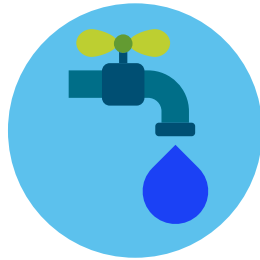


# MY CARBON FOOTPRINT



TRAVEL



WATER USE



WASTE



ELECTRICITY








FOOD



HAND PRINT™  
action towards  
sustainability



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# ACKNOWLEDGEMENTS

This 'My Carbon Footprint' booklet was first compiled in 2010 as an assignment for Project 90x2030. Many people assisted in the development of the booklet and we are grateful to all of them for their support. In particular Avril Wilkinson (WESSA Schools Programme) contributed very helpful information on the formulae for calculating the CO<sub>2</sub> emissions. Valuable input and further contributions have been made by Rob O'Donoghue (Rhodes Environmental Learning Research Centre) as well as by teachers and other educators who have used the booklet in schools and at environmental education centres. In this regard Vivo Venter at Umngeni Valley has put the latest version to good use with teachers and especially found the 'Enviro Meal' section useful for healthy eating.

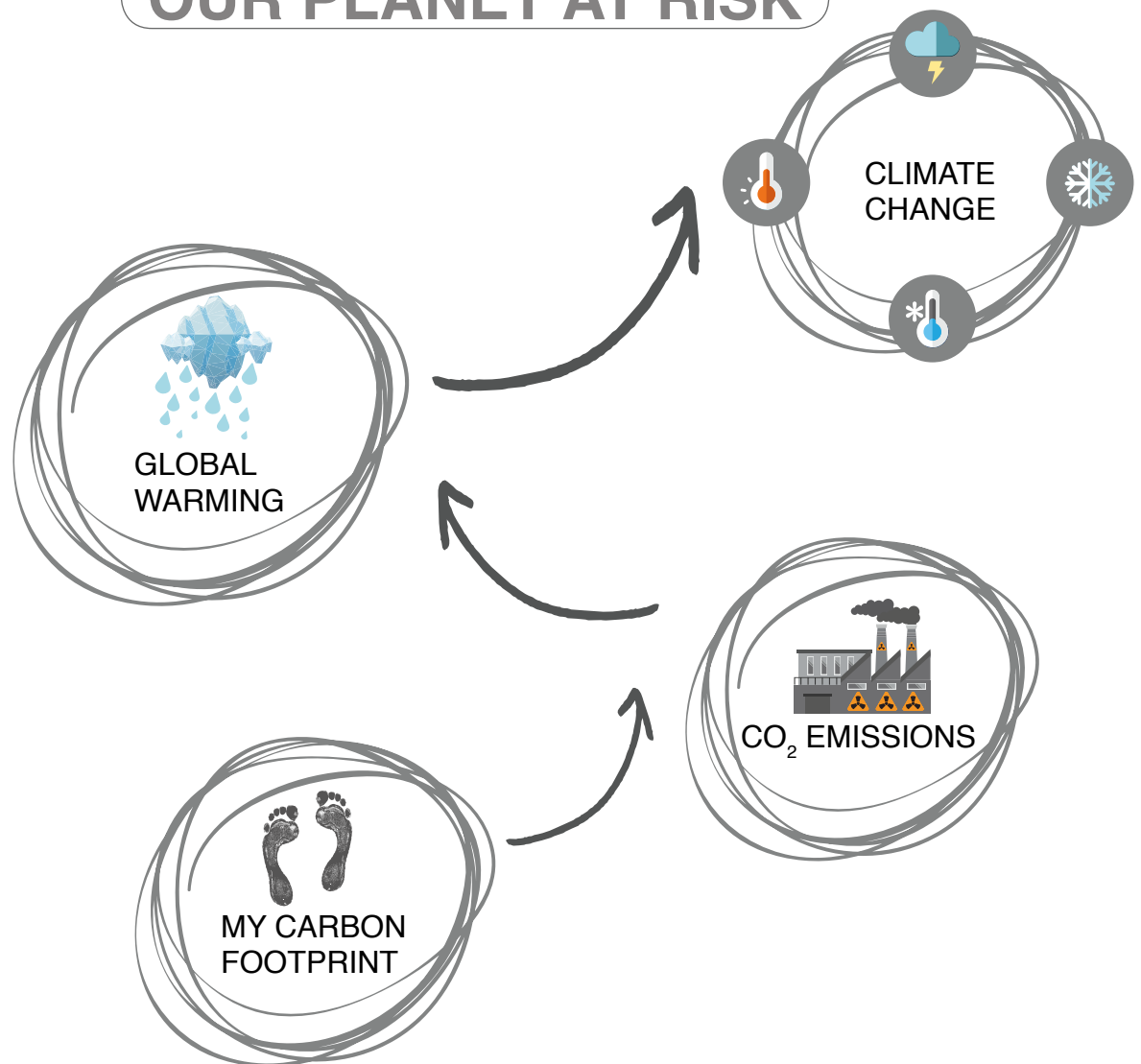
The booklet was also applied, used and adapted by Lina Nantinda in schools in Namibia. She also accompanied the Prime Minister of Namibia to the Copenhagen COP meetings on climate change, and shared the resource with any leaders there who were interested! Ranjana Saikia also shared the resource with The Energy Research Institute in India and offered insights into the development of the resource. Members of the German supported Education for Sustainable Development (ESD) Expert-Net have also shown interest in this resource and their input is valued. Pramod Sharma and Kartikeya Sarabhai from the Hand Prints project at CEE are also firm supporters of this work. They always remind us that positive 'hand-prints for sustainability' are more important than the negative complaining that is often associated with the environment movement!

Lurette Schultz and Jim Taylor (WESSA Professional Support Service) have also assisted with editing and have provided the content and links to the SDGs and the NDP. We invite all who read and use the booklet to assist us in providing further feedback so that we can make improvements for possible future editions. Our grateful appreciation to Grindrod (Marietjie Coertzen and Cathie Lewis) for supporting this version and to Greymatter & Finch for presentation and layout.

Liz Taylor Howick July 2016



## OUR PLANET AT RISK



As the threats to our planet increase and we progressively exceed planetary boundaries, we have a choice: either we carry on the same, become depressed, or pick up the challenge and explore the true impacts of our lifestyles and try to reduce our CO<sub>2</sub> emissions.

We all seek to live in a way that is good for us and others and bring about happiness. But this is not always the case. Sometimes the way we live, and the resources we use and greenhouse gases our lifestyles emit exceed the life support systems of Earth. We use too much energy and create greenhouse gases that further threaten life on Earth. We create too much waste, use too much water and, often, our lifestyles reduce the precious biodiversity that sustains life on Earth. How can we live differently on Earth?

In this booklet we provide a toolkit that helps us understand the implications of our actions. It gives us simple formulae to calculate just about every impact of our lifestyles including the food we eat, energy we use and waste we create. Understanding these human impacts helps us make informed choices about future ways of living. We invite you to join us in making choices for a better world for all!







*Our activities are  
rapidly reversing the  
very processes that  
made human life on  
Earth possible!*



# BACKGROUND

Life Sciences

## What is a CARBON FOOTPRINT?

A carbon footprint is carbon dioxide (CO<sub>2</sub>) that is released into the atmosphere as a result of our actions. Carbon dioxide is one of the major contributors to climate change (global warming).

### How does GLOBAL WARMING occur?

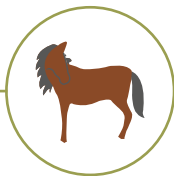
Carbon dioxide and other gases are released into the atmosphere and form a layer. This layer allows the shortwave radiation from the sun to enter and heat up the earth, but this layer traps some of the outgoing reflected heat (longwave) radiation. Therefore the earth's atmosphere is heating up as we release more and more CO<sub>2</sub> into the atmosphere.

### Where does the CO<sub>2</sub> come from and how is it linked to our ACTIONS?

Every action that we perform on Earth needs energy.



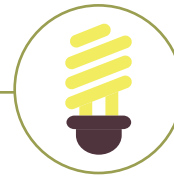
The energy we use can come from our own **BODIES**, e.g. lifting, walking and digging. For this, we need to eat food. Our bodies break down the food to release energy and we breathe out CO<sub>2</sub>.



We could use **ANIMALS** to do the work for us (e.g. oxen ploughing, horse pulling a cart). We would then need to feed the animals. Their bodies break down the food to release energy and they breathe out CO<sub>2</sub>.



We could use **MACHINES** to do the work for us (e.g. tractor for ploughing, driving a car). These machines need fuel to operate. This is usually in the form of "fossil fuel" (oil, petrol). Burning oil and petrol releases energy for the car to use, which releases CO<sub>2</sub> into the air.



We could use **ELECTRICITY** to do the work for us (e.g. to run machinery in factories, do work in our homes). This electricity comes mainly from burning coal. Burning coal releases energy which is used in power stations and releases CO<sub>2</sub> into the air.

When anything moves energy is used to enable the movement to take place. Look around you: Everything that is moving – cars, trucks, ships, aeroplanes, humans and animals, the air around you and the water in the rivers and oceans of the world, is moving because it has energy. Cars, trucks, ships, aeroplanes, humans and animals release CO<sub>2</sub> when they use energy.

There are some forms of energy that do not release CO<sub>2</sub> into the air e.g. wind energy. Can you think of others?

.....

.....

.....

.....





## The importance of PHOTOSYNTHESIS?

Many millions of years ago, before there was any sign of life on Earth, there was no free oxygen in the atmosphere (i.e. there was no  $O_2$ ). Then, roughly 1 billion years ago (1 thousand million years ago) the first life appeared as blue-green algae. This primitive one-celled organism was able to use light from the sun to photosynthesise, taking in  $CO_2$  molecules and releasing the first  $O_2$  molecules. **THIS WAS THE FIRST FREE OXYGEN.**

Over the next few millions of years the algae developed into more complex plants and continued taking in  $CO_2$  and releasing oxygen. (This process allowed the atmosphere to become more oxygen rich, creating the right conditions for animals to evolve). By the start of the carboniferous era about 355 million years ago, there were 3 000 parts per million of  $CO_2$  in the atmosphere.

During the carboniferous era, which lasted 50 million years, many trees, cycads and ferns grew and died. During their life they would take in  $CO_2$ , keep the carbon to build their bulk and release oxygen. Once the plants died, they would sink into the swamps and eventually become coal. They did not rot away as most plants would today. Over this incredibly long time a LOT of carbon was taken in from the atmosphere and stored under the ground as coal.

Eventually, at the end of the carboniferous era, the measurement of  $CO_2$  in the atmosphere was 250 parts per million. When we burn this coal, we release the carbon back into the atmosphere as  $CO_2$ . This is what is increasing the amount of  $CO_2$  in the atmosphere. Today our atmosphere has about 400 parts per million of  $CO_2$  and this is increasing. This  $CO_2$  is a greenhouse gas which leads to global warming and ultimately to climate change.



# ELECTRICITY

Mathematics

## How much ELECTRICITY do I use in a day?

A watt is a unit of power  
 A watt rating is the rating given to appliances.  
 A kilowatt (kW) is 1 000 watts  
 kWh = kilowatt-hour

*Briefly describe how electricity is made.*

.....

.....

Eskom, last year alone, burned more than 200 million tons of coal. This released about 260 million tons of CO<sub>2</sub> into the air.

What does kWh mean? .....

**DID YOU KNOW?**  
 1kg of CO<sub>2</sub> is produced for every kWh of electricity consumed.

List all the things you use every day that rely on electricity.	Insert the watt rating of each of these appliances. You will find this underneath each appliance. (This is an indication of how much ENERGY the appliance is using.) Divide by 1 000 to calculate kilowatts.
Heater	
Kettle	2 200W ÷ 1 000 = 2,2kW
Toaster	750W
Fan	
Lights	
Computer	
TV	
Stove	







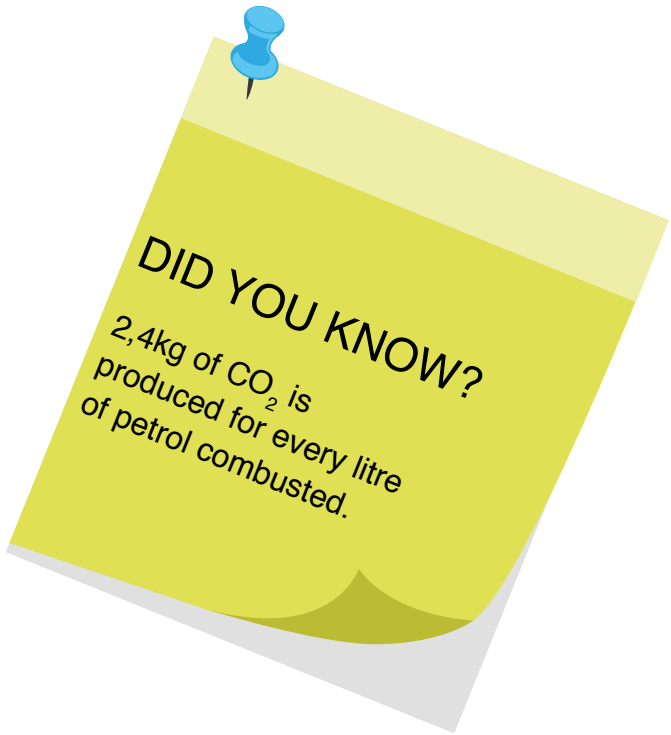
# TRAVEL

Science

## How much PETROL do I use in a day?

Measure the distance you travel each day by car.

To school.....km  
 To sport.....km  
 Home from school.....km  
 .....km  
 .....km  
 .....km  
 .....km  
 .....km  
 .....km  
 TOTAL.....km



What is the SIZE of your car's engine?

Engine size (cm <sup>3</sup> )	Consumption (km/l)
Hybrid	22,22km/l
Under 350	33,3km/l
351 – 1 100	20km/l
1 101 – 1 300	12,65km/l
1 301 – 1 500	12,3km/l
1 501 – 1 800	10,63km/l
1 801 – 2 000	10,41km/l
2 001 – 2 500	9,17km/l
2 501 – 3 000	8km/l
3 001 – 4 000	7,24km/l
Over 4 000	6,37km/l

Our car travels ..... km on one litre of petrol

Please note that these figures were calculated by Avril Wilkinson in her work on Formulae for Science Projects. Advice on updates or more recent calculations are welcome.







## *Measure your petrol use for one day.*

How many litres did I use in one day?

.....km ÷ .....km/l (our car) = .....litres used

THEREFORE

.....litres x 2,4kg CO<sub>2</sub> = .....kg CO<sub>2</sub>

.....kg of CO<sub>2</sub>  
released by me in  
one day.



# WATER USE

Geography

## How much WATER do I use in a day?

**All the water you use in a day needs to be pumped to your house or school. This uses electricity.**

- ① Did you know it takes about 0,0018kWh to pump 1 litre of water for your use?
- ② Therefore  $0,0018\text{kWh} \times 1\text{kg CO}_2 = 0,00178\text{kg CO}_2$  for every litre of water you use.

Please keep this audit sheet with you at all times and update it lunch time, supper time and when you go to bed. Water used for washing clothes, washing dishes and cooking will have to be an estimate. Think of how much is used at home.

### SHOWERING

Get one person to stand in the shower holding a bucket at the shower rose. Switch on the tap at the volume you would usually use for showering. Time one minute. Measure the amount in the bucket. Now everyone just needs to record their showering time and multiply it by the volume in the bucket.

### BRUSHING TEETH AND WASHING HANDS

Similar to the above method, hold a jug under the tap and open the tap to the volume you would use for washing hands or cleaning teeth and then time one minute. Thereafter you just need to time yourself and multiply by the volume.

Day 1	Pre-lunch		Lunch to supper		After supper		Total
	Number	Amount	Number	Amount	Number	Amount	Amount
Glasses of water (340ml or 0,34ℓ)		..... in litres		..... in litres		..... in litres	..... in litres
Cups of tea/coffee (250ml or 0,25ℓ)		..... in litres		..... in litres		..... in litres	..... in litres
Brushing teeth (.....ml or ..... ℓ)		..... in litres		..... in litres		..... in litres	..... in litres
Washing hands (.....ml or ..... ℓ)		..... in litres		..... in litres		..... in litres	..... in litres
Flushing toilet (.....ml or ..... ℓ)		..... in litres		..... in litres		..... in litres	..... in litres
Showering (.....ml or ..... ℓ)		..... in litres		..... in litres		..... in litres	..... in litres
Washing clothes (.....ml or ..... ℓ)		..... in litres		..... in litres		..... in litres	..... in litres
Washing dishes (.....ml or ..... ℓ)		..... in litres		..... in litres		..... in litres	..... in litres
Cooking (.....ml or ..... ℓ)		..... in litres		..... in litres		..... in litres	..... in litres
							Total..... in litres







*Measure your water  
use for one day.*

TOTAL .....litres x 0,00178kg  
CO<sub>2</sub> = .....

.....kg of CO<sub>2</sub>  
released by me in  
one day.





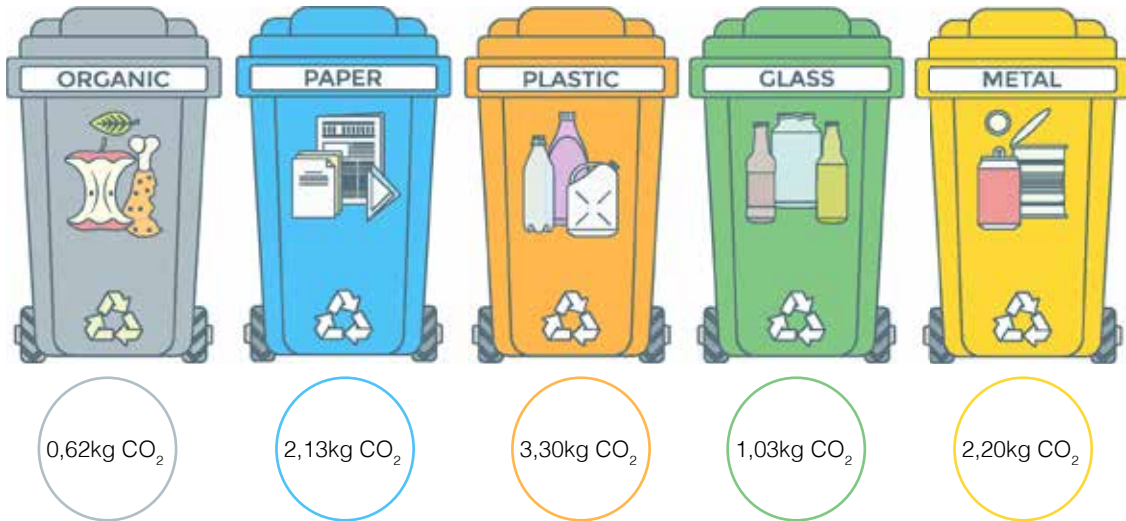
# WASTE

Life Orientation

## How much WASTE do I produce in a day?

Everything you throw away was made somewhere in a factory. This process of making the item released CO<sub>2</sub> emissions.

kg CO<sub>2</sub> produced per 1kg waste\*



- ① Carry a plastic bag with you all day. Put everything that you would have thrown into the bin in the bag.
- ② At the end of the day separate the rubbish into paper, plastic, glass and tin.
- ③ Weigh each separate pile.

Type of waste	Weight of waste	CO <sub>2</sub> produced by 1kg	Total CO <sub>2</sub> emissions
Organic material		0,62kg CO <sub>2</sub>	
Paper		2,13kg CO <sub>2</sub>	
Plastic		3,30kg CO <sub>2</sub>	
Glass		1,03kg CO <sub>2</sub>	
Metal		2,20kg CO <sub>2</sub>	
			Total

Please note that these figures were calculated by Avril Wilkinson in her work on Formulae for Science Projects. Advice on updates or more recent calculations are welcome.







*Measure your waste  
for one day.*

.....kg of CO<sub>2</sub>  
released by me in  
one day.









# FOOD

## Consumer Studies

### Carbon footprint associated with FOOD AND DRINK

The most important things about the food that you consume, when related to your carbon footprint, is:

-  How far did it travel to get to you?
-  Is it meat or fish?
-  Is it in season or has it been refrigerated for months (or flown in from somewhere else)?
-  How is it packaged?

### THE ENVIRO MEAL

This Enviro Meal activity helps give us an indication of CO<sub>2</sub> levels produced. It does not give an actual CO<sub>2</sub> score like the Electricity, Travel, Water and Waste calculations.

The Enviro Meal is an educational activity which examines some of the choices we make as consumers – in particular, choices around food, packaging and waste which have an impact on our environment. It can be used as a stand-alone activity or as part of a larger learning programme. The activity is exciting and competitive and lends itself to active participation by everyone involved. In addition to the environmental learning which grows out of the activity, the Enviro Meal is great for team building!

#### Time required:

4 – 6 hours

#### Group size



12 – 36 participants in 3 – 4 teams (depending on available cooking facilities)

#### Resources

Each team should be supplied with an Enviro Meal audit sheet, a pencil, a cardboard box and cash with which to buy the food (R20,00 per person).

#### Instructions for participants

Your team must plan and prepare a meal, which you will eat together. You will need to purchase all of the ingredients you need for the meal with the money provided by the facilitators. Afterwards your meal will be audited to assess its environmental impacts, in terms of food types and packaging. The Enviro Meal audit sheet will be used to assess these impacts. Your team's final score represents the impact of your meal on the environment. The higher the score, the greater the impact.





## Rules

- ① No ingredients will be provided beforehand. You must purchase everything you need to prepare your meal including salt, oil, margarine, tomato sauce, drinks etc.
- ② You may not add your own money to the money provided. You must remain within the budget.
- ③ Your team should attempt to cater for the preferences and special dietary requirements of all of its members.
- ④ Teams may share items, such as salt and oil.
- ⑤ You may not purchase pre-cooked foods such as roast chicken, pies or pizza.
- ⑥ You may not remove any packaging from items, while shopping, to reduce your packaging points. Collect and keep all items of packaging, which came with your ingredients, in your cardboard box.
- ⑦ Nothing may be discarded.
- ⑧ All purchases should be accompanied by till slips – keep these for auditing purposes.
- ⑨ Each team should cater for one of the facilitators and invite him/her to eat with them.

## Some QUESTIONS to discuss together

- What could you have done to reduce your score in this activity? If you could do the Enviro Meal again, would you do it differently?
- What influenced the decisions you made as a group?
- Did you stick to your original plan? If not, why not?
- Did the options available at the shop make it easy for you to make environmentally friendly choices? Who do you think is responsible for limiting our options in this way?
- What do you think of the scoring system in the audit sheet? What aspects of the audit sheet would you like to change?
- Your environmental impacts have been audited using someone else's value system. How does this make you feel?
- Do you agree with the way this activity interpreted your environmental impacts as a consumer?
- Are there other environmental impacts that were not considered in the activity?
- What can you do, in your own life, to reduce your environmental impacts as a consumer?
- What will happen to the packaging and leftover food after this activity?



## Guidelines for facilitators



### Planning the meal:

After explaining the purpose of the activity and the rules, give the teams about 20 minutes to plan their meals. If the group is very large, tell them to select four members per team to do the shopping.

### Shopping:

Allow at least an hour for the shopping. Most of the challenges and difficult choices in this activity will be experienced while shopping. Facilitators should speak to shop managers and security personnel beforehand to explain the purpose of the activity and to get permission to do the activity in their store.



### Cooking and eating the meal:

Return to base and prepare the meal. Set the tables and decorate them. Enjoy the meal together and taste the food prepared by the other teams.

### Auditing the waste:

Get each group to categorise the waste they have collected in their box into the various packaging types for recycling. They then need to explain why they have made the choice of divisions.



### Auditing the meal:

Each team should audit their meal using the Enviro Meal audit sheet.

- Make a list of each item purchased and its price.
- Calculate how much money was spent and how much was left over.
- Separate the packaging into types, according to the Enviro Meal audit sheet. Count how many pieces of each type of packaging are present. For example if a team has two soft plastic bags, it will accumulate packaging points for each of the two items. Calculate a subtotal for packaging.
- Identify the food types present. Calculate a subtotal for food types.
- Calculate a final score and interpret it using the Enviro Meal scale.

### Reporting and consolidating:

Ask each team to present their score and explain why they got the score they did. Discuss the activity and the learning that has taken place.



Enviro Meal Audit sheet. Use the table on pages 17 and 18 to score the items you have bought. The GRAND TOTAL score is an indication of your carbon footprint associated with food and drinks. The smaller the score the better.

Item	Distance you traveled to buy this item ( <i>Only score one distance if you bought items at the same shop.</i> Write "same" in the other blocks.	Price	Packaging	Food/drink type	Local, national or imported
TOTAL		Overspent			
SUBTOTAL – DISTANCE TRAVELED to buy					
SUBTOTAL – OVERSPENT					
SUBTOTAL – PACKAGING					
SUBTOTAL – FOOD/DRINK TYPE					
SUBTOTAL – LOCAL, NATIONAL, IMPORTED					
GRAND TOTAL					

The team with the **LOWEST** score is the winner





Score the items using the following points:

How far and by what means did you travel to the shop to purchase your items?		R20 multiplied by the number of people in your group. Did you overspend?		What kind of packaging is on your purchases? You need to count each package e.g. 3 plastic bags = 3x4	
Distance traveled	Score	Overspend	Score	Packaging	Score
Walked	0	Under budget	0	No packaging at all	0
Cycled	0,5	Up to R2 over	1	Returnable glass bottle	1
By car – 1km	2	R2 to R5	2	Discard bottle	2
By car – 2km	4	R5 to R8	3	Paper, cardboard, tin	3
By car – 3km	6	R8 to R 11	4	Composite packaging, aluminium can, soft plastic	4
By car – 4km	8	Over R11	5	Hard plastic, styrofoam	5
By car – 5km	10				
By car – 6km	12				










What kind of food did you buy?		Where does your food come from? How far has it traveled to the shop?	
Food type	Score	Local/national/imported	Score
Home grown in your own garden	0	Homegrown	0
Vegetables, fruit salad, pure fruit juice	1	Local. This item was obtained from an area less than 30km away	3
Bread, rice, pasta, maize meal, tea, coffee, milk	2	National. This item was obtained from an area more than 30km away but still in SA	10
Mixed juice	3	Imported. This item was imported from another country	30
Chicken, fish, tins, custard, ice-cream	4		
Red meat, alcohol, fizzy drinks	5		





## TOTAL carbon footprint for one day



	Total CO <sub>2</sub> Emissions
 Electricity	
 Travel	
 Water use	
 Waste	
 Food*	

\* Not a CO<sub>2</sub> score. An indication only

My total carbon footprint for one day is.....kg of CO<sub>2</sub>  
 one week is.....kg of CO<sub>2</sub>  
 one month is...kg of CO<sub>2</sub>  
 one year is.....kg of CO<sub>2</sub>

### Ideas for discussion

Discuss other factors that are not accounted for in the daily budget that could influence the weekly, monthly or yearly budget i.e. activities that are not done every day."

	These are some activities that could increase your water budget:
	Watering the garden Washing the car Swimming pools
	These are some activities that could increase your electricity use:
	Heaters in winter Air conditioner in summer Holidays Increased use of stove Swimming pool







# A carbon economy is not viable

The *Mail & Guardian* Critical Thinking Forum brought together science, business and green lobby groups to interrogate the possibilities of shifting away from producing energy that pollutes the environment. An expert panel debated the topic, "More energy, less carbon dioxide", at the Gateway to Robben Island the V&A Waterfront in Cape Town. It was a heated debate moderated by Judge Dennis Davis, who, at one point, likened the scientific debates on green energy and climate change to a "convenient moral panic" that "certain people are using to push an agenda".

The panellists responded with thoughtful and practical ideas on what path the energy supply chain should follow to save the environment, benefit citizens and halt "greedy capital". The debate was contextualised within the dilemma for developing economies such as South Africa. Davis wanted to know from the experts whether a country with a relatively small economy needed to pump capital into green energy sources when funds should be allocated more directly to the social needs of the poor. The issue of the cost of generating power was central to the discussions. The challenge was to balance development which uses green energy strategies with ensuring growth and attracting investment.

These are edited excerpts from the panellists.

**Stefan Raubenheimer is chief executive of SouthSouthNorth, a global network-based non-profit organisation. Raubenheimer is lead facilitator of the Long Term Mitigation Scenario Project on energy for the South African Cabinet:**

“We have a phenomenal challenge in South Africa. We need to power our nation for development and the battle against poverty. We need mainly electricity and liquid fuel to power our nation. The current delivery of electricity and liquid fuels is almost 80% from coal. In terms of liquid fuel, 30% from coal and gas is through Sasol. The rest is imported, all R95 billion a year of it. These fuels keep our economy running. The problem is that these fuels emit gigantic amounts of carbon dioxide. The whole economy emits about 450 million tonnes [of carbon dioxide] per year. Even though we are one-sixth the economic size of the United Kingdom, we have the same [carbon dioxide] emissions. Our emissions will increase fourfold by 2050 if we continue this way.

If we get in step with the rest of the world we will have to be an economy without any coal [energy supply] by 2050. We would have to be an economy with at least 60% less liquid fuel in the system. We should urgently begin to consider another direction. One should be risk averse. To be successful we have chosen to be competitive in the global economy but we won't be successful if we choose a carbon economy. If the world reacts to the science in a prudent way we will have a world where the inherent carbon in goods will be a reason to trade or not. Our kids are going to be the leaders of that world and a country like South Africa, burning fossil fuels, just won't be popular any more. We'll be the pariahs of the world. It's not going to be easy and there aren't simple answers. We're going to pay top dollar to develop nuclear energy. So we need to start with the things that we can do. We can start with solar water heaters.”

**Richard Worthington, manager of the WWF climate change programme:**

“Climate change is happening faster than any of the models predicted. We need to think about more energy services and less ecological footprint. We haven't yet evaluated our alternatives in South Africa. The opportunities of a low-carbon economy are fantastic. There are employment opportunities in utilising wind and solar energy, harnessing renewable energies, keeping value in communities and moving away from an energy supply system that utilises fuels for profit. We can make energy supply more democratic, people and climate friendly. We need more energy services for all people and industrial activity we want to pursue. We can do it but that means moving away from business as usual. That means challenging the people who are reaping the benefits from plundering the resources and thinking in terms of what is the best way to meet energy needs, and what is the best way to live within the carrying capacity of our planet.

A low carbon economy is sometimes seen as a burden. It's not such a challenge, unless you're sitting in a boardroom trying to persuade a bunch of investors that they shouldn't look to their returns in the next three or four years, but returns that their children will live with. This planet does have enough resources to support all the people on it and a few more if we are prepared to use them in a way that meets our service needs rather than accumulating capital and wealth. Many of us are proposing that humanity does something extraordinary. We are asking for responsibility. We are asking people to rethink what is productive. Gross domestic product growth is not the same thing as progress. We need to move towards quality of life.

“I'm not an environmentalist. I just want a sustainable economy. The environment is only what we need to make the economy sustainable. It just means that there's less profit. Capital needs to be more patient.”

If we can get global emissions to start to decline before 2020 that will give us a 50-50 chance to keep global warming down. The cost of using coal to access energy includes children living in a compromised environment. The cost for energy has a price that society pays. We have major challenges. We need to get the polluters to pay.

The average carbon footprint per South African is 10 tonnes an annum. But only 10% of the population is responsible for 90% of that. Climate change is not a horror story. It's an opportunity for humanity to move to a zero-carbon economy with better quality of life.”





**Dr Wolfgang Heidug, general manager and special adviser on carbon dioxide policy at Shell Downstream Services International BV:**

“There is an effort internationally to design policies for clean technologies worldwide. It is a chance to develop a policy framework for developing countries such as South Africa. We can incentivise clean technology. You can do a project in a developing country and you can get credit for that. Energy producers need to take the cost of the environment into account. That way the cost of using fossil-produced electricity becomes more expensive.

“Our kids are going to be the leaders of the world and a country like South Africa. Burning fossil fuels, just won't be popular anymore.”

We need to communicate the benefit of technology to the public. But the big companies can't do that because the public doesn't trust us.”

**Professor Kevin Bennett, UCT's department of mechanical engineering:**

“Developing economies are effectively world leaders in the use of renewable energy because they don't have the opportunity to get hold of commercial energy. They don't rely on large power stations. We can learn a lot from where we should be going. What would be the way to get away from carbon? Renewable energy is an obvious option. We don't have intense renewable energy sources. They're weak. Why are we trying to build big power stations using renewable energy? Why aren't we forcing people to put solar heaters on their houses? Why aren't we using heat from solar or wind on a very small scale?

“The developed countries went through the cycle from wind to coal to gas to nuclear. Undeveloped countries haven't got there. They're still sitting with wood. There has to be a mixture [of energy sources]. We have to have coal and nuclear. But I think we're spending too much effort on those and not looking at the non-carbon options. We are totally blinded by this carbon fixation. Carbon dioxide has increased in the past 20 years and the economy hasn't gone up at the same rate. We shouldn't be completely determining our energy futures on carbon dioxide. We need to continue with the idea of continued reuse of renewable energy, not necessarily those that need to be purchased from the First World.

“Developing countries need to look at domestic applications. For the major parts of the economy we might have to go nuclear. That's not a carbon-based option. We can't ignore it. There are concerns around nuclear. But there aren't going to be many other options. We're not going to drop everything and become completely renewable. We are going to be stuck with fossil-fuel power stations for the next 20 years.”






# Mapping the SDG Targets and NDP Objectives

**1 NO POVERTY**

**NDP Chapter 11**  
Social Protection




**2 ZERO HUNGER**

**NDP Chapter 5**  
Environmental Sustainability and Resilience


**Chapter 6**  
Inclusive Rural Economy

**Chapter 11**  
Social Protection



**3 GOOD HEALTH AND WELL-BEING**

**NDP Chapter 10**  
Health Care for All



**4 QUALITY EDUCATION**

**NDP Chapter 9**  
Improving Education, Training and Innovation



**5 GENDER EQUALITY**

**NDP Chapter 11**  
Social Protection

**Chapter 12**  
Building Safer Communities



**6 CLEAN WATER AND SANITATION**

**NDP Chapter 4**  
Economic Infrastructure

**Chapter 5**  
Environmental Sustainability and Resilience



**8 DECENT WORK AND ECONOMIC GROWTH**

**NDP Chapter 3**  
Economy and Employment



**9 INDUSTRY, INNOVATION AND INFRASTRUCTURE**

**NDP Chapter 4**  
Economic Infrastructure



**7 AFFORDABLE AND CLEAN ENERGY**

**NDP Chapter 4**  
Economic Infrastructure

**Chapter 5**  
Environmental Sustainability and Resilience



# 10 REDUCED INEQUALITIES

**NDP Chapter 3**  
Economy and Employment  
**Chapter 11**  
Social Protection  
**Chapter 15**  
Nation Building and Social Cohesion



# 11 SUSTAINABLE CITIES AND COMMUNITIES

**NDP Chapter 4**  
Economic Infrastructure  
**Chapter 5**  
Environmental Sustainability and Resilience  
**Chapter 8**  
Transforming Human Settlement



# 12 RESPONSIBLE CONSUMPTION AND PRODUCTION

**NDP Chapter 5**  
Environmental Sustainability and Resilience



# 13 CLIMATE ACTION

**NDP Chapter 5**  
Environmental Sustainability and Resilience



# 14 LIFE BELOW WATER

**NDP Chapter 5**  
Environmental Sustainability and Resilience



# 15 LIFE ON LAND

**NDP Chapter 5**  
Environmental Sustainability and Resilience



# 16 PEACE, JUSTICE AND STRONG INSTITUTIONS

**NDP Chapter 13**  
Building a Capable and Developmental State  
**Chapter 14**  
Fighting Corruption



# 17 PARTNERSHIP FOR THE GOALS

**NDP Chapter 7**  
South Africa in the Region and the World



If you are viewing this document electronically, click on the coloured boxes to go to SDG's website or the icons to go to the NDP site.





# Discussions from the Mail & Guardian Critical Thinking Forum

Read the discussions on pages 21 and 22. Use this as an opportunity to question, debate and discuss the following quotes. ( It might be best to work in groups of 4 to 5 people so that different people can add to the debates and discussions.)

1. Read the first paragraph on page 21 out aloud in your group.
2. In the second paragraph Judge Dennis Davis wanted to know from the experts whether a country with a relatively small economy needed to pump capital into green energy sources when funds should be allocated more directly to the social needs of the poor. Discuss the meaning of this in your group.
3. Stefan Raubenheimer says "Our kids are going to be the leaders of that world and a country like South Africa, burning fossil fuels, just won't be popular any more." What does he say is a good way to start?
4. Richard Worthington says "A low carbon economy is sometimes seen as a burden". Why does he say this?
5. "I'm not an environmentalist. I just want a sustainable economy. The environment is only what we need to make the economy sustainable. It just means that there's less profit. Capital needs to be more patient. "If we can get global emissions to start to decline before 2020 that will give us a 50-50 chance to keep global warming down. The cost of using coal to access energy includes children living in a compromised environment. The cost for energy has a price that society pays. We have major challenges. We need to get the polluters to pay. There are a number of points that Richard Worthington makes in this quote. Discuss and debate the meanings.
6. "The average carbon footprint per South African is 10 tonnes an annum. But only 10% of the population is responsible for 90% of that." What does that mean?
7. Dr Wolfgang Heidug "Energy producers need to take the cost of the environment into account. That way the cost of using fossil-produced electricity becomes more expensive." What does this mean?
8. Professor Kevin Bennett "Developing economies are effectively world leaders in the use of renewable energy because they don't have the opportunity to get hold of commercial energy. They don't rely on large power stations. We can learn a lot about where we should be going." What does this mean?





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***Further reading to guide sustainable living:  
WESSA (2016) Stepping up to the Sustainable Development Goals – a practical guide  
to integrating the SDGs into our daily lives, including our practical activities, year plan,  
networking and sustainable centre developments through change-choice-practices.  
WESSA-USAID Project, Bryanston, Johannesburg.***