy and water consumption and waste output. It also provides information on how to keep our natural world as strong and diverse as possible.

The handbook is divided into four chapters: Water, Waste, Environment, and Energy. The book contains a lot of information, so we recommend that you give yourself sufficient time to work through it. Attempting to read all the chapters together, and trying out all the new actions at once, could be difficult. Perhaps start with reading the summary of each chapter and decide which chapter interests you the most or will give you what you need to make smart decisions in your home, and then begin.

Different types of households are faced with different environmental issues. For example, high-income households may find that they are high consumers of electricity and need to explore ways to reduce their consumption.

Informal households, on the other hand, may face the biggest challenges around health and safety due to unsafe energy use in the home. If a section does not seem to relate to your issues, simply move on to the next one or explore and consider the issues facing you and your household.

Each chapter provides the following information:

- ✓ the key challenges relating to the resource;
- ✓ what the City is doing to manage the resource or issue;
- ✓ what you can do in your home to help conserve the resource; and
- ✓ contact information sources, and steps for implementation.

Activities and pictures are provided to help you interact with the issues, as well as for easy reference. Safety and health issues are also addressed in each

Campaign website:
www.capetown.gov.za/SmartLiving

of the chapters. And since community organisation and activity are vital for good governance, the handbook contains information on some interesting initiatives in Cape Town's civil society as well.

Guided by the information shared in this book, we can all make a difference by living smarter. Water and energy-saving products are available from most hardware stores and suppliers of plumbing or lighting devices in Cape Town. There are many waste recycling initiatives at schools and in communities, so consult your community newspaper for more details. Many "green" products are available locally – visit Cape Town Green Map at www.capetowngreenmap.co.za for more information. Our local nurseries are well stocked with indigenous plants and will be able to guide you on those best suited to your local area. Alternatively, contact Kirstenbosch for more information.

Play your part in making Cape Town more resource-savvy and resilient.

Acknowledgements

Compiling a book such as this requires research, input and advice from various sources. We are grateful to all who have contributed to the information contained in this handbook.

A special word of thanks goes to staff from the following City directorates and departments:

- ✓ Future Planning and Resilience Directorate: Communication Department
- ✓ Energy Directorate: Sustainable Energy Markets Department
- ✓ Water and Sanitation Directorate: Communications and Partnerships Department
- ✓ Urban Waste Management Directorate: Public Empowerment and Development, Urban Waste Management Departments
- ✓ Spatial Planning and Environment Directorate: Environmental Management Department

Water

Water is a scarce natural resource on which all life on Earth depends. We need to protect it and use it with care and respect. Providing water services in an urban context is complex, particularly in an area where rainfall is unpredictable. The City of Cape Town works with residents to ensure sustainable services, and to become an even more water-wise city.

Importance of water

Less than 3% of all water on Earth is fresh water, and only a small percentage (around 0,3%) of this is available for use as surface water in rivers and dams. Most of this easily available water is already being used and polluted by human activity.

Cape Town is one of hundreds of cities across the world affected by water scarcity brought on by climate change, and we face an even drier future. For greater water security, we can no longer solely rely on our rain-fed dams. This is why the City, too, is now getting its water from new sources, such as groundwater, reclaimed water and desalinated sea water, to ensure that we and generations to come can continue to live and thrive in our beautiful city.

Here are just a few reasons why water is precious:

- Every living thing needs water to survive. All people, plants, animals, insects and birds – all creatures – need water to survive.
- Water is important for our health. Every cell in our body requires it. We must constantly be adding fresh, clean water to our body in order to keep it properly hydrated. We can live for weeks without food, but only three days without water.
- Water is important for hygiene. We need it to wash our bodies and clothes, and keep our homes clean. From brushing our teeth, to doctors and nurses washing their hands, water is important for hygiene.
- Nature needs water. Plants need water and sunlight for photosynthesis, so that they can create their food. Agriculture requires water for crop irrigation and keeping animals hydrated. We need water to keep our gardens green and in bloom.
- Commerce and industry need water. Water is essential for commercial buildings, operations and manufacturing. Particularly heavy industries often use large amounts of water for cooling or in their operations.
- Water keeps us fit and entertained. Swimming, diving, water-skiing, surfing and sailing are some of the things you can do in water. Water-based sports are an excellent way to stay fit. Swimming, for instance, uses almost all the muscles in your body and provides a full-body workout.

For these and many other reasons, we need to use water with care and protect our water resources and infrastructure. This includes preventing wastage or pollution of water sources and our rivers, streams, canals and vleis (wetlands).

Introduction to natural and urban water systems

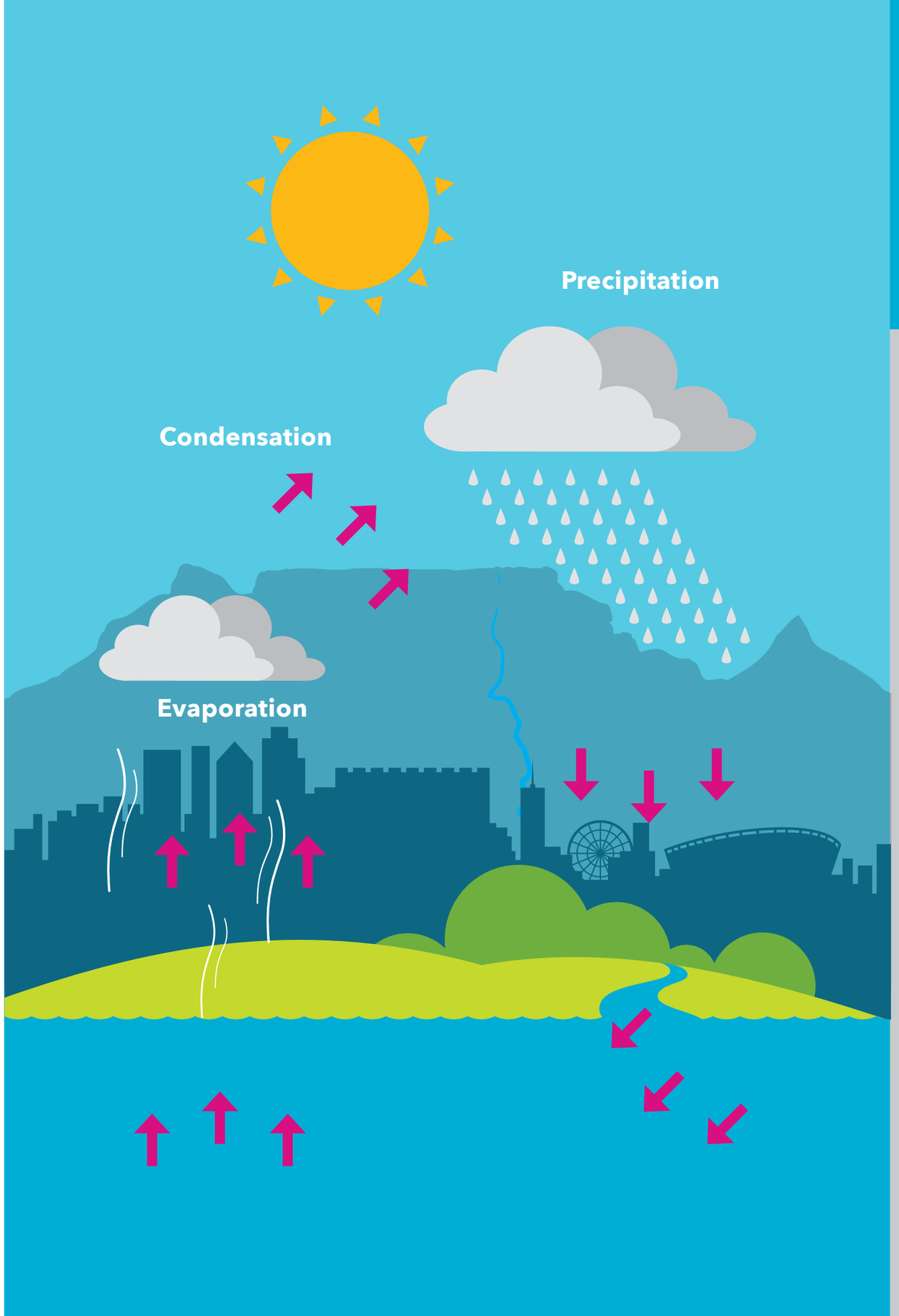
The water that runs from your tap has travelled a long way and is part of a much larger natural water cycle and urban water management system. Traditionally, Cape Town relied on surface water in the form of rainwater and other precipitation[1] in our catchment areas, flowing into our dams. But rainfall is increasingly unreliable, which is why the City is now diversifying its water sources to include groundwater, desalinated sea water and reclaimed water.

The natural water cycle and rainfall in the Cape Town catchment area

Water on Earth evaporates to become water vapour, which rises and forms clouds. When the water vapour cools, it condenses to become heavy raindrops, which fall down to Earth as rain. Along with rain, other types of precipitation include hail, snow and dew.

Your water can come from hundreds of kilometres away as water vapour that evaporated off our shores due to the sun's heat. Water vapour rises, cools and condenses to form clouds over the ocean and falls as rain on the mountains surrounding Cape Town. From there, it runs down mountain streams and rivers to be stored in one of the dams supplying Cape Town and surrounding areas.

Unlike most of South Africa, Cape Town receives most of its rain in winter. Typically, however, Capetonians have used more water in the hot, dry and windy summer months.



1 *Water Services and the Cape Town Urban Water Cycle*, August 2018.

Rainfall in the Cape Town metro is unpredictable and uneven, with areas on or close to mountainous terrain often receiving more rainfall. Clouds that form over the mountains when the southeastern wind blows also contribute to precipitation. Table Mountain's famous "tablecloth" dampens the top of the mountain, and this precipitation helps keep streams and springs flowing from the mountain for much of the year.

Some of the rainwater seeps into the ground to become groundwater and can be stored in naturally occurring underground water bodies called "aquifers". Other water gathers in streams, rivers or canals and is referred to as "surface runoff". This surface water flows down catchment areas and is collected in dams that supply our urban water needs.

The main catchment areas for Cape Town's dams are the mountain fynbos areas located to the east and northeast of the city, including the Hottentots Holland, Riviersonderend, Wemmershoek, Wellington and Porterville mountain ranges. Table Mountain is also a catchment area, although these days, it contributes less than 1% of Cape Town's total water supply.

Protecting our freshwater ecosystems

Not only do we live in a water-stressed country, but about 80% of South Africa's rivers are classified as threatened by urban development. We need to protect our freshwater ecosystems. Human activities, such as industry, settlement and recreation are popular along ecologically sensitive "green corridors", such as floodplains and wetlands, and should be carefully managed.

Water bodies, and particularly wetlands, play a very important role by controlling the flow of water, filtering impurities and replenishing groundwater. Wetlands naturally absorb greenhouse gases that are contributing to climate change. Natural vegetation in these areas should be protected, as it maintains biodiversity and reduces surface runoff, soil erosion and the risk of flooding. However, alien invasive vegetation is water-intensive and should be removed as far as possible.

Why are invasive alien plant species a problem?

Invasive alien plants directly threaten our water security, ecosystems and the productive use of our land. They intensify the impact of fires and floods, increase soil erosion and absorb enormous amounts of water before it can flow into our dams.

Examples of common alien plants that consume lots of water include the silver wattle, cat's claw creeper, oleander, Port Jackson willow, watercress, kikuyu grass, weeping willow and silky oak.

One adult black wattle tree, for instance, can consume up to 200 litres of water per day, while eucalyptus (gum trees) use even more because of their ability to grow deep roots (30-50 m) and suck up groundwater effectively.

Water in our City

The water supply system that serves Cape Town

A large water supply system brings water to your tap and deals with your wastewater in urban Cape Town.

Different spheres of government are involved. In terms of national legislation, the national Department of Water and Sanitation is responsible for water resource management. In Cape Town, the City, as the municipality, is both a water services provider and a water services authority, which means it is involved in both providing and managing water services. This is unusual compared to other South African municipalities.

From 1850, surface and spring water was stored to serve the growing population of Cape Town. With the Mother City falling in a winter rainfall region, storage had to be provided for the dry summer months. The City's 2019 Water Strategy contains information on Cape Town's water supply history.

Turn to **"Contacts and resources"** at the end of this chapter for a link to the strategy.

These days, Cape Town forms part of the Western Cape Water Supply System (WCWSS), which gets its water from a network of six major dams that supply the region. The WCWSS covers the West Coast District Municipality and the local municipalities of Drakenstein, Stellenbosch and Witzenberg. Cape Town uses approximately 61% of the WCWSS water, agriculture uses about 32%, and other smaller towns about 7,5%. The national department manages the three largest dams in the system, which contribute 85% of the system storage, while the City manages the other three. The system is connected through a complex set of pipelines, canals and tunnels that are managed jointly by National Government and the City to maximise water yield. Apart from the three large dams in the WCWSS, the City also manages eight small dams, 150 reservoirs, 164 water pump stations, 420 wastewater pump stations, 23 wastewater treatment works, 12 water treatmemt works 38 maintenance depots and 28 497km of water, sewer and stormwater pipelines.

The approximately 4 600 employees of the City's Water and Sanitation Directorate includes more than 1 100 operational staff who are on-call 24 hours a day, seven days a week. At the time of compiling this publication (2025), the City was serving more than 687 626 metered customers, growing at a rate of about 6 700 per year. Moreover, approximately 181 000 informal households were being served with different kinds of toilet facilities and standpipes close to their homes. Advanced pressure management reduces leaks and waste. Wastewater is reused where possible and safely discharged into about 860 kilometres of waterways the City manages, and into aquifer recharge points and out to sea.

What are our water rights and responsibilities?

Water rights

In terms of the Water Services Act 108 of 1997, all water service authorities must provide access to water and sanitation services that are efficient, affordable, economical and sustainable.

In practice, this means that everyone must be able to access the water they need, which, in South Africa, is a minimum of 25 litres per day. In Cape Town, low-income households classified as "indigent" are entitled to receive 6 000 litres of water per household per month at no charge.[2]

2 As at the time of compiling this publication. See www.capetown.gov.za for updated information.

All other households need to pay for what they use to keep water and sanitation services financially sustainable. The City's water webpage, "Think Water", contains more information on water tariffs and

Cape Town's shared water future

Having gone through a serious multi-year drought crisis, the City produced its Water Strategy in 2019. The document outlines the path towards a shared water future and lists the following five City commitments:

- safe access to water and sanitation, particularly for those in informal settlements;
- wise use of water;
- sufficient, reliable water from diverse sources of bulk water supply, including groundwater from aquifers, reuse and the desalination of sea water;
- shared benefits from regional water resources; and
- facilitation of the transition to becoming a "water-sensitive city" in the longer term.

The strategy is being implemented through a collaborative approach. Find the link to the Water Strategy under "Contacts and resources".

indigent classification. Consult **"Contacts and resources"** at the end of this chapter for a link.

The national requirement for water and sanitation services to informal settlements is one tap for 25 families within 200 m of any dwelling. In terms of communal and shared toilets, these must also be within 200 m of a dwelling as a minimum requirement. The City works towards a higher standard of one toilet for a maximum of five households, and one tap for 25 households, both within a maximum walking distance of 100 m. In situations of emergency relief, the City provides a "shared service", which is one tap for 40 households within a 200 m radius, and one toilet for 10 households.

Water responsibilities

To cover the cost of providing water and sanitation services, the City must generate enough revenue from consumers. Charges for the supply of water and wastewater removal and treatment are intended to cover the costs of operating, maintaining, upgrading and expanding the City's water and wastewater systems and services. Firstly, therefore, water users are responsible for paying for the water and sanitation services they use.

Secondly, you are responsible for using water wisely and carefully, especially in water-restricted conditions. This means maintaining taps, toilets, plumbing and pipes on your property to ensure there are no leaks, and fixing any leaks as soon as they are detected. Leaks are a waste of water that can run up a high cost. So, to prevent loss of water and your hard-earned money, monitor your water usage on an ongoing basis. This will help you detect a potential leak or unusual consumption early.

In the event of an underground leak or a leak not visible to the eye on the primary plumbing, the City can grant a rebate based on average previous consumption, among other factors. Apply for the rebate at one of the City's customer interaction centres (walk-in centres) that deal with payments. For a link to a list of City walk-in centres, see **"Contacts and resources"**.

Why tap remains tops in Cape Town

Cape Town's drinking water is of a very high standard, as most of it comes from largely unpolluted mountain catchment areas. The City has 12 water treatment facilities where water is consistently treated to the SANS 241 national standard for drinking-quality water.

Raw water entering treatment plants is constantly monitored and drinking water leaving the plants into the distribution network is tested every two hours. There are also approximately 250 sampling points across Cape Town. All water is tested in the City's accredited Scientific Services laboratory, which uses sophisticated water testing instrumentation and methods. For a link to more information on water quality, go to "Contacts and resources".

There is no reason why people should not drink tap water in Cape Town. Costing about R15 per litre, bottled water is expensive (considering that one litre of tap water in your home costs 6c – 8,5c).[3] The bottles also contribute to the waste sent to our landfill sites. Rather get your own reusable water bottle and refill it with our good-quality tap water.

3 According to 2024/25 tariffs. See the City of Cape Town's website for the latest tariffs.

Other responsibilities include:

- ✓ using alternative water safely;
- ✓ preventing pollution and sewer blockages;
- ✓ adhering to laws and by-laws; and
- ✓ reporting any water-related problems (see **"Contacts and resources"** for contact details).

To read more about your water rights and responsibilities, the City has compiled a summary guide to its water and other by-laws and regulations.

Turn to **"Contacts and resources"** to find out where you can download it.

Water meter reading

The City reads over 687 626 meters every month, using mobile handheld devices. Ideally, meter reading should happen each month, which then serves as the basis for calculating consumers' water charges according to current tariffs.

However, some meters are not accessible. If your meter cannot be read, whether due to a locked gate, aggressive pet or other circumstances, and you do not submit your water reading, your bill will be an estimate based on your previous water use. As soon as the meter reader is able to get an actual reading, all cost estimates are updated and, if necessary, corrected.

You can help the City get an accurate reading for your water meter by doing the following:

- ✓ Know where your water meter is.
- ✓ Ensure that the meter is not covered by sand or weeds, is accessible to City officials, and easy to read.
- ✓ If your water meter is behind locked gates, under a parked vehicle or in an area guarded by dogs, you can submit the reading yourself 11 times a year. Consult **"Contacts and resources"** for the relevant contact details. The 12th reading needs to be confirmed by a City meter reader.
- ✓ Alternatively, ask the City to relocate your meter to outside your property – check under **"Contacts and resources"** how to do so.

Our water footprint

Water is required to manufacture the goods we buy, produce the food we eat, and provide the services we benefit from. A "water footprint" is a measure of the total amount of water used to produce goods and services.

Let's look at the example of coffee. Somewhere in Kenya, a farmer needs to plant and nurture his coffee shrubs so that he can pick the beans. He requires water to feed his shrubs, which will, after three to five years of growth, produce beans that he can pick. The beans are then washed, roasted and ground to make coffee. They then need to be packaged and transported before being sold. All along the process of coffee manufacturing, packaging and distribution, water is required. By the time you pour yourself a cuppa, the water footprint to produce it already comprises approximately 140 litres.

The Water Footprint Network has more information in this regard. See **"Contacts and resources"** for their web address.

Water in your home

Household water-saving tips

Households consume some 70% of the water in Cape Town, making our homes a very important area of focus for saving water. We all need to incorporate wise water-saving habits into our daily lives to ensure that we adapt to our "new normal" – water scarcity. Any action we take to use water more efficiently makes a difference to the sustainability of our water resources. Remember, the more water you save, the less you pay – and the more water remains in our dams.

The residential water-saving tips in this section are based on Capetonians' experience during the recent drought crisis.

Toilet flushing and sanitation

- ✓ Only flush the toilet when necessary and do not use the toilet as a dustbin.
- ✓ Flush the toilet with greywater (laundry, bath and shower water) or another form of alternative water, such as rainwater, borehole or well-point water.[4] If you're using only alternative water, you can close the toilet stopcock (angle valve).
- ✓ Place a full glass bottle in your cistern to reduce each flush to a maximum of six litres (if you have no choice but to use municipal drinking water for flushing).
- ✓ Use less toilet paper to minimise the risk of sewer blockages.
- ✓ Use bleach or disinfectant to regularly sanitise toilets and surrounding areas, and keep hands sanitised to prevent health risks.

Body washing and personal hygiene

- ✓ Take short, stop-start showers. Wet your body. Turn off the tap. Wash with soap. Rinse quickly.
- ✓ No shower? Take a sponge bath. Use minimal water in a basin, bucket, bowl or washtub (waskom).
- ✓ Collect the water that runs while you wait for it to heat. Use that cold water wherever possible, or heat your water in a kettle or on the stove for a sponge bath.
- ✓ Collect as much bath or body washing water as possible and reuse for flushing toilets. Excess greywater can also be used for plants or washing vehicles.
- ✓ Do not let taps run for too long or at full flow. Use a cup for brushing teeth or shaving.

Laundry and dishes

- ✓ Only wash what is necessary.
- ✓ Wait for a full load before running washing machines and dishwashers. Some washing machine models even let you use the final rinse water for the next washing cycle.
- ✓ Washing laundry by hand can use less water than many washing machines, especially older models with no eco-cycles. Check your machine's usage.
- ✓ Use as little soap as possible to save on rinse water.
- ✓ Reuse rinse water for the next wash wherever possible.
- ✓ Reuse laundry water for flushing toilets.

Plumbing fittings and fixtures

- ✓ Fit flow restrictors on indoor taps to reduce the flow rate to less than six litres per minute, as per the City's current Water By-law.
- ✓ Install low-flow showerheads or fit a flow restrictor to your existing showerhead to reduce flow to a maximum of seven litres per minute, as per the City's current Water By-law.
- ✓ Reduce water pressure to your property by turning your stopcock lower and/or installing a flow restrictor on the main pipe connection from your meter.
- ✓ Find and fix leaks on your property.

Gardens and outdoor areas

- ✓ Use a broom and harvested rainwater to clean hard outdoor surfaces.
- ✓ Cover your topsoil with a layer of mulch to reduce evaporation. Mulch with materials like grass clippings, shredded leaves, bark chips or straw.
- ✓ Modify your gutters and downpipes to collect rainwater in containers.

4 Using water from alternative sources can pose health and hygiene risks. To stay safe, always keep your hands and surfaces clean and disinfected. Do not store greywater for more than 24 hours, as it can become a breeding ground for harmful bacteria. Also, store water containers securely, as children can drown in even small amounts of water.

Swimming pools[5]

- ✓ Fit a pool cover to significantly reduce evaporation.
- ✓ Recycle backwash water.
- ✓ Harvest rainwater and direct it to your pool for top-ups by attaching pipes or plastic sleeves to your gutters.

Other ways to save water

- ✓ Use minimal water for food preparation. For instance, do not run water to defrost or rinse food.
- ✓ Harvest as much rainwater as you can. Store in sealed containers in a cool place and use for cleaning floors, outdoor hard surfaces (such as verandas, decks, paths and driveways), windows and vehicles, washing laundry and flushing toilets. Do not use for drinking, cooking or bathing, as per the City's Water By-law.

Essential items for your water-saving kit

- ✓ Bleach or disinfectant to keep the toilet area sanitised when using grey/alternative water for flushing.
- ✓ Pipes or plastic sleeves for your gutters to harvest rainwater for pool water top-ups or water tank collection.
- ✓ Single-ply toilet paper to prevent sewer blockages.
- ✓ Waterless hand sanitiser.

5 At some water restriction levels, no municipal drinking water may be used for pools, ponds or water features. Note, however, that dirty, greasy water from dishwashing is not suitable for reuse.

Should you change your showerhead?

Before you decide to change your showerhead or fit a flow restrictor, you should know how much water your showerhead uses. In terms of the City's current Water By-law, no showerhead should exceed a flow rate of seven litres per minute.

To test the flow rate of your showerhead, you will need a bucket, a stopwatch with a seconds timer, and a measuring cup. Now follow these simple steps:

- ✓ Hold a bucket under the showerhead with a fully opened cold-water tap for 12 seconds. Although you want to measure the flow rate per minute, by doing only a fifth of a minute (12 x 5 = 60 seconds), you are saving water, and the bucket is not that heavy either.
- ✓ Measure the amount of water in the bucket (e.g. 1 800 ml, or 1,8 litres).
- ✓ Calculate the amount of water used per minute by multiplying it by five (e.g. 1,8 x 5 = 9 litres per minute).
- ✓ If your shower flow rate is more than the City's prescribed maximum of seven litres per minute, you should replace your showerhead. Anything more than 1,4 litres in the bucket in the 12-second test means your shower is wasting water.

Your “how-to” guide for fixing leaks

How to find and fix leaks

Finding and fixing leaks is an essential part of reducing water wastage. Repairing leaks on your property is your responsibility. By law, leaks must be fixed quickly, which will also save you money. Tenants or those without a dedicated meter should also take action to stop leaks, whether by fixing the leak themselves or notifying the property manager or owner.

A single dripping tap can waste 15–90 litres per day, which is enough to fill an average swimming pool in a year. A toilet leak wastes up to four times as much, or one average pool’s worth every third month. Many people do not realise they have water leaks in their home, allowing the water to go to waste for months or even years. This not only ends up costing you money, but also drains our dams unnecessarily.

While fixing a leak may cost a bit, it typically pays for itself very quickly, even within a month or two for a simple toilet, tap or geyser leak where a plumber replaces a washer. Payback is even faster if you do it yourself. To help you, the City has put together a handy DIY guide – page to **“Contacts and resources”** at the end of the chapter for a link that will take you to it.

So, you think you might have a leak at home? This is how to check and make sure:

- ✓ Stop all water use. Close all taps on the property and do not flush toilets.
- ✓ Check and record your meter reading.
- ✓ Wait 15 minutes and take another reading. Make sure nobody has opened a tap or flushed a toilet since you first noted the meter reading.
- ✓ If there is a difference, you have a leak to fix.

In most instances, locating the leak is easy, if you know where to look. Always check the basics first – toilets, hot-water cylinder (geyser) overflow pipes, as well as taps. These are the most common.

Checking for a toilet leak

If you have identified the toilet as the culprit, check for the cause. Remove the cistern cover and look at the water level inside:

- ✓ If the water is at the same level as the overflow pipe or is flowing into it, the water level is set too high, or the float valve is leaking and needs to be replaced (see page 26-27).
- ✓ If the water level is below both overflow pipes, the flush valve is leaking. Alternatively, the flush valve may be worn or perished, causing water to leak into the bowl. Replace the flush-valve washer (see page 26-27).

Setting the correct water level

If there is water flowing from your overflow pipe, this means your water level is set too high. This may be fixed by lowering the float-valve setting in one of the following two ways:

- ✓ **Method 1:** Close the isolating valve (stopcock), remove the split pin and lift the float arm from the cistern. Bend the float arm slightly downwards. To prevent damage, hold the arm with one hand while bending it with the other. If the float arm is old, it may be brittle and break easily, so be careful. When you are putting it back, make sure it fits in correctly. Finally, reopen the isolating valve and check that the new water level is lower.

Checking for a toilet leak

- ✓ **Method 2:** If the valve is fitted with a screw-type adjuster, turn the screw to lower the float slightly. The water should rise to a level below the overflow, and the float valve should close off. If this does not happen and the water level continues to rise, causing the cistern to start overflowing again, the float-valve washer needs replacing (see how in the next section).

If you can't afford to call a plumber right away to fix a serious toilet problem, use the little stopcock (angle-valve) tap at the base of the toilet to keep it turned off between flushes.

Replacing the float-valve washer

Step 1: Close the isolating valve to shut off the water supply to the toilet.

Step 2: Remove the split pin and the float arm.

Step 3: Unscrew the cap.

Step 4: Remove the plunger by using water pressure to push it out. (Open the isolating valve slightly.)

Step 5: Unscrew the brass plunger to remove the washer held inside it.

Step 6: Fit a new washer. Reassemble the parts by working your way back from the fourth to the first step above.

Step 7: Open the isolating valve slowly and check that the float valve closes when the cistern is full.

Replacing the flush-valve washer

Step 1: Close the isolating valve to shut off the water supply to the toilet. Remove the split pin and the float arm.

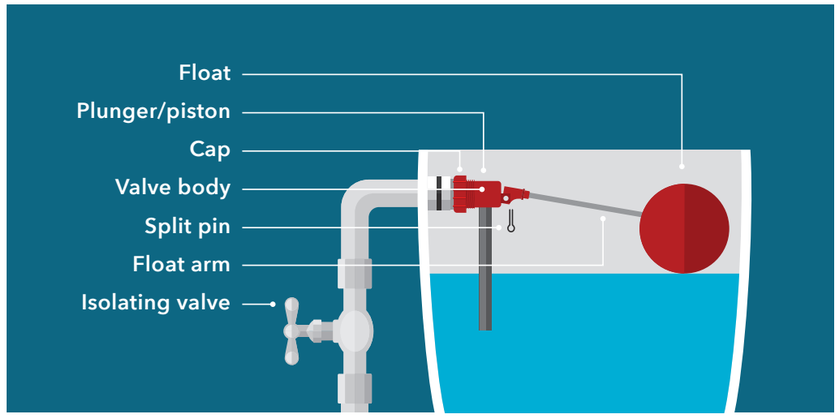
Step 2: Remove the spindle assembly. Be careful not to break the mechanism.

Step 3: Unscrew the bottom flange and remove the washer (remember which side this washer faced for when you fit the new washer). Work gently. If you cannot remove the top part of the flush valve, call a qualified plumber.

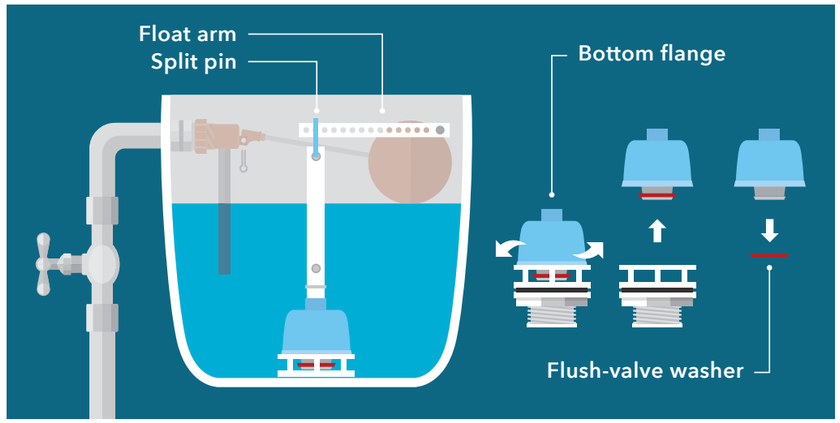
Step 4: Install a new washer with the sloping side facing upwards. Reassemble the parts by working your way back from the third to the first step above.

Step 5: Open the isolating valve slowly and check that there are no more leaks.

Replacing the float-valve washer



Replacing the flush-valve washer



TIP: Different manufacturers use different mechanisms. To ensure that you get the correct replacement washer, take your existing old washer along when visiting the hardware store.

Checking for a leak in the hot-water cylinder

Like toilet cisterns, hot-water cylinders (geysers) have an overflow pipe.

Most modern geysers are high-pressure with thermostat control and are fitted with a pressure-reducing valve. It is normal for water to drip from the overflow pipe, which is connected to an expansion relief valve. Water expands when heated, so a small amount is released through this valve to relieve the pressure inside the cylinder and prevent it from bursting. The drip could continue for an hour or more, losing up to two litres a day. However, this should stop when the temperature stabilises. Instead of wasting this water, the overflow can be directed to the garden or collected from the pipe to water plants. However, if it drips continuously, or the leaking is excessive, call a qualified plumber.

A gravity-fed (non-pressurised) cylinder has a float valve much like that found in a toilet cistern to control water flow. This can be adjusted to correct the water level and reduce water overflow. If worn, the float-valve washer needs to be replaced.

Both high-pressure and gravity-fed geysers are complex and can be very dangerous. The City recommends that you call a qualified plumber once the leak is found. For your convenience, the City has compiled a list of registered Cape Town plumbers – get the link to the list under **"Contacts and resources"**. Please note, the City cannot be held responsible for any work done by any listed plumber.

Replacing a tap washer

Check all the taps in the home and garden for drips. A dripping tap usually means the washer needs replacing. This is how to do it:

Step 1: Close the main isolating valve or the isolating valve linked to the tap, then open the tap fully.

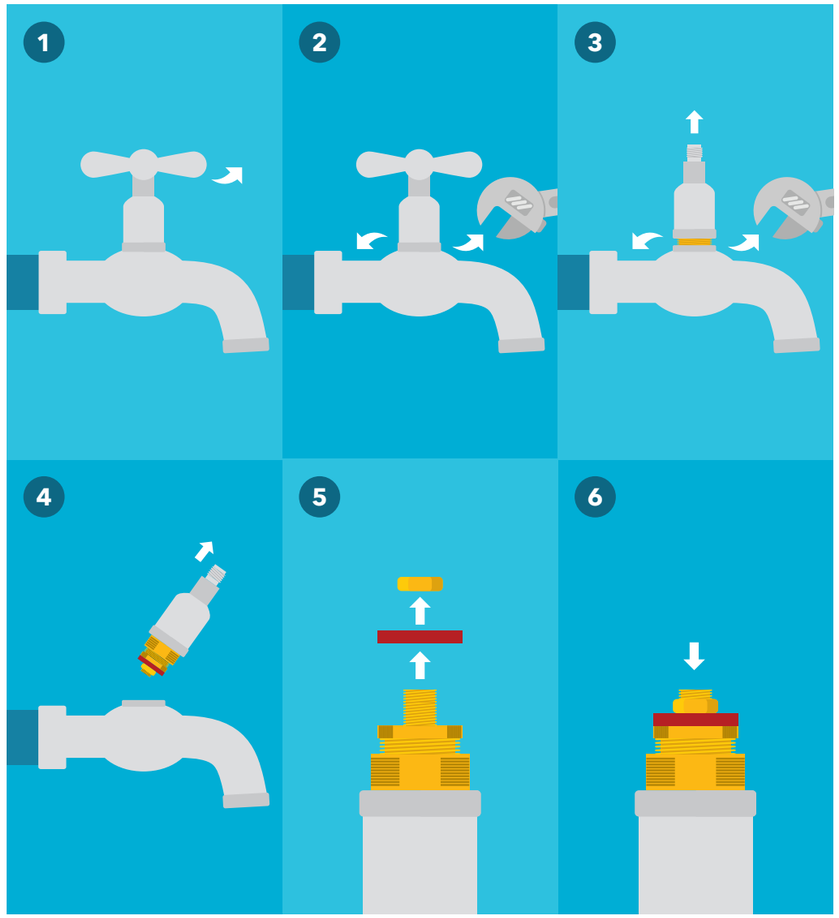
Step 2: Unscrew the cover. When unscrewing the tap, wrap a cloth around it to prevent it from being scratched.

Step 3: Unscrew the spindle.

Step 4: Remove the spindle.

Step 5: Unscrew the washer-retaining nut and remove the washer.

Step 6: Fit a new washer and replace the nut. Make sure that you have the correct washer size for the tap.



Step 7: Reinstall the spindle and screw down the cover.

Step 8: Close the tap, open the water supply slowly and check for leaks again. Do not overtighten the tap, as the new washer is softer and is easily damaged.

NOTE: Some taps are mixed with hot and cold supply controlled from a single lever, usually at the base of the tap. These and some other kinds of taps may not have washers, but rather integrated modules that need to be replaced. These are often specific to the tap manufacturer and model. For leaks from these and other taps without washers, it is best to call a qualified plumber.

Checking for underground leaks

Unless you are confident of an underground leak, check above ground first – toilets, taps and geysers. As soon as you go underground, the costs and complexity increase.

Some underground leaks are easy to detect, while others are more difficult. An unnaturally green patch in the garden, damp patches in walls or hardened surfaces, as well as bubbling and flaking paint or plaster near the ground may all indicate a leaking water pipe. But even if you see these signs, the leak itself can be hard to pinpoint.

Consider the following when dealing with a suspected underground leak:

- ✓ Has there been recent building or landscaping activity on or near the premises? This may give you a starting point for your search.
- ✓ If you were to find the leak in an underground pipe, would you be capable of properly replacing pipe sections or fittings to fix the leak yourself? If not, rather consider calling a qualified plumber to locate the leak for you as part of the repair job.

Most underground leaks are not a typical DIY job. Once you are sure that all other possible leak sources above the ground have been addressed, but you continue to lose water, it might be time to contact a qualified plumber. However, giving the plumber a likely starting point to find the leak may be helpful and could lower the cost of the repairs. Sometimes, it may even be necessary to call in the services of a leak detection expert to find the leak using sophisticated equipment.

Make potential leaks more visible

A slow toilet or geyser leak might be difficult to spot. Your cistern and geyser overflows can serve as an early warning, so make these visible:

- ✓ Toilet cistern overflow often goes into the toilet bowl, where it cannot be easily seen. Instead, overflows should be directed outside the building, where you can see it.
- ✓ Geyser overflows or leaks from expansion valves, pressure relief valves and drip trays are often hidden. Direct any overflow outside into a tank for collection and reuse. There must be a visible air gap between the overflow pipe and the tank so that excessive overflow will be clearly visible, and action can be taken.

Frequently asked questions

How do I shut off the main water supply?

The main tap (stopcock) to your property is the main isolating valve. This is what you turn off to stop the water supply when you need to fix a leak. It can be in the form of a stopcock or a ball valve located on the pipe on your property, between the meter and the house. Since the pipe is usually laid underground, it can develop underground leaks. Always keep the area around the stopcock clear and clean to ensure immediate access should you need to shut off the water supply to your home.

Who is responsible for repairing leaks?

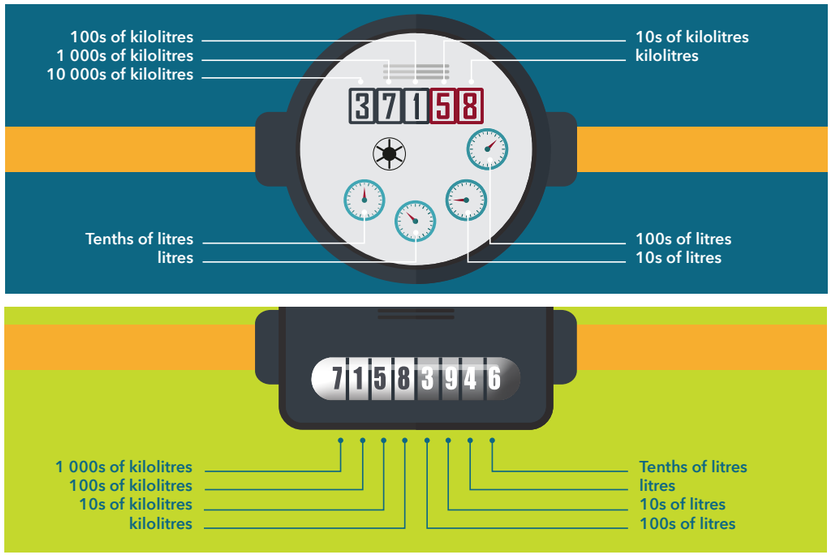
When the water meter is located outside the property, the City will repair the leak if it is at the meter or on the underground pipe up to the boundary of your property. The owner or occupant is liable for all repairs inside property boundaries. When the meter is located inside the property boundary, the City will repair the pipe up to the inlet side of the meter, and the meter itself. Please ensure that the City has safe access to this pipe and the water meter.

Why is it important to open stopcocks and isolating valves slowly?

A stopcock or isolating valve is designed to allow a gradual closing of the supply. If the stopcock is closed suddenly, you may hear a slamming or banging noise in your water pipes. This is called “water hammer” and is caused by a sudden change in water flow. With time, this can loosen brackets holding the pipes and increase the likelihood of leaks. A stopcock should be closed with care, and only when essential.

I have fixed all the leaks. How else can I reduce my water consumption?

There are many ways to use even less water in most households and workplaces. The biggest uses indoors are typically personal washing, flushing toilets and washing laundry. So, take very short showers, reuse your water, only flush when necessary and install efficient showerheads and taps. Gardens and pools also use a lot of water, so cover your pool and plant water-wise vegetation.



How to read your water meter

Reading a water meter is simple. Open your water meter box. If it is locked, the City meter reader can unlock it when (s)he comes around next to read your meter.

Your meter will likely be one of the two kinds illustrated above. Both record the same information, but display it slightly differently.

The one kind has a set of numbers at the top, and some round dials (top illustration). The other kind has numbers only, and no round dials (bottom illustration). There are various makes and models, but all have these basic features.

When monitoring your meter reading to confirm a leak, look for where the meter shows movement of the smallest volumes of water used, indicated by litres or fractions of litres. If there is a leak, and you have stopped all other water usage in the house, you will likely notice a change in the small volumes during the 15-minute monitoring period. On the face with round dials, the small volumes are indicated by the dials for litres (0,001) or tenths of litres (0,0001). On the meter with numbers only, look to the far right of the set of numbers, where the litres (second from the right) and tenths of litres (furthest to the right) are.

How to find a plumber

If it is not a simple job that you can do yourself, you may want to call a plumber. Always work with someone who is properly qualified and registered, such as those listed in the City's plumbers register (see **"Contacts and resources"**). Note, however, that the City cannot be held responsible for any work done by any listed plumber.

Once you have secured a City-registered plumber, ensure that quality, SABS-approved materials are used for any repairs. The Joint Acceptance Scheme for Water Service Installation Components (JASWIC) has issued lists of accepted plumbing materials, which you should consult.

If you can neither afford a plumber nor fix the leak yourself, keep the main tap (stopcock) off between water usages.

Turn to **"Contacts and resources"** for the web address.

Safe use of greywater

One way to save water and money is by reusing some water. Typically, 50–80% of indoor water used in the home can be reused as greywater. However, as greywater often contains harmful bacteria, it does pose some significant health and hygiene risks that need to be well managed to prevent disease.

NOTE: This section applies to greywater that is used within 24 hours and for general (manual) "bucketing" use in, for example, formal dwellings, businesses, sports and other clubs, schools and places of worship. If greywater is stored for longer than 24 hours, it needs treatment, such as filtration and disinfection, as advised by a specialist.

The information is also intended specifically for urban consumers and is always subject to users' own safety checks and discretion.

What is greywater, and what IS not?

Greywater is untreated wastewater that comes from baths and showers (body washing) and handwash basins. Laundry water from washing machines or handwashing qualifies only if environmentally friendly detergents were used. Depending on the source, greywater can contain:

- ✓ bacteria;
- ✓ pathogens;
- ✓ organic material;
- ✓ oil and grease;
- ✓ soap and detergent residue;
- ✓ pesticide residue;
- ✓ dirt;
- ✓ lint;
- ✓ sodium;
- ✓ nitrates and phosphates;
- ✓ high salt and pH levels;
- ✓ bleach; and
- ✓ hair and skin particles.

This makes its safe use essential.

Greywater is **not** toilet water (which contains faecal matter and pathogens) or water from spas, jacuzzis and pools. Water from kitchen sinks and dishwashers contains grease, fats, oils, bacteria, food and other solid particles, and must therefore not be reused.

General rules for greywater use

Greywater is used entirely at the risk of the consumer. The City cannot be held liable for any consequential damage or loss arising directly or indirectly from the use of greywater.

✓ Do …	⚠ Do not …
✓ sanitise your hands after using greywater.	⚠ store greywater for longer than 24 hours, as this will lead to bad odour, slime build-up and health risks. If you do, the water needs filtration, disinfection and treatment, as advised by a specialist.
✓ use environmentally friendly detergents and soaps wherever possible.	⚠ use greywater if any household member is sick.
✓ see the City's guide for the installation of alternative water systems (see "Contacts and resources") and consult a specialist if you plan on installing an alternative water system that requires plumbing work (e.g. a borehole).	⚠ reuse nappy-washing water.
	⚠ allow children and animals near greywater.
	⚠ ever ingest or swallow greywater.
	⚠ spray greywater, as spraying disperses and spreads pathogens.
	⚠ allow greywater to leave the property and flow into stormwater drains, streams or rivers.
	⚠ use already reused greywater for anything else.

Source of greywater	Possible contents	Use
"Warm-up"/lag water Cold water that runs while waiting for hot water from taps or showerheads.	This is still good-quality water and poses a low risk if used immediately, collected in clean, sanitary containers, and not combined with other water sources. Not recommended for drinking. If it has made contact with human bodies or potentially unclean surfaces, it is seen as greywater.	✓ Flushing toilets ✓ Cleaning indoor surfaces ✓ Laundry ✓ Dishwashing
Shower and bath water	Bacteria, hair, organic material, skin particles, lint, oil and grease, soap and detergents	✓ Flushing toilets* ✓ Cleaning vehicles* ✓ Garden irrigation*
Laundry water – from washing machine or handwashing The rinse water from a washing machine cycle has the lowest risk if you can capture it separately from the general water. Preferably use to wash vehicles, as other greywater can leave a residue. Rinse water can also be used for the next wash cycle.	Dirt, lint, organic material, oil and grease, sodium, nitrates and phosphates (from detergent), high salt and pH levels, bleach	✓ Flushing toilets* ✓ Cleaning vehicles* ✓ Garden irrigation*
Handbasin washing water	Bacteria, organic material, oil and grease, soap and detergent residue	✓ Flushing toilets* ✓ Cleaning vehicles* ✓ Garden irrigation*
Vegetable and fruit-rinsing water	Bacteria, organic matter and pesticide residue	✓ Flushing toilets* ✓ Cleaning vehicles*

* Use with caution, as indicated in the next section.

Using greywater safely for flushing toilets, cleaning vehicles and garden irrigation

The following table provides an overview of the conditions for using greywater for flushing toilets, cleaning vehicles and garden irrigation.

Use	Conditions of use to reduce risk
 **Flushing toilets**	✓ Use a jug, and carefully pour greywater directly into the toilet bowl. Avoid splashing, as it may spread germs and bacteria through the air, particularly from faecal matter. Keep the toilet and surrounding area disinfected. ✓ If you are using jugs or buckets to manually flush the toilet, do not pour it into the cistern, as the greywater can flow back into the drinking water system and contaminate it. That would be a health hazard for people on your property, as well as others in the area. Even if you have turned off the angle valve/stopcock, which is usually at the base of the toilet, this will not prevent backflow. If you have a greywater system installed, the drinking water supply should be completely disconnected from the toilet. ✓ Regularly check for leaks, as greywater can clog up the valve mechanism.
 **Cleaning vehicles**	✓ Exercise discretion when using greywater to wash vehicles, as very soapy water may leave a residue. ✓ Environmentally friendly detergents, soaps and shampoos must be used in the washing machine or shower if this water is to be reused. This prevents harmful chemicals from entering and contaminating the stormwater or surface water systems. ✓ If possible, wash your vehicle on a permeable surface (grass or dirt), away from any surface water, so that the water does not run off hard surfaces (driveways, roads and pavements) into stormwater systems. The runoff may contain oils, dirt and hazardous chemicals, which are harmful to water systems and the environment.

 **Irrigating food gardens**	✓ Prioritise the use of low-risk greywater, such as the rinse water from the washing machine. ✓ Always ensure that greywater never touches the above-ground part of fruit or vegetable plants being grown (e.g. the leaves and stems). Water the roots only. ✓ To avoid direct contact with edible food plants, use drip irrigation with a thick layer of mulch on top. Do not use greywater on leafy vegetables (e.g. spinach) and root vegetables (e.g. carrots). ✓ Always wash fruit and vegetables before food preparation and cook root vegetables first if they have had (sub-surface) greywater irrigation. Avoid hosing, spraying or misting irrigation methods.
 **Irrigating non-food gardens, i.e. lawn and plants**	✓ Greywater can make the soil alkaline and add salt, which builds up and damages soil quality. Some plants cannot grow in those soil conditions. Seek advice from garden centres or experts and use with discretion. ✓ Spread the water across the garden to avoid soil clogging or pooling, which attracts mosquitoes and leads to grey/green slime areas developing. ✓ Do not irrigate within 48 hours of rain, as the greywater may pool on the surface if the soil is wet. ✓ Do not use hosing, spraying (or misting) irrigation methods to prevent spreading and breathing in airborne germs. The use of sprinklers is discouraged, but if you do, ensure that it is low-spray with large water droplets. Rather use drip/sub-surface irrigation with a layer of mulch on top. ✓ Avoid/limit the use of greywater in parts of the garden where people and animals go. ✓ Water the garden at night to avoid human contact for eight hours after irrigating, and to reduce evaporation. ✓ Environmentally friendly detergents, soaps and shampoos must be used in the washing machine or shower if this water is to be reused. These substances are low in phosphorus, sodium, boron and chloride, and reduce the negative impact on soils, plants and, ultimately, the water system. Phosphate is particularly dangerous to the environment.

	✓ Rinse water from the washing machine (if not used for the next wash cycle, vehicle washing or toilet flushing) poses the lowest risk to plants. If you can capture it separately from the general water, prioritise its use in the garden. ✓ Only water well-established plants with greywater and monitor them for signs of stress (e.g. yellowing, wilting or mottled colour). Rather use alternative water (e.g. rainwater harvesting) for new plants. ✓ Consider planting salt-tolerant species if plants show stress from irrigation with greywater.

Rainwater harvesting at home

Rainwater harvesting is the practice of capturing rain, usually from the roof, and storing it in large containers for uses such as flushing toilets, garden irrigation or cleaning vehicles, hard outdoor surfaces and windows.

A basic rainwater harvesting system with tanks usually relies on gravity to take the rainwater from your roof to water tanks via the gutters/downpipes. A "first-flush" rainwater filtering system is usually installed to prevent dirt and foreign matter from entering the tanks. Tanks can be installed against a wall of your house under the roof eaves, or underground with the help of a specialist. Rainwater can be pumped from the tanks to where you need it, such as the garden.

The most efficient roof surface for harvesting rainwater is a metal roof, which may be corrugated iron, flat iron sheet or an IBR (inverted box rib) profile. Tiled roofs may also be used, although they are not as efficient as metal for collecting rainwater. Rainwater cannot be harvested from a thatched roof – partly due to the lack of guttering, as well as water discolouration, but mostly due to the lack of runoff from the roof.

The appropriate rainwater storage volume will depend on your circumstances, including factors such as your type and size of roof, the nature of rainfall in your local area, and your intended use levels. The Water Research Commission has funded the development of a useful water harvesting tool to assist prospective rainwater harvesters through the process and help them choose the right design. Check under **"Contacts and resources"** for the link to the tool.

Simple and relatively cheap, flexible plastic sleeves or extendable pipes can be used to direct rainwater from downpipes/gutters directly into pools for topping up, or into rain gardens, ponds or underground storage reservoirs. Underground storage systems provide much larger storage volumes, which last longer, yet are more expensive.

Boreholes and well-points for groundwater

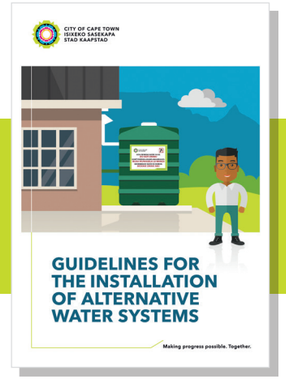
Boreholes and wellpoints draw up underground water, which is generally used for irrigation. However, these must be registered, used moderately and in accordance with the City and national water regulations.

In drought conditions, only very limited irrigation is allowed so that groundwater can be preserved. In times of serious water shortages, groundwater should be used for indoor essential use, such as toilet flushing as a priority, with appropriate treatment.

A wellpoint usually consists of a pump that is mounted at ground level and draws up water via a suction pipe from a maximum depth of 8–10 m. Boreholes, in turn, can be shallow at a depth of about 30 m, or deeper at 100 m or more. Installing wellpoints and boreholes is expensive and should be fully researched beforehand. Not all groundwater is ideal for irrigating plants, as it might have too much salt or iron. Groundwater may not be used for drinking, cooking or body washing, according to the City's Water By-law.

Groundwater plays an important part in the environment. During dry periods, groundwater replenishes low-flowing rivers. During wet periods, the opposite occurs when rivers and surface drainage replenish groundwater. To ensure that borehole water is not polluted or overexploited, the amount of groundwater that is extracted needs to be monitored and all boreholes must be registered with the City. When using this resource, the appropriate City-provided signage must be displayed so as to be visible from a public public road or pathway.

Consult the City's ***Guidelines for the Installation of Alternative Water Systems*** to ensure full compliance (see **"Contacts and resources"**).



Preventing sewer blockages and stormwater pollution

Water going down your kitchen sink, bath, basin and toilet goes into the sewer system, and eventually reaches the wastewater treatment plant, where it gets treated (the system illustrated below left). Rainwater and any other water flowing in our streets goes into the stormwater system, and eventually flows to our rivers and catchments before flowing into the ocean (illustrated below right).

Being a water-sensitive city includes looking after our sewer and stormwater systems.

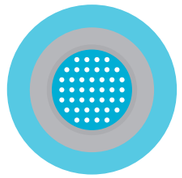
Preventing blocked sewers

Dumping rubbish into a plumbing system not designed for solid waste causes sewer blockages and overflows. This affects us all. An overflowing sewer runs into our stormwater drains and contaminates our rivers, streams and canals. The contaminated water poses a threat to our health and the environment.

Overflowing sewers also attract disease and pollute our air with unpleasant smells.

The hight cost associated with fixing blocked sewers can be avoided or reduced if we all commit to getting rid of our waste properly.

Have a look at the following tips:



Put a **strainer** in the sink to catch food or other waste before it goes down the drain and creates a blockage.

Don't flush nappies and sanitary products; they absorb water and expand, which causes blockages.

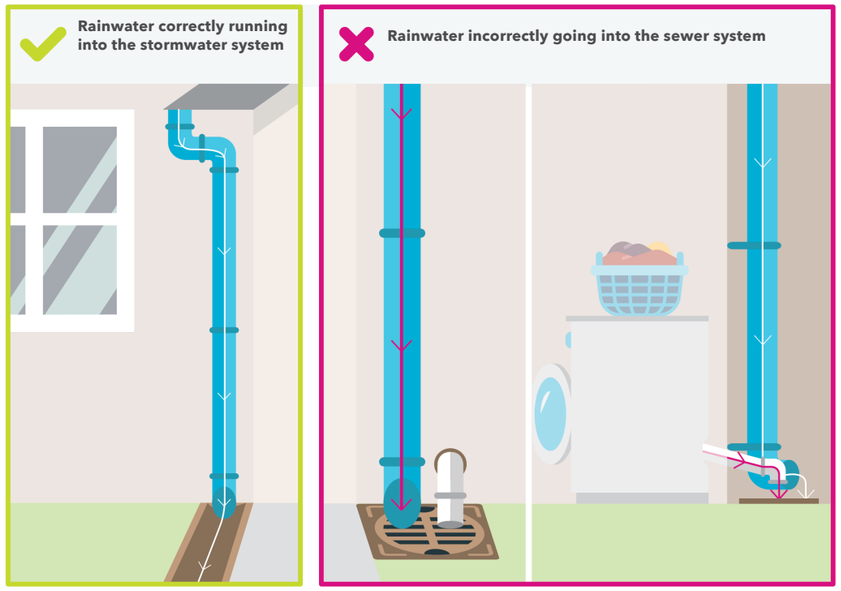
Unwanted food belongs **in the bin**, not down the kitchen sink or drain. Fruit and vegetable waste and eggshells can be used to make compost.

Wipes, earbuds, condoms and hair are small, but they **clump together** with other objects and cause blockages.

Make **compost** with peels or bin them. Peels don't decompose quickly; they get stuck in the pipes and cause blockages.

Don't flush rags and newspapers. These objects don't break down.

Wipe cooking fat, oil or grease off the pan and throw it in the bin; do not pour it down the drain. Fat and oil poured down a drain stick to the inside walls of drainpipes when they harden. Waste items then stick to them, causing blockages. You can also pour used cooking fat, oil or grease into a sealable jar or container and throw it in the bin once it is full.



Channel the rainwater from your gutters/roof to the stormwater system (as illustrated in the top left picture). Do not direct it into the sewer system (top right), as it can cause overflows, especially during heavy rain. If you don't want excess rainwater on your property, rather make a channel or pipe it further to run into the street and down into the stormwater system. Only rainwater is allowed in the stormwater drains, not your greywater or wastewater. (Many people also store some rainwater to use for activities like cleaning vehicles, windows and hard surfaces, and for the garden, etc.)

Turn to **"Contacts and resources"** for details of where to report sewer blockages, missing drain covers, vandalism, burst pipes, leaks and water wastage. When reporting an incident, give the street address and get a reference number.

Preventing pollution, contamination and obstructions in the stormwater system

By following the tips below, you can play your part in protecting our stormwater system from pollution, contamination and obstructions:

- ✓ Pour any dirty (polluted) wastewater down the sink or toilet so that it ends up in the sewer system, not the stormwater system. This includes wastewater from hair products and treatments, pool backwash and bin-washing water. If this wastewater reaches the stormwater system, it is destined for the ocean, where it will harm the ecosystem, contaminate seafood and threaten marine life.
- ✓ Household waste should be binned, recycled or composted, depending on the type. Do not throw it down the stormwater drain, as it either blocks the system and causes localised flooding or ends up in and pollutes our waterways.
- ✓ Wipe cooking fat off the pan with newspaper or paper towels and place it in the bin – do not pour it down the stormwater drain. You can also pour used cooking fat, oil or grease into a sealable jar or container and throw it in the bin once it is full.
- ✓ Pick up any litter on and around your property and put it in a nearby bin. This will prevent Cape Town's infamous winds from blowing the litter into our stormwater system.
- ✓ Wash your vehicle on a soft surface, where the greywater gets absorbed into the soil. Do not wash it on hard surfaces near a drain, as the chemicals in the greywater will run directly into the stormwater system.

It is never too early to start establishing healthy habits involving water.

- ✓ Use eco-friendly products for your garden and for cleaning vehicles. When it rains, chemicals in fertilisers, pest control and cleaning products end up in the stormwater system, harming our rivers, streams, wetlands and the ocean.
- ✓ Used motor oil and paint products should be disposed of at a City-approved drop-off facility (see **"Contacts and resources"** at the end of the chapter on waste). Under no circumstances should these be allowed to enter the stormwater (or sewer) system, as they contain extremely harmful chemicals.
- ✓ Let the rainwater from your roof and paved areas soak into the ground or a flower bed. This ensures that any possible pollutants are absorbed by the soil and plants, diverting them away from our stormwater system, and also reduces the load on the system.
- ✓ Clean your gutters regularly and sweep away leaves and sandy sediment that could land up in the stormwater system, causing blockages and flooding.

For more on how to maintain our waterways, consult the City's Management of Urban Stormwater Impacts Policy (see **"Contacts and resources"**).

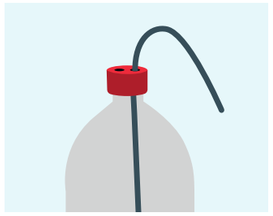
Turn to **"Contacts and resources"** for details on where to report misuse of the stormwater system, as well as to request further guidance and advice from the City's water pollution control team.

Establishing healthy habits

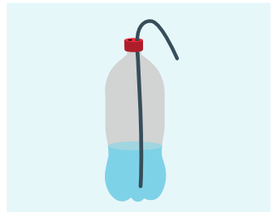
It is never too early (or too late) to start establishing healthy habits involving water. One such healthy habit is regular hand washing. To encourage the little ones to wash their hands, a squeeze bottle and tippy tap are practical, affordable and very effective tools for use in schools, early childhood development centres (ECDs) and crèches.

The squeeze bottle – water-saving hand washing

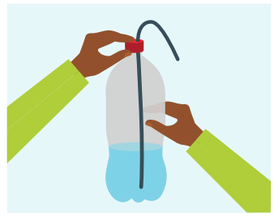
STEP 1: YOU WILL NEED
- ✓ A clean 2-litre plastic bottle with cap
- ✓ 80 cm of clear 4 mm irrigation pipe and scissors
- ✓ A sharp tool to make holes in the cap



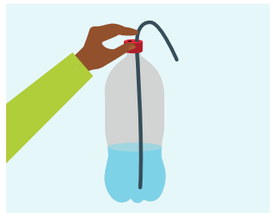
STEP 2: PREPARING YOUR BOTTLE
- ✓ Use a sharp tool to make two small holes in the bottle cap



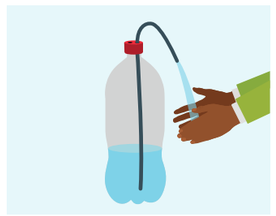
STEP 3: ASSEMBLING
- ✓ Push the pipe through one hole, until it touches the bottom
- ✓ Fill the bottle with water and tighten the lid



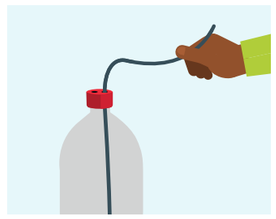
STEP 4: LET THE WATER FLOW
- ✓ Cover the open hole with your finger, while squeezing the bottle



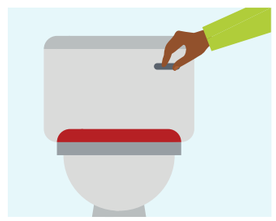
STEP 5: RELEASE
- ✓ Take your finger away from the hole when the water starts flowing



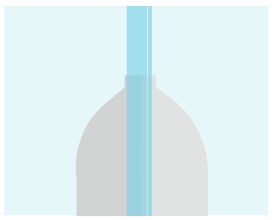
STEP 6: WASH YOUR HANDS
- ✓ Use soap
- ✓ Collect the water used in a bucket



STEP 7: STOP THE WATER
- ✓ Lift the pipe above the bottle cap and the water will stop flowing



STEP 8: REUSE THE WATER
- ✓ The water collected can be used for flushing



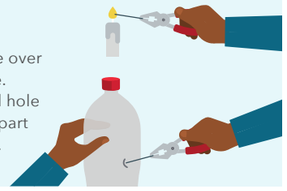
SAFETY PRECAUTIONS
- ✓ Keep the squeeze bottle out of sunlight
- ✓ Rinse and change water every second day

How to make a tippy tap

Step 1:
What you need to make the tippy tap:
- Plastic bottle with screw-on cap
- Medium plastic tube
- Pliers
- Screwdriver
- Short piece of metal wire
- Candle
- Rope
- Bar of soap

Step 2:
Clean the bottle well.

Step 3:
Heat the wire over the lit candle. Make a small hole in the lower part of the bottle.

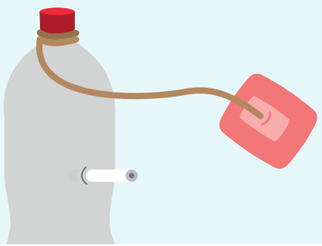


Step 4:
Push the plastic tube through the hole of the bottle. The tube should fit tightly.

Step 5:
Push a hole through the soap with the screwdriver.

Step 6:
Fill the bottle with water and replace the cap.
When the cap is tight, no water should flow through the tube.
When the cap is loose, the water should flow out in a stream from the tube.

Step 7:
When you are sure it works, hang it on a shelf where people can use it for hand washing. Keep soap nearby by threading the soap with string and tie it to the bottle.



Contacts and resources

Contact/resource	Description	Available at
Aerosol Manufacturer's Association	Producer Responsibility Organisation for Aerosol manufacturers	https://aerosol.co.za/
City guide on disposal of asbestos	Specially issued guide to assist Capetonians in safely disposing of asbestos-containing waste	www.capetown.gov.za >> Work and business >> Commercial utility services >> Commercial solid waste services >> Hazardous Waste
City guide on disposal of pesticides	Specially issued guide to assist Capetonians in safely disposing of pesticide and contaminated containers	www.capetown.gov.za >> Family and Home >> Residential utility services >> Residential solid waste Services >> Hazardous Waste
City guide on disposal of portable batteries	Specially issued guide to assist Capetonians in safely disposing of portable batteries	www.capetown.gov.za >> Family and Home >> Residential utility services >> Residential solid waste Services >> Hazardous Waste
Compostable Plastics Council (COPCO)	Producer Responsibility Organisation for manufacturers of compostable packaging and plastics	Connect via Facebook or LinkedIn
Consumer Goods Council of South Africa	Industry association for over 9000 companies across the consumer goods value chain, and formerly registered as a Producer Responsibility Organisation for paper and packaging, lighting, electrical and electronic goods.	www.cgcsa.co.za
Croplife SA	Producer Responsibility Organisation for Pesticides	www.croplife.co.za
Waste drop-off sites, accepted waste types and operating hours chart	Table of drop-off sites and accepted waste types	www.capetown.gov.za >> Search >> "Waste Drop-off sites and Operating Hours Chart"
EPR Waste Association of South Africa (EWASA)	eWASA is the Producer Responsibility Organisation for some of South Africa's largest producers in the EEE, Lighting, Paper & Packaging Products, Portable Batteries & Lubricant Oils industries.	www.ewasa.org
E-waste Recycling Proprietary Association	Producer Responsibility Organisation focussing on collection, recycling, and reposnsible disposal of electrical and electronic equipment waste	www.erpa.org.za
Extended Producer Responsibility Association (ERA NPC)	Producer Responsibility Organisation specialising in waste, electrical, electronic equipment, batteries and lighting	www.eraNPC.co.za
Fibre Circle	Producer Responsibility Organisation for the paper and paper packaging industry	www.fibrecircle.co.za
Home composting	Tips on how to compost at home	www.capetown.gov.za >> Family and Home >> greener living >> green gardening and eating >> Start composting at home
Home Composting Programme	Dates for rollout of home composting containers	www.capetown.gov.za >> City-Connect >> Activities and Programmes >> Cleaning and Recycling >> Home Composting Programme
Metal Recycler Association of South Africa	Industry Association for recycling of scrap metal	www.mra.co.za
Metpac-SA	Industry Association for metal packaging e.g. tin cans	www.metpacSA.org.za
Oasis Association	NGO for improving the lives of persons with disabilities, running a recycling programme to generate an income	www.oasis.org.za
Organics Recycling Association of South Africa (ORASA)	Organisation that captures the value of organic waste in the economy through composting, fly farming and anaerobic digestion	www.orasa.org.za
PET Recycling Company of South Africa (PETCO)	Producer Responsibility Organisation for polyethylene terephthalate (PET) packaging and Liquid Board packaging (Tetra-Pak).	www.petco.co.za
Plastics SA	Central representative body for the South African plastics industry, promoting sustainable practices and supporting recycling initiatives.	www.plasticsinfo.co.za
Poisons Helpline		www.westerncape.gov.za >> Home >> Directories >> Services >> Health >> Emergency Services >> Poisons Information Helpline of the Western Cape
Polyco	Producer Responsibility Organisation for all plastic packaging types, including high-density polyethylene (HDPE), low-density polyethylene (LDPE), polypropylene (PP), polyvinyl chloride (PVC), polystyrene (PS), and multi-layer plastics.	www.polyco.co.za
R2E2 NPC	Producer Responsibility Organisation for the Electrical and Electronic Waste, and Lighting Sectors	www.r2e2.co.za
ROSE Foundation	NPO for promotion of responsible management of used lubricating oil in South Africa. Registers various used oil collectors.	www.rosefoundation.org.za
South African Biogas Industry Association	Represents and lobbies for the interests of the biogas industry	www.sabia.org.za
South African Industrial Container Reconditioners Association	Producer Responsibility Organisation for manufacturers of industrial containers.	www.saicra.co.za

Contact/resource	Description	Available at
South African Mass Insect Rearing Organisation	Representative for the insect mass rearing industry	www.samiro.co.za
South African Plastics Recycling Organisation	Body representing plastics re-processors in South Africa, with its members procuring sorted, baled end-of-life plastics and re-processing them into raw material. Useful info on how to design products to improve recyclability can be found on the site.	www.plasticrecyclingSA.co.za
Story of Stuff	Short kid-friendly documentary on the production of plastic and the impact on the environment.	www.storyofstuff.org
The Glass Recycling Company	Producer Responsibility Organisation for the glass packaging industry	www.theglassrecyclingcompany.co.za
Zero Waste Home	Inspiring blog focussed on zero waste living	www.zerowastehome.com

Waste

Nature operates in a circular system. Among others, this means that waste generated by one organism becomes food for another. For example, fallen leaves decay and the nutrients are returned to Earth, where they are reintroduced as food for the tree. An exciting challenge facing urban communities is to work towards a circular system of our own, where the unwanted items of one cycle are essential goods for another.

Introduction to waste

What is waste?

Traditionally, waste has been seen as an unwanted byproduct of consumption–something to be discarded. This approach reflects a linear economic system of "take, make, dispose," where materials are generally used once and then thrown away.

However, as cities like Cape Town grapple with increasing waste generation, population growth, and environmental pressures, the definition of waste is evolving.

Currently, Cape Town generates approximately enough waste to fill an Olympic size swimming pool of 50m long x 25m wide per day. This poses significant social, economic, and environmental challenges in an already resource-constrained city. With Cape Town's population projected to grow from 4,77 million (2022 Census) to 5,8 million by 2040, urban expansion will place even greater pressure on waste services, natural landscapes, and resources.

In response, Cape Town – like many global cities – is working to enable and stimulate a more circular economy, where materials that were previously considered to be waste are kept in use for as long as possible, reducing the need for constant resource extraction and waste disposal.

In this system:

- ✓ Organic waste (food scraps and garden cuttings) can be composted to enrich soil instead of being landfilled.
- ✓ Recyclables (plastics, glass, metals, and paper) can be processed into new products, reducing reliance on raw materials.
- ✓ Clothing, furniture, and electronics can be repaired, donated, or repurposed rather than discarded.
- ✓ Landfill gas generated by decomposition of organic materials in the landfill can be captured and turned into electricity.

By buying durable and reusable products instead of disposable items, we can start reducing the waste we create. This is well illustrated in the short documentary, *Story of Stuff* – turn to "Contacts and resources" for information on how to view it.

Through the enablement of a more circular economy substances or items that were previously considered to be waste take on a new life as valuable resources and a vehicle for economic mobility.

Every bin put out on the sidewalk in front of our homes each week represents about 70 bins of waste that were generated to manufacture and produce the items we use every day. For example, it takes about 75 kg of resources (coal, oil and water) to produce one cellphone; one toothbrush requires 1,5 kg of resources to produce. When you consider these numbers it only makes sense for us to make every effort to extract maximum value from the products we buy.

What is integrated waste management?

Integrated Waste Management and the Circular Economy in South Africa

South Africa is transitioning towards a circular economy by implementing Integrated Waste Management (IWM)—a strategic approach that prioritises waste prevention, reduction, reuse, recycling, and responsible disposal. Instead of relying solely on landfilling, IWM promotes sustainable waste management practices that minimise environmental harm while maximising resource recovery.

This shift is driven by national policies such as the National Waste Management Strategy (NWMS) and the Waste Act (Act 59 of 2008), which outline targets for reducing waste sent to landfills and increasing recycling rates. By aligning with global trends, South Africa is working towards a more resource-efficient and environmentally sustainable economy.

At the core of Integrated Waste Management is the waste management hierarchy – a structured approach that prioritises waste management actions based on their environmental impact. This hierarchy guides decision-making to ensure that waste is managed in a way that reduces environmental harm and promotes resource efficiency. The hierarchy is as follows:

Prevention (most preferred)

The most effective way to manage waste is to prevent it from being generated in the first place. This involves designing products for durability, using fewer raw materials, and adopting sustainable consumption practices. Prevention reduces the demand for natural resources and minimises waste-related pollution. In South Africa, initiatives such as Extended Producer Responsibility (EPR) encourage industries to minimise generation of waste in order to save costs associated with processing that waste in an environmentally friendly way.

Minimisation

Where waste cannot be entirely prevented, efforts should be made to reduce the quantity of waste produced. This can be achieved through efficient manufacturing processes, waste-conscious product design, and encouraging businesses and consumers to limit unnecessary waste generation.

Reuse

Extending the lifespan of products and materials through reuse reduces the need for new production. This can include refurbishing electronics, repurposing furniture, and promoting refillable packaging solutions. Reuse prevents items from becoming waste too quickly and reduces resource consumption.

Recycling

When materials reach the end of their usable life, recycling ensures that they are processed into new products rather than being discarded. Recycling reduces dependence on virgin materials, lowers greenhouse gas emissions, and creates economic opportunities in the waste sector. In South Africa, initiatives such as Extended Producer Responsibility (EPR) encourage industries to invest in recycling infrastructure and promote a circular economy.

Recovery/Energy capturing

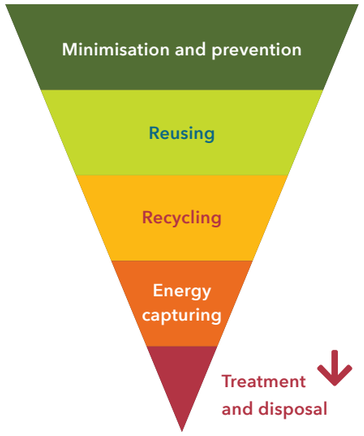
Certain types of waste that cannot be recycled can still be recovered for beneficial use. Organic waste, for example, can be composted or converted into biogas through anaerobic digestion. Additionally, some non-recyclable materials can be used in waste-to-energy facilities to generate electricity, reducing reliance on fossil fuels.

Treatment

Some waste streams require specialised treatment to neutralise harmful substances before disposal. This includes chemical and biological treatment of hazardous waste, wastewater treatment, and stabilising waste to reduce its environmental impact.

Disposal (least preferred)

Landfilling and incineration without energy recovery are the last resort for waste management. These methods are used only when waste cannot be prevented, reused, recycled, or recovered. The goal of IWM is to reduce the amount of waste sent to landfills to protect the environment and optimise resource use.



What are the zero-waste philosophy and circular economy?

What is the zero-waste philosophy?

The zero-waste philosophy relates to the first step in the integrated waste management hierarchy, namely the complete elimination or avoidance of waste. It calls for a new approach to the design and manufacturing of products so that no waste is created. The ideal is to be able to reuse or recycle all materials and substances used in any process, either into the same or another process. In that way, nothing will ever become unwanted or wasted.

The zero-waste philosophy looks to nature for inspiration. Take the ant, for example. Together, all the ants on the planet have a greater biomass than all of humanity. They have been industrious for millions of years. Their productivity nourishes plants, animals and soil. Nothing is wasted and everything flows back into the system. In contrast, in the past 100 years alone, human industry has caused the health of all the planet's ecosystems to deteriorate.

Therefore, the zero-waste philosophy aims for intelligent industrial design, drawing on the principles and examples of natural ecosystems, where waste from one cycle becomes food for another.

What is the circular economy?

One of the key tools to implement the zero-waste philosophy is the circular economy. Traditionally, our economy has been linear in terms of materials: We make goods, use them, and then dispose of them. The circular economy is an alternative economic model. Under such a model, we keep goods and materials in use for as long as possible, extracting maximum value from them. Once they reach the end of their life, we recover and regenerate them, minimising disposal or incineration.

The essence of a circular economy is to preserve natural resources by retaining the quality and value of products, their parts and the materials used to make them. A circular economy also separates the value chains of renewable resources ("biological nutrients") and non-renewable resources ("technical nutrients"), as they require different technologies and methods.

To get to a circular economy, we need all stakeholders, including government, the private sector, households and communities, to be committed and involved. It requires us to change our thinking and behaviour – from how we design products and services, to

Linear economy

Circular economy

how we manufacture, distribute, use, reuse, repair, recycle and, ultimately, dispose of these products or services.

Where does our waste go?

There are various options for disposal of waste in Cape Town currently, from recycling and beneficiation schemes (private and public) to refuse transfer stations and landfills. Over time various interventions from both the City and national and provincial governments will work to reduce the proportion of waste that ends up in landfills by diverting to other beneficiation schemes. The current options are as follows:

Drop-off facilities

Drop-off facilities allow residents (i.e. vehicles with a carrying capacity of less than 1,5 tonnes) to dispose of specific types of waste. Accepted materials vary by site but may include:

- ✓ garden refuse;
- ✓ recyclable packaging (paper, cardboard, glass, metal, and plastic);
- ✓ builders' rubble;
- ✓ bulky household waste;
- ✓ electronic waste (e-waste); and
- ✓ used oil

Staff and contractors on site will ensure safe disposal of waste or beneficiation if possible.

Residents should check what their nearest drop-off site accepts before visiting. Information is available on the City's website (see **"Contacts and resources"**).

What is a Buy-back centre?

A buy-back centre offers cash for recyclables. This is usually a private or community business that generally accepts recyclable packaging materials with a value in the recycling market.

Material recovery facilities

Mixed recyclables collected through the City's kerbside recycling programme are sent to one of these facilities, where they are placed on conveyor belts or sorting tables. Here, items of value are separated by hand or by specialised machinery, such as magnetic sorters. The recovered materials are baled and sold to the manufacturing sector for reuse.

Any waste that cannot be recycled (due to contamination or a lack of market demand) is referred to as "spoils." These are sent to landfill for final disposal, where they are compacted.It is not easy to recycle dirty or contaminated waste. Cleaning (rinsing with greywater) and separating waste at source – including in your home – into wet and dry waste will help the City extract recyclables, which will ultimately see more items being recycled and less being landfilled.

Refuse Transfer Stations

A refuse transfer station helps the City save costs by minimising the distance refuse compactors have to travel to offload what they have collected. These are conveniently located facilities where waste can be compacted before being transferred to landfills for final disposal.

Landfills

A landfill is a licensed or authorised site in terms of NEMWA where waste can be disposed of into lined, specially engineered sections called "cells". These sealed cells are designed to prevent waste from making contact with the earth around it, thereby minimising pollution of the environment, in particular groundwater. City of Cape Town landfill sites are classified for general and low-risk hazardous waste.

After the landfill has reached the licensed capacity a cap is placed over the waste. The waste lies underground decaying slowly for hundreds of years, while the land above is slowly rehabilitated. This is a costly process. Land above closed and capped landfills can be restored and converted into recreational areas like golf courses and parks.

Incineration

Not all waste can be recycled or composted. Some materials are not technically recyclable, and in other cases, are maybe too dirty or contaminated due to a lack of separation or mixed to be recycled or reused in any way. When this happens, one option being explored by the City of Cape Town is incineration, also because many of these waste types (for example non-recyclable plastic or paper items) have the potential to generate significant energy. This potential is known as the calorific value of the waste, which measures how much energy can be generated. This means the burning of certain waste in special high-temperature facilities to reduce its volume and create energy in the form of electricity or heat. In a country with electricity supply challenges such as South Africa, the ability to generate electricity from the disposal of waste is a significant advantage compared to other disposal methods.

Modern incineration is very different from the old methods that caused significant pollution. Today's facilities are designed with advanced technology that filters out harmful gases and particles, making the process much cleaner and safer for people and the environment. In fact, in many parts of the world, these facilities must meet very strict air quality rules and are safely located in urban neighbourhoods, and often performing better in terms of low pollution than required.

Burning waste might not sound environmentally friendly at first, but it can help reduce the need for landfill space and recover some value from materials that can't be recycled. It also opens up new possibilities for job creation and investment in cleaner technologies. For example, ash left over from burning waste can be used in construction, and metal pieces can be removed and recycled.

Cities like Copenhagen, Singapore, Tokyo, and Vienna already use this method successfully. Their incineration plants are clean, efficient, and sometimes even designed to fit into city life – like Copenhagen's facility, which has a public ski slope on the roof!

As Cape Town looks at ways to reduce landfill use and deal with hard-to-recycle waste, incineration may become one of the tools to help manage our waste more responsibly–while also reducing the harm it causes to the planet.

What is meant by reuse and recycling, and why is it important?

Every bin put out on the sidewalk in front of our homes each week represents about 70 bins of waste that were generated to manufacture and produce the items we use every day. For example, it takes about 75 kg of resources (coal, oil and water) to produce one cellphone. One toothbrush requires 1,5 kg of resources to produce.

Our natural ecosystems have taught us that waste from one cycle can become food for another. This, then, is the fundamental principle behind the reuse and recycling of our own waste.

We tend not to think about the value left in the items we are so quick to throw into the bin and send to landfill. But if you consider the time and effort that went into extracting the materials and energy to produce even the simplest items, such as a beverage can or glass bottle, it makes sense to reuse or recycle them instead of simply throwing them away. Reusing or recycling our waste captures its inherent value.

Dioxins

Dioxins are a group of persistent, very toxic chemicals that are formed as by-products of industrial processes involving chlorine, or when chlorine and organic matter are burnt together.

Exposure to dioxins damages the immune system, which may increase the risk of contracting infectious diseases and disrupt proper hormonal function. These chemicals are known to cause cancer in humans and affect reproduction and development in animals, even at very low doses.

Why are reuse and recycling important?

Firstly, resources that are recycled or reused reduce the constant need to extract or mine new resources to produce products and materials. Large amounts of resources are used to generate products that are often thrown away after a single use. Reuse, on the other hand, keeps a resource circling around in the economy, while recycling requires less input than new resource extraction.

Therefore, both slow down the consumption of the resources available to us and retain the value of the resources already consumed to manufacture existing products.

Secondly, reuse and recycling reduce the amount of waste sent to landfill. This, in turn, saves landfill space (also known as "airspace") and delays the environmental impact and high cost of clearing new areas and destroying natural habitats to create new landfills.

Thirdly, reuse and recycling reduce pollution and litter, bringing clear and significant environmental benefits.

Fourthly, the recycling industry is a rapidly growing employer in South Africa. As people realise the inherent value of recycled goods, the mechanisms to collect and recycle these materials adapt and grow to provide unemployed people with a means of income. The size and diversity of the markets for recycled raw materials also continue to expand as new applications for these materials are discovered. New industries that sell reusable items, such as metal or bamboo straws instead of throw-away plastic ones, are also popping up.

Finally, the recycling industry is competitive, with large quantities of recyclables having to be collected to make the industry financially viable. At present, the recycling value chain starts with buy-back centres or some MRFs that pay collectors for their recyclable waste material. Prices differ depending on the material and market demand. These

What is the difference between reuse and recycling?

Reuse of our waste items or materials means using them again, whether in full or in part, for the same or a different purpose, without changing their physical form or nature. An example is using the bottom of a plastic soft drink bottle as a candleholder.

Reuse is growing in popularity. For instance, an increasing number of people use reusable shopping bags instead of buying new shopping bags each time they visit the grocery store.

Recycling our waste items or materials usually involves an industrial process of converting them in different ways, such as shredding and melting, into new raw materials. These raw materials can then be used to make the same or different useful items or objects. A plastic soft drink bottle, for example, can be recycled into a new plastic bottle, or into plastic thread that can be woven into T-shirts.

Recycling has many steps. Yet sorting our waste items at home is a good start to ensure that recycling can take place.

recyclables are generally sorted further and baled (bundled), as well-sorted and baled materials fetch higher prices. Generally, the most valuable recyclable materials are steel, copper, aluminium, brass, mercury and zinc from appliances, light fixtures, cladding, flashing, plumbing, wiring and structural materials.

What is extended producer responsibility?

Extended Producer Responsibility (EPR) is a policy approach that holds producers accountable for the entire lifecycle of their products, particularly their end-of-life disposal, to ensure that products are designed with circular economy principles in mind.

What is a producer responsibiliy organisation (PRO)?

A PRO is an Organisation that helps companies fulfill their legal obligations in terms of EPR.

PROs could manage collection schemes or drop-off points on behalf of manufacturers, advise on current materials to avoid due to management difficulties, or provide guidelines and incentives for producers to use more recyclable materials. All of this is funded by the industries themselves.

Many PROs have useful information for residents on their websites such as locations of drop-off points. See "Contacts and resources"

NEMWA has established EPR as a regulatory mechanism to manage waste in South Africa, and is placing an increasing onus on manufacturers to contribute financially to the safe disposal of waste or towards mechanisms to off-set the environmental impact of their products and packaging.

At this stage only certain categories of waste are covered by EPR schemes, with voluntary schemes available for other types of waste to progressively encourage industry adaptation and buy-in before legal imperatives are introduced.

EPR initiatives are varied and include product take-back programmes (e.g. return of used printer cartridges), deposit-refund systems (e.g. return of glass bottles for a deposit), product fees and taxes, as well as laws on minimum recycled content. All of these hold manufacturers accountable and are mandatory in many countries. In South Africa, the Consumer Protection Act 68 of 2008 and the National Pricing Strategy for Waste Management, 2016, will help us implement EPR.

Mandatory EPR obligations

Under Section 18 of the National Environmental Management: Waste Act (NEMWA), the following product categories are subject to mandatory EPR regulations:

- ✓ paper and paper packaging materials;

Non-renewable? All the more reason to recycle

Earth minerals, metal ores and fossil fuels (coal, petroleum and natural gas) are all considered non-renewable resources, as their supply will not replenish once taken from the Earth.

Metals in particular are valuable non-renewable resources that are highly recyclable and reusable. The Earth contains a finite amount of metal, and mining and refining it into a usable product is financially and environmentally costly. This makes it both necessary and attractive to recycle it instead of keeping on extracting it until we run out.

- ✓ plastic packaging;
- ✓ biodegradeable and compostable packaging;
- ✓ single-use plastic products;
- ✓ single-use compostable plastic products;
- ✓ glass packaging;
- ✓ metal packaging;
- ✓ electrical and electronic equipment (EEE) and batteries;
- ✓ lighting products;
- ✓ pesticides;
- ✓ lubricant oils and
- ✓ portable batteries.

Producers of these products are required to:

- ✓ Register with the Department of Forestry, Fisheries and the Environment (DFFE). This registration ensures that producers are recognised and can be monitored for compliance;
- ✓ develop and Implement EPR schemes: Producers can either establish their own EPR schemes or join existing producer responsibility organisations (PROs) to manage their products' end-of-life processes; and
- ✓ meet specific collection, recycling and/or other related targets that may be relevant to specific waste types (such as recycled material used in new products). These targets are set to ensure that a certain percentage of products are collected and recycled, reducing environmental impact.
- ✓ EPR initiatives are varied and include product take-back programmes (e.g. return of used printer cartridges), deposit-refund systems (e.g. return of glass bottles for a deposit), product fees and taxes, as well as laws on minimum recycled content. All of these hold manufacturers accountable and are mandatory in many countries.

Voluntary EPR schemes

The following waste types do not yet have mandatory EPR in place, but there are waste diversion initiatives specific to certain waste types that are being done on a voluntary basis:

- ✓ clothing and textiles;
- ✓ furniture and mattresses; and
- ✓ paint and paint products.

Producers of these products should prepare for formal implementation of EPR schemes for their respective industries. Product stewardship is similar to EPR, but less regulatory. It means that all parties who are involved in producing, selling or using a product – including designers, suppliers, manufacturers, distributors, retailers, consumers, recyclers and waste disposers – should take responsibility for the product's full environmental and economic impact. Product stewardship is becoming increasingly popular, recognising that all parties have a role to play.

Waste management in our city

Legal frame-works

Municipalities are responsible for ensuring the removal and disposal of waste in their areas, in partnership with the private sector and local community. By law, every municipality needs to prepare an Integrated Development Plan (IDP), which should include an Integrated Waste Management Plan (IWMP).

As explained earlier, NEMWA calls on South Africans to embrace the integrated waste management hierarchy and strive for zero waste. To support this, the City of Cape Town promulgated its Integrated Waste Management By-law in 2009. This by-law, which has since seen amendments in 2010 and 2016, consolidates decades of fragmented regulations and local rules to provide better waste management. It also includes economic incentives to support waste minimisation and recycling.

What is our carbon footprint, and how does it relate to waste?

Our carbon footprint is a measure of how much carbon dioxide, methane and other greenhouse gases we create through our lifestyles. Your carbon footprint is directly linked to what you buy, how much you travel, and the amount of waste you generate. The more waste you generate, the bigger your carbon footprint, as the manufacturing, packaging, transport and disposal of the products you use all generate greenhouse gases. When you buy a product, all greenhouse gases relating to that product and its packaging are added to your carbon footprint, including the methane produced by the product waste once you have disposed of it.

Not generating waste in the first place is a key way to reduce your carbon footprint.

Let's look at a simple example: If you eat a banana and place the banana peel in the rubbish bin, it will end up on a landfill site. Here, it will be covered and compacted so that it decomposes without oxygen (anaerobic). This process will create methane gas, which has a global warming potential 21 times greater than carbon dioxide, thus adding to your carbon footprint. If that same banana peel were composted, it would have decomposed with oxygen (aerobic), and the negative environmental impact would have been much lower, while the nutrients would have been returned to the Earth. That would have shrunk your carbon footprint.

TIP: The Energy chapter on page 173 of the *Smart Living Handbook* provides more details on how to determine your carbon footprint.

What is composting, and how does it relate to the carbon footprint of our waste?

What is composting?

Composting is the biological decomposition of organic waste such as food or plant material. The waste is broken down by bacteria, fungi, worms and other organisms under controlled, oxygen-rich (aerobic) conditions. The end product of composting is partially decayed organic matter called "humus" or "compost", which offers excellent nourishment for soil and stimulates plant growth. Compost can also help regenerate poor soils.

There are many benefits to composting. For instance, when you turn organic materials such as food and garden waste into compost, these no longer contribute to the production of the harmful landfill gas methane, which reduces your carbon footprint. The composting process also encourages the production of beneficial micro-organisms. In addition, it often attracts earthworms, which have a built-in function to break down organic matter and convert it into nutrients for the soil.

Current waste challenges in Cape Town

Despite a recent shift towards waste diversion through recycling and composting, most of Cape Town's waste has historically been managed through landfill disposal. However, as the population continues to grow, the pressure on our existing landfill sites increases, so alternative options are being explored and implemented where feasible.

Exacerbating the waste challenge is illegally dumped waste. Cleaning up illegally dumped waste is much more expensive than regular waste collections from households. The City spends vast sums of money every year clearing illegally dumped waste across town, including on beaches, in canals, rivers, roadsides and streets, and on vacant plots. Illegally dumped waste also has ramifications for Cape Town's stormwater networks. As litter is washed down the stormwater channels, it blocks the system and causes environmental and health hazards.

What is the negative environmental impact of waste?

When waste is not properly managed and contained, the natural environment is polluted by substances it cannot use, absorb or manage, and that are harmful to living organisms. For example, just one litre of used oil can contaminate or poison a million litres of precious water.

Toxic chemicals poured into natural water systems can damage all the organisms those systems contain. Moreover, birds and animals are often exposed to pollutants such as plastic bags or oil, which cause distress or death. Even underground water can be polluted by waste leachate, which makes it unfit for use.

Waste collection for residents, and businesses that have a contract with the City for waste removal

The City provides professional engineering and environmental services to ensure that waste is managed and disposed of in a

Leachate

As waste starts to decay on a landfill site, it produces a liquid called leachate. Leachate may contain high concentrations of heavy metals or other environmentally hazardous substances. If left untreated, it could poison soil and groundwater. On new, modern landfill sites, the cells in which waste is deposited are usually lined with a watertight layer to avoid seepage, and the leachate is pumped to on-site plants for treatment where this is possible and necessary.

Most old landfills still rely on natural clay soil barriers to prevent toxic leachate from entering groundwater systems. Fortunately, this is not the case on Cape Town's operating landfill sites.

Note that leachate production is not limited to landfill sites. For instance, leachate can also be produced by factories, mines or storage sites contaminated by industrial chemicals or toxic materials.

Methane

Methane is one of the primary greenhouse gases – gases that are trapped in Earth's atmosphere and lead to climate change. Methane is the primary constituent of landfill gas – a gas that is produced when organic waste on landfill sites decays in the absence of oxygen (anaerobically). Landfill gas has a global warming potential that is estimated to be 21 times greater than carbon dioxide (the most common greenhouse gas).

Once methane has been generated, it remains in our atmosphere for hundreds of years. It is possible to capture the gas in a landfill through a sophisticated engineering system, and the City has implemented this system at three landfills, but this is complex and costly. A more affordable option is to compost organic material to reduce the chance of landfill-related methane being produced, and due to lower cost this is seen as a more preferable intervention in Cape Town going forward.

legally compliant, responsible and environmentally acceptable manner.

These services are:

- waste collection from both residents and businesses;
- waste transfer by road and rail, via large refuse transfer stations;
- waste processing;
- drop-off facilities for recyclables, garage and green waste, builders' rubble and household hazardous waste;
- sanitary landfilling to dispose of residual general, non-recyclable waste, as well as the safe disposal of hazardous waste; and
- cleansing services for street bins and public areas, including beaches.
- By-law enforcement for deterrance of illegal dumping and enforcement of accreditation requirements

City services to ensure waste reduction include:

- sorting of recyclables at drop-off facilities for sale into the recycling market;
- chipping of green waste for off-site composting;
- composting of domestic waste;
- kerbside collection, handling and processing of recyclable waste in MRFs;
- crushing of builders' rubble at landfill sites for use in City construction projects;
- distribution of home composting containers to residents to encourage composting at home;
- informal collaboration with producer responsibility organisations and SMMEs;
- swop shop trial (residents can exchange recyclables for tokens that allow them to buy products); and
- pilot projects to separate organic waste at source.

Regulation of Waste Management

The City of Cape Town is responsible for accrediting private waste management companies that collect, transport, and dispose of waste within the municipal area. Accreditation ensures that these service providers comply with environmental regulations and operate in line with the City's waste management objectives. In addition, the City has a dedicated law enforcement unit that monitors and enforces compliance with the Integrated Waste Management By-law. This unit investigates illegal dumping, improper waste handling, and other contraventions, issuing fines and taking legal action where necessary. These measures help to maintain a clean and healthy environment while promoting responsible waste management practices across the city.

Cleansing services

The City's Solid Waste Services Department ensures the general cleanliness of Cape Town's streets and public spaces, including our beaches, rivers and canal banks. They also oversee the removal of animal carcasses from public land and roads, and cleaning and refuse collection in informal settlements. In addition, they offer waste management planning advice to the City's partners, and cleansing services for special events.

Other cleansing services include:

- provision and servicing of street-pole litter bins;
- litter picking and clearing of illegal dumping;
- servicing of water tankers;
- cleaning of hawker areas; and
- Special Equipment Unit services (such as for the removal of bulky illegally dumped waste).

Waste collection service for formal households

Once a week, the Waste Services Department collects waste from formal households in 240-litre wheelie bins. Charges for this waste service are based on a tariff structure and policy. Every year, properties valued under a certain amount receive an incremental rebate on their first wheelie bin. An additional (140-litre)

recycling container per household is also being piloted in certain areas.

Waste collection service for informal settlements

All informal settlements receive integrated refuse collection and area-cleaning services. Each informal dwelling is given blue refuse bags, which are collected every week by a municipal service provider and taken to a central container for removal. The service provider is also responsible for clearing litter and dumped material to an agreed standard of cleanliness.

Commercial and industrial waste collection arrangements

While residents must use the City's refuse collection services, owners of commercial properties may choose to use the refuse services of the City or a private service provider. For clients with greater waste needs, such as businesses, the City offers an enhanced refuse collection service three or five times per week, which is charged per wheelie bin per collection. This is aimed at encouraging businesses to generate less waste wherever possible.

Industrial properties must use private service providers who specifically cater for their needs, including special and hazardous waste.

Private providers wishing to offer refuse collection services to commercial or industrial properties (or any other waste service) in Cape Town must first gain accreditation in terms of the City's by-law.

Collection of household recyclables at source

The Think Twice separation-at-source recycling collection programme is being implemented in certain suburbs. It entails the separation of waste and recyclables at home by residents to be collected by a dedicated recycling contractor appointed by the City.

The participating households are issued clear refuse bags or 140-litre recycling bins (depending on the area) to be filled with recyclables, such as glass, paper and plastic.

On average, the initiative has managed to divert over 1 000 tonnes of recyclables from landfill every month and has raised awareness of the importance of recycling. In the medium to long term, the City aims to offer an appropriate separation-at-source service to every Cape Town household.

Work on strategic plans to achieve this and more cost-effective methods of separation at source continues.

Check the City's waste recyclers' map to see if you live in a participating area. See **"Contacts and resources"**.

Management of facilities and landfill sites

The City maintains and operates various waste processing and treatment facilities, refuse transfer stations, MRFs and landfill sites to ensure that all waste is responsibly managed and disposed of.

Currently, Cape Town's waste is sent to two municipal landfill sites, namely Vissershok in the north and Coastal Park in the south. These sites accept general waste only, although Vissershok also accommodates some low-risk hazardous waste. A private hazardous waste landfill site is situated adjacent to the City's Vissershok site.

Finding geologically suitable sites for landfills in Cape Town is becoming increasingly difficult. In fact, a protracted process to finalise the location and establishment of the City's new regional landfill site is still ongoing. Ultimately, Cape Town's waste will need to be transported over longer distances, which will push up tariffs.

City drop-off facilities

The City operates more than 20 drop-off facilities where households can dispose of their bulky waste, non-hazardous garage waste, garden waste, builders' rubble, e-waste and recyclables. These sites not only reduce illegal dumping in Cape Town, but also facilitate the recycling of various types of waste.

At many drop-offs, garden waste is chipped for off-site composting, while recyclables are diverted and sold to the recycling industry. Certain drop-offs even accept items such as wood offcuts or old bricks, which can also be reused or recycled.

Residents can drop off their waste for free on any day of the week, using a vehicle with a carrying capacity of up to 1,5 tonnes. While there is no limit on the amount of recyclables that may be dropped off, households are restricted to three daily loads of garage waste, clean garden waste or clean builders' rubble, such as broken bricks, sand, stone, cement and plaster.

Keep the following in mind:

- ✓ Drop-off facilities do not accept food waste.
- ✓ Business and commercial waste is also not accepted here.
- ✓ Household hazardous waste is accepted only at the special drop-offs at the Athlone refuse transfer station and Bellville integrated waste management facility.
- ✓ Garden waste should preferably be in bundles not exceeding 1,2 m in length and 60 mm in cross-section.
- ✓ Vehicles' carrying capacity must not exceed 1,5 tonnes.
- ✓ Non-recyclable or reusable waste will be transported to landfill for disposal.

Other ways to recycle

In addition to the City's drop-off facilities, there are many private drop-off sites and buy-back centres that can help residents recycle. Some schools offer recycling drop-off sites, and the money raised through the sale of recyclable material is ploughed back into the schools.

Residents who live outside the City's Think Twice separation-at-source recyclable collection areas have a range of private sector recycling collectors to choose from. These providers will collect recyclables from your home on a weekly basis for a nominal monthly fee.

To encourage Capetonians to recycle, the City has loaded a waste recyclers' map onto its website.

Builders' rubble crushing

Instead of having builders' rubble occupy precious landfill airspace, it is crushed and used for roadworks and other construction. The rubble is also used internally on the sites for cover, capping and road-building purposes.

Home composting programme

Feasibility studies have found that the distribution of home composting containers to residents is an effective waste minimisation strategy. In fact, it diverts 15–20 kg of organic waste (fruit and vegetable waste and grass cuttings) per household per month from landfill and

Turn to "Contacts and resources" for instructions on how to access the waste recyclers' map and locate your closest school or private drop-off facility or buy-back centre.

facilitates separation of organic waste at source. Further, socio-economic benefits include improved soil quality and food security, as well as the chance to enable entrepreneurs or community groups to grow and distribute fresh produce.

The City's home composting programme distributes approximately 5 000 containers per year free of charge to residents in formal households with yard areas, which is a requirement for successful composting. Distribution venues include community or recreation halls, civic centres and libraries. The on-site teams generally visit two such venues per subcouncil over three to four days, making a limited number of composting containers available on a first-come, first-served basis each day to ensure even distribution. To date, residents throughout Cape Town have enthusiastically embraced the initiative. See **"Contacts and resources"** for a link to the City's Home Composting Programme web page where rollouts are announced.

However, having a City container is by no means a prerequisite for establishing a composting system at home. The home composting containers provided by the City are also available at most nurseries. Any resident with a garden area can start composting by separating their organic fruit, vegetable and soft garden waste at source, and simply use a compost heap.

City of Cape Town internal recycling programme

Every year, the City appoints contractors to remove and recycle:

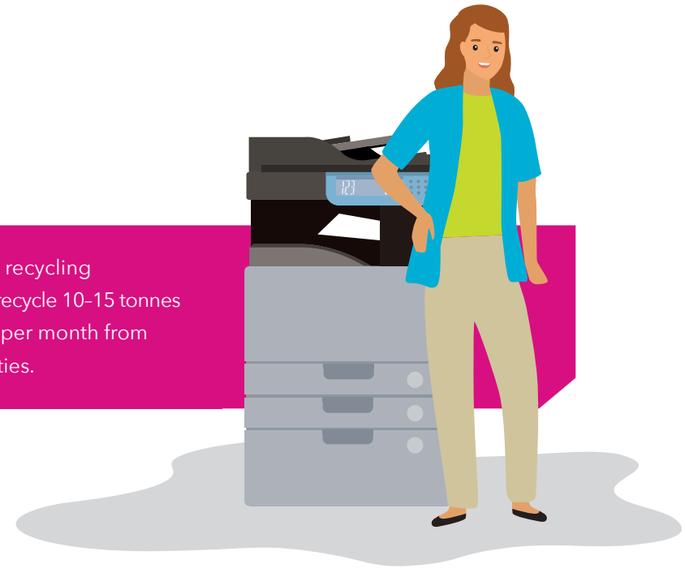
- ✓ waste paper and cardboard from City offices;
- ✓ wooden cable drums from municipal electricity operations;
- ✓ scrap metal from its operations, depots and drop-offs; and
- ✓ used oil from its depots, drop-offs, electricity generators and substations.

Campaigns have been introduced to raise awareness of some of these contracts.

Communication, education and public awareness services

The Waste Services Department presents various waste education and awareness initiatives aimed at communities, schools and higher education institutions, businesses, industries and individual residents. The goal is to encourage people to recycle,

The **Think Twice** paper recycling campaign has helped recycle 10–15 tonnes of paper and cardboard per month from over 250 different facilities.



minimise their waste and choose the best practical ways to improve waste conditions in their community.

Information is shared on how to:

- ✓ become waste-wise by avoiding, recycling and diverting waste;
- ✓ compost;
- ✓ see waste as an opportunity;
- ✓ ensure general cleanliness and environmental health; and
- ✓ ensure compliance with municipal by-laws and relevant legislation, particularly in industries generating waste.

This is done through a range of projects and events, including school visits, mall exhibitions, community events, housing consumer programmes, waste education to stimulate entrepreneurial thinking, litter bin education and waste education around canals and other watercourses.

The waste recyclers' map

The City of Cape Town has made it easier for residents to connect with recycling companies through an easy-to-use digital map.

The waste recyclers' map shows registered recycling companies and entities such as schools, churches, and drop-offs across Cape Town. Each company/entity lists what types of waste they accept for recycling – like paper, plastic, metal, or glass – as well as the areas they collect from or where you can drop off items. There are also buy-back centres listed that will buy your recyclables or sell items. This helps you find the right place to take your recyclables, whether you want to drop them off yourself or arrange for collection.

The map also shows which areas are part of the City's official recycling collection service, which is being rolled out to more neighbourhoods over time. If your area is currently included, the map will indicate contact details for your service provider. You can reach out to them and arrange for bags to be dropped off at your property. They should advise on the collection schedule/day in their response.

The map is free to use and works on any laptop, smartphone or personal computer. Just search your street or suburb to see nearby recycling options. Unfortunately, the map is not yet optimised for mobile use but this will be considered based on available capacity going forward. Find out how to access the map in **"Contacts and resources"**.

Western Cape Industrial Symbiosis Programme

The Western Cape Industrial Symbiosis Programme (WISP) is a multiple award-winning, free facilitation service funded by the City of Cape Town and delivered by GreenCape, a non-profit organisation (NPO) originally established by the Western Cape government to support the development of the region's green economy. WISP facilitators expertly connect member companies with the unused or residual resources of other businesses, such as materials, energy, water, assets, logistics and expertise. WISP companies range from micro to mega and come from a vast array of industries, including food, textile and manufacturing.

By sharing their resources, WISP members:

- ✓ cut costs and increase profit;
- ✓ improve their business processes;
- ✓ create new revenue streams;
- ✓ learn from one another; and
- ✓ operate more sustainably.

In its first five years of operation, WISP managed to:

- ✓ divert 27 436 metric tonnes of waste from landfill;
- ✓ cut fossil greenhouse gas emissions by 73 831 (equivalent to the installation of nine 2,2 MW wind turbines);
- ✓ generate R43,08 million in financial benefits (additional revenue, cost savings and private investments); and
- ✓ create 143 jobs (25 directly in member companies).[1]

The importance of accreditation for waste managers and residents

The accreditation process for waste managers allows the City to monitor waste processed by private waste managers. This helps the City identify gaps in local waste management systems and plan future government support to increase waste diversion. Using an accredited company will give you peace of mind that your waste is being processed in an environmentally-friendly way.

1 GreenCape 2018.

Waste entrepreneurs

A number of innovative entrepreneurial initiatives have been established in Cape Town to encourage recycling and integrated waste management. Many are small enterprises or based at schools and community organisations. Sadly, these initiatives often experience financial difficulty as prices of recyclables fluctuate. Yet, thanks to the passion, time and energy of entrepreneurs, volunteers and supporters, they continue to make a difference.

Here are a few examples:

- ✓ The Hout Bay Recycling Primary Co-operative is a rare example of a successful waste management co-operative and has been operating successfully for nearly ten years. They collect recyclables from schools, restaurants and some homes in Hout Bay, which are then taken to the City's Hout Bay drop-off, where they are stationed. The recyclables are sorted and collected by a recycling company, who pays for the items.
- ✓ Afrakan ReCreations was established after a fire destroyed thousands of informal homes in Imizamo Yethu, Hout Bay, in 2017. They recycle waste from film sets and building sites, and redistribute the materials to fire victims to rebuild their homes.

Oasis Association

The Oasis Association is an NGO that seeks to improve the lives of people living with intellectual disabilities through a range of activities. Their primary income generator is a recycling project that is currently processes over 60 tons of recyclable waste every month. In addition, they are partnered with over 250 businesses to whom they provide a free recycling collection service.

The project has generated much-needed income for Oasis's day centres, group homes and workshops catering for over 500 adults and children living with intellectual disabilities. In addition, Oasis has opened four charity shops stocked with the household items donated at their recycling drop-off. For the Oasis Association's details, turn to **"Contacts and resources"**.

GOOI – weekly organic waste collection service

Gooi offers a convenient doorstep service that turns your kitchen scraps into compost, helping to divert organic waste from landfills. Users receive a bucket for food waste that's collected weekly by Gooi and composted to enrich soil and support local farmers. A variety of subscription models are available for residents to ensure a service level that suits their needs.

BLUEPRINT76

Blueprint76 is a pioneering South African initiative that aims to enable economy of scale for entrepreneurs to achieve low volume production of goods from sustainable materials, accelerate growth, and build our City's circular economy.

The company aims to provide a shared workspace for a community of other people who are passionate about creating products from recycled materials. The plan is to stock the workshop with machines, equipment, tools and recycled materials such as plastic panels that make it easier for entrepreneurs to turn waste into marketable products. In addition they want to manufacture low-tech and semi-automatic machinery that can assist entrepreneurs to scale their operations. Anyone interested in participating in such a project is encouraged to visit their website and register this interest to be included on updates going forward.

YWASTE

Ywaste is a majority Black owned (BBBEE Level 1) company that has evolved from domestic worm-farm kits into a large-scale organic waste management enterprise. Since inception, Ywaste has diverted over 21 000 tonnes of organic waste from landfill and currently collects and beneficiates over 600 tonnes of waste per month – more than 7 200 tonnes annually – from landfills through its Athlone Materials Recovery Facility (MRF).

Coming from humble beginnings, the business now offers bin rentals, food-grade containers, drop-off options, and dedicated collections for both organic and dry waste. It also supplies electronic data capture, disposal certificates, waste profiling, and compliance support for hospitality, retail, medical, and residential clients. Growth of the business is a true testament to the potential of the circular economy in the City.

ZTL Organics

Founded in 2009, ZTL Organics (Zero to Landfill Organics) has grown from composting 196 kg per month into an industrial facility at the Philippi agri-hub capable of processing diverse organic waste streams, including food scraps, garden waste, fat-trap waste and paper towels, at volumes exceeding 200 tonnes per month.

ZTL Organics provides consulting services to businesses on how to effectively divert organic waste and provides a collection service for a range of different customers.

Re.Bag.Re.USe

The initiative started out as a hobby during lockdown, where empty bread bags were being repurposed and crocheted into beautiful shopping bags. It has since grown to support six women who process the plastic into raw materials and 17 more who crochet into a variety of products including shopping, cross-body, moon and peg bags, pot plant containers and pencil cases.

A portion of the proceeds from each sale goes to the Neighborhood Old Age Home, or to the SPCA.

They have drop-off points for plastic at Fiddlesticks Haberdashery, Hout Bay Library and Hout Bay Pick n Pay. Products are sold online at **www.rebagreuse.com**, with a limited range also available at The Collective in Hout Bay.

Responsible waste management at home

Living sustainably

Real progress is only possible if everyone practises integrated waste management, or the zero-waste philosophy, and pursues a circular economy. We need to rethink the way we are doing things, starting with waste avoidance and moving towards the six Rs: “refuse” (avoid), “reduce“, “reuse”, “repurpose”, “recycle” and “rot” (compost). Only then will sustainable living become as instinctive as looking both ways before crossing the street.

Try practising the integrated waste principles in your day-to-day routine. Start by avoiding the creation of waste, carefully considering the products that you buy (or refuse to buy) and conducting a waste audit at home to understand the different types of waste that your household generates. Most high-income households produce large volumes of metal, plastic, glass, paper and cardboard waste, mostly in the form of packaging. Some of it can be recycled instead of being sent to landfill; some of it should rather not be purchased in the first place, as it is not currently recyclable in Cape Town. Low-income households tend to generate a smaller amount of waste and much less packaging, but produce larger quantities of organic waste or ash.

Living the zero-waste principles

When managing your waste at home, the basic principles to consider are:

- avoiding or reducing the waste you produce;
- reusing products or materials wherever possible;
- separating recyclable and compostable materials from other rubbish; and
- ensuring that these are recycled or composted.

In this way, you will be reducing the amount of waste that goes to landfill.

These principles form part of the full set of principles underpinning the zero-waste philosophy, which we will achieve only if society as a whole, including business and industry, embrace it. Other principles include redesigning or remanufacturing materials or services, repairing instead of replacing goods, refurbishing or repurposing used products and, as a last resort, recovering the energy from materials.

Blogger and author Bea Johnson has turned the zero-waste philosophy into a global movement with her best-seller book *Zero Waste Home*. See **"Contacts and resources"** for a link where you can read more on her philosophy to pursue zero waste at home.

Avoid creating waste (or refuse to create waste)

The first and most important step is to reduce the amount of waste you create, or to avoid creating it in the first place.

Here are some practical tips:

- Think twice: Do you really need that plastic bag or straw? Start refusing these items that are simply handed out, and you will soon realise that many people support your way of thinking.
- Take your own bags along to the grocery store.
- Consider non-material gifts, such as a night out, cooking a dinner or doing something with the kids. Create memories instead of waste.
- Avoid buying overpackaged products, such as plastic-wrapped vegetables in polystyrene trays. It is best to buy at a farmers' market and take your own bags.
- Think again before printing a document to minimise paper use.
- Buy only what you need, and consider buying some items in bulk, refills or concentrates, as these generally require less packaging.
- Buy products that include recycled or recyclable materials, such as kitchen towels and shampoo bottles with recycled plastic content.
- Choose durable items over products you will soon need to replace.
- Avoid using disposable products such as disposable razors or paper plates.
- Buy local. These products do not travel as far, which means they require less packaging and are fresher. Clocking up less "food miles", local products also cause less pollution through transport.
- Make your own gifts and gift wrapping instead of always buying new items. This can be very innovative and fun, and you will be saving the planet in the process.

Reuse your waste items

If you cannot avoid or reduce the generation of waste, consider how you can reuse your waste instead of just recycling it.

Here are some pointers:

- Buy a refillable glass bottle and reuse it for your water instead of buying plastic bottled water.
- Return glass bottles with deposits to shops for reuse.
- Reuse plastic grocery bags or, even better, use durable cloth bags when you go shopping.
- Donate unwanted gifts, clothes, furniture, toys or books to a charity or school.
- Take your old furniture to a City drop-off facility.
- Repair items instead of throwing them away. Support your local seamstress, shoemaker, bike repair shop and the like. This also stimulates employment and the economy in your community.
- Take items such as cardboard toilet-roll cores, egg boxes, jars, margarine tubs and scrap paper to local schools for art projects.
- Borrow or rent items you only use for a short time, such as kids' carriers, car seats and prams or certain DIY projects, or power tools.

Take a look at these handy ideas for reusing household goods:

- Store food in reusable containers instead of non-recyclable cling wrap or foil, which is made from resource-intensive aluminium.
- Reuse gift bags, gift paper and greeting cards.
- Cut used paper into squares to reuse as notepads.
- Use both sides of any piece of paper before recycling it.
- Plastic tubs and milk or juice cartons with a wax or plastic coating make excellent pots for seedlings.
- Use old T-shirts or underwear as rags for cleaning or dusting.
- Use brown paper bags with sand as containers for beach candles.

Most charities are willing to accept clothing, furniture, books, toys and tools, which can either directly support needy families or be sold to raise funds for their work. In many cases, the organisations will even arrange for the materials to be collected from your home.

Separate your waste at home

The waste you end up with, after reducing and reusing what you can, will need to be separated at home to be managed responsibly. Set up a system in your household to create separate streams of organic waste for composting, packaging waste for recycling, and other rubbish, which will go to landfill.

Organic waste for composting

A large amount of waste is often organic (compostable), such as vegetable and fruit peels and food scraps. These should be separated from the rest of your household waste and placed into a compost heap, worm farm or composting container to make nutrient-rich, free compost for your garden. It also helps reduce the amount of methane gas created. Easy tips on how to make your own compost are provided in the biodiversity section (p 113), a subsection of the Environment chapter of this handbook.

Organic waste

The following things can be used in most compost heaps or worm farms:

- Vegetable and fruit peelings, tea leaves and tea bags, coffee granules, eggshells (avoid meat, bones and dairy, unless suitably managed).
- Garden waste, such as grass cuttings, leaves and dead flowers.
- Small quantities of paper, cardboard, sawdust and wood shavings, woodfire ash and seaweed, which helps absorb moisture.

Recycling

Recycling has many benefits and is an integral part of responsible waste management in your home.

The environmental benefits of recycling include:

- less consumption of raw materials;
- less energy consumption to manufacture new items;
- less air pollution caused by burning waste; and
- less groundwater pollution caused by leachate (see page from landfills).

How to set up a separation system for your waste at home

Here are a few useful tips to get started:

- Start with a three-bin system, if possible. This means separating your dry waste (recyclables), organic waste (for composting) and wet waste (rubbish for landfill).
- Have clearly marked bins for your recyclables, organics and rubbish.
- Try to keep your glass separate, as it can break and contaminate the other recyclables.
- Store your recyclables indoors until you can access a recycling collection or drop-off site.

For your organic kitchen waste, it helps to place a sealable container on your kitchen counter or in your fridge. Empty it onto your compost heap or your composting container daily.

Turn to the section on biodiversity for tips on how to set up a compost heap. Alternatively, consult "Contacts and resources" for a useful link on the City's website.

The following table will help you decide which waste types are recyclable:

Rubbish/waste to landfill – Things you cannot recycle, and will go to your rubbish bin and end up on a landfill site	Mixed recyclables – Things you can recycle
✓ Wet or dirty paper: tissues, paper towels, food wrappings, paper with spills, paper plates and cups ✓ Wax or plastic-coated packaging: pet food bags, potato bags ✓ Soiled paper and cardboard: pizza boxes ✓ Certain types of paper: carbon paper, stickers, self-adhesive paper, chemically treated fax or photo paper ✓ Chip packets ✓ Cigarette butts ✓ Cling wrap used over food ✓ Plastic sandwich and other moulded trays, including PET-moulded trays or polyolefin plastics (no. 2, 4 and 5) ✓ Nappies *Note that while some of these items could be composted, they cannot be recycled.*	✓ Paper and cardboard ✓ Milk cartons ✓ Tins and cans ✓ Glass bottles and jars ✓ Plastic bottles and containers ✓ Polystyrene ✓ Milk and juice cartons with cardboard and foil *Note that these items need to be "washed and squashed", meaning they must be cleaned, dried and flattened.*

How to ensure that your dry waste is recycled

Here are some ways to ensure that your recyclables reach the recycling market:

- ✓ Participate in the City's separation-at-source recycling collection programme if available in your area. Check the waste recyclers' map on the City's website to see whether your area is part of the programme (see **"Contacts and resources"** for details).
- ✓ Take your recyclables to your nearest City drop-off (locate it using the link provided under **"Contacts and resources"** or find on the City's website).
- ✓ Donate your recyclables to a local school, church or community organisation/ recycling drop-off facility (also available on the City's Waste Recyclers app).
- ✓ Sell your recyclable waste to a buy-back centre (look on the Waste Recyclers app).
- ✓ Alternatively, arrange for it to be collected by a private recycling collector (consult the waste recyclers' map for a list of collectors in your area).

Household waste audit

To help you find the best way to reduce your waste and separate it for recycling or composting, it is important to do a household waste audit.

Choose a week in which you list all your household waste under the following headings:

Recyclable	Non-recyclable	Organic waste
e.g. glass	e.g. cling wrap	e.g. tea bags

Take time to examine the products that you would usually throw away. See which of those can be recycled or composted. If you do not want to sift through dirty waste, a tip is to have a look inside your grocery cupboards to see what you will be throwing out.

Keep all the recyclable products aside and find your closest drop-off site or buy-back centre where these can be dropped off. For your organic waste, create a compost heap or get a composting container. Combined, these efforts will reduce the amount of waste you throw away.

Recycling specific types of waste

Paper and cardboard

It takes an astonishing 17 trees to make one tonne of paper. The good news is that cardboard and paper are excellent for recycling. Paper recycling takes 40% less energy and 30% less water compared to new paper production. Recycled paper products are often used to make cardboard for cereal boxes, or moulded paper products such as egg boxes.

When recycling paper and cardboard, try to separate white office paper from magazines and newspapers. Also flatten cardboard boxes to save space.

Paper products that cannot be recycled include:

- ✓ wet or dirty paper, such as tissues, paper towels, food wrappings, paper with spills, paper plates and cups (although many of these may alternatively be composted if not covered with waxy or plastic layers, or too contaminated with cooked food, oil or inks);
- ✓ plastic-coated packaging, such as pet food bags and potato bags;
- ✓ carbon paper, stickers and self-adhesive paper; and
- ✓ chemically treated fax or photo paper.

To get more information on paper recycling options provided by industry, turn to **"Contacts and Resources"** for the web addresses of Fibre Circle and EWASA, producer responsibility organisations serving the paper and cardboard packaging industry.

Cans and metal

Recycling tins and cans saves about 95% of the energy needed to make a new can from raw material. It does not matter whether cans are crushed, rusted or burnt – they can all be recycled. Currently, 72% of used beverage cans in Southern Africa are recovered, which is very good compared to European standards.

Note the following tips for the collection of cans:

- ✓ Rinse food tins thoroughly – it is best to do this after having washed your dishes.
- ✓ Once clean, squash them to save space.
- ✓ Motor oil cans must be kept separate for oil recycling (see "Motor oil" on page 94).

Moreover, the global demand for all steel scrap metals is huge. South Africa exports up to 50% of the scrap it recovers. Interestingly, 70% of recycled scrap metal comes straight from the industry waste stream, not from consumers. Scrap metal can be dropped off at community recycling centres, so-called "scrapyards" or buy-back centres. Find your closest recycling service using the City's waste recyclers' map. Metpac-SA is the PRO for recycling of cans. For more information on industry-funded projects and work to increase diversion of metal packaging please visit their website (see **"Contacts and resources"**).

Glass

Glass does not decompose in landfills. It is made of sand and can be melted down and reused. In fact, recycling one glass bottle saves enough electricity to light a 100 W bulb for four hours.

Ideally, glass should be kept separate from other recyclables to avoid breakage. For now, however, it is still accepted along with your mixed recyclables.

For more on how and where to recycle glass, contact the glass manufacturers producer responsibility organisation, The Glass Recycling Company (TGRC) (see **"Contacts and resources"**).

The following glass products are either laminated or have different melting points, which makes them unsuitable for recycling, so do not put them in a glass recycling bin:

- ✓ Drinking glasses
- ✓ Cups, saucers and ceramic ware
- ✓ Sheet glass, such as windscreens and window panes
- ✓ Mirrors and reinforced glass
- ✓ Light bulbs and tubes, including fluorescent lights
- ✓ Car headlights
- ✓ Laboratory glass

Plastic

Plastic is traditionally made from petroleum-based chemicals (oil, coal and gas). However, new types of plastic made from more sustainable, plant-based oils are now also entering the market (see "Plant plastic?" on the next page).

To distinguish between the many different types of plastic and assist with recycling, poly-logos (plastic identification logos) are provided on most products. The poly-logo has a number that identifies the plastic type, as the different types need to be recycled separately.

Partnering for change: The SA Plastics Pact

The City of Cape Town is a proud supporter of the SA Plastics Pact, a collaborative initiative working to reduce plastic waste and promote a circular economy for plastic. Cape Town was the first African city to support the SA Plastics Pact.

Supporters of the Pact, from the business and public sectors, demonstrate strong commitment to reducing plastic waste by doing so.

The following table provides a summary of the main plastic types, their application and recyclability.

NUMBER	DESCRIPTION	APPLICATION	GENERALLY RECYCLABLE?
1 = PET	Polyethylene terephthalate	Cooldrink, juice and water bottles; jars for peanut butter, salad dressings, oil, cosmetics and some household cleaners	YES, except for moulded products, such as food trays
2 = PE-HD	High-density polyethylene	Motor oil containers, crates, milk bottles, some domestic cleaner bottles, some cosmetic and toiletry containers	YES
3 = PVC	Polyvinyl chloride	Clear trays for food packaging, toiletry containers, blister packs, chocolate containers, gutters and downpipes (white line visible when folded)	NO
4 = PE-LD	Low-density polyethylene	Garbage bags, frozen-vegetable bags, some squeezy bottles, cosmetic tubes, dust covers and shrouds	YES
5 = PP	Polypropylene	Bottle caps and closures, battery cases, cups and plates, hinged or pill containers, buckets, flexible yoghurt containers	YES, except for moulded products, such as food trays
6 = PS	Polystyrene	Disposable cups and plates, rigid yoghurt containers, foamed styrene trays, cosmetic tubs, retail coat hangers and toys, protective packaging (cracks easily when squashed)	YES
7 = Other	PA+PE-LD, ABS, cellophane	Nylon and low-density polyethylene laminates; vacuum packaging for meat, cheeses; mainly multi-layer and specialised packaging. ABS is the plastic from which computers are made.	NO, except as a component of products, such as composite "plastic wood" products

In addition, "polyolefins" is the collective term for plastics that contain PET, whether PE-HD (no. 2), PE-LD (no. 4), PP (no. 5), as well as linear low-density polyethylene, and are all recyclable. The word "polyolefin" means oil-like, denoting the oily or waxy texture of plastic types that include PET.

Plastics SA continues to serve as the central representative body for the South African plastics industry, promoting sustainable practices and supporting recycling initiatives. In alignment with the mandatory EPR regulations introduced in 2021, several industry associations have evolved to meet compliance requirements:

- ✓ **PETCO:** The PET Recycling Company remains the registered producer responsibility organisation (PRO) for polyethylene terephthalate (PET) packaging. PETCO oversees the collection and recycling of PET materials, ensuring environmental sustainability and compliance with EPR mandates.
- ✓ **Polyco PRO NPC:** Formerly focused on polyolefin plastics, Polyco has expanded its scope to manage EPR schemes for all plastic packaging types, including high-density polyethylene (HDPE), low-density polyethylene (LDPE), polypropylene (PP), polyvinyl chloride (PVC), polystyrene (PS), and multi-layer plastics. This consolidation aims to streamline recycling efforts and enhance efficiency across the plastics value chain.

It's important to note that the Polystyrene Association of South Africa and the Southern African Vinyls Association (SAVA) have integrated their EPR responsibilities into Polyco's operations. While these associations continue to exist, their roles have shifted away from direct EPR scheme management.

These developments reflect a concerted effort within the South African plastics industry to unify EPR compliance mechanisms, thereby promoting a circular economy and enhancing the effectiveness of plastic waste management strategies.

Consult "Contacts and resources" for how to contact any of these organisations.

A greener plastic future: Plant-based, compostable, and biodegradable options

Plastic made from fossil fuels has long been part of our daily lives, but new types of greener plastics are being developed to reduce environmental harm. These include plant-based, compostable and biodegradable plastics.

Recycling-specific waste types

Plant-based plastics

Some plastics are now made using plants like sugarcane or corn instead of oil. For example, Brazil has been producing ethanol fuel from sugarcane for decades. In 2007, a Brazilian company called Braskem developed a way to turn this ethanol into a type of plastic called polyethylene (PE-HD) – the same kind used in bottles, containers, and packaging.

This plant-based version is chemically identical to plastic made from fossil fuels, which means it can be recycled in a similar way to its fossil fuel-based equivalent, where the equivalent is recyclable. Remember that not all traditional plastics are technically recyclable. See pg 86 for information on different types of plastic.

It is a renewable alternative that also helps reduce carbon emissions during production.

However, it's important to note that most plant-based plastics do not break down naturally and still need to be recycled like regular plastic, i.e. a plastic labeled "plant-based", does not mean it is biodegradable or compostable.

Compostable and biodegradable plastics

Other new plastics are designed to break down safely in the environment into water, carbon dioxide and plant material. These are called compostable or biodegradable plastics:

- **Compostable plastics** are a subset of **biodegradable plastics**, meaning all compostable plastics are biodegradable, but not all biodegradable plastics are compostable.
- **Compostable plastics** break down fully into compost, made up of natural materials (like water and carbon dioxide) when placed in proper composting conditions, usually in an industrial composting facility.
- **Biodegradable plastics** can degrade into natural materials, under a wider range of conditions, including both aerobic and anaerobic environments, but may not necessarily break down into compost. Biodegradable plastics also break down over time, but the process and results can vary depending on the environment.

In South Africa, the Compostable Plastics Packaging Council (COPCO) is leading the way in growing this field responsibly.

COPCO works with scientists, businesses, and recyclers to:

- act as the official national body, in partnership with the relevant CSIR laboratory, to test and certify compostable products;
- help consumers identify genuine compostable plastics with COPCO's own special African certification logo;
- support proper disposal systems and reduce misleading "green" claims;
- serve their members as a registered Producer Responsibility Organisation (PRO), implementing extended producer responsibility (EPR) programmes that require packaging companies to manage waste, including compostable plastics and packaging, after products are used.

As technology improves, some compostable plastics are now also home-compostable, breaking down in garden compost heaps.

What this means for you

Choosing plant-based or compostable plastics helps reduce pollution, as well as demand for fossil fuels, if managed appropriately and correctly, but it is important to:

- check labels carefully to see how each plastic should be managed, whether through recycling or composting;
- use COPCO certified compostable products and compost them correctly; and
- keep plant-based PE-HD plastics in the regular recycling stream.

COPCO's website is listed in **"Contacts and resources"**.

Milk and juice cartons

Cartons such as Tetra Pak, Tetra Brik or SIG Combibloc are widely used to package many fruit juice and milk products. Finally, these milk and juice cartons are now recyclable in South Africa and are subsequently used to make a variety of new products. The recycling of these cartons falls under PETCO.

Garden and organic waste

If you are unable to compost your organic waste at home, the Organics Waste Association of South Africa, The South African Mass Insect Rearing Association or the South African Biogas Industry Association may be able to assist. These

organsations capture the value from organic waste for a variety of purposes including the production of biogas or insect farming. Refer to **"Contacts and resources"** for contact details.

Builders' rubble

When building or renovating your home, keep builders' rubble separate. Drop it off at one of the City's drop-off sites or a private rubble-crushing company so that it can be recycled or reused for roadworks and general construction. You may drop off up to three loads of builders' rubble per day at the City's drop-offs, free of charge, using a bakkie, trailer or light delivery vehicle with a carrying capacity of up to 1,5 tonnes. The City's landfill sites also accept larger loads of bricks, stone and concrete debris, as well as blocks with a diameter of up to 500 mm, at the special builders' rubble tariff. However, the general waste tariff will be charged at landfills for builders' rubble contaminated with wood, plastic, glass, garden refuse, ceramic tiles, tyres or cabling. Toxic materials are not accepted.

Cooking oil

Cooking oil harms the environment if not disposed of responsibly. This is especially felt in the aquatic (water-based) ecosystems: Any layer of oil stops air from getting into water, suffocating the entire river or lake. Unfortunately, most of South Africa's used cooking oil goes back into the food chain in the form of pet food or livestock feed, or is used in disadvantaged communities for cooking. This could be dangerous to both human and animal health, as used cooking oil can cause cancer.

Yet it remains a valuable resource, and it is a shame that it is sometimes poured down the drain or collected by waste companies, who simply dump it on landfill sites. Used cooking oil can be used to make biodiesel, which is a good alternative to petroleum-based diesel. Biodiesel is named so for the biodegradable materials it is manufactured from, while it is suitable for use in diesel engines. While households would presumably not generate the large quantities of used cooking oil found in restaurants, certain companies will collect reasonable quantities of used household cooking oil for recycling.

To dispose of small quantities of used cooking oil at home, you can add it to your garden or compost system. Refrain from pouring it down the drain or toilet.

Turn to **"Contacts and resources"** for details of the ROSE Foundation, who can connect you with used oil collectors in your area.

Landfill as last resort

The landfilling of waste remains an integral part of waste management, although as a last resort. Our top priorities are always to first avoid the generation of waste by buying responsibly and bringing along our own shopping bags, then to reuse items wherever possible and, finally, to recycle.

Hazardous waste

Hazardous waste is waste that is toxic – even in low concentrations – due to its chemical or physical properties. As hazardous waste is potentially harmful to you and the environment, it requires special handling according to type and must always be dealt with differently from general waste.

There is no completely safe way to dispose of household hazardous waste. However, various technologies have been developed to recycle certain types. In terms of disposing of the rest, the best is to follow all safety precautions. Because of the cost and environmental risk associated with the disposal of hazardous waste, it is important to ask yourself whether there is a safer (less toxic) alternative before buying the item. After all, prevention is better than cure. Also consider how you would safely dispose of the item before you purchase it.

The different types of hazardous waste and their effects are as follows:

- Flammable or ignitable (petrol, paraffin, diesel fuel, matches, thinners, nail polish and products containing alcohol). Keep away from a naked or exposed flame.
- Irritant (ammonia, bleach). Keep the product away from your skin or eyes. Handle with gloves. Irritants can cause soreness or swelling of the skin, eyes, mucous membranes or the respiratory system.
- Corrosive (metal cleaners, car battery acid, drain and oven cleaners, rust removers, bleach and pool acid). These products eat away at materials. For example, when paint thinner is poured into a plastic cup, the cup dissolves. Do not allow any contact with skin.
- Dangerous, toxic or poisonous (paraffin or pesticides). These substances will cause injury or death if swallowed, absorbed or inhaled.
- Explosive or reactive (drain cleaners, bleach-containing scrubbing and dishwashing detergents, especially when combined with ammonia or other acids). These substances can cause an explosion or release poisonous fumes when exposed to air, water or other chemicals.
- Infectious (soiled nappies, condoms, infected needles). These can spread disease and infections.

For links to more information on how to manage hazardous waste, consult "Contacts and resources".

Medium to low-risk hazardous waste

Medium to low-risk hazardous waste is usually generated in private industry and includes both liquid and solid waste, such as batteries, food waste, oils and low-risk industrial waste. Residents can drop off certain types of low-risk household hazardous waste at the City's Athlone refuse transfer station and Bellville integrated waste management facility free of charge. Some of it will be recycled, while the rest will be transferred to the Vissershok landfill if necessary.

Always check whether a product is hazardous before handling it, storing it or disposing of unused product or empty containers. If you would like a materials safety datasheet for a specific product, request one from the supplier. They are required by law to supply you with one.

Extreme and high-risk hazardous waste

While the Vissershok landfill accepts medium to low-risk hazardous waste if it has been screened and a special waste permit has been obtained, extreme and high-risk hazardous waste is not accepted.

Certain types of high-risk hazardous waste may be dropped off at the City's Athlone refuse transfer station and Bellville integrated waste management facility free of charge. Some of it will be recycled; the rest will be transferred to the private hazardous-waste landfill adjacent to the City's Vissershok site if necessary.

Quick audit of hazardous waste

Go around your home making a list of any of the mentioned hazardous materials. Start in the garage and kitchen, as this is generally where cleaning chemicals are kept.

Explore alternatives you could get when you go shopping again. See "Alternative options to reduce household hazardous waste" (page 102-108) for ideas.

Hazardous material	Alternative
e.g. drain cleaner	e.g. baking soda and white vinegar

Safety precautions for hazardous household products

- ✓ Avoid chemical insecticides by investing in a good fly swatter.
- ✓ Select the least toxic products that work for you in your home. Detergents carrying the South African Bureau of Standards (SABS) A-E mark are considered "environmentally acceptable" and are approved in terms of the South African National Standards (SANS).
- ✓ Buy only enough for your immediate needs to avoid storing dangerous products.
- ✓ Buy products with listed ingredients. Knowing what a hazardous product contains will help medical staff treat any case of poisoning.
- ✓ Read the label for ingredients and instructions for use, safe storage and disposal.
- ✓ Ensure that the product is clearly marked, and keep it in the original container.

- ✓ Never mix hazardous products, as this could lead to a chemical reaction.
- ✓ Always use hazardous products in a well-ventilated area and with extreme care.
- ✓ Never smoke or eat while using chemicals, and always wash your hands after use.
- ✓ Keep the container tightly closed. If a container is leaking, put the original container in a spill-proof, durable secondary container and label it "Leaking".
- ✓ Store in a cool, dry and dark place, away from stoves or water heaters.
- ✓ Keep hazardous products away from children and pets.

In case of emergency

- ✓ If a hazardous product is ingested, take the person straight to your nearest poison unit, clinic or hospital.
- ✓ If poisonous chemicals are inhaled, quickly take the person into fresh air. Do not expose yourself to the fumes. Open all doors and windows.
- ✓ If a chemical gets into your eyes or onto your skin, rinse for 15–20 minutes with clean, fresh water.
- ✓ If someone has ingested paraffin, it is important not to try and make the person vomit, as the fumes could enter the lungs and cause damage.

See **"Contacts and resources"** for the number of the Western Cape Poisons Information Helpline. Alternatively, in a life-threatening situation, call the City's emergency line on 107 (or 021 480 7700 from a cellphone).

In case of a hazardous waste spill

Most of the large waste disposal companies have 24-hour spill response teams for hazardous waste, including clean-ups, spillage containment and on-site remediation. Turn to **"Contacts and resources"** for their details.

Recycling or safe management of specific types of hazardous waste

Electronic waste

Electronic waste, or e-waste, is the umbrella term for discarded electrical or electronic devices, including cellphones, computers and "white appliances" (refrigerators, irons and stoves). Many e-waste components are made of potentially hazardous materials and should not be put into general waste bins or sent to landfill. Electronic products and appliances can be dismantled for valuable parts, which can then be reused in other machines or recycled for their metal or other contents.

E-waste recycling is a growing industry in South Africa, already involving the electrical and electronic industry, as well as various recycling role-players. In fact, Cape Town was the first South African city to pilot the repair, reuse and recycling of e-waste, and remains a leader in the field.

Various producer responsibility organisations currently focus on expanding the recycling of e-waste in South Africa. These are the EPR Waste Association of South Africa (eWASA), R2E2 NPC , Circular Energy, the Consumer Goods Council of South Africa,and the E-waste Recycling Authority. Find their details under **"Contacts and resources"**.

Moreover, some of the world's leading electronics companies have joined forces to produce the *Guide to Greener Electronics*. The guide describes what these companies are doing to address their environmental impact through an assessment of their energy use, resource consumption and chemical elimination.

To find the nearest drop-off point or learn more about safe CFL recycling, visit the Extended Producer Responsibility Association (ERA) website. (See "**Contacts and resources**").

Compact fluorescent lamps and fluorescent tubes

Compact fluorescent lamps (CFLs) contain small amounts of mercury and should never be thrown in your household bin. Improper disposal can harm people and the environment.

Instead, follow these steps:

1. Store used CFLs safely. Keep old or broken CFLs in a sealed container, like a plastic tub or original packaging, away from children and pets.
2. Drop them off at a safe disposal site. The Athlone and Bellville household hazardous waste drop-off facilities and some retail outlets accept CFLs for recycling. You can also use registered hazardous waste recyclers.
3. Never crush or break them. If a CFL breaks, ventilate the area and carefully clean up using gloves, not a vacuum cleaner.

- ✓ If a CFL or fluorescent tube breaks, immediately open the vehicle windows for the air to circulate. Place the broken lamp or tube in a plastic bag and drop it off at the nearest participating drop-off centre or collection point.

Motor oil

A single litre of motor oil dumped in water can form an oil slick bigger than two soccer fields. This is why it is essential to recycle used motor oil wherever possible. Also, never pour antifreeze, oil or other chemicals onto the ground, into stormwater sewers or down the drain, as these substances can cause serious environmental damage.

The ROSE Foundation (Recycling of Oil Saves the Environment) is a registered PRO that licenses used oil collectors. Find out whether your garage works with the ROSE Foundation and motivate them to join if not. Residents can also drop off used motor oil at one of the City's drop-off facilities that accepts it.

For the ROSE Foundation's details, and a table of municipal drop-off sites and accepted waste look under **"Contacts and resources"**.

Batteries

Batteries are an integral part of everyday life – from your car and cellphone to your camping torch and wristwatch. All batteries contain a mixture of heavy metals (such as zinc, lead, nickel, manganese, cadmium, silver and mercury) and chemicals (such as sulphuric acid) to power the device they are connected to. Proper disposal of used batteries is important, as the metals and chemicals they contain can be hazardous to the environment.

As such, batteries were one of the first waste types to be subjected to mandatory EPR. ERA NPC and eWASA currently manage the EPR obligations of battery producers, including collection systems and drop-off points, as well as education.

When disposing of batteries, consider whether they can be recycled through the dealer or retailer. Alternatively, take them to a municipal drop-off that handles household hazardous waste (i.e. Bellville or Athlone).

For more information on battery disposal please see the City's guide on the matter, or the ERA/eWASA websites (see "Contacts and resources").

Asbestos

"Asbestos" refers to a group of minerals with extraordinary strength, good thermal and electrical insulation, and fairly good resistance to chemicals. Yet breathing in air containing asbestos dust over an extended period of time can cause disease. Anyone who disturbs asbestos that has deteriorated or been damaged may be at risk of inhaling asbestos fibres.

Although the use and sale of asbestos products is now banned, asbestos may still be found in used or waste products such as seals and gaskets (rope, tape, flanges, etc.), friction products (clutch plates and brake linings), thermal and acoustic insulation, and, most commonly, cement products (roof sheets, gutters, downpipes and pot plant containers). These products may occasionally expose people working with them to asbestos dust.

The City disposes of asbestos-containing waste in a trenched, co-disposal operation on its permitted low-risk hazardous waste landfill at Vissershok, in accordance with applicable legislation. Residents can drop off up to 50 kg of asbestos per day at the City's Athlone refuse transfer station or Bellville integrated waste management facility free of charge. Commercial asbestos handlers are required to take their asbestos to the Vissershok landfill, where the hazardous waste tariff will be charged.

Pesticides

Pesticides are generally substances with an active ingredient that can prevent, control or destroy any pests, including unwanted plants or animals and diseases. The active chemical ingredient determines the type of pesticide, such as herbicides, fungicides, rodenticides, insecticides, plant growth regulators, defoliants and even wood product treatments. Pesticides are designed to be toxic (poisonous) and can harm or kill pets, birds, fish and humans. The toxicity depends on the active ingredient. When used in larger-than-recommended doses, the excess pesticide can pollute the environment.

Without appropriate safety precautions, exposure to pesticides can be harmful to humans. Products should always be handled with extreme care and should never be stored near food or within reach of children. Symptoms of pesticide exposure include headaches, tremors, dizziness, nausea and vomiting, breathing difficulties, skin rashes and/or eye irritations.

Chronic or delayed health effects can include permanent eye damage, cancer, a compromised immune system and neurological diseases. Domestic pesticide waste normally consists of expired pesticide products, unwanted stock, empty containers and contaminated materials.

Unused pesticides should never be disposed of in the general waste or poured down the drain. Instead, residents can drop them off at the City's Athlone refuse transfer station or Bellville integrated waste management facility free of charge.

In addition, residents can find drop-off points on the website for CroplifeSA (See **"Contacts and resources"**).

Household chemicals

Every household uses chemical products to clean and disinfect in and around the home. While these products make our lives easier, they contain at least one active chemical ingredient. This means they must be handled with caution. If not managed correctly, household cleaning aids can harm humans and the environment.

Cleaning chemicals can be broadly divided into water-soluble and non-water-soluble ones. Water-soluble cleaners are risky due to the presence of corrosive and highly reactive chemicals, such as caustic soda flakes. Examples are drain cleaner, hydrochloric pool acid,

oxidising agents such as swimming pool hypochlorite, chlorine bleach and ammonia solutions. Apart from being highly corrosive, these can also cause respiratory problems. Non-water-soluble household cleaning chemicals include furniture oils and polishes, abrasive metal-cleaning solutions and solvent-based spot removers.

Most household chemicals are safe to use and environmentally friendly, provided that the directions on the packaging are followed. However, when they are used excessively or incorrectly, or disposed of into the sewer, this could have cumulative harmful effects. For this reason, all cleaning chemicals should have labels indicating the composition of the substance, directions for use, the risks to human health, as well as a suggested method for disposing of the empty container.

Unused household chemicals should never be disposed of in the general waste or poured down the drain. Rather drop them off at the City's Athlone refuse transfer station or Bellville integrated waste management facility free of charge.

Alternative options to reduce household hazardous waste

Wherever possible, avoid using toxic or hazardous chemicals or materials. Use natural alternatives instead. Have a look at the following suggestions.

For your convenience, the City has issued a guide on the disposal of household chemicals. "Contacts and resources" contains details on where to access it.

Natural cleaning products, and recipes to try at home

Supermarkets and health shops now stock many environmentally friendly (less hazardous) cleaning products. Some locally manufactured ones are Better Earth, Bloublommetjies, Earth Probiotic Earthsap, Enchantrix, Greenman, Triple Orange, ProBac and Pure Simple.

Alternatively, you could mix your own, natural cleaning products at home. Most cleaning around the house can be done with a mixture of vinegar and water, or liquid soap and baking soda.

Here are some safe essential cleaning aids to include in your next shopping list:

- ✓ Baking soda (sodium bicarbonate, bicarbonate of soda) neutralises acids and cleans shiny surfaces without scratching. It cleans and polishes aluminium, chrome, jewellery, silver, stainless steel and tin. It also softens fabric, removes stains and softens hard water. In addition, it deodorises refrigerators, smelly carpets, upholstery and even drains. It can also extinguish cooking oil fires.
- ✓ Borax (sodium borate), a naturally occurring, water-soluble mineral, deodorises, removes stains, discourages mildew and mould, and boosts the cleaning power of soap or detergent.
- ✓ Lemon juice deodorises, cleans glass, removes stains from aluminium and is effective as a mild bleach for wool.
- ✓ Salt is a good abrasive for cleaning or scouring certain metals and plastics, but can scratch some surfaces.
- ✓ Vinegar neutralises bases such as alkaline soaps by lowering the pH level (raising acidity). It cuts through grease on surfaces and is an excellent deodoriser. Avoid using vinegar on marble, though, as it may pit the surface. White vinegar is safe for use on all colour-fast fabrics, other than cotton and linen.
- ✓ Washing soda (sodium carbonate) is a mineral that cuts through stubborn grease and fat on grills, pans and ovens. Together with baking soda, it can serve as laundry detergent and is available from pharmacies and chemical supply stores.

Try the following recipes for natural household cleaning materials:

- ✓ **Bath and shower cleaner:** Wipe with vinegar, and then rub with baking soda using a damp sponge.
- ✓ **Descaling agent:** Use distilled white vinegar to remove limescale from kettles and toilets. Lemon juice is a fragrant alternative to treat teapot stains.
- ✓ **Disinfectant:** Half a cup (125 ml) of borax in a solution of 4,5 litres of hot water makes an effective detergent. Also try hydrogen peroxide (3% solution).
- ✓ **Degreaser:** Use vinegar or lemon to cut through grease. Make a degreasing solution by mixing ½ teaspoon (2,5 ml) of washing soda (sodium carbonate or soda ash), two tablespoons (30 ml) of white vinegar, ¼ teaspoon (1 ml) of liquid soap and two cups (500 ml) of water.

- **Dishwasher detergent:** Mix equal amounts of borax and baking soda (15 ml of each) and use in your dishwasher. However, to be on the safe side, contact the manufacturer of your machine regarding the possible effects of using these products.
- **Drain cleaner:** Regular drain cleaning and pouring boiling water down the drain once a week will prevent grime build-up and blocked drains. Use the following procedure to clean your drain effectively:
  - Pour ½ cup (125 ml) of baking soda down your drain, followed by ½ cup (125 ml) of white vinegar.
  - Cover and leave for two hours, and then rinse with boiling water.
  - If the drain needs to be unblocked, use hydrogen peroxide (available from a chemist) and a plunger. Do not use this with a commercial drain cleaner.
- **Fabric stain remover:** Mix equal parts of glycerine and liquid dishwashing detergent with eight parts of water and apply to the stain as soon as possible. Leave for 20 minutes (or longer for more stubborn stains) and wash as normal with other garments. Store in a squeezy container.
- **Floor cleaner and polish:**
  - **Vinyl or linoleum:** Use a capful (5 ml) of baby oil and water.
  - **Wooden floors:** Apply a thin coat of equal amounts of vegetable oil and white vinegar. Rub in well.
  - **Painted wooden floors:** Use one teaspoon (5 ml) of washing soda diluted in 4 litres of hot water.
  - **Brick and stone tiles:** Use one cup (250 ml) of white vinegar diluted in 4,5 litres of water.

  Rinse with clean water after all procedures.
- **Insect repellents:** Highly fragrant herbs or spices are all excellent repellents. Try citrus oil, lavender, rosemary, peppercorns, powdered red chilli pepper, peppermint, bay leaves, cloves or cedar oil.
- **Metal cleaners and polishers:**
  - **Aluminium:** Use a paste made from cream of tartar and water.
  - **Brass:** Try lemon juice and baking soda paste, or a vinegar-and-salt solution.
  - **Chrome:** Use baby oil and vinegar, or aluminium foil with the shiny side facing outwards.
  - **Copper:** Boil items in a mixture of salt (one tablespoon/15 ml), white vinegar (one cup/250 ml) and hot water.
  - **Silver:** Line a pot or pan with aluminium foil and boil items in water with a teaspoon of baking soda and a teaspoon of salt.
  - **Stainless steel:** Use undiluted white vinegar to clean.
- **Mildew remover:** Scrub mildew spots with ½ cup (125 ml) of borax and 4 litres of water, using a nylon scouring pad. To prevent mildew from forming again, do not rinse off the borax. A scrubbing paste of vinegar and salt will also work.
- **Oven cleaner:** Make a thick paste with water and baking soda to clean a dirty oven. Leave on for three minutes, and then scrub with a nylon scrubbing pad. If particularly greasy, add a small amount of liquid soap to the mixture. A water-and-borax solution (two teaspoons of borax in 1 litre of water) sprayed onto the oven surface also works well. To remove spots, use very fine steel wool. Sprinkle salt onto spills while the oven is still warm. That will make them easier to remove once cool.
- **Toilet cleaning products:** Use bleach (not chlorine-based) alone, or baking soda and vinegar. You can also pour ¼ cup (62 ml) of borax into the toilet bowl, leave for a few hours or overnight, and then scrub and flush. Lemon juice can also be added for fragrance.
- **Window and glass cleaner:** Use warm water with lemon juice (two tablespoons/30 ml) or vinegar (¼ cup/60 ml). Mix and store in a spray bottle.

Natural pest control around the home

- **Ants:** Sprinkle powdered red chilli pepper, paprika, dried peppermint or borax where ants are entering your home.
- **Cockroaches:** Make a paste of borax, flour and sugar (equal parts) with a teaspoon of antiseptic. Spread on floor of infested area. Repeat after four days, and again after two weeks.
- **Fish moths:** Repel silverfish by putting a mixture of borax, sugar and vinegar on baseboards and in cupboards.
- **Moths:** Air clothes well in the sun and store in airtight containers (such as a plastic bag) with sachets of lavender or cedar chips.

If you have no choice but to contact a pest control business, look for a company that is environmentally friendly. Such businesses will target your specific pest problem and will not use generally hazardous products.

Natural pest control for gardens and vegetables

Instead of using insecticides and pesticides in your garden, grow indigenous plants, pull weeds out manually, and spray a soap-and-water mixture onto plants to deter insects. This will reduce your need for products that contain hazardous active ingredients, which are both harmful to the environment and unsafe.

Another good technique to keep garden pests at bay is to "interplant" your vegetable seeds, such as planting a row of onions in between carrots. The mixed scent confuses potential pests and prevents them from eating your growing vegetables.

Other good deterrents that can be planted in between vegetables include strong-smelling herbs or plants, such as marigolds and spring onions. Chives and garlic keep aphids away from roses, while rosemary, nasturtiums, peppermint, sage and basil are all used to deter flying insects and ants.

Alternative paints, finishes, glues and varnishes

If you use paints or wood preservatives, select products with low toxicity levels, such as EnviroTouch and Breathcote. Turn to **"Contacts and resources"** for web addresses where you can find additional information.

For wood finishes, look out for products containing boron (low to moderate toxicity). Boron wood treatment conforms to SANS specifications. However, boron products are also prone to leaching. Therefore, timber painted with these products should not be buried in the ground or submerged in water. When used externally, it is important to apply further oil or wax treatments.

Good-quality water-based or low-solvent paints, glues, varnishes and preservatives offer reasonable alternatives. Nail carpets to wooden floors instead of using glue.

Less-toxic cleaning products

Look for the following words on the container or label to be sure that your household products are environmentally friendly:

- ✓ "Non-toxic"
- ✓ "Non-petroleum-based"
- ✓ "Free of ammonia, phosphates and dyes"
- ✓ "Biodegradable"
- ✓ "Ozone-friendly"
- ✓ "Reusable" or "recyclable"
- ✓ "Enzyme-active"
- ✓ "Organic"

The table on the next page provides a list of cleaners used around the house, their main ingredients and toxins, possible side effects, and some alternatives to consider.[3]

3 Courtesy of Institute for Zero Waste in Africa.

USE	INGREDIENTS	TOXINS	SIDE EFFECTS	ALTERNATIVES
All-purpose cleaners	Detergents Fragrances Bleach Solvents Pine oil Disinfectants Colouring agents and dyes	Ethylenediamine Tetra acid Butyl Cellosolve® Neurotoxin Phenol Carbolic acid Ammonia Chloramine gas Ethylene Glycol monobutyl acetate	Headache Skin rash Lung damage Kidney damage Nausea Birth defects Nervous system damage Internal tissues and respiratory system damage	Hot water Washing soda Soda ash Borax Soap flakes Essential oils Baking soda Salt
Air fresheners	Petroleum Pesticide Insecticide Fungicide Solvents Perfumes Propellants Alcohol	Ethanol Cresol Propane Butane Isobutane Naphthalene Carbon Formaldehyde Hydrochloro-fluorocarbon Sodium bisulphate Propylene glycol	Eye/skin irritation Respiratory tract damage Liver damage Nausea Drowsiness and weakness Headache Loss of appetite Vomiting Mental distur-bance Lethargy/fainting Mucous membrane damage	Open windows House plants such as ivy, spider, peace lilies and philodendrons Water White vinegar Baking soda Potpourri
Dishwashing detergents	Perfumes Salts Alcohol Detergents Colouring agents Preservatives Surfactants	Ammonia Morpholine Diethanolamine Alkylphenols Formaldehyde Nonylphenoxy ethoxylate	Endocrine disruption Reproductive system damage Cancer Menstrual cycle disturbance Thyroid damage Skin burns/rashes Pancreas damage Oestrogen disturbance	Water Borax Vegetable-based dishwashing detergents Salt Glycerine soap Soap flakes Baking soda Washing soda
Glass and window cleaners	Solvents	Butyl Cellosolve® Ethyl Ethanol Glycol Alcohol Isopropyl Propylene	Liver damage Kidney damage Birth defects Nervous system disorders	Water Lint-free cloth Plain soda water Vinegar Lemon juice
Floor cleaners	Detergents Solvents Bleach Fragrance Dye and colouring agents	Dioxane Chloramine Ammonia Arsenic Phosphate Naphtha Lead	Nausea Vomiting Skin reactions Birth defects Eye, nose and throat damage Liver damage Kidney and nervous disorders Cancer	Hot water Vinegar and soap Soap flakes Borax Cornflour Washing soda Baby oil Vegetable oil

USE	INGREDIENTS	TOXINS	SIDE EFFECTS	ALTERNATIVES
Bathroom cleaners	Bleach Muriatic acids	Ammonia compounds Sulphuric acids Phenol Naphthalene Pine oil Quaternary ammonia and lye sodium bisulphate Para-dichloro-benzene	Skin irritation Nervous system damage Depression Circulatory system problems Skin rashes Swelling Pimples Ulcerations Sinus problems	Bowl brush Plain, diluted vegetable-based detergents Washing liquid Baking soda Water White vinegar Borax Lemon juice
Carpet and upholstery cleaners	Detergents Solvents Fragrances Optical brighteners Diethylene glycol	Formaldehyde Dioxane	Birth defects Nausea Miscarriages Skin irritation Red, itchy, teary eyes Kidney damage Liver damage Headaches Respiratory disorders Internal tissue damage Allergic reactions Cancer	Steam cleaning Carpet sweeper Borax Warm water Stiff-bristle brush Cushion covers
Drain cleaners	Caustic soda Propellants	Sodium hydroxide Sulphuric acid	Skin burns Eye, nose and throat damage	Running boiling water regularly Baking soda Drain strainer Table salt Hydrogen peroxide Vinegar
Oven cleaners	Aerosols Propellants	Sodium hydroxide	Skin burns Eye, nose and throat damage	Baking soda Warm water Fine steel wool White vinegar Borax Salt

Contacts and resources

CONTACT/RESOURCE	DESCRIPTION	AVAILABLE AT
City guide on disposal of asbestos	Specially issued guide to assist Capetonians in safely disposing of asbestos-containing waste	www.capetown.gov.za >> Work and business >> Commercial utility services >> Commercial solid waste services
Urban Waste Management	Specially issued guide to assist Capetonians in safely disposing of disposing and management of waste	www.capetown.gov.za >> Work and business >> Commercial utility services >> Commercial solid waste services
Collect-a-Can	Industry association for the recycling of cans	www.collectacan.co.za
E-waste Association of South Africa (eWASA)	Non-profit industry association for the recycling of electronic waste in South Africa	www.e-waste.org
Home composting	Tips on how to set up a compost heap at home	
Metal Recycler Association of South Africa	Industry body for scrap metal recyclers	www.mra.co.za
Oasis Association	NGO for improving the lives of persons living with disabilities, running a recycling programme to generate an income	www.oasis.org.za 021 671 2698 (Claremont) 021 933 1586 (Elsies River) info@oasis.org.za
Organics Recycling Association of South Africa (ORASA)	Organisation that captures the value of organic waste in the economy through composting, fly farming and anaerobic digestion	www.orasa.org.za
Paper Manufacturers Association of South Africa (PAMSA)	Industry association with a paper recycling arm, RecyclePaperZA (previously known as the Paper Recycling Association), which aims to reduce the amount of recoverable paper that goes to landfill by progressively increasing the paper recovery rate	www.recyclepaper.co.za Ursula Henneberry 011 803 5063 082 329 7528 ursula.henneberry@pamsa.co.za

CONTACT/RESOURCE	DESCRIPTION	AVAILABLE AT
PET Recycling Company of South Africa (PETCO)	Company that fulfils the extended producer responsibility (EPR) role for the polyethylene terephthalate (PET) plastic industry by taking responsibility for post-consumer PET bottle recycling	www.petco.co.za info@petco.co.za
Plastics SA	Promotes and supports the plastics industry, including plastics recycling	www.plasticsinfo.co.za
Polyolefin Responsibility Organisation (Polyco)	NPO focusing on reducing the amount of polyolefin waste going to landfill through sustainable collection, recycling, recovery and beneficiation	www.polyco.co.za
Polystyrene Association of South Africa	Organisation that facilitates between the recyclers and suppliers of recycled polystyrene and the buyers representing the various end markets. Previously known as the Polystyrene Packaging Council	www.polystyrenesa.co.za 072 820 2506 info@polystyrenesa.co.za
ROSE Foundation (Recycling Oil Saves the Environment)	NPO that collects, stores and recycles lubricating and motor oil	www.rosefoundation.org.za Bubele Nyiba 021 448 7492 usedoil@iafrica.com
South African E-waste Alliance (SAEWA)	Non-profit industry association for the recycling of electronic waste in South Africa	www.sa.ewastealliance.co.za Susanne Karcher 021 523 0940 071 859 0829 envirosense@xsinet.co.za
South African Plastics Recycling Organisation (SAPRO)	Body representing plastics re-processors in South Africa, with its members procuring sorted, baled end-of-life plastics and re-processing them into raw material	www.plasticrecyclingsa.co.za
South African Vinyls Association (SAVA)	Representative body for the local vinyl industry, fulfilling an active role in the sustainability of the industry	www.savinyls.co.za
Story of Stuff	Short documentary on how buying durable and reusable products instead of disposable ones can reduce the waste we create	www.storyofstuff.org

CONTACT/RESOURCE	DESCRIPTION	AVAILABLE AT
The Glass Recycling Company (TGRC)	Glass manufacturers industry body	www.theglassrecyclingcompany.co.za 0861 2 45277 info@tgrc.co.za
Waste recyclers' map	Map on City website with details on your nearest school or private drop-off facility or buy-back centre, a list of waste collectors, areas included in the City's Think Twice separation-at-source recycling pilot, etc.	https://web1.capetown.gov.za/web1/wasterec/map
Western Cape Industrial Symbiosis Programme (WISP)	Free facilitation service connecting member companies with the unused or residual resources of other businesses	https://greencape.co.za/sector/circular-economy/wisp/

ENVIRONMENT

Cape Town's natural environment is unique and diverse. Its scenic beauty not only serves as a pleasant backdrop for those fortunate enough to live and work here, but also attracts millions of visitors every year. More importantly, though, our natural environment offers significant ecosystem benefits and services. This chapter explains why and how we can all play a part in protecting our precious environment from the effects of urbanisation, pollution, natural hazards and climate change.

Introduction to environment

BIODIVERSITY

"Biodiversity" refers to all the living organisms around us, and the complex web within which they interact. When one part weakens or disappears, every other part of the web is affected. Biodiversity includes species, genetic and ecosystem diversity in our rivers, wetlands, coastlines, oceans, mountains, hills, plains and dunes. It encompasses everything in nature.

The value of biodiversity

Biodiversity provides the foundation for a healthy planet and healthy people. Diverse ecosystems are more resilient, which means they are more likely to recover from stress (such as drought) or human-induced habitat disturbance (such as overgrazing and overfishing). Intact or well-maintained natural habitats also offer many benefits to people, such as recreational, educational, and tourism opportunities, and can enhance surrounding property values. In Cape Town, nature-based tourism is one of the city's most important job creators.

The benefits that result from effectively conserved natural and semi-natural areas are also called "ecosystem goods and services", which include:

- ✓ flood control or prevention;
- ✓ filtering of water runoff and air pollution;
- ✓ replenishment of groundwater;
- ✓ serving as atmospheric carbon sinks;
- ✓ climate change mitigation and adaptation;
- ✓ tourism and green jobs;
- ✓ sustainable livelihoods;
- ✓ food, medicine and raw materials;
- ✓ serving as recreational, educational, cultural and spiritual spaces;
- ✓ protecting the city from storm surges (particularly our coastline);
- ✓ absorbing some of our wastewater; and
- ✓ being available for future enjoyment and use.

Why our biodiversity must be protected

The conservation of biodiversity is an inter-generational imperative. We have a responsibility to protect our biodiversity because …

- ✓ it cleans our water and air, lessens flooding, and holds our soil in place;
- ✓ it provides the complex genetic pool that gives us food and medicines, and supports many people's livelihoods;
- ✓ it supports the tourism industry, which puts bread on the table for many – visitors flock to Cape Town for our world-renowned beaches, great conditions for water sports (such as surfing, kitesurfing and kayaking), and our spectacular marine and coastal animals (such as the African penguin, white shark, southern right whale and Cape fur seal);
- ✓ it offers a place where our children can experience and learn about nature, where we can relax and enjoy beauty and tranquillity, and a place of spirituality; and
- ✓ it includes 190 plant species that are endemic to Cape Town, occurring nowhere else on Earth.

Threats to biodiversity

In Cape Town, we enjoy easy access to the environment, with the beach and the mountains within easy reach. However, our natural environment faces various threats, and it is up to us to reduce these and protect our biodiversity.

Habitat loss due to urbanisation

Globally, the main cause of species extinction is the direct loss of habitat, which, in turn, is mostly caused by urbanisation and development. As more and more people move to the city, the natural environment comes under increasing pressure.

Rapid urbanisation causes fragmentation and loss of natural habitats, leaving flora (plants of a region) and fauna (animals of a region) more vulnerable to invasive alien species, pollution, and other disturbances. It also increases the risks associated with climate change. Beachfront developments, especially on land that was originally reclaimed from the sea, further limit nature's ability to absorb the impact of stronger storm surges.

Urbanisation cannot be avoided. However, with sound city planning, cities can grow and, at the same time, minimise the potential negative effect of such growth on biodiversity, people, and property.

Climate change

Cape Town and its emerging economy are particularly vulnerable to a changing climate. Climatologists predict that Cape Town will experience an increasingly dry and warm climate, with an increase in both the intensity and frequency of extreme weather events. This will lead to water shortages (drought), agricultural failure, changes to our unique and threatened biodiversity, coastal flooding and erosion, extreme wind and rainfall, and longer and more intense heat waves.

Natural coastal ecosystems, like coastal dunes, are our first line of defence. We need to protect, rehabilitate and manage them where possible.

Healthy, functioning ecosystems such as coastal dunes, are globally recognised as the first line of defence against climate change and storm damage. We urgently need to conserve our terrestrial (land-based), freshwater, coastal and marine biodiversity, and restore degraded ecosystems to adapt to climate change.

More specifically, we need to:

- ✓ ensure that our rivers, lakes and wetlands can process the potential increase in runoff that would result from heavier rainfall;
- ✓ protect and rehabilitate our coastal dunes, as the first line of defence against coastal erosion, sea-level rise or large waves caused by extreme storms;
- ✓ protect plants, as they absorb carbon dioxide from the air and produce oxygen;
- ✓ relieve the pressure on our water resources by planting indigenous species, which use less water than invasive alien plants.

Invasive species

When invasive alien species are introduced, they rapidly spread and replace indigenous species, as there are no natural pests and parasites to control them.

Some invasive alien trees burn more readily and at a much higher temperature than indigenous plants. While this destroys our local fynbos seeds, which are stored near the soil surface, the invasive alien seeds usually survive and flourish following a fire.

Aquatic invasive species such as water hyacinth threaten biodiversity by removing oxygen from the water and forming thick mats of plant material. These stop light from entering the water, which kills other, indigenous, water plants and forces fish and other animals to seek refuge elsewhere.

Examples of invasive alien animals include the Mallard Duck, which breeds with the indigenous Yellow-billed Duck, and the House Crow, which preys on small indigenous animals and birds' eggs. Interestingly also, the International Union for Conservation of Nature (IUCN) lists domestic cats among the world's 100 worst non-native invasive species. In fact, both domestic and feral cats pose a threat to small indigenous mammals, birds, and reptiles.

The City's Invasive Species Unit works with the national Department of Forestry, Fisheries and Environment as well as Table Mountain National Park's Alien Vegetation Clearing Programme, and other partners, to rid Cape Town of invasive alien animals and plants.

Inappropriate fire

Inappropriate or uncontrolled fires can harm biodiversity by disrupting ecosystems, destroying natural habitats and threatening the survival of plants and animals. Fynbos needs summer fires for its long-term conservation. If fires are too frequent, though, slower-growing species may be eliminated.

However, other local vegetation types are not fire-dependent. Cape Flats Dune Strandveld, for instance, often has a high succulent component and does not require fire, although it can withstand it occasionally.

Overexploitation

Most of the Cape Flats has unpalatable vegetation situated on sandy, nutrient-poor soils. Historically, the area would not have supported large herds of game for long periods. Today, however, small-stock farmers on the Cape Flats herd cattle and goats throughout the year, often in unsuitable habitats. This causes the vegetation to be trampled and overgrazed, which, in turn, allows invasive alien grasses to grow. Once established, these grasses maintain a shorter fire cycle, which permanently changes the vegetation structure and diminishes biodiversity value. The City does not permit grazing of livestock in City nature reserves.

Pollution and litter

Although Cape Town has extensive seasonal wetlands, most of them are polluted. Waterway pollution occurs either through direct illegal dumping of waste or through the misuse of the stormwater and sewer systems. Flushing of inappropriate items like wet-wipes, rags and other sanitary items leads to blockages in the sewer system and subsequent spillage into the natural environment.

Harsh chemicals and oils are to be disposed of at special City drop-off facilities, as explained in the chapter on waste, and should never be allowed to enter the ecosystem. If you come across instances of littering or waste dumping in Cape Town's waterways, please report this to the City. Go to **"Contacts and resources"** at the end of this chapter for details.

Another source of environmental pollution is car exhaust fumes. Apart from the direct impact on air quality, the nitrogen-rich compounds in exhaust fumes also change soil composition, making it less suitable for indigenous fynbos species. Competitive (usually invasive alien) species respond by growing stronger, which changes the vegetation structure and even the fire regime. The waste and energy chapters of this handbook contain useful information on how you could help avoid air pollution.

Littering, including throwing cigarette butts out of a car, is strictly prohibited by the City's Integrated Waste Management By-law, and offenders can be fined. This applies to littering in any public place, in municipal stormwater drains, on vacant land, in streams, watercourses, streets, roads, wetlands or along the coastline.

Plastic pollution is a growing problem, especially for freshwater and marine life. Plastic waste kills many marine animals (especially seabirds), which mistake the plastic for food, or become entangled in it. Beaches that are littered with man-made debris (glass, metal, rubber and plastic) support fewer crabs and other burrowing animals.

Sadly, most plastic pollution on beaches and in surrounding coastal water comes from single-use plastic such as food and beverage packaging.

Coastal erosion

Development along Cape Town's coast, including the reclamation of land from the sea, has rendered natural buffers less effective against coastal dune dynamics and increasingly intense storm surges in certain areas. This, in turn, has led to coastal erosion, which has a negative impact on coastal ecosystems and it also detracts from the recreational value that beaches provide to the general public.

A coastal management line (CML) is a spatial planning mechanism which is used to promote risk averse and sustainable coastal development. The CML is increasingly important in the context of escalating pressures associated with climate change such as coastal erosion, storm surges, as well as increased urban growth in sensitive coastal environment.

The CML demarcates an area along the coast which aims to enhance the buffer potential that natural systems provide to ensure the long-term sustainability and socio-economic benefit of coastal development.

Crime

Ironically, the current high crime levels in the city also pose a major threat to the conservation of our natural ecosystems, as people generally perceive bushy remnants as areas that harbour criminals or as corridors for criminals to traverse the city undetected. In the process, valuable vegetation is lost as areas are cleared and criminal-proofed.

Illegal activities such as the dumping of rubble and toxic waste, poaching and arson also directly affect biodiversity and people's quality of life.

Overexploitation

Many people who live close to the sea use the coast for recreation, employment and as a food source. Unfortunately, if sea harvesting goes unchecked, marine resources cannot recover, and will no longer serve as a source of income or food for coastal communities.

Overfishing, uncontrolled poaching of Abalone (Perlemoen) and West Coast Rock Lobster (Kreef), as well as commercial fishing practices that result in bycatch, ship strikes, entanglement, and the stranding of whales and dolphins, are all detrimental to the marine environment.

Agriculture

Modern agricultural practices favour mono-crop farming which increases the need for pesticides and fertilisers. Run-off from these and other toxic farm chemicals can poison fresh water, marine ecosystems, air and soil.

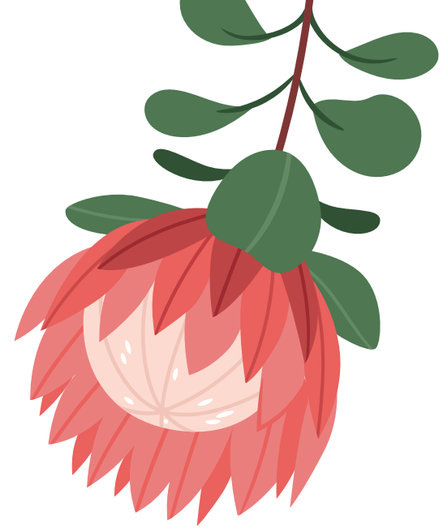
Similarly, livestock farming and the production of animal feed leads to habitat loss. Livestock farming is also a major contributor to greenhouse gas emissions, which stress ecosystems and contribute to climate change.

Habituation of wildlife

Habituation occurs when wild animals are regularly exposed to humans and can potentially have a negative impact on animals and humans.

For instance, the feeding of baboons or seals alters their natural diet and eating habits, impacting the health of these animals. Feeding of wild animals can also lead to these animals becoming more aggressive towards humans. Approaching animals too closely when taking photos or observing them can lead to habituation and cause them to become overly familiar with people.

Environment in our city



The Cape Floristic Region and the urgent need for its conservation

The Cape Floristic Region is the smallest and richest of the world's six floral kingdoms (see map on page 122), and the only one contained in a single country. Cape Town is situated in the heart of this biodiversity hotspot, which means that unique biodiversity forms part of Cape Town's fabric: Critically Endangered plants are found on road verges, in indigenous gardens, on sports fields, and in public open spaces, including nature reserves.

Cape Town is one of the world's 36 biodiversity hotspots that are extremely rich in unique biodiversity, but have lost at least 70% of their original habitat, putting many species at risk of global extinction.

We can save Cape Town's threatened species only by saving the ecosystems that support them. The city contains 20 different vegetation types, seven of which are endemic and, therefore, found nowhere else in the world. Unfortunately, many of these vegetation types are under serious threat. If we fail to conserve the few remaining areas of these ecosystems, we will lose not only the species, their intrinsic value, and their potential future uses, but also the goods and services that these ecosystems deliver, and on which we all depend for our survival.

Cape Town has some of the world's most beautiful beaches. The city's 307 km of coastline includes two of the largest bays in South Africa – Table Bay and False Bay. Our coastline offers more than 70 beaches, tidal pools, rocky and sandy shores, coastal dunes, sea cliffs, estuaries, and islands. The rich and varied coastal landscapes, plants, and creatures make it the perfect coast to explore and, therefore, an important one to take care of. Of particular importance is the need to protect the now critically endangered African penguin.

Our marine biodiversity

Cape Town has one of the most diverse marine ecosystems in the world. The warm Agulhas current that sweeps down the east coast and the cold Benguela upwelling system along the West Coast create a rich and varied marine life, including many rare and endangered species.

The Cape's rocky shores are particularly species-rich because of their diversity of microhabitats (smaller habitats). In summer, the West Coast experiences an upwelling of nutrient-rich, cold water that supports plankton growth. This, in turn, supports various food webs, including shoals of pelagic fish such as anchovies, pilchards, and snoek.

Cape Town's coastline offers some of the world's best whale-watching spots. Between June and November every year, southern right whales are common in the area as they come here for mating and breeding, and can be easily spotted from the shore. Southern rights are so named because they were regarded as the "right whales" to hunt in the past due to their slow movements and due to their very thick blubber these whales floated when dead.

Great white sharks are found along the South African coast, with the highest numbers between False Bay and Algoa Bay, particularly near colonies of Cape fur seals. In Cape Town, inshore great white shark presence is highest from October to March, when the weather is warmer and their preferred food, such as gamefish and other sharks, is plentiful.

Our coastlines and offshore islands also provide breeding sites for seabirds and seals. The critically endangered African penguins are endemic to South Africa and Namibia and breed on Robben Island, while Boulders Beach and Burgher's Walk colony is one of only three mainland penguin breeding colonies in South Africa.

The Local Biodiversity Strategy and Action Plan (LBSAP)

The City has taken significant steps in managing and conserving biodiversity and has developed multiple working relationships and partnerships to ensure effective implementation.

The Local Biodiversity Strategy and Action Plan (LBSAP), which was first approved in 2009, is one of the City's guiding strategies in this regard and is incorporated into the City's 5-year Integrated Development Plan (IDP). Various local governments have adopted an LBSAP to achieve optimal governance and management of biodiversity and ecosystem services in their areas. Cape Town's LBSAP is co-ordinated and led by the Environmental Management Department's Biodiversity Management Branch, together with a number of other line departments. The purpose of the LBSAP is to ensure that biodiversity in Cape Town is conserved and, where appropriate, restored. Its five strategic objectives provide an action plan for the protection of the city's biodiversity and natural assets.

Our nature reserves

As of 2025, the City manages 24 nature reserves and various conservation areas. Apart from the City-run nature reserves, Cape Town has other protected areas that are managed by state or private organisations. Table Mountain National Park, for instance, is administered by South African National Parks (SANParks). CapeNature (the provincial conservation agency) also spearheads a conservation stewardship programme, where private landowners are encouraged to maintain important biodiversity found on their land. The City has facilitated 33 conservation stewardship agreements with private landowners, with additional agreements being negotiated. The parastatal. Eskom, manages the Koeberg Private Nature Reserve.

For more information on opening hours, tariffs and facilities of the City's nature reserves, refer to **"Contacts and resources"** at the end of this chapter.

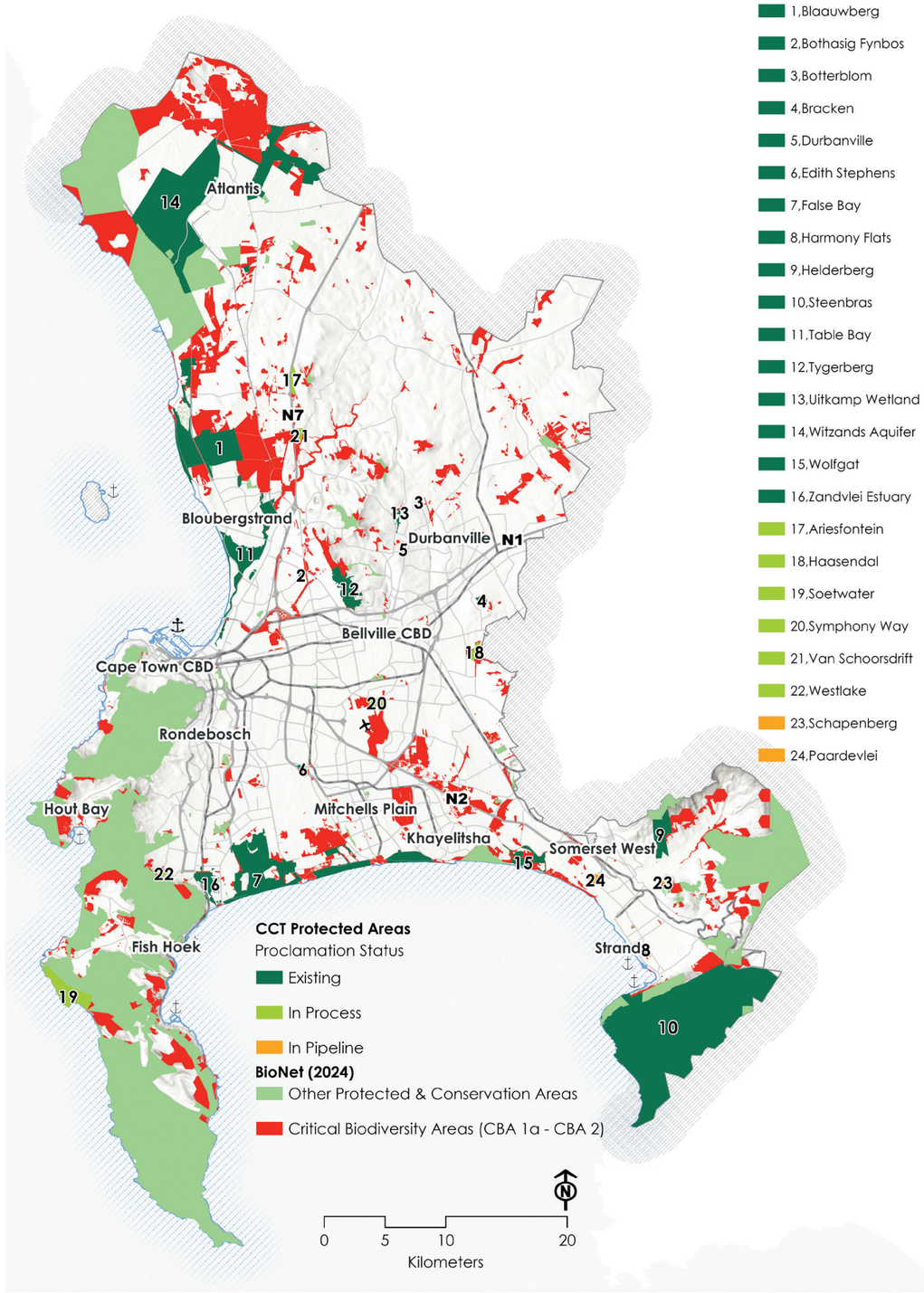
Visitors and residents are encouraged to explore these reserves and enjoy the scenery and outdoor activities they offer. Walk through the aromatic vegetation and discover the variety of colourful flowers that attract birds, insects, and other small creatures. Spend time along the coast, look out for whales and dolphins, explore life in the rock pools, or enjoy a swim or surf.

Our Marine Protected Areas

Over 3 800 marine species living in South African waters are found nowhere else in the world. Approximately 5% of this rich marine biodiversity found in South African's Exclusive Economic Zone (EEZ) is protected by a network of 42 marine protected areas.

Some special marine and coastal ecosystems designated as marine protected areas aim to conserve biodiversity and protect habitats and species. For example, no fishing or other harvesting is allowed in the restricted areas of the Table Mountain National Park Marine Protected Area. Likewise, in the Helderberg Marine Protected Area, no fishing is allowed between the Eerste River mouth and the Lourens River mouth, extending 500 m seawards from the high-water mark.

The map on the next page depicts other closed and protected coastal areas.



Additional coastal management initiatives that the City runs or supports are:

- ✓ the World Wide Fund for Nature South Africa (WWF-SA) Southern African Sustainable Seafood Initiative (WWF-SASSI), which promotes sustainable fishing and eating (turn to page 142 and 143 for more on WWF-SASSI);
- ✓ the Fishing Line Bin Project, providing receptacles where used, discarded fishing lines can be safely disposed of;
- ✓ the Burgher's Walk African Penguin Conservation Project;
- ✓ Clean C, which organises beach and community clean-ups;
- ✓ the South African Network for Coastal and Oceanic Research's (SANCOR) Marine and Coastal Educators Network;
- ✓ the Big Microplastic Survey;
- ✓ Working for the Coast projects;
- ✓ Southern African Foundation for Conservation of Coastal Birds (SANCCOB);
- ✓ Shark Spotters Programme; and
- ✓ Two Oceans Aquarium.

Our beaches and the Blue Flag Programme

Blue Flag is an annual international recognition programme that encourages sound management of coastlines and coastal waters to support tourism growth and development. Although participation is voluntary, this eco-label has become an international symbol of excellence for beaches, boats, and marinas. Blue Flag status implies a certain standard of safety, amenities, cleanliness, environmental information, and environmental management.

Blue Flag has been in operation since 1987. 51 countries across the globe participate in the programme. As of 2024, there are 5 010 Blue Flag beaches, boats, and marinas across the world.

South Africa was the first country outside Europe to receive Blue Flag accreditation for some of its beaches, and the programme has been locally managed by the Wildlife and Environment Society of South Africa (WESSA) in partnership with participating coastal municipalities since 2001. The strict programme criteria are set by the Foundation for Environmental Education, the international co-ordinators of the Blue Flag campaign in Europe.

The Blue Flag programme offers many benefits, such as improved tourism facilities, enhanced management of coastal ecosystems, increased awareness of the coast, and capacity building of coastal municipalities. It also guarantees our local beachgoers, as well as domestic and international visitors a world-class beach experience, with safe, clean, and well-managed facilities. Sites must reapply every year to be considered for the Blue Flag award, and applications are reviewed by a national and international jury. In the southern hemisphere, the Blue Flag season runs from 1 November to 31 October each year.

For further details about the Blue Flag programme and Green Coast programmes, turn to **"Contacts and resources"** at the end of this chapter.

Green Coast programme

South Africa's first Green Coast status was awarded to the City of Cape Town's Blaauwberg Nature Reserve (BNR) in 2018, and since then was awarded annually in recognition of the City's commitment to preserving the unique flora and fauna along its coastline. The Green Coast status complements the international Blue Flag programme as it allows municipalities to sustainably manage coastal sites outside of traditionally developed swimming beaches.

The Wildlife and Environment Society of South Africa (WESSA) is the national implementer for the Green Coast programme. The programme focuses on conservation, sustainable tourism and environmental education along this coastline. It also aims to protect sensitive habitats, sensitive species and cultural heritage.

The BNR has shown ongoing commitment to conserving and monitoring its sensitive coastal areas and has maintained the high standard set out by the WESSA Green Coast criteria. It is situated in an area that includes approximately 2 000 ha of pristine coastal landscape, and inland koppies and flats. It is home to critically endangered vegetation and boasts a coastline of 7 km.

Urban-wildlife conflict

Where city dwellers live alongside urban wildlife, such as seals, penguins, caracals, otters, sharks and baboons, conflict is inevitable. We need to find ways to co-exist peacefully. Read on for information on what the City is doing to achieve this.

The Shark Spotters programme

The threat that sharks pose to human life needs no explanation. However, human activity also poses multiple threats to sharks.

These include:

- ✓ commercial long-line fishing;
- ✓ poaching for shark jaws, teeth and fins;
- ✓ trawler and purse seine fishing;
- ✓ nets and other fish-farming (aquaculture) facilities;
- ✓ damage to coastal habitats, which sharks use for feeding, and/or breeding;
- ✓ boat traffic; and
- ✓ pollution.

Shark Spotters is a pioneering shark safety programme that has been widely recognised for its innovative approach to finding a solution to potential conflict between sharks and people. Adopted by the City in 2004 in response to a spate of shark attacks and increased shark sightings along the Cape Town coast, Shark Spotters is now the primary shark safety programme in town.

The programme improves beach safety through both shark warnings and emergency assistance in the event of a shark attack. It also contributes to research on shark ecology and behaviour, raises public awareness of shark-related issues, and provides employment opportunities and skills development to Shark Spotters.

The programme employs individual spotters, who are placed at strategic lookout points on the mountains along the coastline, from where they communicate shark sightings to the public using a flag-and-siren system. If a shark is spotted close to water users, spotters raise the alarm, and people are evacuated temporarily while the shark is in the area.

In 1991, South Africa became the first country in the world to declare great white sharks a protected species. When apex (top-level) predators such as great white sharks are threatened, entire marine ecosystems suffer. Therefore, by protecting our sharks, our ocean ecosystem remains balanced.

The flag system (see illustration on the next page) consists of:

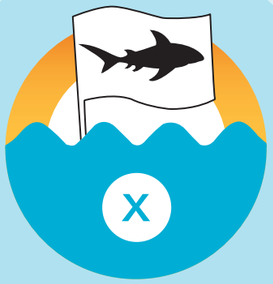
- ✓ a **green flag** with an outlined shark, which means that spotting conditions are good;
- ✓ a **black flag** with an outlined shark, which means that spotting conditions are poor;
- ✓ a **red flag** with a solid white shark, which means that there is a high shark alert;
- ✓ a **white flag** with a solid black shark, which means that a shark has been spotted, accompanied by a siren, which warns all swimmers to leave the water immediately and keep out until the flag is changed; and
- ✓ **no flag**, which means that there are no spotters on duty.

#BeSharkSmart and learn the Shark Spotters flag system.

Spotting conditions are **Good**

High **Shark alert!**

Spotting conditions are **Poor**



A shark has been spotted, siren will sound. **Leave the water immediately!**

Tips for shark and general swimming safety

- ✓ Always swim where lifeguards are on duty. Swim within the designated area, between the red and yellow flags, and adhere to rip-tide warnings.
- ✓ The National Sea Rescue Institute (NSRI) provides easy-to-spot, bright pink buoys on many beaches. Use these when someone gets into trouble in the water.
- ✓ If you plan to swim, choose a beach where Shark Spotters are on duty.
- ✓ Take the time to speak to the Shark Spotters on the day you visit the beach.
- ✓ Pay attention to any shark signage on beaches.
- ✓ Make sure you understand and obey the Shark Spotters and the flag warning system, and listen out for the warning siren.
- ✓ Do not swim, surf or surf-ski:
  - when birds, dolphins or seals are feeding nearby;
  - where trek-netting, fishing or spear fishing is taking place;
  - if there has been a whale stranded nearby; or
  - at night.
- ✓ Do not swim in deep water beyond the breakers.
- ✓ Do not swim if you are bleeding.
- ✓ Do not swim near river mouths.
- ✓ Obey beach officials, lifeguards and Shark Spotters if you are told to leave the water.
- ✓ The rate of great white shark encounters increases significantly when the water temperature is warmer (18 °C or higher) and during new moon due to increased feeding opportunities.
- ✓ If a shark has recently been sighted in an area where no Shark Spotters are present, consider using another beach for the day.
- ✓ If you are a first-time visitor to a beach, ask the local law enforcement officers, lifeguards or locals about the area.

- ✓ Consider paddling in groups and staying close together (in a diamond formation) if you plan on kayaking or surf-skiing far out to sea.
- ✓ Consider using a personal shark shield when you go surfing or kayaking.

Moreover, at Fish Hoek beach, a shark exclusion net further ensures bathers' safety. The Shark Spotters deploy the unique exclusion net in the mornings and retrieve it in the evenings, thereby reducing the impact on marine biodiversity in the vicinity.

Look under **"Contacts and resources"** for a link to further information about the Shark Spotters programme and where and when Shark Spotters are on duty.

The baboon management programme

Cape Town is well known for its baboons. An icon of the Cape Peninsula, the chacma baboon forms part of our rich biodiversity and natural heritage. The few remaining baboon troops are restricted to living in and around Table Mountain National Park or in the Hottentots Holland mountain ranges.

Some of the wilder chacma baboon troops keep their distance, but can become quite aggressive if fed by humans in popular tourist areas, such as Cape Point. We have to respect baboons and understand that they are merely trying to adapt to changes in their natural environment.

We also need to be careful, as baboons are powerful animals and can be unpredictable. More importantly, baboons play a vital part in our natural ecosystem. While foraging for food, they introduce air (aerate) into the soil and scatter seeds and bulbs, which can then germinate and grow into new plants.

The peninsula's baboons are especially vulnerable, and completely surrounded by human habitation. Many of our residential areas are near or next to baboon habitats. And as the city continues to expand, we encroach on the baboons' territory. This not only leads to human-baboon conflict, but can also threaten the animals' genetic diversity due to isolation. The baboon population on the Cape Peninsula is the only baboon population formally protected in South Africa.

Cape fynbos is low in protein and nutrients, and it takes a lot of effort for baboons to sustain themselves on this diet. Unfortunately, it has become much easier for them to find more nutritious food from a dustbin than to forage in the wild. When baboon troops have access to human food, their population density (numbers) may increase by up to five times compared to natural fynbos-foraging troops.

The following suggestions will keep you safe when encountering baboons and minimise conflict:

Be wary of aggressive baboons

Old male baboons, dispersing young baboons or female baboons that are protecting their young offspring can be aggressive. Young dispersing males naturally move between troops to prevent interbreeding and may end up near urban areas as they look for food. Bad-tempered old male baboons no longer in leadership roles can also be aggressive towards what they see as a threat in these environments, such as a human or barking dog.

Do not feed baboons

People, especially tourists, tend to feed baboons at stopping points near nature reserves and parks. Feeding baboons is punishable by law, as it:

- ✓ further encourages baboons to seek out human food and could lead to aggression in an effort to get more food from you; and
- ✓ teaches them bad habits, which may ultimately lead to their death.

Report people feeding baboons to the 24-hour National Environmental Crimes and Incidents Hotline (see **"Contacts and resources"** for details).

On the road and in your car

- ✓ If you see baboons or other animals on the road, slow down.
- ✓ Enjoy watching the baboons from the safety of your vehicle. Avoid any close contact with the baboons.
- ✓ Lock all doors and keep windows and sunroofs closed, as baboons are highly intelligent and have learnt to open doors.
- ✓ Baboons may also enter a car through the windows to snatch food, so food items should never be visible. Pack bags and food items in the boot of the vehicle, or under the seats.
- ✓ Do not feed baboons. It is a punishable offence. Also, do not throw items out of vehicle windows.

When out picnicking or camping

- ✓ Watch out for baboons when picnicking. Be cautious if you spot them nearby, and if they appear aggressive, pack up and leave the area.
- ✓ If a baboon steals your bag, never chase it or try to grab the bag back. The baboon will search the bag, take the food it wants, and leave the rest. Wait for the baboon to move away before you collect your bag.
- ✓ Place waste in a baboon-proof waste bin. If one is not available or too full, take your waste home with you. Baboons raid dustbins and become used to human food.

- When camping, store your food in a lockable box and camping fridge. Remember, baboons are intelligent, and some may be able to unzip or unclip items. Food in your tent is not secure.
- Try not to walk dogs in known baboon-inhabited areas. Only allow your dog off its leash if it is properly trained and obeys basic obedience commands.
- If you walk your dog without a leash, and it chases or attacks a baboon, call the dog off before the fight escalates.

Roadkill

Motorists are urged to reduce their speed and be more vigilant when driving near nature reserves, especially at night, to avoid knocking down wildlife. Animals such as owls, grysbok, caracals, otters, baboons, porcupines, mongoose, genets, tortoises, and snakes are killed on Cape Town roads every year.

Many of these animals are nocturnal and cross roads at night searching for food, new territories, or mates. In most cases, they are hesitant to cross roads, so they often do so suddenly and unexpectedly. This poses a particular risk to both the animal and driver. By slowing down, motorists can ensure their own safety, the safety of other road users, as well as the protection of our wildlife.

Toads – friend or foe?

There are two specific toads to look out for – the western leopard toad and the guttural toad.

Western Leopard Toad – a flagship for urban conservation

The endangered western leopard Toad *(Sclerophrys pantherina)* is a charismatic species in danger of extinction.

This large toad occurs only in the coastal region from the Cape Flats to the Agulhas Plain and is endemic to the region. It breeds in open water in public open spaces or on private land. Your garden could be providing valuable habitat for this species. Gardens are foraging and sanctuary areas for the toads, and vital for their continued survival.

Apart from human activity, another major threat to the western leopard toad is road traffic: Many toads die while moving to and from their breeding grounds in late winter, as well as when the baby toads emerge in early summer. These toads are a protected species, and it is illegal to collect or relocate them.

Guttural toad – an urban invader

When people introduce tadpoles from other regions of South Africa to Cape Town, this creates a problem. When these "foreign" tadpoles or adult toads are released in Cape Town wetlands, this introduces a different subspecies or alien species to the area, both of which will have a negative impact on local biodiversity. These foreign individuals could also spread disease to the native fauna.

One such example is the guttural toad *(Sclerophrys gutturalis)*. This toad, indigenous to the northeastern parts of South Africa, has been introduced to Cape Town, and is invading several suburbs in Cape Town. Being explosive breeders, the guttural toad population is rapidly spreading. The City's Biodiversity Management Branch, in conjunction with the South African National Biodiversity Institute and CapeNature, has identified this toad as a probable threat to the endangered western leopard toad, as these two species compete for similar resources and an already limited habitat.

The City needs your help to capture guttural toads on residential properties and scour the greenbelts around town for migrating and breeding toads. Most activities occur at night, as this is when the toads are active.

Invasive polyphagous shot hole borer beetle (PSHB) – how to identify and report it.

The polyphagous shot hole borer (PSHB) (*Euwallacea fornicatus*) is an ambrosia beetle of great concern to the health of many tree species in our urban and natural areas. The beetle infests both exotic and indigenous trees.

Native to Southeast Asia, the PSHB has a symbiotic relationship with the fungus *Fusarium euwallaceae*. While the beetle infests the tree by boring into it, the fungus can cause infection of the tree's tissues, causing branch dieback and, death in susceptible trees.

First detected in South Africa in 2012, the beetle has since spread to all but one province. It poses a major threat in urban areas, but has also been found infesting important forestry, agricultural crop and native species. PSHB can rapidly kill highly susceptible host plants.

The most susceptible species are boxelder, weeping willow, castor bean and English Oak. The impact of PSHB infestation is something that both the City of Cape and residents cannot afford, and we must work together to curb its spread.

What to look out for and symptoms of infested trees:

Branch dieback – cracks on the branch; discoloured leaves; dry and leafless branches; branch break-off revealing webs of galleries filled with black fungus.

Gumming – blobs of goo coming out of the bark; oozing of liquid and gum from the beetle holes.

Entry and exit holes – very small holes on the bark of the tree, the size of a sesame seed (2 mm); shotgun-like scars developing around the holes.

Staining – brown or dark stains on the bark of the tree.

To prevent or minimise the spread of PSHB:

Avoid moving plant material such as firewood between areas, especially into nature reserves, protected areas and public open spaces.

Do not buy and move firewood from infested areas.

Do not remove or dispose of any trees or wood from trees that are suspected to be infested without first reporting the tree and having it evaluated by a specialist.

If PSHB is confirmed, specific protocols need to be followed for the safe removal and disposal of the tree, as transporting infected wood poses a high risk of further spread.

How to report PSHB beetle sightings

Online:
www.capetown.gov.za/InvasiveSpecies

Call the City of Cape Town's **Invasive Species Unit on 021 444 2357**, Monday to Friday, from 07:30 to 16:00

Send an email to:
invasive.species@capetown.gov.za

For mapped data on PSHB sightings, visit:
https://odp-cctegis.opendata.arcgis.com

Environment at your home

The previous sections have shown that the City is actively working to conserve Cape Town's precious natural environment. Yet we all have a part to play, including in our homes.

There are many ways in which you can help save and protect the Mother City's unique biodiversity. The following sections provide practical tips on how you can protect and conserve biodiversity at home, work, or school. The aim should be to reduce any negative impact on the natural goods and services that are essential to human life.

Indigenous gardening

Establishing a garden

When establishing a garden in Cape Town, consider using indigenous plants. Soils in Cape Town gardens are mostly suitable for fynbos or strandveld plants, provided the area is sunny throughout the year. Fynbos plants (proteas, restios, buchus and ericas) will grow well in acid, sandy soils. Strandveld plants will grow well in most sandy soils. (Turn to page 135 and 136 for a list of indigenous species.)

When planting indigenous, soils require little preparation. Fynbos, in particular, dies when fertilisers are added. Water well for the first two years (preferably with non-potable water), which is the most important time when establishing plants.

Planting trees

For planting trees, ensure that the soil is as nutrient-rich as possible by using compost, bone meal and rock dust. Depending on your area, soil should be mulched to protect it from the sun, as this prevents the roots from drying out. You can also plant indigenous ground covers and use these as living mulch. Your local nursery will be able to advise you on the best options.

Planting trees will depend on the size of your plot: If your plot is small, your indigenous garden will need all the sun it can get, so it will be best to opt for smaller, indigenous (water-wise) shrubs and ground covers (see list on page 136).

Importance and benefits of having an indigenous garden

Even if you live on a small plot, planting a garden will help stabilise soil, prevent dust and sand from blowing into your home, create shade to cool the home, and provide a space for animals and plants to live. And if planting a garden, why not fill it with locally indigenous plants?

Over centuries, Cape Town's locally indigenous plants have developed along with local animals in a complex system of life. This system needs to be supported instead of disrupted to retain the various forms of life it contains. In addition, local plants are adjusted to cope with Cape Town's harsh, sandy conditions. Once established, they require little supplementary watering, which reduces the amount of water you need to keep your garden beautiful.

If you live close to Table Mountain National Park, a nature reserve or a natural vegetation remnant, planting locally indigenous species becomes even more important. This is because the introduction of plants from other areas may cause cross-breeding (hybridisation) with related wild species, which undermines conservation efforts and decreases genetic diversity. This is particularly relevant for proteas (including sugarbushes, spiderheads, pincushions, pagodas and conebushes), ericas (heaths), bitou *(Osteospermum)* and *Agapanthus*.

Different places in Cape Town present different growing conditions, including varying rainfall, wind exposure, and soil types. Therefore, a single list of plants will not suit all areas across town.

For more information on suitable species for your area, consult the website of the South African National Biodiversity Institute (SANBI) – the address is indicated under "Contacts and resources" at the end of this chapter.

Most general nurseries will also have a selection of plants, and the nursery staff will be able to guide you in selecting those suitable for your garden's soil type.

Indigenous plants

Here are some examples of locally indigenous plants to consider planting in your Cape Town garden:

Trees

- ✓ Assegai tree *(Curtisia dentata)*
- ✓ Camphor bush *(Tarchonanthus camphoratus)*
- ✓ Cape saffron *(Cassine peragua)*
- ✓ White milkwood *(Sideroxylon inerme)*
- ✓ Wild olive *(Olea europaea* subsp. *africana)*

Shrubs

- Blombos *(Metalasia muricata)*
- Blue felicia *(Felicia aethiopica)*
- Blue salvia *(Salvia chamelaeagnea)*
- Brown salvia (Salvia *aurea)*
- Cape may *(Coleonema album)*
- Common sunshine conebush *(Leucadendron salignum)*
- Dune crowberry *(Searsia crenata)*, previously known as *Rhus crenata*
- Dune taaibos *(Searsia laevigata)*, previously known as *Rhus laevigata*
- Geelblombos *(Athanasia dentata)*
- Heath phylica *(Phylica ericoides)*
- Silver bush everlasting *(Helichrysum petiolare)*
- Wild aster *(Felicia filifolia)*
- Wild dagga *(Leonotis leonurus)*
- Wild malva *(Pelargonium cucullatum)*
- Wild scabious *(Scabiosa incisa)*
- Wild rosemary *(Eriocephalus africanus)*

Bulbs, reeds and ground covers

- Arum lily *(Zantedeschia aethiopica)*
- Cape thatching reed *(Elegia tectorum)*
- Carpet geranium *(Geranium incanum)*
- Coastal pelargonium *(Pelargonium betulinum* and *Pelargonium capitatum)*
- Cobweb bush *(Plecostachys serpyllifolia)*
- Glastee *(Cliffortia ferruginea)*
- Golden carpet *(Helichrysum cymosum)*
- Sea lavender *(Limonium perigrinum)*
- Silver arctotis *(Arctotis stoechadifolia)*
- Suurkanol *(Chasmanthe aethiopica)*

Easily propagated plants

Simply cut a side branch of these plants and stick it in damp ground:

- Aloes *(Aloe arborescens, Aloe maculata* and *Aloe succotrina)*
- Pelargoniums
- Succulents such as vygies and sour fig *(Carpobrotus)*, pig's ear *(Cotyledon orbiculata)* and bulbinella

Organic agriculture

Organic farming methods combine scientific knowledge of ecology and modern technology with traditional farming practices based on natural biological processes. While conventional agriculture uses synthetic pesticides and water-soluble, synthetically purified fertilisers, organic farmers use only natural pesticides and fertilisers. The principal methods of organic farming include crop rotation, green manures and compost, biological pest control, and mechanical cultivation.

The oldest and most advanced form of organic farming is biodynamic agriculture. This entails the use of special biodynamic preparations that enhance soil and plant vitality, as well as improve seed longevity.

Permaculture

Permaculture ("permanent agriculture" or "permanent culture") is a land design practice that harmoniously integrates buildings, the microclimate, annual and perennial plants, animals, soils, and water into stable, productive communities. When designing your garden at home, you can also incorporate permaculture principles by simply observing natural systems and tapping into indigenous knowledge.

Companion planting

To double your production, try planting the following companion plants together, as they enhance one another's health and vitality:

Spatial companions, such as onion and Swiss chard (spinach). Onions grow just above the ground with straight leaves, while spinach has large, abundant leaves above the ground. The smell of onions also helps repel pests.

Time companions, such as radish, cabbage and lettuce. Radish is harvested first, followed by lettuce, after which the maturing cabbage fills all the gaps, with little unused space remaining in the bed.

Friendly companions, such as basil and tomato. The basil keeps pests away and yields sweeter tomatoes.

Different seed varieties

There are many seed varieties available. Some can be collected and reused, while hybrid seeds cannot propagate again. Heirloom seeds are organically grown and preserve the original genetic vitality of the plant. Genetically modified seeds can be manipulated to require specific pesticides, be better adapted to environmental conditions, or not reproduce.

Remember the following tips when buying seeds:

- Check if there is an expiry date, as seed viability decreases with time.
- If you plan on reusing seeds, get natural seeds instead of hybrids.
- Support local seeds companies, save your own seed or exchange seeds with other people.

Container garden

If you do not have a garden, consider container planting on your windowsill, balcony or even on your roof (if it is flat and protected). With big enough pots, you can also plant herbs and some food plants (such as peppers). However, container planting in covered or shielded spaces requires special attention, as conditions may be very hot (especially if your balcony or roof is north-facing and tiled) or very windy. You may need to create some added protection or shade.

Invasive alien species

Be extremely careful not to plant any invasive alien species in your garden. Invasive alien species such as Rooikrans and Fountain Grass pose some of the greatest threats to biodiversity, use much more water than fynbos plants, and increase the risk of severe wildfires. In fact, it is a contravention of the National Environmental Management: Biodiversity Act (NEM:BA) to plant or keep invasive alien species on your property. There are many indigenous and non-invasive alien species that may be substituted for the invasive plants in your garden.

The SANBI website contains a list of declared invader plants (turn to **"Contacts and resources"** for the address). Some species that should no longer be traded and be actively removed from your garden are indicated opposite:

Invasive alien trees

- ✓ Crack willow (*Salix fragilis*)
- ✓ Manatoka (*Myoporum tenuifolium*)
- ✓ Orange cestrum (*Cestrum aurantiacum*)
- ✓ Pines such as the cluster pine (*Pinus pinaster*)
- ✓ Port Jackson (*Acacia saligna*)
- ✓ Rooikrans (*Acacia cyclops*)
- ✓ Sweet pittosporum (*Pittosporum undulatum*)

Invasive alien shrubs

- ✓ American bramble (*Rubus cuneifolius*)
- ✓ European blackberry (*Rubus fruticosus*)
- ✓ French broom (*Genista monspessulana*)
- ✓ Hakeas (such as *Hakea drupacea*, *Hakea gibbosa*, *Hakea sericea* and *Hakea suaveolens*)
- ✓ Oleander (*Nerium oleander*)
- ✓ Spanish broom (*Spartium junceum*)
- ✓ Tickberry (*Lantana camara*)
- ✓ Triffid weed (*Chromolaena odorata*)

Invasive alien herbs

- ✓ Devil's beard (*Centranthus ruber*)
- ✓ Fountain grass (*Pennisetum alopecuroides*)
- ✓ Pampas grass (*Cortaderia selloana*)
- ✓ Paterson's curse (*Echium plantagineum*)
- ✓ Viper's bugloss (*Echium vulgare*)

Invasive alien water plants

- ✓ Red water fern (*Azolla filiculoides*)
- ✓ Water fern/Kariba weed (*Salvinia molesta*)
- ✓ Water hyacinth (*Eichhornia crassipes*)
- ✓ Water lettuce (*Pistia stratiotes*)

Preventing the introduction of invasive species is the first line of defence against their spread. However, even the best prevention efforts will not stop all invasive species from being introduced.

The second line of defence is early detection and rapid response (EDRR). EDRR efforts increase the likelihood that invasions will be addressed successfully while populations are still small, and can be contained and possibly eradicated.

Once populations are widely established, costly operations are implemented to contain them and mitigate their negative impact. Naturally, the costs associated with EDRR efforts are less than those of long-term invasive species management programmes.

You can help by spotting and reporting EDRR target species. In 2019, there were 21 plant species on the Cape Peninsula EDRR programme target list. For information on this or on how to register as a spotter, go to **"Contacts and resources"** for information on EDRR.

Reducing lawns

Lawns require enormous amounts of water and maintenance. Although couch grass or "kweek" (*Cynodon dactylon*) is adapted to our soils and dry climate, it tends to spread quickly into areas where it is unwanted, including your garden beds. Do not plant kikuyu grass (*Cenchrus clandestinum*) – this East African species is invasive and difficult to control.

Alternatives to lawn are to minimise the actual area used or to consider decking, paving, or mulching in those areas. The best alternative, however, is to plant a totally indigenous garden, without any lawn. Bear in mind that you will need to have enough non-potable water available to water newly planted indigenous plants for two years so that they can establish healthy root systems and become water-wise.

Trees

Trees are an essential part of our natural landscape and of Cape Town's cultural and aesthetic backdrop. Trees also have a large part to play in making Cape Town resilient and adaptable to climate change. They offer a range of benefits ranging from social to ecological and economic, as listed below:

Trees are socially beneficial, as they:

- ✓ connect people to nature.
- ✓ add aesthetic or "green" value to landscapes.
- ✓ absorb traffic noise pollution.
- ✓ provide windbreaks.
- ✓ provide privacy.
- ✓ improve physical and mental health.
- ✓ sustain cultural and spiritual values.
- ✓ create memorable spaces.

Trees are ecologically beneficial, as they:

- ✓ capture carbon, produce oxygen, and release moisture into the atmosphere through transpiration.
- ✓ create habitats and safe refuge for other organisms.
- ✓ condition and improve soil quality.
- ✓ bind soil, prevent soil erosion, and slow rainfall runoff.

Trees are economically beneficial, as they:

- ✓ increase property values.
- ✓ create indirect savings by reducing building heating and cooling costs.
- ✓ reduce infrastructure (e.g. stormwater management) costs by absorbing and transpiring groundwater.
- ✓ have commercial and livelihood value (food, fruit, flowers, bark, roots, medicine, timber).
- ✓ provide shade, and cool down hot areas.

For more information on trees in Cape Town, have a look at the City's Green Infrastructure Programme *Best Practice Guidelines: Trees* (look under **"Contacts and resources"**).

If you choose to reduce lawns by replacing them with hard surfaces, such as paving or stones, please ensure that the new surfaces are permeable (avoid plastic sheeting under paving). Impermeable surfaces in your garden prevent rainfall from penetrating the soil and replenishing the water table, aquifers, and local wetlands. Rather use alternatives that enable penetration, such as porous paving that allows plants to grow through gaps (like "grass-over" pavers), gravel, or woodchip mulch.

Fencing

Another factor to consider in your garden is fencing. Ideally, depending on your neighbourhood, this should be open palisade or have small gaps near the ground to allow small fauna (such as western leopard toads) to move between gardens and their breeding sites. Open palisade also has security benefits and creates a sense of community.

In fire-prone vegetation areas, a continuous, solid, low wall (allowing one to see through above, such as through columns with steel palisade) is recommended to help stop ground fires entering your property.

Avoid having electric fence strands lower than 15 cm above ground level, as this can injure or kill small animals and prevent their safe movement.

Fire

Gardens should not pose a fire risk.

- ✓ If you live in an area at risk of vegetation fires, maintain your garden and remove all invasive alien trees (many of which are highly flammable). Rather plant less-flammable plants such as buffalo grass lawn and succulents around your property boundary.
- ✓ Maintain and clean your gutters regularly. Accumulated dry leaves and other debris in gutters can pose a fire hazard, as a spark landing on the dry leaves could set your roof alight.
- ✓ Thatch is highly flammable, so thatch roofs should be impregnated with certified fire-retardant chemicals to make them fire-resistant. A sprinkler system adequate to wet down the entire thatch roof in an emergency should also be installed and maintained regularly. Rather do not have a thatch roof if you live in a fire risk area.

- Know how to respond in the event of an emergency. Be responsible with braai and other cooking fires. Do not leave open flames unattended. Learn about fire safety and prevention. Understand what is meant by the fire danger index and keep an eye on it during the Cape's fire season (summer).

In case of an emergency in Cape Town, call **107** from a landline or **021 480 7700** from a cellphone.

Protecting our coast

Here are some practical ways in which you can help the City preserve our precious coast:

- Call the Marine and Environmental Law Enforcement Unit to report any suspicious or anti-social behaviour on or near the coast (get their details under **"Contacts and resources"**).
- Participate in coastal clean-up days throughout the year.
- Check the status of fish you buy or order in a restaurant with WWF-SASSI (see **"Contacts and resources"**).
- Dispose of old fishing line in the dedicated fishing line bins.
- For marine wildlife emergencies, such as stranded or injured animals, call 021 480 7700.
- Stay informed by downloading and sharing the City's Coastal Management Programme (the link can be found under **"Contacts and resources"**).
- Learn more about our lesser-known beaches and our coastline's fascinating ecology and creatures by browsing the City's beaches portal or downloading the beaches booklet (get details about both under **"Contacts and resources"**).
- Make use of the City's Identikidz beach project during the December/January holiday season, which gives young beach visitors identification armbands and registers them to ensure that they can be reunited with their parents if they get lost.

The WWF Southern African Sustainable Seafood Initiative (WWF-SASSI)

WWF-SASSI aims to inform and educate people in the seafood trade (such as fishermen, restaurant owners and seafood lovers) on the laws and regulations that apply to the commercial harvesting, buying or selling of seafood. These regulations have been established to ensure that these resources are used sustainably.

WWF-SASSI's consumer species list tells you which South African seafood species are legal and more sustainable to eat, and is updated regularly:

- "Green status" fish are the best choice for you to buy and eat, as they can cope better with current fishing pressures.
- "Orange status" fish should be considered with caution. Rather do not buy and eat these fish, as they are either overexploited or come from problem fisheries.
- "Red status" fish should never be bought or eaten. Some of them are illegal to sell in South Africa, specially protected, or extremely overexploited and endangered. Do not buy or eat "red status" fish.

If you intend ordering seafood in a restaurant or buying fish or other seafood to cook at home, use the WWF-SASSI app. For more details, go to **"Contacts and resources"** at the end of this chapter.

Your community

Encourage naturalisation of suitable public open spaces in your community. For instance, work with the City's Recreation and Parks Department to replace grass on road verges with indigenous shrubs and trees. You could also encourage schools to start indigenous gardens around playgrounds and field edges.

Look at the following additional suggestions for getting involved in greening, protecting, and enhancing the natural beauty of your area:

Attracting birds to your garden

Birdwatching is an extremely popular (and addictive) hobby. It is often also rather competitive! A good place to start is by attracting birds to your garden and neighbourhood.

Many people use bird feeders for this purpose. Yet feeders have some drawbacks:

- They must not be accessible to domestic cats or small mammals, especially squirrels and rodents.
- Bird feeders artificially concentrate birds and, as a result, can spread disease.
- Birds also easily become dependent (and overweight) on an artificial food supply.

So, think of bird food (seed, fruit, sugar water, etc.) as an occasional, irregular treat instead of a staple diet for birds. In fact, refined cane sugar is probably as unhealthy for birds as it is for humans!

Rather consider:

- planting various flowering plants to attract birds – and insects for birds to feed on. Proteas, ericas, lion's paw, salvias and other tubular-flowered plants will attract sunbirds and other nectar feeders, while berry-producing shrubs will attract frugivores (fruit-eating birds) such as bulbuls;

- ✓ introducing species that host insect larvae (e.g. wild peach, or *Kiggelaria africana*) and provide insect nesting material (e.g. kapokbos, *Eriocephalus* species, and camphor bush, or *Tarchonanthus camphoratus*);
- ✓ including thorny shrubs and trees (such as grewia and *Gymnosporia* species) to provide safe nesting sites for birds;
- ✓ creating a layered garden with ground covers, herbs, grasses, shrubs, and trees to provide varied habitat and food sources for insectivores (insect-eating birds) such as white-eyes, and for seedeaters such as Cape sparrow, canaries, and waxbills; and
- ✓ leave fallen leaves to rot and act as mulch in garden beds, as this will also attract robins and thrushes to scratch for insects.

Keeping your neighbourhood clean and environmentally friendly

Take your garden, household, and building refuse to your local solid waste drop-off facility (read the chapter on waste for more details).

If this waste is dumped in the veld, it destroys our natural areas:

- ✓ Builders' rubble can crush natural vegetation and alter soil conditions.
- ✓ Garden refuse often contains invasive plant matter, such as kikuyu grass and weeds, which will invade the veld in which it is dumped.
- ✓ Broken glass disposed of in the veld can magnify sunlight onto a spot and start a fire. It can also injure wild animals and people.
- ✓ Any paper, plastic, or other rubbish thrown into the street, onto the ground, down the stormwater drain or anywhere besides a designated refuse area is known as "littering". This is not only illegal, but plastic litter in particular is very harmful to animals.

In addition, do not drive your car, truck, or any other vehicle on the beach or in natural areas. The City's off-road vehicle regulations prohibit driving on any beach, unless you have an exemption or permit. If you own a motorcycle or quad bike, ensure that you ride only in properly designated areas that have been set aside for this activity.

Environmental clubs

Cape Town has a very active network of environmental clubs, societies and groups:

- ✓ If you are interested in birds, join the Cape Bird Club, which is a branch of BirdLife South Africa.
- ✓ If flowers are your passion, join the Botanical Society and CREW (Custodians of Rare and Endangered Wildflowers).

The Big Microplastic Survey

Microplastics are one of the biggest issues facing the oceans at present. They have a significant impact on marine animals, ecosystems and, ultimately, human health. The Big Microplastic Survey uses citizen science to do research across the world on the distribution and types of microplastics found along various coastlines. The goal is to raise awareness of plastic pollution in our oceans, and of ways in which each citizen can do their part to reduce this.

The City's Coastal Management Branch co-ordinates regular microplastic surveys at various beaches. Volunteers are welcome to assist or to conduct their own surveys. Registration for this international citizen science study is free.

For more information on how to get involved, look under **"Contacts and resources"** for contact details.

Only rain down the drain

- ✓ Do not dump anything other than water down the stormwater drain.
- ✓ Use pesticides and fertilisers sparingly in your home garden.
- ✓ Pick up your dog's poop.
- ✓ Do not throw cigarette butts in the street.
- ✓ Clean your sidewalks and driveways to prevent litter from blocking drains.
- ✓ Do not flush wet-wipes, pads or rags down the toilet.

See Water chapter.

- ✓ Several of Cape Town's nature reserves and greenbelts have active Friends groups, who help with a wide range of volunteer work and fundraising.
- ✓ If you enjoy hiking, join your local hiking/walking club or the Mountain Club.
- ✓ If fighting veld fires inspires you, join the Volunteer Wildfire Services (VWS).
- ✓ The City, in partnership with Nature Connect, also accepts individual and groups of volunteers to assist the Environmental Management Department with various biodiversity management tasks, coastal citizen science initiatives, environmental education and awareness, invasive species clearance, and litter clean-ups.

If you cannot support an environmental group through active participation, consider assisting in other ways, such as through donations, whether financial or in kind (by giving things such as tools or trees).

Turn to **"Contacts and resources"** for the contact details of the organisations mentioned above.

Human-wildlife conflict

As Cape Town is located in an area of outstanding natural beauty, this means it also serves as a habitat to wild animals. With urbanisation on the rise, this often results in conflict between humans and wildlife. In some instances, wild animals need to be caught, and relocated or euthanised.

The City has a successful baboon management programme that, along with conservation partners CapeNature and SANParks, helps keep baboon troops out of urban spaces and mitigates conflict. For the dedicated baboon hotline number, look under **"Contacts and resources"**.

For any other animals that require removal, please contact CapeNature's Cape Metro Business Unit for the latest list of animal catchers (see **"Contacts and resources"** for their number). These are professionals who hold valid CapeNature permits to move animals, remove beehives, or handle snakes. Do not be tempted to try and corner, trap, or kill any animals yourself, particularly snakes, caracals and baboons. Rather call for assistance.

Do your part by preventing any pets from escaping and entering nature reserves. Try to control your domestic pets as far as possible. Cats should wear collars with bells to alert birds, lizards and small mammals.

Dealing with baboons at home

Do the following at home to proactively manage baboons:

- ✓ If you live in or near an area where baboons occur naturally, a baboon-proof electric fence around the property perimeter is recommended.
- ✓ Make sure that sliding windows have latches on either side, as these will stop baboons from pulling the frame and breaking the glass.
- ✓ If you keep windows open, ensure that the burglar bars are properly fitted. To prevent young baboons from entering your property, the gap between bars should not exceed 8 cm. If you do not want to block your view, consider see-through burglar guards.
- ✓ Fit night bolts onto sliding doors to prevent baboons from lifting the doors off their tracks.
- ✓ Try to reinforce all visible gutters and downpipes.
- ✓ Place TV antennae in your ceiling instead of on the roof.
- ✓ Keep your dogs away from baboons. Baboons are strong, have sharp teeth, and will fight back if attacked.
- ✓ If your bin is out, put a lock on it and secure it upright against a wall or pole, or place it on its side (locks towards the ground) on the pavement or roadside.
- ✓ If you can, store your bin in the garage or a lockable cage.
- ✓ Plant indigenous plants, as baboons are often attracted to exotic or alien plants.
- ✓ Do not plant unsecured food gardens, such as vegetables or fruit. Consider using a secure greenhouse or other enclosures so that baboons do not have access.

What to do with snakes?

When you see a snake in the veld, leave it alone. Without fail, snakes (and all other creatures) perceive humans as a threat and will try to escape or use their camouflage as protection when they encounter us. There is no need to kill it. If you leave it alone and remain at a safe distance, the snake will move away.

Most snakes are harmless to people, and the few that are venomous will only bite if they feel threatened.

Most people who get bitten by snakes have frightened, disturbed, or even tried to kill the snake. In that case, the snake will fight back.

Snakes eat rats, mice, and other pests, which makes them good to have around gardens and residential areas.

Three of the most common snake species you could come across in Cape Town suburbs are the common slug eater, the olive house snake, and the mole snake. These are all harmless to humans, and non-venomous.

For assistance with catching a snake, please call the CapeNature Cape Metro Business Unit, who will refer you to a snake catcher in your area (turn to **"Contacts and resources"** for the number).

Beekeeping

Beekeeping (or apiculture) is the human practice of maintaining honey bee colonies, usually in hives. A beekeeper (or apiarist) keeps bees to collect honey and beeswax, pollinate crops, or produce bees for sale to other beekeepers. The place where bees are kept is called an apiary. An important function of bees is the pollination of plants when the insects visit flowers for nectar and pollen, which they, in turn, need for food.

In terms of the 2012 regulations published under the National Environmental Management: Protected Areas Act, no beehives are allowed inside or adjacent to nature reserves. Commercial beehives can swamp wild bees and other pollinators, spread disease, and affect the conservation of both local pollinators and plant species. Domestic beekeeping may require a permit as stipulated in the City's Animal Keeping By-law.

Dogs should be kept on a leash where necessary, such as when walking in forest areas and nature reserves that allow dog walking. In addition, never release unwanted pets (rabbits, ducks, snakes, lizards, tortoises, etc.) or dump a dead animal in a nature reserve or public open space.

Start your own food garden

For many of us, the rising cost of all food, especially vegetables, makes it difficult to eat something fresh and green every day. An effective way to save money while still getting your "five a day" is to establish your own home garden.

The following is a quick overview of how to start your own food garden. For further assistance, there are many local organisations who offer a range of workshops, practical advice, and resources.

What you need to get started

- ✓ A small piece of ground, preferably with good soil and ample sunshine.
- ✓ Some gardening equipment, such as a spade, fork, and rake.
- ✓ A hosepipe or watering can, with access to water – preferably rain or greywater (such as shower water). If reusing water from your bathroom, make sure that it does not contain fats, oils, or harsh chemicals that can pollute your soil and harm or kill plants.
- ✓ Compost or plant food (organic fertilisers).

Planning your food garden

- ✓ Pick a spot that gets lots of sunshine or, at least, morning sun, and is sheltered from the wind.
- ✓ It should be close to your house and have a water source.
- ✓ Choose a place with the best possible soil quality.

Preparing the soil

- ✓ Start by clearing the area and removing all weeds, grass, bushes, trees, and their roots.
- ✓ The length of the beds should run east-west (sunrise to sunset), unless your garden is on a slope, in which case it is more important that the beds run across the slope to avoid soil erosion.
- ✓ The width of the beds should not exceed 1 m and can be about 2 m long – about the size of a door.

- Make a path around the bed so that you can access the veggie garden without having to stand in the beds.
- It is important that the soil has enough air, water, and nutrients for seeds to germinate, so prepare your soil well. Trenching is a good method of soil preparation. This entails layering topsoil, subsoil, and other organic matter (compost).

Planting your food garden

- Plant what you will eat – the bigger the variety, the better for your health and the health of the soil. If you plant one type of vegetable only (monoculture), you will find that there are long periods when you have nothing to eat from your garden, and a short period when you have an oversupply of one type of vegetable. You will also most likely have more pests eating your crop.
- For a healthy harvest, sow seeds in the correct seasons and make sure that they are not planted too deep or too shallow. Read the instructions on the seed packet.
- Plant short rows, not long ones, and make sure you do not waste any space. The distance between rows can be 20–50 cm, depending on the size of the crop.
- Carefully sow the seeds in the furrows – never too thick a layer, but always a few more seeds than you need, in case some do not come up. If too many come up, you can transplant them to another bed, or give them to a friend or neighbour.
- Cover the seeds with soil from either side of the furrows. Press them down gently with your hand so that they are in close contact with the soil and water them gently with a watering can using non-potable water. Do not use a hosepipe, as the strong jet of water will wash the seeds away.
- If the weather is very hot and dry, cover the soil where you planted the seeds with a very fine layer of mulch – so thin that you can still see the soil through it. Remove the mulch as soon as the seedlings come through the soil so that they can get enough sunlight.
- Check every day to make sure that the soil has enough moisture.

Composting

Using compost in your garden binds the soil, increases nutrients, and helps the soil hold water and air, which enhances plant growth.

Turning your organic waste into compost is an excellent way to improve soil quality and, at the same time, take pressure off Cape Town's landfill sites and reduce harmful methane gas. This is all it takes:

Most organic materials that rot or decay will easily make good compost. You can use any of the following:

- Garden waste, such as grass cuttings, leaves, and dead flowers.
- Vegetable and fruit peelings, leftover salad (but no oily salad dressing), tea leaves and tea bags, coffee grounds, eggshells, stale bread, dead flowers, and outdated spices (but not salt, as it kills plants).
- Paper, cardboard (not waxy/glossy), sawdust and wood shavings, animal manure (such as chicken), and woodfire ash.

The following materials should be used sparingly or with discretion for composting:

- Garden waste sprayed with pesticides, toilet or septic tank waste, or diseased animal carcasses or plants. If you want to use these, preferably avoid them on food crops and compost them for a longer time.
- Cooked food scraps, as they can attract rats and mice.
- Grass runners, as they can grow in your compost heap.
- Citrus peels, such as orange peels, as they go mouldy and are acidic.
- Branches and hard materials, as they take a long time to break down. Keep these in a separate pile.
- Avoid weeds with hard seeds, as they are not broken down in the composting process. To prevent weeds (especially invasive alien species) from spreading, place them in bags without dropping the seeds and transport these to a recognised garden refuse dump. Never dump garden rubbish in the veld.
- If potato peels sprout or other vegetable/fruit seeds germinate in your compost heap, you can transplant these seedlings to your food garden.

Never use the following for composting:

- Any inorganic material, such as metal, glass, plastics, chemicals, paint, and rubble (building materials).
- Oil, fat, or grease, as these clog the soil.
- Dairy (cheese, milk), meat, chicken or fish, as these can attract rats and flies.

How to start composting

There are many ways to make compost. Choose a method that suits the amount of waste you have and your available time and space. The easiest way to make compost is simply to create a pile of organic waste, about 1 m wide, in a sheltered and shady corner of the garden. To keep the heap tidy, you might prefer to make it in a container. A sealed container is advisable if you have baboons in your area, and to discourage rats.

Follow these steps:

- First throw down a layer of coarse material consisting of twigs and straw for aeration.
- Place alternate layers of "brown" (dried leaves) and "green" (fresh grass cuttings or kitchen waste) material in equal proportions. If available, put some manure (or seaweed) as an activator layer in between.
- Sprinkle non-potable water (greywater or rainwater), soil, and shredded paper intermittently between the layers until your heap is 1,5 m high.
- You can build layers up over time as you accumulate kitchen waste, mow the lawn, prune shrubs, or rake dry leaves.
- The soil is needed to introduce beneficial organisms, such as earthworms and woodlice, into the pile to help the decomposition process.
- It is useful to have an extra pile of material (dry leaves or shredded newspaper or soil) to place on top of the heap to cover kitchen waste. This will keep flies away and ensure that there is little or no smell.
- Keep the heap covered with a layer of straw, soil, or old carpet to keep rats, insects and other pests out.
- Water the heap regularly (keep it moist, but not wet, with non-potable water) and turn it over with a garden fork after a few months to speed up the process.
- In certain situations, it may be better to bury the organic waste in soil trenches or holes that match the amount of waste generated. You can grow vegetables, flowers, or trees straight from a trench bed. As a sand layer covers the waste, you avoid flies and smells.
- The compost is ready to use when it is dark, crumbly, and smells like soil. This can take between six weeks and six months, depending on the time of year and the organic material used. A good idea is to have two or more compost heaps, so you can have one breaking down, while the other one is being added to.

How to look after your compost heap

Once it is up and running, look after your compost heap by following these steps:

- ✓ Initially, the compost heap will heat up, but will cool down again after a few weeks. This means you need to turn it so that it can heat up again. The heat kills weed seeds and fly larvae.
- ✓ Control flies by covering any new material you add with dry soil, sawdust, grass, or leaves.
- ✓ Turning the compost heap makes the organic material break down faster.
- ✓ Keep the heap moist, but not wet, otherwise it will smell bad. If it does get too wet, add dry absorbent material such as sawdust, straw, or manure, and turn the heap.
- ✓ If you find large, white, C-shaped grubs or larvae in the compost, destroy them. They are the larvae of the large black-and-yellow fruit chafer beetle, which can do damage in the garden.

Herbal pesticides

For natural pest avoidance, plant these herbal pesticides between your vegetables or make a tea from them, let it cool, and spray it on the affected areas:

Problem	Recommended plant/herb
General repellent	Garlic, ginger
Aphid	Garlic, onion, spearmint, nasturtium, basil, lavender
Beetles	Rosemary, garlic, chillies, marigold
Cabbage moth	Dill, mint, thyme, tomato, oregano
Carrot fly	Sage, turnip, parsnip
Caterpillars	Feverfew, lavender, aromatic herbs
Fruit flies	Trap in bottles with molasses-and-water mix
Mildew	Garlic, chives, onion
Nematodes, eel worm	Marigold
Red spider mite	Onion, garlic, ginger
Snails	Garlic, parsley, sage
White fly	Nasturtium, basil, marigold

For more on pest control, turn to the Waste chapter.

"The Earth will not continue to offer its harvest, except with faithful stewardship. We cannot say we love the land and then take steps to destroy it for use by future generations."

–John Paul II

Contacts and resources

CONTACT/RESOURCE	DESCRIPTION	AVAILABLE AT
Baboon hotline	A dedicated line operated on behalf of the City where problematic incidents and encounters with baboons in the urban environment may be reported	071 588 6540
Blue Flag South Africa	WESSA webpage dedicated to the South African Blue Flag programme	https://www.wessa.org.za/blue-flag/
Botanical Society	A non-profit organisation that aims to promote, conserve and raise awareness of indigenous flora and vegetation of Southern Africa	http://botsoc-kirstenbosch.org.za/
Cape Bird Club	A community of birders who share an enthusiasm for birds and the beautiful Cape	www.capebirdclub.org.za information@capebirdclub.org.za
CapeNature's Cape Metro Business Unit	Unit that can assist with a list of registered and professional animal catchers	021 957 5900
Nature Connect	An organisation that supports the preservation of Cape Town's unique and biodiverse natural heritage	natureconnect.earth 021 100 5613 Environmental Education Programme: 021 706 8523 admin@natureconnect.earth
City's beaches portal	A webpage dedicated to Cape Town's world-class beaches	www.capetown.gov.za/Family%20and%20home/See-all-city-facilities/Our-recreational-facilities/Beaches
City of Cape Town Beaches: A Diversity of Coastal Treasures	Booklet with information on the well-known and lesser-known beaches of Cape Town	www.capetown.gov.za and search for: 'Diversity of Coastal Treasures'
Coastal Management Programme	A detailed City plan that sets out how the administration goes about protecting and managing the Cape Town coastal environment	www.capetown.gov.za and search for: 'Coastal Management Programme'
CREW (Custodians of Rare and Endangered Wildflowers)	A citizen science programme that surveys and monitors plants of conservation concern in areas known to house threatened plants	https://www.sanbi.org/biodiversity/building-knowledge/biodiversity-monitoring-assessment/custodians-of-rare-and-endangered-wildflowers-crew-programme/
Early detection and rapid response (EDRR)	Information on the Cape Peninsula programme for the early detection of and rapid response to invader plants	https://www.capetown.gov.za/Explore%20and%20enjoy/Nature-and-outdoors/Be-an-eco-tourist/Looking-after-our-natural-heritage

CONTACT/RESOURCE	DESCRIPTION	AVAILABLE AT
Green Coast programme: WESSA	Green Coast status is awarded annually in recognition of commitment to preserving the unique flora and fauna along the South African coastline.	greencoast@wessa.co.za https://www.wessa.org.za/green-coast/
Green Infrastructure Programme: Best Practice Guidelines	City guidelines to help Capetonians manage and improve Cape Town's green infrastructure, including trees	www.capetown.gov.za and search for: 'Green Infrastructure Programme'
Marine and Environmental Law Enforcement Unit	A specialised law enforcement unit aimed at improving compliance and enforcement within the marine, coastal and terrestrial, natural environments	021 480 7700
National Environmental Crimes and Incidents Hotline	Hotline operated by the national government where all environmental incidents may be reported, including people feeding baboons	0800 205 005
Nature reserves managed by the City	Opening hours, features, and facilities	www.capetown.gov.za/naturereserves
Reporting dumping and littering in Cape Town's waterways	Contact details for reporting waterway pollution to the City	SMS: 31373 (maximum 160 characters) 0860 103 089
Shark Spotters programme	Website with information on the programme and where and when Shark Spotters are on duty	www.sharkspotters.org.za
South African National Biodiversity Institute (SANBI)	Information about suitable locally indigenous species for your garden and information on declared invader plants	https://www.sanbi.org/documents/nemba-invasive-alien-species-regulations/
The Big Microplastic Survey	The Big Microplastics Survey is a global citizen science project where local residents can collect microplastics using a standard methodology.	https://microplasticsurvey.org
Two Oceans Aquarium	A marine conservation and education centre in Cape Town that showcases local ocean life and inspires action through exhibits, outreach, and citizen science programmes.	https://www.aquarium.co.za
Volunteer Wildfire Services (VWS)	A non-profit organisation that helps combat runaway wildfires	www.vws.org.za info@vws.org.za
WWF-SA Southern African Sustainable Seafood Initiative (SASSI)	Initiative that shares useful information on the sustainability status of various seafood species	www.wwfsassi.co.za/sassi-app/ Send a "FishMS": 079 499 8795 sassi@wwf.org.za

Energy

The City of Cape Town's 2050 Energy Strategy outlines how we can overcome the challenges in our current energy system, and how we can benefit from the opportunities of the energy transition already under way. This includes a focus on energy security; power utility reform; investment in the distribution grid of the future; using energy efficiently; and alleviating energy poverty. Making Cape Town's energy system more resilient and better able to deliver reliable, affordable and carbon-neutral energy, is critical for the economic growth needed for more Capetonians to participate meaningfully in the economy and for their families to prosper. This chapter provides key facts and useful tips on how you can join the City in becoming more efficient, safe and carbon-savvy in using energy.

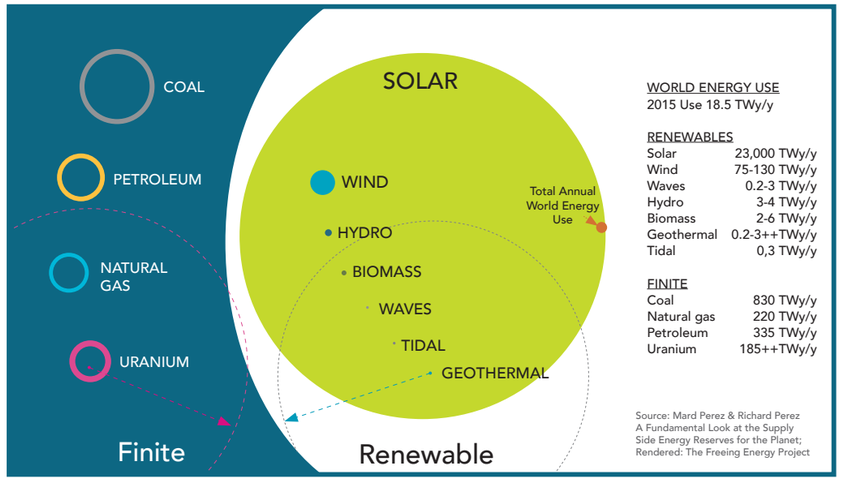
Introduction to energy

Energy sources

Most of the energy Earth receives comes from the sun. This is called solar energy and drives many processes on our planet, such as the wind, sea currents, photosynthesis and the water cycle. However, there are many other sources of energy we can use, such as geothermal energy and the gravitational pull from the moon and the sun, which affects sea water and creates tides.

"Renewable energy" refers to an energy source that is not depleted when used, such as wind, solar, hydro and geothermal energy. Fossil fuels such as oil and coal, on the other hand, are considered "non-renewable energy" sources, as they have a finite reserve and take millions of years to be produced.

The diagram below[1] illustrates estimated finite and renewable planetary energy reserves for 2015 (terawatt-years). The figures for the finite resources represent total recoverable reserves; those for renewables denote yearly potential.



1 www.freeingenergy.com/the-earth-gets-more-solar-energy-in-one-hour-than-the-entire-world-uses-in-a-year/

"Sustainability" means to be able to meet our needs today, without compromising future generations' ability to meet theirs. Therefore, to use energy more sustainably, we need to meet our energy needs more responsibly (energy efficiency), use energy wisely (energy conservation), address everyone's energy needs equitably (energy access) and use energy sources that do not harm people and the environment, but can be replenished to ensure a sufficient supply for future generations (renewable energy).

Understanding energy

"Energy" is the capacity to do work and is measured in units called joules (J). "Power" is the rate at which energy is used, which is measured in watts (W). One watt is equal to the energy consumed at a rate of one joule per second. A kilowatt equals one thousand watts, and a megawatt equals one million watts.

An appliance's power use is expressed in watts, for example, a 5 W LED lamp. To understand the total amount of energy used, we need to consider how long an appliance is used for, i.e. the amount of energy used in kilowatt-hours (kWh). For example, if a 5 W LED lamp is left on for two days (48 hours), it will use 5 W x 48 hours = 240 Wh = 0,24 kWh (divide watts by 1 000 to get kilowatts). Similarly, a 1 kW heater used for half an hour also uses 0,5 kWh.

In South Africa, electricity is supplied at 220/230 volts AC (alternating current) at 50 Hz (hertz), which means that the current changes direction 50 times per second. The base unit of electric current is the ampere, or amp for short.

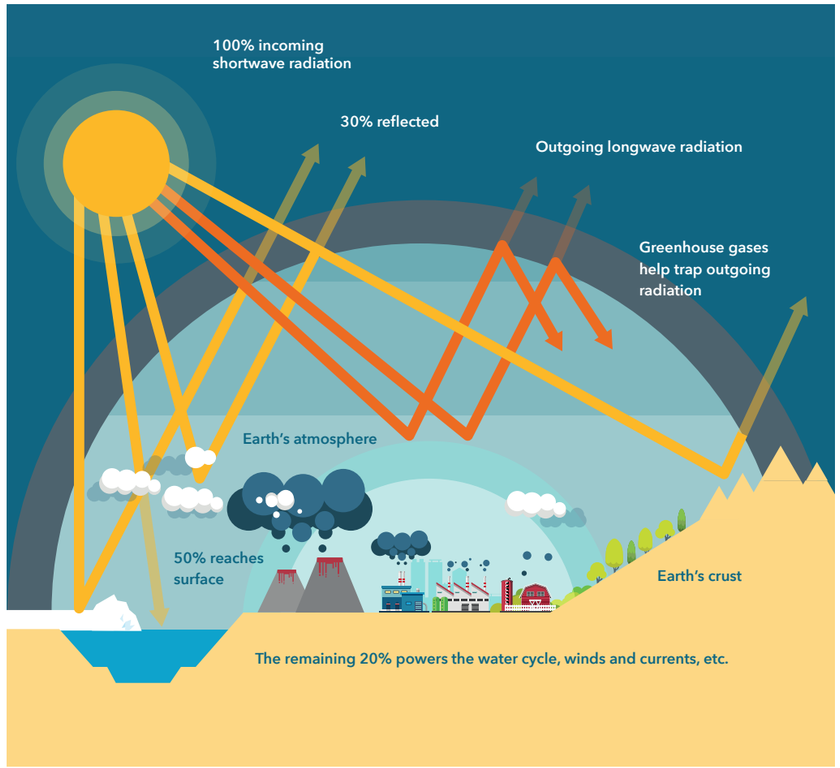
To understand amps, volts and watts, it helps to think of electricity as water flowing through a pipe. Amps would be the volume of water flowing through the pipe (the current), while the water pressure would be the volts (force). Watts would be the power that water could provide based on the current and force (volts x amps = watts).

Once you know these terms and calculations, you can do an energy audit at home to establish which of your appliances use the most power, and how you can reduce your electricity costs. After all, if you can't measure it, you can't manage it!

Energy and climate change

Most climate scientists agree that human activity is driving climate change, mostly due to the burning of fossil fuels, deforestation and, increasingly, intensive agriculture. The atmospheric heat radiating from Earth towards space is trapped by increased levels of greenhouse gases, resulting in the greenhouse effect, global warming and climate change.

The greenhouse effect



The primary gases that contribute to the greenhouse effect, illustrated in the above figure[2], include:

- ✓ water vapour (H_2O);
- ✓ carbon dioxide (CO_2);
- ✓ methane (CH_4);
- ✓ nitrous oxide (N_2O); and
- ✓ chlorofluorocarbons (CFCs).

The consequences of changes in the Earth's naturally occurring atmospheric greenhouse effect are becoming increasingly evident. Scientific models indicate that while specific regional impacts may vary, global trends are clear. On average, Earth is becoming warmer. Rising temperatures lead to more evaporation and precipitation overall, but with significant regional differences—some areas will experience more intense rainfall and flooding,

2 *The New Energy Book* by Sarah Ward, 2008.

while others will become drier and more prone to drought. A stronger greenhouse effect is warming the oceans, accelerating glacier and land ice melt, and causing sea levels to rise. Ocean water also expands as it warms, further contributing to rising sea levels. Additionally, marine heatwaves are becoming more frequent, leading to coral bleaching, ocean deoxygenation, and biodiversity loss.

Some crops and other plants respond favourably to increased atmospheric CO_2, growing more vigorously and using water more efficiently. Shifting climate patterns change the areas where crops grow best and affect the makeup of natural plant communities.

In Cape Town, the following climatic changes are likely to occur; in fact, some are occurring already:

- ✓ a decrease in annual average rainfall;
- ✓ changed seasonality of rainfall;
- ✓ an increase in mean annual average, maximum and minimum temperatures;
- ✓ an increase in the number of very hot days, and in the frequency and intensity of heat waves;
- ✓ an increase in both average and maximum wind strength; and
- ✓ sea-level rise.

Cape Town is also at risk of the following climate change impacts:

- ✓ drought and associated water shortages;
- ✓ flooding and the associated impact;
- ✓ on communities and infrastructure heat stress and its associated health impact;
- ✓ coastal erosion and its effect on coastal infrastructure;
- ✓ damage to infrastructure and communities due to severe storms and strong winds;
- ✓ increased risk of fire, affecting both the natural environment and urban areas; and
- ✓ decreased food security because of the effect of climate change on agriculture.

We need to explore more renewable energy options to reduce both our reliance on coal and the major impact it has on accelerating climate change.

Renewable energy sources

As mentioned earlier, renewable energy is an energy source that is not depleted when used, such as wind, solar, hydro and geothermal energy. Renewable energy should not be confused with "clean energy", which is energy that does not produce greenhouse gases and, thus, does not contribute to climate change. Nuclear power, for instance, is seen as clean energy, but is not renewable.

Most of the costs associated with renewable-energy installations are incurred in the initial set-up. This is different from non-renewable technologies such as coal and nuclear power. Non-renewable power plants imply ongoing fuel expenses and hefty costs at the end of the plant's lifecycle, such as the decommissioning of the plant and safe storage of nuclear waste.

What we need is to combine renewable energy supply from less consistent (variable) sources, such as wind and solar, with more consistent sources, such as biogas and natural gas, along with storage systems, such as batteries or pumped storage. A good balance of renewable energy sources and storage will help us meet our energy requirements.

Solar power

Solar energy is radiant light and heat from the sun that is harnessed using a range of ever-evolving technologies. These include solar heating, photovoltaics, solar thermal energy, solar architecture, molten-salt power plants and artificial photosynthesis.

Solar photovoltaic (PV) panels

Solar PV panels have semi-conducting materials that produce energy when exposed to the sun. They were initially invented in 1954 and work by allowing photons, or particles of light, to knock electrons free from atoms, which generates a flow of electricity.

There are various types of PV panels made from different materials, and the technology continues to improve, making it more versatile and cost-effective. Solar PV can be installed in large-scale solar farms, on rooftops, ground-mounted installations and on water bodies ("floating solar").

Renewable energy systems, such as rooftop solar PV panels, installed on a property that uses most of the generated energy itself (i.e. embedded in the electrical network) are known as "small-scale embedded generation" systems.

The City of Cape Town is actively investing in solar PV to reduce reliance on Eskom and improve energy security. One example is the Atlantis solar PV plant, Cape Town's first large-scale solar project, a 7 MW grid-connected ground-mounted solar PV system directly supplying the City's grid. The City is also enabling private sector solar PV investment through power purchase agreements (PPAs), wheeling arrangements, and feed-in tariffs, creating jobs and boosting the local green economy.

Solar water heating

Solar water heating uses the energy from the sun to heat water and can be linked to, or completely replace, existing household geysers. The solar collector needs to be placed on top of the roof to catch maximum heat from the sun, while the water storage container can either be on or inside the roof.

Solar water heating systems can include a backup element that heats up the water if there is not enough sunshine to heat the water. These backup elements should be linked to a timer so that it is only switched on when needed.

Concentrated solar power and molten-salt storage

Concentrated solar power systems generate solar power by using mirrors or lenses to concentrate a large area of sunlight, or solar thermal energy, onto a small area. The mirrors track the sun and direct it to a receiver.

A ground-breaking project harnessing concentrated solar power along with molten-salt energy storage is the 100 MW Redstone solar thermal power project in the Northern Cape. Liquid salt from a "cold" salt tank (at 288 °C) is pumped up a tower and through the solar power receiver, where it is heated to 566 °C. The heated salt travels back down the tower and is stored in a "hot" salt tank. The hot salt is pumped through a steam generator, which drives a steam turbine that generates electricity.

With 1 200 megawatt-hours of energy storage, Redstone will deliver clean energy to the equivalent of more than 200 000 South African homes each year. This non-intermittent power will feed into Eskom's electricity grid even well after the sun has set.

Wind power

Wind power is the use of air flow through wind turbines to mechanically power generators for electric power. The installation of wind farms is becoming more and more common in South Africa.

The Darling wind farm was the first commercial wind farm in South Africa (2008), delivering a maximum output of 5,2 MW from four 1,3 MW turbines. The City of Cape Town signed a PPA with the developer, which helped make the project feasible.

More recently, large wind farms were built just north of Vredenburg (47 turbines with an installed capacity of 94 MW), Jeffreys Bay (60 turbines with an installed capacity of 138 MW) and outside Gouda (46 turbines with an installed capacity of 138 MW). As of 2024, South Africa's wind energy capacity has grown significantly, with over 2,500 MW of installed capacity across multiple projects, contributing clean electricity to the grid. According to the South African Wind Energy Association, the country now has 30 wind energy developments, including projects in the Western Cape, Eastern Cape, and Northern Cape, generating enough electricity to power hundreds of thousands of homes.

Hydropower and pumped-storage schemes

Hydroelectricity is electricity produced from the flow of water. In a hydroelectric scheme, water is stored in a dam and passed through a turbine and generator set, before being released back into the river downstream. The power station does not consume any water in this process; it only uses the energy contained in running water to turn its turbines.

The City of Cape Town's Steenbras hydroelectric pumped-storage scheme was commissioned in 1979 with an installed capacity of 180 MW, while Eskom's Palmiet scheme was commissioned in 1988 with a capacity of 400 MW. Apart from its economic benefits, Steenbras also lends increased security to the City's electricity supply. Unlike thermal power stations, hydroelectric pumped-storage installations can be activated up to full load within a matter of minutes, making them a critical tool for balancing grid demand and ensuring reliability, especially during periods of high electricity demand or grid instability.

Geothermal power

Geothermal energy is thermal energy generated and stored in Earth. These underground reservoirs of steam and hot water can be tapped to generate electricity or heat and cool buildings directly.

Biofuels

Biofuel is fuel produced from renewable biomass material, commonly used as an alternative, cleaner fuel source to burning fossil fuels. Biofuels are not carbon-intensive, so they do not directly affect global warming. It is even suggested that biofuel formulations can remove materials such as logging waste and cooking oil from the waste stream.

Ethanol

Ethanol is a flammable and renewable liquid produced by the fermentation of grain, or from advanced technology such as agricultural waste, woodchips and paper waste. It is combined with gasoline for increasing octane and reducing carbon monoxide emissions. Certain vehicles run on E85, which is an alternative fuel with a high ethanol content. Ethanol releases approximately 15% less greenhouse gas emissions than gasoline when burnt.

Biodiesel

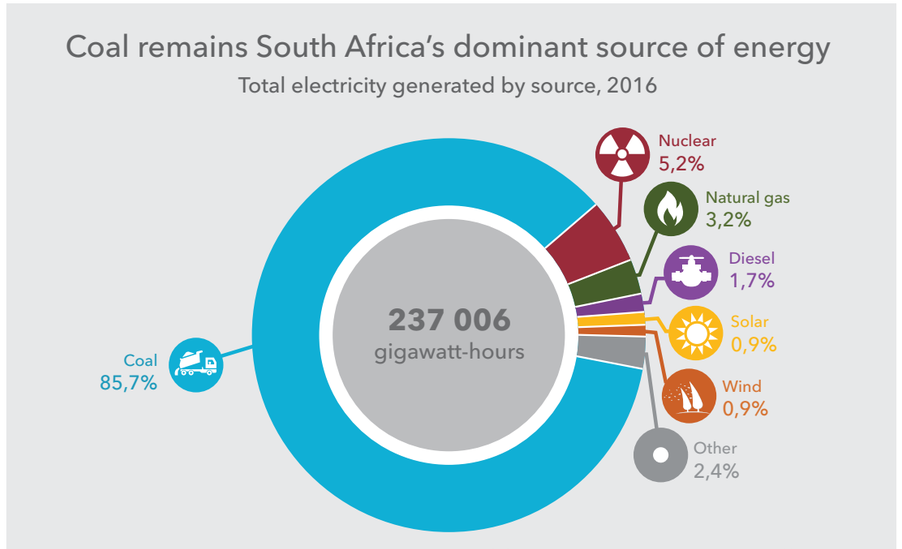
Biodiesel is produced through a combination of alcohol and recycled cooking grease, animal fat or vegetable oil. It is a highly combustible liquid that burns readily when mixed with petroleum-based diesel fuel. During the production of biodiesel, glycerine is produced as a by-product, which is also highly combustible. Biodiesel can be used as a renewable alternative for diesel engines.

Biobutanol

Biobutanol is an isobutanol derived from algae or bacteria, just like biodiesel, or from the fermentation of biomasses, like ethanol. This fuel can be directly used in standard gasoline engines, without any modifications. Due to its high octane levels, biobutanol reduces any loss in fuel mileage.

Other energy sources

As the following figure shows[3], most of the energy in South Africa comes from fossil fuels – coal, gas and oil – which has become the most critical resource on the planet.



The oil supplies on which the world economy depends are tens of millions of years old, originating in ancient seas that teemed with microscopic plant and animal life. As these creatures died and their bodies fell to the ocean floor, they formed a rich organic mud. Over millions of years, these layers were compressed by sediment above them, slowly changing them into the complex mix of hydrogen and carbon compounds that we know as oil.

Similarly, coal is formed by ancient forests buried underground. Strictly speaking, fossil fuel is energy from the sun – solar energy – stored in ancient plant and animal matter. Therefore, fossil fuels can be thought of as "ancient sunlight".

3 www.statssa.gov.za/?p=11292

Coal

South Africa's energy is predominantly derived from coal. South African coal is low-grade and releases large amounts of CO_2 into the atmosphere when burnt. The country produces some nine tonnes of CO_2 per person each year, which is almost double the global average of five.[4]

Burning fossil fuels releases harmful gases into the atmosphere. These cause air pollution, can lead to respiratory disorders and other diseases, and also create acid rain. However, the biggest concern is the creation of greenhouse gases, which directly contribute to climate change.

Crude oil

Our economy largely depends on oil, which we use to produce various goods, such as transport fuels, plastic, food, fertiliser, medicine, beauty products, building products and automotive products. In fact, almost any industry you can think of relies on oil for something.

Yet, South Africa has no natural oil resources. This means that we need to buy this critical resource from other countries. All the money we spend on oil, therefore, flows out of our country. Sasol has developed and implemented technology that converts coal to oil.

However, this technology is expensive to build and operate, and the process produces significant amounts of greenhouse gases.

Coal and oil reserves are limited and they are non-renewable energy sources. Oil reserves are estimated to run out in as little as 40 to 50 years, and analysts predict that long before oil runs out, it will become increasingly inaccessible and, therefore, extremely expensive. Therefore, the need for a sustainable alternative to oil is growing more urgent by the day.

Liquid fuels

Liquid fuels are combustible or energy-generating molecules that can be harnessed to create mechanical energy. Interestingly, it is the fumes of liquid fuels that are flammable, and not the fluid itself.

Some of the most common liquid fuels include:

- ✓ petrol and diesel;
- ✓ paraffin; and
- ✓ liquid petroleum gas (LPG).

Natural and waste gas

Natural gas is a naturally occurring hydrocarbon gas mixture that primarily consists of methane. However, it also commonly includes varying amounts of other, higher alkanes (hydrogen and carbon atoms arranged in a tree structure in which all carbon-carbon bonds are single) and, sometimes, a small percentage of carbon dioxide, nitrogen, hydrogen sulphide or helium.

4 https://data.worldbank.org/indicator/en.atm.co2e.pc

Liquid petroleum gas (LPG) vs natural gas

- ✓ **Convenience:** LPG is compressed into a liquid form, and either sold in portable canisters or delivered via truck to a permanent storage tank on the property. Natural gas, however, remains in its gaseous state and is delivered to the home via a pipeline or canister.
- ✓ **Efficiency:** LPG contains much more energy than natural gas. A cubic metre of natural gas contains 38,3 MJ of energy, while a cubic metre of LPG contains around 90,5 MJ.
- ✓ **Properties:** LPG is heavier than air, while natural gas is lighter.

We use natural gas as a fuel and to make materials and chemicals. Some of the most common natural gas types are compressed natural gas (CNG) and liquefied natural gas (LNG).

The methane produced on landfills (waste) and at sewerage plants (wastewater) – so-called "waste gas" – is another potential source of energy for a city (as discussed under the section on waste).

Wood/biomass

Wood is used in some households for cooking, heating and other activities, such as braais and brewing beer. Most of the wood is harvested from alien vegetation stands close to informal homes. Wood can be considered renewable if obtained from a sustainable source in which trees are replanted.

Nuclear power

Around 5% of our nation's electricity comes from Koeberg near Cape Town, South Africa's only nuclear power plant. Some people argue that because nuclear does not create greenhouse gases, it could be considered clean energy. However, there are concerns about the dangers of nuclear waste, the high costs and lead times for nuclear plant development, the lack of transparency, and the threat of accidents.

Even low-level nuclear waste remains dangerously toxic for thousands of years, while high-level nuclear waste could remain radioactive for more than 100 000 years. Koeberg's low-level waste is currently buried underground at Vaalputs in Namaqualand. The high-level waste remains stored at the Koeberg plant.

Energy and air pollution

Air pollution occurs when substances from human activities (such as dust from roadworks, and smoke and fumes from industries) and emissions from natural activities (such as forest fires or volcanoes) end up in the atmosphere and change the natural composition of the air we breathe. The burning of fossil fuels contributes to air pollution, which seriously affects our health and the environment. Low-income households are more at risk than others because of their exposure to draughty stoves, low-quality fuels and inadequate ventilation. Coal and wood used for indoor cooking and heating pollute the air indoors, while children walking to school or cycling along busy roads are affected by car fumes.

Brown haze

Cape Town's infamous "brown haze" on windless days is caused by vehicle exhaust gases and other light-absorbing soot particles that appear brown when exposed to sunlight. Particularly during the winter months of May to August, Cape Town tends to experience episodes of poor visibility associated with brown haze.

Scientifically, the air pollutants are trapped by temperature inversion, which acts as a lid that constrains vertical air movement.

Acid rain

Acid rain forms when the sulphur dioxide (SO_2) produced from burning coal dissolves in water vapour, raising its acidity. This not only affects plants and animals when it falls back to Earth, but also corrodes metal products such as roof sheeting and wire fences. In addition, acid rain can harm the physical environment by corroding buildings, discolouring fabrics and killing plants and animals.

Energy in our City

Energy and climate planning and management in Cape Town

The City's overarching vision for energy is: Energy security for a prosperous Cape Town: "Together, we can build a resilient energy system where all residents and businesses have access to reliable, affordable, and carbon-neutral energy services." The vision of energy security is achieved through the application of four principles across decisions related to the energy system. These principles guide good energy decision-making by the City and describe the kind of energy system Cape Town needs – a resilient energy system that can provide reliable, affordable and carbon neutral energy to everyone living and working in Cape Town. To achieve this, the City of Cape Town's 2050 Energy Strategy[5] has been developed and adopted with a commitment to harness new energy supply, alleviate energy poverty and optimise energy use. This is achieved by enabling a future-fit utility business while also enabling action by residents, businesses and partners.

Since 2021, the City of Cape Town has been actively implementing its Climate Change Strategy[6], and its climate change response and resilience campaign: Let's ACT for a Stronger Cape Town. This campaign aims to empower and support all residents and businesses to take action towards a stronger, healthier, and more resilient Cape Town. The City has committed to achieving carbon neutrality and climate resilience by 2050, setting a clear pathway towards this goal.

In addition to the Climate Change Strategy, the City developed a detailed Climate Change Action Plan and summary that outlines the steps needed to navigate the challenges of climate change while enhancing resilience across the City. These initiatives are part of Cape Town's broader commitment to sustainability, driving meaningful change in both the environment and the economy.

The Climate Change Action Plan is an "evolving blueprint" that is subject to ongoing review and change. This will ensure that Cape Town remains on track to achieve its targets, but also aligns its ambitions with the Paris Agreement.

Actions and projects that have formed part of the City's energy and climate agenda include:

- ✓ an energy, waste and water forum for the commercial sector;
- ✓ a small-scale embedded generation and solar PV programme;
- ✓ electricity beyond Eskom, promoting cleaner electricity supply;
- ✓ energy efficiency and renewable energy in the municipality's own operations, leading by example and building a more sustainable administration;
- ✓ energy services to low-income residents, in line with the policy of 100% electrification;
- ✓ solar lighting and cellphone charging for non-electrifiable settlements;
- ✓ transport and spatial planning programmes with a focus on public transport, transit-oriented development and densification;
- ✓ developing an electric vehicle framework and including electric buses in our fleet;
- ✓ non-motorised transport;
- ✓ transport demand management; and
- ✓ waste management and minimisation.

The City's Energy Directorate has more information on what the City is doing in terms of energy and climate change. See their web address under **"Contacts and resources"** at the end of this chapter.

5 https://resource.capetown.gov.za/documentcentre/Documents/City%20strategies%2c%20plans%20and%20frameworks/Energy_Strategy.pdf

6 https://resource.capetown.gov.za/documentcentre/Documents/City%20strategies,%20plans%20and%20frameworks/Climate_Change_Strategy.pdf

7 www.capetown.gov.za/ClimateChange

8 https://resource.capetown.gov.za/documentcentre/Documents/City%20strategies,%20plans%20and%20frameworks/CCT_Climate_Change_Action_Plan_Summary.pdf

Climate action

We recognise that cities worldwide must accelerate their climate change work to satisfy the ambitions of the Paris Agreement and prevent catastrophic climate change.

The City has demonstrated its commitment to increased climate action by signing up to the C40 Deadline 2020: Climate Action Planning in Africa, as well as the C40 South Africa Buildings Programme. These are an extension of the City's Energy2040 programmes and commitments, and are in line with
our Climate Change Policy.

Another three South African cities – Johannesburg, Tshwane and eThekwini – have made this commitment. Together, we are working towards one target, namely carbon neutrality for all new buildings by 2030, and citywide carbon neutrality by 2050. Carbon neutrality will help us create a cleaner, more equitable, resource-efficient, safer and more resilient city. In the process, we become more competitive globally, embrace innovation and entrepreneurship, build more sustainable livelihoods and provide affordable and accessible services to our citizens.

Where does our energy come from?

Paraffin, gas, petrol and diesel are all made from refined oil. The process of generating our energy starts with the shipping of crude oil from the Middle East, some 10 000 km away. It is pumped ashore at Saldanha Bay, 120 km north of Cape Town, and then on to the Caltex refinery in Milnerton, 15 km from the city centre. From the refinery, the various liquid fuels are distributed to bulk depots and smaller distributors.

Much of the energy we use is supplied to us by private companies and retailers, although National Government regulates the prices of most of these fuels, including petrol, diesel, paraffin and LPG.

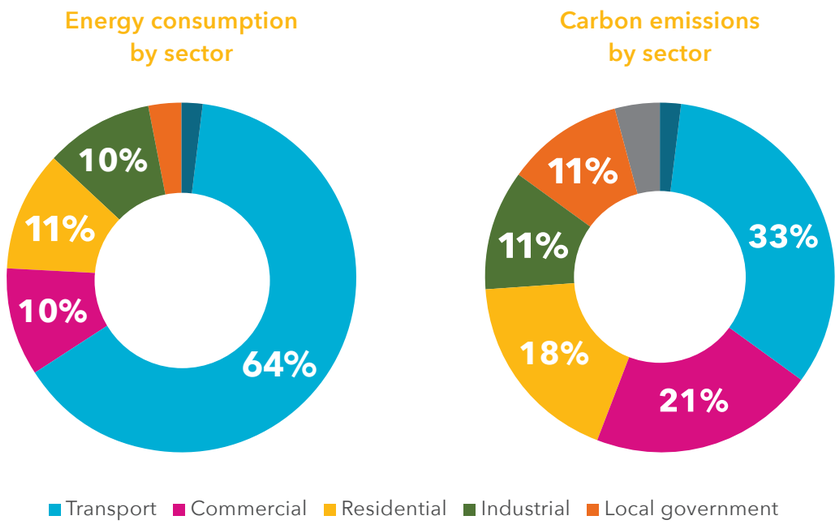
Eskom provides Cape Town with electrical energy through the national grid, most of which is generated near the coal fields of Mpumalanga. Significant energy losses occur in the transmission process between the power station and the end user. Of the electricity consumed in Cape Town, 20% is distributed by Eskom and 80% by the City A small but growing portion of the City of Cape Town's electricity is produced by embedded generators and Independent Power Producers (IPPs).

Where is our energy used?

As the following figure shows, transport is the biggest energy consumer in Cape Town (accounting for 56% of all energy consumption), followed by the residential sector (10,8%) and the commercial sector (10,3%)

However, as seen below, the commercial and residential sectors account for most carbon emissions (39%) due to electricity consumption in buildings. This is because our electricity is predominantly coal-derived and carbon-heavy, while transport fuels are less so.

Cape Town's energy consumption by sector (left) and carbon emissions by sector (right).



Source: *Cape Town State of Energy and Carbon 2022 dataset*

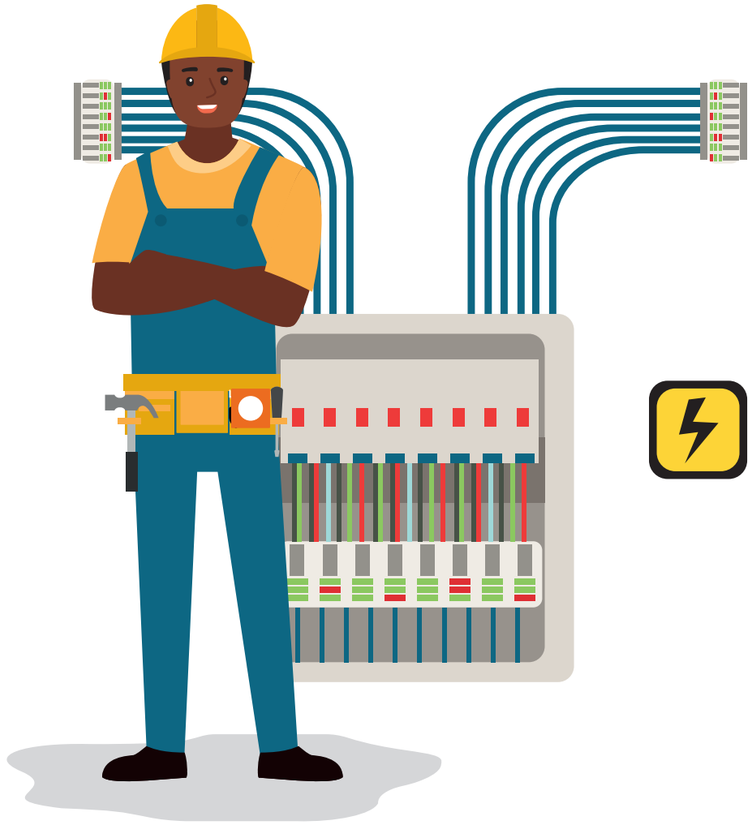
From power line to home

The City is supplied by the national grid, and distribution to residents and businesses occurs either via Eskom or the City itself, depending on location. There are two electricity payment systems:

- With the older credit-meter system, end users receive a continuous electricity supply and are billed monthly based on the amount they have used or are estimated to have used. These meters are being phased out for City-supplied customers.
- Prepaid-meter systems require end users to buy electricity upfront, similar to pay-as-you-go cellphones.

The new smart meters (also called AMIs) will enable even more effective monitoring and efficient electricity use.

It is illegal to change the wiring or tamper with your electricity meter box. This may cause your electricity supply to be cut, requiring you to pay a reconnection fee to have it reinstated.



Residential electricity tariffs

Cape Town households get their electricity either from the City or directly from Eskom, as indicated on the map on the following page. Your electricity service provider is specified on your rates account or prepaid receipt.

Tariffs for City and Eskom supply areas[10]

Households in City-supplied and Eskom-supplied areas pay different tariffs for their electricity.

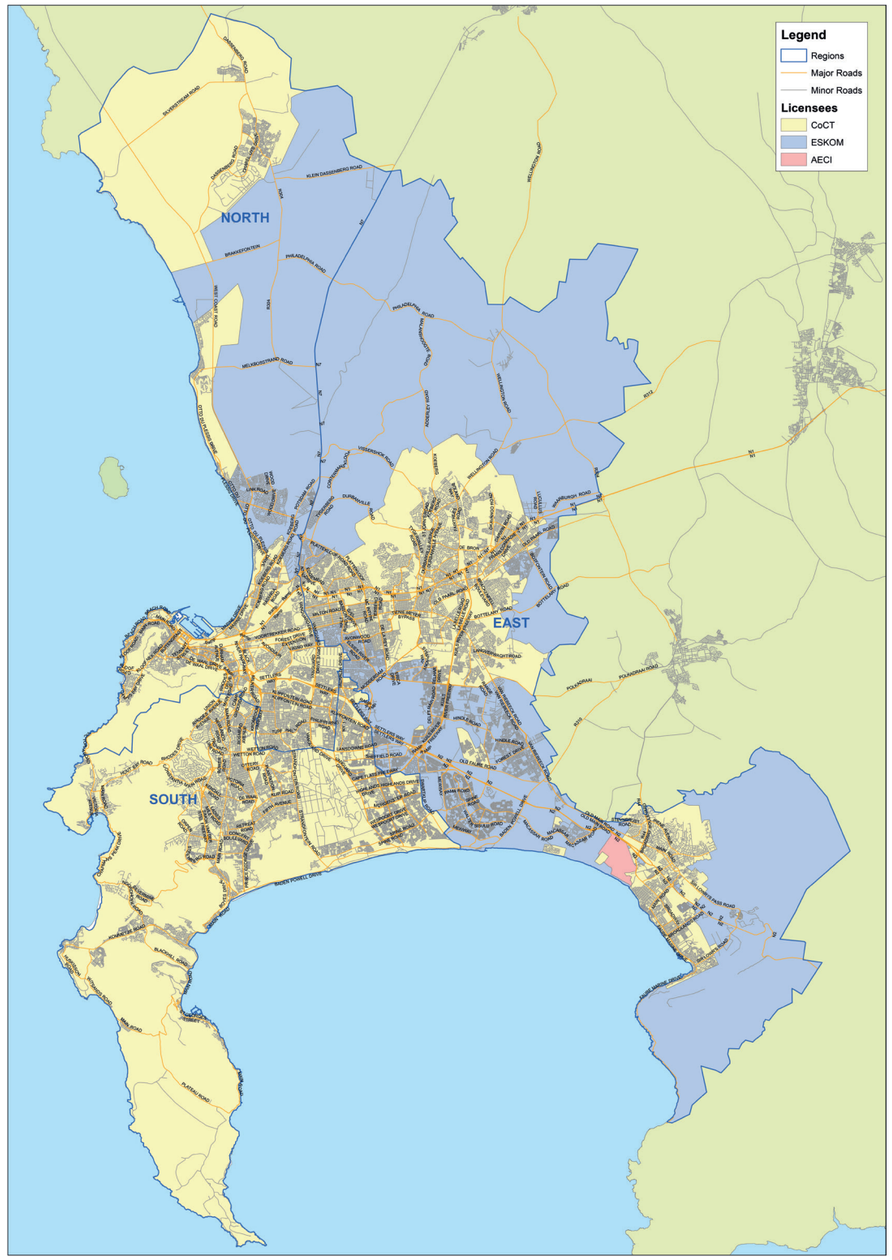
Understanding which tariff you are on and checking that you are on the most suitable tariff will help you manage your electricity costs. Eskom tariffs increase annually in March, while the City's tariffs increase every July. Your tariff depends on your average consumption over the previous 12 months at the time of assessment, as well as your municipal property valuation and the type of meter.

While some tariffs include a daily service charge, others are slightly higher, yet do not have an additional service charge.

For an overview of tariffs based on different household property values and service providers, visit the City's webpage at https://www.capetown.gov.za/CostOfElectricity.

10 For more on residential tariffs in City and Eskom supply areas, turn to **"Contacts and resources"** at the end of this chapter.

Electricity licensees and City of Cape Town electricity regions



Who can get free basic electricity?

Free basic electricity (FBE) is targeted at low-income households and is therefore made available to you if you are on the LifeLine (City) or Homelight 20A (Eskom) tariff and meet certain criteria, including being a small power user.
FBE is not intended as a reward for saving electricity, but as a subsidy for low-income households.

You can read more about the cost of electricity and find out exact tariffs on the City's webpage: https://www.capetown.gov.za/CostOfElectricity.

Why do we pay a service charge?

Certain City and Eskom tariffs include a monthly service charge. This is to cover the costs of keeping you connected to the network, irrespective of how much electricity you use. More specifically, the service charge goes towards maintaining your service connection, paying back the capital invested, covering salaries and wages, as well as any other costs not directly related to the amount of electricity used. The charge appears on your consolidated municipal account.

MYTH	TRUTH
The amount you pay per kWh varies depending on your suburb.	**Your profile determines what you pay** The City and Eskom have a range of tariffs for residential customers. Your profile (i.e. your age/pensioner status, income, property value and usage) – and not your suburb – determines which one of these tariffs is applied to your meter.
If you want to get the full FBE allowance, buy on the first of the month, as the number of units you get drops as you go deeper into the month.	**FBE is not linked to when you buy** FBE only applies to customers on the City LifeLine and Eskom HomeLight tariffs. Free units are granted on your first purchase of every calendar month, irrespective of when that is. If you use less than 250 units per month on average over a 12-month period, you will get 60 units FBE on the LifeLine tariff, and 50 units on the HomeLight tariff. If you use between 250 and 450 units per month on average over a 12-month period, you will get 25 units on the LifeLine tariff.

MYTH	TRUTH
The rate per unit increases as the month goes on, so buy on the first of the month.	**It is not cheaper to buy on the first of the month** The City and Eskom have inclining block tariffs (see box on opposite page). You only pay more per unit if you cross the threshold in the course of a month. The trick is to ensure that you are on the correct tariff for the level of power you consume.
Units are cheaper in bulk, so buy as many as you can in one go.	**Buying in bulk is not cheaper, so only buy what you need** You should only buy what you need for each month. If you buy in bulk, this could bump you into the second block, which is more expensive. So, buying in bulk can end up costing you significantly more money.
Make multiple small power purchases during the month so that you stay within the cheapest block rate with each purchase.	**Making multiple small purchases does not save you money** Your purchases are averaged over the month, so whether you buy in small amounts or purchase what you need in one go, it makes no difference (as long as you stay below the Block 1 threshold). While it is fine to buy small amounts, it is not essential.
You pay more per unit of electricity used in the winter months or during the evening peak hours.	**The price is the same, no matter the time of day or the season** Residential tariffs do not vary according to the time of the day or year.

What is a block (or step) tariff?

The City and Eskom's residential tariffs are divided into block or step tariffs, and each block has a specific rate that increases along with consumption. The block thresholds differ depending on which tariff you are on, but once you use above a certain number of units in a month, you will move to block 2 in that tariff.

The step from block 1 to block 2 of the tariff is applied taking all the purchases for that month into account, not individual purchases.

The blocks are applied per calendar month: This means that if, for example, you buy 500 units on the first of every month on the Home User or Domestic tariffs, these will all be at the lower block 1 rate.

Tariffs for small-scale embedded generation (SSEG)

If you apply for an SSEG system which does *not* feed in excess electricity to the City's network, you will remain on your current electricity tariff.

Customers who apply to feed in excess electricity to the grid will move to or remain on the Home User tariff. They will be charged a month AMI administration fee, and be credited for the electricity they feed in at the SSEG Feed-in tariff rate. If you have a feed-in system and your municipal account is regularly fully offset by the SSEG Feed-in tariff, you can apply to join the City's Cash for Power programme.

For more info on feed-in SSEG systems, visit www.capetown.gov.za/CashForPower.

All SSEG systems installed in the City's electricity supply area must be authorised by the City. See the section *Solar photovoltaics at your home* for more information.

Buying electricity

If you have a City prepaid-meter system, you can buy electricity via your cellphone, online and at various supermarkets, pharmacies, service stations, major banks and ATMs across town. You will require your meter number, which is on your electricity card, on a previous purchase receipt or on the meter itself. The same procedure applies to Eskom customers, although electricity must be purchased from Eskom sale outlets, such as shops, spazas and taxi ranks in Eskom-supplied areas.

Households using the credit-meter system receive a monthly utility bill via e-mail or post for the previous month's consumption. Municipal accounts can be paid by debit order, online, electronic funds transfer, at the post office, or at selected retail outlets. The best way to purchase electricity is once a month, only as much as you need, and only when you need it. Here are some common myths regarding buying electricity that, if you believe them, may end up costing you more:

Load-shedding

Periodic power shortages have meant that South Africans experience an interruption in electricity supply from time to time to avoid excessive load on the electricity network. This practice has become known as "load-shedding". When load-shedding is announced, switch off and unplug all electronics and appliances. When power is restored, supply may come back with a spike in voltage (i.e. a power surge), which can damage computers, TVs, etc.

Here are some useful tips to be prepared for load-shedding:

- ✓ Check the load-shedding schedule to plan your electricity usage.[13] Download the City of Cape Town's app to get the latest information.
- ✓ Charge essential appliances before load-shedding and if possible, make sure cellphones and laptops have sufficient battery life.
- ✓ Buy a solar cellphone charger (about R300), a car phone charger, or a cellphone power bank.

13 Load-shedding schedule and map: http://resource.capetown.gov.za/documentcentre/Documents/Procedures%2c%20guidelines%20and%20regulations/Load_Shedding_All_Areas_Schedule_and_Map.pdf

- Buy a small gas cooker if you don't already cook with gas. A small portable cooker can cost you R300 – R600. Make sure that the gas cooker meets safety standards. If you do not have a gas stove, prepare meals before the power is scheduled to be off. Boil a kettle of water and keep it in a thermos flask for hot drinks. You can also use an insulating cover on teapots, pots and pans to keep drinks and meals warm. Keep adequate supplies of essential foodstuffs.
- Buy rechargeable lights (about R200 – R300). They last for up to 10 hours when fully charged. Light bulbs with built-in batteries are now available. They fit into normal fittings and can last between 2 and 5 hours.
- Switch off your lights and sensitive equipment during load-shedding to prevent damage from a power surge when the power comes back on.
- Use a surge protector plug for your television, computer or laptop and fridge to protect your appliances when the power comes back on. Depending on the number of sockets, these cost R100 – R400.
- Make sure that your vehicle always has fuel in the tank, as most petrol stations cannot pump fuel during power outages.
- Keep some cash on you, as ATMs cannot operate without electricity.
- Keep refrigerator and freezer doors closed. A four-hour power outage should not cause food spoilage, and a freezer should keep frozen food safe for at least a day. It is also a good idea to have alternative snacks available that do not need refrigeration. Most medication requiring refrigeration can be kept in a closed fridge for several hours without spoiling, but check with your doctor or pharmacist if in doubt.
- Unplug inverters and batteries ahead of power coming back on as they automatically cause usage to spike when power is restored. This can cause prolonged outages due to system overload.

Air quality management

The City's Health Department (more specifically, the Specialised Environmental Health Services: Air Quality Management Division) works to protect the air we breathe through implementing the National Environmental Management: Air Quality Act and the City's own Air Quality Management By-law (2016). The by-law prescribes a permitting process to regulate emissions from fuel-burning equipment, such as industrial boilers and other combustion installations, as well as controlled burns of vegetation. Diesel vehicle emissions, dust emissions from wind and other activities, air pollution and the illegal burning of waste are also regulated.

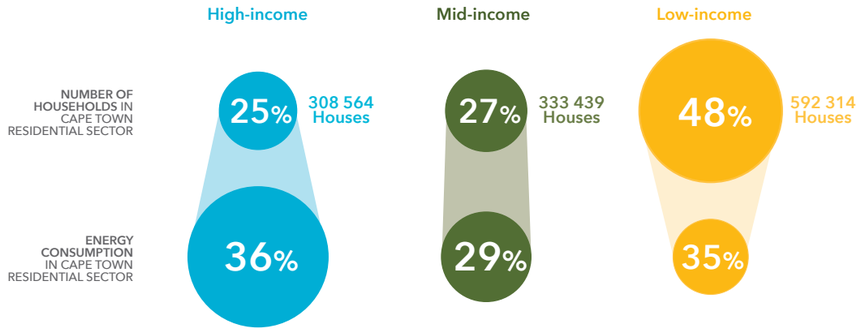
Here are a few things you can do to help reduce air pollution:

- Avoid the use of wood fires, paraffin stoves, heaters and candles where possible, as this releases harmful emissions. Attention must also be placed on safe use and storage to mitigate fire hazards.
- Limit the use of private motor vehicles where possible, in favour of public transport, bicycles, walking and carpool arrangements.
- Compost your organic waste to reduce your contribution to greenhouse gas (methane) emissions. (See the section on biodiversity under "Environment" for handy composting tips.)
- Limit airborne sand and dust particles by planting ground covers, bushes and trees over sandy patches.
- Use environmentally friendly and low-odour paints and thinners, which emit less volatile organic compounds (VOCs).
- Prevent the formation of mould, which releases spores into the air, by keeping your kitchen and bathroom well ventilated. Mould and spores are known triggers for asthma.
- When using gas, keep your windows open to circulate fresh air through your home.
- Do not burn refuse, unwanted furniture or any other materials, as this emits toxic fumes.
- We all love a good braai. Choose dry wood to keep smoke emissions to a minimum. During winter, use dry wood or anthracite in your fireplace to create less smoke.
- Clear your chimney when making a fire, and always ensure good ventilation of fresh air, as indoor fires contribute to poor indoor air quality.

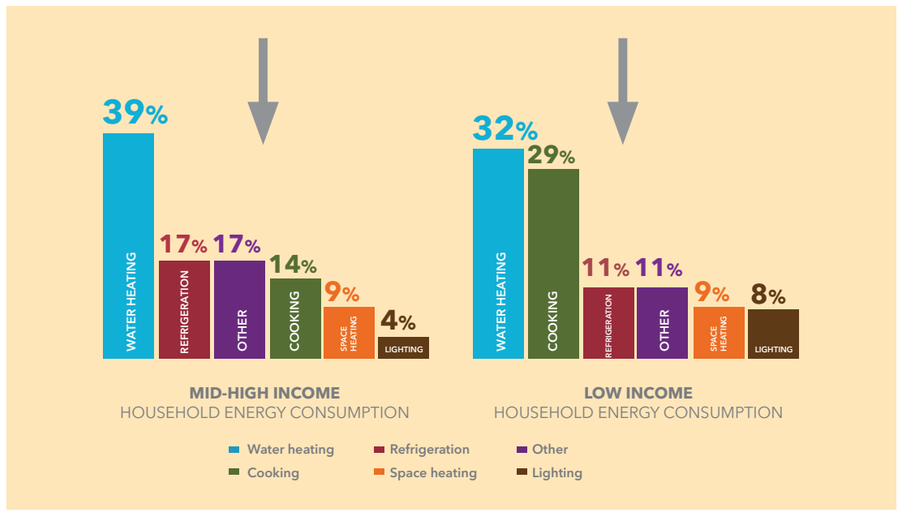
The City's Air Quality Management Unit can provide further advice on how to reduce and prevent air pollution. Get their contact details under "Contacts and resources" at the end of this chapter.

Energy in your home

Energy is a big expense for many of Cape Town's low-income households, taking up as much as 30% of household income. Therefore, 98% of low-income households who can be connected to formal electricity receive substantial tariff subsidies. Energy burdens that poor Capetonians continue to suffer include shack fires, poor household air quality, time spent collecting firewood, as well as paraffin poisoning. While high-income households make up only 25% of residential properties, they account for 36% of the sector's energy consumption. Low-income households, in turn, represent 48% of the residential sector, but account for only 35% of energy consumption (see graph[14] below). Therefore, while the focus for high-income homes is on energy efficiency and energy conservation, for low-income users it is on using sufficient safe, clean energy such as electricity, to move away from the burdens of poor quality energy options.



Source: *Statistics South Africa General Household Survey 2018*



The graph[15] opposite indicates the difference in energy consumption between mid/high and low-income households. In most households, most energy is spent on heating water, while cooking also accounts for a significant proportion of energy consumption in low-income households.

Knowing how much energy your household uses – and what for – will help you prioritise where you can be more energy-efficient. Reducing your electricity use will help you save money, reduce pollution, cut carbon emissions and support the City's sustainable energy and low-carbon development goals.

The amount of energy your home uses will depend on how many people live in the house, whether or not you have an electric geyser, the number and type of appliances you use, and whether you use other energy sources as well, such as gas or paraffin.

By making small changes in your household, you can reduce your electricity bill by 20-30% each month. If you want to save 50% or more, you can invest in energy-efficient appliances, and possibly onsite generation like solar PV.

Heating water

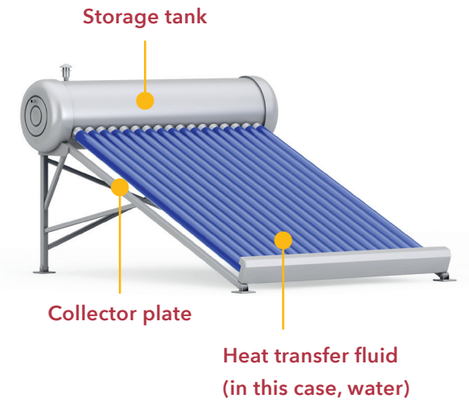
Water heating in the home usually accounts for the biggest portion of household energy use, and is the biggest contributor to your electricity bill. National building regulations require new buildings to heat 50% of their hot water by volume from non-grid sources. Switching to a more efficient water heating system will help you save money and reduce energy consumption.

Solar water heaters

Solar water heaters use the heat from the sun to warm up water in panels installed on your roof for all your household water needs. As such, it is based on two basic facts of physics, namely that dark-coloured objects absorb more heat, and that hot water rises. During winter or cold spells, electricity backup is normally used to ensure that the water is heated.

As illustrated below, a typical solar water heating system consists of three components, namely a solar collector, a heat transfer medium and a storage container:

- ✓ The solar collector absorbs the sun's energy and transfers it in the form of heat to the fluid inside the system.



14/15 Statistics South Africa General Household Survey 2018

The table below provides an overview of the various water heating methods to help you choose:

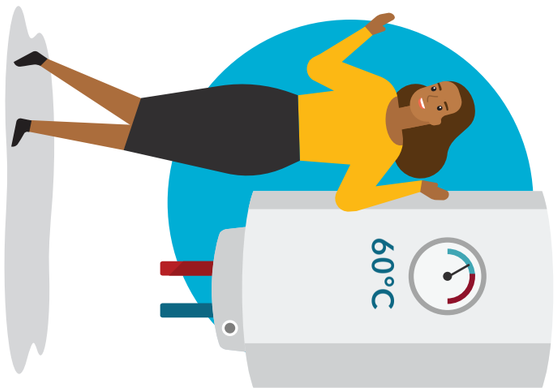
	Low-pressure solar water heater without electric backup	High-pressure solar water heater with electric backup	Water Heating with solar PV	Gas inline water heater	Electric geyser	Heat pump	Paraffin flame stove
Clean/ renewable	100% clean and renewable	Solar portion is renewable	100% clean and renewable	Efficient energy source, but not renewable	Clean energy for household, but there are emissions at the power station; non-renewable	Energy-efficient but not renewable	Dirty emissions for the household; non-renewable.
Affordable/ accessible	Can be inconvenient. No running costs, low upfront costs	Significant upfront investment; better if it can be paid off over several years	Significant upfront investment	Need access to gas supply to fill cylinders. Costs may not be competitive with solar alternatives, and subject to fluctuations of the gas distribution market	Expensive to run. If fitted with timers, they would have less impact on electricity peak demand	High-end customers. Has specialised installation requirememnts	Low-cost investment, but expensive to run.
Health and safety	Very safe	Safe	Safe	Safe, if handled with care	Safe	Safe	Can cause fires and burns, and paraffin can cause poisoning.

- The transfer fluid is the heat transfer medium. In indirect solar water heating systems, this is generally a mix of water and glycol, which passes the energy to the storage container via an isolating heat exchanger. In a direct system, however, the transfer medium is the potable water from the storage container.
- The hot-water storage container (or tank) is thermally insulated to retain heat.

Solar geysers are usually larger than electric geysers, and better insulated. This allows you to maximise your solar gains. Yet, solar water heaters are also more expensive than conventional geysers. If you do not have savings or access to bond finance, there are rental and other financing options available. If your conventional geyser bursts, that is an ideal opportunity to use the insurance pay-out to upgrade to solar or to a heat pump.

When choosing an installer, select a reputable company with a good track record and insist on a system approved by the SABS, with all components covered by warranties.

NOTE A solar water heater may not be suitable for your household for a number of reasons, such as too many trees shading the roof, dwelling in a sectional title unit or flat, having an unsuitable roof or being in a poor position to get direct sunlight. Heat pumps can be very effective at reducing electricity consumption and at heating water (in coastal Cape Town with cloudy winters, especially), so if a solar water heater is not suitable for your household then it is recommended you consider a heat pump.

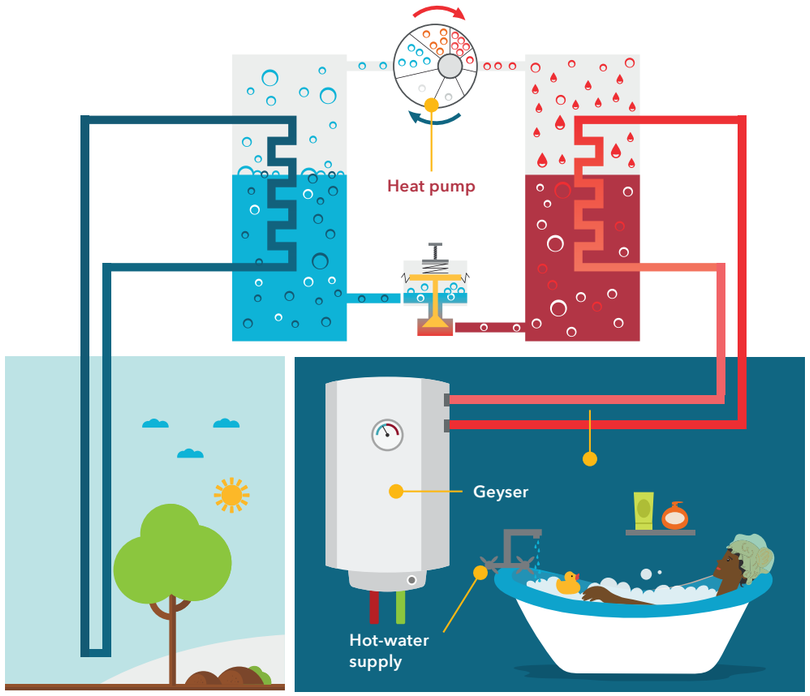


Heat pumps

Heat pumps use a small amount of electricity to power a pump, which acts as an air conditioner in reverse, moving heat from the air into the hot-water geyser (see illustration below).

Heat pumps are a good option for homes and flats that do not get a lot of direct sunshine or do not have enough space or the right construction to support a solar water heater. A heat pump works during the day and at night, and, unlike a solar water heater, does not need to switch to an electric element on cloudy days.

The City's Energy Directorate has more information available about solar water heaters and heat pumps. Turn to **"Contacts and resources"** at the end of the chapter for a web address.



Gas water heaters

Heating water with gas is very efficient and, depending on the price of gas, can be a cost-effective solution. All gas installations must meet regulations and have a certificate of conformity issued.

Water heating with solar PV

You can also use solar photovoltaic (PV) panels to generate electricity to power your geyser. This can be done in two ways:

1. A solar PV geyser system uses the solar PV panel to generate DC electricity, which is used to heat the water in a standard electric geyser. Some can switch between using electricity generated by the solar PV panels, and drawing from the grid when needed.
2. If you have an SSEG installation such as a solar PV system, which supplies your home, you can include your electric geyser to be supplied by the electricity generated by the PV panels. This requires sizing your system correctly and optimising operation by, for example, turning your geyser on during sunlight hours only.

In order for these to be safe and legal, both kinds of systems need to be authorised by the City before they are installed. Visit **www.capetown.gov.za/ApplyForSSEG** for more information.

Energy-efficiency tips for heating water

There are various ways to save electricity when heating water.

Have a look at the following no-cost, low-cost and invest-to-save suggestions:

No-cost tips

- ✓ **Turn your geyser down to 60 °C** to see a 5% reduction in your hot-water electricity bill. In some cases, 55 °C is a good option, although it is advisable not to go below 55 °C for health reasons.
- ✓ **Use less hot water.** Tackle excessive use with more efficient habits, such as not letting the hot water run unnecessarily, using cold instead of hot water to wash your hands, and using a basin plug when washing dishes. When using a bucket and element to heat water, be careful not to leave the element where children can reach it.
- ✓ **Take a short shower** instead of a bath. You will save up to 80% in water and use five times less electricity.
- ✓ **Switch off your geyser** when you go away for a few days or longer. The element heats up a few times daily if you leave it on. When you get back, give the geyser a couple of hours to heat up again.
- ✓ **Switch your geyser off** during peak hours. Less demand on the national electricity grid helps reduce the risk of load-shedding. In winter, peak demand is in the morning from 06:00 to 08:00 and in the evening from 17:00 to 19:00. In summer, demand stays high all day between those peaks, mostly due to air conditioning.

Low-cost tips

- ✓ Simple ways to heat water are to put a **black bucket of water in the sun** or run water through black pipes in the sun.

- **Insulate your water pipes** and wrap your geyser in a geyser blanket. This prevents heat loss, which reduces the cost of electricity needed to keep water warm.
- **Fix leaking hot-water taps.** A dripping tap can waste up to 18 litres of water a day. If this is the hot-water tap, it could cost you hundreds of rands in electricity annually.
- **Install a geyser timer.** Set the timer to avoid peak hours on the national grid and help reduce the risk of load-shedding.
- **Switch to a low-flow, energy-efficient and water-wise aerated showerhead.** These are designed to use up to 40% less water. To test your showerhead, hold a bucket under the shower spray for 12 seconds. If you collect more than two litres, it should be replaced. This is a requirement for all new installations under the new Water Amendment By-law[16] (2018).

Invest-to-save tips

- **Fit your geyser close to hot-water points.** This will optimise electricity efficiency.
- **Install a solar water heater or heat pump**. You can slash your monthly electricity bill by anything from 25% to as much as 50%.

Cooking and refrigeration

The following tables provide an overview of the various cooking methods and refrigeration options, respectively, in terms of impact on the environment, affordability, as well as health and safety:

	Electric hot plate and oven	Electric microwave	Gas ring and oven	Paraffin flame stove
Clean/ renewable	Clean energy for household, but there are emissions at the power station; non-renewable	Clean energy for household, but there are emissions at the power station; non-renewable	Efficient energy source for cooking, but not renewable; some emissions for household	Dirty emissions for the household; non-renewable
Affordable/ accessible	Most cost-effective for electrified households	Convenient, but newly electrified households may not be able to afford appliances. Most cost-effective on a pure energy-efficiency basis for solids heating, but not preferred for most cooking applications	Requires gas bottles, refilling and appliances to be accessible. Can be cost-competitive with electric alternatives, but will require large capital on high-quality equipment and well-developed gas distribution market. Typically only available in large quantities	Very cheap initial capital layout, but expensive to run. Small quantities of paraffin can be purchased
Health and safety	Safe	Safe	Safe, if handled with care	Major cause of fire and can cause poisoning

	Electric chest freezer	Electric fridge/ freezer	Paraffin fridge/ freezer	Gas fridge/ freezer
Clean/ renewable	Chlorofluorocarbon (CFC) gases in the cooling system of older fridges damage the ozone layer. In fact, the use of CFCs is now banned worldwide. Newer non-CFC refrigerants are harsh greenhouse gases that contribute to climate change (if they leak out).			
Affordable/ accessible	A chest freezer is very efficient, as the cold does not "drop out" when the door is opened	To conserve cold, it is much more efficient for the freezer and fridge sections to have separate doors		
			Significantly more expensive to run than electric options, but effective where there is no electricity	
Health and safety	Safe	Safe	Risky	Safe, if handled with care

16 http://resource.capetown.gov.za/documentcentre/Documents/Bylaws%20and%20policies/Water%20Amendment%20By-law%202018.pdf

Energy-efficiency tips for cooking and refrigeration

Here are some no-cost, low-cost and invest-to-save tips for cooking and refrigeration:

No-cost tips

- Use **specialised appliances** for their designated tasks, such as making toast in a toaster and small meals in the air fryer instead of the oven. This is the easiest way to save electricity in the kitchen.
- **Ensure the oven door is kept closed** until the food is done. Opening and closing the door causes the oven to dissipate heat, and reheating it guzzles up electricity.
- **Only use pots and pans that completely cover stove plates** and keep stove plates and reflectors clean to ensure that all the energy is being used to cook the food.
- **Use the microwave** for small to medium amounts of food, and the conventional oven for larger meals.
- When using a kettle, boil only **as much water as you need** and make sure the lid is closed to avoid over boiling.
- **Do not open the fridge door unnecessarily** or leave it open for too long. Cold air sinks, so it literally "falls out" of the fridge when you open the door. Put bottles of water in the fridge, as these hold on to the cold. Remember, an empty fridge has to work hard to keep things cold, but so does an overfull fridge.
- **Never put hot food in the fridge.**
- **Empty your fridge** and switch it off when you go away for an extended period.
- **Defrost your freezer regularly.** This will ensure that it runs more efficiently.
- Run the dishwasher **only when it is full** and make use of eco cycles.
- **Make sure that the dishwasher is linked to the cold-water supply**, as the dishwasher itself heats the water. In fact, a dishwasher requires hot water for only one wash and one rinse cycle. If the appliance is linked to a hot-water tap, it will draw power for the full duration of the wash.
- **Defrost food overnight** in the fridge rather than using the microwave or hot water.
- **Preheat the oven for the shortest amount of time necessary** and limit how long the oven door is opened for. Baking multiple dishes at the same time saves energy.
- Use a microwave for **quick heating tasks.**

Low-cost tips

- **Check and replace the seals on your fridge** to keep in the cold air.
- **Use a pressure cooker or insulation** cooker when preparing foods that take a long time to cook. It will speed up the cooking process and save electricity. Alternatively, you can simply wrap the pot in a blanket. This keeps in the heat, and the food will continue to cook. Download the Smart Cooking Guide for smart cooking.

Invest-to-save tips

- **Choose induction cookers for stove-top cooking.** They not only heat quickly, but also

  save on electricity costs and reduce the risk of burns. For high-temperature cooking, an induction stove uses up to 30% less energy than an ordinary hob.
- Since magnetic fields heat your pots, you need **iron or steel cookware to maximise efficiency**. Take a magnet along when shopping for pots and pans.
- **Stove-top cooking with gas** does offer certain advantages over electricity. Gas supplies instant heat and is load-shedding-proof. It also removes a significant load from peak electricity demand, which can help ensure a more secure electricity supply.
- When purchasing a new fridge, aim for one with a **good energy rating (A++ or A+++).**
- When buying a dishwasher, **choose a model that uses less water**. A water-efficient dishwasher uses up to 50% less water than a conventional one, which means 50% less water to heat.

Lighting

The following table offers an overview of the various lighting options for your home:

	LED LAMP	CFL LAMP	Incandescent bulb	Paraffin lamp	Candles
Clean/ renewable	Electric lighting is clean for the household, but there are emissions at the power station; most grid electricity is non-renewable			Dirty emissions for the household; non-renewable	Emissions for the household
Affordable/ accessible	Most efficient and cheapest over lifespan	Cheap and efficient	Cheap to buy, but does not last. Consumes energy in wasted heat	Cheap appliance, but expensive to run.	Expensive, but accessible
Health and safety	Safe	Safe, but disposal is a problem, as CFLs contain mercury	Safe	Paraffin can cause poisoning and respiratory illnesses; fire risk	Major cause of fire

Paraffin lamps and candles are expensive and provide a low level of lighting. Electric lighting is the best option, especially if LEDs (light-emitting diodes) are used. LED lights can also easily be charged by solar power with a small photovoltaic panel and are very efficient and long-lasting. Moreover, LEDs are no longer expensive, but have turned into common lighting technology with a lifespan of 20 000–50 000 hours, and need very little energy. They come in various colours for mood lighting effects and are found in most supermarkets and hardware stores. Conventional incandescent bulbs are cheap to buy, but very inefficient and power-hungry, making them expensive in the long run. Paraffin lamps are cheap to buy, but costly to use, and do not provide a good quality of light for reading or studying. Compact fluorescent lamps (CFLs) are efficient and are being promoted over incandescent bulbs. Containing mercury, however, they do present a significant waste hazard. When CFLs fail, replace them with LEDs. Old CFLs must be disposed of safely. Some of the major supermarket chains provide disposal bins for CFLs and batteries, as neither can be thrown into your normal rubbish bin.

If you don't have electricity

Solar lights/kits

Many excellent, inexpensive new solar lighting options have come onto the market, and many of them even include cellphone charging capacity. Some kits have three or four lights with long leads; others offer single lights.

Candles

Candles are the top cause of house fires in Cape Town. If you must use a candle, place it in a glass jar with sand at the bottom. The glass jar helps protect the flame and refracts the light, and if the candle is knocked over, the sand can kill the flame. Any open flame can be dangerous and should be carefully managed.

Energy-efficiency tips for lighting

There are no-cost, low-cost and invest-to-save options to save electricity when it comes to lighting:

No-cost tips

- ✓ **Turn off the lights** if you leave a room for more than five minutes.
- ✓ **Maximise sunlight.** Open the curtains in the morning instead of turning on the lights. This will save energy. Moreover, numerous studies have shown that natural light can reduce stress and improve health and productivity.
- ✓ Dust build up can significantly reduce light output, so **regularly clean windows and light fixtures** to maximise your light availability.

Low-cost tips

- ✓ **Replace incandescent light bulbs with LEDs.** LEDs save 80–90% on the amount of electricity used for lighting, and pay for themselves in less than a year. A good quality LED bulb should last up to 50 000 hours.
- ✓ **Choose light colours for interior paints.** Covering walls with dark colours could double the wattage and, therefore, the energy you need to light the room. Some paints also significantly boost reflectivity.
- ✓ **Use solar-powered lights.** They rely entirely on energy from the sun and contain a small chargeable battery, so they can be used at night.

Invest-to-save tips

- ✓ **Use motion-sensor lights in areas like outside, passages and garages to only activate when movement is detected.** Studies suggest that having regular outdoor lights may in fact light the way for criminals, particularly if high walls shield the property. Infrared motion-detector light fittings that switch on when something moves and stay on for a pre-set time are more likely to surprise unwanted visitors, and also use less electricity.
- ✓ **Let the sky light dark rooms.** If you need lights on during the day, your home may benefit from light tubes or skylights. In summer, skylight blinds can help avoid overheating.

Thermal Comfort

Homes in South Africa are generally poorly insulated and "leaky", which means they get hot in summer and stay cold in winter. Before buying heaters, make sure that your home is well insulated.

For instance, put thermal insulation in your ceiling and make sure that your doors and windows fit snugly.

An electric bar heater can be effective if it is close to you, but it is not very effective for room heating. An electric oil-filled heater is effective for space heating, but expensive to buy. Paraffin is more expensive for home heating and it comes with safety and health concerns. Gas heaters are effective, and quickly warm up a room. However, the room must be well ventilated. In terms of cost, gas heaters are more expensive than electric heaters. A wood stove can be very cost-effective if it is efficient.

For a comparison of the various heating options, have a look at the following table:

	Electric bar or fan heater	Electric oil-filled heater	Paraffin heater	Gas heater
Clean/renewable	Electric heating is clean for the household, but there are emissions at the power station; most grid electricity is non-renewable		Dirty emissions for the household; non-renewable	Efficient energy source for heating, but non-renewable; some emissions for the household
Affordable/ accessible	Effective for direct heating; good to use if you are sitting in one place for a while	More effective for heating a room than a bar heater	Can be used for heating and cooking at the same time	Effective for heating the whole room
Health and safety	Safe	Safe	Can cause fire and poisoning if ingested by mistake. Can also cause respiratory problems	Relatively safe

Energy-efficiency tips for temperature control

There are various ways to stay warm (and cool down) without needing to install heating (or cooling) systems in your home:

No-cost tips

- ✓ **Check how you are dressed before switching on the heater.** Dress to be warm! Wool, fleece, down and insulating synthetics trap heat. Use layers for added warmth and control. We lose a lot of heat through our heads, so wear a beanie or other head covering. Scarves also make a big difference.
- ✓ **Choose a hot-water bottle over an electric blanket.** A hot-water bottle filled by a 2 000 W kettle running for five minutes uses 0,16 kWh and gives you at least two hours of warmth. On the other hand, a 200 W electric blanket running for two hours uses more than double the electricity (0,4 kWh).
- ✓ **Make your electric blanket more energy-efficient.** Turn it to the highest setting for a few minutes before getting into bed, and then turn it off for the night.
- ✓ **Use windows wisely.** Although any north-facing house is already built for passive solar heating, you need to give it a hand. As soon as the winter sun is shining, open all curtains to let the warm sunshine in, but leave windows and doors tightly shut until temperatures peak in the afternoon. That is the time for fresh air. Seal up again before it gets cool in the evening with thick curtains or blinds on windows so that you do not lose heat. In summer, close the curtains of all west-facing windows against the hot afternoon sun.
- ✓ **If you have no choice but to use an air conditioner, do so wisely.** Set it to maintain the temperature within the "golden zone", between 18 °C and 22 °C, but keep an eye on the outside ambient temperature and try to minimise the difference between outdoors and indoors. Consider notching up the air conditioner a few degrees on a particularly hot day. Not only will it feel cool, but it will use less electricity and prolong the life of your unit.

Low-cost tips

- ✓ **Place heating right where you need it.** An electric blanket, hot-water bottle or fan heater all direct the heat to warm you up quickly. If you must warm a room, invest in a gas heater, or a heater with a short warm-up time and built-in thermostat.

Only heat rooms that you and your family will be spending time in. Avoid using underfloor heating. Yet, under-carpet heating only where you are sitting can be very effective.

- ✓ **Eliminate draughts blowing in under doors and around windows.** Trace door and window edges with a burning stick of incense or the palm of your hand to find air leaks and block them with self-adhesive weather stripping. Attach a sweep to the bottom of a door or use a sausage bean bag to close the gap to the floor. Check the ceiling for gaps where heat escapes, such as the attic hatch. Better home insulation makes a big difference to thermal comfort in winter and reduces the need for heating.

Invest-to-save tips

- ✓ **Insulate your ceiling.** Insulation in your ceiling slows the transfer of heat and makes your home up to 10 °C cooler in summer and 5 °C warmer in winter, saving up to 16% of the electricity you need annually to heat or cool your home. You can also purchase roof paints specially formulated to reflect the sun's heat. At the same time, make sure your ceiling space is well ventilated so that hot air can escape and you limit moisture build up.
- ✓ **Install roof awnings and overhangs.** These will shade windows from the hot sun in summer, while still allowing in the warm winter sun.
- ✓ **Update old fireplaces.** Open fireplaces send most of their heat up the chimney. Modern, closed-combustion fireplaces and wood stoves retain the charm, while vastly improving efficiency by controlling air flow. Wood pellets from scrap, or firewood from suburban tree fellers, are also sustainable fuels.
- ✓ **Before purchasing an air conditioner, first try a ceiling fan.** They are less expensive and use as little as a tenth of the electricity to run, while lowering the room temperature by a few degrees. Fans do not cool the air, but only the skin of the person in their breeze, so turn them off when exiting the room. In winter, use them in brief spurts or in reverse at low speed in heated rooms to push warm air down from the ceiling.

Household appliances

Energy-efficiency tips for household appliances

No-cost tips

- ✓ **Switch off all unused appliances at the wall.** Appliances in stand-by mode, such as TVs, music systems and computers, can still consume as much as 50% of the electricity they would normally use. It is not necessary to unplug an appliance if the socket is switched off.
- ✓ **Only use your washing machine once you have accumulated a full load of laundry.** Automatic washing machines use the same amount of electricity for a full load as they do for a single item.
- ✓ **Use cold water or a lower heat setting as often as possible.** Wash bed linen at 60 °C (instead of 90 °C) to cut back on the amount of electricity you use. Use cold water to wash clothing, unless it is very dirty.
- ✓ **Skip the pre-wash cycle** for clothes that are not very dirty.
- ✓ **Never overload your automatic washing machine.** Overloading will reduce the cleaning action. Varying the sizes of garments in a full load will improve the cleaning action by allowing free circulation. Take advantage of special features on your washer that can save money. For example, soak cycles remove stubborn stains in one wash.
- ✓ **Hang your clothes outside to dry.** Avoid using a tumble dryer. Do your laundry on a sunny day or use an indoor drying rack to dry your clothes.
- ✓ **Only iron items that really need ironing.** Certain clothing will appear ironed with careful hanging and folding.

Low-cost tips

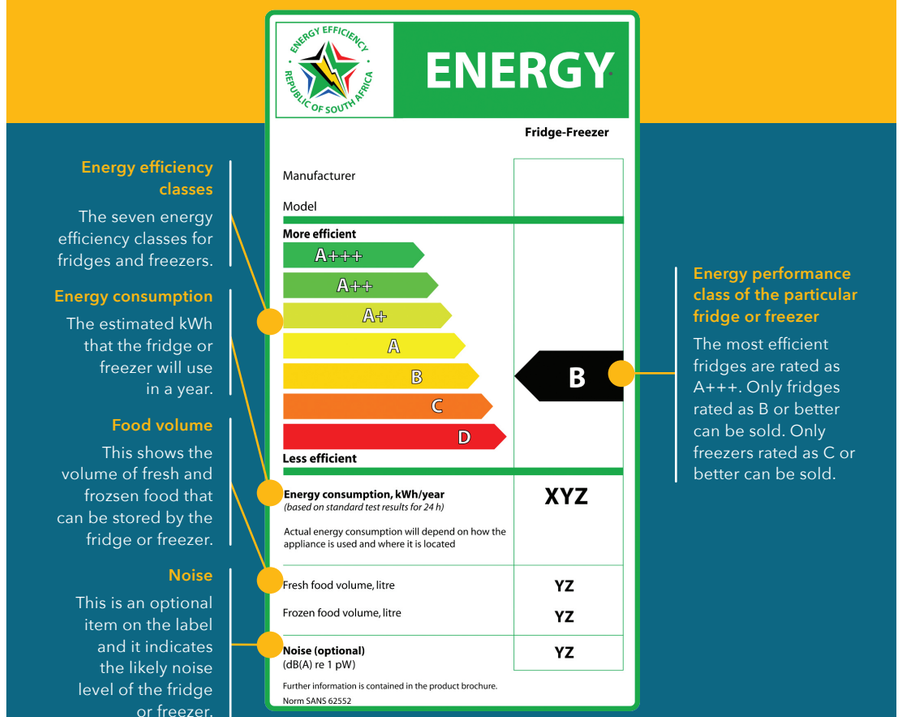
- ✓ **Invest in a front-loading washing machine instead of a top-loader.** Front-loaders use less water and energy, and therefore cost less to operate. Also ensure that the machine you buy offers a variety of water temperature settings, including cold.
- ✓ **If you are buying a new tumble dryer, choose one with electronic humidity control.** This shuts the machine off automatically when clothes are dry instead of relying on a timer.

Invest-to-save tips

- ✓ **Invest in new, energy-efficient appliances.** Buying an energy-efficient appliance can pay back in cost savings very soon. Look for labels such as the Energy Star rating, and always buy an energy-smart model.

A Guide for Energy Efficiency Labelling

Invest in new energy efficient appliances. As electricity tariffs rise, buying an energy- efficient appliance will pay back in cost savings quicker than before. Look for the South African Energy Efficiency label and always buy an 'energy smart' model. It's important to note that newer plasma screen TVs tend to use more electricity than older models and LED TVs.



Source: Department of Mineral Resources & Energy

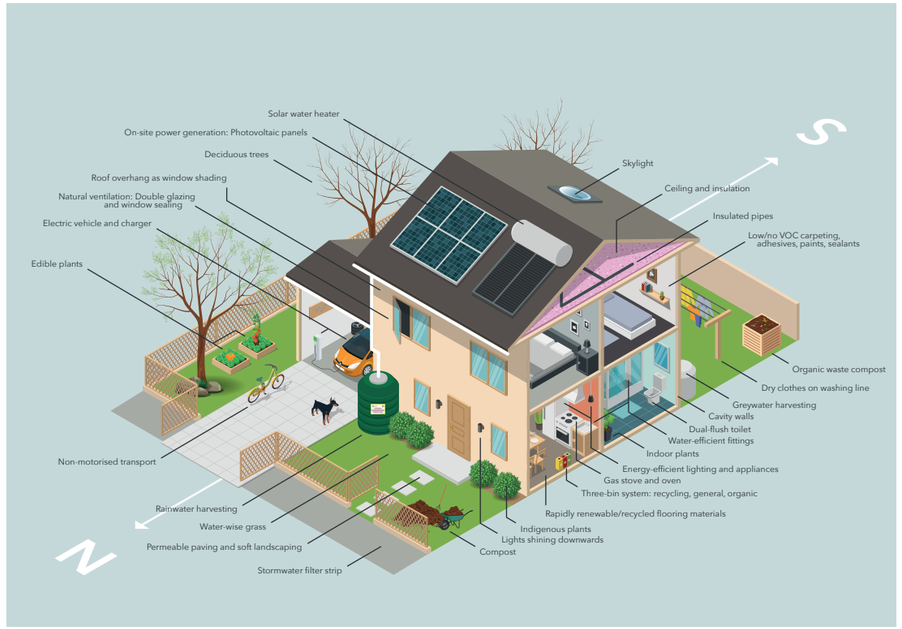
Designing an energy-efficient house

In new buildings, you can cut your total household energy needs by up to 70% through simple design principles that save on your lighting, heating and cooling needs. This is known as "passive solar design". Some key principles to consider when building your home are listed below and depicted in the illustration that follows:[17]

- ✓ Orientate windows to the north or northeast to get the best light and sunshine. However, ensure that your entrance still engages with the street front.
- ✓ As the northern side of your house receives the most sun, the roof overhang on this side should be longer (at least 40–60 cm long). This will shade windows in summer when the sun is high, while allowing the sun's rays through the windows in winter, when the sun is at a low angle.
- ✓ Window shutters, awnings or screens provide shade for rooms and keep the heat out during summer.
- ✓ A skylight in the roof allows natural light into the house on sunny days and reduces the need for artificial lighting. Skylights are easy to install and very efficient.
- ✓ Insulation plays a very important role in indoor temperature control and should be prioritised. It helps keep the house cooler in summer and warmer in winter.
- ✓ Natural materials (stone, timber, thatch and clay), which are all available locally, are best to keep your home cool in summer and warm in winter. Mud bricks are an excellent source of insulation. Avoid cement bricks wherever possible.
- ✓ Brick or concrete floors maintain comfortable temperatures in your home, as they are good at absorbing heat during the day and releasing it slowly at night.
- ✓ Heat loss occurs ten times faster through glass windows than through insulated walls. Therefore, open the curtains during the day to let in the natural light and close them at night to keep in the heat.
- ✓ Grow a deciduous creeper or tree over a veranda or yard. During summer, these leafy plants shade your house and keep the heat out. When they lose their leaves during autumn, the bare trees allow the sun through to warm the house.
- ✓ A tin roof loses a lot of heat during winter and gets very hot in summer. Insulate the roof and paint it white to reflect light, which automatically makes it cooler. Alternatively, use aluminium or other roofing materials.

17 *Resource Efficiency for Development*, 2019.

First steps to greening your home:



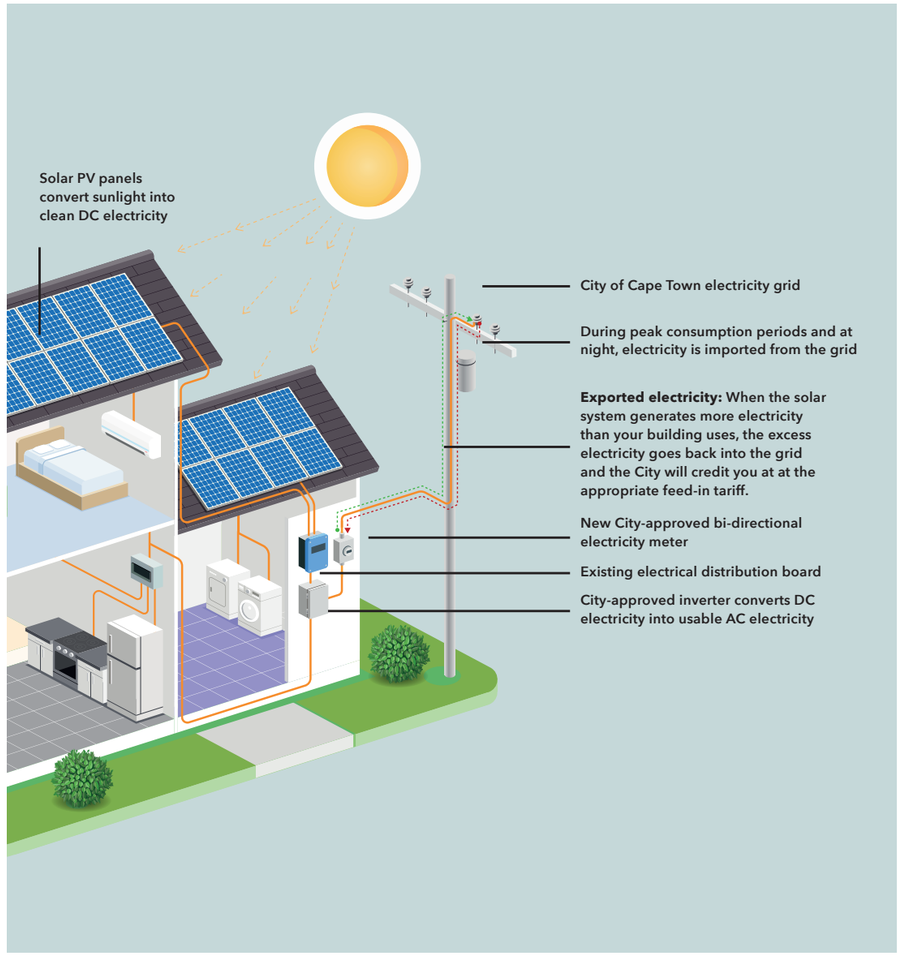
Solar photo-voltaics at your home

The average home in South Africa receives more than 600 kWh of sunshine per day – much more than it can ever use. Solar PV cells convert sunlight directly into electricity, which can be used directly in conjunction with the traditional grid (grid-tied) or with excess generation stored via a battery system. Investing in solar PV reduces your need to purchase electricity and is renewable and low-carbon.

All solar PV systems installed in the City's electricity supply area must be authorised by and registered with the City. This helps the City plan for electricity demand and ensures that it is safe for staff to work on the grid.

When choosing a solar PV system for your home, you have two options:

- ✓ **A grid-tied feed-in system** (or "with-export option") generates electricity for use on the property. Any excess electricity generated from the system is fed back into the electricity grid, for which you may receive credit from the City through the SSEG tariff. This system is illustrated below:
- ✓ **A grid-tied non-feed-in system** (or "without-export option" with reverse power-flow blocking) generates electricity for use on the property only when there is a demand for it. Any excess electricity generated from the system is blocked from feeding back into the grid.



The City's Energy Directorate has issued guidelines on how to safely and legally install rooftop PV systems in Cape Town. Go to **"Contacts and resources"** at the end of the chapter for the link where you can download the brochure. This will help you choose a PV system and design, as well as a good service provider. The guidelines also include a useful checklist for before, during and after installation.

Each of the above systems can also include batteries, which can switch the load from the incoming supply to use the energy stored in the batteries. These systems can operate in load-shedding scenarios.

The City no longer accepts applications for standby and off-grid systems due to the risks they pose. All new applications for solar PV and/or battery systems are being treated as grid-tied and must use City-approved inverters, have professional sign-off, and be authorised before switching on. Stand-by or off-grid systems that have already been authorised will remain valid.

The City's Energy Directorate has issued guidelines on how to safely and legally install rooftop PV systems in Cape Town. Go to **"Contacts and resources"** at the end of the chapter for the link where you can download the brochure. This will help you choose a PV system and design, as well as a good service provider. The guidelines also include a useful checklist for before, during and after installation.

Registration of PV systems with the City

By law, you must apply for authorisation of your SSEG and/or battery system with the City before installing it. This is to ensure your and your family's safety, as well as that of City staff and anyone who comes into contact with the PV or grid system. Registration also makes sure that all grid users pay for their usage. Running your meter backwards or avoiding paying your share of the grid upkeep is illegal and puts greater strain on your fellow Capetonians.

An unauthorised PV system can:

- ✓ **increase the risk of fire** and other hazards, particularly when poorly installed;
- ✓ **result in injury or death**, especially if it continues feeding into the grid during a power outage, which will put the property owner at risk of legal action under occupational health and safety laws; and
- ✓ **cause quality and sustainability problems** with the grid, as actual generation capacity and schedules are unknown to the City.

Go to **www.capetown.gov.za/solarPV** to find out how to register your system.

Find out how to apply for SSEG authorisation in the link under **"Contacts and resources"**.

Exercise: Doing an energy audit of your home

This exercise will help you understand exactly where you use electricity in your home, and where you can save.

Step 1: Collect the data

In column 1 of the table on the following page, list the appliances you have in your home.

In column 2, note the electricity power (W) of each appliance. Appliance power is usually measured in watts and written on the appliance itself. (Note, however, that this can indicate maximum power use, which could be higher than average power use.) The table 'Average electricity consumption of typical home appliances' on page 218 provides estimates for common appliances, which may be helpful.

If you have more than one of any appliance, such as lightbulbs, write down in column 3 how many of each appliance you have.

In column 4, record how long (for how many hours) each appliance is used per day. Consider differences in weekday and weekend use, as well as summer and winter use, and calculate an average.

Note that some appliances, such as fridges and hot-water cylinders, regulate themselves by constantly switching on and off. Consult the table on page 185 to estimate your consumption.

Step 2: Do the calculations

To determine your daily electricity consumption, use this simple formula:

(Watts x hours used per day x number)/ 1 000 = daily consumption in kilowatts

In essence, therefore, you are multiplying column 2 by column 3, and then by column 4 (if there is more than one item). This final figure is then divided by 1 000 to convert from watt-hours to kilowatt-hours, because 1 kilowatt (kW) = 1 000 watts (W). Fill in the total in column 6 to get an estimate of your daily use per item.

Add up your total kilowatt-hours for all appliances to calculate your total electricity consumption. To get your monthly consumption figure, multiply your total daily figure by 30,4 days.

Step 3: Identify priority action areas and potential for savings

Examine your results and identify which areas of the home use the most electricity. By doing this, you can take simple, effective cost-saving actions to reduce your electricity consumption. A simple way to check the accuracy of your audit is to compare it to your actual electricity units used. Remember, it might change depending on the season and number of people in your home. Yet it remains a good yardstick.

Exercise: Determining the cost of energy in your home

This exercise will look at the amount of money spent on energy, instead of total energy consumed. Understanding what uses most energy (and money) will help you identify where you can make savings.

Step 1: Collect the data

In column 1 of the table on the following page, list the fuels you use, such as electricity, paraffin, gas, wood or candles.

In column 2, note the different purposes for which you use each fuel, such as cooking, lighting, entertainment, heating, refrigeration or ironing. You could even include transport fuel and costs if you want to get the full picture.

In column 3, write down how much of each fuel you use in a week.

In column 4, write down the price of the fuel for each unit, such as a litre or kilogram of fuel.

Step 2: Do the calculations

To determine the cost of each fuel per week, multiply the amount you use (column 3) by the cost per unit (column 4). Write down the result in column 5. If you wish to obtain a rough monthly figure, multiply this by 4,2.

Step 3: Identify priority action areas and potential for savings

Think about where you spend the most money on energy every week and use the tips in this chapter to make better energy choices. Also look at "A safe home" on page 208 to see whether you can improve on energy safety in your home.

Column 1: What type of fuel do you use?	Column 2: What is this fuel used for?	Column 3: How much fuel do you use per week?	Column 4: What is the price of the fuel per unit?	Column 5: Cost per WEEK for fuel?
Electricity				
Paraffin				
Gas				
Wood				
			TOTAL COST	

Exercise: Calculating your household's carbon emissions

Different fuels have different carbon dioxide (CO_2) emissions levels. Electricity in South Africa emits substantial amounts of CO_2, as it is derived from the burning of low-grade coal. For a quick estimate of your energy consumption and related carbon emissions, follow these steps:[18]

Step 1: Using the audits you have completed, or a record of your electricity and fuel bills, fill in the amount of fuel you use each month in column 1.

Step 2: Multiply this by the value provided in column 2. For example, for electricity, this is 0,995. This will give you the kilograms of CO2 you emit per month. Write this in column 3.

Step 3: For your annual CO2 emissions, multiply column 3 by 12 months, and add for all fuels.

Step 4: If you want to calculate this per tonne, you will need to divide it by 1 000, as 1 tonne = 1 000 kg.

18 *You could also include transport fuel.*

Column 1: Fuel usage per month	Column 2: Emissions factor	Column 3: Carbon emissions – kg CO_2
Electricity: _____ kWh	x 0,995 kg CO2 per kWh	kg CO2/month
LPG: _____ kg	x 1,622 kg CO2 per kg	kg CO2/month
Paraffin: _____ litres	x 2,577 kg CO2 per litre	kg CO2/month
Total household energy-related emissions per month		kg CO2/month
Total household energy-related emissions per annum		kg CO2/annum

Compare your household's carbon emissions with typical annual CO_2 emissions from Cape Town homes, excluding transport.

Household type	kg CO_2/month
Average low-income non-electrified home in Cape Town	146
Average low-income electrified home in Cape Town	193
Average mid-income home in Cape Town	737

A safe home

Our homes run on energy. Every time we switch on an appliance, turn on a light or heater, cook our food or heat our water, we use energy. Of all the CO_2 released into the atmosphere by Cape Town households, 26% comes from the energy used to run our homes. This means that the actions we take to improve energy use in our homes can help reduce the negative impact of climate change, environmental degradation and resource overconsumption. Using energy more efficiently and conserving energy will save you money.

Wiring a plug

A plug that is wired incorrectly can lead to electric shocks and burns. To wire a plug correctly, put the wires into the correct sockets and turn the screws to secure them. Once screwed in, gently pull the three wires to make sure they are not loose.

Finding a gas leak

Regularly check for leaks in your gas cylinder, piping and connections. To do this, turn the gas off at the cylinder. Check all connections. Slowly turn the gas on and brush the connections with soapy water or liquid detergent. Bubbles will form where the gas is leaking. Take the cylinder to your gas dealer to be checked, replaced or fixed. If you ever smell gas in your home, quickly open the windows and doors.

Close the cylinder valve and leave the room. Have your cylinder checked, replaced or fixed as soon as possible.

Ventilation

When burning any energy source – gas, paraffin, coal or wood – always make sure the room remains well ventilated by keeping a window or door open. Smoke/fumes from burning fuel can cause illness and even death.

Electrical safety quiz

Answer the following to check the electrical safety around your home:

Electricity	Yes	No
Electric wires in our home are kept far from sources of heat, such as stoves or candles.		
All wires are well insulated, with no copper wiring exposed.		
Our electric wires do not run under carpets.		
There are never more than three appliances in one plug socket at a time.		
We do not have electrical appliances in our bathroom or near water.		
All members of our household know never to remove a plug from the socket while it is still switched on, or by pulling on the electric cord.		
All members of our household know that the appliance must be removed from the plug socket (with the socket switched off) before fixing an appliance.		
We always switch off the light before changing a lightbulb.		
TOTAL SCORE		

If you answered no to some of these questions, consider the following actions:

- Move wires away from heat, as they could burn and cause a fire.
- Remove cords running under carpets, as damaged and exposed wires can start a fire.
- Buy insulation tape and cover any exposed copper wires by winding the tape around the wires a couple of times. First turn off the power mains before touching exposed wires.
- If you have too many appliances plugged into one socket, remove some of the plugs, and only plug in an appliance when you intend using it. Try to avoid using more than three plugs in one socket at a time.
- Water conducts electricity. Using electricity in the bathroom or near water may result in an electric shock.
- Always switch off an appliance before removing its plug from the socket, and always switch off a light before replacing the bulb.
- Never put bare wires or fingers into sockets. Touching the wires of an appliance that is still plugged in can cause an electric shock.

Paraffin safety quiz

Answer the following to check the paraffin safety around your home:

Paraffin	Yes	No
Our paraffin stove and lamps are clean and burn clearly.		
Paraffin is stored safely in a cupboard or packed high enough to be out of reach of children.		
Our paraffin bottles are clearly labelled, and not kept in cooldrink or milk bottles that could confuse people, especially children.		
We use a funnel (or cut off the top of a cooldrink bottle) to pour paraffin into the lamps and stove – we never use a cup.		
Our paraffin stove and lamps are always on level, sturdy surfaces and out of the way of playing children.		
Our paraffin lamps are always covered with a glass lamp shade, and never burn with an open flame.		
Our paraffin is kept in a clean container, and we never mix it with other fuels, such as oil or petrol.		
TOTAL SCORE		

If you answered no to some of these questions, consider the following actions:

- Always keep your appliances clean. Dirty or faulty appliances emit a lot of smoke, which can cause asthma, bronchitis, coughing or pneumonia for members of your household.
- Always store paraffin in a safe place where children cannot reach it. Containers need to be clearly marked so that children will know not to drink it. Funnels used to pour paraffin into stoves and lamps should be stored with the paraffin. Do not use a mug or cup for this purpose, as somebody may drink from it by mistake.
- A level and sturdy surface will prevent a stove or lamp from falling over and starting a fire. Make sure appliances are out of children's reach, as they may knock them over by accident.
- A large pot on a small stove may cause the stove to topple over, starting a fire.
- Make sure your lamps are covered, as this will help prevent fires and burns.
- Always use a clean container for paraffin. Dirty paraffin emits dirty, harmful smoke.
- Never be tempted to mix paraffin with other fuels, such as oil and methylated spirits ("meths") as this can be very dangerous and may cause explosions. Petrol and paraffin make a particularly dangerous combination. Sometimes, paraffin is accidentally mixed with a bit of petrol that may be left at the bottom of a transport tank. Smell your paraffin to check that it does not contain any petrol. If it has a pinkish colour, immediately return it to the retailer and get them to contact their suppliers. Petrol burns even more quickly than paraffin, and a mix of the fuels can explode.
- Although more expensive than paraffin, fuel gel provides a far safer option. As it is a gel, it cannot be drunk by mistake and will not spill. This reduces the chances of poisoning and fire.

Candles, coal and wood safety quiz

Answer the following to check whether you have adequate safety measures in place when using candles, coal and wood around your home:

Candles, coal and wood	Yes	No
Candles in my home always stand securely in candle holders.		
Candles are placed well away from open windows and curtains.		
When we make a fire indoors, we have a chimney for the smoke to escape out of.		
We always use dry wood or low-smoke coal.		
When making a fire outdoors, we make sure it is well sheltered, and that the fire is completely out when we go indoors or away.		
TOTAL SCORE		

If you answered no to some of the questions above, consider the following actions:

- ✓ Do not plant burning candles in their own wax on a plate, or directly on the table, as they may easily fall over. Rather buy or make candle holders.
- ✓ Candles can be safely placed in a glass jar partially filled with sand. Apart from securing the candle, the sand will snuff out the flame if the jar is accidentally knocked over.
- ✓ Place candles in safe places. A windowsill is a bad place to put a candle, as the wind may blow it over. The flame may also set curtains alight.
- ✓ Use solar lights instead of candles.
- ✓ Many people, particularly young children, die every year from indoor air pollution due to fire smoke. Always make sure that there is a chimney to let the smoke out of the house.
- ✓ Make sure the house is well ventilated when you use an mbawula (stove/brazier) indoors. Always light the mbawula outside.
- ✓ If outdoors, a wind-protected area or shelter will prevent a fire from getting out of control.

Gas safety quiz

Answer the following to check on the gas safety around your home:

Gas	Yes	No
When lighting our gas stove or lamps, I always light the match first before turning on the gas.		
Our gas cylinders are stored far from any direct source of heat, such as a lamp, heater or stove.		
We buy our gas from a supplier who has a safety rating.		
We ask our gas dealer to check our gas appliances if we are worried about them.		
We regularly check the connecting pipes, rubber seals (washers), bottles and appliances for breaks or leaks, and replace them when we detect a leak.		
The gas bottle key is kept safely away from children.		
TOTAL SCORE		

If you answered no to some of these questions, consider the following actions:

- ✓ Make sure your gas cylinder and connections are in good condition by checking for leaks and replacing or fixing any detected leaks immediately.
- ✓ Do not use a gas cylinder that has been involved in a fire. If in doubt about your cylinder or appliances, first check with your gas dealer.
- ✓ Always buy gas from a registered supplier with a safety rating. This should be displayed on the outside of the supply centre.

Managing accidents at home

In case of an electric shock

- Disconnect the main switch. If this cannot be done, disconnect the electricity at the wall plug to which the appliance is connected. If possible, use a non-conducting object, such as a wooden or plastic broom or chair (not metal), to switch off the electricity at the plug.
- If the electricity cannot be disconnected, do not touch the victim, as you will also get a shock. Rather take hold of the person's clothing and drag them away or use a broom or chair to push the victim away from the electricity source. If the victim's clothing is wet, protect yourself by using dry rubber gloves, newspaper or plastic.
- Evaluate the victim's breathing. Has it stopped, or is it irregular? Check for a pulse and see whether the victim is conscious. Call an ambulance (107 or 021 480 7700) if the person is unconscious, not breathing, or you cannot detect a heartbeat. It is a good idea to familiarise yourself with some basic first-aid techniques, such as mouth-to-mouth resuscitation and heart massage.

In case someone drinks paraffin

- Do not try to make the person vomit. The fumes could enter their lungs and cause pneumonia.
- Do not give the person anything to drink or eat.
- Do not let the person lie down. Make them stand up or sit upright.
- Immediately take the person to the clinic or hospital and take the paraffin container with you.

In case of fire

- Fire needs oxygen to burn. Normal air contains 21% oxygen. Therefore, the best way to put out a fire is to smother it and take away the oxygen supply with sand or a blanket.
- Always keep a large bucket of sand or a large woollen blanket[19] close to where you have your fire or stove. In case of fire, throw sand or a blanket directly onto it. Having a fire extinguisher is even better.
- Never throw water onto a fuel fire (such as a petrol, paraffin or diesel fire), as this can cause it to spread. Water conducts electricity, and if the water touches bare electrical wires, it can give you an electric shock.
- If the fire is in a pot, just put the lid on, as that would take away the oxygen.

19 *Must not be fleece or polyester.*

- If your clothes catch alight, do not run. Stop, drop, cover your face and roll on the ground to put out the flames.
- If your skin is burnt, first cool the burn in water, then go to the clinic or hospital.
- If your house has caught alight, get out as soon as you can. Crawl on your hands and knees to the nearest door. Hot air and smoke rise, so crawling and keeping low will help you remain below the toxic smoke and prevent suffocation from a lack of oxygen.

Burns

- Remember to stop, drop and roll if your clothes catch fire.
- Keep burns under a cold running tap or in cold water for ten minutes. Do not apply ice directly to the burn or rub Vaseline, oil or any other cream onto it.
- Go to a clinic or hospital if the burn is bigger than the size of a person's hand.
- If the victim has suffered a severe burn that affects an entire limb or more, keep it under cold water using a tap, bath or shower until help arrives or transport to a hospital can be arranged. This can save a person's life.

Emergency calls

- Locate the correct emergency numbers for your area. Display them clearly or keep them within easy reach. Tell all members of the household where they are and what they are for.

Cape Town emergency services

Check "Contacts and resources" for key Cape Town emergency service numbers. When making a call, try to stay calm and have these details ready:

- The nature of the emergency
- The exact location of the incident (including nearby landmarks)
- Details about any injuries

Never hang up until you are told to do so.

General emergency number	
Your nearest fire station	
Your local police station	
Your local clinic or hospital emergency room	

Contacts and resources

CONTACT/RESOURCE	DESCRIPTION	AVAILABLE AT
City's Air Quality Management Department	For tips and advice on how to prevent and reduce air pollution	021 590 5200 www.capetown.gov.za and search for: air quality
City's Energy Directorate	For more on the City's efforts to become more energy resilient, resource efficient and sustainable. Information on how to apply for authorisation to install a solar PV system.	www.capetown.gov.za/energy www.capetown.gov.za/SavingElectricity www.capetown.gov.za/ApplyForSSEG www.capetown.org.za/SolarPV
Electricity tariffs in City-supplied areas	Information on electricity tariffs in City-supplied areas	www.capetown.gov.za/CostOfElectricity
Eskom Tariff Book	Information on residential electricity tariffs in Eskom-supplied areas	www.eskom.co.za/CustomerCare/TariffsAndCharges/Pages/Tariffs_And_Charges.aspx
Emergencies	In the event of an emergency threatening property or human life	Dial 107
Emergencies from a Cell C, Vodacom and MTN cellphone	In the event of an emergency threatening property or human life	Dial 112
Police	For urgent police assistance	Dial 10111
Ambulance	For medical emergencies requiring urgent transport to hospital	Dial 10177
Red Cross Hospital Poison Centre	Direct line for poison-related emergencies	021 689 5227
Tygerberg Poison Information Centre	Direct line for poison-related emergencies	021 931 6129
Western Cape Poisons Information Helpline	Joint line operated by Tygerberg Hospital and Red Cross Children's Hospital, providing expert guidance in the event of poisoning	0861 555 777 (24-hour)

Glossary

Introduction

cohesion The bond or 'glue' that holds a society together, often through common values, beliefs and behaviours.

resilience The ability to recover from or adjust easily to misfortune.

Water

alternative water A water source other than municipal supply, reducing people's reliance on Cape Town's drinking water for their non-drinking needs. Examples include harvested rainwater, greywater and boreholes, wellpoints and treated effluent.

aquifer An underground layer of water-bearing rock.

greywater The wastewater generated in households or office buildings from streams without faecal contamination, which means all streams except for the wastewater from toilets.

groundwater The water beneath the Earth's surface in soil pore spaces and the fractures of rock formations.

pathogen A bacterium, virus or other micro-organism that can cause disease.

permeable surface A surface that allows water to trickle through into the soil to filter out pollutants and recharge the water table.

rainwater harvesting The collection of water from surfaces on which rain falls, and subsequently storing it for later use.

water demand management A management approach that aims to conserve water by influencing demand, applying selective incentives to promote efficient water use.

water footprint The amount of fresh water utilised to produce or supply the goods and services used by a particular person or group.

Waste

airspace The space available on a landfill site.

biodiesel An alternative fuel produced from vegetable oil, animal oil or fats, tallow and used cooking oil.

carbon footprint A measure of how much carbon dioxide, methane and other greenhouse gases we create through our lifestyles.

circular economy Keeping goods and materials in use for as long as possible, extracting maximum value, and recovering and regenerating them at the end of their life to minimise disposal or incineration.

co-disposal The disposal of different types of waste in one area of a landfill.

e-waste Electrical and electronic devices and appliances being discarded.

extended producer responsibility The notion that a manufacturer's responsibility for a product does not end once the product is sold, but extends from its design to the end of its life and beyond.

food miles The distance food is transported from production until it reaches the consumer, being one of the factors determining the environmental impact of food.

green economy The production, distribution and consumption of goods and services that improve human well-being in the long term without exposing future generations to environmental risk or ecological scarcity.

greenhouse gases Gases that are trapped in the earth's atmosphere, warming the earth and resulting in climate change.

integrated waste management — A comprehensive approach to waste, including, in this order, waste minimisation and prevention, reuse, recycling, energy capture, treatment and disposal.

linear economy — A system running straight from extraction to disposal, with no attempt to reuse or recycle.

priority waste — Waste types particularly dangerous to humans, hazardous to the environment, and difficult to manage.

product stewardship — The idea that all parties who are involved in producing, selling or using a product should take responsibility for the product's full environmental and economic impact.

sanitary landfilling — The spreading, compacting and covering of waste on a landfill site with continuous layers of soil on a daily basis to prevent odours, flies and other insects and the spreading of disease.

separation at source — The separation of waste and recyclable items at home or wherever else they are generated.

thermal treatment — Incineration and other high-temperature treatments that turn waste into ash, flue gas and heat.

zero-waste philosophy — Pursuing the complete elimination or avoidance of waste.

Environment

aquaculture — The farming of water organisms, including fish, molluscs, crustaceans and plants in controlled environments.

biodiversity — The variety and variability of life on Earth, typically at the genetic, species and ecosystem level.

biodiversity hotspot — A biogeographic region with significant levels of biodiversity that is threatened by human habitation.

bycatch — In the fishing industry, species that are caught unintentionally while catching certain target species.

carbon sink — Anything that absorbs more carbon from the atmosphere than it emits.

container gardening/planting — Growing plants exclusively in pots or other containers instead of planting them in the ground.

dispersing animal — Animals that leave their troops to join new groups, as is especially common among the chacma baboon on the Cape Peninsula.

endemic — Species restricted or exclusive to a geographic area, occurring nowhere else, with "endemism" referring to the occurrence of such species.

exotic species — A plant species from outside the Cape Floristic Kingdom, but that does not harm the environment or compete with indigenous trees or plants.

fauna — The animal life in a particular region.

flora — Generally, the naturally occurring or indigenous plant life occurring in a region or at a specific time.

food web — A system of interlocking and interdependent food chains.

genetically modified seeds — Seeds of which the DNA has been modified using genetic engineering methods to introduce a new trait to the plant that does not occur naturally in the species.

green jobs — Decent employment opportunities that help preserve or restore the environment, whether in traditional sectors such as manufacturing and construction, or new, emerging green sectors such as renewable energy and energy efficiency.

heirloom seeds — The seeds of an old plant cultivar that is grown and maintained by gardeners and farmers.

hybrid seeds — Seeds that are produced by cross-pollinating plants and are commonly used in home gardening.

indigenous A species that occurs naturally in an area and has not been introduced by humans either accidentally or intentionally.

invasive species Any species of which the establishment and spread outside its natural distribution range threatens ecosystems, habitats or other species, or has demonstrable potential to threaten ecosystems, habitats or other species, and may result in harm to the economy, environment or human health.

microclimate The atmospheric conditions of a very small and restricted area, especially where this differs from the larger, surrounding area.

microplastics Very small pieces of plastic – generally less than 5 mm in length – that are present in various products, from cosmetics to synthetic clothing, plastic bags and bottles, and that pollute the environment.

purse seine fishing A type of fishing that uses huge nets (seines) to catch huge schools of fish, in many instances catching many different types of sea animals in the process.

sustainable livelihoods A means of living that can cope with stresses and shocks, and maintain its capabilities, without weakening the natural resource base.

water table An underground level at which the soil and gravel are completely saturated (drenched) with water.

Energy

acid rain Rainfall made so acidic by industrial activity and pollution that it causes environmental harm.

alternating current An electric current that reverses its direction many times a second at regular intervals.

block/step tariff A tariff type that charges customers a different price depending on how much electricity they have used.

brown haze A layer of air pollution containing particles such as soot or dust that absorb and scatter incoming sunlight and, therefore, appear brown. Also called "atmospheric brown cloud".

carbon neutral Having reached a state where carbon emissions generated are balanced out by carbon savings elsewhere.

coastal erosion The loss or displacement of land along the coastline due to the action of waves, currents, tides or storm impact.

direct vs indirect solar water heating Direct systems pass potable water through the thermal collector and, from there, directly to the desired application (e.g. showerhead, tap, etc.). Indirect systems circulate a fluid in a circuit between the rooftop thermal collector and a heat exchanger, and this warms the potable water.

Energy Star rating An energy-efficiency rating assigned by the United States-based organisation Energy Star, which tests the efficiency of appliances in the interests of promoting energy-efficient technology.

floating solar Solar energy plants installed on water bodies such as lakes or ponds.

fracking The controversial process of hydraulic fracturing, which entails drilling down into the earth and directing a high-pressure water mixture at the underground rock to release the shale gas inside.

greenhouse effect The trapping of the sun's warmth in the Earth's lower atmosphere, which warms the Earth surface to a temperature above what it would be without this atmosphere.

Hot box/Smart Cooker Eco-friendly, powerless and portable slow cookers that retain heat, allowing food to continue cooking off the stove plate once brought to the boil.

Paris Agreement	An agreement under the United Nations Framework Convention on Climate Change dealing with the mitigation of greenhouse gas emissions, climate change adaptation and finance, signed in Paris in 2016.
passive solar design	Applying simple design principles to a new building in order to cut down on lighting, heating and cooling needs from the outset.
power purchase agreement	A contract between an electricity generator and a prospective electricity buyer.
precipitation	Any product of the condensation of water vapour in the atmosphere, including drizzle, rain, snow and hail.
pumped storage	A way of storing the energy generated by water flow, or hydroelectrical energy. When energy demand is low, water is pumped from a lower-level reservoir to a higher-level one. When demand is high, water is released back into the lower reservoir through a turbine, which generates electricity.
retrofit	In terms of energy, the addition of new technology or features to older systems to improve energy efficiency.
small-scale embedded generation	Smaller power generation facilities at residential, commercial or industrial sites, generating under 1 MW, including for own consumption.
temperature inversion	A layer of the atmosphere where the temperature decrease with height is much less than normal.
terawatt-years	A measurement of energy equivalence to understand energy consumption on the Earth. One terawatt-year (TWy) is equal to 8 766 terawatt-hours of energy.
volatile organic compounds	Organic (carbon-containing) substances that readily evaporate into the atmosphere at room temperature and contribute to smog production and certain health problems.

Abbreviations

AC	alternating current
C40	C40 Cities Climate Leadership Group
CapeNature	Western Cape nature conservation agency
CBD	central business district
CFCs	chlorofluorocarbons
CFL	compact fluorescent lamp
CH_4	methane
CITP	Comprehensive Integrated Transport Plan
City (of Cape Town)	the Cape Town municipality
CML	coastal management line
CMP	Coastal Management Programme
CNG	compressed natural gas
CO_2	carbon dioxide
CREW	Custodians of Rare and Endangered Wildflowers
ECDC	early childhood development centre
EDRR	early detection and rapid response
EPR	extended producer responsibility
eWASA	E-waste Association of South Africa
FBE	free basic electricity
H_2O	water
Hz	hertz
IBR	inverted box ribbon
IUCN	International Union for Conservation of Nature
IWEX	Integrated Waste Exchange
IWMP	Integrated Waste Management Plan
J	joule
JASWIC	Joint Acceptance Scheme for Water Service Installation Components
kW	kilowatt
kWh	kilowatt-hour

LBSAP	Local Biodiversity Strategy and Action Plan
LED	light-emitting diode
LNG	liquefied natural gas
LPG	liquid petroleum gas
MJ	megajoule
MRF	materials recovery facility
MW	megawatt
N_2O	nitrous oxide
NEMWA	National Environmental Management: Water Act
NEMBA	National Environmental Management: Biodiversity Act
NGO	non-governmental organisation
NPO	non-profit organisation
NSRI	National Sea Rescue Institute
ORASA	Organics Recycling Association of South Africa
PAMSA	Paper Manufacturers Association of South Africa
PE-HD	high-density polyethylene
PE-LD	low-density polyethylene
PET	polyethylene terephthalate
PETCO	PET Plastic Recycling Company of South Africa
Polyco	Polyolefin Responsibility Organisation
PP	polypropylene
PPA	power purchase agreement
PS	polystyrene
PV	photovoltaic
PVC	polyvinyl chloride
ROSE Foundation	Recycling Oil Saves the Environment Foundation
RTS	refuse transfer station
SABS	South African Bureau of Standards
SAEWA	South African E-waste Alliance
SANBI	South African National Biodiversity Institute
SANCOR	South African Network for Coastal and Oceanic Research
SANParks	South African National Parks
SANS	South African National Standards
SASSI	Southern African Sustainable Seafood Initiative
SAVA	South African Vinyls Association
SDGs	Sustainable Development Goals
SSEG	small-scale embedded generation
TGRC	The Glass Recycling Company
VOC	volatile organic compound
VWS	Volunteer Wildfire Services
W	watt
WCWSS	Western Cape water supply system
WESSA	Wildlife and Environment Society of South Africa
WISP	Western Cape Industrial Symbiosis Programme
WWF	World Wide Fund for Nature

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