# What Can Do About CHATE CHARE

The Intergovernmental Panel on Climate Change (IPCC) is a United Nations organization that assesses the current science about climate change. It provides decision makers with information that is helpful in responding to the global challenge of human induced climate change. During the course of its Sixth Assessment Cycle, the IPCC has released three Special Reports<sup>1-3</sup> which highlight the importance of bold action and the need for global system transitions that involve major changes in society and the economy.

In light of this, it is important for individuals to know what they can do to contribute to this process.

In 2020, eThekwini Municipality launched the first Climate Action Plan<sup>4</sup> on the African continent, which commits Durban to achieving a 40% reduction in greenhouse gas emissions by 2030, from a 2015 baseline, and an 80% reduction by 2050.

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This does not imply IPCC endorsement or approval of this material or any recommendations or conclusions contained herein. The material in this booklet has not been subjected to IPCC review. This booklet draws on the science available in the three most recent IPCC Special Reports, as well as other sources, to highlight what Durban's residents can do to contribute to meeting the goal of ambitious mitigation action.

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Climate change makes existing problems worse and creates new ones for humans and for nature.

## What is the problem?

Global warming is not only a future danger. It is happening here and now.

The world is **already 1°C warmer** on average than it was 150 years ago. At the current rate of emissions we would reach 1.5°C warming somewhere between 2032 and 2050<sup>1</sup>.

Durban has experienced water shortages as well as heavy storms, high seas, coastal erosion and flooding, causing deaths, injuries, displacements and structural damage.

In future, South Africa will see more heat waves, droughts, wildfires, storms, heavy rainfall, flooding and sea level rise, with impacts on human health, poverty and the economy<sup>3</sup>. These **dangers will get worse** as temperatures keep rising. They are exacerbated by underdevelopment and poor governance.

Some changes such as the death of coral reefs, will become so severe that they **cannot be reversed** for thousands of years, or ever. Certain changes, such as the collapse of the large Antarctic ice sheets, or the disruption of major ocean currents, have **points of no return**, which could occur between 1.5 and 2°C of global warming<sup>2</sup>.

Over time climate change also takes away choices and reduces options. Climate change will make it harder and harder to develop sustainably, and in a way that does not **jeopardize our children's future**.

Many changes and impacts on our health, wellbeing and economy can be avoided if we **ACT NOW** to slow down global warming and avoid going above 1.5 °C<sup>1</sup>.

## How do we solve the problem?

We can only solve the climate change problem by dealing with its **root causes.** 

#### What causes climate change?

The climate is changing because the earth is warming from a build-up of **greenhouse gases** (gases that absorb heat) in the atmosphere. The greenhouse gases that have increased the most due to human activities, and that are causing global warming, are carbon dioxide ( $CO_2$ ), methane, nitrous oxides, and halocarbons.

The biggest source of greenhouse gases is the **burning of fossil fuels** (coal, oil, natural gas) for **energy**. This energy is used for making electricity, heating, transport, travel, industry, and so on.

If we do not change the way we make and use energy, the amount of greenhouse gas in the atmosphere will continue to increase, and the level of global warming will keep on rising.

Greenhouse gases are also released from other sources such as certain industries, agricultural fertilizers, waste, and the destruction of natural ecosystems, soils and forests.

South Africa is the country with the 15th largest carbon footprint in the world<sup>5</sup>. We therefore have an important role to play. Climate change is not just someone else's problem, but also ours. A carbon footprint is the total amount of greenhouse gases that come from things or activities, be it a country, a city, an event, an organization, a service, a product, or an individual person. Some have bigger carbon footprints than others, based on what people do and how they do it.

## What can I do?

Individuals can do a lot. About 72% of global greenhouse gas emissions come from household decisions<sup>6</sup>: how much energy we use, how much we consume, how we live.

Our **spending habits** give a good estimate of our personal carbon footprint.

To estimate your personal carbon footprint, visit https://www.carbonfootprint.com/ or scan the QR code with your cell phone. Pick 'South Africa' and enter how much you spend in different categories. For comparison, the calculator also shows the personal footprint for the average South African, as well as what the personal footprint needs to be to keep average global warming below  $1.5^{\circ}$ C - the equivalent of 2 tons of CO<sub>2</sub> per year (=2000kg CO<sub>2</sub>e).



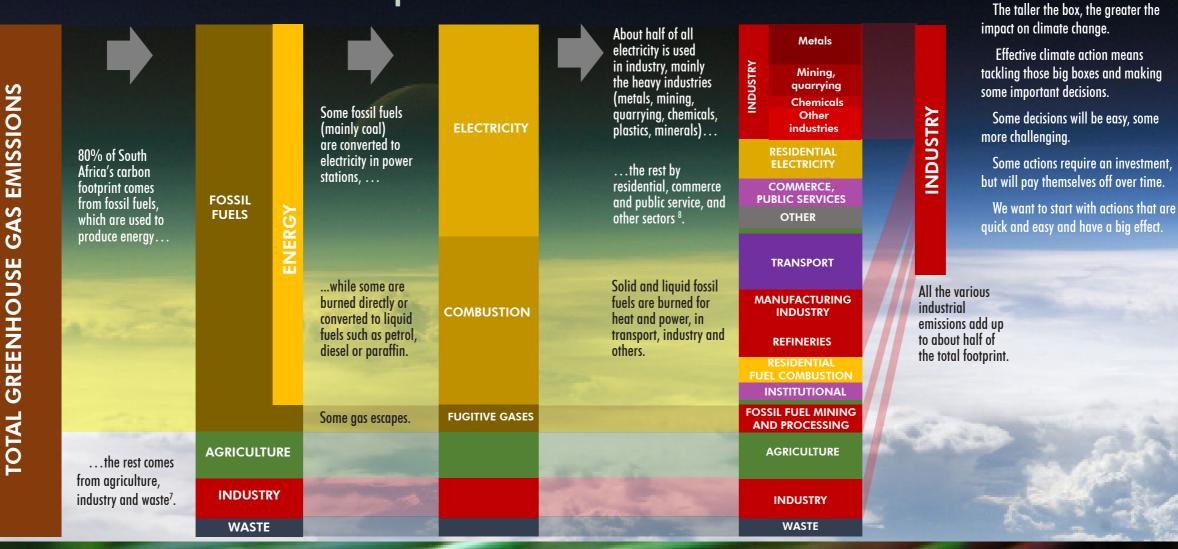
There are many things we can do to reduce our carbon footprint. Some actions will have a large effect, others will have a smaller effect.

How do we know what actions will have a big effect? Let us look at our country's carbon footprint.

and the second

5

## South Africa's carbon footprint



## **Twelve important action areas**

page 13

### 1. Renewable Energy

Tinstall solar panels and/or solar geysers.

Start small, expand over time.

Shift electricity use to daylight hours.

Steven Work towards electric vehicles in future.

#### 2. Electricity

Avoid all-day air conditioning or space heating.
 Run geyser only when needed, at lower temperature.

- 📽 Use LED lights or natural lighting.
- Se Use appliances sparingly, especially those that heat.
- Reduce all forms of heating.

### page 10 3. Transport

### page 18

Avoid air travel.

Current de la constitue de la

Increase occupancy (car-pool / share lifts).

- Construction of the smallest, most economical car you need.
- Twatch your driving style and speed, avoid congestion.

#### page 22

### Buy less stuff.

4. Industry

Especially buy less metal, plastic, minerals, chemicals.
Use what you've got, second-hand is good.
Avoid foam and Styrofoam.

#### 8. Water 5. Waste page 24 page 30 Save water - always. Say no to plastic. 📽 Refuse, Reduce, Repair, Re-use, Repurpose, Recycle 📽 Install rainwater tanks. 9. Food 6. Construction page 26 page 31 Live in the smallest house you need. Eat a healthy diet, mainly plant-based. Increase people per area (formal housing). Seat little meat, minimal red meat. Energy-efficient building designs. Avoid food waste. Cow carbon building materials. 10. People-Money-Voice page 32 7. Nature page 28 Spend money on people, not things. the invest in education, health and wellbeing. Protect healthy ecosystems, including the soil. Shift your investments to a green economy. Restore degraded ecosystems.

- 🕏 Go indigenous to help nature.
- Plant trees to offset your carbon emissions.

Pass on the message.

All the sour voice heard.



## 1. Renewable Energy

We need to find ways to power our daily lives (heating, cooling, lighting, transport, etc.) that do not involve burning fossil fuels. Renewable energy may not be the first thing we think of, but for an ambitious climate change response, people everywhere need to move to more renewable sources of energy, and eThekwini Municipality has committed to this.

Renewable energy is energy harvested from sources such as **sunlight**, wind, tides, waves and **geothermal heat** and even **water**. Renewable energy has other benefits. It can supply electricity to places where there is no (reliable) power grid, providing people with power for a This man<sup>2</sup> shows that was a decent quality of life and economic activity.

This map<sup>9</sup> shows that even areas with the least sunshine in Africa, can still get more power from sunlight than Europe, where solar power is already widely used.

6 5 4 3 2 kWh/m<sup>2</sup> daily total Photovoltaic electricity potential While electricity prices have gone up faster than inflation, the cost of renewable energy has come down. Renewable energy pays itself off and produces absolute savings after several years.

### **Solar energy**

The most widely available source of renewable energy in Africa is the sun.

The sun's energy can be harvested in various ways:

- Heat (e.g. solar geyser)
- Light to electricity (solar panels)
- Heat to electricity (concentrated heat powering a turbine)
   Invest in solar panels and/or a solar geyser.
   You can start small and expand over time.

Shift activities that require lots of electricity (cooking, water heating, appliances) to daylight hours, to make your lifestyle more sustainable.



### Wind energy

This wind map<sup>10</sup> shows

mean wind speed for

South Africa.

KwaZulu-Natal may not be the most suitable province for harvesting wind energy, but some places are windy enough to make it worthwhile. Much depends on the local geography.

2 m/s December 2018 Sun energy is only available during the day, wind comes and goes. For constant power you either need batteries, or you need to continue to use the electricity grid.

100m above around level

It would make these renewable options more attractive if local government was able to incorporate private solar and wind installations into the city energy plan, for example by buying surplus electricity from their consumers in a way that benefits both parties.

Large-scale wind turbine

Rooftop wind turbines and solar panels

## Low-tech solutions

Instructions on clever, low-tech home solutions that provide heat and light using renewable energy, can be found by searching the Internet.



A cooking box is simply a well-insulated bag or box. Bring food to the boil, then place it inside the box where it continues to cook in its own heat.

A aravity light is powered by a tiny generator driven by a weight hanging from a rope.





A solar oven channels heat from the sun into a sealed. insulated box that gets hot enough to bake.

A parabolic solar cooker, a kind of solar concentrator. reflects and focuses solar heat to a point. There are other kinds of concentrators



A whirlpool turbine channels Methane from decomposina water into a funnel, where it garden waste ('biogas') can be used in a gas cooker. spins a generator.

## **Electric vehicles**

Electric vehicles charged with solar power, and hybrid cars (which are part electric, part fuel driven) will be an important part of a sustainable future, but they are still unaffordable for most people.

Start demanding cheaper models, and for public transport to be electrified.

At present there is no city-wide infrastructure to support electric vehicles, but they could work well together with home solar power installations.



## **2.** Electricity

Other appliances with heat

The electricity-related carbon footprint can be very high for space heating (heaters), space cooling (air conditioners), hot water storage (geysers) and pool pumps, because these are often left running for most of the day.

However, the electricity usage of all of the various appliances in the home, added together, can be even greater.

By using our appliances carefully, we can reduce our carbon footprint by half or even more, and cut our electricity bill at the same time.

Heater Air conditioner Geyser Pool pump Lighting (10x incandescent)

Hotplate Computer Oven Tumble dryer **Refrigerator** (with freezer) Stove Dishwasher Washing machine Freezer (chest) Vacuum cleaner Kettle 0.5 **Clothes iron** Microwave oven 0.5 Television (51cm colour) 5.0 Toaster 0.2 M-Net decoder / DVD player 3.0 **Cellphone charger** 1.0

8.0 5.0 8.0 6.0 3.0 8.0 1.0 This graph<sup>11</sup> 1.0 shows the carbon footprint for each appliance, assuming the appliances are operated every day for the number of hours shown at the end of each bar.

6.5

1.0

1.0

1.0

6.5

1.0

0.5

8.0

The emissions are calculated from Eskom's stated figure of 1.06 tCO, per MWh.

tons of carbon dioxide per year

## Hot water geyser

Keeping the geyser water hot 24 hours a day wastes a lot of electricity. The graph shows the kilo-Watts (kW) of electricity used by a standard 150L geyser, if you empty it twice in one day, and how much that costs. The steps show how you can save thousands of Rands in a year on electricity costs<sup>12,13</sup>.

(1) Many thermostats are set to 75°C by default while a hot shower is only about 40°C. This is a big waste.

Set the thermostat to a lower temperature. Every 10°C less, per geyser-full, saves R1300 a year.

(2) It takes 2 hours to heat water by 35°C.

Only turn the geyser on when you need hot water, then turn it off again.

(3) By using only one geyser of hot water a day, you use significantly less electricity.

> Use an automatic timer to turn the geyser on and off at set times every day.

Use a digital geyser controller to heat water to specific temperatures at different hours of the day.

### State less hot water.

(4) Reduce electricity consumption even more by doing both:

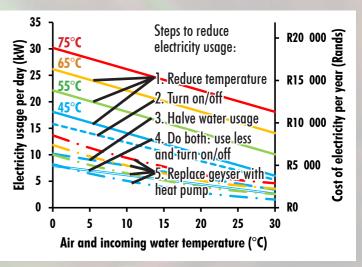
Se less hot water AND turn the geyser on/off.

(5) Electric heat pumps require a lot less electricity than electric geysers, especially for higher temperature settings. Heat pumps are more expensive than conventional geysers, and need to be serviced regularly, but the investment will pay itself back in saved electricity costs.

Selovest in a heat pump.

this also helps.

Instant water heaters are another option for small amounts of hot water.



## Heaters / air conditioners

- Avoid using air conditioners: reduce incoming heat through curtains, blinds or shade trees that keep the hot sun out.
- Se fans for cooling.
- Avoid using the heater: wear an extra jersey or use a blanket.
- Set the temperature as close as possible to what it is outside (not too cold for air conditioners in summer, not too warm for heaters in winter).
- Turn off when leaving the room.
   Close doors and windows to stop cold or warm air escaping or coming in.
   Insulation in the sailing can help been be
- Insulation in the ceiling can help keep heat in (when it's cold) or out (when it's hot).

The only climate-friendly and eco-friendly pool is a pool filled by rainwater with a solar powered pump. A solar pump can pay itself back in a few years.



## Lighting

It matters how many lights we have around the house, how long they are left burning, and especially, what kind of light bulbs are used.

A dozen of the old 100W incandescent light bulbs could use as much electricity as a geyser in one day. 23 Watt fluorescent bulbs are 4 times more efficient, and 6 Watt LEDs 16 times more efficient, saving thousands of Rands a year in running costs.

Install LED (or fluorescent) lights.
 Switch lights off when not needed.
 Reduce the number of bulbs installed.
 Use natural lighting whenever possible.

## Refrigeration

Allow food to cool before refrigerating.
Protect fridges and freezers from the sun.
Set the temperature correctly.
Fill to capacity, but do not over-fill so that enough air can flow inside.
Open and close quickly, don't let cold air escape.
Check the seals, defrost, keep the condenser coils at the back dust-free.
Fix gas leaks and replace with non-greenhouse gases.

Skylights reduce the need for indoor lighting.

## **Appliances**

Heating uses more energy than movement (e.g. pumps, fans). Try to use appliances that heat less, or reduce the temperature.



- as possible.
- Cook food for as little time as possible (eating raw or briefly cooked vegetables is also healthier).
- Defrost food by leaving it out (instead of microwaving it).
- A kettle is 80% efficient, so rather use a kettle to boil than a stove (70% efficient) or microwave (50%).
- An induction stove is slightly more efficient (85%) but the extra efficiency achieved is not worth the carbon footprint created by buying a new appliance, and more energy can be saved through the options listed above.

## Dishwasher

Use full loads not half loads.
Skip the hot drying cycle, rather air-dry the dishes.

## Washing machine

Coly wash clothes when dirty.

- Contemporary set the set of the s
- Solution: The coolest settings necessary to do the job.

Se economy cycles.

### **Tumble dryer**

Air-dry clothes whenever possible.

- Setting.
- Spin dry and untangle clothes first.

Clean the filters.

Class full loads, not half loads, but don't overfill.



### Electronics

- Avoid large plasma televisions or gaming consoles.
- **Reduce screen brightness.**
- Turn screens off when not in use.
- Switch off appliances and chargers at the wall as they draw current in stand-by mode.

## 3. Transport

We all need to travel. How can we cut down on emissions related to transport? Until solar powered vehicles become a reality for us all, we can make significant savings in other ways.

There are four things to consider:

- Mode (type of transport)
- Occupancy (number of passengers per vehicle)
- Mileage (total kilometres travelled)
- Fuel efficiency (emissions per km travelled)

## l person

### One trip

#### 4 people One year

Per person

## Air travel

In a real-life example, a four-leg international trip (South Africa to Canada, about a 38,000km round trip) resulted in 4500kg of carbon emissions.

1 person

limit

That was more than double the maximum total annual emissions of 2000 kg CO<sub>2</sub>e per person, if we are to limit global warming to 1.5°C. In comparison, during that entire year, a family of four drove 17,000km in

**One year** their family car, producing 3500 kg CO<sub>2</sub> (850 kg per person).

### Carbon Emission: 1028.50 kgs

|         |                |  |            | -                  |
|---------|----------------|--|------------|--------------------|
| Class   | T - Economy    |  | Non St. p  |                    |
| Departs | 20:15          | O R Tambo International Arpt, Johannesburg | JNB        | Terminal B         |
| Arrives | 06:15          | Frankfurt Intl, Frankfurt Germany          | FRA        | Terminal 1         |
|         | Flying<br>Time | 11:00                                      | Carbon Emi | ssion: 1028.50 kgs |
|         | Equipment      | Airbus Industrie A340-600                  |            |                    |

| Mode   |                           | 14 📃 💂   | 156                |
|--|---------------------------|----------|--------------------|
| This graph <sup>14</sup> shows grams of CO <sub>2</sub> emitted        | 42                        |          | 4                  |
| per passenger for every km travelled, by different modes of transport. | 55                        |          | 4                  |
| It shows that personal emissions are                                   | 68                        |          | 12.7               |
| by far the highest for flying and                                      | 72                        | *        | 1.2                |
| the lowest for train travel. 104                                       |                           | <b>~</b> | 1.5                |
| 158  |                           |          | 1.5                |
| 285  |                           | L<br>L   | 88                 |
| 300 250 200 150 1<br>Grams of CO <sub>2</sub> per km per pas           | 1 <b>00 50</b><br>ssenger |          | number<br>ssengers |

## Occupancy

This graph also shows that if more passengers travel in a vehicle together, emissions come down per person.

So, for a given number of passengers, the smallest vehicle that can fit this many people will be the most economical, and produce the least emissions.

## Mileage

One sure way to reduce transport emissions is simply to drive less.

- 🛠 Use your car as little as possible.
- Combine trips and get the most out of every kilometre travelled.
- Work from home if possible, or allow staff to work from home.
- **D** Use Google Maps to find the best route.

COVID-19 has created health risks for air travel. Many people no longer want to fly. The pandemic has encouraged online meetings, which is good news for climate change. It also saves money, time and effort.

COVID-19 also creates risks for other forms of public transport. So while high occupancy rates are economical and good for climate change, we need to take the personal protection measures very seriously.



**Privas little as** 

## **Fuel economy**

The graph on the right<sup>16</sup> shows that though the fuel economy of cars has improved over time, there is a 4 to 5fold difference between the most and least economical car.

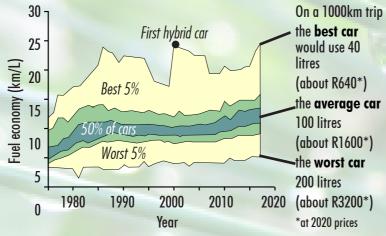
- The single biggest factor is the engine size and this counts for motorbikes too.
- Drive the smallest, most economical car you need.
- To get the most out of every litre of fuel, see the table.

## Should I replace my car with a more efficient one?

Maybe, but not necessarily. Be aware that the carbon footprint of manufacturing a new car<sup>17</sup> is from: • 6 tons CO<sub>2</sub>e for the smallest car,

- 17 tCO2e for an average sedan, to
- 35 tCO<sub>2</sub>e for a large SUV.

Depending on the car, this may be equivalent to many years' worth of fuel. It may be best to drive a car as long and efficiently as possible, until the end of its serviceable life.



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## Behaviour

### **Driving style**

Aggressive driving, with strong acceleration and hard braking can **double** fuel consumption in cities<sup>19</sup>.

## Speed

The best speed is somewhere between 40-100 km/h. Fuel consumption **doubles** at very slow speed (20km/h) or very fast speed (140km/h) when compared to this optimum<sup>19</sup>. Therefore:

Drive at a moderate speed on open roads and highways.

In town, choose free-flowing, faster routes, that avoid having to slow down and stop often at intersections, or to stand idling at traffic lights.
 Drive in the highest gear possible for a particular

## speed.

## Congestion

Traffic jams make things even worse. Fuel consumption **doubles** in cars and **triples** in trucks in congested traffic, compared to the same speed in steady traffic<sup>20</sup>.

Avoid rush hour and congestion.



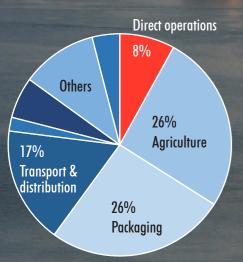
## 4. Industry

Earlier we saw that, when you add up all the various components, industry is the **biggest source** of greenhouse gas emissions in South Africa overall.

We may think that we, as individuals, do not control the industrial sector, but this is not true. Industry

supplies what we demand. We are the **end-users** of industrial products.

Let us remember that the 'heavy industries' (metals, minerals, plastics, chemicals, mining and quarrying) have the biggest carbon footprint.



Different products have different impacts on the climate and on the environment. **Full life cycle** analysis calculates the total carbon footprint of a product or service, from all stages of production.

For example, **only 8%** of the total life cycle footprint of a fizzy cooldrink is due to '**direct operations**' (i.e. direct 'Scope 1' and indirect 'Scope 2' emissions at the cooldrink company itself)<sup>21</sup>.

The other 92% are emissions that happen outside the company ('Scope 3' emissions). This includes everything from growing, harvesting, processing and transporting the sugar, producing the plastic, glass and metal containers and packaging, to shipping, storing and selling the product, and everything that happens to the empty container after you throw it away.

### Buy less stuff.

- Especially buy fewer things made of metal, plastic, minerals, and chemicals.
- Six things when they break.
- Continue using a gadget (like your cell phone or an appliance) until the end of its life, not only until a new model comes out.
- & Buy, sell, and pass on second-hand items.
- Buy quality that lasts, avoid cheap throw-away goods.
- Give gift vouchers, rather than things that people may not use.

## Halocarbons

Apart from its contribution to energy-related emissions, industry also produces **halocarbons**. This group of greenhouse gases has a warming effect that is a thousand times more powerful than  $CO_2$ . Once in the atmosphere, halocarbons remain there for thousands of years.

These gases are mainly produced by cooling / refrigeration systems and the foam industry.

Avoid using foam and Styrofoam.
Fix gas leaks in fridges and air conditioners.
Ensure your fridge and freezer use climatefriendly gas. There are laws about this now, ask your fridge repair person.

## 5. Waste

Waste is closely related to industry.

In the picture on the right we see organic waste (food waste, agricultural leftovers, manure and human waste) rotting and producing methane.

We also see **inorganic waste** burning (inorganic waste does not rot, though it may break down eventually).

We also see the results of general wastefulness: some parts of society use too much of everything.

And then we see the results of **wasted** production: things used once and then discarded (such as packaging).

## The problem with plastic

Plastic deserves a special mention. In general, packaging makes up 36% of plastic production, and 47% of plastic waste<sup>22</sup>. Plastic also goes into textiles and other consumer products.

Nearly every piece of plastic begins as a fossil fuel, and greenhouse gases are emitted at each stage of the plastic lifecycle (extraction, production, distribution and waste management). Plastic stays in the environment for tens to hundreds of years, or even longer. Ultraviolet light eventually breaks down plastic into (sometimes toxic) chemicals that enter the environment where they can be absorbed by plants or consumed by animals.

Because methane is over 30 times

more powerful as a greenhouse gas

than  $CO_{\alpha}$ , the effect of organic waste

on global warming is very important. Food waste and food loss is a major

contributor to waste-related methane

emissions.

Recycling of plastic is very difficult and expensive while producing new plastic is very cheap, so in practice very little plastic actually gets recycled, despite what you may think. Therefore, plastic recycling is not a solution. We simply need to use less. The Seven Rs

Say NO to plastic bottles,

and metal packaging.

shopping bags, Styrofoam,

plastic cutlery, and any plastic

efuse





If you cannot do without something, try to use less than before: less gadgets, jewellery, shoes, clothes, etc.

educe

### epair



Buy things to last. When they break, try to fix them instead of throwing them away.



You can also reuse things. For example, reuse empty containers for storage, or old towels for floor rags. Buy and sell second hand. Refuse to take part in consumerism that results in so much wasted production.



You can often find an alternative use for things rather than throwing them away. The internet is full of great ideas of 'upcycling' (making useful and stylish things out of waste).



Some things can be recycled. Metal is most worth recycling in terms of saved emissions. Note that, though recycling is important, on its own it will not solve the problem of waste. It is almost the last resort.



Finally, for things that end up in the landfill, some value can be recovered such as extracting precious metals and chemicals, or harvesting methane gas. But by this stage of the waste stream, most of the damage has already been done.



## 5



Rammina

earth

## 6. Construction

## **Building materials**

Both bricks and cement have large carbon footprints.

Bricks cause a large amount of emissions during baking. Mining of clay also causes emissions.

Cement is made by roasting limestone and clay in an oven and then grinding it to a powder. This not only uses a lot of energy, but also releases chemical CO<sub>2</sub>.

Rammed earth is an ancient building method in which foundations, floors and walls are constructed using compacted earth. It has many benefits: it is sustainable, durable, cheap, easy, strong, and insulates well from the heat and cold.

The problem is that currently it is not approved by most local authorities — so these Rammed earth building sorts of alternative building approaches still need to be brought into mainstream development approval processes.

> Wattle and daub is also a low-carbon option, which contributes to the low carbon footprint of rural areas.

## Design

Since 2011 the South African building regulations for new buildings or building modifications have demanded higher energy efficiency. This includes factors such as the position of the house in relation to the sun, the building materials used, insulation, natural ventilation and lighting, water heating solutions, etc.

EThekwini Municipality has released a New Buildings Green Policy for net zero carbon buildings for comment, the first of its kind in South Africa.

High-tech smart homes are equipped with lighting, heating and electronic devices that can be controlled remotely by a smartphone or computer, to come on and off only and exactly when needed, so they do not waste electricity.

## Density

Construction includes roads, bridges and pipelines. Sprawling cities with many kilometres of roads and other infrastructure have higher emissions per person than more concentrated cities.

Such urban sprawl also turns more natural land into built-up areas. Land that could have absorbed CO, now releases CO<sub>2</sub>.

For this reason, denser cities, with more people per area, are better than spread-out cities of low density.

Increasing the number of people who live on one property reduces the per-person carbon footprint.

However, high densities are a problem in informal settlements. Upgrading informal settlements can help with low carbon development, and also reduces the exposure of residents to the impacts of climate change.

## Size

For all the above reasons, smaller houses have a lower carbon footprint.

Some people buy the biggest house they can afford. But there is a new trend, called the 'tiny house movement', where people from all walks of life choose to live in small homes. A large home, and the costs that come with it, is unnecessary and not good for the environment.

🛠 Live in the smallest house you need. 🕿 House share / rent out spare living space. 📽 Use low-carbon building materials. 🕏 Build to use less power.

## 7. Nature

Climate change mitigation involves producing fewer greenhouse gas emissions, but also removing CO<sub>2</sub> that is already in the atmosphere.



Plants

Plants absorb and store CO<sub>2</sub> naturally when they grow. Healthy natural ecosystems need to be protected, and degraded ecosystems need to be restored.

Indigenous plants support local biodiversity, while exotic (non-South African) plants do not. Restoration and reforestation should be done with indigenous species. Exotic species disrupt the food chain, and invasive aliens in particular damage local ecosystems.

Herbs, flowers and small plants also have great value for biodiversity.

small area. Fruit trees also provide food. hushes store

Healthy ecosystems absorb

and store  $CO_{2}$ . Forests and

particularly good 'carbon

sinks'. On the other hand,

deteriorating ecosystems can

also be a source of emissions.

Trees are bulky and store a

large amount of carbon in a

mangrove swamps are

Shrubs and bushes store less  $CO_2$  in total but they grow quickly.



Grass has extremely fast growth rates which is good for agriculture, wildlife and biodiversity. Grasslands can store as much carbon as forests.

### **Offset emissions**

Some emissions are hard to avoid. To offset this part of our carbon footprint, we can plant trees. As they grow they remove  $CO_2$  from the air.

Different indigenous trees in South Africa remove from 30 to 130kg of  $CO_2$  from the atmosphere every year, depending on size and growth rate<sup>23</sup>.

- Use the table to calculate how many trees would offset your annual electricity and fuel consumption.
- Plant trees yourself, or
- Give them to someone who has space, or
- Contribute to tree planting efforts.

Every year as a tree grows, it stores carbon above and below ground.

| Annual                 | CO <sup>2</sup> emissions    | Plant trees: |        |       |
|------------------------|------------------------------|--------------|--------|-------|
| consumption            | produced                     | large        | medium | small |
| 100L fuel              | 240kg (petrol)               | 2            | 4      | 8     |
| (~2 tanks)             | 290kg (diesel) <sup>24</sup> | 3            | 5      | 10    |
| 1000 kW<br>electricity | 1060 kg <sup>25</sup>        | 8            | 19     | 36    |

For example, every 100 litres of petrol used per year produces 240kg CO<sub>2</sub>. To offset this, you would need to plant 2 large kinds of trees, such as an indigenous fig tree. You only need to plant the trees once off. Every year, as they grow, they absorb your annual fuel emissions.

It could take one tree 30 years to offset an overseas trip.

Baobabs, Africa's most iconic trees, keep growing for centuries, storing hundreds of tons of carbon. But recently they have been dying - possibly due to climate change.

In nature, more carbon is stored in the soil than in plant life above ground.

How does carbon get into the soil? Plants push carbon underground through their roots, with the help of fungi. Animals that live in soil (like insects or earthworms) also bury huge amounts of dead plant litter from the surface.

Healthy soils hold onto this carbon and collect more over time. Gradually the carbon moves deeper underground. But bare soil, exposed to sun, wind and rain, erodes and loses carbon. The soil loses fertility and life.

- Avoid chemicals that kill plants, fungi or animals.
- Leave no bare ground: ensure permanent plant or compost cover to protect the topsoil.
  - Struct soil from overheating, disruption, compaction and erosion.

Avoid tilling.

Ultimately, we want to remove as much CO. from the atmosphere as our lifestyle produces (carbon neutral), or even better, reverse emissions from the past (carbon negative).



underaround.

## 8. Water

Water is an absolutely essential resource that will become scarcer in many parts of the world, including South Africa, as a result of climate change.

Clean tap water also has its own carbon footprint. It takes energy to purify and pump drinkable water, and to treat wastewater. By saving water every day, not just during a drought, we reduce demand on municipal water supplies.

Ake saving water a habit.

2 Install rainwater tanks.

Reuse grey/used water.

## 9. Food

Food is a basic need and pleasure in life, that has deep cultural meaning and value. Yet a third of all food produced in the world never gets eaten. Food loss/waste makes up 8–10% of total greenhouse gas emissions<sup>3</sup>.

The modern food production system has a big carbon footprint, due to (1) land use change and deforestation releasing CO<sub>2</sub>, (2) crop fertilizers releasing nitrous oxides, (3) cow flatulence releasing methane. A lot of deforestation happens to make space for cattle or crops, and crops are often fed to livestock, instead of being eaten directly by people. As a result, the carbon footprint of meat is many times higher than for plant-based protein (beans, nuts, grains). It also matters how the livestock are farmed.

The pie chart on the right<sup>26</sup> provides a useful guideline for a balanced daily diet, based on:

- What we need, nutritionally
- What is good for us, in terms of our health
- What is sustainable for the earth

Eat a healthy diet mainly of plant-based food. Ration the meat. Have regular no-meat days. Eat mostly white meat, very little red meat. Eat less processed food (avoid industry emissions). Eat locally produced food (avoid transport emissions). Buy only what you will eat, eat what you buy.



Grams per day of: Vegetables Fruits 300 Dairy Red meat White meat / eggs Legumes Whole grains **Starchy vegetables** Added fats Added sugars

125

60

## 10. People

People are behind climate change, but people can also be the solution.

Education, especially for girl children, health care and family planning are vital for health, wellbeing, development, reducing poverty and fighting social ills such as gender violence.

We can invest in people, rather than things. Spend less on goods, and more on services, for example:

- Pay someone to do something, instead of buying a machine. Spending money on staff reduces expenditure on high-carbon consumer items and activities.
- Pay 'poverty-busting' wages, rather than just the legal minimum. That way we contribute to equity, and put our Rands to good socio-economic use.

## 11. Money

In the economy, if customers demand it, someone will supply it. We can help move the economy towards a low carbon development path through how we invest our money.

Find out what products or industries your brokers are investing in, on your behalf.

Ask your financial institutions to make sustainable, responsible options available, if they are not yet.

Pull your money out of carbon-intensive industries, and reinvest in a sustainable, new energy economy. If more of us do this, the market will follow.

You may even be able to influence the investments of organizations you are connected with, such as non-profit or religious organisations.

## 12. Voice

🛠 We can all pass on the message, and tell our friends and neighbours about our own climate actions.

- As young people, we can educate our parents, and take on the responsibility of making changes in our own homes and families.
- As employees we can look into our companies' climate policy and petition for change.
- As voters and civilians we can put pressure on governments to move in the right direction, through our vote and by being politically active.
- As earth citizens we can join in global climate activism.

## **Climate Action Checklist**

| <b>Renewable Energy</b>              | Install electric heat pump            | gaming consoles                       |
|--------------------------------------|---------------------------------------|---------------------------------------|
| SOLAR ENERGY                         | Insulate geyser and pipes             | Turn screens off when not in use      |
| Solar geyser                         | APPLIANCES                            | Reduce screen brightness              |
| Solar panels                         | Boil only as much water as needed     | Switch off appliances on wall         |
| ☐ Battery pack                       | Boil in kettle, not stove/microwave   | FRIDGES / FREEZERS                    |
| ELECTRIC VEHICLES                    | Store boiled water in flask for later | Open/close fridge doors quickly       |
| Electric car / Hybrid car            | Cook on low heat                      | Cool food down before refrigerating   |
| LOW-TECH HOME SOLUTIONS              | Cook for as short a time as possible  | Protect fridge/freezer from sun       |
| Cooking bag/box                      | Eat more raw vegetables               | Set temperature correctly             |
| Solar oven or parabolic solar cooker | Air-defrost food (not microwave)      | Check seals, defrost                  |
| ☐ Gravity light                      | Look for green AAA rating             | Keep condenser coils dust-free        |
|                                      | DISHWASHER                            | Do not over-fill                      |
| Electricity                          | Use full loads not half loads         | 🗌 Fix gas leaks                       |
| AIR CONDITIONERS / HEATERS           | Skip hot drying cycle                 | Replace with non-greenhouse gases     |
| Set temperature close to ambient     | WASHING MACHINE                       | LIGHTING                              |
| Reduce running time                  | Wash clothes only when dirty          | Install LED (fluorescent) light bulbs |
| Use shade (curtains/blinds/trees)    | Use full loads not half loads         | Reduce number of lights               |
| Use fan instead of air conditioner   | Use the coolest settings              | Switch lights off                     |
| Keep doors/windows closed            | Use economy cycles                    | Use natural lighting                  |
| Turn off when leaving the room       | TUMBLE DRYER                          | □ Install sky lights                  |
| Insulate ceiling                     | ☐ Air-dry clothes                     | POOL PUMP                             |
| HOT WATER GEYSER                     | Use a cool setting                    | ☐ Fill pool with rainwater            |
| Set to lower temperature             | Spin dry and untangle clothes first   | Install solar powered pump            |
| Only heat water when needed          | Keep filters clean                    | _                                     |
| Turn off for rest of day             | Full (not half) loads, don't overfill | Transport                             |
| Install automatic timer              | ELECTRONICS                           | AIR TRAVEL                            |
| Install digital geyser controller    | Avoid large plasma televisions and    | Avoid flying                          |
| Consume less hot water               |                                       | Fly economy, not business class       |

32

#### CAR / ROAD TRAVEL

- Use car as little as possible
- ☐ Share trips with other people
- □ Work from home
- Use Google Maps to optimize route
- Drive small economical car
- Drive gently, not aggressively
- Drive between 40-100km/h
- Use free-flowing, faster routes
- Avoid rush hour and congestion

#### Industry

- ☐ Buy less stuff
- □ Buy less made of metal, plastic, minerals, chemicals
- ☐ Fix things when they break
- Use appliances until their end of life
- Give gift vouchers instead of things
- Buy, sell and pass on second-hand
- Buy guality, not throw-away items
- Don't buy things you do not need

### Waste

- Avoid food waste: eat what you buy
- Refuse plastic as much as possible
- Refuse Styrofoam П
- Reduce consumption all round
- Repair, don't throw away
- Reuse things

## Repurpose (find alternative use)

☐ Recycle and sort at home

## Construction

Live in the smallest house you need ☐ House share Rent out spare living space Low-carbon building materials Energy-efficient house designs ☐ Smart houses Green buildings

□ Retrofit house to use less power

#### Nature

- Offset personal carbon footprint
- Plant indigenous trees
- Conserve and restore ecosystems Avoid chemicals that kill plants. animals or fungi
- Permanent plant/compost cover to protect topsoil
- Prevent soil from overheating/ compaction/erosion/disruption

#### Water

#### Save water П

#### □ Install rain water tanks Reuse grey water

#### Food

- Eat mainly plant-based food Ration meat / no-meat days
- Eat minimal red meat
- Eat less processed food
- Eat locally produced
- Do not waste food

#### People

- Pay someone to do somethina instead of buying a machine
- □ Pay 'poverty-busting' wages

#### Money

- □ Check the carbon footprint of your investments
- □ Disinvest from carbon intensive industries
- ☐ Ask for green investment options
- ☐ Invest in a sustainable, green energy economy

#### Voice

- ☐ Make changes in your home
- □ Pass on the word
- Tell friends and neighbours
- □ Educate your family
- ☐ Be an agent of change at work
- ☐ Vote for climate action
- ☐ Join global climate activism

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#### Picture credits

Durban flooding - Dominic Chandler, Obscape; Power station - Gerhard Roux; Solar farm - Activ Solar; Wind turbine on roof - Nenad Kajic / Veneko; Solar oven - Hunter McNenny; Whirlpool turbine - Tech Insider YouTube video; Biogas - ClimateTechWiki; Gravity light - GravityLight; Parabolic cooker - Rob Goodier / Engineering for Change; Electric car - Ludovic Hirlimann; Fuel economy graph - ; Ancient buildings -Maureen flickr user; Ramming earth - Moshirah; Rammed earth building - WikiSysop; City background - Google Maps; Soil - Soil Science Flickr user: Root fungi - Aberdeen Mycorrhiza Research Group

"Every bit of warming matters, every year matters, every choice matters." — Hoesung Lee

### **Every individual** matters.

## YOU are part of the solution!

Chair of the Intergovernmental Panel on Climate Change

HOW MUCH global warming is 'safe'? - LESS is MUCH better than more!

In 2017 the world was on average 1°C warmer than 150 years ago, according to the Intergovernmental Panel on Climate Change. This has already had substantial impacts on our world, especially on the poor and vulnerable. 1.5°C will increase negative impacts further; the next half degree of warming will be much more dangerous than the first degree was. 2°C will be extremely dangerous for many human and natural communities around the world. Many species and individuals will / may not survive it<sup>1</sup>.

#### WHEN must we act? - NOW!

The IPCC says that carbon dioxide emissions will need to be halved by 2030, and be net zero by 2050, to avoid global warming of more than 1.5°C. That means global emissions would need to drop by about 7.5% every year (roughly what we saw during the COVID-19 pandemic) between 2020 and 2030. If that is not achieved, it gets much more difficult and expensive to limit global warming to 1.5°C, and eventually it becomes impossible<sup>1</sup>.

WHO must act? – EVERYONE, some people FIRST, the rest right after.

Given the different levels of development seen around the world today, climate change is not caused by everyone equally. Better resourced countries and

individuals are historically most responsible for global warming, and therefore should set the example for ambitious climate action. Their actions can set the world on a better path, enabling the rest to follow more easily.

WHAT actions? - Every action matters, but some actions have a greater IMPACT.

Read this booklet to find out what these actions are.